

# Condition Assessment Strategies and Protocols for Water and Wastewater Utility Assets

**W**ater and wastewater utilities must cost effectively manage a large investment in physical assets while they provide safe and reliable services to their customers. A strategic asset management (SAM) approach can help utilities meet this challenge. This research helps water and wastewater utilities use condition assessment tools and techniques to improve both the long-term planning and day-to-day management of assets.

The report is structured for two distinct audiences:

- Utility planning managers who are embarking upon cost-effective condition and performance assessment programs, in order to support long-term planning decisions.
- Engineering or maintenance managers who want more information on the advantages and disadvantages of various available tools and techniques for measuring the condition and performance of utility assets, in order to support daily maintenance and operation of assets.



**Condition assessment helps managers establish the current condition of assets so they can better prioritize and forecast maintenance and rehabilitation efforts.**

## Explaining Condition Assessment

Condition assessment establishes the current condition of assets as a means of prioritizing and forecasting maintenance and rehabilitation efforts. Some assets are more important than others and should receive proportionally more attention. A standard way to characterize the importance of an asset is to evaluate the risk of it failing. Risk is an important consideration in asset management and the design of cost-effective condition assessment programs.

Condition assessment can help managers understand the level of asset deterioration and the impact it has on the probability of asset failure, which is one component of risk; the other component being the consequences of asset failure. The utility can then attempt to either reduce the probability of failure through some operational or capital intervention, or accept the level of risk associated with the asset's condition.

When undertaking condition assessments, inspectors collect data with tools that provide information on such things as the presence of defects and their severity. However, even when identifying a defect, such as a crack or corrosion, the question still remains as to the significance of the findings. Data collected during inspection of assets must be interpreted through appropriate analysis to give an assessment of condition in terms of the operating demands placed on the asset.

## Selecting Condition Assessment Tools and Techniques

This research provides a framework to assist utilities in the selection and use of condition assessment tools. The researchers developed selection tables that are based on the available inspection, survey, and condition assessment tools and techniques. The selection process has four main components:

## BENEFITS

- Provides a step-wise approach for developing a condition and performance assessment program.
- Provides guidance for integrating an assessment program into an overall asset management framework.
- Recommends criteria for selecting assessment tools and techniques.
- Reviews available condition assessment tools and techniques used in the water and wastewater industry.
- Provides a prototype expert system to facilitate the selection of condition assessment tools and enable updating and refinements of tool selection in the future.

## RELATED PRODUCTS

*An Examination of Innovative Methods Used in the Inspection of Wastewater Systems (01CTS7)*

*Asset Management Strategic Planning and Implementation Guidelines for Wastewater Infrastructure (03CTS14)*

*Ultrasonic-Based Defect Characterization in Wastewater Concrete Pipelines Using Invariance Transformation Techniques (99CTS3ET)*

## RELATED ONGOING RESEARCH

A State of the Art Review: Remaining Asset Life (SAM1R06d)

Development of Protocols and Methods for Predicting the Remaining Economic Life of Wastewater Pipe Infrastructure Assets (SAM3R06)

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1. **Determine technical feasibility** Identify the types of tools that are appropriate to the condition assessment application under consideration.
2. **Review the tool summary information** Identify applicable techniques.
3. **Detailed review of potential tools** Examine detailed tool descriptions to determine most appropriate candidate tools.
4. **For viable options, undertake cost-benefit analysis** Give due consideration to the accuracy of the tool, the level of asset risk, and the available budgets.

The project developed criteria to guide the selection of tools and techniques. Where relevant information could be found, researchers evaluated the attributes relating to the exclusion criteria for each of the tools and techniques reviewed in this project. These attributes summarize the application and use of the tools, and provide the information necessary to identify the range of tools and techniques that are applicable to the condition assessment application under consideration.

The research team recommended a 10-step approach to an integrated condition and performance assessment program within asset management.

### Making Cost-Effective Decisions

Understanding the risk associated with an asset is critical to determining the appropriate proactive level of attention to give that asset. A direct extension of risk-based arguments is that the more important the asset is (the higher the consequences of failure), the more expense can be justified in assessments undertaken to ensure the asset does not fail. However, to minimize costs, inexpensive tools should still be used where possible.

The research team made the following observations:

- Inexpensive screening tools and approaches should be used routinely.
- The results of the screening approach may dictate a need for additional information and/or accuracy. This may require the use of more sophisticated/accurate assessment or inspection tools.
- Additional expense should be considered only when justified in terms of risk costs avoided or benefits accrued.

The research team suggested an iterative approach to the use of tools, using increasing levels of sophistication to build on the results of previous tools and assessments. In this approach, a manager initially selects tools that perform a screening function; for example, to identify the early signs of deterioration. A utility can then use a more detailed inspection and analysis to investigate the asset condition further, if and when justified.

### The Next Step

The research team also recommended a conceptual framework for developing a web-based expert system to facilitate the tool selection process (called the Condition Assessment Technology Selection Tool). WERF's ongoing research program for strategic asset management (SAM1R06) is expected to tackle this, with funding collaboration from the Water Research Foundation (formerly AwwaRF) and WSAA (Water Services Association of Australia).

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