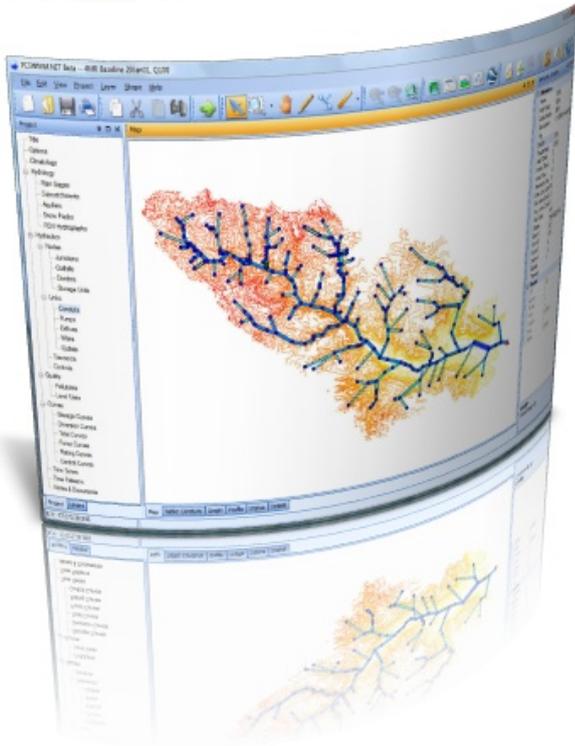




# PCSWMM.NET



Welcome to PCSWMM.NET, the all-new version of CHI's comprehensive, GIS-based, graphical decision support system for US EPA SWMM5 urban drainage modeling (sanitary, storm and/or combined systems).

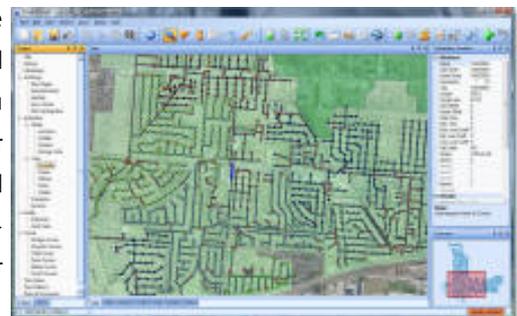
Built from the ground up around a modern, powerful GIS engine that works seamlessly with the latest GIS data formats, PCSWMM.NET implements advanced, intelligent tools for streamlining sewer collection system model development, optimization and analysis.

With full support for the latest, fully dynamic US EPA SWMM5 hydrology/hydraulics engine, PCSWMM.NET provides a scaleable (unlimited model sizes), and complete array of professional, enterprise level, urban drainage system modeling tools for an affordable price.

## Flexible, smart GIS engine

PCSWMM.NET is the most powerful urban drainage modeling application for working with GIS/CAD based data. PCSWMM.NET enables both engineers and GIS professionals to work on the same data, improving workflow and increasing the flexibility of your model building and analysis toolset. In addition to direct support for ESRI ArcGIS geodatabases\*, ArcView shape files and ArcInfo E00 files, PCSWMM.NET supports the leading open standard and proprietary GIS and CAD formats, including Geomedia SQL, MapInfo, Microstation, AutoCAD, GML, OpenGIS SQL, KML and many others (over 30 vector and raster formats supported), giving you the flexibility to choose the SWMM data storage format that's right for you.

PCSWMM.NET's high-performance, massively scaleable GIS engine provides powerful GIS analysis and hydraulic modeling in a single stand-alone environment, with no other third-party licenses required. You can create, edit, modify, run, map, analyze, design and optimize your GIS based sewer network models and instantly review, query and display simulation results either from within the specialized and optimized PCSWMM.NET interface or from within ArcGIS (or the GIS of your choice) ? its up to you.



PCSWMM.NET automatically maintains a standard, fully accessible US EPA SWMM5 input file at all times. Support is provided for using other SWMM5 data editors (e.g. US EPA SWMM5 interface, or in-house tools), as edits to the input file are detected and the SWMM model GIS layers are automatically updated. PCSWMM.NET provides direct support for opening, editing, running, plotting and analyzing any existing SWMM5 models, as well as importing/converting SWMM4 models.



