

## version changes history

One of the many advantages of using XP Software products is the knowledge that we are continually improving the software, continually adding new features that keep our customers equipped with the latest modeling technology. The following is a history of our version changes, separated by version number. Each version number is also categorized into an enhancement or a maintenance item.

### Version 2010 (v12), Service Pack 3 (March 2011)

<p>ENHANCEMENT S – 2010 SP3</p>	<ul style="list-style-type: none"> <li>▪ 12D ASCII files can now be loaded completely by right-clicking on the DTM layer (including DTMs with concavities/gaps)</li> <li>▪ The runoff node sub-catchment dialog now includes UK Hydrology methods: Variable PR, Wallingford Procedure, Revitalised FSR/FEH (ReFH), Flood Estimation Handbook (FEH) and Flood Studies Report (FSR).</li> </ul>
<p>MAINTENANCE – 2010 SP3</p>	<ul style="list-style-type: none"> <li>▪ File-&gt;Revert no longer duplicates background images</li> <li>▪ An error message is now given when time of concentration is non-positive for Rational Formula or Time-Area Method</li> <li>▪ Surface area calculation and/or relaxation technique has been updated for storage basins (use "BASIN_RELAX_PRE10" for backward compatibility)</li> <li>▪ Importing catchments from GIS now handles mapping of fields to subcatchments other than the first</li> <li>▪ An error message is now given when non-zero sediment depth is specified for a natural channel</li> <li>▪ Save As now correctly saves all changes to the new file (previously only the original file's contents were saved until a Save action was performed)</li> <li>▪ Froude Number calculation for reverse flow has been corrected</li> <li>▪ The dialog will no longer appear multiple times after double-clicking or choosing Edit Data more than once for the same node or link</li> <li>▪ Fixed issue: hydraulics would not solve after sanitary in certain cases with a sanitary load specified</li> <li>▪ Print error in output file for RNF Pollutant/Landuse (BMP) has been fixed</li> <li>▪ SUBCATCHMENT_RES parameter is now default to see individual subcatchment results in XP Table</li> <li>▪ An alert is now given when boundary condition time-series data is missing for a 2D simulation</li> <li>▪ Fixed a problem where nodes occasionally did not move correctly when a group of nodes and links are dragged together</li> <li>▪ A warning is now given after XPX import when a catchment is specified for a non-existent node</li> <li>▪ Volume/area vs. depth printing error for a storage node been fixed</li> <li>▪ Fixed issue: disallowed snapping 1D/2D connection lines to 1D/2D interface lines under certain conditions</li> <li>▪ Flythrough path layers have been removed, as the 3D view and paths are no longer functional</li> <li>▪ Time series output interval for 2D simulations is now set to match the map output interval</li> <li>▪ Trigger / Shape Connections layers now save their visibility and locked status as expected</li> <li>▪ Error relating to tracking of minimum velocity has been fixed</li> <li>▪ Snyder Alameda (unit hydrograph) RNF method has been revised to match the result with HEC-HMS</li> <li>▪ Loading projection from MIF file on GIS import now functions as expected</li> <li>▪ HEC-22 Gutter spread calculation error has been fixed</li> <li>▪ The title of the Vertical Ellipse special conduit dialog now says "Vertical Ellipse" as expected, instead of "Horizontal Ellipse"</li> <li>▪ Fixed a sorting issue in the pull-down box in plot output graphs, which was sometimes causing the wrong graphs to be matched to plot output items</li> <li>▪ All required user rating curves are now exported correctly for simulation, and the program no longer hangs while exporting them</li> <li>▪ Generate Cross-Section and CatchmentSim Export dialogs have been neatened up to display correctly at 96 DPI</li> <li>▪ Fixed a crash that occurred on Tools-&gt;Calibrate Model when a long file name was present</li> </ul>

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MAINTENANCE – 2010 SP3

- The Properties menu item is now disabled in the Reporting->Legends layer's right-click menu when no valid 2D results are present
- The simulation engine no longer reads unnecessary sections from the SWMXP.INI file (solved runtime display error)
- Files are now added to the Recent Files list immediately on Save As
- Subcatchment numbers should once again display correctly in XP Tables
- The correct Edit Data dialog will now be shown for elevation shape and dynamic elevation shape polylines and polygons, regardless of which layer is currently selected
- Indexing error in SCS calculation has been fixed which used to produce erroneous results for 2nd subcatchment
- Concavities / gaps in 12D TINs (through triangles marked as being outside the TIN) are now respected in conversion to XPTIN
- Importing polyline links from GIS more than once now functions correctly (polylines were being applied to the wrong links on second and subsequent imports)
- An error message is now given when the read and create hydraulics interface file names are identical
- Fixed an error in the computation of outfall depth with fixed backwater where an incident internal rating curve is present
- Tooltip ordering of variable name and units has been made consistent (some dialogs were incorrectly stating the units before the variable name)
- TC == 0 warning no longer appears incorrectly on selecting constant TC method for pervious but not for impervious, and vice versa

**Version 2010 (v12), Service Pack 2 (November 2010)**

ENHANCEMENTS – 2010 SP2

- Node and link description variables have been added to XP Tables
- Reverse direction now works on a multiple link selection
- DTM triangulation engine has been replaced, and triangulation speed has been improved significantly. Existing DTMs will be automatically converted from the old format (.tin.0, ..., .tin.9) to the new format (.xptin). Existing triangulations that are converted will retain the same set of triangles, i.e. they will not be retriangulated unless the user explicitly recreates them from source data.

MAINTENANCE – 2010 SP2

- Quantity and quality result summary in .OUT file should now be reported correctly in all cases
- Results should now be computed correctly for models that contain particular combinations of user-defined conduits, inlet-capacity nodes and multiple global storms
- Improved handling of result reporting for nodes with names longer than 10 characters
- Horton infiltration decay rate now converts correctly between 1/s and 1/hr units when importing from and exporting to EPA SWMM5
- Saved views from a previously opened model will no longer show up in a subsequent new model
- Fixed incorrect numerical rounding in XP Tables when precision is increased in the Variable Format dialog
- Max tailwater, max headwater, and max velocity times depth now show correctly in XP Tables when global storms are active
- Maximum flow and velocity in XP Tables now report the highest absolute values as originally intended, and the minimum flow and velocity report the value closest to zero
- Node inverts, ground elevations and link lengths now import correctly from LandXML files
- An error message has been added to indicate when the area for an orifice is missing
- A warning message has been added when runoff redirection and BMP are both active
- Multiple rain gauges in one rain interface file are now handled correctly
- Allowed zero areas to be set for landuse in Water Quality dialog
- Fixed unit conversions on node, link and label display sizes for US Customary models
- Engine no longer hangs when effective RDII rainfall time period does not match simulation time period
- Quick Data View now switches between Node, Link and GIS tabs as expected based on the current selection
- XP Tables variable names have been altered for some rational formula hydrology fields to distinguish between pervious and impervious values
- Default interface file names are now populated on solve if none have been specified
- Importing from GIS files into elevation shape layers now handles polylines in addition to polygons

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MAINTENANCE – 2010 SP2

- Fixed a numerical error that resulted in zero flow when the slotted drain under the HEC-22 option was used
- Results from EPA SWMM5 can now be reviewed as expected for pumps and weirs
- CSV files containing XYZS data (e.g. from 2D result map output) can now be read into DTM Builder
- Fixed some layout issues in the Rational Formula Hydrology dialog
- Pump, weir, orifice and special conduit names are now restricted to 10 characters as required by the database
- Fixed an error in overland flow velocity reporting for rational formula hydrology with Alameda TC method (it was off by a factor of 100)
- Rational Formula Hydrology dialog now has an additional field "Overland Flow Velocity" for the Alameda TC method, to distinguish between flow velocity and flow path slope
- Large XYZS files loaded from the DTM layer right-click menu are now read in much more quickly
- Creating a DTM from an XYZS file through the DTM layer right-click menu now takes breaklines into account (previously, DTM Builder had to be used)
- "User Defined Rainfall File" option for rainfall global database records will no longer be incorrectly unticked after exiting the User File Selection dialog
- An error message now appears on solve if subcatchment slopes are less than or equal to zero using rational formula hydrology with kinematic wave TC method
- Added a check for outgoing links when exporting outlet nodes to EPA SWMM5
- Fixed some object counts in the layer control that were not being refreshed on content deletion
- DTM no longer removes text after the "." in the output filename, unless it is the .xptin extension
- Memory usage and speed of exporting DTMs to 12D ASCII has been improved
- Fixed an issue in Sacramento Runoff Job Control with multiple scenarios where an unwanted character was sometimes added to the date fields
- Snyder and Snyder Alameda unit hydrograph routing methods now behave like Clark method (same as HEC-HMS)
- Fixed an error in volume calculation of a storage node if input data has decrement in surface area
- The correct conduit depth is now used when left at the default value of 0.05
- Corrected an error in managing multiple grid extent layers that in some cases caused the wrong layers to show after deleting one of them and reopening the model
- Fixed an error where the calculation of B for the Laurenson runoff method always used the roughness for the pervious part of a subcatchment even when the subcatchment was fully impervious
- Added a missing backslash in constructing 2D output file paths with Use Directories ticked
- Variable time interval rainfall now graphs correctly when intensity values are entered instead of depths
- Holes no longer appear in DTM fill with Restrict Display Range unticked when very large magnitude elevations are present

**Version 2010 (v12), Service Pack 1 (August 2010)**

ENHANCEMENTS – 2010 SP1

- Link Offset as Elevation (new EPA option) is now supported in the EPA SWMM5 reader

MAINTENANCE – 2010 SP1

- Dynamic cross section view now shows correct heights for arch, vertical ellipse, horizontal ellipse and modified basket handle conduit types
- Ruler window no longer shows in top-left corner of screen before being moved to top-right
- HEC22 gutter depression metric unit (m --> mm) has been corrected
- Fixed incorrect ordering when reporting special conduit parameters
- R\_TC is now exported to XPX for all hydrology methods
- Gauged data now shows as expected with scenarios active in Review Results
- Inlet rating curves are now only exported if they are used somewhere in the model
- Fixed an occasional crash when exiting the graphical encoding legend dialog
- CHANGES.TXT file should now show correct formatting when viewed from the web
- Node names are now shown in full on the Conduit Profile dialog, and the link name is shown in the title bar
- User inflow hydrograph flag import from EPA SWMM5 is now exported correctly, and node limits have been increased

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MAINTENANCE – 2010 SP1

- Corrected interface exporting of rational formula data that caused engine to freeze
- Rational formula: Added blocker to prevent runoff pattern from being repeated for long sim times
- Deleting objects from the right-click menu now asks for confirmation
- A horizontal scroll bar now appears when necessary to view long file paths in the Background Images dialog
- Corrected data file reading routines that ignored last entry of a line in various cases when the simultaneous flag was enabled
- Tooltip and status bar message added for the Point tool
- Fixed an issue with rational formula routing when the simultaneous flag is on
- Simulation no longer hangs in RDII method when simulation time exceeds rainfall time
- Producing correct values with Clark method when the simultaneous flag is on
- Added safety check when the first area of a storage table is given as 0.0 (was causing a faulty table computation)
- Version information in Help->Check for Updates now requests a refreshed version, to avoid old information by caching
- Dynamic long section no longer crashes when node or link table options button is pressed with invisible node or link table
- Line colours in profile plot now match those in the legend
- Time to reach final elevation for dynamic elevation shapes now has a minimum of 0.01 hr
- Water quality routing problem with negative flow has been fixed
- Fixed a problem with the simultaneous flag for the Sacramento County method
- A bug that occurred for a special setting of user-defined conduits has been fixed
- Fixed an erroneous "file not found" message that occasionally occurred when plot output line hydrographs were viewed with two models open simultaneously
- Fixed an issue causing negative flow in the Clark method with evaporation active
- Natural channel cross sections imported from EPA SWMM5 are now correctly attached to links

Version 2010 (v12) (June 2010)

ENHANCEMENTS – 2010

- LA WSPG procedure implemented
- Dynamic Long Section Views Enhanced (Supports dual drainage, embedded xptables)
- 2D Scenario management now supported with active/inactive layer management
- 2D Dynamic Elevations implemented (Dam Break, Fence collapse)
- 2D Elevation shapes added for additional terrain manipulation
- 2D Initial Water level boundaries supported (ponds, lakes)
- 2D results files can be directly loaded and viewed
- New Intel Engine - improved speed efficiencies
- Contour labels now displayed for DTMs
- Increase allowable number of pump curves (user configuration:PUMP\_CURVE\_POINT)
- Catchment Redirection - directly to node without runoff routing (additional checks implemented)
- RDII method for continuous modeling is now supported (support for Interface files)
- RTK parameter sets are now unlimited from a previous max of 5 global database records. The number of patterns is controlled through a config parameter RDII\_PAT=X
- RTK can now be applied to continuous simulations using a rain interface file.

MAINTENANCE – 2010

- Modify Elevation now works correctly for all cases when setting to lowest link invert
- Evaporation from the Depression Storage for Uniform loss method now incorporated
- Reporting error in Table R5 & R9 has been fixed
- More than 5 RDII patterns are now allowed by using "RDII\_PAT=" configuration parameter
- 2D Plot output graphs dates now correctly displayed
- Modify invert elevations corrected when setting to lowest connected link invert regardless of value
- Storm names now checked for invalid characters
- Error in graphic display of Pollutant Load/Concentration/Cumulative has been fixed for RNF/SAN/HDR modes
- XP Viewer installation issues (installing DirectX) resolved
- Additional output precision added for 2D flood depths
- Changes in Volume of water in 2D domain now can be monitored in simulation runtime window
- Flood results for open channel left, main, right channel flow, velocity now reported

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MAINTENANCE – 2010

- User Defined Rainfall file now reads first non zero value
- Default 2D folder structures changed and not created for 1D only models
- Added tolerance for check on lowest cell elevation along 1D/2D Interface
- Pollutant Routing Method (CSTR) in HDR has been updated (configuration parameter gives WQ\_PRE2009 backward compatibility)
- User-defined conduit data now consistently saved in XP Tables for all cases
- LandXML version information correctly exported
- Egg-Shape conduit now plotted correctly
- DTM legend restricted range colour display fixed
- Node renaming correctly verified when editing in XP Tables
- Handle max iterations input correctly when data is outside of valid range
- Display of Cross section left/right banks on layout updated immediately after data changes
- Dynamic Plan View now displays base scenario results when multiple scenarios exist
- New 2D Intel engine (2009-07-AE) has been incorporated
- Support Interface rainfall data and user-defined rainfall in one model
- Kinematic Wave RNF routing error has been fixed
- Fixed initial buildup shown for this model with dry days greater than zero
- Inlet Type data now exports only relevant data for computation
- Handle missing/corrupt 2D results files (Check and process appropriately)
- Bug in orifice coefficient changes with time has been fixed
- Fixed invalid high continuity error reported with catchment redirection and evaporation
- Review results now display first time step results in Runoff layer
- Fixed computation for Alameda runoff coefficient for Rational Formula
- Rational formulae method now uses correct runoff coefficient for FAA
- Horizontal Ellipse now rounds up to next pipe denomination (upsizing)
- Arch pipe now rounds up correctly (upsizing)
- Allow double click on polymesh element (e.g. elevation shapes etc) to edit data
- RDII results now corrected when rainfall stops before simulation end time
- RTC multilink objects now exported correctly (fixes RTC dialog issues with case 659)
- Tabbed dialogs now drawn with correct colours
- DTM properties dialog reconfigured for easier display/edit
- Added View log messages from loading 2D results to Reporting layer right-click menu
- Correctly pick the 2D maximum/minimum results for all cases
- Initialization error in Clark Method calculation has been fixed

**Version 2009, Service Pack 3 (11.3) (December 2009)**

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- New menu item, View->Go to..., has been added. Allows centering the view on specified (X, Y) coord.
- 2D job control settings now accessible by right-clicking the 2D Domain layer & choosing 2D Job Ctrl.
- Network locks now identify the client machine by MAC address
- Dongles are now enumerated correctly when multiple XP dongles are connected to a network server

MAINTENANCE – 2009-SP3

- Fixed erroneous export of initial abstraction fraction in some cases using the SCS method
- Pipe diameters can now be converted between mm and m units in XP Tables and when importing
- Initialization issues in Green-Ampt infiltration method have been fixed
- EPA SWMM5 import utility has been updated
- Curve legends showing maximum values now always appear, even with only one storm or scenario
- Table R3 in output file has been updated
- A bug in initial abstraction calculation in the SCS runoff method has been fixed
- New link labels no longer overlap with old labels when a conduit is split
- Invalid last point in RNF review result graphs has been fixed
- Fixed an error exporting 2D results to shape files
- Print preview now stable when no printers are installed
- When dongle has been removed, user can now insert dongle and retry
- Review results now shows the correct cumulative load data for metric models (kg not grams)
- Welcome dialog selects newest recently used file by default instead of oldest
- Fixed a crash while editing water level line vertices
- Loading shape files or generating interface file names with long paths now stable.

