

Continuous Simulation using SWMM 5 LID and Groundwater Features in a Linked 1D/2D Network using InfoSWMM 2D for a 50 Year Period

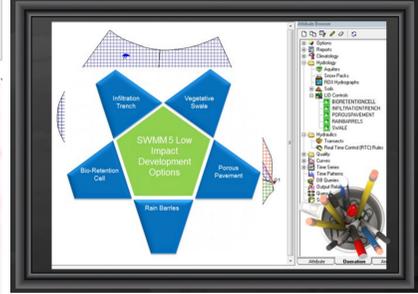
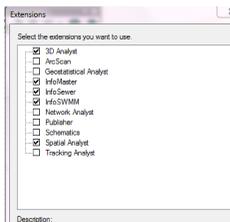
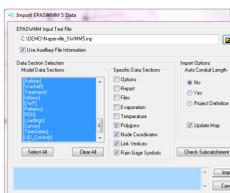
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Import and Export from SWMM 5 and EPANET is very important to all of our software. All of our software shown above either imports EPANET or SWMM 5. We find that an EPANET or SWMM 5 file is a common means of model transfer throughout the world.

InfoSWMM 2d can import, export and actually uses a SWMM 5 input data file for the simulation engine. The 2D components connecting to a node in InfoSWMM are connected with weir, orifice and outfall components.

InfoSWMM and InfoSWMM 2D are extensions in Arc Map 9.3 and Arc Map 10 and 10.1. The layers of InfoSWMM and InfoSWMM 2D are editable in the Arc Map Table of Contents and all of the Arc Map Toolbox commands and layer property commands can be used to manipulate InfoSWMM data layers.



The LID Controls are created either as DB item in the Operations Tab of the InfoSWMM Browser or created using the DB editor. The number and type of LID control along with Subcatchment specific information is entered for each Subcatchment using the InfoSWMM Attribute Tab of the Browser or in the LID Subcatchment Coverage DB.

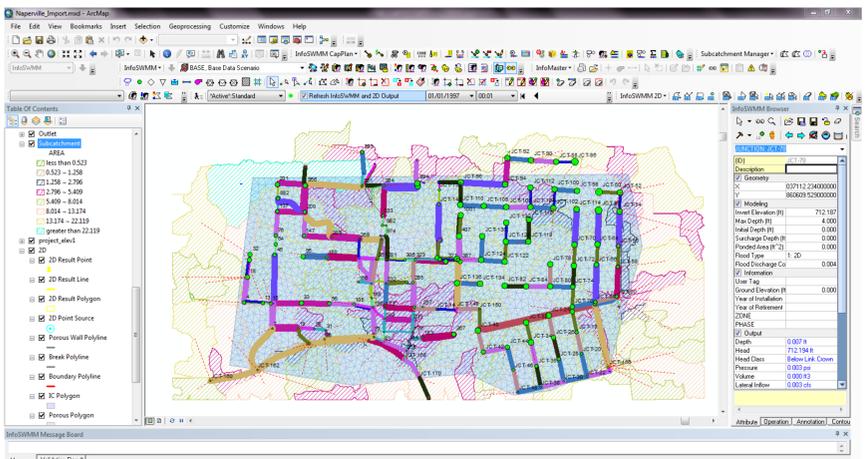
You can plot all of the SWMM 5 LID Report Variables for each LID in each Subcatchment.

The Aquifers for the model are also defined in the Operations Tab of the InfoSWMM Browser and then either the Groundwater DB Table or the Attribute Tab of the InfoSWMM Browser ties the Aquifer to Subcatchment Specific Groundwater data.