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## Advanced modeling capabilities

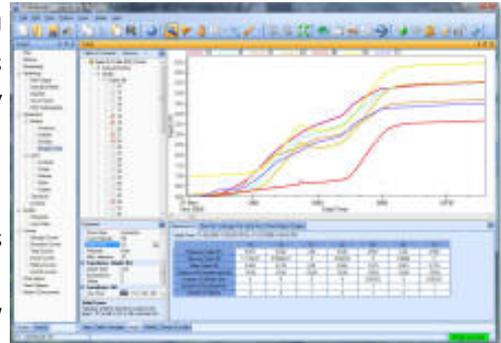
Integrating the full US EPA SWMM5 engine, PCSWMM.NET accounts for various hydrologic processes that produce runoff from urban areas. These include:

- time-varying rainfall
- evaporation of standing surface water
- snow accumulation and melting
- rainfall interception from depression storage
- infiltration of rainfall into unsaturated soil layers
- percolation of infiltrated water into groundwater layers
- interflow between groundwater and the drainage system
- nonlinear reservoir routing of overland flow

Spatial variability in all of these processes is achieved by dividing a study area into a collection of smaller, homogeneous subcatchment areas, each containing its own fraction of pervious and impervious sub-areas. Overland flow can be routed between sub-areas, between subcatchments, or between entry points of a drainage system.

PCSWMM.NET also contains a flexible set of hydraulic modeling capabilities used to route runoff, RDII, DWF, and/or external inflows through the drainage system network of pipes, channels, storage/treatment units and diversion structures. These include the ability to:

- handle networks of unlimited size
- use a wide variety of standard closed and open conduit shapes as well as natural channels
- model special elements such as storage/treatment units, flow dividers, pumps, weirs, and orifices
- apply external flows and water quality inputs from surface runoff, groundwater interflow, compute rainfall-dependent infiltration/inflow (RDII), dry weather sanitary flow (DWF), and user-defined inflows
- utilize either kinematic wave or full dynamic wave flow routing methods
- model various flow regimes, such as backwater, surcharging, reverse flow, and surface ponding
- apply priority-based, dynamic control rules to simulate the operation of pumps, orifice openings, and weir crest levels.



In addition to modeling the generation and transport of runoff flows, PCSWMM.NET can also estimate the production of pollutant loads associated with this runoff. The following processes can be modeled for any number of user-defined water quality constituents:

- dry-weather pollutant buildup over different land uses
- pollutant washoff from specific land uses during storm events
- direct contribution of rainfall deposition
- reduction in dry-weather buildup due to street cleaning
- reduction in washoff load due to BMPs
- entry of dry weather sanitary flows and user-specified external inflows at any point in the drainage system
- routing of water quality constituents through the drainage system
- reduction in constituent concentration through treatment in storage units or by natural processes in pipes and channels.

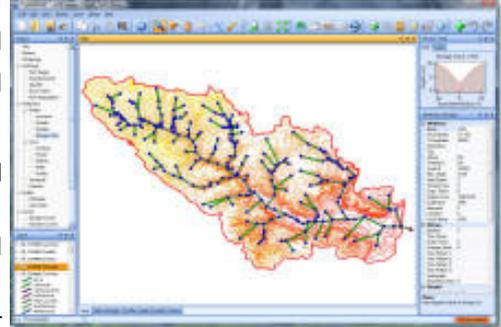


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## Applications

With over 3000 licenses, PCSWMM has been the leading decision support system for US EPA SWMM since its inception in 1984. Applied in thousands of sewer and storm water studies throughout the world (over 50 countries), typical applications of PCSWMM include:

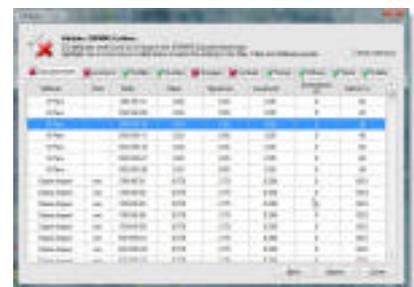
- design and sizing of drainage system components for flood control
- sizing of detention facilities and their appurtenances for flood control and water quality protection
- designing control strategies for minimizing combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs)
- evaluating the impact of rainfall-dependant inflow and infiltration (RDII) on sanitary sewer overflows and water-in-basements (WIBs)
- dual-drainage (major/minor system) modeling and design, including dynamic interaction of dual systems
- evaluating global optimal and/or passive real-time control (GO RTC) operational strategies
- flood plain mapping of natural channel systems
- integrated catchment/watershed management modeling, including rural areas, river systems, urban sewer systems, treatment plants and receiving waters
- generating non-point source pollutant loadings for waste load allocation studies
- evaluating the effectiveness of best management practices (BMPs) and/or low impact developments (LIDs) for reducing wet weather pollutant loadings
- evaluating strategies for NPDES Permits, CMOM, and TMDL requirements.



