



Unlock Hidden Savings

A Guide for Growing Water Utilities



Table of Contents

- + **Conservative Designs and Estimation – Are You Saving or Losing Money? ▶**
- + **Challenges Aided by Hydraulic Analysis ▶**
- + **The Value of a Good Analysis Solution ▶**
- + **Scope of Improvement ▶**
- + **Analysis Features Used by Utilities to Save Time and Money ▶**
- + **What is OpenFlows™ WaterGEMS®? ▶**
- + **Conclusion ▶**



Conservative Designs and Estimation – Are You Saving or Losing Money?

Water distribution systems supply communities with the vital service of water. Composed of pipes, pumps, valves, and reservoirs, these systems are designed to deliver water at adequate pressures and volume, meeting comprehensive quality standards.

The cost of operating and maintaining these systems is significant. Most utilities collect information about their system assets but may not be strategically using that information to highlight inefficiency, optimize design and operation, or reduce energy consumption and cost.

While large utilities and complex projects often emphasize hydraulic analysis as a means to improve and optimize efficiency, smaller utilities too often label modeling software and effort as costs rather than as investments with distinct returns.

Many smaller utilities consider hydraulic analysis to be complex, costly, and unnecessary while ignoring the reality that a few minutes spent at a computer will enable better decision-making and help reduce costs related to design, operation, and maintenance.



In fact, due to their tighter budgets and shorter project deadlines, small utilities and consultants have the greatest need for the efficient workflows from hydraulic analysis software.

Often, we see engineers who still use conservative design or estimation approaches under the guise of saving costs. However, the costs of these workflows are hidden as conservative designs lead to inefficient operation, increased construction costs, and poorer service quality.

The perceived fixed cost savings on the initial project can cause much more significant recurring expenses during operation.

The good news is that when utility staffs utilize advanced hydraulic analysis software like Bentley's OpenFlows WaterGEMS, they can benefit from intuitive and automated methods that can significantly reduce overall costs.

Cost savings may be realized instantly during design when advanced tools provide better and faster capacity estimates and pump specifications. These savings could be realized in the long term with better service quality and lower operational costs.

Challenges Aided by Hydraulic Analysis

There are numerous challenges faced by growing utilities that can be efficiently addressed by using hydraulic modeling.

- **Ensuring Capacity:** Engineers need to ensure they have sufficient capacity and fire flow for new developments; the pipes used for system expansion must be sized large enough to provide adequate capacity while not too large to create service deficiency, poor water quality, or operational inefficiency.
- **Pump Specification and Operation:** Engineers must also determine when to replace old pumps as well as when to specify new pumps, often weighing the service benefits of variable speed pumps versus the increased operational costs needed to run and maintain them. To maximize energy efficiency in both cost and usage, pumps must be designed and operated correctly.
- **Reservoir Optimization:** Reservoirs must also be optimized to meet standard service levels while providing emergency supply volume without creating conditions for poor water quality.





- **Capital Budget:** Regulators continue to develop and enact requirements for asset inventory and assessment of risk and performance. Utilities must prepare capital budgets and master plans, with increasing scrutiny on justifying not only costs, but selection of projects.
- **Operation Criticality:** Utilities must assess where they are vulnerable and how they can mitigate issues like main breaks, fires, and disinfectant byproducts. These are dependent on valves, storage and pumping, and pressure zone settings and boundaries.
- **Reduce Water Waste:** With ongoing global concerns over preserving and sustaining water supply sources, utilities are striving to reduce non-revenue water. Hydraulic analysis can help estimate both the quantity and relative location of non-revenue water including leakage, deteriorating meter quality, and unallocated water use.

These are just a few of the issues where hydraulic analysis is paramount for making the right decision and save costs.

Without detailed analysis, decision-makers end up resorting to conservative methodology, inaccurate or inadequate data, and guesswork.

