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## Introduction to InfoSWMM RAM



The InfoSWMM RAM is used to analyze system flooding extent in sewer systems and the consequences of overflows using the flooding results and a background DEM. It is comprised of the following components. For an overview of the InfoSWMM RAM's capabilities, please click [here](#).



InfoSWMM RAM can be used in conjunction with InfoSWMM 2D to show the possible worst flooding extent based on a the Maximum HGL at a flooded node and the elevation terrain DEM.

InfoSWMM RAM Interface	InfoSWMM RAM Features	
<a href="#">InfoSWMM RAM Menu</a>	<a href="#">Create Flood Damage Extent</a>	<a href="#">Defining Ponded Area</a>
<a href="#">InfoSWMM RAM Toolbar</a>	<a href="#">Flood Damage Reports</a>	<a href="#">Frequently Asked Questions</a>
<a href="#">Contact Us</a>	<a href="#">Percentage of Flood Contribution Calculation</a>	




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## **InfoSWMM RAM Overview**

InfoSWMM helps modelers and planners predict overflows from urban systems based on a one-dimensional solution of the full St. Venant equations. The prediction of these overflows is only the first step in a flood risk assessment and management process. The remaining tasks require spatial input data and analysis to find areas where the flooding impacts the built infrastructure including homes, businesses, bridges, levees, etc. Further analysis of the extent of flooding can predict monetary damages from the flood extent and estimate the sources of the flood waters from the flooding volumes, suggesting areas to improve the flood drainage infrastructure.

InfoSWMM Risk Assessment Manager (RAM) Suite extension meets this critical engineering challenge with consistent, accurate, flexible methods that are simple to understand and incredibly powerful when implemented. This critical tool automatically performs the sophisticated spatial analysis required to locate at-risk structures.

InfoSWMM RAM gives users expanded power and flexibility in estimating the extent and consequences of overflows and flooding on their wastewater and stormwater collection systems, and in formulating and evaluating urban sewer and small stream emergency response, recovery, remediation and operations plans and service upgrades.

InfoSWMM RAM is designed to help wastewater utilities reduce their sewer infrastructure vulnerability and enhance their ability to prepare for and respond to natural disasters, abnormal service disruptions and emergencies. It leverages the power of GIS and advanced graph-theory and computational geometry with inverse distance weighting (IDW) to very accurately represent flood depths and area of spread across the ground model. It quickly determines the extent of sewer overflows and flooding (volume and reach), calculates population at risk, pinpoints sources overloading the system, locates system capacity limitations and blockages, and estimates property damage costs. Overland flow pathways can also be quickly examined, showing the lateral routes and spreading of floodwaters.

Unlike trivial and inaccurate “compartmentalized” procedures, InfoSWMM RAM advanced geospatial analysis technology will result in the most

accurate and representative risk assessment modeling. RAM can be effectively used to identify viable solutions before an incident or disaster occurs, or to assist in responding should it occur. These capabilities will greatly assist wastewater utilities in planning and designing reliable systems and emergency response programs, and forging closer ties with their customers.

InfoSWMM RAM allows users to very accurately represent and model overland urban flooding. It generates flood mapping to represent flood depths and area of spread across the ground model due to surcharging within the system.

InfoSWMM RAM  can:

- very accurately represent flood depths and area of spread across the ground model.
- quickly determine the extent of sewer overflows and flooding (volume and reach)
- calculate population at risk
- pinpoint sources overloading the system
- locate system capacity limitations and blockages
- estimate property damage costs
- highlight overland flow pathways showing the lateral routes and spreading of floodwaters



Operating in the most advanced geospatial urban drainage modeling environment, InfoSWMM Risk Assessment Manager lets you to edit, manipulate, and manage all your GIS data and modeling data in one intuitive and simple interface with incredible ease and speed. Wide ranging scenarios based on actual rainfall data, engineering design storms, and dry-weather inflows can be implemented simultaneously to evaluate any potential flood mitigation technique. The robust scenario manager shows side-by-side comparisons of results from different flood mitigation techniques. These comprehensive capabilities will allow you to effectively utilize your engineering knowledge and judgment while minimizing some of the repetitive task associated with flood risk analysis.

We are happy to bring you this intuitive and sophisticated geospatial service risk assessment tool to continue to fully support your urban drainage and stream flooding management activities.

Our high-level, state-of-the-art research and development effort in GIS-based network modeling is continuing at a rapid pace and we intend to update and refine InfoSWMM Risk Assessment Manager to reflect this progress. We are pleased to be at the forefront of this vital geospatial modeling technology and to continue to advance it to an unprecedented level of reliability, comprehensiveness and performance.

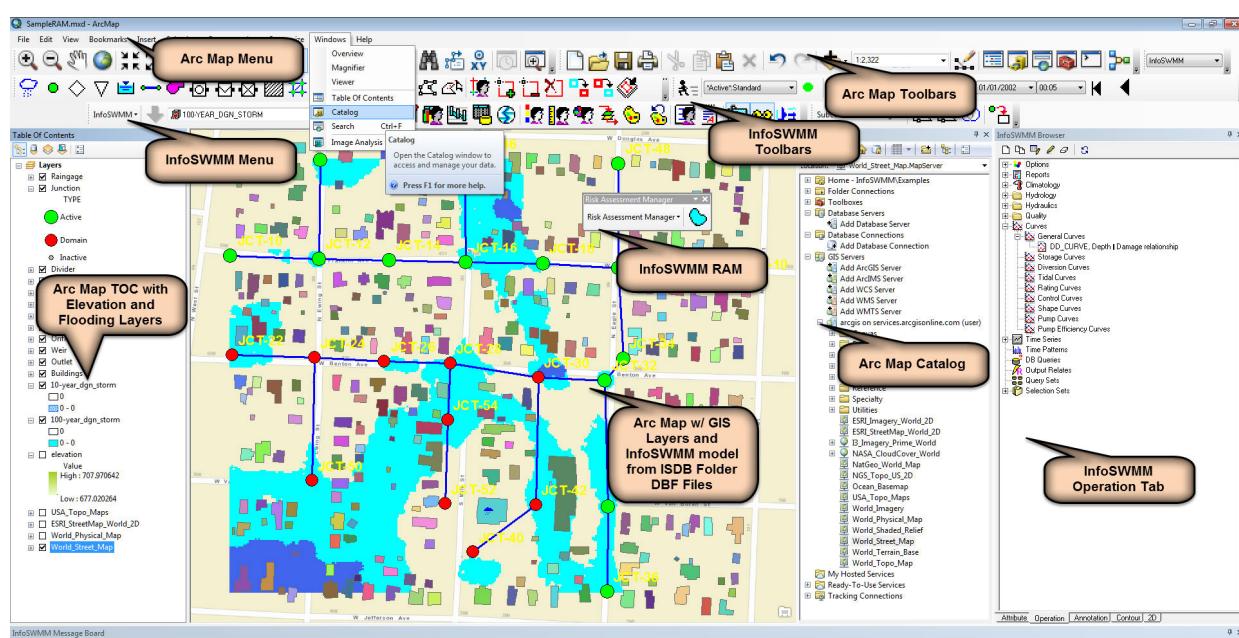
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**Paul F. Boulos, Ph.D., BCEEM, Hon.D.WRE, Dist.D.NE, F.ASCE,  
NAE**