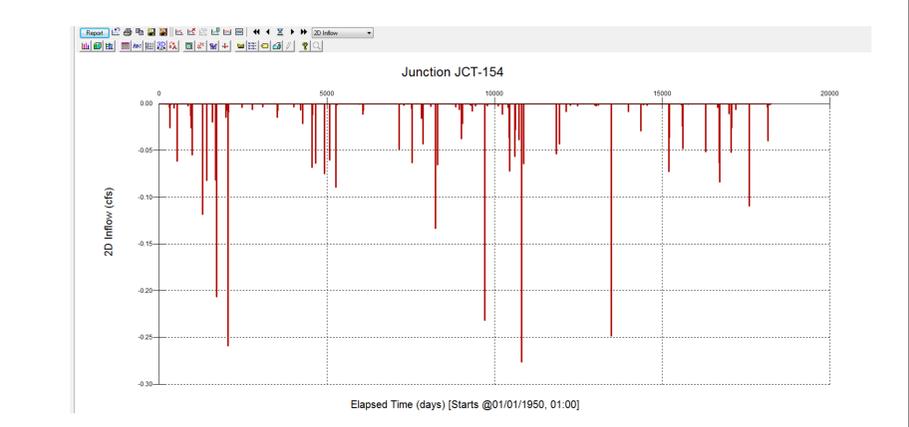
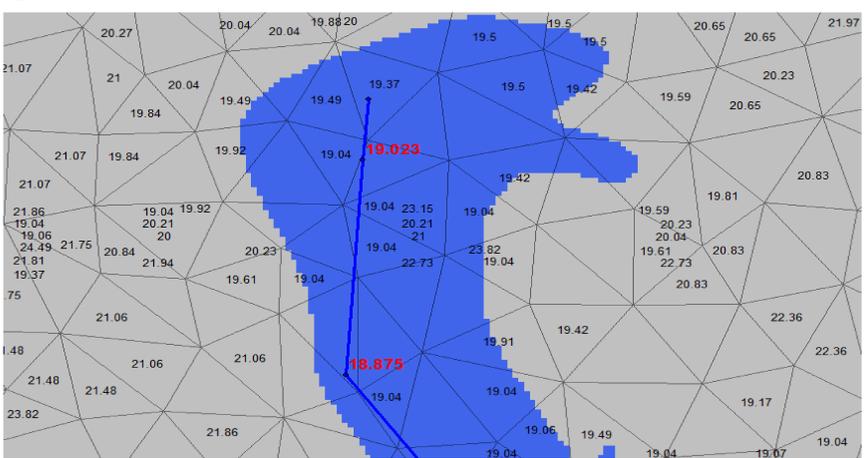
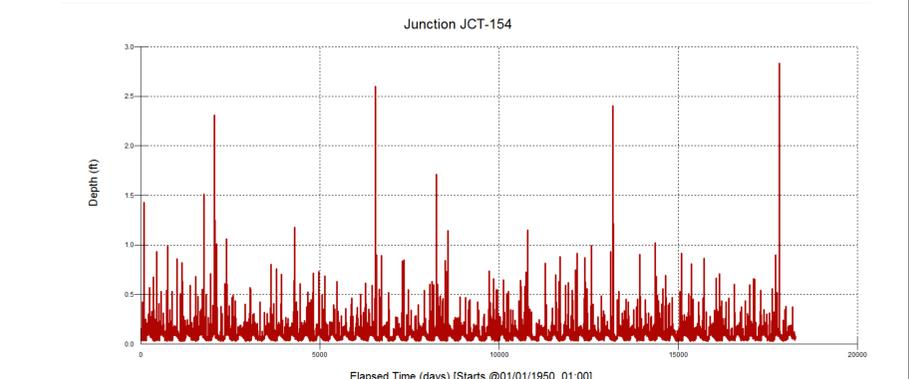
LID Controls in DB Tables

LID Graphs by Subcatchment

The types of LID Controls are defined in the LID Controls DB Table or in the Operation Tab of the Attribute Browser.



Graph of the Junction depth for a Node that connects the 1D Drainage Network to the 2D Mesh for 50 years and the flow OUT of the 1D Node to the 2D Mesh is shown for the 50 years. The flow can be positive or negative depending on whether the flow is out of the 2D Mesh or into the 2D Mesh.