## New Features

### **Engineering audits (QA/QC)**

Quality assurance / quality control is simplified through attribute validation, orphan detection, and pipe slope screening tools. The attribute validation tool provides model-wide analysis and reporting on over 60 different attributes, with support for any number of user-defined expected-range validation sets. Select, zoom to, and edit any entity directly from the validation report. Disconnected entities (link, node and subcatchment), missing data, and potential data errors such as negative pipe slopes are quickly identified and reported on.





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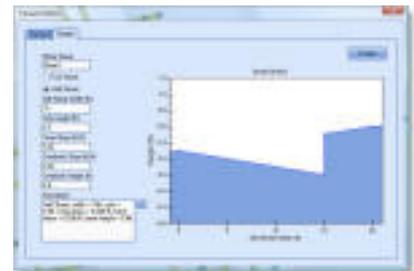
## Fill in missing data with PCSWMM Calculators

As well as the flexible multi-entity mathematical and topological editing tools, specific calculators tools have been created for quickly identifying and estimating missing data. Choose either to manually control the calculation of subcatchment area or conduit length attributes from map units, or turn on the auto-length feature and have these spatial attributes automatically synchronized. Determine subcatchment width from user-defined overland flow path lengths. Calculate conduit inlet and outlet offsets from conduit inlet and outlet elevation data. Fill in missing node invert elevations (even in consecutive nodes) by length-weighted interpolation between upstream and downstream node data. Calculate missing node ground/rim elevations by conduit slope-based interpolation. Determine node maximum depth by subtracting invert elevation from ground elevation. Adjust node invert elevations to achieve a user-defined conduit slope. Connect links to inlet and outlet nodes based on proximity, and more.



## Dual drainage creation wizard

Developing major/minor system models is simplified with the new Dual Drainage Creator. Providing an editor for managing, creating, graphically editing, importing and assigning street cross-sections and other major system conveyance channels, as well as modeling inlet control with SWMM5 outlet entities, the Dual Drainage Creator also provides for the automated roughing out of the major system, based on minor system. The two systems are solved simultaneously with dynamic interaction of flows between the systems.



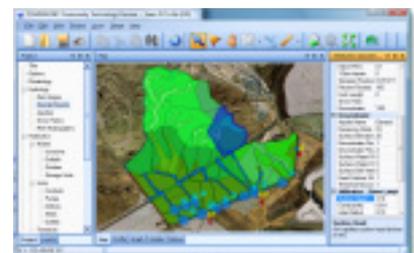
## Time pattern creation and load allocation for DWF

A new dry weather flow (DWF) analyzer tool allows for the instant creation of hourly, daily, and/or monthly patterns for sanitary sewer DWF model inputs. Dry weather flow periods can be selected from long-term observed flow records as the basis for the analysis, and tools are provided for assigning DWF patterns to manholes on a sub-sewershed basis. Flexible and powerful options are provided for DWF load allocation (for example, conduit-length-weighted apportioning within each sewershed), and/or topological operations for allocation of parcel or point water metering records.



## Area weighting

Area weighting operations are provided for any polygon layer (e.g. SWMM5 subcatchments, RDII and/or DWF sewersheds). This tool has application in both radar-rainfall integration (generating individual input hyetographs from radar-rainfall polar coordinate or grid cells & associated time series), as well as for impervious area and infiltration parameter computations (e.g. from soil maps), and many other applications.





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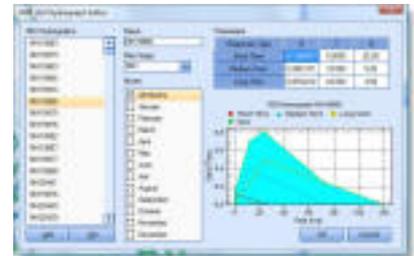
## Radar rainfall

Subcatchment-specific hyetographs can be computed from rain-gage calibrated radar-rainfall data through an area weighting process (DE-9IM model) relating a radar-rainfall overlay (polar coordinate, grid, etc.) to the model's subcatchment polygons. This process is fast and supports any length of radar-rainfall time series and any number of radar cells or subcatchments. Native support is provided for Vieux and Associates (rain-gage calibrated radar-rainfall data providers) data.



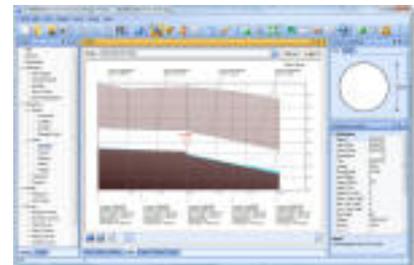
## Visual editors

All applicable editors include plots to illustrate concepts and data. For example, the rainfall derived inflow/infiltration (RDII) editor includes a plot of the three unit hydrographs (fast, medium and slow response) as well as the sum of the three. All curve editors include plots, including even functional storage stage-area relationships.