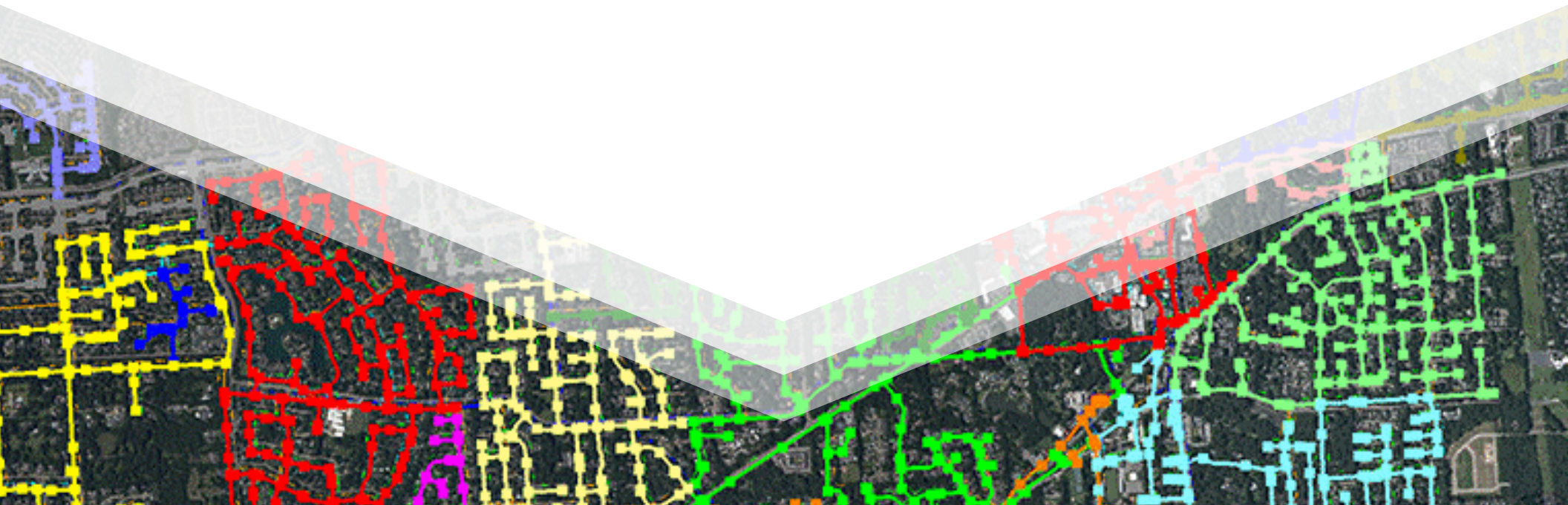
The Value of a Good Analysis Solution

Large water utilities often have engineering staff devoted to hydraulic analysis, or they hire consultants with extensive expertise in modeling.

Smaller utilities typically do not have these luxuries. If they have an engineer on staff who can perform hydraulic analysis, that resource may have too many other day-to-day responsibilities to spend time constructing or maintaining a hydraulic model, particularly considering the lack of features and support in lower quality software.

Similarly, consultants working with these utilities must also be extremely cost-efficient. They often need to deliver projects in tight deadlines. The faster they learn using the tool, the faster they deliver the projects and eventually, they can spend more time prospecting or working in newer projects. This is where a small investment in a highly efficient software like Bentley Systems' OpenFlows WaterGEMS can deliver a very quick return on investment.

- Using **automated model building** features and existing asset information in record drawings, GIS, and data tables reduces the time needed for model construction and maintenance.
- Using the **power of analysis** will lead to better decisions that also reduce costs. For instance, an oversized pump may not only cost more to buy and install than a correctly sized pump but it will continue to bleed energy and maintenance costs year on year when running at a low efficiency point that causes faster equipment degradation.
- Small **tweaks to system operations** can result in dramatic savings - lower energy costs, less water lost, and avoidance of water quality issues, to name a few. A model can point to where those savings can be found.





A hydraulic model may seem like a costly luxury, but an investment of a few thousand dollars actually results in much larger savings over time as modeling is used to optimize new construction, existing asset renewal, and system operations.

When small utilities do not have the resources to perform modeling themselves, they can rely on their engineering consultant who can serve multiple small utilities using an efficient tool to get answers inexpensively.

Consultants that use OpenFlows WaterGEMS can use efficient, automated workflows to get accurate decision information quickly.

The cost of high-quality software pays for itself by saving engineering labor expenses plus providing better information to support decisions.

Both the water utility and the consultant come out ahead when they use software that makes their work more efficient and effective.

Scope of Improvement

Modeling and analysis help with planning for and adapting to growth. Utilities need to be efficient and focused with capital and operation expenses – the projects they choose and the assets they renew must be those that provide the most benefit when evaluating the risk of failure, the consequences of failure, and the overall system benefits of replacement.

Many small utilities are reactively replacing assets that fail when hydraulic analysis could aid a proactive strategy that is far more cost effective in the long term.



