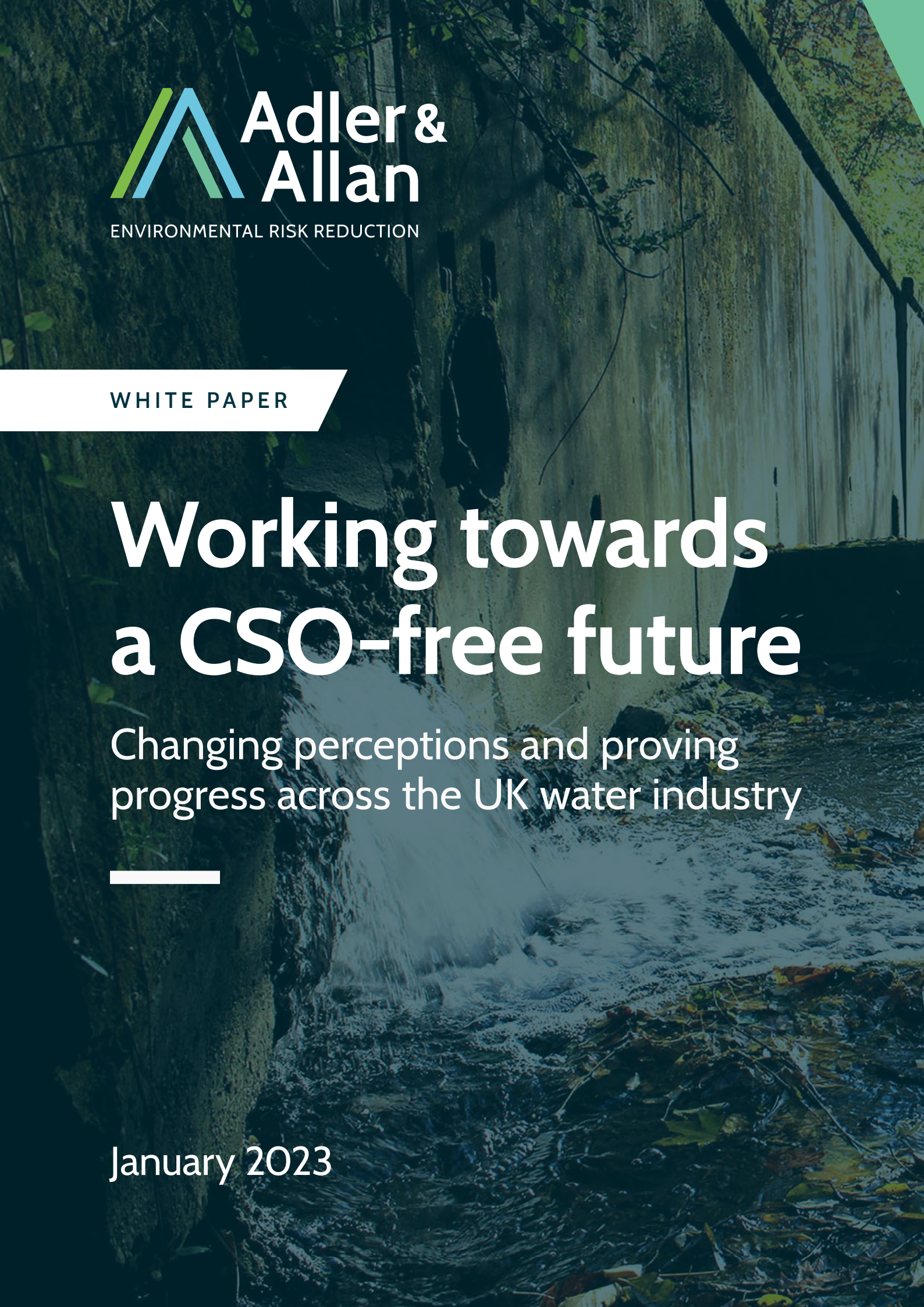

Adler & Allan

ENVIRONMENTAL RISK REDUCTION

WHITE PAPER

Working towards a CSO-free future

Changing perceptions and proving progress across the UK water industry

January 2023

Contents

WHITE PAPER

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INTRODUCTION

The use of combined sewer overflows (CSOs) is a very public problem for UK water companies.

Widespread media attention has flagged rising CSO release rates, sharing Environment Agency (EA) reports that spotlight out-of-permit spills and threats to rivers and coastlines.

