

**Bentley**  
Advancing Infrastructure



## OpenFlows™ PondPack®

Detention Pond Design and Urban Hydrology Modeling

OpenFlows PondPack is a versatile software program that models stormwater system projects from basic site designs to complex drainage studies. Users can model rainfall and runoff from urban and rural watersheds to design detention and retention facilities, outlet structures, and channels.

### Complete System Analysis and Interconnected Pond Modeling

The robust OpenFlows PondPack analysis engine computes outlet rating curves with tailwater effects, accounts for pond infiltration, calculates pond detention times, analyzes channels, and performs interconnected pond routing with divergent (multiple) outfalls.

In many scenarios, downstream conditions cause backwater effects that influence the performance of detention pond outlet structures. A pond may discharge to another pond that is close in elevation, or to a location influenced by downstream tidal effects or flooding. With the advanced OpenFlows PondPack Interconnected Pond Modeling (ICPM) capabilities, these complex scenarios can be modeled with confidence.

### Graphical Interface and Interoperability

OpenFlows PondPack's graphical user interface streamlines network layout, data entry, and output viewing. Users have the option to add DXF, Shapefiles, or raster background layers (e.g. aerial photos), and trace catchments, ponds, and channels over the top to scale.

Both OpenFlows PondPack and OpenFlows PondPack for AutoCAD versions include a stand-alone interface. OpenFlows PondPack for AutoCAD can also be run in AutoCAD.

### Hydrology

OpenFlows PondPack handles an unlimited number of synthetic or real storm events of any duration or distribution. Choose from a number of standard and regionalized methods such as SCS 24-hour Type I, IA, II, and II rainfall distributions, Bulletin 70 and 71 rainfall distribution data for the Midwest U.S., gauged rainfall data, rainfall curves created from I-D-F data, I-D-F curves, and more.

For catchment runoff computations, users can choose from the SCS Runoff CN method, the Santa Barbara unit hydrograph, user defined unit hydrograph, the Modified Rational Method, or Rational Q/Qp templates. Users can also add an unlimited number of user defined hydrographs throughout the watershed.



*OpenFlows PondPack's graphical user interface provides the option to model your systems in a scaled environment.*

Catchment infiltration losses can be computed using the SCS Method, the Green-Ampt equation, the Horton equation, or by entering a constant infiltration rate. OpenFlows PondPack also calculates the time of concentration quickly and accurately, even when there are several possible flow paths to consider. The application offers engineers the choice of modeling infiltration from a pond to the surrounding soil using a constant flow rate, or rates that vary depending on the depth of water in the pond.

### Simple Step-by-step Pond and Outlet Design

OpenFlows PondPack PondMaker® guides users through the pond design process with an easy step-by-step interface that provides constant feedback on how the design is progressing. Engineers can explicitly set the allowable pond outflow rate, or let PondMaker automatically apply pre-developed conditions for multiple storm events. PondMaker also assists by keeping track of information such as target outflows, pond volume estimates, outlet structure design trials, peak pond outflows, and maximum water surface elevations for multiple storm events and/or multiple ponds.

### Comprehensive Scenario Management

The Scenario Management Center in OpenFlows PondPack gives engineers full control to configure, run, evaluate, visualize, and compare an unlimited number of scenarios within a single file. Engineers can easily make decisions by comparing alternative designs for a variety of storm events and system conditions (including pre- and post-development).

