

Bentley[®]
Advancing Infrastructure

 CONNECT Edition



OpenFlows™ SewerGEMS®

Urban Sanitary and Combined Sewer Modeling

OpenFlows SewerGEMS enables you to produce optimal urban sewer planning and overflow remediation analysis designs in an easy-to-use environment. You can design and operate sanitary or combined conveyance sewer systems by using built-in hydraulic and hydrology capabilities with a variety of wet-weather calibration methods. OpenFlows SewerGEMS takes advantage of Bentley CONNECT *services* by associating a hydraulic model with a CONNECT project. CONNECT *services* allows your team members to easily access the model.

Superior Interoperability

With OpenFlows SewerGEMS, utilities and consultants can model from within several platforms while accessing a single, shared project data source.

These platforms include:

- Windows for ease of use, accessibility, and performance.
- ArcGIS for GIS integration, thematic mapping, and publishing.
- AutoCAD for engineering design environments.
- OpenRoads™, OpenSite®, and OpenRail™ Designer for a comprehensive, 3D-modeling solution.

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

You can leverage geospatial data, CAD drawings, SCADA data, databases, and spreadsheets to jump-start the model building process. OpenFlows SewerGEMS provides synchronized database connections, geospatial links, and advanced model-building modules that connect with virtually any digital data format. The application also provides drawing and connectivity review capabilities to guarantee a hydraulically coherent model.

Wastewater and Stormwater Loading Allocation and Estimation

The LoadBuilder module helps you allocate sewer loads based on a variety of GIS-based sources such as water usage billing data, area-wide flow measurement, or polygons with known population or land use. Sewer loading can also be applied as user-defined hydrographs, pattern-based loads, and unit loads. The software's features enable you to access and customize the comprehensive unit (dry weather) load engineering library with numerous typical unit loads based on population, area, count, and discharge. Additionally, OpenFlows SewerGEMS allows you to input and save an unlimited number of flow patterns to accurately model flow changes over the course of a day. You can also load models with wet weather runoff flows derived from precipitation using OpenFlows SewerGEMS' built-in



OpenFlows SewerGEMS can be used from within OpenRoads, OpenSite, OpenRail Designer, AutoCAD, ArcGIS, or as a stand-alone application.

rainfall distributions or user-defined rainfall events. Runoff flows are modeled and calibrated using a choice of hydrograph methods, including RTK, SCS, Modified Rational, EPA-SWMM, or user-defined generic unit hydrographs. You can also load the model based on property connections.

Easy Model Management with Scenarios

OpenFlows SewerGEMS' Scenario Management Center provides you with the ability to configure, evaluate, visualize, and compare an unlimited number of scenarios within a single file. The feature helps you evaluate strategies for design, operations, sanitary loading, and network topology to improve your decision-making.

Advanced Analysis

OpenFlows SewerGEMS can model the effect that low-impact development controls have in retaining runoff before it enters the sewer system. The application enables you to model hydrogen sulfide formation to decrease the risk of pipe damage from H₂S formation, reduce foul odors, and improve worker safety.

Multiple Solvers

Depending on the type of system analyzed, OpenFlows SewerGEMS can easily switch among multiple solvers.

- To solve the Saint Venant equations, users can choose between OpenFlows SewerGEMS' explicit EPA solver based on SWMM and the implicit dynamic wave engine. These two dynamic engines account for storage effects within structures and quantify overflows should they occur.
- The convex/gradually varied flow solver uses convex routing to determine gravity sewer flows and gradually varied flow (backwater analysis) to determine hydraulic properties once the flow is known.
- With the rational/gradually varied flow solver, peak flows in the storm sewer system are calculated using the rational method. Use this solver to analyze peak flow conditions, or to automatically design storm sewers.

System Requirements

Platform Requirements

OpenFlows SewerGEMS runs without platform restrictions as a stand-alone application.

It also runs from within ArcGIS, AutoCAD, OpenRoads, OpenSite, and OpenRail Designer. See: [Platform Compatibility](#)

Processor

As per minimum operating system requirements

Memory

8 GB minimum, 16 GB recommended

Operating System

Microsoft Windows 10, Windows 10 x 64, Windows 8, Windows 8 x 64, Windows 7, Windows 7 x 64

Note: Windows 7 operating system is supported only with its service pack (SP1) installed

Find out about Bentley at: www.bentley.com

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OpenFlows SewerGEMS At-A-Glance

Interface and Graphical Editing

- Includes stand-alone Windows interface
- Runs within ArcGIS (with ArcMap license)
- Runs within OpenRoads Designer, OpenSite, OpenRail Designer (with Civil license)
- Runs within AutoCAD (with AutoCAD license)
- Dynamic elevation updates from terrain models
- Ribbon interface
- Unlimited undo and redo
- Element morph, split, and reconnect
- Merge nodes in close proximity tool
- Automatic element labeling
- Element prototypes
- Multiple background file layer support
- Bing Maps, image file, CAD, and GIS backgrounds

Interoperability and Model Building

- Automated catchment delineation
- Automatic elevation assignment and update using terrain model
- Automatic sanitary load allocation from geospatial data (for example, land use), flow monitors and/or property connections
- Seed files for new model templates
- Model building and synchronization with Shapefiles, Geodatabases, Geometric Networks, SDE, spreadsheets, databases, and ODBC connections
- Oracle Locator and Oracle Spatial data connection
- Creation of model elements from CAD drawings
- GIS-ID property to associate model and GIS elements
- SCADACONnect for live system data connections
- Unified file format with OpenFlows SewerCAD®, OpenFlows CivilStorm®, and OpenFlows StormCAD®
- Import/export of InRoads® Storm and Sanitary files
- Import of MX Drainage files

Hydraulics and Operations

- Two available solvers for the full set of 1D St. Venant equations: Implicit dynamic and Explicit dynamic (EPA-SWMM)
- Gradually varied flow-convex solver included (OpenFlows SewerCAD solver)
- Gradually varied flow-rational solver included (OpenFlows StormCAD solver)
- Extended period simulations
- Steady-state simulation, including peak flow
- Long-term continuous simulation
- Critical storm analysis
- Energy cost analysis

- Automatic constraint-based design of gravity systems
- V-shaped and parabolic gutters
- Culvert headwalls with SWMM and HDS-5 culvert support
- Control structures (weirs, orifices, depth-flow curve)
- Air valves for high points in force mains
- SCADA signal element
- Low-impact development controls
- Ability to model individual property connections, taps, and laterals
- Evaporation definition
- Aquifer simulation
- Pollution analysis with optional definition of land use categories and surface characteristics
- Hydrogen sulfide formation
- Rule-based controls
- Tractive stress calculation
- HEC-22 inlet capacity and node headloss calculations
- Variable-speed pumps
- Totalizing flow meters

Results Presentation

- ArcMap visualization
- Thematic mapping
- Dynamic, multiparameter, and multisenario graphing
- Dynamic profiling
- Advanced tabular reporting with FlexTables
- Property-based color coding, symbology, and annotation
- Publish iModels in 2D or 3D, including to Bentley Map® Mobile
- Engineering profile annotation tables
- Custom reports
- Animation AVI creation
- Gutter cross section viewer

Model Management

- Tracking of model changes by user, date, and element
- Custom data fields with user-assigned or formula-based values
- Unlimited scenarios and alternatives
- Scenario comparison
- Tabular reports with global edit, sort, and filter
- Statistical analysis from tabular report
- Customizable engineering libraries
- Dynamic and static selection sets
- Orphan node and dead-end pipe queries
- Sub-model management
- Surface flow path tracing from terrain
- ProjectWise® integration