Regulators and ratepayers have been vocal in their criticism. In April 2022, nationwide protests called for water firms to stop sewage pollution in rivers and seas.

The government has demanded comprehensive improvement plans for poorly performing assets and handed out record fines for non-compliant water companies. In their largest-ever crackdown, the EA and Ofwat are currently conducting criminal and civil investigations at more than 2,200 treatment works.

CSO releases – and the pollution issues they can present – are symptoms of an outdated infrastructure, originally built to prevent flooding in homes and businesses.

While most assets are decades old and no longer fit for purpose, they remain a necessary safety valve within the UK sewer network. In extreme weather, overflows stop sewers from backing up into bathrooms, kitchens, and roads by discharging a combination of rainwater, surface water, and diluted foul water into rivers and the sea.

Each year, the EA allows water companies to alleviate pressure on the system via a pre-agreed number of permitted CSO releases.

However, increased rainfall, population growth, urban creep, and infiltration have pushed outflows to peak levels.

Water companies are acutely aware of the issues, investing billions to minimise CSO reliance.

The added combination of fats, oils, greases, and wet wipes and other non-flushables are impacting on a network that is already under pressure.

Industry-wide work is under way to pinpoint the most active CSOs and upgrade assets that cause the most significant environmental damage – all while keeping customer bills as affordable as possible.

Tech-enabled solutions, such as smart sewers and data-driven customer portals, are also in development.

ACCELERATE AND INNOVATE

For stakeholders and the public, however, the pace of change is too slow. They want clear, measurable progress and a visible commitment to ending sewage pollution.

In the recently released final methodology for the 2024 price review (PR24), Ofwat urged companies to accelerate and innovate before PR24 takes effect, embracing 'opportunities to improve performance through smart technology and better use of data'.

With fewer than ten months to shape their business plans, operators must move quickly to meet escalating standards at PR24. In turn, Ofwat promises to "reward companies that go much further and faster to meet customers' expectations on key outcomes".

Root causes of CSO discharges, such as climate change and the flushing of wet wipes, require education, behavioural change, and a collaborative approach to fix.

Water companies are already taking action with a five-year £7.1 billion programme of environmental improvements – but they can't solve the CSO situation alone.

Environment Agency river quality data shows that storm overflows are responsible for only 4% of the problems affecting river and waterway health.

Ofwat concedes that "effective partnerships between companies and their customers, communities and stakeholders are also vital to addressing urgent challenges such as reducing sewer blockages, reducing sewage discharges and identifying (then delivering) nature-based solutions".

Root causes of CSO discharges, such as climate change and the flushing of wet wipes, require education, behavioural change, and a collaborative approach to fix.

This white paper explores short-term solutions to tackle CSO use – and outreach efforts that ensure everyone rises to the challenge.

UNDERSTANDING YOUR INFRASTRUCTURE

As part of the Environment Agency permitting process, water companies are required to design, construct, and maintain sewer systems according to 'best technical knowledge not entailing excessive cost (BTKNEEC)'. Assets must be classified as unsatisfactory, substandard, or satisfactory, and poorly performing sewers should be marked out for investment and improvement.

The goal is to identify CSOs that might operate in dry weather, pollute groundwater, contaminate designated bathing waters, or cause other environmental harm – and those that might do so in the future.

A cost-effective schedule of surveys and maintenance identifies your worst-offending assets and supports the EA's 'no deterioration objective', which aims to prevent acceptable CSOs from sliding down the scale.

Possible plans of action

A trusted environmental advisor can shape a programme of audits and assessments to classify assets, prioritise upgrades, and focus resources. Based on your existing infrastructure, they'll recommend which standalone service – or combination of services – will provide an actionable picture of your estate.

Services to help you navigate your network

These surveys and assessments deliver a detailed overview of your entire infrastructure, helping you understand exactly where current and future pollution threats lie – and the most viable route to resolving them.

Spill rates can be immediately reduced by focusing on your most problematic assets, while you plan future upgrades in the context of overall network health.

Infrastructure mapping

Get an end-to-end profile of your underground infrastructure, highlighting immediate pollution sources and longer-term concerns.

Mapping usually involves an OS19X-qualified team producing CAD drawings of your underground estate, exposing time-critical repairs and longer-term targets for routine cleaning, maintenance, and monitoring.

