South West Water

Wastewater and Storm Overflow Explainer

Find out how the wastewater system works, how storm overflows operate and what we're doing to improve water quality.

What makes up the wastewater system in the South West?

Household wastewater from toilets, baths, showers, washing machines and sinks enters our wastewater system via the pipe network owned by our customers.

This wastewater is carried through our 23,000km network of pipes and c.1,200 pumping stations (to deal with local topography) to our 650 plus treatment works across the South West. It is filtered, treated, and processed, before being safely returned to the environment through outfall discharge points – see the outfall explainer.

According to a recent UK Water Industry Research study (ukwir.org) the length of the private drainage system in England lies between 2 and 3 times greater than the length of the existing public sewerage network. This means that the majority of the wastewater pipes in the total network covering the South West are owned by our customers, both householders and businesses. We do not control the maintenance of this additional wastewater pipework in our region which, if not properly maintained, can cause huge pressure on our wastewater system through groundwater seeping in through cracks in the pipes and faulty connectors.

It is estimated that 4% of the UK domestic population is served by a septic tank (hutton.ac.uk) which are more commonly found in areas of the UK which are rural and where the population is geographically dispersed like the South West. They can cause pollution to rivers and bathing waters if they are poorly built or maintained.

What is an outfall?

An outfall is the discharge point of a fluid into a river, estuary, or the sea. Generally, storm overflow structures are not located at outfalls, but they are the place at which water flow from storm overflows enters the environment. South West Water owns thousands of outfalls; others are owned by the Environment Agency, Highways Agency and private trade premises. Over 65% of our outfalls are for drainage rainwater (not household wastewater) and about 20% of them discharge combined liquids from different sources.

How does our wastewater system operate when it rains?

When it rains, drainage rainwater from buildings and roads enters our wastewater system and mixes with household wastewater. As the flow increases, treatment works (which have been designed to manage a specific volume of throughput) become full with the extra drainage rainwater. To allow the treatment works to function normally, excess drainage rainwater and household wastewater is stored in large storm tanks located next to the treatment works. When the rain stops and flows in our wastewater system return to normal levels, the content of the storm tanks is returned to the treatment works for processing. This system protects the environment and allows the

treatment works to continue working in all weathers.

Long periods of rain and rising groundwater levels fill the wastewater system and storm tanks to capacity. When this happens, storm overflows release automatically, relieving pressure on the wastewater system. Storm overflow releases are more than 95% drainage rainwater, and they are fitted with screens to trap debris to prevent it entering the environment. The storm overflow release is then further diluted and washed away by outgoing tides and currents. Without storm overflows, the wastewater system would back up causing household wastewater to flood homes, gardens and roads.

It should be noted that storm overflows are different to emergency overflows which are permitted to be used at network pumping stations in the event of electrical power failure, a mechanical breakdown of pumps, failure of the downstream rising main or blockage of the downstream sewer. The physical overflow can be the same location but the mechanism for their use is different.

What causes our storm overflows to operate?

Increased demand, removal of natural drainage and climatic change

A growing population and resulting increase in demand and the removal of natural drainage to make way for housing and infrastructure, the influx of 10m visitors to our region each year and more frequent and heavier storms because of climate change (amplified by our exposure to the Atlantic) have increased pressure on the wastewater system in the South West. The population of the South West has increased 20% in the last 30 years and the number of tourists visiting the region has doubled in the last 15.

The Met Office has also identified that extended periods of extreme winter rainfall are now 7 times more likely and we have experienced our wettest February on record in 2024.

Groundwater and tidal infiltration

Groundwater infiltration refers to water which is beneath the ground that finds its way into our wastewater pipes and those of our customers through cracks caused by wear and tear, tree/plant root intrusion, faulty pipe connections, and deteriorated manholes. Groundwater infiltrates the system by slowly seeping into the wastewater system. This can continue to occur long after rainfall has ceased. Near coastal areas (including estuaries) our wastewater system can also experience infiltration from sea water when tides are high.

Blockages caused by wet wipes and fats

Discharges from storm overflows can also occur due to pipe blockages; these cause household wastewater to back up and discharge to the environment as onward flow has been restricted or prevented. The main cause of blockages in our wastewater system (over 90%) is the presence of ‘fatbergs’ which are formed when wet wipes or cleaning wipes combine with oils and fats that have been poured down sinks. Neither should be put into the wastewater system.

