CASE STUDY

Bentley Helps Barwon Water Save Nearly $120,000 per Year on Fire-Flow Reports

WaterGEMS-GIS Integration Provides Australia Water Authority Immediate Access to Flow-and-Pressure Information

Project Summary

Organization:
Barwon Region Water Corporation

Solution
Water and Wastewater

Location
Victoria, Australia

Project Objectives

- Integrate WaterGEMS models with Barwon Water's existing GIS
- Create and sync new flow-and-pressure data layer in GIS
- Provide instant access to fire-flow information requested by customers

Products Used
WaterGEMS

Fast Facts

- Barwon Water's in-house modeling team built WaterGEMS models from scratch
- WaterGEMS' ModelBuilder support for Oracle Spatial enabled integration with Barwon Water's GIS
- WaterGEMS fire-flow analysis tool populated the GIS flow-and-pressure data layer

ROI

- Barwon Water delivered the project for $45,000 using internal resources
- Over a three-year period, the fire-flow analyses will save $230,000 in field tests
- Instant access to fire-flow data will save $165,000 in man-hours over three years
- Net savings over three years are expected to exceed $350,000

Water Storage Level Less Than 20 Percent

Barwon Region Water Corporation (Barwon Water) provides potable water, sewerage, and recycled water services to more than 275,000 people across 8,100 square kilometers in Victoria, Australia. Its $1.2 billion asset base includes 10 major reservoirs, 10 water treatment plants, and nine water reclamation plants as well as more than 6,000 kilometers of pipes. From 2006–2010, the state suffered a drought that reduced water storage levels to less than 20 percent. Water use was restricted, and the danger of fire was high. To provide instant access to the fire-flow information needed for adequate fire protection, the company integrated its geographic information system (GIS) with Bentley's WaterGEMS® water distribution modeling and analysis application. The solution reduced fire-flow reporting time by 93 percent and saved Barwon Water more than $120,000 per year.

Hydraulic Modeling History

In the mid 1990s, Barwon Water recognized the value of hydraulic modeling for managing its vast water network. The company began building models using WaterCAD®, Bentley's water distribution modeling program. All zones were completed in 2006, and the models were primarily used by the planning department.

These early models were assembled semi-automatically and updated manually only as needed because they were both labor-intensive and costly exercises. This led to their becoming outdated and under utilized by other departments. Another drawback was that element identifiers in the models bore no relationship to element identifiers in Barwon Water's GIS. (GIS element identifiers, known as GIDs, are used as general identifiers across the organization.)

Rebuilding from Scratch

In 2009, Bentley introduced Barwon Water to the WaterGEMS and Oracle Spatial integration technology, which would make model updating faster and easier. WaterGEMS is a comprehensive and easy-to-use water distribution modeling application that can run from within ArcGIS, AutoCAD, and MicroStation®, or as a stand-alone application. And because WaterGEMS builds on WaterCAD's water distribution modeling, users can easily upgrade to WaterGEMS to gain advanced modeling capabilities.

Although they could use their WaterCAD files in WaterGEMS as the two share the same file structure, based on the potential benefits to the organization, the modeling team decided to rebuild their out of date hydraulic models from scratch using WaterGEMS. After some trial-and-error, and with assistance from Bentley Technical support, the team also successfully implemented the integration technology. The integration project put the models and the GIS in sync and gave them shared element identifiers. The WaterGEMS models can pull data from the GIS database, run various scenarios, and then push data back to the GIS database.

Model updating is now done quickly and regularly. Instead of the 2 to 3 weeks it took to update the early models, the WaterGEMS models take just 2 to 3 hours to update. This has created opportunities to provide information to whole new categories of users for diverse applications. One such application is generating water flow-and-pressure test results.

Field-Test Limitations

Water flow-and-pressure tests were traditionally performed in the field but only indicated instantaneous pressures, not the 95 percent pressures simulated over 24 hours of flow as required for fire-protection planning. Field tests also wasted water resources that must be conserved under water restrictions, as well as caused losses associated with non-revenue water.

The use of hydraulic modeling reduced the need for field tests but still consumed time and resources. When customer service received a request for flow-and-pressure test results, the asset planning department identified the location on the models, ran a simulation, and prepared a report. Customer service then used the report to prepare an official reply for customers. This process typically took 7 to 14 days. The information, in turn, was used by customers for fire protection system design.

Slow Response Times

The Country Fire Authority, a volunteer community-based fire and emergency organization serving 20 districts throughout Victoria, requires property owners to obtain accurate water

The benefit from this project is exceeding what we originally planned. The WaterGEMS layers in our GIS have become a valuable tool in Barwon Water for the Asset Planning, Customer Service, and Operations departments."

—Ririn Erinawati, Senior Engineer – Modeling Services, Barwon Region Water Corporation

flow-and-pressure test information as the basis for design of fire protection systems. In the port city of Geelong, for example, inadequate fire flow made it necessary for developers to provide on site water storage for fire protection. Inaccurate results could lead to customer complaints, faulty designs, fire damage or casualties, and/or legal action.

