



PROJECT SUMMARY

Organization

Brisbane Water

Solution

Water and Wastewater

Project Objective

- Ensure the delivery of the pressure and leakage management program and maintain the Brisbane water network's fire fighting capacity

Products Used

- WaterGEMS®

FAST FACTS

- Brisbane Water's goal was to implement two potentially conflicting strategies (WSSCI program and Pressure and the Leakage Management program)
- Brisbane Water selected WaterGEMS after exhaustive reviews and project trials
- The WaterGEMS fire flow capabilities include automated fire flow to determine available fire flow availability, and fire flow results browser and color and size coding for easier and faster results interpretation

MAINTAINING FIRE FIGHTING CAPACITY WHILE MANAGING PRESSURE TO REDUCE LEAKAGE AT BRISBANE WATER

Brisbane Water is one of Australia's largest utilities, providing water and wastewater services to the city of Brisbane's 1 million residents and drinking water to an additional 1 million people in southeast Queensland. The utility was recently challenged by the need to accelerate two high-priority programs involving potentially conflicting drivers: a capacity improvement program to guarantee an acceptable level of fire fighting capacity, and a leakage management program that would help maintain reliable water supplies under the record drought affecting southern Australia. Utility engineers used WaterGEMS to deploy a rigorous hydraulic model to find operational scenarios that would satisfy the goals of both programs.

CONFLICTING REQUIREMENTS

The Water Supply System Service Capacity Improvement (WSSSCI) program was conceived to improve the city's fire fighting capacity to comply with Brisbane Water's performance targets. The work consists primarily of augmenting or replacing existing small-diameter (3-, 4-, and 6-inch) pipes, particularly in older areas that comprise dense developments of wooden structures from the early 1900s.

The Pressure and Leakage Management program is one response to the long-term drought that has caused a water crisis in southeast Queensland. The program aims to decrease water losses by reducing water pressure, thereby decreasing the leakage rate through small defects that occur in pressure pipe networks. The strategy involves breaking the network grid into discrete District Metered Areas (DMAs) of 500 to 3,000 properties each, helping city engineers to pinpoint leaks and prioritize and schedule repairs. It also supports separation of high-pressure from low-pressure areas, allowing for pressure modulation for certain pressure-sensitive areas.

However, because the formation of the DMAs requires numerous boundary valves to be closed, managing pressure and leakage could have a major impact on the WSSSCI program and Brisbane's

ability to fight fires. As a result, the utility had to deploy a rigorous desktop fire flow modeling solution to perform the DMA design and verification to ensure fire-fighting performance was not compromised.

BRISBANE WATER'S SOFTWARE SELECTION: WATERGEMS

Faced with this challenge, Brisbane Water needed a software solution that would enable it to conduct numerous and frequent fire flow simulations without incurring large overheads and significant project delays. The utility tested several water distribution modeling packages and found WaterGEMS to be the best solution for its needs.

Ben Wilson, Water and Sewerage Strategic Planner at Brisbane Water, explained, "WaterGEMS was implemented in parallel with a program of system improvement, particularly in checking and correcting the underlying GIS data and process automation. As part of this effort, the Network Navigator connectivity-checking tools in WaterGEMS found and corrected the majority of these errors to which fire flow analysis models are extremely sensitive. The implementation of the software was an unqualified success."

FIRE FLOW MODELING AND ARCGIS INTEGRATION

With the help of WaterGEMS, Brisbane Water has in a short period of time been able to transition to a process of routine fire fighting analyses by all modelers across a wider range of applications, with answers often being available in minutes. At the top of page 2 is a comparison table prepared by Brisbane Water summarizing the improvements after implementing WaterGEMS for fire flow modeling.

Today, fire flow modeling in WaterGEMS is more efficient than ever. Wilson explained, "Traditionally, fire flow investigations are one of the most labor-intensive types of water modeling analysis. Previously, separate manual runs often took

“Brisbane Water’s implementation of the WaterGEMS water modeling solution was an unqualified success.”

ABOUT BENTLEY

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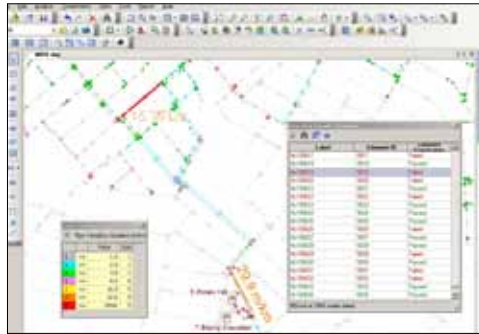
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Fire Flow modelling BEFORE WaterGEMS	Fire Flow modeling AFTER WaterGEMS
Complex: Required a number of model preparation steps prior to running the program.	Simple: All master models are pre-set with a complete suite of fire flow analysis scenarios.
Infrequent analysis: Intensive level of effort per run was an impediment to regular processing.	Frequent Analysis: Far more accessible, allowing incorporation into nearly all regular planning, investigations, and designs.
Required high skill levels: Limited to a few modelers with previous experience in setting up, running, and extracting results.	Lowered required skill levels: All modelers, regardless of skill set, can use it.
Time consuming: More than 24 hours to receive simulation results.	Time efficient: Simulation results received in minutes.

hours to set up, run, and save for each critical network location. The WaterGEMS Fire Flow Results Browser is a powerful new feature that significantly reduces these overheads. In a single fire flow simulation our engineers immediately determined where and why the water network had failed to meet the desired standards of service.”



The Fire Flow Results Browser was used to identify why capacity shortfalls occur. Note the high headloss gradients in the distribution main downstream of the reservoir, and the 3” local reticulation main, for the selected fire event.

In addition, WaterGEMS model results can be read directly inside ESRI’s ArcGIS, one of the four platforms (stand-alone, AutoCAD, and MicroStation®) WaterGEMS supports out of the box. The ArcGIS integration allows a network model and its results to be overlaid on rich background maps and layouts, eliminating the need to import or export model results.



The WaterGEMS integration with ArcGIS allows users to analyze their network directly inside ArcGIS and to overlay model results in ArcGIS for presentation.

PRACTICAL APPLICATIONS

Fire fighting analysis is now a necessary part of almost all studies, investigations, and designs that Brisbane Water carries out, including:

- Master planning and long-term infrastructure plans – all new master plans now analyze fire-fighting capacity (not carried out previously due to modeling difficulties);
- Fire-fighting risk assessments and works prioritization – carried out under Brisbane’s WSSCI program;
- Operational investigations – A newly acquired ability to quickly gauge and report the impact on fire-fighting capacity from proposed re-zoning, valve openings or closings, or water main maintenance operations.

Wilson added, “Brisbane Water’s implementation of WaterGEMS was an unqualified success. It met our aim of maintaining reliable water supplies under the ongoing drought, while helping to ensure community fire safety”.

“We estimate that we will save about half a million dollars in planning and design overheads in the long term. In optimized capital works, we expect to save tens of millions of dollars, because we are able to run more analyses within the available timeframe leading to optimized design.”



The WaterGEMS thematic mapping capabilities show the available fire flows that helped it to identify critical locations and to discover that the general capacity shortfall occurred in this zone’s northern supply area.