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MAINTENANCE – 2009-SP3 (cont.)

- Individual lines are now imported correctly from MID/MIF files
- Value range for 2D inflow capture coefficient has been changed to (0.5, 100)
- Flood results on 2D maps are now shown to 3 decimal places
- 2D grid limited to square cells (vertical and horizontal sizes have been merged into a single size)
- Network dongle license can no longer be obtained by other users while a model is being solved
- XP Tables now shows all nodes and links when several disconnected networks are present
- Default coordinate system changed to NONEARTH for GIS file export
- Multiple views can now be saved and restored without corrupting the selected object set
- HDR water quality calculation has been updated. Config parameter WQ\_PRE09 added for backward compatibility
- Restricted display range is now used for DTM legends when turned on, instead of entire DTM elevation range
- Links with vertices will now show on the display when the endpoints aren't visible
- Overlapping DTMs with different display styles (filled/contoured) no longer affect each others display
- Minimum and maximum elevation values are now always included on DTM legends
- Model extents are now automatically updated when a new polygon or polyline is added
- DTM fill is no longer executed when only contours are displayed
- 2D map results should now print correctly using the default PRINTDIRECT=0
- Node names are truncated to 10 characters when a node is renamed by double-clicking its label, to avoid corruption of .xp files
- Application no longer crashes on numerical errors when pipe design is turned on
- Clicking Retry after the dongle license is lost will now successfully reconnect with the network server
- Deleting a DTM when the properties of another DTM are subsequently changed now stable.
- Blank space no longer shows around the edges of a DTM that is overlaid on another DTM
- Application no longer crashes attempting to review runoff results when results have not been saved
- Fixed a bug where ID errors were shown in some situations after deleting a node
- Tools->Export To AutoCAD now creates the .DXF file in the correct folder
- The number of elevations shown on DTM legends is now limited to avoid exceeding the display
- Fixed a bug exporting to EPA

**Version 2009, Service Pack 2 (11.2) (October 2009)**

MAINTENANCE – 2009-SP2

- DTMs now have a separate layer for legends (and no longer get drawn over by other layers)
- ESRI grid export of 2D results now works for angled grids
- JPEG world files with extensions .JGW, .JPEGW, & BMP world files with extension .BPW, are now read
- Using PUMP3\_MAXQ parameter will now allow max flow rate through dynamic head pump (type3) at zero or negative head difference (d/s-u/s)
- SCS (Curve 484 & 256) unit hydrograph dimensionless ordinates have been updated
- Fixed some issues where only part of the network was displayed in dynamic plan view
- Review results now shows the correct concentration and cumulative load regardless of the units used
- Removed old third-party image libraries that were causing xpswmm to fail to load on some machines
- HDR BMP calculation has been updated (fixed)
- ECW support libraries are now only loaded when required (some DLL dependencies of the libraries were causing xpswmm to fail to load on some machines)
- Natural channel shape global database now handles imports correctly
- Volume vs Storage calculation at storage node has been updated
- Pump's off/on reporting in Table E17 has been updated
- Default evaporation for SCS method now ignored using SCS\_NOEVAP param. (pre-v10.62 approach)
- 2D check files are now created in the correct folder with the correct prefix
- Fixed a crash when a node is deleted with the mouse cursor on top of its label
- Fixed a crash when creating AVI animations
- 1D depth calculation has been updated at 1D/2D "linked to invert" culvert inlet/outlet SX points
- Tools->Utilities can now be executed successfully when using a network dongle
- Simulation engine can now display cell counts of more than 5 digits (up to 8)
- Fixed a problem with dynamic section view when negative elevations were present
- The old approach (pre-2005) to calculate the flow through a surcharged weir can be adopted using WEIR\_PRE05 parameter

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MAINTENANCE – 2009-SP2

- Various updates made to graphics code: smoother lines drawn in network view
- Polygon / polyline handling rewritten to reduce memory leak, improve strength of vertex operations
- Invisible DTM layers no longer contribute to the displayed terrain where multiple DTMs are present
- Split conduit now splits at the correct position (was getting downstream and upstream nodes mixed)
- Fixed a crash when importing an XPX file specifying a non-existent node attached to a catchment
- Double-clicking on a breakline will no longer bring up the Edit Data dialog twice
- Double-clicking to create a polygon while holding Ctrl now works
- Closest vertex to mouse will now be used when dragging polygon or polyline vertices
- Selected polygon or polyline will no longer change after a vertex drag
- Selection highlight will no longer change to black after selecting some polygons
- 2D grid extents are calculated for rotated grids; grid displays when horizontal/vertical cell sizes differ
- HDR Water Quality Pollutant routing (CSTR) has been updated
- Fixed an issue with US Customary unit jobs where the scale was displayed incorrectly

**Version 2009, Service Pack 1 (11.1) (June 2009)**

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- Build date is now shown in “about” dialog and “check for updates” dialog

MAINTENANCE – 2009-SP1

- Split link now makes two links with the same visual properties as the original link
- Fixed hanging problem in the simulation engine when using a network lock
- Added missing .dxf files to installation (caused failure to load some CAD drawings)
- Print preview no longer crashes when no printer drivers are present
- Fixed 2D results (elevation) display for water level lines
- TuFlow results files greater than 2GB now load successfully
- Text objects in GIS layer are now selectable
- Fixed graphical encoding issues (now always displaying when layer is turned on, menu item reenabled and can change settings when turned off)
- .xp files converted from an older version and saved as the latest version will now be backed up as <filename>\_v<old version>.xp (and corresponding .mdb)
- Link labels no longer disappear when a multi-link is converted to a single link and back again
- Plan view, long section and dynamic section views now use correct results file when multiple scenarios and storms are present
- Fixed an occasional crash when status bar progress control was being updated
- Fixed an application startup crash on machines with DEP disabled
- Water quality results are now plotted correctly with global and local storms
- Crash no longer occurs when loading GIS files containing LINE sections
- DTM can now be created from XYZS files delimited by tabs
- Fixed an issue opening 2D inflow capture dialog
- Now opening correct 2D results files for plot output points and lines when "Use Directories" is ticked in 2D Job Control settings
- Layer control now updates correctly when plot output points or lines are added, and no longer crashes on right-clicking plot output layers
- Fixed a crash in quick data view settings
- Merging with new version files now works as expected
- Inlet edge design text corrected to say Conc for concrete items
- Now displaying an error message when sediment depth is greater than conduit diameter or height
- Fixed a problem adjusting levels with 2D cell checks
- Now exporting 2D results contours to GIS files correctly, completion message updated to indicate correct export file type
- Fixed issue: licensing code that was causing only the first dongle on a network server to be found
- Demo, evaluation and starter pack versions can now solve 2D jobs of under 10000 cells without getting an error message
- Fixed a crash on solve using Sacramento hydrology method
- Job control dialog titles have been changed to be more informative
- Pipe design diameter is now updated correctly for multiple scenarios
- EPA SWMM5 import utility engine has been updated
- Max depth selection for Arch Conduit has been fixed
- Fixed SCS (Curve 484) unit hydrograph dimensionless ordinates

## Version 2009 (1100) (March 2009)

### ENHANCEMENT – 2009

- SWMM 5 Engine supported, including review of SWMM5 results
- Added support for importing CAD layers into selected XP model layers
- Improved 2D results map and contour display
- Color and style now user definable and saved for review results
- Layer Control View simplified and improved
- Background Graphics revamped, increased draw speed, improved picture quality
- Allow multiple networks to be analysed in Hydrology layer simultaneously
- Worst Storm - Now displays worst storm result in Spatial reports/Graphical Encoding & XP Tables
- Basin Optimization Added
- Rainfall on 2D Grid (including IL/CL), double precision computation added
- Layer Control View simplified
- Allow export of network objects to GIS files
- Added icon on toolbar for Zoom Previous
- Link labels - allow opacity and modification of location
- 2D Inflow Capture Option Added
- Selection info now available from menu to look at model/layer
- Allow the user to set the next counter for the default node/link names
- Added support for 2D variable roughness based on depth
- Shape Export
- Updated AutoCAD background images handler
- 2D Check files now viewed correctly for imperial unit models
- Importing of LandXML (e.g. Data from Civil 3D, Arc Hydro databases)
- 2D Analysis updated
- Handle invalid 2D extent data when opening models

### MAINTENANCE – 2009

- Scenarios and multiple storm analysis now output named results files
- DTM display range restriction fixed
- Various EPA 5 export issues fixed
- 2D Hazard maps now directly read from result files to give correct maximums
- Fixed Links selectability when selection flag off, layer control share selection/visibilty flag
- Ridge lines data correctly imported
- Allow the deletion of 3D Path lines for viewing network in 3D
- Continuity Error with catchment redirection fixed
- Spatial reports - Display on selected objects now updates correctly
- Dynamic zoom (mouse wheel) improved
- Fixed grid setting Dynamic Section View - check valid data
- Update results contours on water level lines after solve
- Support results of smooth contours on water level lines
- Long filenames (256 chars) now allowed
- Ruler tool now always displays area as positive
- 2D analysis now possible with multistorm and 1D scenario changes
- Inlet Capacity dialog redesigned to correctly display options
- Additional checks on Storage data for checking invalid data
- Conduit Profile on multilink from Right click on now displays correct conduit
- Quick Data View settings now saved
- Water level lines improved for editing and automated generation
- Various memory and resource allocations improved
- CAD file with rotation now supported
- XP tables order now maintained correctly
- Zooming in Dynamic Plan view improved
- Link Label context (in Layer control) options now appear correctly
- Various Dialog alignments fixed
- Spatial Report formatting error fixed
- Display the min/max values of 2D results contours
- When using restricted range on 2D results, correctly display edges
- Fix dragging multiple objects with snapping on

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MAINTENANCE – 2009  
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- 2D level checks improved
- Handle catchment connectors correctly when centroid in outside polygon
- Handle opening invalid files appropriately
- WLL trimming fixed
- ECW files correctly handled
- 2D advanced parameters supported, 2D directories now supported,
- Frequent Layer control refreshing fixed
- XP Tables paste fixed
- Multilink dynamic view improved to handle ceratin data set
- Added checks to fix models with global database duplicate names
- Improve min area calculation

**Version 10.6.3 (October 2008) (Service Pack 3. SP3 contains SP1 and SP2 Changes)**

ENHANCE  
MENT –  
10.6.3

- 2D Plot output charts options enhanced
- xpswmm now compatible with Watershed Modeling System (WMS) v8.1 import/export link

MAINTENANCE – 10.6.3

- DTM display with restricted range now draws correctly
- Save as template now resets node/link counter for creation
- Graphical Encoding settings file now saved with extension always
- Modiy inverts - setting to lowest invert now works when old inverts at 0
- EPA SWMM5 export to storage nodes fixed
- Check valid valid arch sizes on solve
- Fix error in reporting of design flow for closed conduit
- Allow 10 char for an object name to make consistent printing in Table T4
- 2D plot output lines now drawn with direction
- Ensure 2D results Depth file is created when head is computed
- Ensure nodes created are snapped to exact locations if snapping is on
- Check object name validity to exclude invalid characters such as "
- Fixed snap to Grid when offsets are not zero
- Get rid of all of the Checks for special prefix of object name to control simulation setting
- Handle footers correctly in Printing
- Support long path Name. Up to 246 character (for 1d) including file name.
- Fixed Max Flow depth cal in Table R9. Added a new local variable (PEAKQ) to track the total runoff during the same timestep
- Inlet Capacity: Maximum capacity editbox now enabled/disabled correctly for given type
- Correct results picked for Review results when all scenarios are not active
- Pipe design - diameters now updated for multi conduits
- Spatial Reports/Graphical Encoding fixed when active Sceario changed
- When selecting objects all object types are active by default
- Spatial Reports/Graphical Encoding fixed when data modified via XPX
- Object Labels - Allow the counter for the node and link names to be increased
- DTM display now does not use transparencies to draw contours, just fill areas
- Sediment depth draw in Sectional views fixed to look at US/DS object
- Memory allocation errors adressed.
- Ignore rotation axis when viewing AutoCAD files
- Fixed error in switching Network and XP Table views
- Allow the catchment names in XPX file to be imported as case insensitive
- Fixed initialized problem for RNF kinematic wave parameter
- Separate kinematic wave length for all the impervious areas
- Fixed problem in detailed printout of pump (and other) resultsZoom out in Plan view section fixed
- Ensure a valid DTM exists for 2D models
- Additional 2D model data validation added
- Export to DXF now does not export muliple links
- Fixed 2D contour export when extent polygon has rotation
- Water Quality issues: Fix summation calculations