**President, COO and Chief Technical Officer**

**Innovyze Inc.**

**January 30, 2019**



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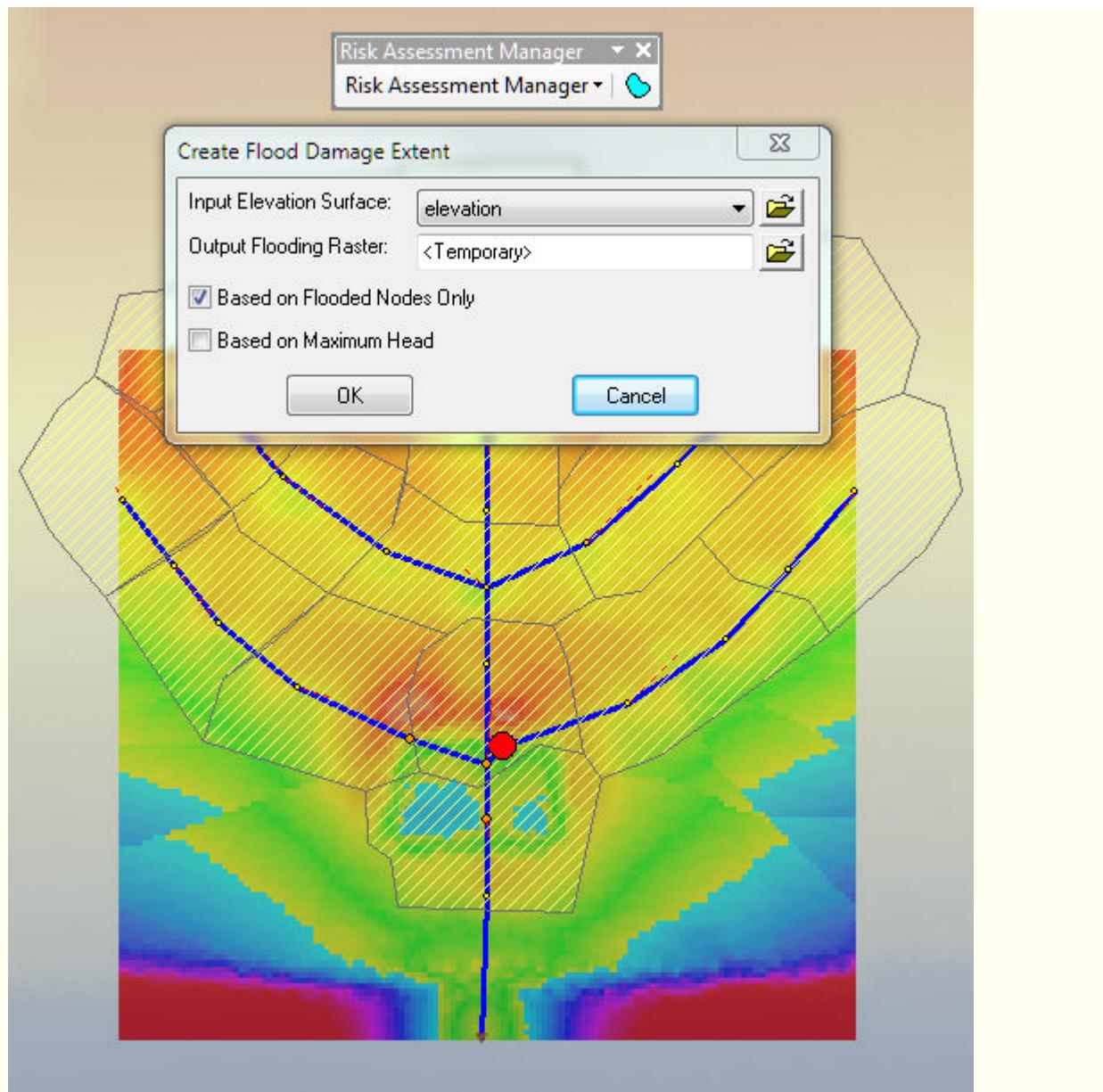


## About InfoSWMM RAM

### On-Line Help for RAM



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- January 30, 2019
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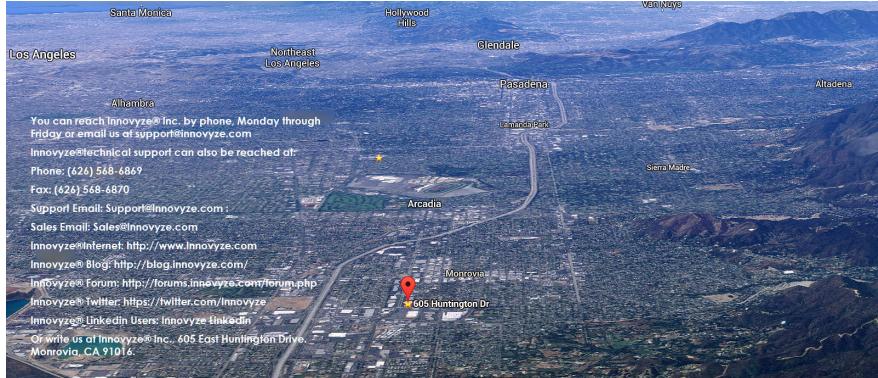
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- Your company details
- Innovyze product name and version number
- Operating system on which the software is running
- The level of urgency of the problem
- A brief description of the enquiry, fault or problem

If you contact the support team by fax or e-mail, please include all this information. It will help us to deal with your request more quickly.

