

# GREEN RECOVERY REPORT

2023/24



SEVERN  
TRENT

WONDERFUL ON TAP



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# INTRODUCTION FROM OUR CEO



Liv Garfield  
CEO

In 2021 we committed to deliver six projects under our ambitious Green Recovery Programme. I am delighted to introduce our third Green Recovery Report, which sets out the progress we have made over the last 12 months and brings to life the environmental and societal benefits of our Programme.

Each of our projects aims to deliver improvements for our customers and the environment, whilst also addressing some of the economic and social challenges faced by our region and the country in recent years.

Our teams have made excellent progress on each of our projects over the last year and I want to ensure we learn as much as we can from this process. We have learnt a huge amount so far, about what works and indeed what doesn't work, adjusting our approach in response. We are sharing with the rest of the sector to ensure their approaches can be developed in view of our learnings. This report provides an update on each of our programmes, their respective deliverables, knowledge gained, innovation applied, information shared and our engagement with our key stakeholders. Transparency is one of the most important things in our sector and to us, so this report sets out an honest assessment of our progress in each of these areas, in a way that is meaningful for our stakeholders.

One of the key themes of our Programme, that runs through each of the projects, is innovation. Green Recovery has given us an invaluable opportunity to develop and test new ways of working, identify and use cutting-edge technology and develop novel approaches to challenges facing the sector as a whole and share our learnings. Many of these large and complex projects are genuinely ground-breaking and I am proud of the industry leading role we are taking.

## Since the start of our Green Recovery Programme:



**£288 million**

has been invested as we continue delivery of our Programme



Over **111,000**

smart meters have been installed



**210**

roles have been created and filled within Severn Trent to support the Programme



**7,331**

customers have had a supply pipe improvement



Lower water consumption



Faster environmental improvements



Rivers safe for swimming



Protecting customer supply pipes



Creating sustainable flood resilient communities



More water for more customers

A highlight for me has been our Witches Oak scheme, where we are building what will be one of our largest water treatment works, once operational. Our innovative approach to delivery, including the use of off-site prefabrication, will enable us to complete this scheme in roughly half the time it normally would. You can read more on pages 64 to 67.

A key learning for us over the last three years has been the critical role of effective communication, engagement and collaboration with all of our stakeholders, adopting a tailored and personalised approach that works for them. We want to bring our customers and other stakeholders with us as we develop and deliver these projects. Whether it's river users across our region, residents in Warwickshire or communities in Mansfield, we want our projects to deliver maximum positive impact. Through working in partnership with our customers and wider stakeholders, we can better understand their priorities and gain their feedback on our plans at an early stage, to help shape our approach.

Our engagement activity has also seen us continuing to build on the positive relationships we have formed with local and national representatives, such as local authorities, MPs and Councillors, to share our plans for the communities we jointly serve. In a similar vein, our engagement with our regulators, including Ofwat, the Drinking Water Inspectorate ('DWI') and the Environment Agency ('EA') has continued and we have valued their feedback when hosting them at our projects.

Many of the issues our projects look to solve are common to all companies in the sector, which is why we are sharing our learning with others. Throughout the year we

have hosted a number of water companies to share our approach and support the development of their plans to benefit all water sector customers and the environment at a faster pace. These sessions have involved knowledge-sharing on technical matters, ways of working with supply chain partners, internal organisation and team structures and customer engagement. We have also learned a lot from these discussions and we welcome continued sector collaboration on our shared challenges.

Everyone at Severn Trent is hugely committed to our Green Recovery Programme. The learnings from these projects will help solve shared sector challenges for the benefit of customers and the environment, through providing resilient and reliable water supplies both now and for future generations. This is developing innovative, nature-based treatment approaches, ensuring that our region is more resilient to flooding as a consequence of climate change and promoting the health of our rivers for us all to enjoy. Additionally, the Programme is making a massive difference in our communities, providing a boost in terms of employment, with hundreds of jobs created by our projects, and building specialist, technical skills and expertise in our region that will deliver long-term benefits.

At Severn Trent, our purpose is 'taking care of one of life's essentials' and this is something that everyone at Severn Trent embodies every single day. I would like to reinforce my thanks to my colleagues and everyone who helped Severn Trent – whether directly or indirectly – on our Green Recovery Programme this year. Thank you for supporting us, our customers, communities and each other over the last 12 months.

# OUR GREEN RECOVERY PROGRAMME

**We believe water companies can make a positive difference to the places where their customers live, at the same time as delivering their essential services.**

Our Green Recovery Programme consists of six innovative projects, five of which will be delivered by 31 March 2025 with our Accelerating Environmental Improvement project completing delivery in 2027. It aims to update our water networks, make our region an even better place, and seek new innovative ways of delivering services to benefit our customers now and in the long term.

These projects are tackling real and current issues, that our customers have told us are important to them, such as river health, climate change and population growth. At the same time, delivering these projects – some of them UK firsts – are building a huge amount of technical knowledge and innovation which we are sharing with the rest of the water industry.

Green Recovery will therefore help all of us to face the challenges of the future with confidence, supporting our customers, the environment, and helping us all to continue 'taking care of one of life's essentials'.



## Our Programme will help deliver long-term sustainable benefits, such as:

- Improving the environment and enhancing nature for our communities, so we and future generations can enjoy the places where we live;
- Reducing the amount of water lost through leaks;
- Helping customers understand their water usage;
- Delivering improvements to river water quality;
- Helping communities to become more flood resilient, whilst also improving the environment;
- Protecting customer health and wellbeing; and
- Creating jobs and opportunities for people and our communities.

## Lower water consumption

Smart meters help to ensure more of our water gets to where it is needed, and we are fitting tens of thousands of them across Coventry and Warwickshire. As well as helping consumers learn about and manage their water use, smart meters help us to spot leaks, understand demand patterns as such allowing us to respond and plan more effectively.

## Protecting customer supply pipes

Many homes in the UK still rely on old supply pipes, sometimes made from lead, at risk of leaking and jointly shared with neighbours. To improve water supplies and reduce future risks, we are replacing thousands of customer-owned supply pipes – at no cost to households – in two areas; one urban (Coventry) and one semi-rural (Bomere Heath in Shropshire).

## Faster environmental improvements

We want to make positive changes to the environment around us more quickly. So an integral part of our Green Recovery Programme will see us innovating and using new ways of working to realise benefits sooner. For example, our >£168 million investment in projects at our wastewater treatment sites is improving the quality of water we return to rivers. This will improve the health of 500 km of rivers in our region, five years earlier than originally planned, effectively delivering Water Industry National Environment Programme ('WINEP') one whole Asset Management Plan ('AMP') cycle quicker.

## Creating sustainable flood resilient communities

Climate change, population growth and urban development all pose challenges for dealing with rainwater, the effect of which have been observed this year. As a result, many communities are at an increased risk of surface water flooding both during and after periods of heavy rainfall. In our largest-ever such programme to date, we are installing sustainable urban drainage systems ('SuDS') across Mansfield. A range of interventions will use natural solutions to capture, slow, store and filter rainwater, as well as delivering improved biodiversity and community enjoyment opportunities.

## Rivers safe for swimming

Rivers are important to everyone, no matter how they use them. One of our projects will deliver an investment of £78 million to improve the water quality along more than 50 km of rivers throughout Warwickshire and Shropshire.

Green Recovery gives us the chance to make a positive difference to the world around us, whilst also gaining valuable knowledge we can share with the industry. It's ambitious, innovative and delivering huge benefits for our customers and the environment.

**Chris Wand, Director of Green Recovery**

We will also be moving two stretches - on the Rivers Leam and Teme - towards bathing quality. This is just one part of our overall work on river health, paving the way for improvements to more of our rivers in the future.

## More water for more customers

Protecting our water resources is vital, particularly against the backdrop of climate change and population growth. Our challenge is to increase water supplies whilst also reducing customer demand. Our projects include a new treatment works in the East Midlands that will supply enough water every day for another city the size of Derby. We are also adapting traditional engineering techniques and trialling more environmentally-friendly and sustainable ways of treating and supplying water for customers.

Creating new wetlands means we are using natural water filters to clean and care for your water – in a sustainable way, reducing our carbon impact, meaning we need to use fewer chemicals to treat and clean it too.

This project also sees us linking up with thousands of businesses across our patch to understand their water usage, helping them to become more sustainable, save water and reduce their bills.

# CUSTOMER BENEFITS OF OUR GREEN RECOVERY PROGRAMME



## Lower water consumption

Supporting customers to understand their water usage and reduce where possible. Using smart meters to identify leaks to preserve water supplies and reduce the potential for leaks to cause damage.

### How we are doing it

- Installing more than 157,000 smart meters for customers, on top of our base meter installation target.
- Giving customers timely access to their usage data, alerting them to potential leaks and sharing hints and tips to reduce their usage.

### What this looks like

- Around 5Ml/d lower water consumption, due to more efficient use and reduced leaks.
- Helping customers to save money on their water bills.
- Raising awareness of the environmental impact and carbon footprint of water usage and undetected leakage.
- Improving data capture and having a better understanding of our water balance.



## Protecting customer supply pipes

Helping customers to replace old, leaking and lead-based supply pipes.

Preserving supplies from customer-side leaks and protecting customers from the potentially harmful effects of lead in drinking water.

### How we are doing it

- Replacing customer supply pipes in two very different areas (urban and semi-rural) for thousands of customers – at no cost to them.
- Testing different models of delivery – direct labour, contract labour and grant model – to find the most efficient methods and inform future planning.

### What this looks like

- Reduced risk of leaks from customer pipes, saving thousands of litres of water per day.
- Simplified supply pipes with old joint supply pipes replaced with individual supplies.
- Reducing the need for chemical dosing to protect customers from lead (in Bomere Heath).



## Faster environmental improvements

Improving the environment more quickly – delivering Water Framework Directive outcomes five years ahead of our target.

### How we are doing it

- Reducing spills from combined sewer overflows ('CSOs') to protect rivers from the impact of storms.
- Using the latest technology and innovative methods to treat wastewater to the highest quality possible.
- Monitoring river water quality and sharing this data publicly.
- Accelerated CSO interventions and enhanced site investigations.

### What this looks like

- Improving over 500 km of river.
- Supporting aquatic wildlife to thrive.
- Improving river health and not being the reason that our rivers do not achieve good status.



## Rivers safe for swimming

Improving water quality along more than 50 km of rivers throughout Warwickshire and Shropshire, and moving two stretches (on the Rivers Leam and Teme) towards bathing river quality.

### How we are doing it

- Using ozone technology for wastewater treatment – a first in the UK – improving the UK's river water quality and our understanding of micropollutants such as pharmaceuticals and their environmental impact.
- Increasing our network resilience by adding more storm water storage and implementing long-term solutions that remove surface water from our network to increase our capacity.

### What this looks like

- The rivers are a better place to be for everyone, no matter how they use them, providing future riverside amenity opportunities.
- Provides a blueprint for improving more rivers in the future, supporting and growing river-based economies and providing new community well-being and enjoyment opportunities.
- Improved biodiversity across river-based habitats, for land-based and aquatic species.



## Creating sustainable flood resilient communities

Helping the urban area of Mansfield to become more flood resilient.

Reducing the impact of rainfall on our current sewerage network.

### How we are doing it

- In the largest UK programme to date, we are installing lots of SuDS such as rain gardens, detention basins and bioswales. Creating a greener, cleaner environment across urban and suburban sites.
- Reducing up to 58,000 m<sup>3</sup> of storage requirement from our traditional sewers in the local area.

### What this looks like

- Up to 90,000 of our customers will have a much lower risk of flooding with lower carbon solutions.
- Creating biodiverse-rich habitat.



## More water for more customers

Helping to secure water supplies for the future, using new technology and nature based approaches.

### How we are doing it

- Using floating wetlands to treat water, with 31 new wetlands across our Witches Oak site.
- A brand-new water treatment works at Witches Oak where we will be fully treating and cleaning water ready for drinking, using sustainable, low-carbon processes.
- Helping local schools and businesses save water by offering free water efficiency checks.