## Version 10.6.2 (July 2008) (Service Pack 2. SP2 contains SP1 Changes)

ENHANCEMENT – 10.6.2	<ul style="list-style-type: none"><li>▪ Highlight rows with selected objects from network in XP Tables</li><li>▪ Added Automatic generation of Water Level lines, Deletion of WLL, draw WLL directions</li><li>▪ SCS Curve number Loss Method now available across other hydrology methods such as Clark</li></ul>
MAINTENANCE – 10.6.2	<ul style="list-style-type: none"><li>▪ Fix dialogs for HC-12 and 2D Eddy viscosity to display optional (radio items) correctly</li><li>▪ Modified EPA export to handle Dry weather flow data correctly</li><li>▪ Fixed intermittent Minimize/Maximize of network view crashing</li><li>▪ Support Double type fields in MapInfo MID/MIF files (e.g. importing Z points for DTM)</li><li>▪ Show warning message if active node(s) in runoff and not in current simulation (App Settings)</li><li>▪ Allow the node/link prefix name to be empty for new names</li><li>▪ Display error message if simulation time for user defined rainfall is less than 0</li><li>▪ Total Ground water flow now reported correctly in XP table</li><li>▪ Support corner specified ESRI ASCII grid files (specified by xllcorner and yllcorner)</li><li>▪ EPA export now exports storage curves correctly</li><li>▪ Used default min/max limits if user defined size is beyond the range for Ellipse &amp; Arch shape conduit.</li><li>▪ Allow multiple instances of application to exist</li><li>▪ Map Project for MIF file created, correct the coordinate setting for the extent</li><li>▪ Profile Plot: Increase number of points from 100 to 1000</li><li>▪ Calculation of Excess Rain &amp; Infiltration when multiple subcatchments are attached to single node</li><li>▪ Allow the dynamic/long section display without the need for running the model simulation</li><li>▪ Fixed display of Gauged Flows for Runoff Node</li><li>▪ Show the number of selected objects in each layer that will be deleted on delete key</li><li>▪ Protect memory allocation for database filenames</li><li>▪ RDII time step precision increased</li><li>▪ Added time out for web update check</li><li>▪ Only show 2D results animation controls when 2D results are valid</li><li>▪ Refresh network view on deleting image(s)</li><li>▪ Modified EPA export to export handle weir names with spaces, export special conduit types correctly</li><li>▪ Hazard (VD) now optionally computed at every time step on simulation, and stored in results file</li><li>▪ RDII rainfall data has been extended till simulation end time</li><li>▪ Save the 2D map results flag correctly</li><li>▪ Fix Horton to Uniform loss conversion when Proportional loss (Max ignored, Min used)</li><li>▪ Reporting of stage and depth values now considers all incoming redirected groundwater flow</li><li>▪ Display error message if direct input evaporation data is invalid/missing</li><li>▪ Check and display error message if invalid rainfall data when using global storms</li><li>▪ Data convertor now imports RDII data from EPA SWMM 5.0</li><li>▪ Support tooltip to display both imperial and metric units for all dialogs (e.g. Hec-12)</li><li>▪ Fixed conduit split when the split is not at the middle position</li><li>▪ Added "Catchment Area" in Summary of Quantity and Quality Results (OUT file).</li><li>▪ Hec-12 Inlet Capture: Indexing problem between Intel type and Pavement type has been fixed.</li><li>▪ Allow Default values for all XP variables to be set from INI file (e.g. Sacramento Hydrology)</li><li>▪ Support SHPT_POINTZ data type in shape files when building DTMs</li><li>▪ Allow all XP variables to be imported in XPX file (e.g. Sacramento Hydrology)</li><li>▪ Correct reporting of Node Crown Level when ponding allowed option is used</li><li>▪ Export only active nodes in hydraulic mode in 2D models</li><li>▪ Reporting of total surface runoff depth, total flow and loss now considers all incoming redirected surface flow</li><li>▪ Export correct elevation data for 2D fill areas for imperial units</li><li>▪ Export nodes when they are connected to non-active open channel linked to the 2D mesh</li><li>▪ Quick Data View now updates correctly with selection changes</li><li>▪ Fixed conduit length/slope calculations for multi links (were ignored)</li><li>▪ All 2D result files are deleted before commencing to create new result files</li><li>▪ Quick Data View now loads correctly</li></ul>

## Version 10.6.1 (April 2008) (Service Pack 1)

### ENHANCEMENT – 10.6.1

- Clark Hydrology added
- Added CatchmentSim Data Exchange
- Online Help now added for access to latest help from xp web site
- Added Uniform loss Infiltration (Initial/Continuing Loss)
- New 1D/2D integrated solve window, faster 2D runtimes
- Added GIS layer for viewing MapInfo(mid/mif)/ESRI(shp) files

### MAINTENANCE – 10.6.1

- Elevation checks on 1D/2D Interface & connected nodes now checked based on 2D Job control setting
- DTM:Fix legends for flat terrains
- DXF Export for links with vertexes fixed
- Node selections flag checked for valid selection
- Deselect objects in layer when selection/visibility for layer turned off
- Spatial report format dialog fixed for invalid options
- Scenario now saves catchment flags correctly if >3 catchments
- Plotoutput points/lines, removed invalid properties, added delete, rename
- Plotoutput line vertexes not corrupted when exporting for imperial files
- Fix External Database import for records with missing object names
- 2D Output results to CSV formatting fixed
- User defined rainfall not dependent on station variable being set
- Support xyzs file format import without s value (creating DTM)
- Added ability to import 3D breaklines from GIS files
- Additional Progress controls added for opening database
- Setting the node invert to lowest connected link invert is not determined by existing node invert
- Fix zero divided problem resulting from calculated surface area
- Engine supports long path name
- Fix flow depth calculation problem when sediment depth is modelled
- Revised memory allocation for Sacramento hydrology
- Fix error in number of raingage calculation when HOT file is in use
- Corrected the ground water depth to be exported to RES file (XP table)
- Calculation of Infiltration over total catchment is fixed for RES file (XP table)
- Link Creation with vertices fixed while panning/zooming
- DXF Catchment export now incorporates drawing style
- 2D Results now splits render triangles at all user defined color points to display color correctly
- Improve 2D results file loading
- Fixed the color/hatch/linestyle popup window location when using multiple monitors
- Fixed DXF export to be compatible with AutoCAD 2009

## Version 10.6 (October 2007)

ENHANCEMENT – 10.6	<ul style="list-style-type: none"><li>▪ Support ESRI Grid File Import for DTM creation</li><li>▪ Sacramento Hydrology now includes Nolte and Sacramento methods</li><li>▪ Export 12D format ASCII file with triangulated elevation information from DTM</li><li>▪ Legend for DTM added</li><li>▪ Integrated 1D/2D model now supports map result display for 1D component in network display</li><li>▪ Additional support of XP layers to be exported to GIS</li><li>▪ New AutoCAD DXF export with more support for XP layers</li><li>▪ 2D results now exported to ASCII grid file for current time step</li><li>▪ 2D result contours now drawn optionally by interval specification</li><li>▪ Cross-section profile on DTM now marks user created vertices</li><li>▪ RDII - Rainfall derived Infiltration Inflow Added in Runoff layer</li><li>▪ DO-BOD - Dissolved Oxygen BOD Interaction simulation added in Sanitary layer</li></ul>
MAINTENANCE – 10.6	<ul style="list-style-type: none"><li>▪ Increased maximum numbers of vertices to 100,000 for each Poly mesh</li><li>▪ Added ability to reverse layout of cross-section direction and display banks on layout</li><li>▪ Support long string names</li><li>▪ Validate extension when creating files (XPX)</li><li>▪ Able to handle large DTM in 3D view</li><li>▪ Only Display flood symbol when not sealed manhole and HGL above Ground elevation</li><li>▪ Export 2D results contours corrected</li><li>▪ ECW background image now saved and managed correctly when more than 2 files</li><li>▪ 2D Water Elevation map displays fixed, now uses DTM elevation for non flooded area</li><li>▪ Added 2D cell count to properties of 2D extent</li><li>▪ Catchment connectors now display connection information</li><li>▪ Spatial reports now hides blank fields and reports and refreshes after solve</li><li>▪ Drawing speed enhanced for large network models</li><li>▪ Network grid control now snaps object correctly</li><li>▪ 2D Legend data now initialized and saved correctly</li><li>▪ 2D result vectors now draws</li><li>▪ Added legend for 2D water elevation display (head)</li><li>▪ Restoring of Previous view now works</li><li>▪ Text object management revamped and attributes enhanced</li><li>▪ Network map view animation AVI files now produced with compression</li><li>▪ Plan section legend display now fixed</li><li>▪ XP Tables: Handle precision correctly, load and save precision for fields fixed</li><li>▪ Allow link imports from GIS files to be connected to existing nodes based on locations of endpoints</li><li>▪ Printing: fix page margins for imperial unit setting</li><li>▪ Fix display of object's notes in XP Tables</li><li>▪ Allow more than 32000 items in XP Database list as needed</li><li>▪ Handle large paths when running the program via the selection of XP file in explorer</li><li>▪ Hydraulics WQ: fixed export pollutant data when more than one pollutant and a different user list</li><li>▪ Updated pipe sizes now saved correctly in appropriate scenario</li><li>▪ Fixed profile plot results when using multi storms</li><li>▪ Fixed memory allocation for large networks</li><li>▪ Unit conversion in SAN open channels for Metric Unit corrected</li><li>▪ Continuity report in Table E21 updated, now based on Inflow/Outflow listing in the table</li><li>▪ Overflow Calculation for 1d2d integrated model updated, removed dependency on spill level of open channels</li><li>▪ BMP computations fixed</li><li>▪ Unit of the Pollutant exported to external CSV file fixed (unit=mg/l)</li><li>▪ Total inflow and outflow to/from a node is corrected considering the effect of negative flow and multi-barrel</li><li>▪ Directory/path setting of INI file is corrected to access correct Configuration parameter</li><li>▪ Horton infiltration calculation corrected when total infiltration exceeds max infiltration volume</li><li>▪ Reporting of peak minor losses in a reverse grade conduit (culvert) corrected</li><li>▪ Interface utility program is updated to make it compatible with upper data file version</li></ul>

## Version 10.52 (May 2007)

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- Import Node/Link Elements from ESRI Shape files and MapInfo Interchange files
- Support added for RTC sensor second trigger value
- Added directory paths for saving 2D results/check/log files

MAINTENANCE – 10.52

- Create Option in DTM Property Dialog now launches DTM Builder
- Split Conduit now splits link with multiple vertexes correctly
- EPA Export - Check for names with spaces, display log file, export X-Sections if link active, fixed sections Buildup/WashOff
- When Storm/Scenario change on network view ensure Spatial Reports Graphical Encoding gets refreshed
- Automatic backup timer minimum occurrence set to 2 minutes ignores prompting and checks if solve active
- When closing main window check printing correctly
- Graphical Encoding Restore now restores the normal network draw
- Correctly pop up menu when right mouse click to access options on selected vertex
- 2D Water Head draw speed fixed
- Support Text with greater than 30 chars
- Graphical Encoding - support encoding of Boolean variables, correct use of node/link flags for txt sizes
- On closing job, the extents of network are not recalculated with each object removal
- Calculate the network extents correctly when multiple tins exist
- Load 2D messages file correctly for jobs in imperial units
- Perspective View navigation improved
- 2D Point Charts - fixed last point on chart that showed max data
- Fix 2D draw of map results - sometimes triangle edges drawn in black
- Spatial Reports, hide/show blank reports as previously
- DTM Builder: Handle comments in xyz line as start of new break line when appropriate
- Vertex insert fixed on last segment
- Export inlet configuration data for active HDR nodes only
- Fix multilink profile plot data
- Results Depth Legend drawn correctly for restricted range data setting
- When reading XYZ file in DTM Builder new lines also start new S i.e. restart break line
- Multi Link Creation and vertex handling made similar to single link
- 2D Results: restricted range now reflected in Legend
- 2D results now created for the specified results types only
- Background image filenames now saved as long strings
- ECW background images now reloaded correctly
- Dynamic section view now corrected for multilink elements with scenario/global storms
- 2D results files now created with scenario/global storm names
- Number 2D active cells now based on extent polygon, active regions need to exist within
- Fix reading of polygon elements from GIS files when data filtering used
- Fixed catchment loading, when catchments are modified.
- Fixed time lag with gauged rainfall, gauged data plot and gauged user inflows

## Version 10.5 (November 2006)

### ENHANCEMENT – 10.5

- Integrate Sacramento Hydrology
- 2D - Node connections are now either at inverts or spill crest
- DTM Creator - Read Polylines from MID files as breaklines, supporting contours
- Exports network layout to jpeg, gif & bmp
- Export Graphics now exports current image to jpg,bmp,gif
- Diagnostics MIF file now supports Regions
- Optionally display time on dynamic 2D results animation
- Added ability to change application background colour
- New AVI capturer - 2D Results now captures to AVI at every timestep
- Added Water Elevation and 2D results cross-sections
- Added ability to modify units of imported data from external databases
- Allow printing with AutoCAD drawing as sheet styles
- GIS import now imports Multi conduit, pump,weir, orifice & other diversion data
- Display simulation period vs run-time efficiency at run time
- Added Configuration Parameter LOG\_RTC (or LOG\_RTC) to write RTC controls to the .OUT file
- Added additional point at beginning of simulation for Runoff Review Results graphs
- Display Interface File time and date in MM/DD/YYYY and HH:MM:MM format
- Allow the same landuse to be used multiple times when defining buildup-washoff characteristics
- Report on Sensor condition in RTC
- Use depth to centreline of orifice (new default) rather than depth to invert when using Configuration Parameter USE\_ORF\_EQN.
- Added Configuration Parameter USE\_OLD\_ORF\_EQN for backward compatibility
- Limit HGL for a node whose spill crest is above 2D ground elevation
- GIS module now allows import of Breaklines from Mapinfo Interchange and Shape files
- Export to EPA 5 Database added as optionable module
- Added XPX command to import catchments
- Added description to network nodes & links
- Added smoothing to 2D result contours
- Draw sediment depths in cross-section and long-section views
- Gauged Data now support user defined files

### MAINTENANCE – 10.5

- Handle Shape file as background without associated dbf file
- Correct draw of link elements (with vertices) when creating/moving
- Correct delete of Node/link elements when Spatial Reports attached
- Fix saving of toolbar positions and status, add visibility access from menu
- On appending selected objects, correctly traverse from last selected
- Correctly save 2D Fill Areas when multiple fill areas exist
- Zoom Rect now checks horz/vert fit
- Fix 2D results imperial unit conversion for displaying maps
- Runoff Redirection option correctly displayed as valid for RUNOFF method
- Importing External databases now converts data with different units correctly
- DTM Creator - Handle multiple type of elements in mid file, and skip data appropriately
- DTM Creator - Read lines from MID files as breaklines/contours
- 2D BreakLines - now uses imperial units correctly
- Toolbar window positions/status now saved
- Background image display now optimized to only render when scale/origin changed
- 2D Results Plot outputs consolidated
- XP Tables - filters fixed for OR join
- Catchment layer Area calculation now shows appropriate units
- Fix save/load of default node/link display type
- Invert management now handles selected objects in disconnected networks
- 2D result locations fixed for imperial units
- 2D Result Map Colors selection/editing and Vector management improved
- Fixed reading of catchment results data
- 2D Results peg now adds correctly & range on data frequency fixed
- 2D results vector properties dialog loads correctly

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- 2D results intensity color fixed
- DTM now rendered to boundaries
- Allow drag of all selected network elements
- XP Tables - fixed number of columns pasted from clipboard, do not save void cells
- Import External databases - Correctly report number of rows read when importing list data
- Import External databases - Fix importing of GLDB items (natural channel shapes)
- Fix status bar display when main window resized
- Fixed saving of 2D model ridge/gullies lines
- Save as template file now does not save xp database but only template file
- XP Tables - Fixed problem with copying and pasting in drop down cells
- XP Tables - Fixed bug with indenting variables
- Fixed opening of xp files with multi-storm results in Spatial Reports
- XP Tables - fixed problem with unit display and xy co-ords
- Printing fixed
- Replaced Job Control Dialogs
- Speed Improvements to 2D results display
- 2D results now further tessellated for color refinement
- Handle long DBF filenames when importing from external databases
- Handle formatting of custom variables in XP Tables
- Fixed 2D Roughness, default roughness now does not override defined Roughness areas
- Points, arcs now handled in ESRI Shape files
- Configuration parameter MGD now reflected in results display
- Now handles invalid Spatial Report settings correctly
- Swmm Configuration parameter list now saves/loads correctly
- 2D Results now have additional formatting options for maps/vectors
- Fixed dialog reload (optimized) when object deleted
- 2D results loaded with correct units for metric files
- Fixed problem with centering object from XP Tables
- Fixed Profileplot startup.
- Fixed loading of object images
- Inflow and outflow calculation for continuity checks has been corrected in reverse grade
- Storage Node Depth measured from invert: Surcharge elevation has effect in model now.
- Continuity check and functionality in RTC module has fixed
- Using of Rainfall interface file has been fixed
- Storage node volume (last data point) is corrected
- Inlet Rating curve: Surface & subsurface node HGL have been matched
- Subcatchments with two or more rainfalls with different durations at a node is handled correctly now
- Now performs WQ buildup for the 1st time step.
- Spatial Reports and GE now display multi cond data correctly.
- 2D active/inactive areas correctly displayed
- Use correct snapped point for 2D Layer connections
- Fixed XP Tables subcatchment results display
- Read 2D Node data from Tuflow BC file to detect SX nodes (nodes not connected to open channels)
- Removed duplicate copies of Configuration Parameters from run-time display
- Do BMP Water Quality removal on Runoff nodes after all sub-catchment BMP removals have been aggregated
- Corrected problem where WQ flag in HDR layer was not always set
- Corrected DWF units when using GPM and MGD Configuration Parameters in combination with DWF input
- Set Runoff flow and quality to zero when Runoff simulation ends before HDR and solving both layers simultaneously
- Fixed error reading hardware lock in 2D simulation
- Changed end volume calculations for 2D
- Power Function Storage: Volume calculation has been corrected
- Allow buildup to always occur at the first time step
- Fixed zero divide on catchment area