We will also seriously consider your suggestions for future versions of all Innovyze® Products.

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Contact Type	Email
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Innovyze Pty Ltd (AUS):	<b>Suite 38, 75 Wharf St</b> <b>Tweed Heads</b> <b>NSW 2485</b> <b>Australia</b>

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Innovyze Forums:	<a href="http://forums.innovyze.com">http://forums.innovyze.com</a>
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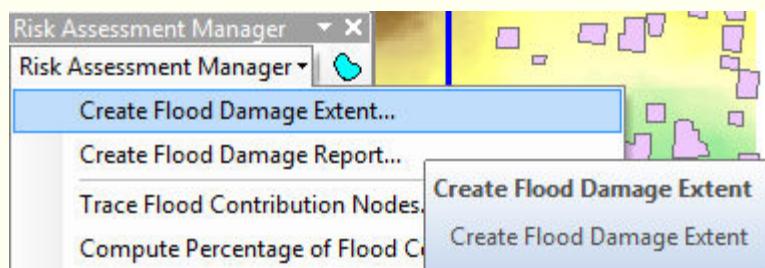
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## InfoSWMM RAM Menu

The InfoSWMM RAM menu is only accessible from the [RAM toolbar](#). The RAM menu provides access to the RAM commands displayed below:



### Create Flood Damage Extent

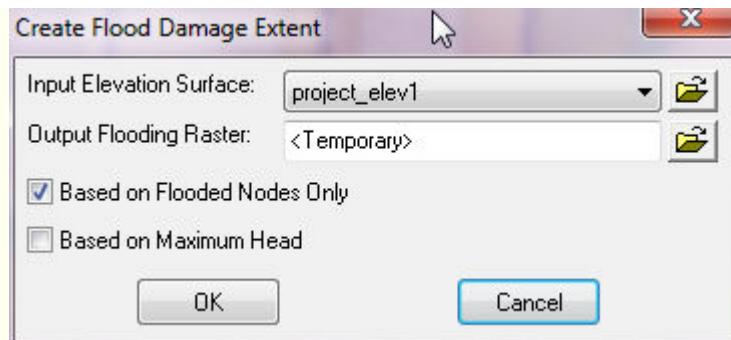
A flood damage extent map shows areas subject to flooding at the current simulation time of the network model. The current simulation time is shown on the InfoSWMM Output Toolbar, and it can be adjusted using the date and time drop-down selectors or the slider-bar.

#### InfoSWMM

calculates a flood flow for each node where the hydraulic depth is greater than the sum of the invert elevation, the maximum depth and the surcharge depth, provided the simulation does not model ponding. With ponding, the total flood volume is assumed to be contained in the ponded area where it will safely reenter the storm drainage system.

The flood damage extent only utilizes nodes that have a flood flow greater than zero to compute the flood surface.

For these points, the hydraulic grade line (HGL) is interpolated between flooded nodes according to an inverse distance weighting scheme. The result of this interpolation is a flood elevation which may or may not rise above the ground surface as defined by the elevation raster layer. Any parts of the flood elevation above the surface elevation are flooded, and any below are dry.



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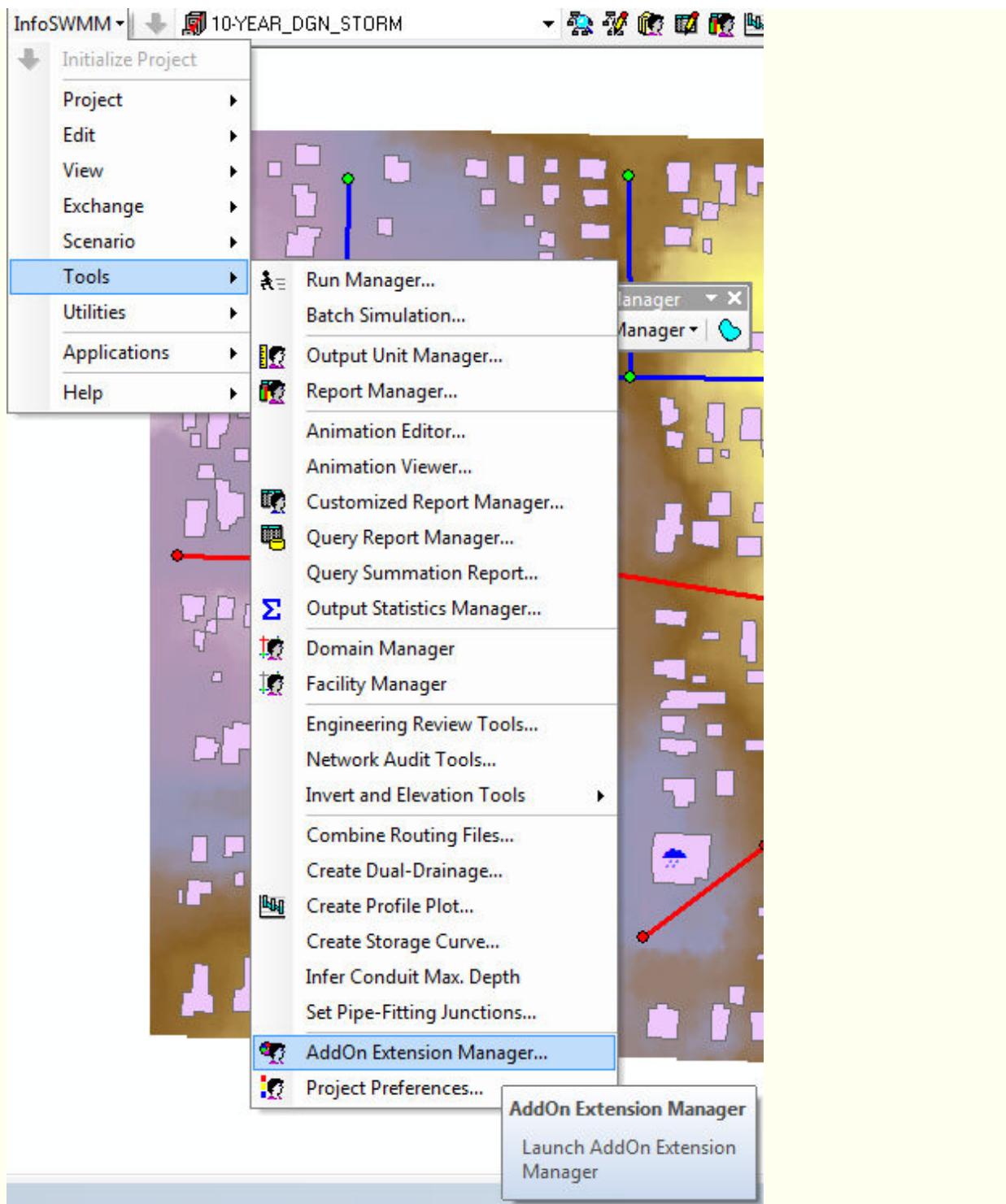
[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [The RAM Interface](#) > **RAM Toolbar**