### What this looks like

- Additional water supply of 93Ml/d, to provide resilience against climate change and population growth both now and for the benefit of future generations.
- Improved biodiversity with 46 hectares of habitat enhanced.
- Improved knowledge on low carbon water treatment – shared with others in our sector to help the UK understand how to bring new capacity into supply.



# OUR PROGRESS

## Faster Environmental Improvements

- 25 pairs of river quality monitors deployed and sending data
- 8 live construction sites
- 20 pre-procured dosing rigs ready to install

- 4,909 m<sup>3</sup> storage capacity delivered through:
  - 47 rain gardens and street planters
  - 1 bio retention tree pit
- 4,876 m<sup>2</sup> of permeable paving
- 5 bioswales
- 3 detention basins

## Creating Sustainable Flood Resilient Communities

## Lower Water Consumption

- 111,853 smart meters installed
- >76,000 meters connected online and customers have access to their smart meter data
- 27,907 customers interacted with 'My Smart Tracker'
- 481 potential large leaks (over 100 litres per hour) identified with 4.09ML/d potential water saving
- 1,106 potential medium leaks (between 30 and 100 litres per hour) identified with 1.7ML/d potential water saving

## Rivers Safe for Swimming

- 5,000 test results have been reported to us from livestock infection test kits
- 291 community stakeholders engaged

- 6 contracting companies completing works on the contractor model
- 10 plumbers completing works on the grant model
- 1,000 supply pipes replaced for social housing
- 17,120 customers signed up through our communication channels
- 7,331 jobs completed to date

## Protecting Customer Supply Pipes

- 31 Water Resources floating reed beds built, planted and installed
- 14 ceramic membrane units procured and fabricated ahead of schedule
- ✓ membrane building roofed and clad early
- ✓ final phase of civils building complete at the inlet to Witches Oak
- 2,161 Commercial Customer Water Audits audits completed
- 0.49 ML/d water savings

## More Water for More Customers

# JOB CREATION FROM OUR GREEN RECOVERY PROGRAMME

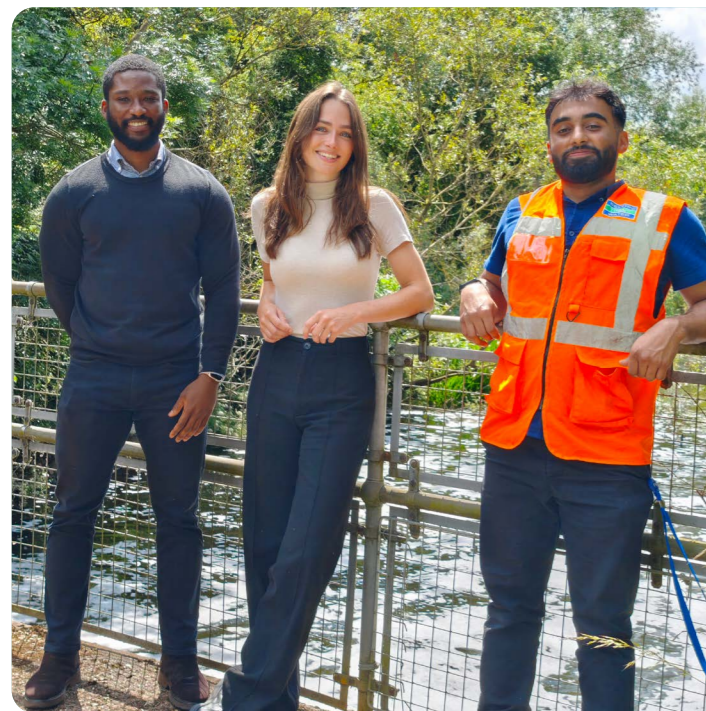
Our Green Recovery Programme has generated hundreds of job opportunities throughout our region. At Severn Trent, we have already directly hired 210 individuals, and our supply chain partners are creating even more employment opportunities. Our programmes are also generating indirect employment opportunities in the communities we serve. For example, we are generating work for plumbers in Coventry, contracting designers and engineers in Mansfield, engaging river officers to champion river protection in the community,

and creating new supply chains to develop and deploy river quality monitoring systems.

We are using local companies where possible to build skills and expertise in our regions to deliver benefits now and in the future. Ensuring that our teams working on our schemes represent our communities is crucial. We value a diverse range of backgrounds, experiences, and ideas. To date, we have achieved a 33% female hire ratio and 13% minority ethnic background ratio – a positive step towards our goal of having a workforce that reflects the communities we serve.

We are passionate about developing new talent and supporting Graduates, Apprentices and Interns. We have supported more than 45 individuals with placements on our Green Recovery Programme, providing them with opportunities to experience real-life working environments, helping them to develop professionally and personally, and creating skills for life.

We continue to put focus on our employee engagement to retain and attract talent, and to inspire our teams. The engagement survey tool results for our Green Recovery team members remains in the top 5% of utility companies globally at 9.3/10.



## Job Creation

**210**  
people  
directly  
recruited

**13%**  
recruited  
from a minority  
ethnic background

**33%**  
of those  
recruited  
are female

**9.3**  
score out of 10 in our  
annual employee  
engagement survey





# LOWER WATER CONSUMPTION

Installing smart metering across Coventry and Warwickshire.

**As part of our Green Recovery Programme, we are installing more than 157,000 smart meters across Coventry and Warwickshire. These intelligent devices play a crucial role in optimising water distribution:**

- **Swift leak detection:** Smart meters act as vigilant sentinels, spotting leaks promptly. This ensures that more water reaches its intended destinations – our homes, schools, hospitals, and vital businesses.
- **Adaptive demand management:** Our smart meters will help us anticipate and manage demand fluctuations effectively. Customers get the water they need precisely when they need it.
- **Empowering you:** Customers are able to monitor their water usage, identify leaks, and address internal plumbing issues swiftly. Plus, it is a win for the environment: reduced water and energy consumption and fewer greenhouse gas emissions.
- **Our £20 million network:** Our ambitious project creates a smart data network spanning Coventry and Warwickshire. It allows us to gather, access, and analyse real-time data across the entire network – remotely and efficiently.



## Customers using My Smart Tracker

We currently have around over 76,000 customers with access to our 'My Smart Tracker' platform linked to their installed smart meters and this has transformed the way our customers engage with us. Since its launch, we have sent over 360,000 emails, including monthly reports and leakage alerts. Our customers are highly engaged, with a 71% open rate and a 28% clickthrough rate – above industry averages.

Our partnership with technology provider Advizzo, has helped us better understand how to ensure our customers think about their water use. We have improved our communication journeys and methods, supported by content shown on My Smart Tracker.

Sometimes, it is the seemingly small changes that yield the most significant impact. For instance, on My Smart Tracker, relocating the consumption graph from the middle of the page to the top of the page resulted in a doubling of engagement levels. Customers now spend twice as much time reviewing their consumption data.

This has helped with our introduction of the leakage alerts journey. We also have 'nudge' communications which prompt our customers who have never logged on to access and use the platform and manage their own water use.

Another of the key areas of focus is reducing customer consumption. We are seeing positive engagement from monthly letters and emails to our customers encouraging them to use less water, and guiding them to our online platform.

## Reducing leaks and consumption

**1.65 ML/d**  
**leakage saving**

Our smart meters also are key in helping us to detect internal water wastage. The cumulative impact of leaky loos and dripping taps adds up. Our customers are crucial in helping us to spot leaks quickly. With the installation and monitoring of smart metering, both we and our customers can promptly identify any unexpected flow when the meter should remain still.

We have established a robust process to promptly contact customers when their meter flags a potential problem and we have simplified our communications journey for customers to report a potential leak. Our four easy steps - from an initial Leak Alert, through more robust messages warning that their meter is showing continuous flow, have driven improvements and over 50% of our customers end their continuous flow after Leak Alert 1, rising to almost 70% after Leak Alert 3.



## Smart meters on properties marked as void

Smart meters are supporting a more dynamic approach to managing void properties which will help keep bills low for all customers. Currently around 1.67% of our connected smart meters are at properties marked as void on our records, meaning the property should be empty and using no water. Of these, only 55% are showing to be using 0 m<sup>3</sup>/d and are likely to be genuine void cases. We have brought 252 'void' properties back in to charge as a result of the smart metering evidence.

**252 void**  
**properties brought back in to charge**

## Customers switching to metered bills

Our project focuses on installation and data and we are promoting it to those customers on a meter. So far we have concentrated on those customers who appear in the 'Financially Struggling' Acorn demographic groups and who could see a bill reduction of over £50 per year if they switched to a metered bill. We ran a campaign targeted at low occupancy households who would benefit financially from changing their basis of charge.

In January 2024, we sought to gain insight into smart metering, with particular emphasis on switching campaigns. One key learning is that in the current financial climate, customers value knowing that their bill will stay the same each month. The perceived lack of certainty if choosing to switch can be daunting.

In February 2024, we ran our first campaign for customers who we know are unlikely to save money, this has been targeted at affluent groups for whom the financial position is less critical. This communication is built around a fairness and an environmental message.

Smart meters are not just devices; they are allies in our mission to conserve water. By utilising their capabilities, we safeguard against leaks, promote responsible water use, and contribute to a greener future.

**3.65 ML/d**  
**reduced consumption**

We have recently started sending 'Thank You' emails and text messages, acknowledging those customers who have acted to end the continuous flow and asking them to tell us where the loss was, i.e. was it a leak, or was it a behaviour? Their answers help to inform our approach and activity, and will help to improve the assumptions we make around leakage.



## Promoting smart meters

Encouraging people to have a new meter installed can sometimes be difficult and there can be some resistance to change. So our Smart Meters Campaign to promote meters was vital. The campaign was well received with a good click through rate and a clear interest to find out more. A proactive online article on the community-based CovLive platform has prompted dozens of new installs.

We are already utilising a range of communication methods and continue to build on this, we are about to start sending promotional letters. The limited test we carried out with letters saw fewer people signing up, so we are refining content for the campaign.

Going forward we will use other channels such as proactive phone calls and other options to encourage to customers to sign up. Learnings from this are being applied to our other smart metering programme and will be valuable for our AMP8 smart metering campaigns as we need smart metering uptake to continue to hit our Water Resources Management Plan.



**There are currently a variety of network connectivity options being trialled across the industry, with the main three being LoRaWan, Flexnet and NBIOT. We are currently using LoRaWan, alongside other water companies including Yorkshire Water, Northumbrian Water, and South West Water. This standardisation is allowing us to share lessons learnt.**

The LoRaWan network is used more widely overseas, which means we can explore more innovative solutions and options already being used at scale.

There is no single solution that covers all geographical locations, but our sector is working collaboratively to understand the best solution for each area, allowing the industry to draw direct comparisons.

We have installed 151 gateways across the Coventry programme area, creating a cost effective LoRaWAN network that can be used by many organisations as well as Severn Trent.

Connexin (our communications network delivery partner) have now covered most of the Coventry and Warwickshire area. We have been working closely with Connexin to identify areas where connectivity is not strong and we will continue to work closely with them.

- We have increased the rate of connected meters to 78.2%.
- The proportions of meters giving 22-24 reads per day has increased to \*56.6%.
- 60.7% of our meters are now giving at least one read per day consistently over a seven-day period.
- We were able to identify that gateways were not always installed correctly in Coventry. As a result, Connexin are raising 133 antennas in Coventry, which has already caused more meters to connect to the network.
- We now have 1,282 smart meters in Solihull. These had been without a network since the start of the programme as Connexin were waiting for permission from the Council. We have been working with Connexin to explore other alternatives such as polling and the network is now coming into operation for Solihull.
- We identified a data transmission issue with some of the data. Through close collaboration with our data team, we successfully resolved this problem which has had a positive impact on connectivity.

Across Coventry and Warwickshire, the network now covers over 76.7% of properties. We have installed 111,853 meters and will continue to install a further 45,476 smart meters in Coventry and the wider Warwickshire area before the end of March 2025.