## MAINTENANCE – 10.5

- Fix to depth dependent roughness
- Corrected Water Quality table headings in Statistics Layer
- HGL for flooded subsurface node now matches with surface node when inlet capacity is ON
- Don't delete hotstart file when solving RNF and HDR layers simultaneously
- When importing External Database handle selection of list data correctly and add additional validity checks
- Fixed resource leaks in general graphics management
- Create Links now draws correctly
- Fixed area calculation on ruler tool
- Fixed launching of application when running xp database from File Explorer
- Handle External Database where field names have trailing spaces correctly
- Fixed Global Database constant rainfall type display in dialog
- Fix calculation of major/minor contour elevations for DTM
- Fix insertion of vertex in polygon on the last segment
- When global storms active analyse in multi-mode regardless of current mode
- Fixed 2D results contours at the boundaries
- Fix editing of node labels in network view
- Fixed 2D Results Head display
- Allow ctrl select button to both select/deselect nodes/links
- XP Tables - correctly display appropriate scenario, fixes problems when child scenarios created in diff order
- Allow for missing min/max values in 2D results
- Fix incorrect conversion for imperial 2D flow/velocity results
- XP Tables Result display (with multistorms ative in RNF) fixed when solving in Hydraulics only
- Fixed saving of fill area elevations
- Fixed memory leak when reloading files with DTMs and contours displayed
- Handle delete of object with Spatial Report displayed
- Added saving of some 2D result display attributes
- Fixed display of gauged data in Grid format

## Version 10 (February 2006)

## ENHANCE-MENT – 10

- Added 2D Hydrodynamic modelling capability
- Added Support for Digital Terrain Models
- BMP supported in Runoff & Hydraulics layer
- SWMM 5 Data Import added
- XP Tables major enhancements - Support global data, easier variable management, formatiing options, etc
- GIS style layer management
- Added generic Polyline and Polygon tool
- Added ability to change visibility/moveability/selectabilty on all network elements
- AVI Creation of network 2D simulation
- Improved link vertex management
- Dynamic zoom added to mouse wheel
- Network Drag added to Right mouse click drag
- Support for ECW files as background images
- Ruler tool added
- Timed Backup now supported
- Newtork object name prefix defaults and default drawing styles added
- External database now supports import of list data
- GIS module now imports geometric elements from Mapinfo mid/mif and shape files
- 3D Perspective view added to visualize terrain and network elements
- Added DTM Buider to create DTM from existing network & xyzs,mid/mif files
- Cross-section for open channel now supported, automated creation from DTM and link to channel shape
- Added roughness zones global data and in layer control

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ENHANCE-MENT – 10

- Added catchment layer and linkage with existing catchment nodes
- Spatial reports now as tooltips on network elements
- XP Tables - displaying subcatchment node results
- Maintain creation cursors while dynamic zoom & Right mouse click drag
- Display 2D results maps/vectors and legends
- Added F4 key as Property Key of currently selected layer
- Added XPX command for Vertex data for links & its cross-sections
- Add Property and Delete All for most layers
- Support polygons and polylines in a mesh so as to share common vertexes
- Improved network draw speed
- Calculate inverts and ground elevations from DTM
- Added Snapping to network elements
- Added functionality to save status of toolbar
- Added Progress control to main network frame for better user feedback
- Spatial Reports and Graphical Encoding settings now available from layer control
- Added cross-section profiler to view sections on DTM
- Ability to add patterns and transparency to generic polygons
- Additional 2D network elements (areas, boundary conditions, interfaces)
- Security related to network users
- Allow Water Quality pollutant removal in Runoff Layer
- Allow Water Quality pollutant removal in Hydraulics Layer
- Added wet and dry ponds to Runoff Layer
- Added BMP Names and other format changes to output file
- Allow files created for Review Results to be used in statistics utility
- Allow outflow from BMP's to be dependent or independent of inflow
- Implemented RAFTS routines to exactly duplicate RAFTS results
- Optimization of HEC-12 Inlet Capacity data to allow more manholes with dual drainage
- Continuous Snowmelt now uses dynamic memory allocation
- Maximum number of return periods for IFD (IDF) increased from 9 to 20
- Added more flexibility to reading Free Format rainfall data.
- Volume of conduits connected to a node are now included to improve stability of WQ concentration calculations
- Preissman slot transition width changed from 25% to 1% to improve volume calculations for rectangular conduits
- Restrict subsurface node water elevation to water level of surface node for Inlet Control
- Include maximum link volume in output file
- Message added to indicate a file that needs to be written to is open in Excel
- Added Configuration Parameter YEAR\_XX=<xxxx> where <xxxx> is the number to add to a 2-digit year (default is 1900)
- Added Configuration Parameter NO\_OPTIMIZE\_LOOP (or NO\_LOOP\_OPTIMIZE) to only loop through conduits connected to the current node. Default is ON
- Added Configuration Parameter RECT\_SLOT\_TRANS=<xx> where <xx> is the transition width from a rectangular conduit to the Priessman slot (default is .01 (1%))
- Added Configuration Parameter OLDRAFTS (or OLD\_RAFTS) to use the original Laurenson method. The default now uses the actual RAFTS code.
- Added Configuration Parameter 2D\_WEIR\_LEN to use the sharp-crested weir equation to calculate flow from a 2D surface into a manhole.
- Added Configuration Parameter 2D\_ORIF\_AREA to use the orifice equation to calculate flow from a 2D surface into a manhole.
- Added Configuration Parameter SAVEALLPTS to save all points in a simulation for Review Results. Default is to now only save data if it has changed from the previous timestep, significantly reducing file sizes.
- Removed 2Gbyte limitation for Inlet Capacity arrays greatly increasing nodes available for dual-drainage (10000+)
- Add reverse flow flap gate to rating curve

MAINTENANCE – 10

- - Added link label transparency & show/hide arrowheads
- New Job Wizard now calculates simulation time on date change
- Plan section view - draw nodes on top of links
- Added interactive check on multi-storm limits and storm data validation
- External Data Mappings saved on window close.
- Fix long-section direction of plot and defaults modified
- Fix merge of XP databases so that it does not rename existing objects
- Added missing Hec12 data from curb inlet config
- Graphical Encoding field mappings dialog extended to accommodate longer lists
- On new file creation if data.xp exists chooses next available name
- Issues with copy/paste in XP Tables and grid dialogs resolved
- Rational Formulae units displays fixed
- Resizing of pipes (design) now stored as part of scenario
- Corrected implementation of MAXPTS=-1 configuration parameter in Sanitary Layer
- Check for reverse flow when calculating max d/D ratio
- Allow for reverse flow when calculating pollutant concentrations
- Fixed problem whereby Runoff results now displayed when run simultaneously with Hydraulics
- Fixed an intermittent problem reading configuration parameters from the SWMXP.INI file
- Delete zero-byte files on exit
- DVDT term modified to improve stability of water quality routing
- DWF loads in Sanitary Layer for units other than CFS were corrected for process flow
- Check for possible zero divide in Groundwater routines
- Groundwater redirection to a downstream conduit corrected
- Check for valid node or link before diversion of groundwater
- Flows converted before output to interface file
- Change to weir surcharge calculation
- Removed Configuration Parameters MAKE\_XPX and USE\_XYINFO, they are now available within the interface
- In 2D simulation get node depth from 2D (TUFLOW) simulation
- Correct pump on/off count
- Volume reporting now allows for 2D flow exchange
- Green-Ampt infiltration corrected to account for losses greater than available rainfall
- Removed duplicate code causing additional gutters to be created instead of as additional inlets
- Continue to perform washoff even when concentration is zero

**Version 9.52**

ENHANCE-  
MENT

- When using global storms display active storm in Window for viewing results

MAINTENANCE –  
9.52

- Dynamic Section Views now displays water elevations correctly for current Scenario/Storm
- Fixed RTC Sensor selection
- Read and Display correct water elevation when using inlet capacity
- Tidy up Rational Formulae Hydrology fields
- Empty unique object names list on database close
- Correctly read subcatchment results after solve
- Use correct multilink pipe length/grade/RI in ProfilePlot
- Use correct scenario/storm results in Profile plot
- Graphical Encoding & Spatial Reports now displays correct results for given scenario/storm

**Version 9.51**

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MENT

- Security related to network users

## Version 9.5 (March 2005)

ENHANCE- MENT – 9.5	<ul style="list-style-type: none"> <li>▪ Modify Elevations - Allow setting Node invert to minimum link invert</li> <li>▪ Added LINK_MAKEMULTI to XPX Command handlers for converting single conduit to multi conduit</li> <li>▪ Allow suppression of all intermediate printout</li> <li>▪ Read new AES rainfall format</li> <li>▪ Keep processing rain interface file even if rainfall is missing for one or more years</li> <li>▪ Added individual hydrology subcatchment results in Tables</li> <li>▪ Variable selection dialogs now resizable</li> </ul>
MAINTENANCE – 9.5	<ul style="list-style-type: none"> <li>▪ Scenario Manager Fix - correctly check modified data when comparing with default data</li> <li>▪ Global Storm Fix - export only active storm with respect to Scenario</li> <li>▪ Scenario Manager Fix - correctly save list data when saving scenario data</li> <li>▪ Scenario Manager Fix - Remove redundant transaction recording</li> <li>▪ Tables - support Infiltration global databases correctly</li> <li>▪ Tables - correctly display catchments numbers</li> <li>▪ Tables - Filter now works correctly for value comparison</li> <li>▪ Hec-Ras Data imported fixed for unnamed sections and use averaged roughness</li> <li>▪ Additional checks for object name uniqueness before adding to network</li> <li>▪ Check for pipe length to see if any below simulated min length</li> <li>▪ Correction to VARIABLE_N configuration parameter. Use values of n/nfull for circular conduits from T.R. Camp Sewage Works Journal vol 18 Jan-Dec 1946. (City of Spokane)</li> <li>▪ Correction to continuity calc for multiple conduits connected to an outfall (does not affect results).</li> <li>▪ Corrected memory over-write in run-time graphing that could cause the program to crash if run-time graphing was selected multiple times.</li> <li>▪ Corrected pollutant removal problem is ST Plant module for pollutant numbers &gt; 5.</li> <li>▪ Corrected potential zero-divide when calculating the normal depth of a section that overtops the base of a natural channel or trapezoidal section (when using VERT_WALLS)</li> <li>▪ Corrected error caused by attempting to design a conduit that was actually a rating curve.</li> <li>▪ Corrected numeric underflow in calculation of pollutant concentrations.</li> <li>▪ Corrected memory allocation error in number of detailed printout locations.</li> <li>▪ Corrected format of interface file written by hydraulics layer (when re-used by another HDR run).</li> <li>▪ Corrected calculation of conduit diameter from flow in LA County method.</li> <li>▪ Corrected hydrograph spike in LA County hydrology method caused when storm duration is less than time of concentration.</li> <li>▪ Corrected error in WASP interface output file.</li> <li>▪ Fixed Numeric Underflow in Scour/Deposition.</li> <li>▪ Formatting changes to metric output in sanitary layer</li> <li>▪ Check for zero watershed area</li> <li>▪ Use natural channel default data if cross-section available</li> <li>▪ Hec-Ras Import now handles single mannings for a channel</li> <li>▪ Added pollutant data/results to variable selection for Hydraulics layer (XPX/SR/GE)</li> <li>▪ Handle XPX Import/Export Pollutant concentration variable "F_T_PCCON"</li> </ul>

## Version 9.14

ENHANCE-MENT – 9.14	<ul style="list-style-type: none"> <li>▪ Remove rainfall data echo from the .OUT file. Use ECHO_RAINFALL to show rainfall.</li> <li>▪ Added the configuration parameter SUBCATCHMENT_RES to create a \$subcatchment section in the .RES file.</li> <li>▪ Added the configuration parameter GW_CSV to create a CSV file of groundwater results (max 256 columns per file)</li> <li>▪ Added the configuration parameter RESSNOW=GWSTAGE to replace the Snowmelt parameter in review results with Groundwater Stage</li> <li>▪ Added the configuration parameter RESSNOW=GWFLOW to replace the Snowmelt parameter in review results with Groundwater Flow</li> <li>▪ Added the configuration parameter RESSNOW=GWMOIST to replace the Snowmelt parameter in review results with Groundwater Soil Moisture</li> </ul>
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ENHANCEMENT – 9.14

- Added the configuration parameter INIT\_TS=xx to set the value (in seconds) of the initial time step in the HDR simulation 9to remove the initial peak flows caused by a dry conduit)
- Added the configuration parameter ZERO\_DEPTH=xx to set the value (ft or m) used as zero depth (default 0.00001)
- Added "additional travel time" to TC calculations.
- Report peak loads and concentrations, remaining loads, and water quality continuity error
- Added DRYWET\_TS=<xx> Configuration Parameter (where <xx> is in seconds) to reduce the timestep used in the transition from no flow (and minimize the initial spike)
- Added DRYWET\_DUR=<xx> Configuration Parameter (where <xx> is in seconds) is the duration for which the DRY\_WET=<xx> time step is applied
- Added FULL\_WIDTH Configuration Parameter to allow inflow to be distributed using the width of the conduit at it's current depth (Removes spikes from initial inflow)
- Allow groundwater redirection to a Runoff Node with zero catchment area
- Calculate and report surface width at US and DS ends of conduit at every time step.
- Increased maximum number of points in LA hydrograph method (F0601) from 200 per day to 1500 per day
- Added text error messages to LA hydrograph method (F0601)
- Write individual watershed results to SYF file
- Write individual watershed hyetograph, groundwater, Snowmelt and infiltration data to SYH file
- Notes on objects now Editable in Tables with unlimited string length
- In XP Tables show all multilink objects (pumps, weirs, orifices, etc) if name exists
- Correctly display all the multilink object flags in XP Tables
- Added Water Quality pollutant loading for LA Hydrology
- Read associated world coordinate file (jpw)for jpg image files for background images
- XP Tables now displays all objects in current network as well as all objects in model
- Field precisions now overridden from ini file

MAINTENANCE – 9.14

- Correct flow continuity calculations for multi-conduits with multiple barrels connected to an outfall.
- Correct pollutant continuity calculations for pollutant number 11 or greater in SAN layer.
- Only put vertical walls on open conduits (not on preissman slot).
- Correct calculation of normal depth for zero slope channels with vertical walls (VERT\_WALLS).
- Clean up excessive memory usage in RNF layer.
- Remove scratch file ASILEM.IB at end of run.
- Corrected rounding error in HDR water quality.
- : Check whether a HDR node or conduit exists when using an HDR element as the groundwater boundary condition.
- Corrected sub-catchment re-direction error.
- Corrected groundwater re-direction error.
- Corrected memory allocation error for RNF layer circular conduits.
- Corrected memory allocation error for groundwater wilting point.
- Corrected calculation of wetter perimeter for overbank sections with zero depth (when using VERT\_WALLS).
- Check whether weir is below the DS node
- Added additional checks on quality of interface file data.
- Corrected format of table headers in pollutant summary output
- Corrected memory over-write in SAN water quality routing.
- Corrected export error for 1977 IFD data.
- Aggregate watershed results for display at a RNF node.
- Fix Generate Intermediate Inverts when selecting DS to US
- Fix Reading of pump/weir results for new results variables
- Separated WP array into WP (wetted perimeter) and WPoint (wilting point) arrays
- Don't try to design the outlet from a free outfall when "design undersized conduits" is selected
- Check for numeric underflow for very small pollutant concentrations
- Correct reporting of natural channel conveyance for models containing parabolic channels
- Corrected problem where left and right overbank stations in natural channels could sometimes be incorrectly located
- Corrected Inflow and Outflow detailed printout in Runoff layer

*Continued on next page*

MAINTENANCE – 9.14

- Corrected channel and pipe routing in runoff layer
- Corrected array overflow errors in runoff layer
- Corrected continuity check in channels and pipes in runoff layer
- Corrected accumulation of redirected flows to an inlet (gutter) in the runoff layer
- Don't allow negative design depths in hydraulics layer
- Corrected writing water quality results to WASP format file
- Format of sanitary layer tables corrected
- Corrected output of groundwater moisture, wilting point and flow for metric units
- Printout ALL conduits connected to a node in the runoff layer
- Miscellaneous fixes to LA Hydrology Procedure to gain County Approval
- Correctly display all the multilink object flags in XP Tables
- When object name changes correctly change names in all scenarios
- Save as now also saves the associated scenario database
- Allow XPX export of storage depth/area variables
- dlist data (e.g. user defined flow) now not sorted on cell change
- Correctly use sediment depth and inlet type defaults for analysis when not defined
- Added more checks when importing corrupt databases
- Correctly usage of temporal variations in HDR layer for analysis
- Draw the shape files correctly when shape objects have multiple parts
- Correctly lock file when file saved as another file repeatedly
- Scenario Manager now correctly updates data when same data modified multiple times in base.
- CUHP rainfall results now displayed correctly in Review results.