Analysis Features Used by Utilities to Save Time and Money

- **Scenario management:** Quality software can efficiently evaluate several designs and compare the results or analyze operations of an existing system under numerous extreme and typical conditions. In OpenFlows WaterGEMS, scenarios and alternatives are based on a parent/child relationship, making the analysis process efficient and flexible. Changes undertaken during a dynamic design process do not have to be made and validated in several locations, but rather cascade through the hierarchy of the project.
- **Easy model building:** Jumpstart the model-building process and manage your model effectively to make the best engineering decisions. You can leverage and import many well-known external data formats, which maximizes the return on investment for geospatial and engineering data and automates input data generation. OpenFlows WaterGEMS can leverage numerous electronic data sources and enable flexible operations within CAD and GIS platforms, allowing access to and comparison with record drawings and live GIS asset and background data.
- **Criticality analysis:** OpenFlows WaterGEMS enables you to include all valves in a hydraulic model without increasing the number of pipe elements or degrading performance. Find the weak areas or links in water distribution systems and assess the adequacy of isolation valves. Evaluate the ability to isolate portions of the system, generate network segments, and serve customers using different valve locations.



- **Fire flow analysis:** Access and identify inadequacies in fire protection and design improvements to meet fire flow and protection requirements. You can modify the sizing and location of pipes, pumps, and tanks in order to meet fire flow and protection requirements. OpenFlows WaterGEMS includes automated fire flow analysis tools so that you do not have to manually create scenarios and iterations to evaluate every hydrant location.
- **Pump Optimization:** Model pumps accurately using hydraulic modeling, including complex pump combinations and variable speed pumps, to understand the impact that different pump operational strategies have on energy usage. You can minimize energy related to pumping costs while maximizing system performance. OpenFlows WaterGEMS has several features that enable this analysis, including the ability to generate a quick comparison of a pump's operation to its intended design and efficiency.
- **Assess Water Quality:** Carry out water quality analysis easily using simulations to help solve water quality problems. You can create water quality simulations for chlorine decay, water age, source tracing, and multispecies analysis (MSX). OpenFlows WaterGEMS enables comprehensive thematic display of the results, both within and apart from GIS platforms, to get a clear understanding of how and where problem areas develop in your system.
- **Flushing Analysis:** Optimize flushing programs with multiple conventional and unidirectional flushing events in a single run. Increasing velocity in mains can flush out solids and stale water, with the primary indicator of success being the maximum velocity achieved in any pipe during the flushing operation. OpenFlows WaterGEMS includes automated tools for flushing analysis, including the ability to print a sequenced report for use in the field.
- **Great visualization:** You can use tools such as color coding, annotation, profiling, and graphing to create a better visualization experience in your modelling application. The ability to easily implement background images such as Bing Maps helps you create and present information in an interesting way.

