



# OpenFlows™ Storm

## Stormwater System Modeling and Management

### COMPREHENSIVE STORMWATER SYSTEM PLANNING AND DESIGN

OpenFlows Storm is a multiplatform hydraulic and hydrologic modeling solution developed for engineers to analyze complex stormwater systems, improve pond design, and gain workflow efficiency. Detect system bottlenecks, improve capacity, and limit stormwater flooding to comply with regulations. Minimize capital investments with optimized network designs and master plans for your entire system.

### PLAN, DESIGN, AND ANALYZE STORMWATER SYSTEMS

OpenFlows Storm provides a user-friendly environment for designing and analyzing stormwater systems. Perform comprehensive analyses for all aspects of stormwater systems, including rainfall and runoff modeling for urban watersheds, inlet capture and bypass flows, gravity storm sewer and pressure piping, 2D surface flows, ponds and outlet structures, open channels, and culverts. Analyze networks of channels and closed conduits, as well as low-impact development controls for retaining runoff. Model complex pond outlets for a variety of tailwater conditions, using weirs, orifices, culverts, risers, and inlet boxes in your design.

### SCENARIO MANAGEMENT

Configure, run, evaluate, visualize, and compare unlimited scenarios within a single file. Easily make decisions by comparing alternative designs or proposed rehabilitation methods for a variety of system conditions.

### INTEROPERABLE HYDRAULIC MODELING

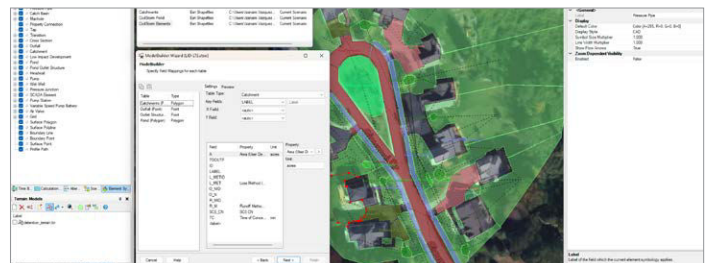
OpenFlows Storm streamlines model creation and updating by offering compatibility with many data formats and sources. Efficiently build your hydraulic model, quickly synchronizing network data from standard formats, such as GIS and CAD files, databases, and spreadsheets. Import and export model files using the EPA SWMM file format. Import rainfall data and distributions from external sources or enter rainfall data directly in the software using a variety of formats. Incorporate real-time or historical system conditions from SCADA or other data sources. Eliminate frustration and enjoy the interoperability of working within your choice of MicroStation<sup>®</sup>, AutoCAD, ArcGIS Pro, and stand-alone platforms while accessing a single, shared project data source.

### MULTIPLE 1D HYDRAULIC SOLVER OPTIONS

OpenFlows Storm makes several solvers available so you can choose the best match for your project needs. The GVF-Rational solver is used to evaluate peak flow conditions or automatically design storm sewers, including sizing pipes and setting elevations. The Implicit and Explicit (SWMM) dynamic solvers use the full 1D Saint-Venant equations to evaluate unsteady flow, storage, and overflows for complex stormwater networks and controls. Level pool routing and interconnected pond modeling calculation methods are available for stormwater detention design.

### 1D/2D HYDRAULIC ANALYSIS

Better understand surface flooding depth and velocity, flood hazard, and inundation times with user-friendly applications that connect 1D network elements with 2D surface flows. Communicate important information to stakeholders with versatile mapping and reporting capabilities.



Model and analyze all aspects of the stormwater system in a scaled environment.



Model complex pond outlets for a variety of tailwater conditions.

## SYSTEM REQUIREMENTS

**MINIMUM:** 720 x 480 resolution, Windows 10 or higher, 8 GB RAM

**RECOMMENDED:** 1,920 x 1,080 resolution, Windows 10 or higher, 16 GB RAM

**PLATFORM COMPATIBILITY:** Stand-alone application, or runs within MicroStation, AutoCAD, OpenRoads™, OpenSite®, or OpenRail™ Designer

# OpenFlows Storm At-A-Glance

OpenFlows Storm includes the capabilities of OpenFlows CivilStorm®, OpenFlows StormCAD®, and OpenFlows PondPack®. The software is licensed in four convenient tiers. See the [Comparison Checklist](#) to decide the tier that best suits your project and analysis needs.