A simulation of 125 Subcatchments, 225 pipes and 225 nodes with 3500 2D Meshes for 50 years with LID's and Groundwater for each Subcatchment takes about 1 hour on a Quad Core PC.

The 2D Mesh calculations ONLY take place when nodes are flooding and the flow is going to the 2D Meshes. This lessens the computational time for the 2D Simulation.

To View 1D Modeling Report [CLICK HERE](#)

To View 2D Modeling Report [CLICK HERE](#)

To View LID Report [CLICK HERE](#)

	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
Total Precipitation	11546.074	2247.770
Evaporation Loss	832.405	103.648
Infiltration Loss	9350.530	1625.467
Surface Runoff	2688.941	523.478
Final Surface Storage	0.025	0.005
Continuity Error (%)	-0.224	

	Volume	Depth
Groundwater Continuity	acre-feet	inches
Initial Storage	29.954	59.997
Infiltration	626.077	1254.003
Upper Zone ET	41.826	83.776
Lower Zone ET	230.438	461.877
Deep Percolation	426.705	854.470
Groundwater Flow	-84.524	-169.297
Final Storage	29.270	58.626
Continuity Error (%)	1.877	

	Volume	Volume
Flow Routing Continuity	acre-feet	10 ⁶ gal
Wet Weather Inflow	1536.255	500.612
Dry Weather Inflow	2688.945	876.233
Groundwater Inflow	-84.524	-27.543
RDI Inflow	0.000	0.000
External Inflow	30.240	9.854
External Outflow	4154.414	1353.778
Internal Outflow	8.259	2.691
Storage Losses	0.000	0.000
Initial Stored Volume	0.001	0.000
Final Stored Volume	0.001	0.000
Continuity Error (%)	0.198	

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2d1 Initial condition file loaded

Total 2d simulation time (s) : 83.6295

Volume balance reports

2d Zone Name : NOQ

Initial Volume (m3) : 0.0000

Net Inflow (m3) : 10.0679

Inflow (m3) : 37290.5004

Total Volume in the surface (m3) : 10.0679

Volume in the 2d zone (m3) : 10.0679

Volume out of the 2d zone (m3) : 0.0000

Rain volume in the 2d zone (m3) : 0.0000

Volume lost in the 2d zone (m3) : 0.0000

Mass error balance (%) : 0.0000

Effective area (ha) : 1.0245

Flooded area at the end of the simulation (ha) : 0.0000

Maximum flooded area (ha) : 1.0245

Net inflow in point sources

Node id : 20 // Net Inflow (m3) : -3492.1143

Node id : 149 // Net Inflow (m3) : 9502.1822

Net inflow in external boundaries

Existing SWMM 5 components are used to connect the 1D Node to the 2D Mesh. The flooded water flow out a bottom outlet orifice to the 2D Mesh and then the 2D Mesh. The 2D mesh can also flow back into the 1D mesh through the same Outfall.

[ORIFICES]
 JCT-154_ORIFICE JCT-154 JCT-154_OUTFALL BOTTOM 6.991000 0.004000 NO
 JCT-156_ORIFICE JCT-156 JCT-156_OUTFALL BOTTOM 4.000000 0.004000 NO

[OUTFALLS]
 OFALL-10679.000000 FREE NO
 JCT-154_OUTFALL 680.000000 FIXED686.991000 NO
 JCT-156_OUTFALL 680.475000 FIXED684.475000 NO

Connection to 2D Mesh is through a SWMM 5 orifice to a SWMM 5 Outfall which is in the middle of the Mesh.

The Output Statistics Manager of InfoSWMM analyzes the statistics for up to 500 locations at the same time for a continuous simulation. In the case of this example, there were 189 events in which the 1D Network flooded to the 2D Network or flow from the 2D Network flowed into the 1D network.

