Overview

Risk management is the most important concept associated with water utility asset management. Although the concept of risk management may appear easy to understand, water utilities have had difficulty applying risk management techniques because many of their assets (e.g., pipelines) are buried. This complicates the utility’s ability to analyze the condition of the asset or assess failure.

By quantifying and evaluating the risks posed by the potential failure of an asset, water utilities can identify operating and maintenance procedures, as well as capital rehabilitation or replacement projects, to lessen the risks of a possible failure.

Risk Management Process

Water utilities should consider the following steps when developing a risk management process (Reekie 2010):

1. **Establish the context.** This ensures that the risk management process supports the water utility’s business plan and identifies the business objectives, relevant stakeholders, standards, and regulations that must be addressed.

2. **Identify risks.** This involves identifying consequences to customer service, health and safety, the environment, regulatory compliance, and finances. It also includes identifying the root cause or initiating event for this process, such as a pump or pipe failure.

3. **Evaluate risks.** This determines the size of the risk, ideally in quantified terms. For each risk, the water utility should determine how frequently it occurs and the magnitude of the consequences.

Quick Facts

- Because many of their assets are buried, water utilities have had difficulty applying risk management techniques
- Utilities should use a 5-step process of risk management
- Utilities should evaluate each risk to an asset and prioritize projects to lessen that risk
4. **Identify the options.** This includes identifying and evaluating potential treatment options and determining which ones are ready for implementation. The water utility can rank these treatments in order of financial benefits or overall risk reduction.

5. **Engage in risk treatment.** This involves the funding and implementation of the treatment for the risk.

**Risk Management for Buried Assets**

Water utilities should evaluate each risk to an asset and develop a list of priorities for projects to lessen those risks. For buried assets, high risk will usually be associated with high consequences in the case of failure.

A utility’s evaluation of buried pipeline asset risks typically would include issues such as:

- Lack of adequate hydraulic capacity
- Lack of adequate water quality in areas serviced by the buried pipe
- Excessive numbers of pipeline failures that interrupt service for customers
- Failures that allow for the introduction of contaminants
- Failures that interrupt the use or serviceability of other infrastructures, such as causing traffic interruptions or road damage

**Risk Identification, Evaluation, and Mitigation**

Water utilities should base decisions about rehabilitation, replacement, or disposal of an asset, and the timing of those activities, on a determination of the critical failure mode (failures with the highest consequences). This assessment will help utilities focus on the assets and failures that can have the greatest impact on the organization. After the critical failure mode of an asset is identified, water utilities can target and refine maintenance plans, capital expenditure plans, and investigative activities to address that failure (IPWEA 2011).

Water utilities can identify risks through a range of processes including workshops and case studies. After they have been identified, the risks can be entered into a risk register and then grouped into general categories, such as natural events, external impacts, physical failure risks, and operational risks (IPWEA 2011).

When grouping the risks, it is important for water utilities to identify the critical assets as well as the critical failure mode, so that resources can be targeted to the most important areas. Many water utilities have dual risk management systems—one focusing on large diameter pipelines and another focusing on small diameter pipelines—and devote resources to addressing risks in both systems (IPWEA 2011).

Although small diameter pipeline failures do not usually lead to substantial outages, these failures can affect customer service. However, failures to large diameter transmission and distribution mains can be significant (e.g., substantial service outages), and there are fewer redundancies in the system should those types of failures arise.

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**REFERENCES**