\*as of June 2024

## Trialling smart metered areas

We currently have two areas within the Coventry postcode region that we plan to turn into smart areas. In these areas, we aim to install smart meters in 100% of the properties, with a 15 minute nightline – which determines how regularly the meter sends us data during the night. Getting data at more frequent intervals will increase our understanding of usage versus leakage, helping with leak detection and calculation.

We will also be installing smart loggers elsewhere on our network, so we can see exactly what enters the area and where it leaves. This will give us valuable insight with a fully balanced picture of the area. This should help us by having field technicians spending less time on the ground trying to find the leaks within their patch and give us lots of data to challenge or support our water balance calculation.



## Installations

At the start of the project, our focus was on the basics – replacing the most meters to gather a wealth of data. We exceeded expectations, and this year, we set our sights on more complex challenges. Our focus has been more on finding innovative ways to tackle more complex jobs (such as dig down installations).

Making the most of our different innovation streams, we have begun to tackle the complicated metering jobs. A recent galvanised steel trial proved a success and has led to completion of our roll out in Rugby, supporting new installations on difficult material that is brittle and prone to leaks.

In February 2024, we began conversations with Citizen and Midland Heart on metering solutions for housing associations. We can see this potentially being another way of installing meters over a large population that would benefit from a meter, in the most effective way.

Some installations have proven to be especially difficult. Internal installations in particular can be tricky, due to lack of space in kitchens or encased internal plumbing.

We are looking into the most efficient ways to resolve these issues, otherwise increasing coverage will remain a challenge for the whole industry.

**111,853 smart meters installed**



### Converting existing meters

We have been trialling new technologies to convert many of our existing meters to smart meters without exchanging the whole meter. This is a much more cost-effective way to convert our metering portfolio.

We are exploring how the connectivity of these compares to our typical smart meters. We have been able to collect additional information to identify factors that can effect connectivity such as lid material and chamber depths.

This exercise allows us to potentially diversify our smart metering supply chain, so we are not dependent on one key supplier. Within this trial, we have been testing a new system to see how it compares with our existing system, Temetra.

### Working with Network Plus

We are working with Network Plus on a new resurveying process. This will be done on >130,000 properties in Coventry and Warwickshire which were previously determined as having no metering solution. We have raised 56,000 internal exchanges to Network Plus to see if a new meter can be fitted externally, providing us with greater access in the future.

There are currently around 3,000 properties that are categorised as digs on private property. We are working with Network Plus on the process, sampling and communications approach for these digs. Network Plus would like to, where possible, move private side stop taps onto the public curtilage ensuring easy access for the future.

All the lessons we are learning through Green Recovery meter installations are being put into practice to help deliver our enhanced AMP8 programme of smart meter installations in the most practical and efficient way.

## Industry knowledge sharing

Smart water meters will remain a priority for the water sector in the years to come. We believe it is important to share learnings with our stakeholders and others in our sector.

### Smart Metering Advisory Group

The industry's Smart Metering Advisory Group ('SMAG') holds regular meetings for water companies. Our smart meter programme team attends SMAG meetings and has regularly presented on a number of topics surrounding smart metering.

Through SMAG we have been able to work with other water companies to collaborate on topics such as:

- capturing hourly usage data as standard for household customers;
- capturing 15 minute data between 2am - 5am to improve our understanding of night time data; and
- procurement opportunities for meters in this AMP and AMP8 to ensure the supply chain can meet the increased demand.

### Global Smart Metering Conference

We were delighted to present at the global smart metering conference in London in March 2024. We delivered a data science presentation which was well-received by other industry attendees.



### Waterwise conference

We were very pleased to be able to present and share our smart metering insights at the Waterwise conference in March 2024. We shared our approach to installation, data insights, water efficiency and the customer interaction.

### Hosting other water companies

Over the last year we have held a number of individual sessions to discuss network connectivity and share our approach with Anglian Water, Thames Water, Yorkshire Water, Northumbrian Water, South West Water, Jersey Water, Affinity Water, Dŵr Cymru, Welsh Water, United Utilities, Portsmouth Water and Irish Water. Exploring a range of topics including:

- storing and managing the large datasets;
- leak threshold levels;
- non-household 15 minute data collection; and
- effectiveness of engagement on customer platforms.

### Customer communications

In addition to the operations data sharing, we have also met with the Consumer Council for Water ('CCW') to talk about how we are promoting smart meters and encouraging sign-ups from our customer base. We shared our plans before rolling out our customer campaigns.





## PROTECTING CUSTOMER SUPPLY PIPES

Replacing lead supply pipes in Coventry and Bomere Heath.

Many homes built before 1970 still have old supply pipes made from lead. Some of these might be shared with neighbours or be at higher risk of leaking. Our supply pipes trial programmes seek to replace thousands of customer supply pipes – at no direct cost to the customer – in two very different environments.

To date we have replaced more than 7,300 customer supply pipes from our water main up to the customers' kitchen taps - providing one safe water supply fit for the future. We are looking to increase the rate of work even more in the coming year and have looked very closely at the best models of work to help us achieve our aims and learn lessons for the future of lead replacement.

## Contractor model

Our model approves contractors to support our project, provides employment opportunities in our region and builds skills and expert capability for the future.

Our contractors are assigned areas, and engage with potential customers, securing registrations and sign-ups for our scheme. They individually handle customer liaison, traffic management and scheduling. Our involvement comes into play at the final stage, where we collect and analyse customer feedback.

Contractor work includes the public communication pipe, private customer supply pipe and internal pipework.

As in previous years, we used a flexible approach to sourcing and appointing contractors, in order that we can flex suppliers to meet demand, while giving contractors the opportunity to join until the end of the

programme if suitable. We have continued to increase the number of contractors we have throughout the year and are continuing to do so in 2024/25.

This is a competitive model, where we can allocate areas to specific contractors. This allows different-sized firms to take part, and is a faster route to market than a traditional procurement process which means we can deliver improvements to the customers more quickly.

**6 contractor companies delivering replacements**



## Grant model

With the grant model, WaterSafe or WIAPS approved plumbers complete the private-side and internal work to replace customer supplies. We provide a grant to cover the cost of this and then replace the pipe in the street.

Having a range of independent and trusted experts working on the programme gives maximum customer choice. It is a good way of supporting local plumbing businesses and we now have 16 firms signed up, with 10 who have completed work.

**10 plumbers working on the grant model**

Customers can choose their own WaterSafe or WIAPS approved plumber on the open market and we have a dedicated website supporting customer options, which could mean working with a plumber who they already have a strong relationship with. It allows a bespoke service for the customer, with plumbers able to tailor their service. If the customer opts for the grant model they could incur some costs, but this gives the customer choices on the specification, including flooring, complex internal fittings, or new kitchens.

We were initially also running an 'in house' model, however the grant model is now so successful we are now utilising all our teams to support the grant model rather than completing any end-to-end work in house.



## Observations on the different models

In our experience so far, both models have proven to be effective. However, there can be some challenges where they overlap. For instance, plumbers can go anywhere, while contractors are assigned specific areas. This could cause issues if plumbers sign up a large number of customers in a contractor's allocated area, so this needs to be managed carefully.

The contractor model is more effective and efficient where we are targeting the removal of lead pipes in quantity in distinct areas. In the grant model, plumbers are not bound by geographical constraints and are not obliged to take on any and every job.

The grant model works really well to reduce lead supply pipes across wider areas on an individual customer basis – with many independent operatives offering great options and choices to customers.

**7,331 total supply pipes replaced**

## Bomere Heath

Bomere Heath is a small town in rural Shropshire that is currently phosphorus dose dependent due to historic lead pipes. We aim to remove all the lead pipes in Bomere Heath so we can remove the need for dosing. We are currently sampling every property in the area to ensure we identify and remove lead pipes wherever possible.

We chose to do this to help us understand exactly where our lead hotspots are, as visual checks and inspections were unreliable due to the nature and makeup of local properties. We have also used innovative lead detection equipment (noise correlator) however, this requires customers to be home and can lose accuracy with lengthy service pipes.

The scheme is on track and we have 100% customer sign up where we have identified lead pipes. This puts us in a strong position to disengage phosphate dosing at Bomere Heath borehole site, which will save around a tonne in phosphate each year and will have a positive impact on our carbon footprint in the area.

**100% customer sign-up in Bomere Heath where we have identified lead**

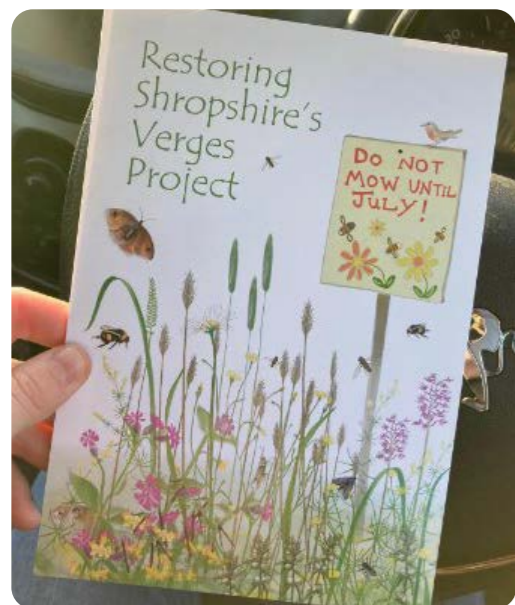
## Phosphate removal

Water companies add phosphates (typically phosphorus) to drinking water to help protect public health. Phosphates minimise metal leaching from pipes, leading to safer water quality.

Removing all the lead pipes would remove the need to dose. It is possible to remove all the lead pipes in Bomere Heath because it is a geographically small community that can be easily supplied by a single water source at which phosphate dosing can be easily limited.

Phosphates can be harmful for waterways (read more on page 32) so to prevent this we currently remove phosphorus in our wastewater treatment, which requires energy and increases our carbon impact. If we put less phosphorus in our clean water treatment, there is then less for us to deal with in our wastewater treatment.

Additionally, phosphorus is mined overseas and transported to the UK in bulk. Reducing the dosing means a reduced carbon footprint due to reducing the mining and transportation of phosphorus.



## Engaging with the community

As a small, tight knit community, engagement and collaboration with the Bomere Heath community was essential. Their involvement was pivotal to the success of our project, and developing a shared understanding was key to ensuring residents signed up to have their lead pipes replaced.

One example of our commitment lies in our partnership with the much-loved Bomere Heath coffee shop. This not-for-profit establishment, operated solely by dedicated local volunteers, faced imminent closure in 2023 due to financial constraints. Recognising its vital role as a community hub, we offered support, ensuring that this venue could continue serving its patrons.

Our community engagement did not stop there. We supported the Shropshire verges project, organising litter collections, and even replacing the weathered village bench – a natural gathering spot – with a fresh one, overlooking the village.

These endeavours are not just about physical improvements; they are about building trust. By actively participating in these activities, we empowered local residents to envision the tangible benefits our project could deliver to benefit customers and the environment, both now and over time.



I want to send a resounding THANK YOU to you for making everything happen for the Hope Bowdler verges. The purchase of the yellow rattle, and the bringing on board such a lovely team to work with. I admit we were so lucky with the weather, and the memories of the day will carry me through the winter and beyond.

Lorna Taylor,  
Shropshire Resident





## Social housing

We have completed more than 1,000 replacements for social housing properties. This brings benefit to customers who may be more financially vulnerable and helps us to carry out batches of work more efficiently.

To do this, we worked with local housing associations in Coventry to get agreement for lead supply pipe replacements in their properties. Working with Citizen Housing and Midland Heart, we carry out lead pipe replacements on their properties, subject to access.