## System Requirements

### Platform Pre-requirements

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

It also runs from within AutoCAD. See: [Platform Compatibility](#)

### Processor

As per minimum operating system requirements

### Memory

As per minimum operating system requirements

### 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

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# OpenFlows PondPack At-A-Glance

## Interface and Graphical Editing

- Stand-alone Windows interface
- Runs in AutoCAD (AutoCAD and OpenFlows PondPack for AutoCAD required)
- Unlimited undo and redo
- Element morphing, splitting, and reconnection
- Automatic element labeling
- Scaled, schematic, and hybrid environments
- Element prototypes
- Dynamic zooming
- Aerial and Named views
- Image, CAD, and GIS background layer support

## Model Building

- A single set of model files for four compatible platforms
- Bidirectionally synchronized shapefile, database, spreadsheet, and ODBC connections
- Polyline-to-pipe connections from DXF and DWG files
- Oracle Locator/Spatial data connections
- InRoads/PowerCivil import/export (pond elevation-volume data)
- GIS-ID property (maintain associations between records in source file and elements in a model)

## Model Management

- Unlimited scenarios and alternatives
- Scenario management
- Active topology (activate or deactivate network elements)
- Tabular reports with global editing, sorting, and filtering
- Dynamic (query-based) and static selection sets
- Element selection by polygon
- Element selection inversion
- Table opening on selection
- Engineering units management
- Drawing review tools
- Automatic topology review
- Network navigator
- Orphaned node and dead-end pipe queries
- Hyperlinks for network elements
- User-data extensions
- ProjectWise® integration (including engineering libraries)
- Customized engineering libraries for conduit, curve number (CN), culvert inlet coefficient, rainfall curve, material, Q/Qp template, unit hydrograph, storage chamber, storm event, vortex valve, weir depth coefficient, weir submergence
- Import of OpenFlows PondPack V8 engineering library data (\*.plb) files
- Import of OpenFlows PondPack V9 and V10 engineering library data (\*.plb) files
- Import of OpenFlows PondPack V10 data management center (\*.plb) files
- Submodel import/export

## Presentation of results

- Report Builder: per element, all elements, index, summary
- Thematic mapping
- Dynamic, multiparameter, and multiscenario graphing

- Advanced tabular reporting with FlexTables
- Property-based color coding, annotation, and symbology
- DXF export
- Scaled print of network view

## PondMaker: Pond Outlet Design

- Automatic update of worksheet containing design data for multiple design trials of a single pond
- Multiple pond designs possible
- Establish maximum outflow rates (pre-development or user-defined flows)
- Post-development pond inflows computation
- Pond size requirements estimation
- Pond geometry design (grading plan or underground storage)
- Outlet structure design
- Pre- and post-development peak flow and volume comparison
- Hydrograph routing through ponds

## Hydraulics and Calculators

- Underground detention chambers (including data from CULTEC)
- Vortex valves (including data from Hydro International)
- Calculators: first flush, estimated storage (overlay hydrographs), minimum drain time, estimate storage (rational method QPeak), estimated storage (peak flows), TR-55 tabular method, TR-55 graphical peak and storage, SCS CN volume
- Channel types: circular, rectangular, trapezoidal, parabolic, irregular
- Routing methods – For channels: modified Puls, Muskingum, translation. For ponds: level pond routing, interconnected ponds
- Outlet types: user-defined rating, culvert (box, circular), stand pipe, inlet box, circular orifice, orifice area, weir (rectangular, V-notched, irregular), vortex valve
- Water quality: first flush volume, minimum drain time, detention time estimation

## Hydrology

- Unlimited number of return events, using SCS 24-hour Type I, IA, II, & III rainfall distributions, Bulletin 70 and 71 rainfall distribution data for the Midwest U.S., Gauged rainfall data, I-D-F curves
- Rainfall data input: dimensionless curves with total depth, time-depth curves, user-defined Intensity- Duration-Frequency (IDF) table, IDF curve equation
- Time of concentration methods: user-defined, Carter, Eagleson, Espey/Winslow, Federal Aviation Agency, Kerby/Hathaway, Kirpich (PA), Kirpich (TN), length and velocity, SCS lag, TR-55 sheet flow
- TR-55 shallow concentrated flow, TR-55 channel flow
- Peak flow and hydrograph methods: SCS graphical peak discharge method, rational method, SCS unit hydrograph method, modified rational method, Santa Barbara urban hydrograph, user-defined unit hydrograph, user-defined hydrograph