

# Force Main Management

SYSTEM-WIDE FORCE MAIN MANAGEMENT HELPS UTILITIES REDUCE FAILURES AND INVEST CAPITAL WHERE IT IS NEEDED MOST

Given the high social, environmental, and financial consequences of a force main failure, the need for an innovative approach to managing these challenging pipeline assets is clear. Xylem provides actionable condition assessment data, a critical step toward proactive force main management.

Assessing force main condition has historically proven difficult for pipeline owners and operators due to inspection costs, lack of redundancy, access, and technology limitations, among other challenges. Traditional assessment methods focus almost exclusively on gravity sewers but are not applicable to force mains. As a result, utilities have reactively managed this critical infrastructure.

With advances in technology, utilities can now determine which pipes and valves require rehabilitation, which need to be replaced, and which can continue operating safely in their current condition. Proactive force main management programs make it possible for utilities to successfully reduce failures, mitigate risk, decrease capital expenditures, and increase confidence in the overall operation of their pipelines and valves.

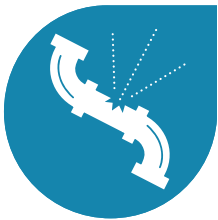


About 7.5 percent of collection system assets are force mains<sup>1</sup>, which convey sanitary flows under pressure. Most force mains are comprised of metallic pipe, though nonferrous materials, particularly prestressed concrete cylinder pipe (PCCP), dominate in diameters above 36 inches.

Xylem has assessed more than **1000 miles** (1600 kilometers) of force mains with its proprietary inspection platforms.



## Benefits of a Force Main Management Program



### • Fewer failures

When a force main fails, it hits a utility hard. Not only does this affect the utility financially and operationally, but force main failures also have a large impact on the community and environment. Yet nearly 75 percent of metallic force main failures and 65 percent of failures on non-metallic pipe are preventable<sup>2</sup>. Better understanding force main condition enables utilities to intervene before a pipe fails, while optimizing system control reduces the liability of aging infrastructure.



### • Reduced costs

As wastewater infrastructure ages, there is an unprecedented need for capital replacement funds. However, force mains do not typically deteriorate or fail systematically. Our condition assessment data show that less than 10 percent of pipes surveyed have indicators of distress, while even fewer require repair or replacement. By identifying localized deterioration, condition assessment helps utilities focus resources on distressed pipe for roughly 5 to 15 percent of the cost of full-scale replacement programs.