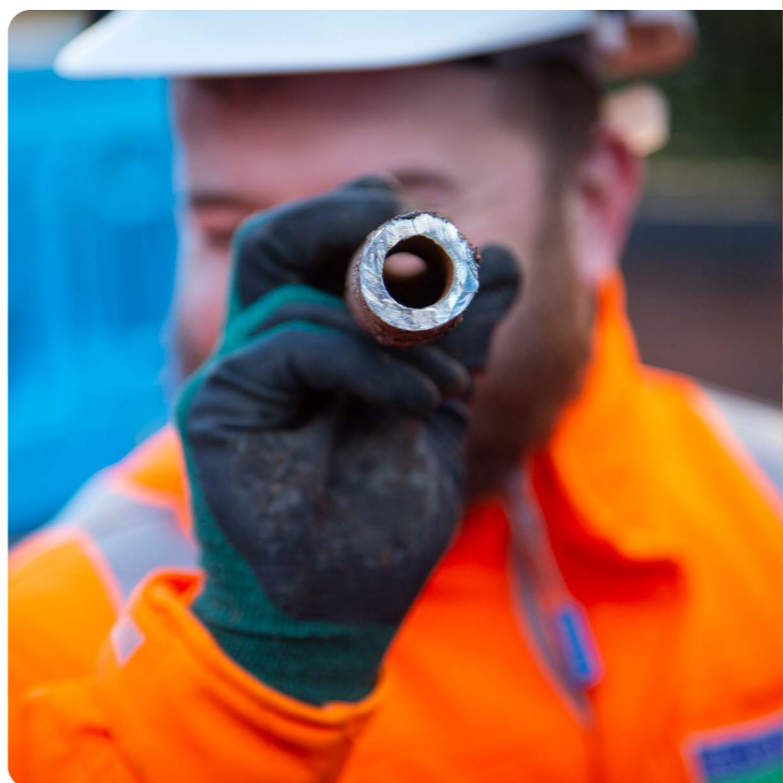
We are excited to be continuing in the months to come, and at the date of writing are already in the process of signing up yet another local housing association – bringing the benefits of a safe, reliable water supply to more people.

## Insights into lead removal challenges

Despite our best efforts, joint supplies continue to pose challenges within our project with lots of these running under customers' extensions or build overs. These often require complex remedial works or the replacement of expensive flooring or discontinued flooring materials.

Securing land access and obtaining permission to lay customer service pipes across multiple properties also remains challenging. While we explore alternative routes – such as bringing pipes through the front of properties and manoeuvring around skirting boards and door frames – these solutions are frequently less acceptable to customers.

Our comprehensive understanding of these multifaceted issues is instrumental in accurately assessing the costs and time required for lead removal across various property types for now and in the future of lead removal.



## Sharing knowledge with the industry

We are keen to share our experiences on supply pipe replacement across the industry. Collaborating with others ensures a consistent approach across the country and leads to better outcomes for customers, communities, and the environment.

A recent annual event held at our purpose-built Academy in November 2023 exemplifies the spirit of cooperation and progress. With representatives from every UK water company, the DWI, Ofwat, and the Water Research

Centre, it was an event dedicated to enhancing outcomes for customers, communities, environment, and the water industry as a whole. Topics for the day included sharing updates on our trials.

We shared our successes and learnings from each of the business models we have adopted, including how we managed the customer journey.

Several water companies have held bespoke sessions with us so they could tailor their individual approaches to their customers needs to inform their plans for AMP8 and beyond.







# FASTER ENVIRONMENTAL IMPROVEMENTS

Early delivery of Water Framework Directive improvements.

## Delivering early

By 2025 we expect to have delivered improvements to at least 10 water framework directives ('WFD') – five years earlier than originally planned and more than we were forecasting at the start of the programme. The EA have agreed permit limit changes for 45 projects representing 47 WFD points.

We collaborated with our Tier 1 supply chain at an early stage, providing them with insight into the programme and seeking their input during the design phase. This proactive engagement enhanced our understanding of buildability and risk management for our assets, allowing us to identify and implement effective mitigation strategies.

This has enabled us to slim down the process, and speeding up design is helping us to deliver faster. Trialling new approaches to delivering capital schemes means we have reduced the average time from promotion to starting on site.

We have grown the capabilities of our current contractors. As a result, firms that might have delivered pipeline projects in the past can now support our ambitious plans by delivering treatment works projects.

Growing our supply chain in this way helps us prepare to deliver the AMP8 programme. It gives us a smooth 'runway' to increase productivity and shorten the time it takes to build capital schemes and get them on line.

We took proactive steps by pre-ordering and pre-procuring many key components. This strategic move not only secured the supply chain but also ensures optimal value while safeguarding the cost and delivery of the project.

## Improving rivers

Our significant investment over many years has drastically reduced the amount of phosphorus and ammonia in our effluent. We are now treating sewage down to the lowest technically achievable levels. This will minimise the impact that our treatment works have on rivers.

We are installing assets such as chemical dosing rigs, tertiary solids removal plants and activated sludge plants to lower levels of phosphorus down to as low as 0.2 mg/L before being discharged to river. Where possible we are embracing nature-based solutions such as reed beds to deliver some of these benefits.



## Focus on phosphorus

**Phosphorus is essential for plant and animal life. But too much of it can have detrimental effects on rivers and other bodies of water. Here's why:**

- **Eutrophication:** Excessive nutrients, including phosphorus, promote the rapid growth of algae and other aquatic plants. These algae blooms can cover the water surface, blocking sunlight from reaching deeper layers and disrupting the natural balance of the ecosystem.
- **Low dissolved oxygen:** Algae blooms consume oxygen during their growth and decay. As a result, the dissolved oxygen levels in the water decrease. Low oxygen concentrations can harm fish and other aquatic organisms.
- **Altered water quality:** Too much phosphorus can cause turbidity (cloudiness), affecting the clarity of the water. It can also lead to the accumulation of organic matter, which further contributes to oxygen depletion.

- **Nutrient imbalance:** When phosphorus levels are out of balance, it disrupts the natural nutrient cycle. This affects the entire food web, from algae to fish and other aquatic organisms.
- **Proper management and monitoring** are crucial to prevent phosphorus pollution and maintain healthy waterways.
- **There are many contributions to phosphorus in rivers**, such as agriculture, surface water runoff and industry, as well as the impact the water industry has.

## Our Programme

### Derbyshire

- Ten projects being delivered along the River Derwent.
- £45 million investment planned across these sites.
- Four low-cost CSO interventions implemented.

### Nottinghamshire

- Six projects along the River Maun and River Idle.
- £62 million planned investment across these sites.

### River Trent

- Seven projects to move Trent tributaries to good status across Nottingham, Derby and Leicestershire.

### Leicestershire

- Six projects along the River Soar to support the improvement of its ecological status from 'poor' to 'good'.
- In our largest wastewater treatment project to date, we are increasing the amount of flow treated at Wanlip wastewater treatment site, reducing storm spills and improving the quality of effluent being discharged.

### Gloucestershire

- Two projects to improve the River Isbourne.
- One project to improve the River Cam.

### Warwickshire and Worcestershire

- Ten projects along the River Avon to move it from 'moderate' status to 'good'.
- One project to improve the River Salwarpe.
- One project along the River Mease to move it from 'poor' status to 'good'.

Green Recovery is linked to removing 57 reasons for not achieving good 'RNAGs' in waterbodies in our region. Read more about our work on rivers in our Severn Trent Water Annual Report of Accounts ('ARA'), Sustainability Report and our Get River Positive Report.



## Using biology to remove phosphorus at Wanlip

Conventional processes to remove phosphorus from wastewater use chemical dosing. It is expensive and carbon intensive – chemicals have to be produced and transported, often from overseas. And eventually we add one chemical to remove another. There is a large environmental cost of removing phosphorus by chemical dosing at large sites.

Enhanced Biological Phosphorus Removal ('EBPR') harnesses naturally-occurring, carefully-nurtured biological processes and environmental conditions to efficiently extract phosphorus from wastewater.

Our Wanlip site is a great example of EBPR in action.

We are creating the condition in which the bacteria in the activated sludge plant can capture the phosphorus and lock it in. We carefully monitor conditions and feed the bacteria the right amount of air and nutrients so it can use the wastewater as food.

This approach reduces our reliance on chemicals and minimises the carbon footprint associated with manufacturing, delivery and operational interventions, while cleaning wastewater to the highest of standards.

As we have had tight phosphorus permits for longer than most of the industry, we are a leader in EBPR technology.



## Innovation and low cost solutions

### Artificial Intelligence ('AI')-controlled valves

We are testing AI controlled Centaur smart valves at our Alfreton site. These valves help to create more capacity in the network, helping us manage volumes of wastewater and reduce spills. These valves open and close in such a way that turns the network into strategic storage during periods of increased natural volumes.

The trial is ongoing but so far the results are yielding positive outcomes.

### Storm water generator

One of our challenges is being able to test various types of technology against all types of storm flow. We need manageable, repeatable and controlled environments to achieve the best testing results when designing new solutions.

Our new storm water generator being built at Spenal, will allow us to dial up a range of storms so we can test different CSO treatment solutions. We then use data intelligence and hydraulic modelling to create a range of scenarios.

### Combined sewer overflow interventions

CSO interventions can be simple and low-cost, such as increasing the weir height at an individual storm overflow, to capture and store more water during periods of high rainfall to reduce spills at those sites. An example of this is our Kelham Bridge CSO work, where we increased the weir height by 250mm, which will more than halve the total number of spills at this site. To date, we have implemented seven cost-effective interventions targeting CSO spill reduction in our Green Recovery Programme.

### Reed beds

Reed beds are our 'go to' solution for tertiary treatment on smaller sites. They are the original nature-based solution we have been using for some time and we have over 650 of them. They are a 'passive' solution, needing little regular intervention, with low cost and a low carbon footprint.

At the same time, reed beds create a great habitat for wildlife, improving biodiversity of both native plant and animal species.

Currently we are refurbishing five of our existing reed beds to give them another six years of life.





## Sharing knowledge with the industry

In common with all our projects, we are sharing our findings with the entire industry. In some areas – such as EBPR – we are considered to be experts in the field due to many years of experience.

We have contributed articles on reactive media reed beds for the Institute of Water magazine. These reed beds use natural processes to treat wastewater, involving plants and microorganisms.

By promoting the benefits of such schemes, we have not only raised awareness, but we also shared our technical knowledge to facilitate the adoption of this technology by others in the sector.

In addition, we presented on the future of wastewater treatment at the Institute of Water Conference. This allowed us not only to share our findings on nature-based solutions, but also discuss some of the challenges that have impacted our programme.

We also host individual water companies throughout the year to share our approach.

## River monitoring – what we have learned

We have successfully installed 50 sondes (remote monitors) at 25 sites across our catchment, to provide a rich and detailed dataset to inform our approach.

The simplest type is a stake installation. It is quick and low-profile to install and can be easily removed, leaving minimal impact on the surrounding area. It works very well for riverbanks with penetrable ground in lower footfall areas and which are less prone to heavy flooding. Most of the sondes we have installed as part of our river quality monitoring project are installed in this way.

In areas that may be subject to heavy flooding, or higher footfall, we use a kiosk-style installation. This provides a more secure and robust site for the equipment. It is less likely to move post-installation – which could compromise the quality of data collected.

We are also using a mounted install, where we attach a small kiosk onto a wall or pre-installed post. This is another low-profile type of installation, with minimal impact on the site and needing less equipment. We can use this in areas prone to flooding, as by installing it higher up, it is at less risk.

Each site has its own challenges and we have worked hard to install monitors at pace. With future monitors planned across the rivers in our region, we are making sure all this learning helps us develop even more effective solutions to drive performance improvement for customers and the environment, at the pace they expect.



# CREATING SUSTAINABLE FLOOD RESILIENT COMMUNITIES

Using more natural ways to reduce flood risk.

With population increasing in towns and cities, alongside less-predictable weather, dealing with rainwater has become an ever-increasing challenge. SuDS use natural methods to slow down and soak up rainwater.