Asset failures

Like all major infrastructure (railways, roads and power networks) there are times when our assets malfunction and require repair. We in the South West have one of, if not the most, complex set of wastewater assets in the UK. This is due to:

- The geographic disbursement of our population increasing the length of our pipes and number of wastewater treatment works in comparison to other water companies in the UK - for example, we have 653 treatment works vs. 356 for Thames Water (OFWAT); and
- Our unique terrain which requires household wastewater to be pumped over hills, cliffs and moors to reach our 650 plus treatment works.

Illegal connections

Modern wastewater pipework (installed since the 1960s) contains two pipes to keep separate the wastewater collected from homes and businesses, and the rainwater falling in built-up areas. However, there are instances where individuals not working for

us illegally connect to these systems. Two types of illegal connections exist:

- Where customer wastewater pipes are connected to clean surface water drains and the household wastewater therefore enters the environment without any treatment; and
- Where surface water drains are connected to our wastewater system which can cause storm overflows to operate more frequently than they should, and additional costs to pump and treat the flow.

Both scenarios can cause pollution in the receiving water environment.

How much impact do Storm Overflows have vs. other sources of pollution?

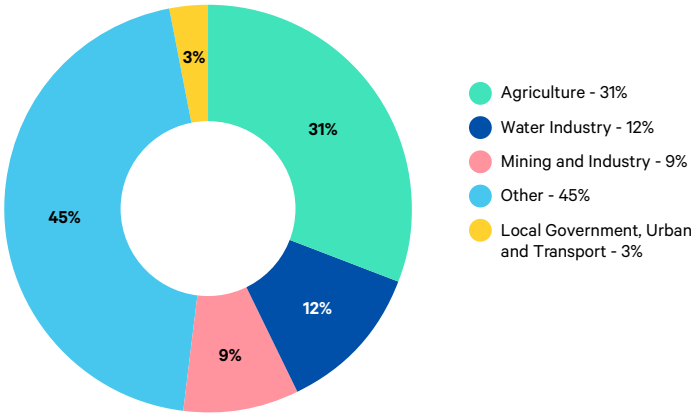
Rivers

The Environment Agency (EA) assesses the reasons for our rivers not achieving good status. These assessments are published by the EA through their Catchment Data Explorer tool: environment.data.gov.uk/catchment-planning/. The pie chart below is a visualisation of the latest EA data relating to the South West River Basin which excludes river basins not within South West Water's area of delivery (August 2023).

Our contribution to poor river water quality (12% vs. 22% at a full River Basin level and 26% for England as a whole) is mainly related to phosphorus discharged from treated effluent from wastewater treatment works.

We are investing c.£50m to reduce the impact of phosphorus in the current investment period and plan to spend a further c.£100m in the next period which runs from 2025 to 2030.

Reasons for not achieving 'Good' status in the South West Water area (August 2023)



This is a subset of the Environment Agency's South West River Basin validated data set.

> In February 2024, Helen Wakeham, the **Environment Agency's Director of Water** said that "The water industry is not wholly responsible for the state of water in England or anywhere else.
>
> The storm overflows in the headlines contribute about 7% of the problem of clean and plentiful water in England. That's a small part of the water industry more broadly. Agriculture is a bigger component, roads and transport are a bigger component and we don't hear people talking about them." (Wakeham, 2024)

Agriculture, mining and quarrying, urban areas and transport all also contribute to poor river water quality. In the South West, the EA has identified that agriculture is the source of over 30% of issues preventing waters reaching 'good status'; this percentage rises to over 50% for England as a whole. We have been working with the farmers in our region since 2006 to help them address this through our Upstream Thinking programme: https://wrt.org.uk/project/upstream-thinking/

Bathing waters

The sources of pollutants to a bathing water are complex but when there is heavy rain, high tides or strong winds, reduced water quality is more likely. This is because heavy rain can wash pollutants and bacteria from the land into rivers and onto beaches. It can also lead to storm overflows operating if the wastewater system is overwhelmed.

Every year the EA receives reports of suspected sewage pollution, at coastal waters, that are in fact algal blooms which are attributable to natural ecology. It is when algal blooms breakdown that they can be mistaken for sewage due to the unpleasant smell but foam on the water or the beach is more likely to be the result of an algal bloom. The risks to human health are low. However, some individuals may be sensitive to marine algae and display some reactions.