A detailed outline of your network helps you systematically manage upgrades, budgets, and resources and carry out urgent work to swiftly reduce outflows.

Environmental asset assessments

Locate your most pressing pollution hazards with a risk matrix displaying an asset's potential for spillages and ecological damage.

These evaluations expose the vulnerabilities of individual sewers and the sensitivities of their surrounding environments, allowing you to intelligently plan repair works and prioritise your worst offending CSOs.

Services to expand overall capacity

Flow and drainage issues compromise your infrastructure, causing blockages and pinch points that lead to CSO discharges.

These quick-win services maximise existing assets by regulating your network and locating system weaknesses that disrupt the movement of water and effluent.

CCTV surveys

Remotely diagnose current or emerging drainage concerns, including collapsed drains, concrete or grout accumulation, cracked or displaced pipes, and root intrusion.

High-resolution footage shares accurate details of physical system defects, which can be interpreted to gauge a cumulative effect on CSO performance.

Sonar tracing services

Use pulse signals to identify defective or collapsed sewers hindering network flow and triggering spills.

When a CCTV survey uncovers a drainage problem, sonar tracing equipment is your second line of defence, providing the location, line, depth, and direction of a system fault.

An environmental consultant can use this data to determine the most suitable fix and excavation point, ensuring a cost-effective repair.


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CSO-specific surveys and assessments

When general diagnostics detect weak spots within your network, CSO-specific surveys and assessments highlight exact issues and solutions. These services make it simpler to allocate already-restricted budgets, control spend, and single out substandard CSOs for bespoke repairs.

Impermeable area studies

Evaluate the catchment of a CSO or pumping station by tracking surface water from roofs and hardstanding to either a foul or storm drain.

The survey shows where sewage enters the storm network, where the two systems meet, and the expected impact. Results isolate outflow risks and potential pollution hazards, helping you to take targeted preventive action.

Storm overflow assessment frameworks (SOAFs)

A five-step programme that uses event duration monitoring, hydraulic assessments, and environmental and aesthetic impact studies to define the precise effects of a specific CSO, their underlying causes – from capacity concerns to tidal intrusion – and the most budget-friendly remediation measures.

Outfall aesthetics surveys

Identify if an asset operates in dry weather and its visual impact on the surrounding environment.

An outfall aesthetic survey offers photographic evidence of sewage litter and fungus to measure a CSO's observable effects – and its potential for harming watercourse amenity and driving public complaint.

TRACKING PERFORMANCE WITH REAL-TIME DATA

Robust, reliable information is an operational requirement – and in the current climate, it's also a PR necessity. Part of winning back public opinion is proving you're actively boosting water quality and complying with permits, inside and outside storm conditions.

While every pollution event is unique, it's possible to pinpoint trends through proactive data capture and analysis. Interpreting the stats behind your sewage spills can help predict and prevent future pollution events.

Data delivered by event duration monitors (EDMs) lies at the heart of the EA's planning, compliance, and enforcement activities.

These sensors measure the frequency and length of discharge events, assessing flow and water levels.

In the EA's March 2021 Event Duration Monitoring report, 12,400 monitors (86%) returned data, up from 8,276 the previous year.

Interpreting the stats behind your sewage spills can help predict and prevent future pollution events.

To further drive transparency in tracking and reporting, the EA required all storm overflows to have EDMs by the end of 2023. The industry is on track to achieve this goal, with nine out of ten CSOs now monitored.

Possible plans of action

As a starting point, water companies are legally required to measure performance against established water quality standards.

These readings provide a basic snapshot of possible pollution risks, but EDMs and other data analytics deliver deeper insights to help you take control of compliance.

A three-pronged approach – supplementing required EDM activity with detailed ecological and geographical evaluations – delivers the most comprehensive view of water quality and environmental threats.

Event duration monitors (EDMs)

Required under the EA's permitting rules, EDMs evaluate how long a discharge event has lasted.

The outputs offer an accurate snapshot of single spills and, over time, develop a credible overview of storm overflow performance and patterns. EDMs are an essential element of compliance reporting.

Biological riverbed surveying

Used in tandem with EDM information to ascertain water quality.

This process involves capturing and identifying resident macroinvertebrates, as species have different tolerances to water contamination.

Upstream catchment studies

Record upstream pollutants, such as runoff from farmland, forestry, and other industries, to isolate contamination hazards around a specific storm overflow.