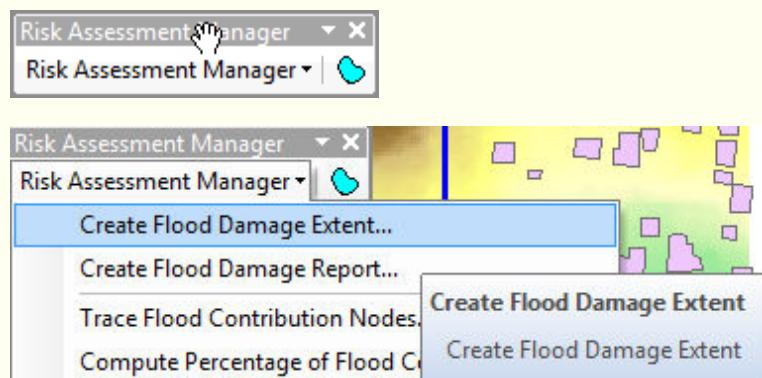
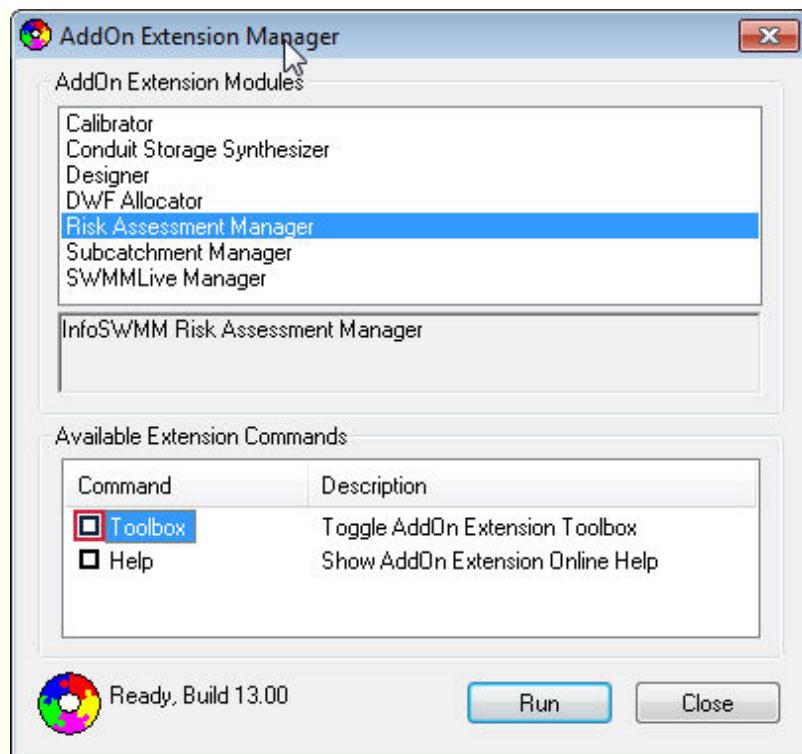


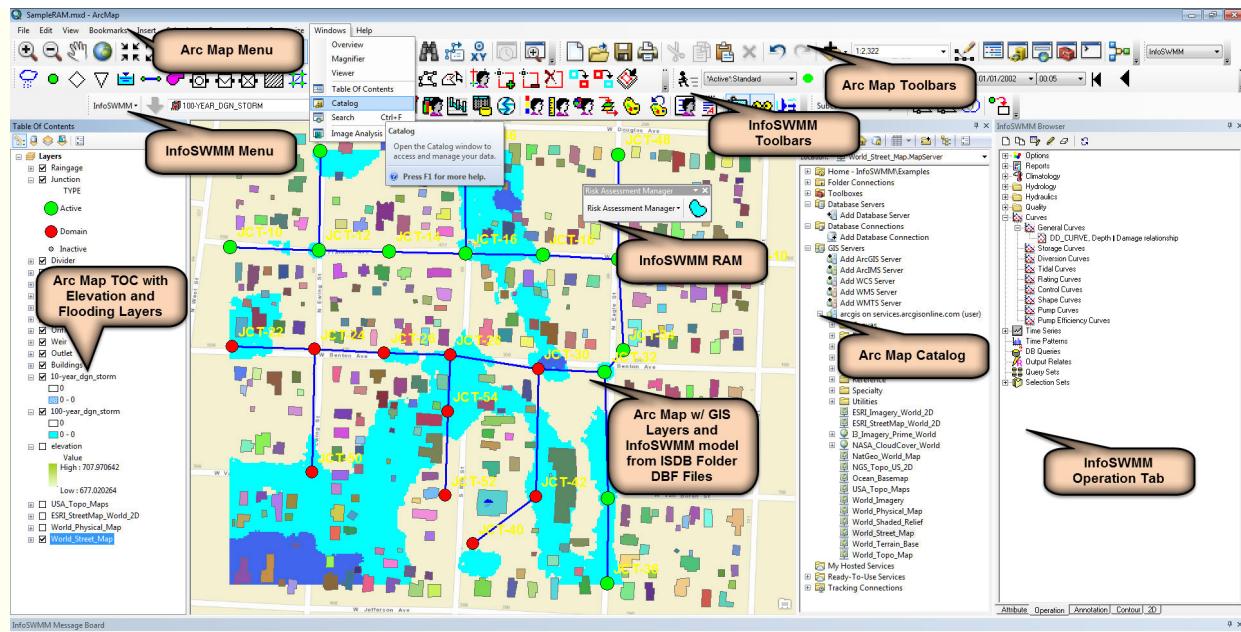
## **RAM Toolbar**

The RAM toolbar provides access to the flush zone manager, the flush sequencing manager, and all other RAM commands. In addition, the toolbar is used to view results of any sequence.