Version 9.1

ENHANCE-MENT – 9.1

- Use 90% weighting of US area (removes instability in highly super-critical flow conditions and better match of gauged results). Use SPATIAL=.55 (55% US) for previous version characteristics.
- Added SHOW\_CONTINUITY configuration parameter to display continuity error dialog at end of simulation
- Re-start analysis whenever conduits sizes change when designing undersized conduits
- Add Constant Inflow concentrations and temporal patterns in HDR layer to pollutant loads generated in RNF layer
- Add WQ pollutant concentrations to RES file
- Added SPATIAL6 to Configuration Parameters to check for US and DS critical flow
- Added simulation summary data to the LA (F0601) hydrology method
- Added reading and writing user-hydrographs to LA (F0601) hydrology method
- Reset initial abstraction for SCS method after 10 days (or use SCSDUR=xx to change default)
- Expanded autoloader to support templates
- Allow engine to run hidden or minimized using command-line arguments
- XP-SWMM Interface now supports solving using older engines and reading computed results
- Graph groundwater component of flow at a node for multiple sub-catchments draining to one node
- Graph Snowmelt component of flow at a node for multiple sub-catchments draining to one node
- Graph composite rainfall at a node with multiple sub-catchments and different rainfall
- Graph aggregate infiltration at a node with multiple sub-catchments and different infiltration rates
- Trap zero surface area for stepwise linear storage nodes and set to value at previous depth
- Warn if surface area for stepwise linear storage nodes decreases as depth increases
- Warn if low point in natural channel is not between left and right overbanks
- Increase maximum links connected to node from 10 to 20
- Select all nodes and links upstream and/or downstream of a selected node (with right mouse click)
- Report groundwater draining out of system.

MAINTEN-  
ANCE – 9.1

- Route pollutants through adversely graded conduits in HDR layer
- Correct intermittent error reading outfall data in very large models caused by compiler optimization bug
- Pollutants are now routed through pumps, weirs, orifices and rating curves in HDR layer (elements with zero area)

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- Storage nodes using the power function storage option now have the minimum surface area equal to the default node surface area (use OLD\_POWER\_STORAGE for previous characteristics)
- Trap potential zero divide for catchments with zero depression storage.
- Trap potential zero divide for catchments using kinematic wave method and zero impervious area
- Correct out of bounds error in Storage-treatment plant module
- Fix accounting for number of seconds in a leap year in statistics module
- Correct array out of bounds error in storage-treatment plant module
- Correctly display %complete during simulation of multiple scenarios
- Correctly display worst node or link during simulation run-time
- Correct array dimensions for pollutant characteristics (prevent memory overwrite)
- Correct array dimensions for peak pollutant concentrations (prevent memory overwrite)
- Corrected out of bounds error caused when only some sub-area of a sub-catchment have the water quality flag enabled (when WQ is being simulated)
- Set concentrations to zero when flow is zero in interface file but pollutants are also being input in the HDR layer
- Don't attempt to calculate flow in a conduit with no upstream depth but where there is a downstream water depth. e.g. Tide gate closed
- Added additional variables to hot-start file
- Corrected NaN if two Rainfall values occur at exactly the same time and all adjacent stations are identical
- Don't allow ZREF=xx to overwrite Initial node depth if initial depth > ZREF, or when using fixed backwater and no tide gate
- Prevent possible zero divide in SCS method
- Prevent possible zero divide in Snowmelt option
- Correctly display results for MGD and GPM configuration parameters
- Delete padded blanks from end of lines in HDR file to minimize file size when running simultaneous RNF and HDR layers
- Move tracking of sediment size from local to global procedure
- Initialize Culvert rating curve to zero
- Add conversion factor for mg/l -> lbs/ft<sup>3</sup>
- Added version number to RES file
- Initialize left-bank and right-bank conveyance
- Track natural channel low-points
- Correct memory over-write of available pollutant sediment sizes
- Correct memory over-write of WQ node names
- Calculate correct hydraulic properties of Rectangular-Round-Bottom conduit when flow is at partial depth of lower (round) section
- Correct zero divide when calculating time remaining on very fast computers
- Initialize MSGBOX name
- Initialize date format to mm/dd/yyyy
- Added code to read [DEVELOPMENT] section in INI file
- Correct seed-type to randomization function for EMC generation with standard deviation > 0
- Corrected Infiltration I/I flow written to RES file
- Handle long filepaths and connection strings for importing external databases
- Appropriately handle strings that are longer than max field length
- Correctly display unit strings for on data graphs
- Read the lengths correctly when importing from a Hec-Ras file
- Record the XPX commands & rtc data into active scenario
- Fixed regeneration speed of AutoCAD background drawings
- Corrected Rational Formula method field definitions
- Fixed shortest path network traversal selection routine
- Variable Selection now loaded with alphanumeric ordering
- Fixed saving/loading from grid data dialogs for LA (F0601) data
- Correctly display units and cursor location on list graphs
- Fix delete button on both list data and graph
- Correctly display WQ graphs for Weirs and Orifices

MAINTENANCE – 9.1

- On importing EPA dat files check for valid number of natural channel shapes
- Correct memory allocation to handle large databases objects
- Correctly display constant rainfall data for intensity values.
- Several fixes to the LA hydrology Procedure
- Fix zoom pan on AutoCAD files with negative ranges
- Appropriately generate redraws after Spatial Report settings have been modified
- Deleted erroneous message concerning rating curves causing conduits to be above the model ground surface
- Corrected additional travel time component of rational formula method
- Corrected inlet rating curve continuity error caused by excess capacity of downstream pipes
- Corrected surface water continuity error caused by groundwater draining out of network
- Corrected surface water continuity error caused by multiple subcatchments (Version 9.03-9.07 ONLY)
- Corrected problem with sub-catchment re-direction causing surface water continuity error
- IFD Table depth and intensity printout restricted to durations stored in the input data.
- Recurrence interval interpolated correctly for 1977 rational formula method
- Fixed potential memory overwrite caused by excessive printout locations in RNF layer.
- Changed default maximum number of barrels used when designing undersized conduits to 10 (from 100).
- Corrected format of table headers in groundwater summary output

Version 9 (January 2004)

ENHANCE-MENT – 9

- Improved color selection. Now supports RGB colors throughout
- XPX Export adds Global Database and Global Data export
- XPX Export now using enhanced variable selection
- Grid controls now used in many dialogs for enhanced list edit, copy and paste
- Natural Channel cross-sections now saved into global database
- Modifying inverts and elevations of conduits has been improved
- Added HEC-RAS channel cross-section import
- Added scenario management
- Link Groundwater boundary condition to node or link water levels in hydraulics layer
- Added 110 new results variables to XP Tables in Hydraulics layer
- Added 25 new results variables to XP Tables in Runoff layer
- Solve Runoff and Hydraulics layers in parallel or series (using SIMULTANEOUS keyword)
- Added Rational Formula methodology (use OLD\_RAT keyword for older rational methodology)
- Added water quality data to Hotstart file
- Added vertical walls to open channels and trapezoidal sections (up to node ground elevation) (using VERT\_WALLS keyword)
- Calculate gutter spread, depth and velocity
- Select from a list of available pipe sizes when designing conduits
- Design for a percentage of full flow
- Design for minimum freeboard (under pressure)
- Design for minimum cover
- Add multiple barrels if design constraints are not met (using MAX\_BARRELS keyword)
- Design for multiple storms
- Don't allow under-relaxation of Orifice elements (unless using RELAX\_ORIFICE keyword)
- Sort Nodes by number of connected pipes before solving (like SOBEK) (using SORT\_NETWORK keyword)
- Provide very detailed output of natural channel data (using DEBUG\_NATURAL keyword)
- Added Intensity-Frequency-Duration rainfall curves
- Added Time of Concentration calculations using Friend's Equation
- Added Time of Concentration calculations using Kinematic Wave
- Added Time of Concentration calculations using Alameda Method
- Added Time of Concentration calculations using Izzard's Formula
- Added Time of Concentration calculations using Kerby's Equation
- Added Time of Concentration calculations using Kirpich's Equation

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ENHANCE-MENT -- 9	<ul style="list-style-type: none"> <li>▪ Added Time of Concentration calculations using Bransby Williams Equation</li> <li>▪ Added Time of Concentration calculations using Federal Aviation Authority Equation</li> <li>▪ Allow multiple conduits connected to one outlet</li> <li>▪ Added XPX Command "MODE RNF HDR SAN"</li> <li>▪ Check for surcharge at both ends of conduit</li> <li>▪ Added user-defined Preissman Slot width (using PSLOT=xx keyword in % of conduit width)</li> <li>▪ Added ability to stop Sanitary layer in middle of simulation</li> <li>▪ Added flag to ignore warnings on Solve (INI file setting)</li> <li>▪ Support simultaneous runs at each time step in RNF(hydrology) and HDR(hydraulics) layer</li> <li>▪ Now loads independent of Registry setting so able to install with previous versions</li> </ul>
MAINTENANCE - 9	<ul style="list-style-type: none"> <li>▪ Fixed highlighting of links with vertexes</li> <li>▪ Fixed generation of inverts when links are connected with different directions</li> <li>▪ Fixed importing of XPX variable T_PCCON</li> <li>▪ Storage-Treatment group number is exported correctly</li> <li>▪ Fixed timestep in Review Results for CUHP method</li> <li>▪ Don't allow ponding at sub-surface node when using Inlet Capacity</li> <li>▪ Add a new point at the Node Surcharge Elevation (reduce continuity error for poorly defined stage storage curves)</li> <li>▪ Read Snowmelt and wind speed data correctly</li> <li>▪ Read temperature data correctly</li> <li>▪ Correction for plug flow in metric units</li> <li>▪ Fixed evaporation in hydraulics layer (using HDR_EVAP or EXT_EVAP keyword)</li> <li>▪ Use Centre channel lengths when left and right lengths are not specified</li> <li>▪ Fixed highlighting of links with vertexes</li> <li>▪ Fixed generation of inverts when links are connected with different directions</li> <li>▪ Fixed Sewer Input Flows and Loads in Sanitary layer</li> <li>▪ Show correct depth for Trapezoidal Channels</li> <li>▪ User Defined Files now Support dates earlier then 1970</li> <li>▪ Draw Editboxes correctly on Windows XP.</li> <li>▪ Check validity of supported dbase filenames when importing external databases</li> <li>▪ Corrected output of DXF files for all RNF layer</li> <li>▪ Tipping Bucket rainfall data to use application date format</li> <li>▪ Fixed header in Sanitary layer output file that printed "OUTFLOW HYDROGRAPHS" when "Print Input Hydrographs" was turned on</li> <li>▪ Fixed WQ concentration in Hydraulics layer for storage nodes with almost (but not quite) zero outflow</li> <li>▪ Use single error log when doing multiple solves</li> <li>▪ Correctly display the surface elevation in Review Results</li> <li>▪ Correctly display the max stage when -ve elevations present in Review Results</li> <li>▪ Load the appropriate result data for multi-conduit elements in profile plot</li> <li>▪ Fixed Copy/Paste to Sewer Inputs Data</li> <li>▪ Now saves current XP Table tab position</li> <li>▪ Number of times first pump turned on in a multilink was reported as one less than actual number</li> <li>▪ Rating Curve Washoff corrected for metric units</li> </ul>

**Version 8.53**

ENHANCE-MENT -- 8.53	<ul style="list-style-type: none"> <li>▪ Added LA Hydrology Procedure</li> <li>▪ External Database Import. Uses the X &amp; Y in Mandatory Fields to update the position of existing nodes.</li> <li>▪ Detailed error messages for External Database Import/Export.</li> <li>▪ Added Conduit Max Volume Variable</li> <li>▪ Added support for creating new job as blank database</li> <li>▪ Added Regen All command under View menu (Also added Active Job Control to toolbar)</li> <li>▪ Added Table E14a - Natural Channel Encroachment Information</li> <li>▪ Added Table E14b - Floodplain Mapping</li> <li>▪ Added Left, Main and Right channel volumes for natural channels</li> </ul>
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ENHANCE-MENT – 8.53	<ul style="list-style-type: none"> <li>▪ Added maximum link volume (during simulation) to Table E15 and time series to "Detailed Printout"</li> <li>▪ Added Conduit Slope calculations over entire or specific network elements</li> <li>▪ Added encroachment depth to output file</li> <li>▪ Support Lahey Interface files created by PDX-SWMM</li> <li>▪ Always use USE_ORF_EQN keyword if using RTC</li> <li>▪ Added additional error checking to hot start files.</li> <li>▪ Horizontal and Vertical Ellipses are now checked against max and min sizes.</li> <li>▪ Allow 500 files for multi-runs.</li> <li>▪ CUHP now supports global plus catchment-dependent rainfall</li> <li>▪ Added Attributes to Text context menu</li> </ul>
MAINTENANCE – 8.53	<ul style="list-style-type: none"> <li>▪ Fixed nodes drawing issues, nodes were not drawn under circumstances</li> <li>▪ External Database Export update compatibility improved, especially with Excel, Access &amp; DBase IV.</li> <li>▪ Spatial Attachment and Boxes drawing fixed</li> <li>▪ Increase the number of weirs and orifices handled by review via INI setting (MAX_WEIRS &amp; MAX_ORIFICES)</li> <li>▪ Check node name validity (quotes etc) when importing from EPA file</li> <li>▪ Correctly display us/ds node vars when displaying multilink objects</li> <li>▪ Show Window titles correctly</li> <li>▪ Save current selected table</li> <li>▪ Fix maximum infiltration volume</li> <li>▪ Correct rainfall utility for 4-digit year EarthInfo ASCII format</li> <li>▪ Correct rainfall utility for 4-digit year for new Canadian AES format</li> <li>▪ Correct rainfall utility for user-defined rainfall on last day of year</li> <li>▪ Fix to Temperature Utility to read user-defined temperature data</li> <li>▪ Fix to maximum allowable infiltration volume for Horton infiltration</li> <li>▪ Correct event duration reporting error for 4 digit years</li> <li>▪ Correct run-time graphing at nodes</li> <li>▪ Calculate storage in adverse grade dry conduits using intersection of water surface and pipe slope</li> <li>▪ Report results for more than 10 pollutants correctly in HDR layer</li> <li>▪ Check Object Name is unique when on screen Object editing and also via Tables</li> <li>▪ Fix up Graphical Encoding encoding to encode by Link width by int vars</li> <li>▪ Correct error caused by 9th detailed printout location being named C2</li> <li>▪ Fictitious rainfall volume at the beginning of a storm has been eliminated</li> <li>▪ Evaporation in HDR Layer (using HDR_EVAP) has been corrected</li> <li>▪ Remember the selected XP Table and highlight restore it appropriately</li> <li>▪ Correctly display units in gauged data dialogs</li> <li>▪ Export the CUHP data correctly when analysing, resolve conflicts with EPA data</li> <li>▪ Draw network properly after Print Preview of network layout</li> <li>▪ Check invalid or missing inlet rating curve references</li> <li>▪ Fix Import (XPX) of S/T Plant variables</li> </ul>