Our project in Mansfield is the UK's single biggest SuDS scheme and we have already learned a huge amount about how to roll out SuDS at scale and how, when and where retro-fitting of SuDS is viable – something that had not been explored at scale until this project. We think this will help us – and others – in building more SuDS for more places, in the years to come.

## Basins and bioswales – super SuDS

There are a wide range of different options for SuDS, but in Mansfield we are finding that we are having enormous success and getting most value from detention basins and bioswales. Typically, these tend to be larger interventions than in-street options like rain gardens and planters, and they are very effective at dealing with large volumes of water. Although proving more costly than initially anticipated, these sites are proving extremely effective and great value for money, whilst also delivering environmental and community enjoyment benefits where they are developed and reducing the pressure on the sewerage network.

### Bioswales

Bioswales tend to be engineered channels with gently sloping sides, often found running alongside roads. They are usually smaller than detention basins. Bioswales take away stormwater runoff, guiding it along a route and allowing it to soak into the ground more naturally, or slowly drain to the sewer if infiltration conditions are not conducive. Native plants can help with filtering the water as it travels. Bioswales play a vital role in sustainable water management and environmental protection.



373m<sup>3</sup> storage delivered in bioswales

### Our progress so far

We have completed five bioswales to date with a further 13 constructed between April and June 2024, six in progress and 20 with completed designs. We have another 171 outline designs for bioswales so we have lots of viable options for delivery in 2024/25.

Having looked at other likely sites in the town, we believe we can provide around 18,000m<sup>3</sup> of storage in 2024/25 from bioswales – making a valuable difference to the town and its residents.



## Detention Basins

Detention basins are normally excavated depressions, designed to temporarily hold stormwater runoff during periods of sustained rainfall. They act as storage, slowing down the flow of water and preventing downstream flooding. Detention basins retain water for a limited time, allowing it to gradually release into natural water bodies or slowly into the sewerage network.

We have worked hard to ensure we have the most effective design for our detention basins 'drainage systems'. Our focus in the designs has been to:

- Remove surface water entering the combined sewerage network or alleviate surface water flooding risk to property or rivers.
- Be predominately dry for a majority of the time, with the basins being vegetated.

- Where possible, infiltrate the surface water back into the ground and include a return pipe to the sewer system where conditions are not favourable to allow full infiltration.
- Direct surface water flows into the basin via new pipework.
- Model to ensure no change in flood route risk.
- Have permanent access so maintenance can be carried out easily and safely.
- Designed to a maximum of a 1:3 slope with a flat base – which allows for self rescue (walk in/out).
- Maximum water depths are restricted to 0.9-1.5m.

Each detention basin needs a bespoke design to ensure we make the best use of the size and shape of the space available. Setting out our key design principles has meant that despite being bespoke, we are able to replicate elements of each design more easily and faster.



2,704m<sup>3</sup> storage delivered in detention basins

### Our progress so far

To date, we have successfully completed three expansive detention basins, and the momentum continues with seven more currently in progress or in the final stage of detailed design.

The largest site so far has been at Samworth Church Academy, where we have erected a basin with 1,332m<sup>3</sup> of water storage on the school grounds. This basin is engineered to allow partial infiltration into the earth, with the flexibility for water to also return to the sewer system when conditions permit.

Detention basins have also been installed on public land in Mansfield, one at Racecourse Park and another at Goodwood Way. Together, these basins provide a combined capacity of 1,371m<sup>3</sup>. At the Racecourse Park site, we have diverted surface water away from local sewers, channelling it directly into the basin. The positive impact of retaining surface water was immediate.

The most challenging part of the detention basin programme is identifying suitable sites. Work is underway to assess and secure other sites in the town to deliver additional storage for the benefit of customers and the environment.

## Advantages of basins and bioswales

The project has identified that detention basins and bioswales are more efficient in dealing with water and reducing flood risk.

Despite being large in size, they are relatively easy to construct and can easily be 'retro-fitted' where localities have space available.

Another advantage is that we can normally build them in areas where there will be little to no negative impact on

local residents' daily lives in the long term. Customers tend to be less supportive of in-street SuDS measures that disrupt long established parking behaviour, for instance.

We are planting in the bioswales and hydroseeding the detention basins with innovative planted turf which is grown in a nursery in Thorney, Nottinghamshire from local suppliers (Green Estate in Sheffield). This adds to the overall amenity value for communities, improves the water management and provides habitat for other species.



## What we learned about basins and bioswales

They are ideal for dealing with large volumes of water, and the investment per cubic metre of storage represents best value for money for customers, so we are delivering more volume than originally anticipated.

However, these are still large interventions, and we have found building basins and bioswales is more expensive than originally expected, which may have an impact on the final capacity delivered in Mansfield.

These interventions are relatively easy to build, with less complexity than other types of SuDS. They also tend to be less intrusive than on-street solutions, with less resistance from local residents.

The project has identified more constraints than originally anticipated, limiting the overall number and size of opportunities. These include: land availability; access; topography; proximity to adjacent properties; planning permission; ecology and protected species.





## Urban streetscapes

Through this project we have developed and constructed a range of highways interventions include rain gardens in both verge and street locations. These schemes have proven challenging, with complex processes, significant constraints, high costs and buildability issues.

Our experience with these smaller interventions has been useful in helping us understand the best options for future development.

While the built examples are performing well and helping to provide a flood-resistant environment, our experience suggests that for most urban locations these types of SuDS may not be the primary option.

We are therefore proposing to limit total capacity of these interventions at 1,000m<sup>3</sup> for this project as we do not believe they provide sufficient value for our customers' money.

589m<sup>3</sup> storage delivered in urban streetscapes

### Verge and street rain gardens and bioretention tree pits

We have built 48 of these smaller interventions across the town, delivering more than 589m<sup>3</sup> of storage in total.

These types of SuDS are useful for more targeted areas and are effective at capturing surface run-off, leading to reduced flooding risk. They performed well, as we expected through the storms we saw in late 2023 and early 2024.



#### Key learnings

An objective of Green Recovery is to trial new solutions and innovative products. We have learned valuable lessons about the cost-effectiveness of different solutions which is vital to ensure our AMP8 programme delivers the best value for customers.

These types of intervention are significantly more challenging – and expensive – to build at scale than we originally expected. Smaller-volume installations are not viable in terms of cost to retro-fit, which will impact the final mix of interventions we install in this area and how we deliver SuDS in the future.

Issues include lengthy processes to deal with highway design approval, road safety audits, ground investigation, utilities avoidance, traffic management, parking impact and existing trees. Despite standard design templates, these often have to be modified due to existing local factors, leading to additional cost and longer timescales.

We have developed an excellent relationship with our partners Nottinghamshire County Council, and have seconded Highways design staff and funded road safety auditors. This has created a collaborative team that has developed an agreed way of designing in the adopted highway and provided interventions that have blended in with the local environment without the intervention becoming a hazard to road users.

The project has led to the production of a design manual, and experience that can be taken forward in retro-fit and future greenfield sites.

Our original expectations were that verge and street rain gardens would be popular with residents as a form of 'greening' local areas. However, our experience has shown that rain gardens are often unpopular with customers as a consequence of impacts on

## Permeable paving

Our original expectations were that permeable paving would contribute up to half of the storage volume proposed. This form of SuDS lends itself to installations where a parking need exists and must be maintained.

Up until the end of 2023/24, we have successfully implemented 54 permeable pavement sites, resulting in a total storage capacity of 1,243m<sup>3</sup>.

#### Key learnings

Permeable paving works best in very specific locations and is an effective solution where hard surfaces must be maintained. In places where there is a risk of water building up and rapidly flowing across the surface – such as the camber of a roadway – water does not have enough time to soak into the material. This can then lead to high velocity water flow in the gutter channel, silting and clogging the channel rather than the water travelling across and soaking into the permeable paving.

To address this issue, we have developed a new standard for the use of permeable paving which has been agreed with Nottinghamshire County Council Highways Authority. This standard utilises a matrix outlining catchment area and gradient limitations, which will be used for all future permeable paving where it is effective.

Applying these guidelines, some of the council tenant car parks, with more flat areas, remain suitable for permeable paving. Parking cut-ins next to properties, in or adjacent to the highway, tend to be more complex and costly to make work, due to the channelling risk, traffic management required and need to line and avoid infiltration to the ground close to properties. With these considerations we have de-scoped these types of site from the overall project.

parking, despite us selecting locations where the existing parking capacity far outweighed the current need. These issues would not be present where the SuDS features are being built as part of a new urban development, but are significant when retro-fitting. We have developed a good understanding of where rain gardens are acceptable to customers and have built these learnings into our future approach.

1,243m<sup>3</sup> storage delivered in permeable paving



## Lessons learned – costs

An objective of the project was to understand the cost implications of various SuDS under diverse conditions using a variety of innovations. This knowledge is instrumental in enhancing our planning efficiency and effectiveness for AMP8 and beyond. Unit costs for this project are higher than originally expected, due to several factors as outlined below.

<b>Novelty</b>	There were few comparable schemes at the time of us developing the original business case. Any solutions that were visible were often very different in nature to the SuDS we have eventually designed.
<b>Constraints</b>	<p>We experienced more constraints than originally anticipated including: land availability; buildability/construction access; planning permission; proximity to adjacent property; ecology and protected species; and customer objections.</p> <p>These added significant costs, reduced the pool of cost-viable locations and limited the potential for economies of scale as we needed to redesign each intervention around a range of site-specific factors.</p> <p>Highways constraints have also reduced the potential for lower cost construction methodologies, for example the abundance of underground utilities have resulted in the use of far more expensive vacuum excavators for safety reasons.</p>
<b>Complexity</b>	SuDS interventions that encroach on highways have proven to be significantly more complex than initially anticipated. These interventions involve legal hurdles that must be overcome. The process typically includes road safety audit assessments, approvals from both the Council and Highways Authority for proposed designs, and recommendations or mandated modifications.

The initial aim to achieve 11% funding from other sources has also been challenging. Contributions have been limited and any activity we anticipated we would be given in kind, such as highway design approval and road safety audits, has in fact been charged for.

## Innovation

Innovation has been key tenet of our programme, and we are trialling a range of new solutions to gain learning and insight for future schemes. Examples include:

- Innovative new materials and processes such as roll-out pre-planted turf, and hydroseeding plus the use of hydrorock as an alternative storage layer to plastic geo-cellular or granular.
- Slimline design / Plug & Play trial – trying several options in a catchment as a way of driving efficiency and standardisation.
- Specialist nature-based solutions – expert designers embedded in the design process to drive an innovative approach in everything we do.

- Non-return valves and Control Chamber to prevent flow from sewer back to SuDS and retain the flow within the intervention with a 10mm diameter orifice.
- Permeable paving components – first time upstand, quadrant and inlet kerb templates developed with suppliers, Marshalls and Brett.

We are also running a pilot introducing the concept of Non-Household Greening. This is where we work with local businesses, offering them SuDS with the incentive of a reduction in their surface water wholesale tariff. We are trialling seven sites as part of our efforts to inform AMP8 WINEP projects and our Zero Spills Hub.



## Research and knowledge sharing

We are sharing our knowledge and learnings with the industry to help develop SuDS usage more widely. For example, our learnings have been shared with leaders in national building specification standards such as the Chartered Institute of Water and Environmental Management.

In addition, we have presented at a number of industry events such as Wastewater 2024 and have hosted representatives from regulators, government organisations, other water companies and local stakeholders to share our approach.

## Collaboration and partnership

Our partnership in Mansfield links into the District Council's in-flight 'Urban Greening' scheme, allowing us to incorporate SuDS into the designs. This has been a huge success, transforming swathes of the town centre with pleasant green spaces while providing effective rainfall capture to reduce flooding.

This collaboration supported work on some high-impact schemes in the town centre, such as replacing an existing >500m<sup>2</sup> car park with the new memorial garden community space. We were able to tackle areas that had experienced significant surface water flooding issues in the past, with three large rain gardens and a tree pit. We added a further rain garden on Queen Street in the town centre, which took runoff from Mansfield Bus Station.