The breakdown of an algal bloom at Keymarshes near the New Forest (Telling the difference between an algal bloom and sewage - Creating a better place - blog.gov.uk)

What have we done and what do we plan to do to improve water quality in the South West?

In 1990, around 90% of the sewage in Devon and Cornwall was discharged untreated to the environment, most to coastal waters. This was the legacy of historic underinvestment which was calculated at £650m at the point of privatisation by the Government appointed Walker Review: The independent review of charging for household water and sewerage services (Walker review) - GOV.UK (www.gov.uk)

Thanks to our Clean Sweep programme, the largest marine improvement programme in Europe which was underpinned by £13 billion of investment, we created a legacy of excellence in our region's designated bathing waters. Just one example of Clean Sweep's positive impact is Exmouth - one of the most popular beaches in our region, where we have seen significant (around 96%) falls in harmful bacteria in the Agency's water samples since the 1990s.

Release from overflows can result in diluted untreated wastewater going into our rivers and seas, and it is not acceptable. That's why we have committed to investing a further £330 million as part of our Waterfit 3-year plan to deliver better river and bathing water quality by 2025: www.southwestwater.co.uk/waterfit/

We have also committed a further £21m to fund the creation of the Centre for Resilience in Environment, Water and Waste (CREWW) in partnership with the University of Exeter to identify innovative solutions to address the impact of climate change and population growth on our wastewater system: www.southwestwater.co.uk/about-us/what-we-do/improving-your-service/projects-and-investment/creww. One of CREWW's inaugural projects (following launch in March 2024) is focussed on machine learning data modelling to enable proactive identification of groundwater infiltration risk across our system to quickly identify repair requirements to reduce the risk of Storm Overflow use.

CREWW is the next phase of our longstanding partnership with the University of Exeter; this dates back over 20 years through our work on our pioneering Upstream Thinking project, a collaborative approach to improving water quality in our region using nature based solutions to reduce flow of rainwater into our wastewater system and the management of agricultural land to reduce harmful run off into our rivers: https://wrt.org.uk/project/upstream-thinking/

Who has paid for all the infrastructure improvements?

Every 5 years, Ofwat decides on 1) what an efficient running cost is for day to day operations 2) what infrastructure additions will be needed to maintain our drinking water and wastewater network operations 3) what infrastructure additions will be needed to enhance our network to prepare for future requirements. They also decide how much we can charge customers in their bills during this period to pay for these costs. About 50p of every pound of a bill goes towards staff costs, power, chemicals, and network repairs.

All water companies have a regulated capital value (RCV) which records the value of infrastructure assets, as financed by our investors. As at end-March 2024, Pennon Group's total shadow RCV is £5.2bn. These costs are paid for by our shareholders and debtholders and are remunerated over time through dividend and interest payments – this accounts for the remaining 50p of every pound of a bill. This allows us to make the investments today which will benefit customers for decades to come but not making our existing customers foot the entire bill.

Why don't we separate the wastewater system to remove rainwater drainage completely?

The UK Government estimated the cost of separating the combined network across the country could be up to £593 billion - this is over 3 times the cost to fund the entire NHS for a year: Storm_Overflows_Discharge_Reduction_Plan.pdf (publishing.service.gov.uk).

According to the report, this would require a significant increase to customer bills (more than doubling them), would cause harm to the environment through loss of habitats and generate huge carbon emissions (through excavation and use of concrete) which would undermine the UK's push to net zero. It would also be highly disruptive and take years to complete.

Helpful links

Understanding the scale and impact of privately owned drains and sewers on sewer capacity (ukwir.org)

Septic tank discharges as multi-pollutant hotspots in catchments (hutton.ac.uk)

Environment Agency Catchment Data Explorer tool: environment.data.gov.uk/catchment-planning/

Upstream Thinking programme: https://wrt.org.uk/project/upstream-thinking/

Telling the difference between an algal bloom and sewage - Creating a better place - blog.gov.uk

The independent review of charging for household water and sewerage services (Walker review) - GOV.UK (www.gov.uk)

South West Water website, Projects & Investment page: www.southwestwater.co.uk/about-us/what-we-do/improving-your-service/projects-and-investment/creww

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