### Version 8.52

ENHANCE- MENT – 8.52	<ul style="list-style-type: none"> <li>▪ Added Conduit Slope calculations over entire or specific network elements</li> <li>▪ Multilink objects now supported in Quick Data View</li> <li>▪ External Databases now uses OLE DB connection by default and optionally ODBC</li> </ul>
MAINTENANCE – 8.52	<ul style="list-style-type: none"> <li>▪ Fixed Location of OK &amp; Cancel Items on Resizeable Dialogs</li> <li>▪ Reliance on Sentinel Server removed and upgraded sentinel drivers</li> <li>▪ Correctly load English resources on all language OS.</li> <li>▪ Sorting of objects fixed on XP Tables</li> <li>▪ Initialization color of Text objects fixed</li> <li>▪ Fixed variable for Outfall Depth Criteria</li> <li>▪ Subcatchment flags and Rainfall Reference handled correctly on Quick Data View and XP Tables</li> <li>▪ Database Driver Pack now available separately for External Database connections.</li> </ul>

## Version 8.51

ENHANCE- MENT – 8.51	<ul style="list-style-type: none"> <li>When saving view status, also save object selection</li> </ul>
MAINT – 8.51	<ul style="list-style-type: none"> <li>Check Object Name is unique when on screen Object editing and also via Tables</li> <li>Fix up Graphical Encoding encoding to encode by Link width by int vars</li> </ul>

## Version 8.5

ENHANCE-MENT – 8.5	<ul style="list-style-type: none"> <li>Implemented Export of Data to External databases (Access, Excel, Dbase, ODBC, etc)</li> <li>Implemented Multiple Connection settings for Import/Export of External Databases</li> <li>Added a wizard mode to create database connection and mapping</li> <li>Added Multiple storm handling and comparison with result comparisons</li> <li>New File creation now has a default global data &amp; default object field setting</li> <li>Update conduit lengths (single/selected) based on real world co-ordinates</li> <li>Implemented new variable selection (with tree control)</li> <li>Design, Natural Surface and Services added to Link Profile for illustration in Profile Plot</li> <li>Quick Data View added to Display</li> <li>Added multiple XP Table viewing capability like sheets in Excel</li> <li>Added Filters to XP Tables and optionally display different object types</li> <li>Correctly display multilink as individual objects i.e pumps, orifices, weirs etc.</li> <li>Notes added to Link Context Menu</li> <li>Object Search names (exact) extended to pumps, weirs, orifices</li> <li>Support for USB and Sentinel Plus Locks</li> <li>XPX command added [GLDBITEM "global database" "name"]</li> <li>XPX command added [GLDBDATA field name "global database" "name" N data1..data]</li> <li>Added Most Recently Opened Files in [Files/Recent Files]</li> <li>Added Misc SWMM utilities (user defined AP Launcher) to [Tools\Launch Application]</li> <li>When depth for open channel is zero substitute depth as ground Elev - invert</li> </ul>
MAINTENANCE – 8.5	<ul style="list-style-type: none"> <li>Analysis using existing floodway encroachment stations no longer changes those stations at the end of the simulation.</li> <li>NWS Post 1980 Fixed Format rainfall data now supports 4 digit years</li> <li>Fixed calibration interface problems</li> <li>Increase the maximum number of active rainfall databases from 100 to 1000</li> <li>Corrected display of tif file location</li> <li>Correctly display saved views in menu to restore</li> <li>Consistently edit link/node names in network on selected objects with Dbl Click</li> <li>Corrected node label drawing in Plan Section display</li> <li>Corrected zoom extents on network</li> <li>Always delete temporary db~ files</li> <li>Corrected Field Info &amp; scrolling on HDR DWF dialog</li> <li>Fixed Object search for partial names</li> <li>Fixed Paste Data with respect to CUHP data</li> <li>When exiting a dialog (cancel) ensure network redraw is done</li> <li>Read and apply DATE_FORMAT variable in analysis engine</li> </ul>

## Version 8.2

<b>ENHANCEMENT – 8.2</b>	<ul style="list-style-type: none"> <li>▪ The RTC module now caters for the situation where a RTC device is re-activated before it has finished</li> <li>▪ Initialize the old area of a conduit to the new area of the conduit at the first time step to reduce dry-pipe spikes.</li> <li>▪ The sizes of elliptical conduits are now restricted to the maximum and minimum values shown in the help file.</li> <li>▪ Use orifice equation if using RTC</li> <li>▪ Under-relaxation parameter removed from orifice equation</li> <li>▪ RTC modified to use Gain parameter in calculation of sensor tolerance</li> <li>▪ Check elliptical conduits for maximum and minimum sizes</li> <li>▪ Use Left, Right and Centre channel lengths for natural channels (like HEC-RAS)</li> <li>▪ Show Rainfall in Review Results for CUHP Hydrology</li> <li>▪ Can now run Hydraulics and CUHP Hydrology simultaneously</li> <li>▪ CUHP method allows hydrographs from different storms at different nodes to be saved to an interface file</li> <li>▪ Show elevations or depths at diversions with REVIEW_ELEVATION or REVIEW_DEPTH parameter (default is REVIEW_ELEVATION in Review Results)</li> <li>▪ Calculate left &amp; right overbank properties in natural channels from actual cross section</li> <li>▪ Calculate starting volumes for continuity error check using hot-start parameters</li> <li>▪ Remove under-relaxation from weir flow calculations (modeled explicitly)</li> <li>▪ Show Rainfall and infiltration in Review Results for Runoff Hydrology method</li> </ul>
<b>MAINTENANCE – 8.2</b>	<ul style="list-style-type: none"> <li>▪ Corrected memory error for pollutant routing in Hydraulics layer</li> <li>▪ Generate CUHP hydrographs in Review Results for all print options</li> <li>▪ The friction loss reported in XP-Tables has been corrected.</li> <li>▪ Report negative maximum elevations in tables and long section profiles</li> <li>▪ Treat free outfalls with and without tide gates in the same manner</li> <li>▪ Set minimum tide elevation for outfalls with tide gates at invert of outfall (not invert of US node)</li> <li>▪ Report depth section property correctly for user-defined conduits (no effect on results)</li> </ul>

## Version 8.1

<b>ENHANCEMENT – 8.1</b>	<ul style="list-style-type: none"> <li>▪ Added the Configuration Parameter REDUCETIME=xx to reduce spikes due to dry conduits (default=1)</li> <li>▪ Added the Configuration Parameter SCSDUR=xx to set the number of days for continuous SCS rainfall before resetting K (default = 7)</li> <li>▪ Allow Ponding Allowed with Inlet Rating Curves</li> <li>▪ Default iteration limit set to 0.1% of flow (Q_TOL=0.1)</li> <li>▪ Added Maximum Infiltration Volume for Horton Infiltration</li> <li>▪ RAIN Utility no longer requires rainfall gauges to be sorted in order of latest to earliest ending date when appending gauges.</li> </ul>
<b>MAINTENANCE – 8.1</b>	<ul style="list-style-type: none"> <li>▪ Instabilities caused by expansion/contraction losses in conduits connected to weirs and pumps has been corrected</li> <li>▪ Correctly export the points for natural sections with floodway encroachment</li> <li>▪ Merge Temporal Variations Global Databases correctly</li> <li>▪ Correctly display d/D variable in Spatial Reports</li> <li>▪ Correctly display field info for Node Dry Weather Flow Variables</li> <li>▪ Fix Review of RNF Node Results when Inlet Capacity Active in HDR Layer</li> <li>▪ Fix Import External DB Variable Selection for Win98/WinME OS</li> <li>▪ Corrected the drawing of labels in the dynamic plan view</li> <li>▪ Correctly display inlet type description on selection</li> <li>▪ Correct export of Encroachment Data when encroachment is inactive</li> </ul>

## Version 8.06

ENHANCE-MENT – 8.06	<ul style="list-style-type: none"> <li>▪ Inflow through an outfall node is now reported in the output file and accounted for in the continuity check</li> <li>▪ Initialize maximum velocity at end of first time-step instead of start of first time-step</li> <li>▪ Variable formatting now rounds the last decimal place instead of truncating</li> <li>▪ MAXPTS=-1 allows graphing of all points in Runoff Review Results</li> <li>▪ Added ability to have pervious surfaces run onto impervious surfaces (or vice versa) and also flow redirection to another node</li> <li>▪ Limit warning messages about end of data on the interface to one instead of once at each time step</li> <li>▪ Added d/D to output file and XP-Tables and added warning to output file if d/D exceeds 1 for an open channel (and it pressurizes)</li> </ul>
MAINTENANCE – 8.06	<ul style="list-style-type: none"> <li>▪ Correct Total Pollutant Load in Spatial Reports for US units</li> <li>▪ Rainfall Utility now supports 4 digit years for "NWS Post 1980 Variable" format</li> <li>▪ Rainfall Utility now supports "Save Storm Event Summary" - previously a buffer overflow caused a zero byte file to be created</li> <li>▪ DWF=2 was being incorrectly mapped to DWF Method 5 (instead of 6) for the first node in a network</li> <li>▪ Corrected a problem with power function channels causing a crash at the end of the simulation (results were not affected)</li> <li>▪ Corrected a problem with project multi-run files sometimes terminating early (on fast processors)</li> <li>▪ Corrected a problem with "Import External Database" dialogs losing focus on Windows 98 OS</li> <li>▪ Corrected a problem with memory over-writes caused by negative heads at weirs (in HDR layer)</li> <li>▪ Corrected a problem with ALL inflows ending when interface file inflows end (in HDR layer)</li> <li>▪ Node names at outfalls were only being compared for uniqueness to 8 characters (in HDR layer)</li> </ul>

## Version 8.05

ENHANCE-MENT – 8.05	<ul style="list-style-type: none"> <li>▪ Speed improved approx 3-4 times for "Importing External Databases" plus interface is now more responsive</li> <li>▪ Colorado Urban Hydrograph Procedure (CUHP) now supported</li> <li>▪ Report on network database properties (number of links, nodes etc) now available</li> <li>▪ Added tooltip support for Dialog items</li> <li>▪ Most Recently Used files list (MRU) is now limited by [STATUS][MRU_COUNT] in INI file</li> <li>▪ Allow inflows through weirs</li> <li>▪ Make MINLEN dependent on units</li> <li>▪ Allow dynamic allocation of number of tidal points (previously 50 max)</li> <li>▪ Create Interface files from Hydraulics Layer including WQ concentrations</li> <li>▪ Inlet Rating Curves now allow reverse flow</li> <li>▪ Write hot-start parameters to output file when DEBUG configuration parameter is used</li> <li>▪ The Earth Info format now supports comma separated and vertical slash (\) separated files.</li> <li>▪ There is now a utility available that will let you read flow and rainfall interface files and optionally create a CSV file.</li> </ul>
MAINTENANCE – 8.05	<ul style="list-style-type: none"> <li>▪ Error in graphing rainfall intensity when "Intensity" option is selected has been fixed.</li> <li>▪ Locate PEST directory correctly</li> <li>▪ Modify the opening banner dialog to correctly display the most recently used files</li> <li>▪ Correctly display the position of the simulation on initial loading of dynamic results</li> <li>▪ Fix resource memory leak in dynamic cross-sectional display.</li> <li>▪ Close all results files correctly after use in Review results</li> <li>▪ Remove font memory leakage on drawing network objects, obvious in very large databases</li> <li>▪ Delete all temporary files</li> <li>▪ Fix network connectivity - create links between only valid nodes</li> <li>▪ Pollutant loads from Interface File were not being reduced by the "Use % Interface File" value &amp; therefore concentrations were increasing</li> <li>▪ NEW_STORAGE (3D-volumes) was enabled when OLD_DROP configuration parameter was used</li> <li>▪ A beta version 8.0 had 2D volumes as the default</li> <li>▪ Arch was using depth as width</li> </ul>

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MAINTENANCE – 8.05

- SCS and some unit-hydrograph flows are sometimes set to zero if Green-Ampt infiltration is used
- Ponding Allowed and Sealed options sometimes caused zero flow to occur in a link
- Flow Adjustment Factor was not being included in reporting volume from inflow sources resulting in erroneous continuity error
- Incorrect reporting of freeboard with "ponding allowed" in spatial reports has been corrected
- In the Rain Utility missing and deleted data for part of a day no longer causes the data for the entire day to be deleted.
- Appending rain gauge data from different sources now also works for 2-digit years.
- An incorrect Julian date being calculated for 1/1/2001 in the graphing routine has been corrected.

Version 8

ENHANCE-MENT – 8

- Support added for large variety of background images
- Real Time Control Module added
- Added functionality for faster drawing of larger networks
- New and easier interface for importing of External Databases
- Ability to reverse the direction of link connection
- Added functionality to split conduit into two with intelligent data copying
- Dynamic Reviews - Speed Enhanced, splitting windows added
- Added extra checking for unique object names incl. pumps and weirs
- Allow percentage of flow in interface files
- Added ability to handle floodway encroachment
- Added ability to copy entire XP Table range
- EPA data file - Supports customized Hillsborough County format
- EPA Data file - various checking and bug fixes
- Added weir fields to field selection list
- Max depth now reported for conduits
- Corrected display for water elevations in dynamic display for all cases
- Corrected label orientation in dynamic display
- Node width in dynamic display now user definable
- Dynamic display - Previous button fixed when simulation spans over a day
- Make object label drawing optional
- Added ability to lock node positions
- Toolbars split for easier placement, status bar collapsed to one
- Handle background images in Plan section view
- Plan section to display current extents only, optimizes speed
- Names for orifices and weirs added
- Pipe loss and Pipe Extension factor added
- Option to save results only on specified intervals
- Indexing to results file added for faster access to data
- Changed the dialog toolbar implementation for easier use
- Changed zooming to allow extra flexibility
- AutoCAD 2000 Images now supported
- Max Edges connected to node increased to 20
- Dry Weather Flow handled in HDR layer
- Added ability to save and restore view locations

MAINTENANCE – 8

- Instabilities caused by expansion/contraction losses in conduits connected to weirs and pumps has been corrected
- Correctly export the points for natural sections with floodway encroachment
- Merge Temporal Variations Global Databases correctly
- Correctly display d/D variable in Spatial Reports
- Correctly display field info for Node Dry Weather Flow Variables
- Fix Review of RNF Node Results when Inlet Capacity Active in HDR Layer
- Fix Import External DB Variable Selection for Win98/WinME OS
- Corrected the drawing of labels in the dynamic plan view
- Correctly display inlet type description on selection
- Correct export of Encroachment Data when encroachment is inactive

MAINTENANCE  
- 8

- Printing fixed when background images loaded
- Fix scroll bar interface in plan section during play
- Y axis modified to include all gauged points in review results, line style changed
- Corrected user defined display in dynamic cross-section
- Corrected conversion factor for user defined vars
- Handle the vertexes in Link correctly

**Version 7.56**

ENHANCE-  
MENT -  
7.56

- Added optimized object name access in INI file [config] OPT\_OBJ\_NAME\_ACCESS=ON
- Added user defined default values for variables [Field Defaults] FIELDNAME=Value