While these were high-cost solutions, their visibility helped us to gain positive buy-in from local residents and representatives such as the Mayor.

Our partnership with academic institutions has been

important, with a co-funded Post-Doctorate research programme with the University of Sheffield supporting the Mansfield project since January 2023.

We contributed £75,000 to this programme with a further £65,000 matched funding from the University of Sheffield. The programme had a number of outputs, including the design of our monitoring programme (see below), performance analysis against storm events, lab tests of SuDS components and support for design and suitability decisions.

## Monitoring and evaluation

The Post-Doctorate research, together with a separate PhD student co-sponsorship programme we helped fund, have provided this project with significant monitoring and evaluation resource.

These programmes allowed the project to:

- test orifice drill and outlet chambers for performance and water retention;
- test growing medium for optimised water absorption and transport;
- understand the performance and limitations of permeable paving; and
- monitor interventions to understand their individual performance, infiltration, sewer output, helping inform future design and location decisions.

During recent Storm Babet, a total of 110.2mm of rainfall fell in Mansfield, with 85mm falling within 39 hours from 22:00 on 19 October 2023. This has been the most sustained rainfall since the installation of interventions.

Our monitoring showed all interventions operated as intended, working at maximum levels.



# RIVERS SAFE FOR SWIMMING

Making River Teme and River Leam better places to be.

Our bathing rivers programme covers three types of trial intervention to understand their impact on water quality of sections of the River Teme, River Leam and River Avon. The intervention categories are:

- Treatment works improvements – installing ozone disinfection at Frankton, Ludlow and Itchen Bank to trial ozone technology for wastewater treatment.
- Network storm overflows – reduce the impact of overflows on the Rivers Avon, Leam and Teme upstream of the target areas for improvement.
- Technology and engagement – undertake river water quality monitoring and make information available through a portal to help the public make decisions about river use.

## Using ozone for advanced wastewater treatment

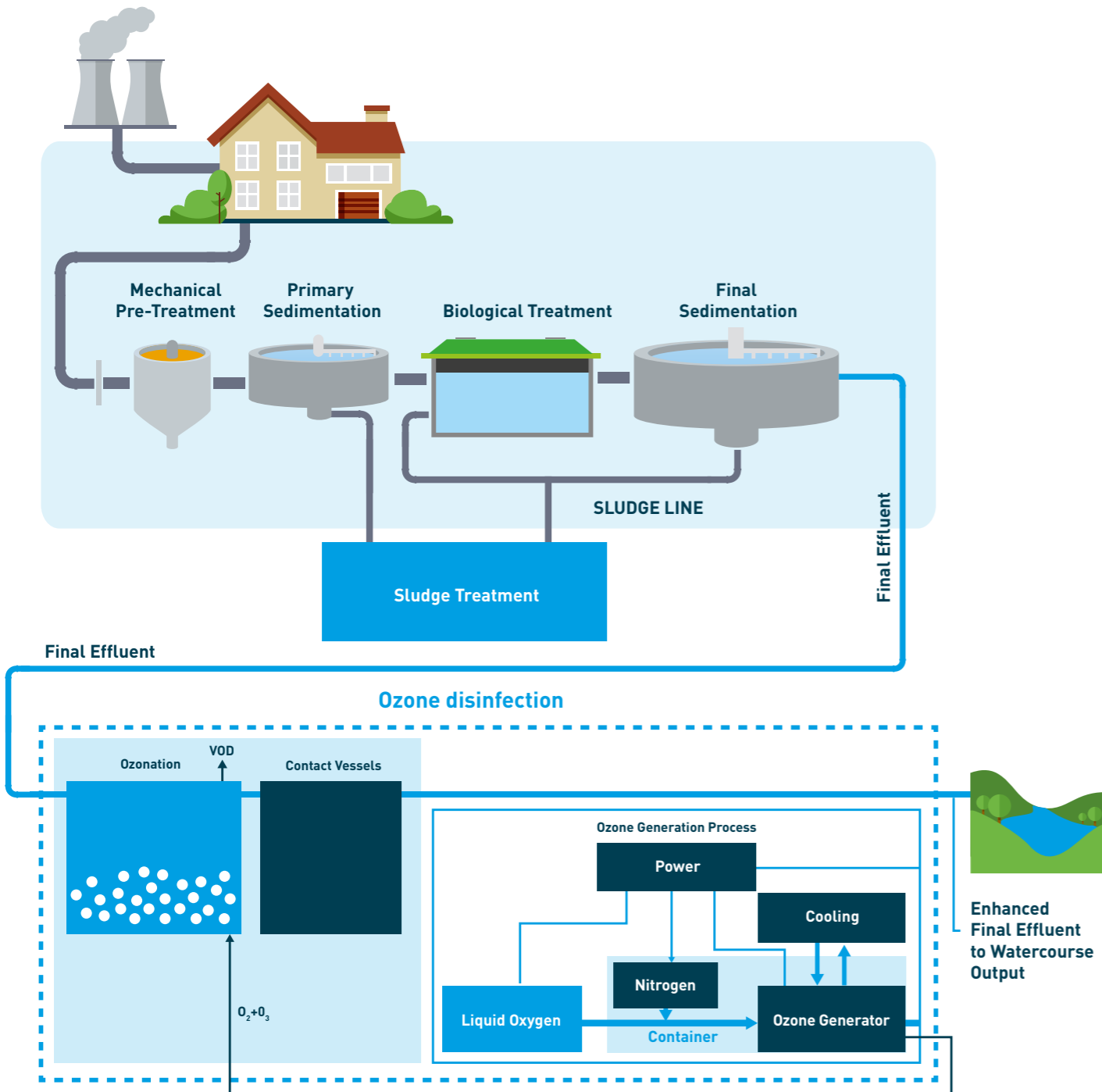
In a first across the UK, we are installing ozone disinfection at three wastewater treatment works: Ludlow in Shropshire, and Itchen Bank and Frankton in Warwickshire.

Ozone treatment is an additional step added to our normal wastewater treatment process which produces

a final effluent that exceeds the quality specified by our current regulatory requirements.

This extra process uses ozone gas to reduce bacteria remaining at the end of the normal sewage treatment process. Through this trial, we are hoping to understand ozone's effectiveness in removing micropollutants and pharmaceuticals before we consider installing it more widely across our wastewater treatment works.

## Wastewater treatment process



## Environmental advantages of using ozone

Ozone ( $O_3$ ) is naturally occurring and does not introduce harmful chemicals into the environment. The ozone molecule is unstable and has a short half-life, causing it to break down to oxygen ( $O_2$ ). Ozone disinfection offers several environmentally friendly benefits:

- It degrades back into oxygen after use, leaving no residual pollutants or byproducts.
- It is an effective disinfectant offering enhanced treatment, even at low concentrations. It efficiently eliminates microorganisms, including bacteria, viruses and fungi.
- This process will also achieve partial or full removal of trace organics, pharmaceuticals and personal care products.



## Key learning: offsite ozone system building

A key objective of the project was to understand ozone treatment in more detail and establish learnings to inform our approach moving forward.

One of our most significant learnings has been the successful implementation of offsite ozone system construction. Manufacturing and assembling away from the site provides several advantages:

- **Weather Independence:** Working offsite eliminates weather-related delays, meaning our teams can continue production without interruption.
- **Reduced Footfall:** On busy project locations, minimising foot traffic is crucial. Offsite assembly means fewer people on-site, reducing congestion and enhancing safety.
- **Thorough Testing:** Before installation, we rigorously test each system. Offsite construction allows us to ensure quality and functionality before deployment, reducing delays where post-installation intervention would typically be required.

## Accelerated progress

We have almost completed manufacturing and assembly of the necessary components for ozone treatment on site at Frankton. Following the success of the first system assembly, we have also commenced assembly of the plant for the Itchen Bank and Ludlow sites.

With the ozone system manufacturing and assembly being completed in advance of the site work, we are well-prepared for rapid progress once work commences on site.

We have commenced work onsite at Frankton and anticipate completing the installation by November 2024, with the other two sites following shortly thereafter.

Ludlow and Itchen Bank wastewater treatment works also face population growth pressure in the catchment. To accommodate increased flows resulting from network interventions, we are enhancing our storm tank capacity. This approach will ensure active management of the additional flows.

Our streamlined approach will lead to efficient installations and successful project outcomes as well as a huge amount of insight that we will share with the rest of the sector and that we will take forward into our AMP8 capital delivery programme.

## Storm overflows

When we embarked on our ambitious project to transform sections of the River Leam and River Teme, we recognised the need for improvements across our wastewater network and sewage treatment facilities. Our initial project aimed to enhance 23 overflows. At that stage, we had conducted preliminary modelling and feasibility analysis to outline the indicative scope of the project.

There is an increased focus on the use of storm overflows from customers and wider stakeholders. We have therefore reviewed our approach in view of these increasing expectations to ensure we deliver improvements at the scale and pace our stakeholders expect.

### Refining our approach for Green Recovery

Aside from our dedicated Storm Overflow Improvement Plan, we have reviewed our Green Recovery Programme approach to make progress on this important issue. Working in tandem with our developing AMP8 Business Plan and Drainage and Wastewater Management Plan ('DWMP'), we have fine-tuned our engineering interventions to maximise benefits at pace.

- **Better Engineering Interventions:** Our detailed analysis identified a suite of engineering interventions that not only maintain the original project's benefits but also extend the length of river improved. By avoiding redundant work between AMP7 and AMP8, we are optimising our efforts.
- We have identified CSOs in the Rugby catchment upstream of those originally chosen. While these CSOs only activate during rainfall events, and in line with the legal permits to discharge, we want to invest to reduce the frequency with which they spill.

Our ongoing programme of work on overflows is aligned to our DWMP. This takes into account recent statutory changes, delivering a further reduction in spills. These changes also increase the length of river we will improve, to deliver even greater benefits for customers, communities and the environment both new and over time.

Our solutions have been designed to minimise the number of interventions whilst maximising the number of storm overflows positively impacted. These green solutions are final and will not necessitate rework. We have also minimised their carbon footprint wherever possible. Additionally, we prioritise sustainable gravity-based options over mechanical and electrical alternatives, which tend to consume more energy.

You can read more about our commitment to improving storm overflows including our accelerated investment for 2024 in the Severn Trent Plc Annual Report and Accounts at [severntrent.com](https://www.severntrent.com)



## Technology and sharing data with the community

We launched our Storm Overflow Map on our website in April 2024. Providing near real-time storm overflow data enables our customers to see the current status of all storm overflows in our region. We are developing two further data maps which will be made available on our website in due course. The first is a River Water Quality map, designed to show key ecological health indicators. The second is a Risk Forecasting map (covering the Rivers Leam, Avon and Teme only) to support those who use these rivers for recreation.