Working alongside an environmental risk consultant provides an added level of assurance, helping you to interpret 'bigger picture' sewer behaviour and plan achievable maintenance and upgrade strategies.

USING ALARMS TO AVOID INCIDENTS

Introducing sensors into your wastewater network helps you understand how systems perform in real time – and effectively respond to irregularities.

System alarms notify operators of effluent build-up, rising levels in the absence of rainfall, and other anomalies, allowing them to intervene before a spill event occurs.

While speed of response is vital during a pollution event, it's not the most significant benefit of smart technology.

Artificial intelligence (AI) will speed the shift to proactive sewer management. With AI-led system monitoring, sensors speak to each other around the clock to create a constantly updated profile of overflow patterns.

Data is analysed against historical run rates, local weather forecasts, and regional rainfall gauges, building an automated illustration of sewer behaviour in different conditions.

Over time, water companies can predict and plan for spills, while targeting investment to prevent them altogether.

Possible plans of action

While several firms are already piloting intelligent wastewater networks, the move to infrastructures powered by state-of-the-art monitoring and communications technology will be gradual and costly.

An experienced environmental consultant can recommend interim monitoring solutions to capitalise on your current framework and lay the foundations for future development.

System monitoring and alarms

Wireless telemetry systems evaluate network effectiveness and critical water quality indicators, including dissolved oxygen and ammonia levels, temperature and pH values, and turbidity.

A tailored web-based platform displays values, graphs, and reports in real time. Meanwhile, staff text or email alerts signal unusual activity, blockages, and system failures.

Smart sewers

The ultimate objective for many water firms, offering systematic sewer management through digital twinning and artificial intelligence.

Flow and assets are digitally tracked and controlled across the entire network, providing real-time performance data and advanced warning of pollution events.

The result is improved energy efficiency, fewer CSO discharges, reduced sewer flooding, and lower carbon emissions.

SAVING MONEY THROUGH ACCURATE REPORTING

Through a range of reporting channels, water companies are answerable to Ofwat, the Environment Agency, their shareholders, and their customers.

They're legally obliged to keep records of all telemetry alarms, breakdowns, failures, blockages, and emergency discharges – and the steps they've taken to fix them.

For the 2023/24 fiscal year, 11 companies will pay combined penalties of £150 million for missing targets across key areas, including internal sewer flooding, pollutions, and water treatment works compliance.

Where routine spill event duration monitoring is required, firms must provide data and tracking information in formats agreed with the EA.

On the customer satisfaction side, Ofwat's ODI (outcome delivery incentive) regime ensures providers live up to service level commitments made at the beginning of each price review.

For the 2023/24 fiscal year, 11 companies will pay combined penalties of £150 million for missing targets across key areas, including internal sewer flooding, pollutions, and water treatment works compliance.

Partnering with a knowledgeable environmental consultant can minimise both the environmental and financial impact of pollution issues.

Possible plans of action

Achieving ODI targets

Missing ODI targets can lead to significant financial penalties, diverting vital funds that could power PR24's required innovation and service transformation.

In line with the EA's 1-4 classification scale (with 4 signifying no environmental impact), water companies incur penalties in the region of £60,000 for every Category 1-3 incident above an agreed threshold.

Although costs for failing the ODI incident target vary between firms and fluctuate annually, sums generally reach seven figures.

Most reported discharges receive a Category 3 classification, although, upon further investigation, this may not be the most appropriate rating.

As you work to solve spill issues at their source, a trusted advisor can provide evidence – including site photos and water quality data – to prove the absence of environmental harm.

This deep-dive activity can successfully downgrade classifications, allowing you to focus resources on meaningful CSO improvement efforts.

Post-incident reporting

Effective reporting of environmental data following an outflow can also downgrade more serious incidents, providing a more accurate view of asset performance, reducing penalties, and correctly sharing accountability in events involving third parties.

RESPONDING TO INCIDENTS

Since 2019, water firms have worked towards Ofwat's challenge of cutting pollution incidents by a third – and are investing £3.1 billion in storm overflow improvements between 2020 and 2025. More than 7,000 overflows have been upgraded and over 90% of CSOs are now monitored, providing actionable data to drive further system enhancements.

Despite industry-wide advancements, overflows continue – so it's imperative to react appropriately.