To make the RAM toolbar appear, choose Toolbars from the ArcGIS View menu and select Risk Assessment Manager.







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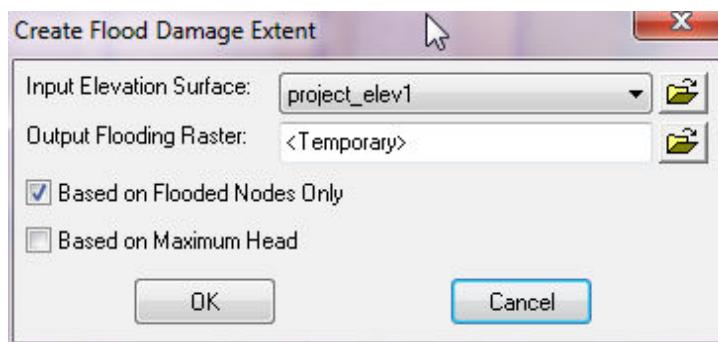
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## Create Flood Damage Extent

A flood damage extent map shows areas subject to flooding at the current simulation time of the network model. The current simulation time is shown on the InfoSWMM Output Toolbar, and it can be adjusted using the date and time drop-down selectors or the slider-bar.

InfoSWMM calculates a flood flow for each node where the hydraulic depth is greater than the sum of the invert elevation, the maximum depth and the surcharge depth, provided the simulation does not model ponding. With ponding, the total flood volume is assumed to be contained in the ponded area where it will safely reenter the storm drainage system.

The flood damage extent only utilizes nodes that have a flood flow greater than zero to compute the flood surface. For these points, the hydraulic grade line (HGL) is interpolated between flooded nodes according to an inverse distance weighting scheme. The result of this interpolation is a flood elevation which may or may not rise above the ground surface as defined by the elevation raster layer. Any parts of the flood elevation above the surface elevation are flooded, and any below are dry.



**Note** - The following is a Description of each of the Items in the above Dialog.

### **Input Elevation Surface**

Select an raster elevation dataset for the flood damage extent analysis using the drop-down box.

### **Output Flooding Raster**

The output raster representing the flooding extent will be stored in the ArcGIS Spatial Analyst temporary directory by default. Optionally, a file path and name typed in this box.

Use the button to select a path using a windows browser. This also allows the output file type to be specified.

### **Based on Flooding Nodes Only**

Check this box to base the computation of the flood surface on the flooded nodes only (i.e. nodes not flooding at the set [output time](#) will be ignored in flood extent calculations. Otherwise the flood surface calculations will include nodes that do not have flooding.

### **Based on Maximum Head**

Check this box to base the computation of the flood surface on the intersection of the node Maximum Head and the Raster.

OK

**OK**

Press this button to perform the flood damage extent calculations and create the output flooding raster.

Cancel

**Cancel**

Press to close the dialog without saving any changes.

You can check the Report output file to see if there are any flooding nodes if you have a question about any of the flooding node results.

\*\*\*\*\*

Node Flooding Summary

\*\*\*\*\*

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Depth Feet
JCT-30	1.44	0.14	0 12:44	0.002	0.011
JCT-32	2.96	0.40	0 12:18	0.008	1.261
JCT-34	3.32	0.26	0 13:09	0.011	0.085

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## Frequently Asked Questions

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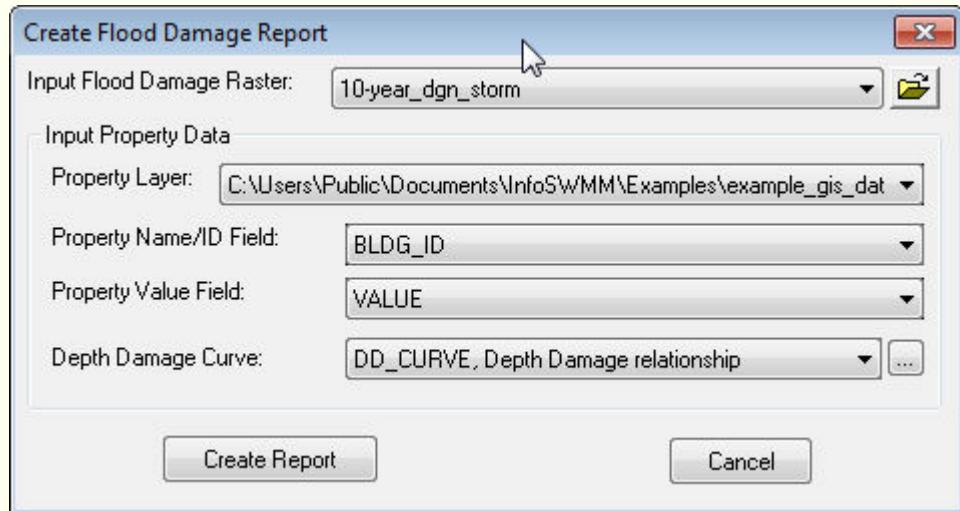
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**Create Flood Damage Report**