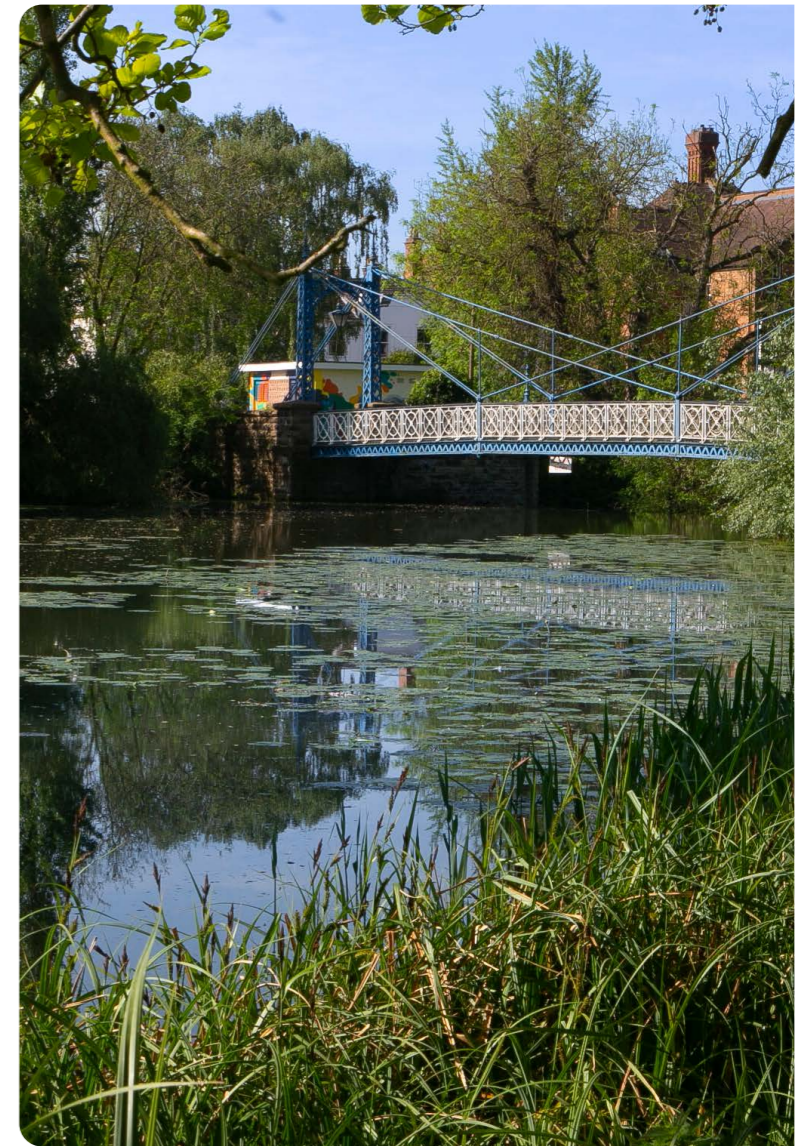
For our River Quality Monitoring project, our water quality monitoring sondes measure Ammonium, Dissolved Oxygen, pH, Temperature and Turbidity upstream and downstream of CSOs at 25 sites. We are working on collating the data from these into a form that we can share on the River Water Quality map.

For our Risk Forecasting map, we are approaching the first design milestone as our technology team are putting the prototype together in a test environment. We have engaged with river-user focus groups in building this map, we want to ensure the experience is user-driven so people have access to information about stretches of the Rivers Leam, Avon and Teme in an accessible and transparent format.

## Progress in Leamington

Our investment at the River Avon is progressing well with key achievements as follows:

- **Milverton School Playing Field:** An example of our green approach is the surface water separation solution in the north-east of Leamington. In this area, we are removing approximately 80,000m<sup>2</sup> of impermeable surface, allowing rainwater to be captured within a new surface water sub-network. Beneath the surface, we are creating an underground storage facility. We are laying new surface water sewers locally across the north-east of the town over the summer. The groundwork is complete, and we are ready to start the next phase of the work. This pipe network will separate surface water from sewage, benefiting both the Rivers Leam and Avon.
- **South Leamington Storm Storage:** We are constructing an underground storm storage tank near the station. This will bolster our waste network capacity, capturing more storm water and minimising overflows, to benefit customers and the environment.
- **Upstream in the Avon Catchment:** Our environmental surveys and site investigations identified schemes upstream that could deliver benefits. Near the River Sowe, we are adding more storm storage near Finham. We have already prepared the site for construction and carried out groundworks, dewatering preparation, and levelling activities.



## Bathing water designation

A dedicated swimming group based in Shropshire recently applied for designated bathing water status for 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 - including the need for facilities, safe access and avoiding environmentally sensitive areas.

We have recently received confirmation from Defra that three sites have been designated bathing sites:

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

We will continue to work with the local community to support the designation.

## Engaging with the community

We have actively engaged with communities as widely as possible through a range of media channels, alongside updates to our website, we have issued a quarterly newsletter and also shared our plans via local radio broadcasts and newspaper articles.

In October 2023, we held a community roadshow in Shropshire alongside Middle Marches Community Land Trust. This gave us the chance to engage with communities about the work we are doing to protect and improve river health. Those who attended posed many questions about rivers, water quality and what more could be done to educate and inspire wider public engagement with nature.

As part of our commitment to community engagement, we organise, facilitate and participate in schools programmes and local events such as the Big Avon Clean Up during Stratford-upon-Avon's Great Big Green Week celebrations. These events bring together individuals, organisations, and environmental enthusiasts to enhance our surroundings by litter-picking and revitalising both land and water. The event featured dedicated representatives from Rubbish Friends, the Stratford-upon-Avon Kayaking Group, and the Severn Rivers Trust. Together, we contribute to a cleaner, greener environment for everyone.

## Sharing our learnings and knowledge

The lessons we have learned so far are being shared with the wider industry.

We have created a training package specifically for the industry which we have delivered via Chartered Institute of Water and Environmental Management ('CIWEM'). This includes shared lessons on approaches to managing CSO spills including: optimisation of the sewer system, building additional storage, and reducing the amount of rainfall entering the drainage system.

Case studies from our bathing rivers programme have helped to bring the training to life including:

- Interactions between Princes Drive and Longbridge sewage treatment works (utilisation of existing capacity, smart approach, programming/commissioning).
- The surface water sewer separation opportunities (what to include/exclude, scale of benefit).

We have also hosted individual water companies to share our approach and support development of their plans.



## Engaging with farmers

We have been working with farmers for the past 10 years, primarily in areas such as catchment management. We work together to help prevent pollutants such as pesticides and nitrates reaching water sources.

Initially the project was designed to be educational, providing webinars and testing kits.

We launched our Test, Protect and Improve scheme in early 2023 with a number of webinars.

We have developed our approach through the year to include a payment to farmers to cover costs for test activity completed given the time, effort and organisation required to implement our recommendations for testing. So far, over 5,000 livestock test results have been reported to us from the two catchments. We also signpost them to external grant funding provided by other organisations and if necessary, we can fund a report from their farm vet.



It's important to do this testing to improve our rivers, if everyone does a little bit, collectively it'll make a big difference.



**Andy Towers, Top Barn Farm in South Kilworth**





# MORE WATER FOR MORE CUSTOMERS

Making an additional 93 ML/d of water available, by building a new treatment works and reducing non-household consumption.

Our Water Resources Programme will cover:

- Revitalising Witches Oak Abstraction Pumping Station: to ensure it operates at optimum capacity and efficiency.
- Floating Wetlands Pre-Treatment: Creating lush, buoyant ecosystems using nature to treat water before it enters our water treatment works.
- Witches Oak Water Treatment Works ('WTW'): Our engineers are building a new treatment works at Witches Oak.
- Pilot Plant: Our pilot plant will inform development of our full scale WTW. The pilot plant enables us to fine-tune processes, optimise performance, minimise chemicals and set the gold standard for treating River Trent water.
- Distribution Pipeline: We are installing new pipework to deploy the treated water from Witches Oak WTW into our network.

## Non-household

All customers can have a positive impact on future water resources by being mindful of their usage and being as efficient as possible. While a lot of our activity concentrates on domestic households, non-household ('NHH') customers could potentially make a big difference.

Our programme of NHH audits covering 3,000 different business users across our region is well established. We offer free, no-obligation audits where our technicians visit businesses and carry out a full assessment, install free water saving products and, where possible, install loggers. Our recommendations can help to improve water efficiency for the customer whilst also helping to reduce the amount of water that needs to be put into the network.

We have successfully completed 2,161 audits with estimated savings of 0.49ML/d.

To support delivery of our 3,000 audit target, we have trialled various methods to engage with our customers and partners.

### Severn Trent led activity

This project has successfully completed 1,754 audits, uncovering estimated savings of 0.2ML/d. As part of our ongoing efforts, we have explored various methods for engaging business customers. Telemarketing has proven highly effective in engaging the right individuals within target businesses, leading to successful sign-ups for water-saving audits and we have been working with a dedicated team throughout 2023/24. We have increased our uptake rate to 85% and the conversion rate from an initial visit to having remedial works that require water saving products installed is 64%.

In 2024/25, we will be implementing additional strategies, including targeting our Continuously Logged Users and piloting flow valves in relevant businesses and we are looking forward to exploring the potential that smaller businesses could present.

**Whitbread** has been working in partnership with H2OIQ to deliver 34 audits in their portfolio of Premier Inn hotels. Experience has shown that hotel premises can be unintentionally heavy users, and we have saved 0.15ML/d from these audits.

### Retailer-led activity

One trial involved engaging with water retailers to understand their capacity to deliver audits. The advantage of having a retailer-led trial is that they hold customer data.

Four retailers are now working with us in delivering audits in an end-to-end service, and the initial results of this activity are positive.

We have already had 365 audits delivered in the retailer trial. In 2023/24 water savings have been found at 77% of the premises being audited, with total savings to date of 0.132ML/d being made from retailer-led activity.

Retailers work in a variety of sectors and some retailers concentrate on specific elements of the market; for instance, one of those we are dealing with focuses on hospitality and retail. This will help us in developing strategies for certain types of businesses looking forward.

#### Derbion is a large indoor shopping centre in Derby, with space for up to 200 separate retail units.

We conducted a one-off study to assess water saving over a large environment. The savings identified being attributable to the water saving products we installed. All work was finished by the end of March 2024 and we achieved total savings of 0.003 ML/d.

Additionally, the shopping centre maintenance team resolved many leaks themselves ahead of our visit to install products, which is a great additional water saving benefit, although not claimed on the project.

### Engagement

We continually explore and identify opportunities to engage with local and regional businesses about water saving. The Midlands Expo in February 2024 provided us the opportunity to engage and get the message out with industry leaders and business owners.

In January 2024, we hosted online information sharing sessions with other wholesalers, Northumbrian Water and Dŵr Cymru Welsh Water, preparing for the Business Demand performance commitment being introduced from April 2025. We were able to share our learnings and approach, discuss challenges and provide guidance on their own programmes.

### Local authority properties

We have strong and constructive relationships with the local authorities in our region, who have offered new properties for us to audit. We have worked in collaboration with them in terms of specialist equipment installation - for example, specialist taps in care homes and nursery schools, where they find it more difficult to use the standard push tap.

We attended the Green Festival hosted by Broxtowe Borough Council in September 2023 and represented water efficiency for both domestic and business customers.

We have worked with Broxtowe Borough Council to audit 13 of their properties with savings of 1,800 litres per day in total across them. They were so pleased with the results that we were invited to attend an online meeting with Environment Working Group from other local authorities to promote the project. We have also established this type of work with eight other local authorities across the project achieving water savings of 384L/d.

Now that we have seen the savings, water and financial, it's made a huge impact and educated people across Broxtowe.

**Sarah,**  
Broxtowe Borough Council Representative

### Lessons learned

We are on track to deliver the 3,000 audits, however we are not observing the volume of water saving that we had anticipated.

For example, we have not been able to realise the volume of savings we had hoped within schools, as many schools are already operating in a water efficient way.

We have trialled many different types of property, and the more audits we do, the more we recognise that there are many factors (often not available in any centralised dataset) that can help determine if businesses are good candidates for savings.

We have trialled and tested multiple communication channels to engage with our non-household customers including written communication and editorial opportunities. Our project has identified that direct telemarketing communications is by far the best approach.

We have also made changes to the script used to triage customers with a direct criteria to focus on those businesses most likely to achieve greater savings.

We continue to investigate different types of businesses and explore different parameters to both maximise water savings in the remainder of the project, and to ensure that we capture as many learnings as possible to inform future business water saving activities.

## Water saving products

### Urinal control

These are devices that are fitted to uncontrolled supplies that flush urinals in washrooms. They can reduce wastewater by typically 60%.

### Tap regulators

Tap regulators have a flow control device built in that slows the flow but creates a useful spray or aerated pattern that is ideal for hand washing. They can reduce waste by up to 80%.

We have identified that many of the schools in the region where we are operating the trial had already been through a process with the Local Education Authority to improve their water efficiency. On this basis we have not continued looking at schools in 2023/24.