**Version 7.55**

ENHANCE-MENT - 7.55

- Enhanced handling of inconsistent/corrupt databases
- Read NWS data that has been modified to include 4-digit years
- Added defensiveness to storage volume calculations
- Suppress SYQ & SYT files with NOSYQ and NOSYT keywords
- Compressed format of interface file locations
- Fixed formatting problem of intermediate printout
- Suppress intermediate printout if JNTER or INTER = -1
- Report +ve flow as being in the direction of the arrow rather than towards the lowest end of the link
- Report link concentrations as value in the previous time-step rather than the average of the US & DS nodes
- Allow Hot-start files to read node and link data in any order.
- Allow an unlimited number of points in Natural Channels (previously 200)
- Added NEW\_ITERATION method that halves time step if model fails to solve after 10% of max number of iterations

MAINTENANCE - 7.55

- Update user defined file selection correctly
- Collate time correctly for user defined files with separate time fields
- Correct auto selection of Rainfall Interface file type when graphing
- Check correct date format in rainfall database
- Handle two year date as per INI file [config] parameter eg.YEAR\_XX=2000 to imply year 01 as 2001
- Correctly display 4-digit years in Rainfall from user-defined files
- Correctly display 4-digit years in STATS block
- Calculate storage volumes correctly for AE (area-elevation) keyword
- Report max vel\*depth correctly in RES file
- Report max volume, HGL and Surface Area correctly in RES file
- Fixed problem causing incorrect flows in Rating Curves attached to Stepwise Linear storage nodes with hot-start files
- Eliminated possible zero divide in Groundwater routine.
- Eliminated possible zero divide for Rating Curve element.
- Correctly handle AE (Area Elevation) keyword for storage nodes
- Correctly calculate DS depth of conduit with adverse grade flowing into drop structure
- Correctly calculate hydraulic properties of Modified Basket Handle shape
- Correctly calculate hydraulic properties of Rectangular Triangular Bottom shape
- Correctly calculate hydraulic properties of Rectangular Round Bottom shape
- Correct the flow splitting of Sanitary layer diversion structures
- Corrected a possible NaN error in Groundwater hydrology

## Version 7.5

### ENHANCEMENT -- 7.5

- Report WQ concentrations in output file when EXTERNAL\_XLS is active
- Storage Node data modified with user control of depth calculation
- Show total inflow outflow in WQ Review for detention basins
- Display simulation days in dynamic replay
- Consolidated all the interface file dialogs into one dialog
- Handle images for links
- Enable selection (& centering) of currently selected obj in view
- Be able to handle PSEUDO fields in tables
- Added picture filename to variables list
- On right mouse click restore the cursor to an arrow cursor
- Handle background pics in plan view
- Added Most recent files list on opening dialog

### MAINTENANCE -- 7.5

- Added vertical walls for natural sections in Cross sectional view
- Cleanup drawing objects appropriately in long section view
- Handle date display & check correctly for rainfall database
- Check pollutant loads for user inflows when polls exist
- Add XP extension to all XP files handled if no ext exists
- ensure saved as file does not remain lock when closed
- Stop plan section replay when network view in focus
- Display HGL within bounds in long section replay
- Handle zero length conduit in long section replay
- Table variable range checking now correct when columns dragged
- Fixed crash in Export graphics dialog handling (full window)
- Ensure lsect uses scales properly (max of elev/hgl)
- Handle large scales and x,y locations appropriately
- default for natural channel max depth changed to 0.0
- fix TAB Key to navigate network
- fix network updates - so that links are added on creation
- Fix line selection when the network consists of multiple outlets
- if background picture file does not exist, handle appropriately
- Draw Background pictures to correct real world extents
- Fix Printing of background pictures to fit to bounds
- On opening file use correct scale for files with background picts
- Allow user to pick supported picture file formats
- Fix Beep on Tabbing in dialogs
- Save node label position correctly
- Implement link with vertices in plan view
- Draw correct legend location in Plan view
- Update link names in plan section
- Added more validity checks in plan section
- Fix general dialog handling for user defined files dialog
- Added date checking in for user defined files
- Common look & feel for User defined files dialog
- Remove field width dependency for spec of free format files (UDF)
- Handle Dbl Click on listbox as selection
- Fixed memory leaks in dialog listbox handling
- Update user text correctly when listbox item changes in dialog
- Corrected field information on dlist dialogs
- Display units and defaults correctly for different units
- Reset Tool ID appropriately on closing database
- Turn case-sensitive off (default) for searching objects
- Handle Color command correctly for export to DXF
- Fixed drawing view for profile plotting

## Version 7.2

### ENHANCEMENT – 7.2

- Added TWO\_DIGIT\_YEAR keyword to subtract 1900 from year entered in Rain input files (Rain Utility) s
- Added daily and hourly temporal variation to Sewer Inputs -> Constant Inflow in SAN (Transport) Layer
- Added daily and hourly temporal variation to Sewer Inputs -> Pollutant Conc. in SAN (Transport) Layer
- Added daily and hourly temporal variation to Sewer Inputs -> Dry Weather Flow in SAN (Transport) Layer
- Added 3 new flow generation methods to Sewer Inputs -> Dry Weather Flow in SAN (Transport) Layer
- Added 5 new flow units (GPM, MGD etc.) to Sewer Inputs -> Dry Weather Flow in SAN (Transport) Layer
- Added Dry Weather Flow to HDR (Extran) Layer
- Added 3 new methods for dry weather flow generation to HDR (Extran) Layer
- Added daily and hourly temporal variation to HDR (Extran) Layer
- Added 5 new flow units (GPM, MGD etc.) to HDR (Extran) Layer
- Obtain the day of the week used in daily temporal variation from the Julian Day of the simulation
- Allow simultaneous solves
- Allow entry of Pollutant data in HDR layer
- Added Rectangular time-varying orifice
- Allow 16 character pump names
- Support new Canadian AES rainfall file formats
- Changed Year 00 to be 2000 (instead of 1941)
- Lock nodes in place to prevent accidental relocation of objects
- Close all secondary views when closing main XP file
- Major changes to account for force main losses in pumps
- Report elevation and depth for stepwise linear storage nodes
- Set default maximum number of points in Review Results to 5000 (previous MAXPTS = 500)
- Review Results now shows Water Elevations at the US & DS ends of the conduit (instead of node elev)
- Dynamic long-section shows Water Elevations at the US & DS ends of the conduit
- Dynamic long-section includes a synchronized dynamic view of the conduit X-section with Water Elevation
- Dynamic long-section includes a synchronized dynamic view of the hydrograph with a time line.
- Dynamic long-section now shows the max HGL of the run immediately upon opening
- Dynamic cross-section now shows the max depth in the conduit immediately upon opening
- Dynamic long-section and cross-section views show the maximum value of the simulation (instead of MAXPTS)
- Additional Q\_TOL=<xx> (where <xx> is % flow value: e.g. Q\_TOL=1) has been added to permit faster convergence
- Additional H\_TOL=<xx> (where <xx> is % head value: e.g. H\_TOL=1) has been added to permit faster convergence
- Modify pump curve to account for losses in the force main.
- Remove under-relaxation from pumps.
- Modify the PBT file format.
- Modify hot-start algorithm to better model start-up conditions.
- Added keyword USE\_OUT\_RC\_DEPTH to use depth rather than elevation at a rating curve (Type 5) outfall
- Allow user-definition of Time Weighting Factor
- Modified XPX Import through HYDRO.INI file to allow spaces in file names.
- Design undersized conduits now limits pipe crown to ground elevation.
- Display size of dynamic long-section increases when labels are disabled.
- Vertical scale of dynamic long-section now includes HGL elevations.
- Plot user-defined cross-sections.
- Modify tide-gate algorithm to work with rating curves (Use OLD\_TIDE\_GATE for previous functionality).
- Remove potential zero divide for Rating Curve Outfalls.
- Provide backward compatibility with DWF=x options in new dry weather flow routines.

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ENHANCE-MENT – 7.2

- Suppress creation of \*.syr file (used in Review Results) with NOSYR configuration parameter.
- Fixed potential problem with multiple rating curve outfalls.
- Allow tolerance in calculation of Julian date (rounding error in real/integer data types).
- Initialize rain gauges.
- Calculate pump on/off and run times based on wet well elevations not conduit flows.
- Add error message if pump check valve incorrectly defined.
- Add error message if pump type incorrectly defined.
- Correct calculation of finishing volume for continuity calculation.
- Calculate and report ponded volume
- Calculate volume of storage nodes using volume of frustum.
- Improve performance by tracking storage nodes.
- Correct volume calculation in culvert statistics
- Added OLD\_STORAGE configuration parameter to calculate storages as 2D rather than 3D shapes
- Don't use under-relaxation term for initial surface areas (causes continuity error)
- Pump performance improvements
- Calculate correct starting volumes of conduits with elevations below sea level.
- Remove storage volume calculation fudges. Now the volume is being calculated correctly
- Interpolate left and Right stations in a natural channel if not at entered stations
- Calculate low point as lowest point in main channel (removes instabilities)
- Add OLD\_CHANNEL\_LP to allow a natural channel low point outside the main channel (which will cause instabilities or crashes)
- Calculate overflow volumes from manholes and storage nodes
- Allow pumps rated by depth in node to use multi-point pump curve.
- Allow multi-point pump curves to increase or decrease
- Remove unnecessary output files
- Added Static Head Pump (Like Rated by depth in node but with on/off elevations)
- Reset slot width, time weighting, max iterations, under-relaxation, courant factor, flow adjustment factor and initial smoothing to default values when routing control is turned off.

MAINTENANCE – 7.2

- Removed dependency on 1900 for some date formats (Only affects printout - not results)
- Fixed bug in Inlet Rating Curves
- Normalize Top Width of User-Defined conduits using max. width rather than width at max. depth
- Fixed problem with Inlet Rating Curves and long node names
- Removed references to Extran
- Fixed error reading Particle Distribution in HDR Layer
- Fixed error in Profile Plotting causing parallel lines to converge
- Fixed error in Profile Plotting causing plots to appear postage-stamp size on some printers
- Enter and Esc keys mapped to OK and Cancel buttons on dialog
- USE\_XYINFO now returns length for ALL conduits
- Fixed memory allocation error for multiple orifices that caused crash at end of run
- Disable playing long section when model has not been solved
- Fixed problem in HDR whereby flow condition could be undefined
- Fixed problem causing random selection of time-varying orifice data when mixed with normal orifices
- Correctly calculate the maximum number of rainfall gauges
- Fixed stack overflow problem for models larger than 3000 nodes
- Spelling fixes - Qualifier changed to Aquifer and Parameters changed to Parameters
- Water Quality loads are now reported correctly in Review Results (all layers fixed)
- Fix User Inflow hydrographs (HDR). Stop setting first point to zero.
- Fix error whereby Spatial Reports were not always updated.
- Removed bogus error message "Temporal Variation not Found" for EPA DWF method.
- Correctly account for total flow between nodes where conduits have adverse grades
- Correct calculation of crown elevation for horizontal ellipses and arches.
- Fixed Rating Curve Outfalls and report data
- Fixed conveyance calculations for left, right and centre components of natural channels
- Interpolate water elevation in first slice of a natural channel correctly
- Fixed a Gauged Inflow problem with the date format when used in conjunction with the Introduce Time Interval flag.

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MAINTENANCE -- 7.2	<ul style="list-style-type: none"> <li>▪ Fixed an uninitialization problem in Gauged Inflows.</li> <li>▪ Changed New Scale: caption to New File.</li> <li>▪ Fixed title page when printing plan view of network.</li> <li>▪ Display diameter in dynamic long-section is now consistent.</li> <li>▪ Allow selection of smallest elliptical pipe in list of available sizes.</li> <li>▪ Fixed initialization of user defined minimum junction/conduit depth.</li> <li>▪ Calculate the correct volume for Ponding Allowed</li> <li>▪ Report correct the Water Quality concentrations for metric units in Review Results</li> <li>▪ Fix Tidal Stage/History outfall condition for negative tidal values</li> </ul>
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### Version 7.1 (January 2000)

ENHANCE-MENT -- 7.1	<ul style="list-style-type: none"> <li>▪ Menu system overhauled</li> <li>▪ Increased number of Orifices/weirs in Review results</li> <li>▪ Added Copy/Paste/Review to object popup menu</li> <li>▪ Implemented dynamic formatting to allow the format to be dependent on the magnitude of the value</li> <li>▪ File names can now be up to 128 characters long</li> <li>▪ The model will fill up to the backwater elevation prior to the start of the simulation if it contains an outlet with fixed backwater condition and no tide gate</li> <li>▪ Allow intermediate printout to be suppressed (Use 0 or -1)</li> <li>▪ Echo Inlet configuration</li> <li>▪ Added USE_US_RC and USE_DS_RC to use the US or DS head to drive the internal rating curve (default is to use difference in heads)</li> </ul>
MAINTENANCE -- 7.1	<ul style="list-style-type: none"> <li>▪ Implemented Enter/Esc keys to work on dialog as Ok\Cancel</li> <li>▪ Stop automatic sort on Graphing for Special Internal Rating curve</li> <li>▪ Fixed the SBUH method</li> <li>▪ Fixed calculation of volume to correctly report continuity error</li> <li>▪ Sorted standard arch sizes by height to allow use of all available sizes not just first 17</li> <li>▪ Fixed problem where Time Weighting Factor could sometimes overwrite Routing Method</li> <li>▪ Fixed problem in STATS where formatted variables were written to binary file causing crash</li> </ul>

### Version 7 (December 1999)

ENHANCE-MENT -- 7	<ul style="list-style-type: none"> <li>▪ Check for active link in Runoff</li> <li>▪ Changed the default for the calculation of the discharge coeff. for surcharge weirs - The coefficient is calculated based on the velocity in the upstream pipe at the point of surcharging</li> <li>▪ Report scour as positive value in the .out file - Makes more sense if negative scour is interpreted as deposition</li> </ul>
MAINTENANCE -- 7	<ul style="list-style-type: none"> <li>▪ XP Tables fixed</li> <li>▪ XPX progress fixed</li> <li>▪ Closing files with active spatial reports fixed</li> <li>▪ Fixed the problem when using antecedent dry weather days (DWDAYS) in transport [DM]</li> <li>▪ Fixed the problem using the antecedent dry weather days when using start time of zero hours [DM]</li> <li>▪ Fixed the scour/deposition bug - deposit load was being initialized after running the DWDAYS [DM]</li> <li>▪ Fixed the critical particle size method for the removal of pollutants for screen processes</li> <li>▪ Fixed the particle size distribution method for the removal of pollutants for detention processes</li> <li>▪ Fixed an error in the conversion of units in the rating curve washoff method - only effects metric units</li> <li>▪ Fixed a bug which caused an error in the calculation of loads for model with multiple landuses (failed to generate conversion factors)</li> <li>▪ Fixed the bug which prevented the use the removal equation option for plug flow</li> <li>▪ Fixed a bug in the conversion of units of flow in the removal equation for screen processes</li> <li>▪ Corrected the unit conversion in the calculation for the total pollutant load for the a runoff catchment</li> <li>▪ Fixed a variable initialization problem, which prevented flow being generated in the SCS method</li> <li>▪ Fixed the bug which caused wrong concentration/loads to be calculated for DWF=1 and DWF=3</li> </ul>

## Version 6.32 (November 1999)

### ENHANCE-MENT – 6.32

- User-defined Report CSV format modified for import into Access/dBase. Display results in your GIS
- Profile plotting module completely re-written
- Graphing speed improved 50-70 times
- Added user-defined scales in graphing module
- Added user-defined line types and colors in graphing module
- Added Hydraulic Brake option to Special Conduits in HDR layer
- Added editable reports
- Added spreadsheet interface (copy/paste to excel etc.)
- Send all messages on Reading RES file to error log
- Allow simultaneous solving in network environment
- Improved trapping of "Unknown Error" messages
- Allow entry of default Configuration Parameters in SWMXP.INI file
- Added FHWA Weirs with submergence factors (Culvert)
- Added FHWA Inlet Control
- Removed limitations on time-step reduction allowing large time step in HDR and giving same results at any routing time step
- Added a database connectivity module allow you to open any Access, dBase, FoxPro, Excel or ODBC compliant database (includes SQL support).