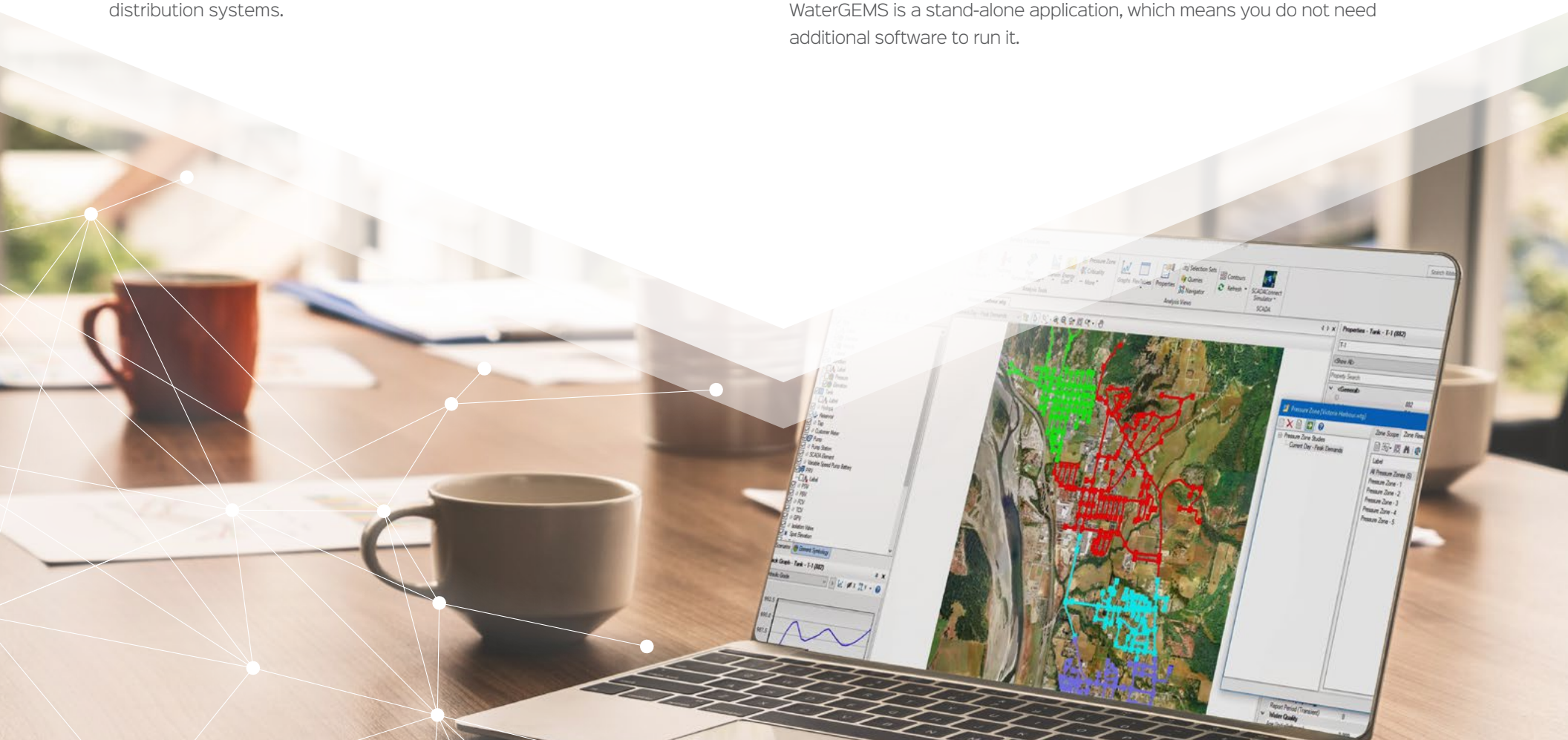
What is OpenFlows WaterGEMS?

OpenFlows WaterGEMS is a hydraulic modeling application for water distribution systems and features advanced interoperability, geospatial model building, optimization, and asset management capabilities.

From fire flow and water quality analyses to energy consumption and capital cost management, OpenFlows WaterGEMS provides an easy-to-use environment for engineers to analyze, design, and optimize water distribution systems.

Hydraulic modeling can be used as a reliable decision support tool across a wide range of projects, from the design of a new system and pipe replacement to operation and emergency response.

Integration of your hydraulic modeling software with the leading GIS and CAD platforms will enable your staff to work in an already-familiar environment and expedite both learning the software and generating useful results. OpenFlows WaterGEMS is a stand-alone application, which means you do not need additional software to run it.



Conclusion

We often encounter growing utility companies that initially relied on conservative methods for design and operation, or even basic hydraulic analysis software. These utilities were happy with these methods until they realized what they were missing out on.

No matter the size of your business, it requires efficient technology applications to grow.

If you are not using hydraulic analysis, every day may be costing you extra through wasted time and service inefficiencies. When evaluating tools, remember to consider the long-term expenses that come from a short-term savings.

[Learn more about OpenFlows WaterGEMS](#)

OpenFlows Utilities WorkSuite offers a 40% discount on our two most popular OpenFlows products if bought together – OpenFlows WaterGEMS to analyze, design, and optimize your water distribution systems and OpenFlows SewerGEMS® to plan, design, maintain, and operate sanitary and combined sewer systems.

[Learn more about Utilities WorkSuite](#)

About Bentley Systems Bentley Systems (Nasdaq: BSY) is the *infrastructure engineering software company*. We provide innovative software to advance the world's infrastructure – sustaining both the global economy and environment. Our industry-leading software solutions are used by professionals, and organizations of every size, for the design, construction, and operations of roads and bridges, rail and transit, water and wastewater, public works and utilities, buildings and campuses, and industrial facilities. Our offerings include *MicroStation*®-based applications for modeling and simulation, *ProjectWise*® for project delivery, *AssetWise*® for asset and network performance, and the *iTwin*® platform for infrastructure digital twins. Bentley Systems employs more than 4,000 colleagues and generates annual revenues of more than \$800 million, in 172 countries. www.bentley.com