## Pilot plant

To support our project at Witches Oak, we have built a pilot plant to replicate the full-scale treatment works.

We want to use low carbon technologies to treat River Trent water at Witches Oak. Our pilot plant which has been operational since December 2022 – allows us to test different types of chemicals and optimise the ceramic membrane system that will be an integral part of the main water treatment works when it goes into operation. This allows us to choose the best type of filter media for removing contaminants such as pesticides from water.

The pilot plant is also helping infer our understanding of operating procedures, such as the optimum life of filter media and how often we need to maintain it. Essentially, we can stress-test the planned new water treatment plant in a safe environment.

We have been sharing the information gained from this with the wider water industry and the DWI. In addition, we believe this will help the sector to make more informed decisions about emerging water quality risks such as poly-fluoroalkylated substances ('PFAS').

## Wetlands

We wanted our floating wetlands to have the longest possible time to grow before we started using them to treat water. To do this, we accelerated the building of new wetland reed beds, with all 31 in place by September 2023, to maximise the number of growing seasons before the water treatment works starts operating.

The floating reed beds are installed on stainless steel frames that are anchored in the lakes. This means we can tow them into position using small boats. On-shore maintenance is much easier as we can bring them to the bank to undertake work. Also, once we are abstracting the water from the wetland to the new Witches Oak WTW, we can optimise their positioning to ensure maximum treatment performance.

We hosted Ofwat, the DWI and the EA during the year. The feedback was positive, recognising the pace of progression. In addition, we will be hosting the DWI to discuss the results of the PFAS trials as it is an emerging risk to the sector.

The reed beds have been an invaluable engagement topic, with visits from local schools over the summer of 2023. We were able to talk about the benefits of using nature to treat water and the importance of securing water supplies for the future.



## Biodiversity in the wetlands

The floating wetlands, while primarily designed for water treatment, also offer potential biodiversity benefits. We are optimistic that this project will not only meet but potentially exceed our 15% biodiversity net gain target, enhancing our environment in the process.

We work in partnership with Derbyshire Wildlife Trust, to develop a plan to increase the biodiversity value of the site and meet our biodiversity net gain targets. This work includes increasing or enhancing habitats for birds, mammals and insects. Already the wetlands have been colonised by common terns providing a safe roost for them at night.

Local angling clubs have also given our Witches Oak plans their approval as it will provide additional nursery habitat for local native fish species. In addition, as part of the pumping station we are installing a new fish recovery system that will safely return fish to the River Trent.

The project will deliver enhancements for biodiversity to the site which align with Derbyshire Wildlife Trust's long-term plans for the site.

## Treatment works

We remain on track to complete the Witches Oak WTW in line with the planned timetable of two years. This is around half the time it normally takes to build a WTW of this size – one of the 10 largest WTWs we own.

To manage a project of this scale at pace, we have taken an innovative approach learning from other sectors and industries.

## Innovation

We have used new ways of working to provide a more efficient build cycle:

- Contact tanks at treatment sites can attract several issues, such as the risk of ingress and significant ongoing maintenance. Instead we are installing a cross flow UV plant with built-in resilience. This is new to us so we arranged for industry experts to write a new design standard for the technology and agreed it with our Standards Team.
- We arranged for roof panels for the granular activated carbon ('GAC') filters to be made offsite to save time in construction and installation. These were installed on a weekend to avoid lifting over busy working areas.
- Where we can, we use Design for Manufacture and Assembly in controlled conditions. Not only does this speed up installation on site, it also reduces the risk of accidents on a very busy construction site.
- The administration building is a modular design, manufactured in a factory and delivered in 11 sections saving installation time and improving quality standards.
- The chemical dosing systems are pre-assembled in Glass Reinforced Plastic kiosks in the factory to allow testing and simplify site integration.
- All building roof structures have been designed to support solar panels.

## Design

Digital technology has been a great enabler during this programme. New assets were 3D designed, into a fully integrated digital model. Using 4D technology we carried out digital rehearsals to ensure installation and commissioning phases were optimised.

We have built a 'digital twin' of the hydraulics and control system to test how the various individual components will work as a whole. It will also help us develop the commissioning sequencing for bringing the works online and supplying our customers with safe drinking water.



## Health and safety

Our construction has been managed to the highest health and safety standards. This is really important as with the pace of the project there are multiple construction work areas on the site at any one time.

Our contractors are running the site on extended working hours and weekend shifts with a rota system to protect the wellbeing of everyone involved with this scheme. We review the programme weekly to ensure key deliverables are provided on time and any potential delays are addressed with mitigation plans.



## Advance procurement

We put additional resources into project engineering so we could procure key equipment early where possible. The 14 ceramic membrane units sit at the very centre of the process, and to protect the programme we advance-procured them. They have now been manufactured and are in storage in the UK awaiting shipping to site for installation.

## Collaboration

We chose construction and installation subcontractors on the basis of their record on similar works whilst insuring good value for our customers through competitive tendering processes.

We conduct project planning sessions involving all client, construction, and design organisations within the P6 planning environment, which is a robust project management solution used for prioritising, planning, managing and executing projects. We selected this technology because it is widely used in engineering and construction planning and execution due to its comprehensive capabilities and flexibility and allowed us to share the critical planning with our contract partners.

We analyse the top 10 critical paths to ensure that the appropriate focus is given to the right design and construction activities.

We developed and reviewed the ceramic membranes and GAC design using 4D modelling to check the assembly sequences and the complex installation process. We have installed a second crane in the building to speed up the installation and loading of the membranes.

## Value engineering

Design teams working closely together have insured efficient and effective value engineering solutions, such as:

- Removing on-site sludge treatment, with a new sewage pumping station transporting the sludge to Derby wastewater treatment works.
- Designing new raw water balance tanks to control the flow into the ceramic membranes.
- Redesigned the backwash system using lessons learned from other projects to improve performance and simplify the operation.
- Simplified and centralised the chemical storage system using bulk storage tanks with the ability to transfer the correct amount of chemical to each point of application. This rationalised the number of storage tanks and simplifies chemical deliveries.

## Resilience

The outlet from the new water treatment works will have two pipes to ensure resilience. If one pipe fails, we could still maintain supply with the other pipe at average flows. We are also providing connections on the outlet mains so we can maintain supplies to Nottingham whilst the existing Strelley pumping station undergoes refurbishment in the future.

As part of our resilience aims, we are building a new mobile pumping station, which could be deployed elsewhere in emergencies. This avoids us building a permanent fixed asset, with regular maintenance requirements, that would be used very infrequently. Instead, the pumps will be stored in containers at Minworth, ready to be deployed by our Network Response Team.

## Flooding challenges – our experience

Over the winter of 2023/24, we experienced an exceptional amount of rainfall, with 10 named storms from September 2023 to February 2024. These weather events provided us with a perfect opportunity to test our programme and construction site's resilience to flooding.

Between October 2023 and February 2024, the construction site faced more than 30 days of inaccessibility due to flooding. We raised the Motor Control Centre above the flood level so that the pumps and eel screens could continue to operate should flooding of this nature occur again. By advancing our construction schedule, we successfully mitigated any

impact on the project's overall completion date forecast. We proactively installed the roof and cladding on the membrane building early to close it off from adverse weather conditions and protect our workers.

Additionally, we brought forward the construction of the river intake to ensure that the flooding did not hinder our water supply goals.

Even during the unprecedented flooding, the floating reed beds remained undamaged and secured in place, and the reeds are now growing at a faster rate than anticipated.



# CLEAR AND TRANSPARENT REPORTING

Transparency is one of the most important things in our sector and to us as a company. We seek to demonstrate transparency in our reporting in a way that is meaningful for our customers and wider stakeholders.

As such we have included relevant metrics for our 2023/24 activity in one accessible place. All other additional reporting requirements are a nil return for 2023/24. All additional reporting requirements will be included in our final Green Recovery Report in July 2025.

## Hampton Loade

We have continued to contribute to the Green Recovery scheme at Hampton Loade which is being delivered by South Staffordshire Water. This year, we have contributed £3.865 million to the delivery which is included in table 4S of the Severn Trent Water Annual Performance Report data tables, available in the Regulatory Library on the Severn Trent Water website.

## Accelerating environmental improvements

Description	Further details	Units	APR24 reporting value
Storm overflow assessment framework costs	Cost per stage 1 SOAF	£	798.47
	Cost per stage 2 SOAF	£	8,205.06
	Cost per stage 3&4 SOAF	£	2,179.32
Storm overflow assessment completed	Stage 1	0	0
	Stage 2	0	73
	Stage 3&4	0	53
Spill intervention costs	Cost per intervention (spill intervention costs)	£	59,368.14
Spill intervention benefit - reduction in average annual spill days / intervention		d	24.4
Spill interventions delivered		0	5

## Building sustainable flood resilient communities

Description	Units	APR24 reporting value
Grassed/planted detention basin storage volume delivered	m <sup>3</sup>	2,703.6
Planted bioswale storage volume delivered	m <sup>3</sup>	372.7
Rainwater planter storage volume delivered	m <sup>3</sup>	0
Permeable paving storage volume delivered	m <sup>3</sup>	1,040.2
Verge rain garden storage volume delivered	m <sup>3</sup>	252.4
Street planter storage volume delivered	m <sup>3</sup>	294.3

## Building sustainable flood resilient communities cont.

Description	Units	APR24 Reporting Value
Bioretention tree pits storage volume delivered	£	8.2
Grassed/planted detention basin cost	£	5.701
Planted bioswale cost	£	3.599
Rainwater planter cost	£	0
Permeable paving cost	£	14.592
Verge rain garden cost	£	6.508
Street planter cost	£	7.405
Bioretention tree pits cost	£	0.137
Area of permeable paving delivered	m <sup>2</sup>	4,079.4
Non-customer secured costs	£m	0.399

## Smart metering

Description	Further details	Units	APR24 reporting value	
Number of new meter installations	Screw-in	000	11.192	
	Internal	000	0.001	
	Boundary Box	000	5.653	
New meter installations – outturn costs	Screw-in	£m	1.339	
	Internal	£m	0.000	
	Boundary Box	£m	2.080	
Number of existing basic meter installations replaced with AMI capable smart meters		000	23.918	
Existing basic meter installations replaced with AMI capable smart meters – outturn costs		£m	1.682	
Leakage savings from meter installations	New installations	MI/d	0.872	
	Replacements	MI/d	0.295	
Usage savings from meter installations	New installations	Reductions in direct usage	MI/d	0.260
		Reductions in customers internal losses/wastage	MI/d	1.626
	Replacements	Reductions in direct usage	MI/d	0.475
		Reductions in customers internal losses/wastage	MI/d	0.548
Percentage of household properties within your smart metering trial area covered by the company communication network		%	76.7	
Percentage of smart meter installations in the smart meter trial area providing a successful daily transmission of data		%	60.7	

To calculate the water savings from new smart meters we identify the start date (or installation date if we believe it was already leaking) and end date of the leak and multiple it by their average minimum daily water usage (i.e. what is flowing when the customer is not using anything) to calculate the total loss of water that would have occurred without the smart water meter.

To calculate the water savings from smart meters replacing existing meters we are deriving the 'speed of find' and 'speed of fix' and comparing those values to equivalent values on non smart meters. The difference between them is then multiplied by the average minimum daily water usage (i.e. what is flowing when the customer is not using anything) to calculate the total loss of water that would have occurred without the smart water meter. On average speed of find and fix on smart meters are over 100 days faster than on other meters.

The water saved is then divided between leakage (leaks on the supply pipe) and PCC (losses within the home). As we are unable to know where every leak is, we spend a bit of our time talking to our customers via different platforms to find out where they have fixed the leaks.

We have determined from known leaks that 35% of losses are from the supply pipes or before internal stop taps, and therefore classed as leakage and 65% are from internal leaks such as leaky loos and dripping taps and therefore classed as PCC. We therefore apportion all savings to 65% PCC and 35% leakage.

We notify the customers on installation if we believe there is already a problem.

