



WaterGEMS

Water Distribution Modeling and Management

WaterGEMS is a hydraulic modeling application 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.

Superior Interoperability

WaterGEMS users enjoy the power and versatility afforded by working across CAD, GIS, and stand-alone platforms while accessing a single, shared, project data source. With WaterGEMS, utilities and consultants can choose to model from within four interoperable platforms:

- 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 CAD layout and drafting

Modeling teams can leverage the skills of engineers from different departments, and engineers can flatten learning curves by choosing the environment they already know and provide results that can be visualized on multiple platforms.

Streamlined Model Building

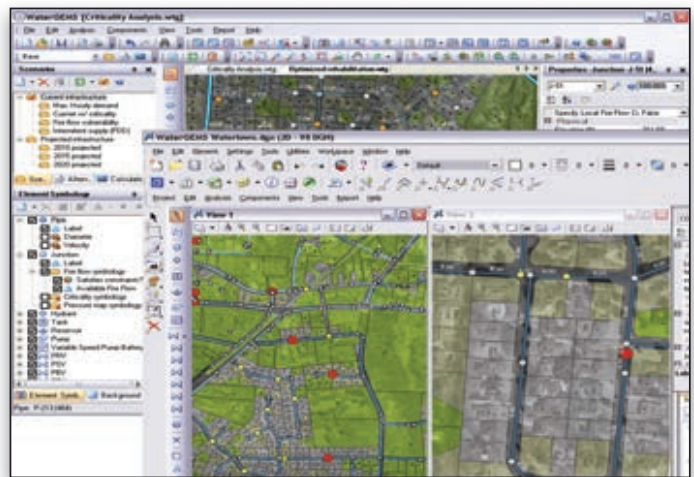
Engineers can leverage geospatial data, CAD drawings, databases, and spreadsheets to jumpstart the model building process. WaterGEMS provides synchronized database connections, geospatial links, and advanced model-building modules that connect with virtually any digital data format.

WaterGEMS includes LoadBuilder and TRex modules to 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.

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.



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

Darwin Calibrator evaluates millions of possible solutions to let users quickly find a calibration hypothesis that best matches measured flows, pressures, and on/off status, empowering users to make reliable decisions based on accurate hydraulic simulation of the real world.

WaterGEMS' SCADAConnect module lets modelers automatically acquire supervisory control and data acquisition (SCADA) data, creating a real-time system simulator that accurately represents current system conditions. It also enables WaterGEMS model results to be published to a utility's existing SCADA control room screen(s), helping to forecast operating conditions and potential issues.

Darwin Designer automatically finds maximum benefit or minimum-cost designs and rehabilitation strategies, based on available budget, construction cost, and pressure and velocity constraints.

Engineers can also 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 level constraints. Energy costs can be aggregated across pumping stations and factor in complex tariffs as well as non-model-related energy costs, to perform net present value analyses of their operating scenarios.

System Requirements

Refer to the 'Installation Requirements' section of 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 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 from within four compatible platforms:
 - » 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
- 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, parallel, branch-trimming, multi-criteria automated skeletonization of pipes
- 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
- 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
- Publishing of i-models in 2D or 3D, including to Bentley Map Mobile

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

Hydraulics, Operations, and Water Quality

- Steady-state simulation
- Extended-period simulation
- Constituent-concentration analysis
- Multi-species water quality analysis
- Tank-mixing analysis
- Water-age analysis
- Water quality batch run
- Criticality analysis
- Fire-flow analysis
- Rule-based or logical controls
- Variable-speed pumping, with option to use APEX (Automatic Parameter Estimation eXtension)
- System head curves
- 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

- DXF, spreadsheet, database, and ODBC connections
- Shapefile, Geodatabase*, Geometric Network*, and SDE* connections (*when running from within ArcMap)
- Oracle spatial support
- GIS-ID property to maintain associations between records in the data source / GIS and elements in the model
- SCADACONnect unlimited-signal pack for live data connections (to and from SCADA systems)
- Graphical SCADA element
- Customer Meter element