During the four-year drought, Barwon Water was hard pressed to keep up with customer requests for flow-and-pressure information. The company had been receiving such requests about once a month, but that number increased to 6 to 8 per week. Each enquiry required the modeling team to run at least five scenarios, which was a time-consuming task using the early models. Customer service was required to respond to each request within 14 days, but limited resources made it impossible to run scenarios and prepare reports in that amount of time. This inevitably led to customer complaints.

Fire-Flow Data Layer

To provide accurate information in a timely fashion, Barwon Water needed a more streamlined process. The solution was in the integration between the WaterGEMS models and the Barwon Water GIS. Fire-flow test results generated by the hydraulic models could be exported to the GIS, where the data could be made more readily available.

The GIS staff created special Oracle tables called "GEMS tables" for flow-and-pressure data. The modeling team used the WaterGEMS fire-flow analysis tool to run a fire-flow analysis on every node in the network, with six defined flows for each node [5 liters per second (L/s), 10 L/s, 15 L/s, 20 L/s, 25 L/s, and 30 L/s]. Using ModelBuilder, the results were exported to the Oracle database. This process, called "sync out," writes new data to the GEMS tables but does not affect data in other tables, which have read-only access.

By creating a new flow-and-pressure data layer in the GIS, this project enabled the hydraulic models to pull current data from the Oracle database, run fire-flow analyses, and then push the updated fire-flow test results back to the GIS database. Barwon Water GIS users simply hover their mouse pointer over a fire-flow node on the GIS to prompt the results to appear. Double clicking a node generates the fire-flow graphs and tables.

Better Customer Service

The successful two-way integration of WaterGEMS and the Barwon Water GIS allows WaterGEMS to import water network information from the Oracle database, as well as export information back to the database. This capability ensures that GIS users throughout the company get up-to-date hydraulic modeling results.

Customer Service can now access flow-and-pressure information directly through the GIS (see figure 1) and, with the click of a mouse, provide instantaneous reports to customers. This eliminates the need for the Asset Planning department to be involved and shortens turnaround time for processing requests from more than two weeks to one day or less. Customer service can also answer other questions about system capacity without help from the modeling team. The Barwon Water customer service coordinator noted, "The WaterGEMS layers are real 'gems'."

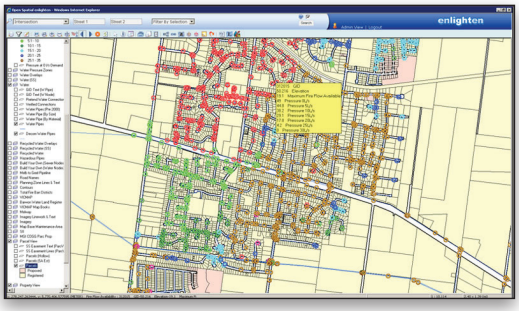

Figure 1: Barwon Water now accesses flow-and-pressure information through the GIS.

More Layers, More Applications

This project has opened the door to the distribution of modeling results to different departments, further streamlining their operations. Four layers have been created in the Barwon Water GIS since the project's completion: summer pressure, critical pipe, minimum velocity, and maximum velocity (see figure 2). These layers are useful tools for assessing overall system performance, and the users do not need any special training or modeling expertise to apply the data.

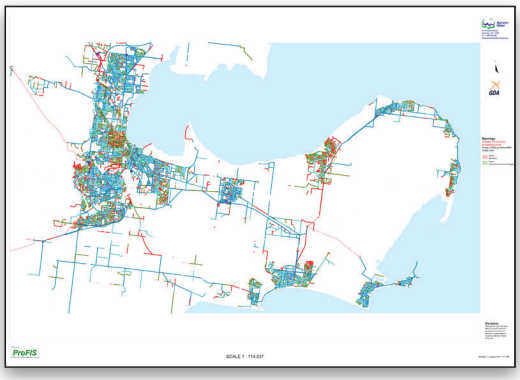

Figure 2: An illustration of the maximum velocity data layer, one of four layers created in the Barwon Water GIS.

Barwon Water is also working to make the GIS available to the public online. A web-based portal could reduce the need for customer service to be involved in providing fire-flow information and fulfilling other information requests.

Unexpected Savings

Barwon Water completed this project at a cost of just $45,000 by using internal resources. The company plans to update the flow-and-pressure data layer every three years for about the same cost. Over each three-year period, the project will eliminate about $230,000 in field tests. The asset planning department will save about $110,000 in man-hours, and customer service will save about $55,000 in man-hours. The reduction in field tests will also save Barwon Water $6,600 in non-revenue water. As a result, the net savings over three years will be about $356,600 – far exceeding what Barwon Water originally planned.

Bentley Sustaining Infrastructure