Pipe Rover and Leak Detection

Background
Water losses can account for 10% of water usage across the state. For this reason, leak detection and managing water losses – as well as pipe integrity - are of significant interest to the industry.

A range of solutions have been trialled with further technologies now being considered for trial and future application.

The Program Leader for the Pipe Rover and Leak Detection Program is Dean Barnett from Western Water

Pipescan+
Pipescan+ is a device that can be manually fed into a live water main to assess pipe integrity.

The trial of JD7 Pipescan+ is now complete and the technology is not recommended as a business as usual tool at this point in time.

However, suggestions have been made for future development of the technology and IWN are hopeful of conducting trials of the improved technology in the future.

Satellite leak detection
The UTILIS / Detection Services leak detection trial uses ground penetrating radar imagery taken by satellite which was developed to find water on other planets.

Because drinking water has a particular spectral signature, the system can use geological, meteorological and hydrological factors to indicate leaks underground. The technology also has potential for use with Class A recycled water.

The trial began in late 2015 over an area of 45x70km. Sites identified with leaks have since been visited to check accuracy.

After calculating and adjusting any distorting factors, the information is intersected with the piping infrastructure layout and the system indicates locations of potable water underground leakage.

Western Water, City West Water, Yarra Valley Water and South East Water took part in the trial which found leaks. However, the accuracy of the data needs to be improved before it can be recommended for business as usual. A future trial is being considered to incorporate the learnings from the first trial.

Fibre Optic Cable Sensor
The scope of this technology is to investigate options with:

• Water main leak detection
• Pipe pressure monitoring
• Identifying illegal water connections
• Dam wall integrity/movement monitoring
• Key infrastructure security
• Pipe strain – curved sewers.

Optic fibre cable supplier, Hawk, is currently working on a process for conducting a live entry into a water main. Once achieved, trials will commence across a number of water corporations and pipe types, sizes and materials.

Trials are likely to commence in late 2016.
Concrete pipe testing

A strategic assessment and business case has been submitted, pending approval, for a joint project between IWN and Latrobe Uni to undertake concrete pipe testing on sewer mains.

The testing will be undertaken while the main is still in use and will involve a small tractor that travels through the pipe and can test the density of the concrete wall at different intervals.

If approved, trials will commence in 2016 in collaboration with interested water corporations.

p-CAT detection

The University of Adelaide has developed technology that enables the non-invasive diagnosis of pipeline condition over long distances along a pipeline, with minimal disruption of current services.

The technology is based on analysing data from the generation of a small transient wave (approximately 75kpa).

p-CAT analysis uses two main techniques for interpreting the results from the transient pressure wave tests:

1) Sub-Section Partitioned Wave Speed Analysis for assessment of the level of deterioration in a sub-section
2) Localised Fault Detection of significant anomalies such as air pockets and blockages

The theory has been developed into non-invasive techniques to determine the interior condition of pipelines (corrosion, cement mortar lining spalling), locations of: leaks, air pockets & blockages, the sealing status of valves, closed valves and cross-connections.

Detection Services Pty Ltd owns the commercial rights to the technology, which is suitable for all pipe types with the exemption of PVC & PE.

Recommendation

p-CAT can be a business as usual tool for pipe condition assessment with consideration for other technologies to refine the 10m area to pinpoint the pipe integrity issue.

The Intelligent Water Networks program is a partnership between VicWater, 17 Victorian water corporations and the Department of Environment, Land, Water and Planning (DELWP), investigating new technologies and innovations to meet common challenges such as population growth, ageing infrastructure and climate variability in a more efficient manner.