## Create Flood Damage Report

The data requirements to create the flood

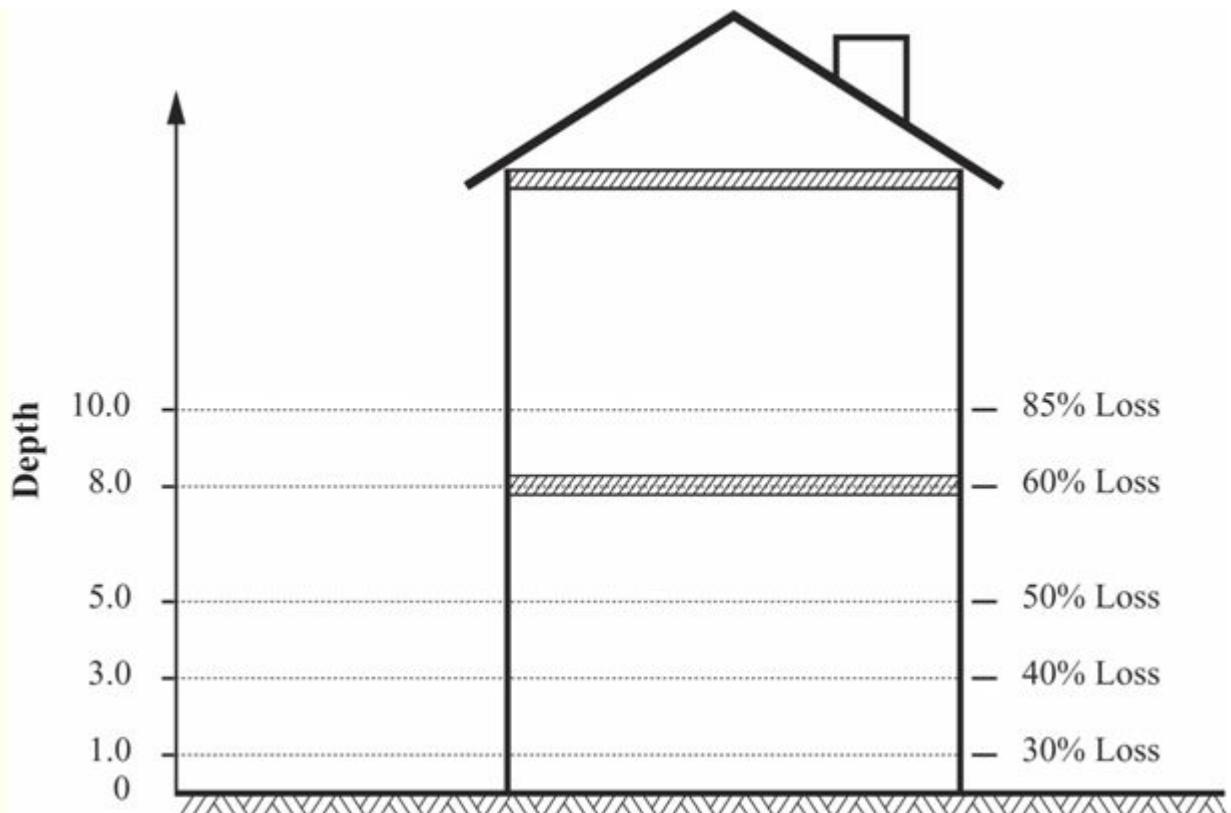
damage report include a polygon layer of the property subject to flooding and a flood damage raster. The Depth Damage curve allows the definition of flood depth vs. repair cost for a structure. [Click here for an example.](#)



### Property Value Field Example Depth Damage Curve

A residential two-story home with flooding

on the first floor may be valued at a 30% loss from its total value, while if the flooding reaches above the second floor, the loss will be much higher—in this example 85%.



Flood Damage Report

	Property Name	Flood Depth	Property Value	Loss
1	52436	1.97	66902.77	29769.98
2	11359	0.75	22219.31	0.00
3	11050	0.05	42663.50	0.00
4	10378	0.49	7526.83	0.00
5	10423	0.03	20637.51	0.00
6	52773	1.22	70969.63	23594.24
7	11033	0.56	11973.28	0.00
8	11044	1.52	36808.60	13894.55
9	11061	1.88	11105.82	4804.13
10	10994	1.18	6357.50	2075.81

Total Loss: 106,014.34

**Close**

## Flood Depth

The average flood depth over the property is listed in this column.

## Loss

The loss (or damage) caused to property by the flooding is listed in this column. This is calculated using the flood depth, property value, and the specified depth-damage curve.

### **Property Layer**

Select an polygon dataset representing buildings or structures subject to flooding using the drop-down box. This dataset must be currently contained in the ArcGIS table of contents. It must have the same spatial references as the flood damage extent raster for accurate computations.

The total value of the property is listed in this column.

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**Trace Flood Contribution Nodes**



## Trace Flood Contribution Nodes

Select a node in the network with flooding, and this tool traces the network upstream from a flooded node and adds all upstream nodes to the domain for further analysis. Examples of analysis that can be performed are listed below. please refer to the InfoSWMM helpfile for more information on the terminology used.

- Create  
contours using the contribution nodes
- Create  
annotations using the contribution nodes
- View  
a Junction Summary report of the contribution nodes
- Create  
a Junction Group Graph using the contribution nodes
- Create  
an animation using the contribution nodes

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Note -

The above analyses are all performed using the domain functionality. The trace flood contribution nodes tool should be used when the domain is clear to ensure the above analyses only include the flood contribution nodes.

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## Compute Percentage of Flood Contribution

Use this tool to generate a [report](#) of all of the inflow tributary to a graphically selected flooded node.

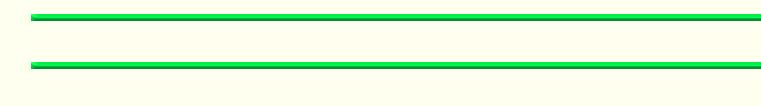
ID	Lateral Flow	Percentage
1 JCT-30	0.36	8.32
2 JCT-42	0.35	8.09
3 JCT-40	0.56	12.94
4 JCT-28	0.25	5.78
5 JCT-54	0.32	7.40
6 JCT-52	0.39	9.02
7 JCT-26	0.30	6.93
8 JCT-24	0.34	7.86
9 JCT-50	0.84	19.42
10 JCT-22	0.63	14.56

### Junction ID

The unique identifier for each junction contributing inflows at the selected node is listed in this column.

### Lateral Inflow

The lateral inflow of the junction (at the [output time](#)) in the corresponding row is listed in this column.