The most effective response begins before a spill happens, with a well-maintained system, accurate monitoring, and ongoing prevention measures.

However, when a discharge does occur, scalable support from an environmental expert ensures fast, efficient action in any situation.

Possible plans of action

Because spills are influenced by rainfall, site conditions, and system aberrations, no two are exactly the same. Infrastructure knowledge, established emergency procedures, and technical expertise are key to shaping the correct response.

24/7 consultancy-led pollution response

Working with an expert who offers around-the-clock response services can significantly reduce the environmental, financial, and reputational damage caused by a pollution event.

Your partner will provide immediate phone and onsite support to assess scale and severity and deploy trained engineers and specialist equipment to contain pollutants and minimise impact.

Emergency process consultation

An environmental advisor understands the potential effects of an overflow – and your practical and regulatory requirements before, during, and after an incident.

After evaluating your network, processes, risks, and resources, they will prepare an emergency plan that outlines every practical step.

Remediation and restoration

Following a pollution event, fines and fallout can be drastically reduced by restoring the spill site to its original condition.

A qualified consultant can not only deliver frontline clean-up services, but also gather and submit critical evidence to the EA to prove you've met all post-incident air, water, land, and aesthetics requirements.

COMMUNICATING WITH STAKEHOLDERS

Alongside the legal obligation to report on EDM activity, water companies face increasing pressure to share regular, detailed CSO updates with consumers. Going above and beyond annual reporting requirements is a valuable opportunity to manage perception, share successes, and build trust through precise, dependable information.

By establishing a direct dialogue with stakeholders – rather than allowing third-party apps to control notifications – you can place CSO efforts into context, explain the pace and scale of improvement works, and contain misinformation.

Clear communication channels also help to educate your audience about solving CSO use as a team, including the responsible disposal of wet wipes, nappies, and fats, oils, and grease (FOG).

Possible plans of action

Customers are fatigued with greenwashing and performative environmental efforts, so it's essential your updates are timely, factual and consistent. Inaccurate or vague information can do more harm than good.

Ofwat's PR24 methodology echoes the importance of consultation and two-way dialogue, saying, "Effective engagement

between companies and customers and other stakeholders is also important to achieving long-term aspirations, such as changing water-usage habits. This means involving customers in service design and delivery, providing education and sharing information to support their meaningful and active engagement".

Dependable messaging is key. Partnering with an environmental specialist can ensure every exchange begins with qualified, credible inputs. So you always share straightforward, reliable data and develop relationships based on transparency and trust.

Companies can initiate the critical conversation in a variety of ways.

Customers are fatigued with greenwashing and performative environmental efforts, so it's essential your updates are timely, factual and consistent.

Real-time notifications

Customers can request live email and text alerts about sewage spills in their local area, helping them make informed decisions about bathing and water use.

Notifications are also published on social media channels, such as Twitter and Facebook.

Purpose-built customer portals

Portals take transparency to the next level, with interactive maps, searchable release histories, and real-time information about stormwater and wastewater releases near coastal or inland waters.

Stakeholder outreach initiatives

Preventing blockages and CSO outflows is a shared responsibility.

Developers must rethink the construction of hard surfaces that inhibit natural water drainage.

Consumers and businesses need to get rid of waste in the right way.

Raising awareness via social media, customer events, and connections with community and industry groups can change behaviours and spread the burden of accountability across landowners, billpayers, housing companies, and water firms.

CREATING A FUTUREPROOF INFRASTRUCTURE

Small-scale investments can cut CSO use, boost capacity, and extend asset life in the short term.

However, with the help of an experienced advisor, you can ensure your network strategy addresses evolving environmental requirements – from overall water efficiency to reducing greenhouse gas emissions from wastewater.

Possible plans of action

A clean, well-maintained network not only limits the need for storm overflows, but also reduces the 2.9 million litres of water leaked in the UK each day.

Preventive maintenance, carried out by a skilled environmental partner, enhances the effectiveness of ageing infrastructures – and lays solid foundations for future-looking sustainability initiatives.

Drainage repairs and planned preventive maintenance (PPM)

Fixed-cost network cleaning, repair, and management help you identify pollution hazards and solve them with specialist remediation equipment for sewerage, effluent, and surface water.

High-pressure jetting

A powerful water stream increases capacity and cuts overflow odds by clearing sewers and syphons of root intrusion, silt build-up, concrete deposits, bricks, and grout.

