



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.



WaterGEMS runs in its stand-alone platform, but also ArcGIS, AutoCAD, and MicroStation. All 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

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, and pump operations.

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. Darwin Scheduler optimizes the operations of fixed- and variable-speed pumps, and tank storage, to minimize energy usage or energy cost, based on pressure, velocity, pump start, and tank constraints.

System Requirements

Refer to the 'Installation Requirements' section of the WaterGEMS' ReadMe file:

www.bentley.com/WaterGEMS-Spec

Platform pre-requirements:

WaterGEMS runs without platform restrictions as a stand-alone application.

It also runs from within ArcGIS, AutoCAD, and MicroStation. The requirements are also available in the WaterGEMS' ReadMe file.

Find out about Bentley at: www.bentley.com

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WaterGEMS At-A-Glance

Interoperability, Interface, and Graphical Editing

- Runs in four compatible platforms, with one set of files:
 - » Stand-alone Windows
 - » ArcGIS (ArcMap)
 - » MicroStation
 - » AutoCAD
- Unlimited undo and redo
- Element morphing, splitting and reconnection
- Merge nodes in close proximity tool
- 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
- Water quality batch run
- Fire-flow analysis
- Rule-based or logical controls
- Variable-speed pumping, with option to use APEX® (Automatic Parameter Estimation eXtension)
- System head curve for closed system supported
- Leakage and sprinkler modeling
- Water loss analysis
- Pressure-dependent demands
- Scenario modeling-based unidirectional flushing
- Source tracing
- Valve modeling
- Air release valve element
- Top Fill Tank element
- Combination pump curves
- Carbon emission calculation
- Optimization of pipe renewal with Pipe Renewal Planner

Model Building and Data Connection

- Polyline-to-pipe conversion from DXF files
- Spreadsheet, database, and ODBC connections
- Shapefile, Geodatabase, Geometric Network and SDE connections
- Oracle spatial support
- GIS-ID property to maintain associations between records in the source file and elements in the model
- SCADAConnect 25-signal pack for live data connections (from SCADA system)
- 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
- Skeletonization support for isolation valves
- User-data extension, including formula-based

Model Management

- Unlimited scenarios and alternatives
- Comprehensive scenario management
- Global attribute tabular edition
- Pressure zone management
- Automated model skeletonization
- i-model support
- Personalizable engineering libraries

- Sorting and persistent filtering on tabular reports
- Statistical analysis from tabular reports
- 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® / ProjectWise® Geospatial Management support

Results Presentation

- Direct ArcMap visualization and mapping
- Thematic mapping
- Dynamic, multi-parameter, and multi-scenario graphing
- Scenario and element comparison
- Shapefile contouring
- Advance profiling
- Advanced tabular reporting with FlexTables®
- Property-based annotation, color coding and symbology
- Creation of Google Earth (KML) files

Optimization (using Genetic Algorithm)

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

Energy and Capital-Cost management

- Energy cost analysis
- Capital cost analysis
- Automatic design and rehabilitation
- Automated pump scheduling