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**Define Ponded Area**

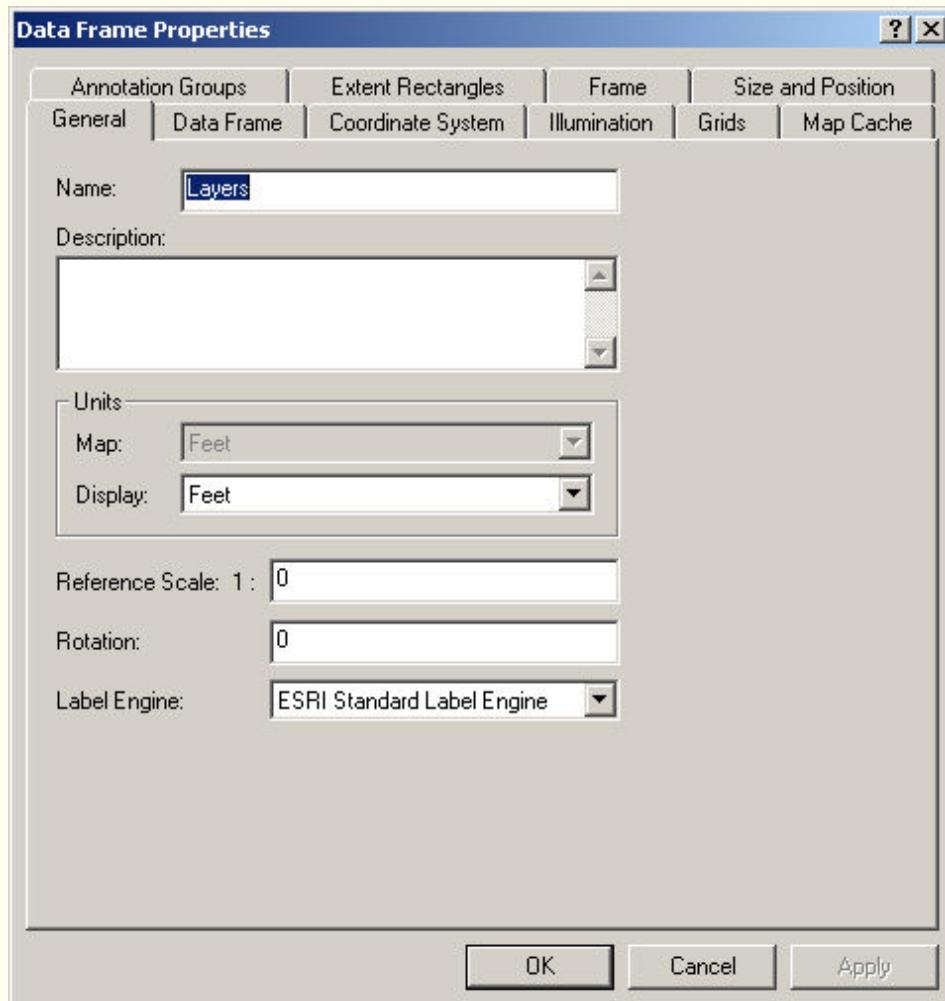


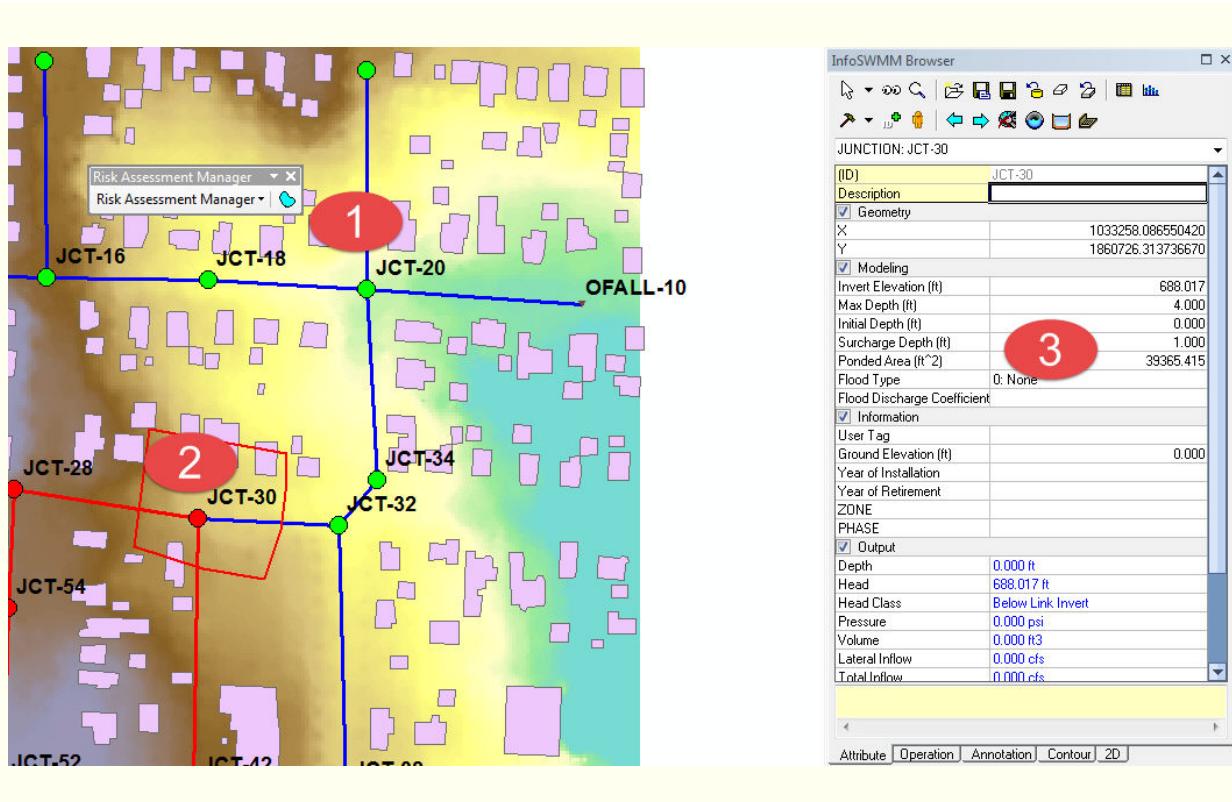
## Defining Ponded Area

Select a node then digitize a polygon over a flooded area. The resultant available storage within the digitized polygon area is calculated and entered into the ponded area field of the appropriate data table on the object's attribute list.

### Ponded Area Units

The ponded area is calculated using the units of the data frame. To check the units of the data frame, double-click on the data frame (named  **Layers** unless modified). On the General Tab, look for the **Map:** under the **Units** section. In the example below, the map units are feet, so the calculated ponded area will be in square feet.





