Case Study: Pressure and Leakage Management Plan

Overview

Council has developed a Pressure and Leakage Management Plan to divide Ballina Shire's water network into 'Pressure Management Zones' and 'Demand Management Zones'. This has allowed Council to better monitor and control the underground water network, achieve savings through reduced water loss and improve environmental performance through a more efficient water distribution network.

Initial trials in three locations, and resulting repairs, led to combined annual water savings of 134 ML; an amount equivalent to 40 Olympic sized swimming pools.

A business case analysis evaluated the benefits of rolling out additional infrastructure that would place 90% of the water supply network under direct flow monitoring and 65% under pressure control. Works were completed and commissioned in October 2015.

Background

The trial of infrastructure was initiated as part of the NSW Water Loss Management Program 2006 - 2011 (administered by the NSW State Government). Three trial zones were constructed at West Ballina, East Ballina and Lennox Head and were completed in 2012. Council then completed a desktop planning and business case study aimed at expanding the existing pressure and leakage management scheme.

A constraints analysis determined that it was possible to develop a total of nine Pressure Management Zones and three Demand Management Zones in Ballina's drinking water network. The estimated leakage savings were quantified using the Water Service Association of Australia's latest LAPMET software (Version 1A) and Ballina Shire Council's historical water balances and burst records.

Pressure Management Zones and Demand Management Zones are each equipped with a flow meter, pressure monitoring and telemetry. Pressure Management Zones also have a pressure reduction valve. The reduction of pressure acts to reduce water loss through leaking joints/cracks etc. By monitoring flow meters and pressure, significant mains breaks and slowly deteriorating leaks are able to be detected.
Implementation

The project included decision gates at the end of each phase, which allowed Council to determine if the project would proceed. Council's elected body reviewed the business plan during the concept phase and supported the project. A Review of Environmental Factors was prepared as part of the design phase and reviewed by Council’s regulatory team, which determined there were no matters of concern for the project. The cost estimate indicated that infrastructure would return a satisfactory net present value.

In construction, Council appointed their own internal construction team to undertake a portion of the works (the "boundary valves"). This drove an improved understanding of the project and of the water supply network by Council's operational staff. It also prevented contract risks arising where there was uncertainty concerning the network configuration.

Timeframes, budgets and project partners are described below:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Date completed</th>
<th>Budget</th>
<th>Project partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial</td>
<td>2012</td>
<td>State-govt funded</td>
<td>State Government, Wide Bay Water</td>
</tr>
<tr>
<td>Concept</td>
<td>2013</td>
<td>$60,000</td>
<td>Wide Bay Water</td>
</tr>
<tr>
<td>Design</td>
<td>2014</td>
<td>$150,000</td>
<td>Cardno</td>
</tr>
<tr>
<td>Construction</td>
<td>2015</td>
<td>$1.3M</td>
<td>Ledonne</td>
</tr>
<tr>
<td>Operational</td>
<td>Ongoing</td>
<td>Under Investigation</td>
<td>Heaton Plant and Pipeline</td>
</tr>
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Outcomes

The project met the following objectives:

- **Return on investment** - the business case identified a payback period of 3 years, with ongoing savings resulting in reduced operating costs for the network.

- **A more water efficient distribution network** - Ballina Shire Council previously ranked poorly against similarly sized water utilities with respect to rates of water loss. As a result of the project Council has been able to demonstrate a trending decrease in water loss.

- **Increased monitoring and control of the water distribution network** - Council is now able to use real-time data to uncover short and long term trends in asset performance, which can be used to inform strategic asset management processes.

- **Improved response times to water outages** - Council is able to initiate responses to abnormal events such as a water outage or low pressure prior to direct community notification.

- **A more resilient water supply** - demand reduction targets during drought periods can be supported with targeted infrastructure assessment and renewal, thereby helping to ensure that Council's water network is not contributing to unavoidable water use.

With this new infrastructure in place, Council has since been able to:

- Undertake repairs to infrastructure, such as the Smith Drive water main renewal, resulting in water savings of approximately 100 ML/year.

- Reduce pressure in some areas, for example in West Ballina where water savings of 20ML/year were achieved.

- Commence zone-by-zone acoustic surveys of water mains in order to pinpoint leaks and further reduce water loss in other areas, e.g. Owen Street, Ballina.
Key Learnings

Council has learned how to target its operational and capital programs to under-performing assets by periodically reviewing trends in water loss and targeting that zone for additional inspection.

Field staff accessing real-time data for asset management purposes is a key outcome of the work to-date. Systems have been put in place which have resulted in other asset data being more readily available, for example the historic performance of sewage pumps in wet weather. Council is continuing to develop its asset management practices with regard to integrating it with real-time information.

New resources are now available to support field investigations for water loss (e.g. the CENTROC/Water Directorate Water Loss Publication) and this is helping to transfer knowledge of these techniques to operational staff, who will play a key role in the ongoing success of the program.

Now that real costs and benefits are emerging, Council intends to consider the extension of the infrastructure into other areas which were not previously considered economically viable.

If embarking on a similar project, a more concerted effort should be made to train staff in water loss management at the front end of the project to help guide their input into the nature of the infrastructure. This training could be delivered through site visits to similar facilities.

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This project was the 2016 winner of the Water Conservation Award at the LGNSW Excellence in the Environment Awards