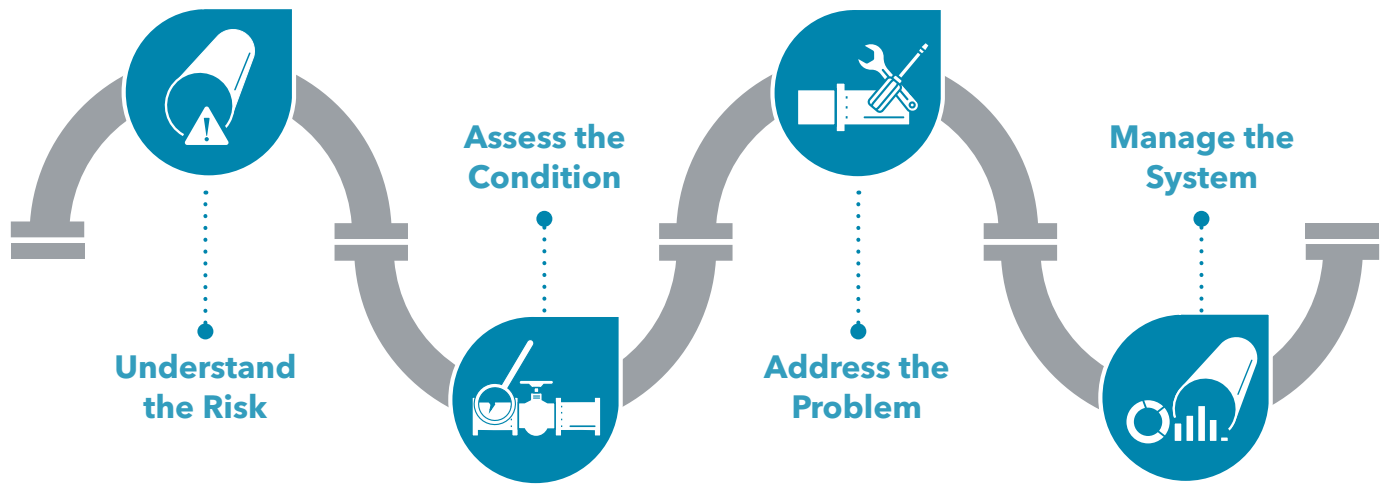


### • Lower risk

A data-driven approach shifts reactive operation and maintenance to proactive planning. Condition assessment informs targeted repair and rehabilitation strategies for extending the useful life of pipes and valves and identifies those with severe distress requiring replacement. With a clear picture of force main condition and level of risk, utilities achieve greater confidence in the overall operation of their system, translating to greater customer and community assurance.

<sup>1</sup> Water Environment Research Foundation (2004) "An Examination of Innovative Methods Used in Inspection of Wastewater Systems (01CTS7)"

<sup>2</sup> Water Environment Research Foundation (2010) "Inspection Guidelines for Wastewater Force Mains"



## Xylem’s Approach to Force Main Management

Reducing risk is the goal of most condition assessment programs. Xylem helps utilities tailor their force main management strategy to balance risk with system performance and cost.

### Risk assessment

Understanding risk is an important step in determining which force mains to inspect and which inspection techniques to use. As risk increases, so does the value of using high-resolution, comprehensive assessment methods. Inspection planning involves reviewing existing force main data, conducting a preliminary risk assessment, and identifying information gaps.

### Valve assessment

Valves are critical assets responsible for controlling flow within the collection system. Knowing the location and operating condition of valves helps utilities minimize the consequences of force main failure and the disruption of planned maintenance.

### Gas pocket inspection

Internal hydrogen sulfide corrosion is the most common failure mode for force mains and starts when a gas pocket forms in the pipeline. Xylem’s free-swimming **SmartBall®** and tethered **Sahara®** platforms use acoustic technology to accurately locate leaks and gas pockets in force mains of all materials. Both tools inspect the pipeline while it is in service.



Valve condition assessment



SmartBall inline free-swimming pipeline inspection platform

## Inline wall inspection

Xylem offers external assessment services as well as inline inspections with its **PipeDiver®** and **PureRobotics®** platforms. The PipeDiver platform is a free-swimming pipeline condition assessment tool that is easy to deploy and operates while the pipeline remains in service. The PureRobotics platform is a tethered, modular robotic crawler used in depressurized pipelines, capturing data via multiple sensors and live video. Both tools accurately pinpoint areas of pipe wall distress in metallic and concrete force mains using nondestructive electromagnetic technology.



PipeDiver inline free-swimming pipeline condition assessment platform

## Continuous monitoring

**Transient pressure monitoring** measures the true impact of system operations on a pipeline. Collecting transient pressure data is critical in the hydraulic evaluation of a pipeline and adds significant value to condition assessment. For PCCP, Xylem's **SoundPrint® Acoustic Fiber Optic** monitoring system detects and locates wire breaks, alerting utilities to structural changes in near real time to prevent pipeline failures.



Transient pressure monitor

## Engineering assessment

Condition assessment transforms inspection data into actionable information to provide a clear view of a force main's current and likely future performance. Condition assessment informs targeted renewal decisions that eliminate unnecessary replacement. Structural evaluation services, such as finite element analysis and remaining useful life calculations, enable utilities to make informed, long-term pipeline management decisions.

For more information on how we can help you, contact us at: [puretech@xylem.com](mailto:puretech@xylem.com)



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