



# WATERGEMS®

## WATER DISTRIBUTION MODELING AND MANAGEMENT

WaterGEMS is a hydraulic and water quality modeling solution for water distribution systems with advanced interoperability, geospatial model-building, optimization, and asset management tools. From fire flow and constituent concentration analyses, to energy consumption and capital cost management, WaterGEMS provides an easy-to-use environment for engineers to analyze, design, and optimize water distribution systems.

### One Product. One Model File. Four Environments

WaterGEMS users enjoy the power and versatility afforded by working across CAD, GIS, and standalone platforms while accessing a single, shared, project data source. With WaterGEMS utilities and consultants have built-in support for four interoperable platforms, all packaged together in a single product. No need to choose because all platforms are included:

- Windows Stand-alone for ease of use, accessibility, and performance
- ArcGIS for GIS integration, thematic mapping, and publishing
- MicroStation® for bridging geospatial planning and engineering design environments
- AutoCAD for convenient CAD layout and drafting

Utilities and consultants can share a single dataset using different interfaces, and modeling teams can leverage the skills of engineers from different departments. Engineers can flatten learning curves by choosing the environment they already know and provide results that can be visualized on multiple platforms.

WaterGEMS ArcGIS interface allows GIS professionals to leverage ESRI's geodatabase architecture to guarantee a single dataset for modeling and GIS. They can create, edit, calculate, and visualize WaterGEMS models directly from ArcMap with full access to every hydraulic modeling tool, as well as geoprocessing features that streamline the model-building process.

### Geospatial model-building tools

Engineers can leverage geospatial data, CAD drawings, databases, and spreadsheets to jumpstart the model building process. WaterGEMS provides synchronized

database connections, geospatial links, and advanced model-building modules that connect with virtually any digital data format.

WaterGEMS included LoadBuilder™ and TRex™ modules help engineers allocate water demands and node elevations based on geospatial data found in shapefiles, geodatabases, various types of DEMs, and even CAD drawings. These modules help engineers avoid potential manual-input mistakes and streamline the model building process.

WaterGEMS also provides drawing and connectivity review tools to guarantee a hydraulically coherent model. Skelebrator® automatically removes network complexity, while maintaining hydraulic equivalence, to efficiently tackle a wider range of modeling applications.

### Optimized model calibration, design, and operations

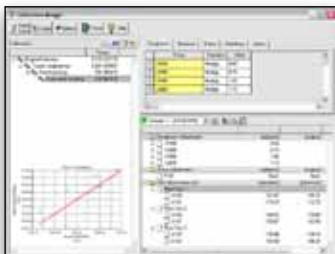
WaterGEMS includes state-of-the-art genetic algorithm optimization engines for automated calibration, design, and rehabilitation. Darwin® Calibrator lets users quickly find a calibration hypothesis that best matches measured flows, pressures, and element status. This empowers users to make reliable decisions based on accurate hydraulic simulation of the real world, Darwin Calibrator evaluates millions of possible solutions to return the best possible calibration hypothesis. Darwin® Designer automatically finds maximum benefit or minimum-cost designs and rehabilitation strategies, based on capital investment, reposition cost, and pressure and velocity constraints. Engineers can also manage infrastructure capital cost, and analyze energy consumption to identify the most energy-efficient pump scheduling strategy.



*ArcGIS, AutoCAD, MicroStation, and stand-alone environments within one single product*



*Use LoadBuilder to allocate demands using customer meters, service polygons, and more.*



*WaterGEMS' Darwin Calibrator module saves time and money by quickly giving you a calibrated model*

## WATERGEMS SYSTEM REQUIREMENTS

### Processor:

Pentium III at 1 GHz  
(recommended: Pentium 4 at 1.2 GHz)

### Operating System:

Windows Vista, Windows XP,  
and Windows Server 2003

### Memory:

256 MB (384 MB recommended, 1Gb  
recommended for large networks)

### Hard Disk:

500 MB of free storage space,  
with additional room for data files

### Display:

800 x 600 resolution, 256 colors

### Platform pre-requirements:

Stand-alone: none; ArcGIS: 9.3;  
MicroStation: V8i; AutoCAD: 2009

Support for older platform software versions  
is available if required. Contact your Bentley  
representative for details.

## ABOUT BENTLEY

Bentley Systems, Incorporated is the global leader dedicated to providing comprehensive software solutions for sustaining infrastructure. Architects, engineers, constructors, and owner-operators are indispensable in improving our world and our quality of life; the company's mission is to improve the performance of their projects and of the assets they design, build, and operate. Bentley sustains the infrastructure professions by helping to leverage information technology, learning, best practices, and global collaboration – and by promoting careers devoted to this crucial work.