Large-scale blockages are removed by powerful vacuum tankers, while environmentally friendly recyclers treat and reuse water for jet cleaning.

Supplementary storm tanks

Adding to your short-term storage capacity can prolong system performance, reduce pollution entering waterways, and prevent the bottlenecks that trigger CSOs.

A risk reduction expert can scope, design, and selectively extend your network to manage excess effluent and control contamination hazards.

Water management consultancy

A specialist advisor provides a forward-facing view of your entire water management approach, based on current capabilities and long-term business goals.

Solutions combine technology, process, and asset transformation to minimise waste, cut carbon emissions, and improve overall efficiency.

Sustainability analysis and carbon offsetting

Working with a water sector sustainability expert, you reduce your carbon footprint by investing in projects with a range of social and ecological benefits – from renewable energy and rural regeneration to rainforest conservation and peatland restoration.

Nature-based initiatives

Natural solutions can be used in two ways.

Firstly, sustainable urban drainage solutions (SUDs), including rain gardens in town centres, help clean rainwater out of sewers and limit the risk of flooding.

Secondly, tertiary treatment solutions, such as reed beds, give an extra layer of protection to prevent CSOs from directly discharging into watercourses.

Ofwat's PR24 methodology stresses the vital role of new ideas and non-standard solutions going forward. The expanded document states, "We want companies to deliver greater social and environmental value, so they can deliver more for the funding that customers provide. This includes making a step change increase in the use of nature-based rather than traditional solutions".

The regulator promises to fuel advancements in this area with a range of support:

- Providing a ten-year operational expenditure allowance for non-traditional opex-based schemes.
- Rewarding companies that reduce costs by delivering wider benefits. For example, through partnerships.
- Retaining and expanding the Innovation Fund – which rewards breakthroughs that better meet evolving customer, societal and environmental needs – to at least £300 million.
- Introducing a fund of up to £100 million for companies to help customers use water more efficiently.

TACKLING THE CSO ISSUE TOGETHER

CSO reliance is a complex problem – being played out on the public stage.

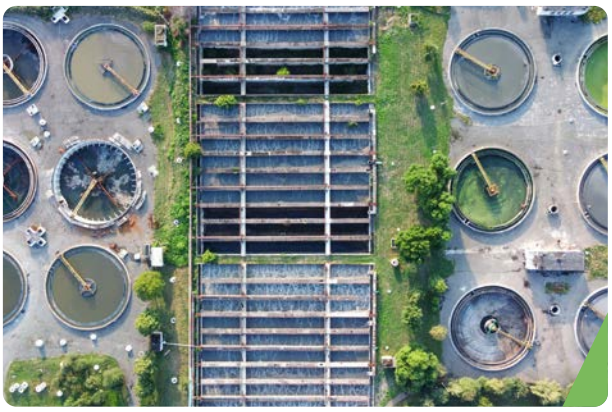
Despite billions earmarked to end sewage pollution, rising outflow rates have clouded customer perceptions and placed the UK water industry in the regulatory firing line.

In the lead-up to AMP8 and PR24, it's time to reset opinion and create a collaborative plan to solve CSO usage.

In its final PR24 methodology, Ofwat requires companies to "set their five-year business plan in the context of a 25-year long-term delivery strategy".

It's a delicate balancing act that demands practical action plans for today's customer and environmental priorities – and scalable solutions to address future challenges.

Water companies must take the lead and convince stakeholders to be part of the CSO solution. That requires the credibility that comes from networks that perform properly and information that's open, honest, and readily available.



The shift won't happen overnight, but proving progress with visible, data-driven action can accelerate positive change.

In its final PR24 methodology, Ofwat requires companies to "set their five-year business plan in the context of a 25-year long-term delivery strategy".

Accurate monitoring and targeted infrastructure upgrades will extend critical asset life and minimise sewage overflows.

Regular communication will shape behaviours, broaden accountability, and build consumer trust.

And the right support will ensure you keep pace with evolving environmental concerns, from CSOs through to Net-Zero objectives and alternative energies.

The way forward is a blend of short-term practical improvements, forward-looking technology, and dialogue that demonstrates a clear-cut commitment to a CSO-free future.

To learn how Adler and Allan can boost network performance and reduce reliance on CSOs, visit **adlerandallan.co.uk**.

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