## INTEROPERABILITY

- Includes stand-alone Windows interface
- Runs within MicroStation (with MicroStation license)
- Runs within OpenRoads, OpenSite, or OpenRail Designer
- Runs within AutoCAD (with AutoCAD license)

## MODEL BUILDING AND MANAGEMENT

- Automated catchment delineation and elevation assignment from terrain
- Automated CN and rational “c” weighting from land use polygons
- Seed files for new model templates
- Supports shapefiles, geodatabases, geometric networks, SDE, spreadsheets, databases, Oracle Spatial, and ODBC connections
- Creation of model elements from CAD drawings
- Import/export of LandXML, MX Drainage, SWMM, and MicroDrainage model files
- Time-series data import
- Storm events scenario wizard tracks model changes
- Custom data fields with user-assigned or formula-based values
- Unlimited scenarios and comparisons
- Active topology to activate or deactivate network elements
- Tabular reports with global editing, sorting, filtering, and statistics
- Customizable engineering libraries
- Drawing review capabilities with queries to ensure network connectivity
- Automatic topology review
- ProjectWise® integration
- Import/export of SWMM and MicroDrainage model files

## HYDRAULICS

- 1D/2D hydraulic analysis for surface flood modeling
- Two solvers for the full set of 1D Saint-Venant equations: implicit dynamic and explicit dynamic (EPA-SWMM)
- Steady-state, peak flow, and gradual varied flow rational solver engine
- Automatic constraint-based design of gravity storm sewers
- Surface flow path tracing from terrain
- Long-term simulations with statistical reports
- HEC-22 inlet capacity and node head-loss calculations
- V-shaped and parabolic gutters
- Regular and irregular surface channel shapes
- Detention/retention ponds and storage chamber systems
- Simple and multistage detention pond outlet structures (weirs, orifices, culverts, inlet boxes, standpipes, vortex valves)
- PondMaker® application for detention pond design, flow and volume estimates, and data tracking
- Pre-development and post-development peak flow and volume comparison

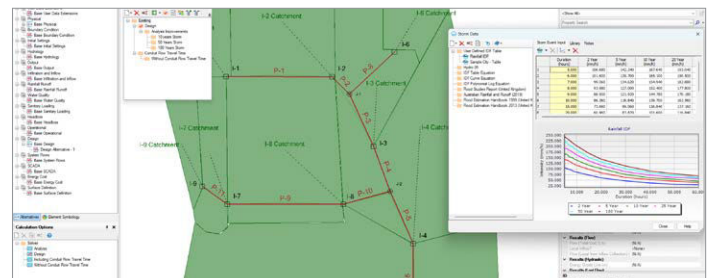
- Level pool routing and interconnected pond modeling
- Low-impact development controls
- Evaporation definition
- Aquifer simulation
- Pollutant and treatment analysis
- HDS-5 and SWMM culverts
- Inline control structures and diversions (weirs, orifices, depth-flow curves)
- Tractive stress calculation
- Critical storm analysis
- Rule-based controls

## STORMWATER LOAD ALLOCATION AND ESTIMATION

- Support for synthetic design storms and gauged rainfall events
- Intensity-duration-frequency curve input in tabular or equation format
- Time of concentration methods: User-defined, Carter, Eagleson, Espey/Winslow, Federal Aviation Agency, Kerby/Hathaway, Kirpich (PA and TN), Length/Velocity, SCS Lag, TR-55 Sheet Flow, TR-55 Shallow Concentrated Flow, TR-55 Channel Flow, Friend, Kinematic Wave, Bransby-Williams, and UK standard
- Runoff methods (all levels): Rational Method peak flow calculation, SCS Unit Hydrograph, Modified Rational Method, generic unit hydrograph, Santa Barbara Urban Hydrograph, and user-defined hydrograph
- Additional runoff methods: EPA SWMM, RTK Unit Hydrograph, Time-Area Method, and ILSAX
- Loss Methods (all levels): Constant loss rate, Green and Ampt, Horton, SCS CN
- Flood Estimation Handbook Rainfall (U.K.)
- Additional Loss Methods: Green and Ampt (modified), Horton (modified), and Initial Loss and Constant Fraction or Constant Loss Rate
- Australian Rainfall and Runoff
- Inflow control center

## RESULTS PRESENTATION

- Thematic mapping with color coding
- Scenario and element comparison
- Engineering profile with annotation table



Configure, visualize, and compare unlimited scenarios within a single file for a variety of system conditions.