

PREVENTING RISING MAIN FAILURES: LEVERAGING INSPECTION DATA FOR PROACTIVE RISING MAIN MANAGEMENT



Water utilities are currently under huge pressure to reduce sewage leaks. Figures from the Environment Agency show there were 301,091 spills in England alone in 2022 – an average of 824 per day. Public anger over the pollution of our rivers and seas has prompted utilities to announce a £10 billion investment plan, on top of the £3.1 billion being spent by 2025.

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Ageing rising mains are of particular concern to water utilities. It's known that many are vulnerable to failure due to surges in pressure, joint leakage, external corrosion, and internal corrosion – yet often, these are not spotted until disaster has struck.

Most rising mains failures are preventable. And today, inspecting them is easier, more cost-effective, and less disruptive than ever, thanks to the development of advanced inspection technology such as Xylem's SmartBall.

By taking a proactive, data-guided approach, water utilities can reduce rising

mains failures, cut costs, boost public trust, and remain compliant with the Environment Act 2021.

Consequences of failed rising mains
Rising main failures hit people and the environment hard. They may release a large amount of wastewater into the environment, or cause sewage back-up in residential, commercial, or industrial buildings.

Emergency repairs are often extremely disruptive to the public and sewer rising main failures can cost water utilities in excess of £1m to repair, as well as causing unwanted media attention and major reputational damage.

On top of this, the Environment Agency could soon be given powers to impose unlimited civil penalties – currently capped

at £250,000 – so the financial implications are huge. With proper inspection and maintenance programmes however, failures can be averted by detecting and repairing problem areas before they happen.

The challenges of inspecting rising mains
Rising mains are far more difficult to inspect than gravity sewers for several reasons. Firstly, there may be access issues. A lot of technology that has been developed for gravity sewer inspections is unsuitable for rising mains, such as smoke testing and traditional CCTV. Even newer technologies may encounter the problem of unlocatable or impractical access points and so struggle to inspect long pipeline lengths in a single run.

Rising mains also often have the problem of lack of redundancy. It is common for rising mains to transport sewage from one region

to another along a single pipeline and so dewatering or even stopping flow for any significant period is not feasible.

Lastly, there are technology limitations. While other kinds of acoustic technologies may be able to locate leaks, they do not have the functionality to detect gas pockets which are of a bigger concern.

Because of these difficulties, pipeline owners and operators have historically tended to take a reactive approach to rising main maintenance, but the Environment Act 2021 and growing public dissatisfaction for sewer spills are placing pressure on water companies to act. Plus, advances in technology are revolutionising the task of inspecting rising mains, making it easier and more cost-effective for utilities to take action.

Consider a holistic, data-driven approach
To meet the challenge of repairing our country's rising mains, it is essential that utilities develop a data-driven management strategy and programme of repairs. Xylem helps utilities develop a rising main management strategy that balances risk with system performance and cost-effectiveness.

Our holistic rising main approach begins with collecting relevant pipeline information - including length, flow, pressure, air valve locations - conducting a desktop inspection feasibility study and creating a custom inspection plan tailored to the specific pipeline.

Next, we assess the condition of the pipeline by identifying leaks and more importantly, gas pockets - which cause accelerated hydrogen sulphide attack. We do this by using the free-swimming platform SmartBall which is equipped with acoustic sensing technology. SmartBall can be used while the rising main remains in operation, can cover long distances in a single deployment, and is material agnostic so it is able to detect leaks and gas pockets in both metallic and non-metallic mains.

Complementary to leak and gas pocket detection is the identification of internal and external corrosion on a pipe-by-pipe basis. For high-risk assets where further investment is warranted, we offer the PipeDiver platform which uses non-destructive electromagnetic technology to pinpoint defects in the pipe wall and measures relative wall thickness.



Again, it is used while the pipeline is in service and is simple to deploy and retrieve just like SmartBall.

Finally, accompanying the SmartBall and PipeDiver results, is a comprehensive engineering assessment of the pipeline to analyse current and future risks. This includes a design check, hydraulic analysis, structural analysis and Remaining Useful Life analysis which enables utilities to make insightful, informed decisions about the strategic long-term management of their pipeline.

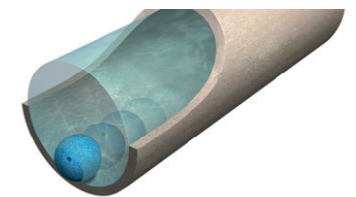
Prioritise inspection of rising mains to lower costs

With the Environment Act 2021 tightening regulations around sewage spills, breaches can now cost water companies dearly. It pays to invest in inspections and targeted repairs – yet too often, utilities are undecided where best to direct their resources.

Upgrading the entire network is not practical, as replacing large pipes comes with a significant price tag: costs vary anywhere from £400,000 to over £2m per kilometre for large pipelines depending on pipe diameter.

Fortunately, rising mains rarely develop issues across the full length of the pipeline: in fact, generally we find less than 5% of inspected pipes show signs of deterioration. Pinpointing and repairing these faults before they fail is key to managing capital expenditure and saving on reactive repairs, not to mention avoiding hefty Environment Agency fines.

By carrying out a holistic programme of inspection and targeted repairs, utilities around the world are avoiding failures and extending the lifespan of their critical rising mains for just a fraction of the cost of full replacement.



Making data-led decisions

Rather than waiting for a failure to occur or jumping to complete pipeline renewal as the first port of call, the first step should involve collecting data. Data from desktop studies are useful to identify which mains are high risk however they are insufficient to make multi-million pound decisions such as pipeline replacement. The money is much better spent collecting inspection data and only making localised repairs to the sections that need it.

SmartBall is a quick and cost effective first step for screening rising mains for leaks and gas pockets. Trusted by utilities worldwide for over 15 years, SmartBall has inspected more than 11,500km of pipeline and successfully detected thousands of leaks and gas pockets.

For the high-risk rising mains, electromagnetic inspections and engineering analyses are the natural next steps available to understand pipeline condition. These services work hand-in-hand with SmartBall to provide a complete picture of rising main health, and give water utilities the data necessary to make confident decisions around managing these critical assets for years to come.

Visit info.xylem.com/smartball-workshop to register your interest in a free Rising Main Management Workshop where Xylem's engineering experts can provide further information on how to effectively assess the condition of your rising mains.