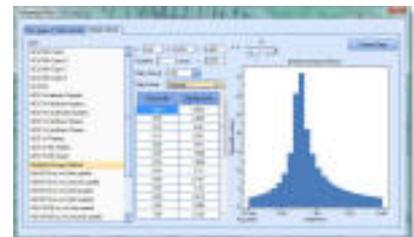
## Dynamic hydraulic grade line plots

The dynamic hydraulic grade line (DHGL) panel gets an update, with the ability to see cross-connections, improved representation of natural channels, plotting of the energy grade line (EGL), plotting of storage tanks and ponds, improved aesthetics with gradient fill, and probably best of all, the ability to not only select individual entities by clicking on them in the profile (for immediate viewing of entity graphs and attributes), but to also graphically edit the entities (node inverts, depths, conduit lengths, diameters, offsets, etc.)



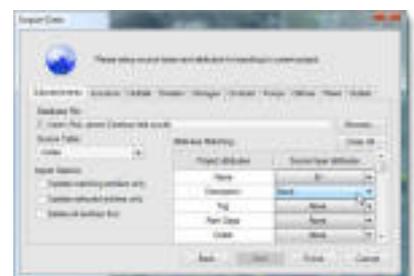
## Design storm generation

PCSWMM.NET includes a new tool to easily generate design storms based on SCS, Huff, AES, and Chicago design storm methods. The first three require only the total rainfall as input, the Chicago method requires a, b, c, r and storm duration as input. Time series and Rain gage objects are automatically created for the chosen design storm.



## Data importing

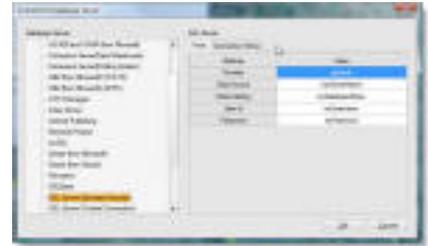
Support is provided for populating entities and attributes from external data sources such as GIS/CAD, database, spreadsheet and delimited text files. 16 popular open standard and proprietary GIS/CAD formats are supported, including ESRI formats, Mapinfo, GeoMedia, OpenGIS, XML, Google Earth, MicroStation, DXF and many more. In addition, direct support for importing from Microsoft Excel and Access (incl. Office 2007) is provided, along with csv/text.





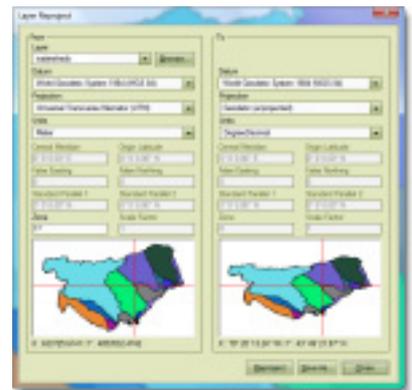
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Database server importing (through OLE DB) is provided for Oracle, SQL Server, MySQL, AS/400, DB2 and 18 other formats. Finally, ODBC support is embedded for importing from anything else. The Import Data Wizard supports importing to multiple SWMM5 layers from multiple data sources simultaneously, and provides data filtering and attribute matching control.



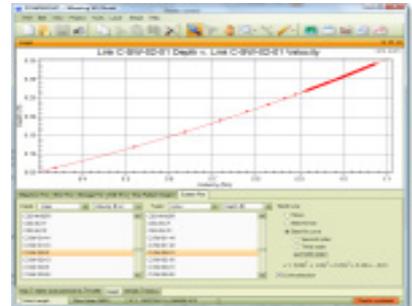
## Layer reprojection

Vector layers can be reprojected between any of the 26 supported projections and 227 supported datums, including Universal Transverse Mercator (UTM - all zones), Transverse Mercator, Lambert Conformal Conic, Albers Equal Area Conic, Hotline Oblique Mercator (i.e. the three state plane projections), Geodetic (unprojected lat./long.) and 20 other projections. Supported datums include WGS 84, WGS 72, NAD 83, NAD 27, and 223 others. Supported units include feet, meters, decimal degrees and 20 more. In addition, with a single button click, any model (or any vector layer) can be reprojected on-the-fly, directly into Google Earth for 3-dimensional visualization of model layout and results.



## Scatter plots

Scatter plots can be generated for any two computed model time series (conduit depth v. velocity, storage depth v. discharge, subcatchment rainfall v. runoff, etc.). Positive or negative strong, weak, or no correlation is reported along with r-coefficient and significance (t). Optional plotting of trend line or best fit curve (2nd, 3rd, or 4th order polynomial) is provided with the polynomial equation reported.



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