For more information,  
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## WATERGEMS AT-A-GLANCE

### Interoperability, interface, and graphical editing

- One set of files for four compatible interfaces
  - Stand-alone Windows interface included
  - ArcGIS-based interface (ArcMap) included
  - MicroStation-based interface included
  - AutoCAD-based interface included
- Unlimited undo and redo
- Element morphing, splitting and reconnection
- Automatic element labeling
- Scaled, schematic, and hybrid environments
- Element prototypes
- Aerial view and dynamic zooming
- Named views library
- Multiple background-layer support
- Image, CAD, and GIS background support

### Hydraulics, operations, and water quality

- Steady-state simulation
- Extended-period simulation
- Constituent-concentration analysis
- Criticality analysis
- Tank-mixing analysis
- Water-age analysis
- Fire-flow analysis
- Rule-based or logical controls
- Variable-speed pumping, with option to use APEX® (Automatic Parameter Estimation eXtension)
- Sprinkler modeling
- Water loss analysis
- Pressure-dependent demands
- Scenario modeling-based unidirectional flushing

- Source tracing
- Valve modeling

### Results presentation

- Direct ArcMap visualization and mapping
- Thematic mapping
- Dynamic, multi-parameter, and multi-scenario graphing
- Shapefile contouring
- Advance profiling
- Advanced tabular reporting with FlexTables®
- Property-based annotation, color coding and symbology

### Model building and data connection

- Polyline-to-pipe conversion from DXF files
- Spreadsheet, database, and ODBC connections
- Shapefile, Geodatabase, Geometric Network and SDE
- SCADACONnect® available for live data connections
- Automatic demand allocation from geospatial data
- Geospatial demand allocation from customer meters
- Demand allocation from lump-sum geospatial data
- Geospatial-based water-consumption projection
- Daily, weekly, monthly, and superimposed patterns
- Unaccounted-for water and leakage estimation
- Composite demands global edition
- Area, count, discharge, and population-based loading
- Pipe-length-based demand loading
- Elevation extraction from DEM, TIN, and shapefiles

- Elevation extraction from CAD drawings and surfaces
- Series skeletonization of pipes
- Parallel skeletonization of pipes
- Branch-trimming skeletonization
- Multi-criteria automated skeletonization

### Model management

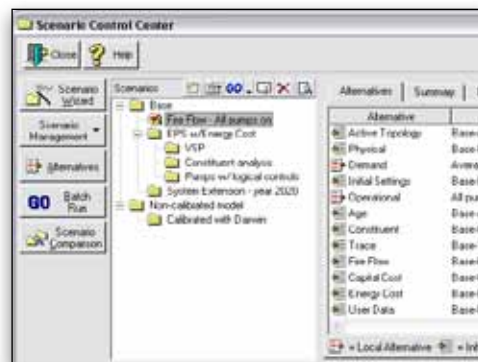
- Unlimited scenarios and alternatives
- Comprehensive scenario management
- Global attribute tabular edition
- Sorting and persistent filtering on tabular reports
- Statistical analysis from tabular reports
- Automated model skeletonization
- Personalizable engineering libraries
- Dynamic and static selection sets
- Local and global engineering-units management
- Sub-model management
- Drawing review tools for connectivity consistency
- Automatic topology review
- Orphaned nodes and dead-end pipes queries
- ProjectWise® XM / ProjectWise® Geospatial Management support

### Optimization (using Genetic Algorithm)

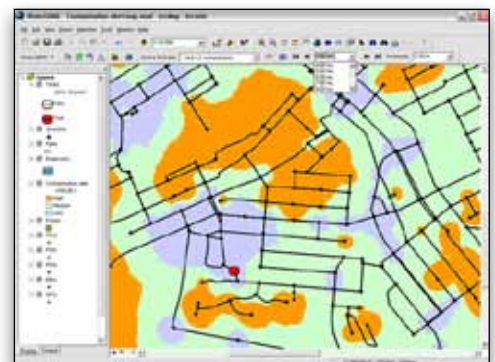
- Automated model calibration with Darwin Calibrator
- Optimized design and rehabilitation with Darwin Designer

### Energy and capital-cost management

- Energy cost analysis
- Capital cost analysis
- Automatic design and rehabilitation



Flip through scenarios from your plan view, FlexTables, contour maps and graphs



Perform constituent, water age, tank mixing, and source trace analysis dynamics in your system