### MAINTENANCE 6.32

- Changed the assignment of the link pollutant concentrations in the HDR layer from an average of the upstream downstream node concentration to be dependent on flow direction.
- Fixed the units for total pollutant load.
- Fixed "Ponding Allowed". The area of the node wasn't being calculated resulting in unrealistically high water surface level at the node. If "Ponding Allowed" is enabled at a storage node the depth entered for the stage/storage relationship is measured from the surface.
- Removed 0.9 multiplier for average concentrations of non-residential landuse pollutants
- Fixed the interface file output from the HDR layer. Can now read an HDR interface file back into HDR layer.
- Alameda Synder method data export corrected
- Long Section Plotting instabilities causing program to freeze have been fixed (finally!)
- Right mouse-click on object on initial load fixed
- Graphing function fixed for plotting list data
- "Save As" unlocks current file
- Hydsys date format based on INI file
- Fixed Time-Area, Synder, Synder (Alameda)and Rational hydrology methods
- Fixed the metric units for the EXT\_EVAP keyword (evaporation in HDR layer)
- Fixed Multiple Review Results
- On "Paste Data" recalculates Spatial Report data only when active (speed up re-draws)
- Stop re-designing conduits in HDR Layer when design flag is turned off
- Green-Ampt data was incorrectly reported and Conversion factor was incorrect
- Fixed problem with Arches, Horizontal Ellipses and Vertical Ellipses not being correctly calculated
- Arches, Horizontal Ellipses and Vertical Ellipses now work in metric units
- Added normalized Area, Hydraulic Radius & Top Width for Gothic, Catenary, Semi-elliptic and Semi-circular conduits (were treated as circular in previous versions)
- Can now be installed in a directory having a space in the directory name e.g. "c:\Program Files"
- Speed of loading results from large models has been greatly improved (100+ times).
- Fixed error in calculation of Top Width for User-defined conduits
- Fixed error in calculation of flows in closed conduits in Runoff layer

### Version 6.3 (November 1999)

ENHANCEMENT – 6.3	<ul style="list-style-type: none"><li>▪ XP Tables Added</li><li>▪ ODBC Data Import Supported</li><li>▪ Profile Plotting overhauled</li><li>▪ Graphing speed improved</li><li>▪ Added Hydraulic Brakes Option to Special Conduits in HDR</li><li>▪ Send all messages on Reading RES file to error log</li><li>▪ Inlet Control option added</li><li>▪ Default Data sets imported on XPX exports</li><li>▪ Printing enhanced</li><li>▪ Enabled automatic load of application via hydro.ini</li><li>▪ Reading of results (RES) file optimized</li></ul>
MAINTENANCE – 6.3	<ul style="list-style-type: none"><li>▪ Fixed Time area, Synder, Synder (Alameda), Rational hydrology methods</li><li>▪ Fixed the metric units for the EXT_EVAP keyword (evaporation in EXTRAN)</li><li>▪ Green Ampt data converted &amp; reported correctly</li><li>▪ Alameda Synder method data export corrected</li><li>▪ Long Section Plotting instabilities fixed</li><li>▪ Right Mouse click on object fixed on initial load</li><li>▪ Graphing function fixed for plotting list data</li><li>▪ Reports, CSV format modified for empty data &amp; unit info</li><li>▪ Save As unlocks current file</li><li>▪ Hydsys Date format display based on date format in INI file</li><li>▪ Fixed Multiple Review Results</li><li>▪ On Paste Data recalc SR data only when active</li><li>▪ Fix Graphical Encoding restoring and calc suggestions</li><li>▪ Fix Rainfall user defined file support</li><li>▪ Long Section Window tab fixed</li><li>▪ Calibration Bugs (Graphing &amp; Data Commit) fixed</li><li>▪ Review results - Invalid data objects ignored</li><li>▪ Gauged Inflow supports all flow units</li></ul>

### Version 6.17 (September 1999)

ENHANCEMENT – 6.17	<ul style="list-style-type: none"><li>▪ Support multi language interface</li></ul>
MAINTENANCE – 6.17	<ul style="list-style-type: none"><li>▪ Changed the assignment of the link concentrations from and average of the up/down stream node concentration to be dependent on flow direction.</li><li>▪ Fixed the units for Total pollutant load (divided by 1000-&gt;kg/s)</li><li>▪ Fixed Ponding allowed (the area of the node wasn't being calculated)</li><li>▪ Removed 0.9 multiplier for average concentrations of pollutants non-residential landuse"</li><li>▪ Fixed the interface file output for HDR layer</li></ul>

### Version 6.13 (May 1999)

MAINTENANCE – 6.13	<ul style="list-style-type: none"><li>▪ Graphical encoding restore bug fix</li><li>▪ Isolated node delete bug fix</li><li>▪ Allow zero depth for Open Channels in Design Mode</li><li>▪ Fixed the water quality algorithm in EXTRAN</li><li>▪ Fixed the max volume and max/min concentration vars</li></ul>
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## Version 6.1 (January 1999)

ENHANCE- MENT - 6.1	<ul style="list-style-type: none"> <li>▪ Tipping bucket rain file added to catchment</li> <li>▪ "RAFTS" configuration parameter added - This parameter allows the user to perform simulations using the same loss model as XP-RAFTS</li> <li>▪ "BX", (XP-RAFTS calibration) configuration parameter added</li> <li>▪ Flow HDR nodes uses the net inflow into the node when reviewing the results in water quality</li> </ul>
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## Version 6 (October 1998)

ENHANCE- MENT - 6	<ul style="list-style-type: none"> <li>▪ Handle Water quality in Extran</li> <li>▪ Diameter/Roughness added to Conduit Profile dialog</li> <li>▪ Added three new special conduits</li> <li>▪ Support user defined file types to handle gauged inflows</li> <li>▪ Inlet Rating Curves supported</li> <li>▪ Added Redraw button to toolbar</li> <li>▪ Replaced Clark with Alameda Synder (Unit Hydrograph)</li> <li>▪ Added Ku (pit loss) support</li> <li>▪ Display Engine version</li> <li>▪ Extended variable list for selection (eg. Max VD)</li> <li>▪ Highlight all Links or all Nodes in the network</li> <li>▪ Added variable velocity*depth</li> </ul>
MAINTENANCE - 6	<ul style="list-style-type: none"> <li>▪ Make HDR the default layer</li> <li>▪ Handle Review of Water quality in Extran</li> <li>▪ Plan View - Active Nodes displayed only</li> <li>▪ Use Extents of DXF/DWG file from file</li> <li>▪ Saved object selections loaded from XP</li> <li>▪ Fix handling of DXF/DWG files</li> <li>▪ Check diameter &gt; 0.05m if not designing</li> <li>▪ Handle zero Node name size appropriately</li> <li>▪ Extend range for variable R_SHF</li> <li>▪ Fix Insert/Add for Report items</li> <li>▪ Fix up Report grid display</li> <li>▪ Check object names in review results</li> <li>▪ Fix tracking on moving SR attachment</li> <li>▪ Close dialog boxes</li> </ul>

## Version 5.6 (April 1998)

ENHANCE- MENT - 5.6	<ul style="list-style-type: none"> <li>▪ Application Setting now viewed from XP (Help\License)</li> </ul>
MAINTENANCE - 5.6	<ul style="list-style-type: none"> <li>▪ Project SEN field updated on solve (case insensitive)</li> <li>▪ Child Window management enhanced</li> <li>▪ Handle different file types</li> <li>▪ Plan Section / Long Section / Profile Plotting - Various Bug Fixes</li> <li>▪ EXT simulation end month field renamed to MOS due to conflict</li> <li>▪ Font cards rectified</li> <li>▪ Solve Validity modified - validity variable reset</li> <li>▪ Extended File Type Selection</li> <li>▪ Insert option added to Report setup</li> <li>▪ Defining items for Report generation now prevents duplicate data</li> <li>▪ Pan Tool made consistent as per other action tools</li> <li>▪ Graphical Encoding persistency fixed</li> <li>▪ Graphical Encoding suggest bounds format corrected</li> <li>▪ Handle zero sized link names without</li> <li>▪ Fix polyline draw with vertices for different modes</li> <li>▪ Calibration single/double point handled correctly</li> </ul>

### Version 5.5 (March 1998)

ENHANCE- MENT - 5.5	<ul style="list-style-type: none"><li>▪ Optionally support all Conduit Types in XPUDD32</li><li>▪ Profile Plotting added</li></ul>
MAINTENANCE - 5.5	<ul style="list-style-type: none"><li>▪ Fix: Link objects size property changing after Solve</li><li>▪ Font 0 (GSS font number) supported from older databases</li><li>▪ Modified basket Handle Fixed</li><li>▪ Warning Messages for incorrect data in Circ Conduit Dialog fixed</li><li>▪ Default values changed for Job Control</li><li>▪ Object drawn only when in active screen (logic made local)</li><li>▪ Pump Name Length checked in dialogs (restricted to 15 chars)</li><li>▪ Routing Control dialog modified. (tabbing order and NFAIL modified)</li><li>▪ Title length check handled correctly</li><li>▪ Pump Speed Factor defaulted to 1.0</li></ul>

### Version 5.4 (December 1997)

ENHANCE- MENT - 5.4	<ul style="list-style-type: none"><li>▪ Extran(EXT) referenced as Hydraulics(HDR)</li><li>▪ Transport(TRN) referenced as Sanitary(SAN)</li><li>▪ Support CDG File Format</li><li>▪ Added Variables (Crowns, pipe fall)</li><li>▪ Help File now user definable</li></ul>
MAINTENANCE - 5.4	<ul style="list-style-type: none"><li>▪ Calibration process corrected</li><li>▪ Graphing: Annotation bug fixed: DLL updated</li><li>▪ Fix object's text size shrinking</li><li>▪ Update RNF peak node flow after every Solve</li><li>▪ Dialogs correctly reworded</li><li>▪ TEMP directory used</li><li>▪ Banner dialog sensitive to application</li><li>▪ Increased precision of user defined inflow hydrograph</li><li>▪ Editing of DWF Global Database fixed</li><li>▪ View of Pumps in LSECT fixed</li><li>▪ Allow Zoom in/out in both directions</li><li>▪ Handle only 30 chars in Report Entry labels</li></ul>

### Version 5.3 (November 1997)

ENHANCE- MENT - 5.3	<ul style="list-style-type: none"><li>▪ UDD Mode Only supported</li><li>▪ Visual Hydro Startup supported</li><li>▪ Design Conduits in Extran</li></ul>
MAINTENANCE - 5.3	<ul style="list-style-type: none"><li>▪ LSECT/PSECT weir data display corrected</li><li>▪ Drag of network on Browse file selection (Dbl Click) fixed</li><li>▪ Dot on Upper LH corner of network removed</li></ul>

### Version 5.2 (October 1997)

ENHANCE- MENT - 5.2	<ul style="list-style-type: none"><li>▪ Plan view Plotting Added (PSECT)</li><li>▪ Report Generation Revamped to utilize grid controls</li><li>▪ Dialog Color now user definable</li><li>▪ About Dialog now shows the User Information</li><li>▪ Lsect: Configuration added</li><li>▪ Program to transfer personal configuration created</li><li>▪ Special Conduit Types Modified</li></ul>
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MAINTENANCE – 5.2	<ul style="list-style-type: none"> <li>▪ Handle Loading Files with old pump variables</li> <li>▪ View all Rainfall global database list data</li> <li>▪ Lsect: View Multi-Conduit data</li> <li>▪ Lsect: Add display of pump data and fix view</li> <li>▪ Review Results - Max Flow Values made absolute</li> <li>▪ Pest Interface - Shorten Command line calls</li> <li>▪ Pest Interface - Check template files not generated from Pest dat files</li> <li>▪ Fix import of Runoff EPA dat files.</li> <li>▪ support Export of network to DXF or autoCad Script files</li> <li>▪ Export of User Inflow Data, inc precision for sorting time data to 0.0001</li> <li>▪ Number of Pictures in INI file made active (default of 10)</li> <li>▪ Solve not permitted if any viewing on current data.</li> <li>▪ Additional checking in Color Selection dialog.</li> <li>▪ Graphical Encoding of Triangular shaped nodes handled.</li> </ul>
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### Version 5.1 (September 1997)

ENHANCE- MENT – 5.1	<ul style="list-style-type: none"> <li>▪ Long Sectional Dynamic Player revamped <ul style="list-style-type: none"> <li>- support panning &amp; zooming</li> <li>- alert symbols for flooding</li> <li>- grid control</li> <li>- manual control of time step allowed</li> </ul> </li> <li>▪ Display node's bitmap or avi file</li> <li>▪ Sealed Manhole types supported</li> </ul>
MAINTEN- ANCE – 5.1	<ul style="list-style-type: none"> <li>▪ Fixed Circular data Reference for Used Pollutants</li> <li>▪ Review Results - Weir and Orifice data now displayed</li> <li>▪ Review Results - Gauged data now handled</li> <li>▪ Review Results - Max Values displayed</li> <li>▪ Panning tool reverts to click tool after used pans</li> </ul>

### Version 5.04 (Beta)

ENHANCE -MENT – 5.04	<ul style="list-style-type: none"> <li>▪ Access Notes on Right Mouse Click</li> <li>▪ Warn on network tidy up</li> </ul>
MAINTEN- ANCE – 5.04	<ul style="list-style-type: none"> <li>▪ Review Result, load max number of graphs initially</li> <li>▪ Review Result, fix x axis time scale in Runoff mode</li> <li>▪ Calibration- Handle long directory names for file locations</li> <li>▪ Storage Treatment, new bitmaps and correct co-ord location</li> </ul>

### Version 5.03 (Beta)

ENHANCE -MENT – 5.03	<ul style="list-style-type: none"> <li>▪ Support Notes field on Report</li> <li>▪ Multi-run database save options have overrides</li> </ul>
MAINTEN- ANCE – 5.03	<ul style="list-style-type: none"> <li>▪ Converting pump data more defensive when no pump data exist</li> <li>▪ Possible to delete first item in list</li> <li>▪ Save Project file prompted when exiting (if project setting changed)</li> <li>▪ Support Dbl Click to open files in project</li> <li>▪ Allow opening of LONGSECT and REVIEW RESULTS concurrently</li> </ul>

## Version 5.02 (Beta)

ENHANCE- MENT – 5.02	<ul style="list-style-type: none"><li>Swmmcom - Interface to the SWMM engine configuration parameters. Parameters now stored in XP database.</li><li>Extran - Handle Extran layer separately</li></ul>
MAINTEN- ANCE – 5.02	<ul style="list-style-type: none"><li>Sentinel - Support old sentinel locks (new DLL needed sc32w.dll)</li><li>Solve - Handle long directory names for file locations</li><li>MAX_NODES, MAX_LINKS, MAX_DBCARDS not user definable</li></ul>

## Version 5.01 (Beta)

ENHANCE- MENT – 5.01	<ul style="list-style-type: none"><li>XPX - Import Global Database Names</li></ul>
MAINTEN- ANCE – 5.01	<ul style="list-style-type: none"><li>Projects - checks if a file in the project is open before attempting to open it</li><li>Projects - Make the added file the active item after adding</li><li>Review Results - Move Next/Previous when have more than 2 graphs per page</li><li>Review Results - Be able to inspect any one object</li><li>Review Results - Handle all pump diversion on a particular multi-conduit</li><li>XPX - Import link objects without corrupting the network extent</li></ul>