## Frequently Asked Questions

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## Flood Damage Report

The final flood damage report shows the flood depth, total property value and the loss for each structure with some flooding. This report also sums these values to quickly evaluate the total losses for the entire flooded region.

### Total Loss

The total loss (or damage) caused to all properties by the flooding is listed in this box. This is calculated by summing the loss column.

The screenshot shows a Windows-style dialog box titled "Flood Damage Report". At the top left are two icons: a bar chart and a scatter plot. The main area contains a table with the following data:

	Property Name	Flood Depth	Property Value	Loss
1	52436	1.97	66902.77	29769.98
2	11359	0.75	22219.31	0.00
3	11050	0.05	42663.50	0.00
4	10378	0.49	7526.83	0.00
5	10423	0.03	20637.51	0.00
6	52773	1.22	70969.63	23594.24
7	11033	0.56	11973.28	0.00
8	11044	1.52	36808.60	13894.55
9	11061	1.88	11105.82	4804.13
10	10994	1.18	6357.50	2075.81

At the bottom of the dialog box, there is a label "Total Loss:" followed by a text input field containing "106,014.34". A "Close" button is located at the bottom right.

---

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[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [RAM Reports](#) > Percentage of Flood Contribution Table



## Percentage of Flood Contribution Table

This table details all of the inflow tributary to a flooded node (selected graphically using the [Compute Percentage of Flood Contribution](#) tool) as well as the percent contribution of flow from each node.

ID	Lateral Flow	Percentage
1 JCT-18	0.32	10.78
2 JCT-16	0.27	9.10
3 JCT-46	0.66	22.24
4 JCT-14	0.29	9.77
5 JCT-12	0.27	9.10
6 JCT-44	0.63	21.23
7 JCT-10	0.53	17.86

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Note -

Click on any portion of the toolbar above for information on any item.

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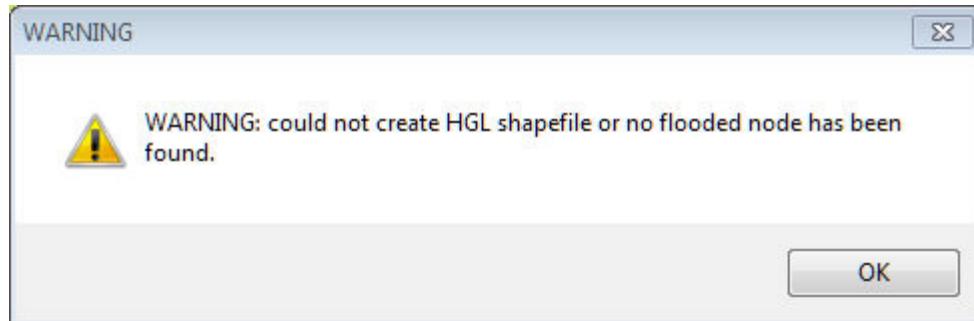
[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [RAM Reports](#) > **Warning: could not create HGL Shapefile or no flooded node has been found.**



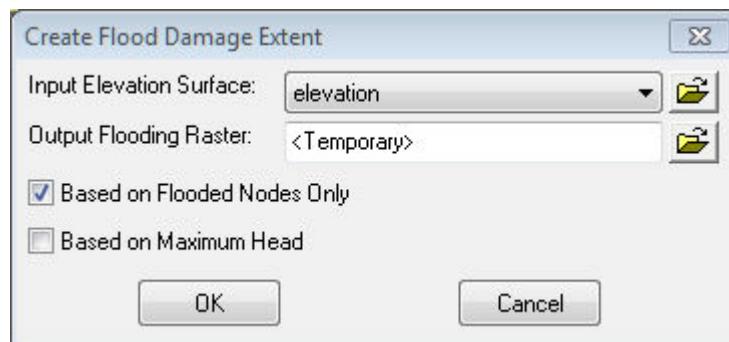
-----

## **Warning: could not create HGL Shapefile or no flooded node has been found.**

The warning seen below can be caused by any of the following situations. Please refer to the InfoSWMM helpfile for more information on the terminology used.



If this happens then use a different report time for the flooded nodes or use the Maximum HGL Level



---

**Problem:** There is no active output

**Solution:** Run an InfoSWMM Simulation

---

**Problem:** There is no flooding at the output time specified

**Solution:** Change the [output time](#)

---

**Problem:** There is no flooding in the active output source

Solution: Change the active output source to a scenario that contains flooding

---

Problem: There is no flooding

Solution: Uncheck the "Based on Flooding Nodes Only" option in the [Create Flood Damage Extent dialog](#)

---

Problem: The Raster Dataset is not in the same spatial reference as the junction feature class

Solution: Change the spatial reference (refer to the ArcGIS helpfile)

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## Frequently Asked Questions:

The list of questions below are some common questions that may be asked when using InfoSWMM RAM. Click on any topic for detailed information:

- [Why am I getting a warning when trying to create the flood damage extents raster?](#)
  - [What is the output time?](#)
  - [What units represent the calculated ponded area?](#)
- 
- 
- 

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# **Risk Assessment Manager (RAM)**

## **USER GUIDE**

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You can reach Innovyze® Inc. by phone, Monday through Friday.

Innovyze® technical support can be reached at:

Phone: (626) 568-6869 Fax: (626) 568-6870

Support Email: [Support@Innovyze.com](mailto:Support@Innovyze.com)

Sales Email: [Sales@Innovyze.com](mailto:Sales@Innovyze.com)

Innovyze® Internet: <http://www.Innovyze.com>

Innovyze® Blog: <http://blog.innovyze.com/>

Innovyze® Forum: <http://forums.innovyze.com/forum.php>

Innovyze® Twitter: <https://twitter.com/Innovyze>

Innovyze® Linkedin Users: [Innovyze Linkedin](#)

Or write us at Innovyze® Inc., 605 East Huntington Drive. Monrovia, CA 91016.

## **Software License Agreement**

“The current version of Innovyze’s Software License Agreement can be found at the following location:

[http://www.innovyze.com/licensing/”](http://www.innovyze.com/licensing/)



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## Installation Guide

System Requirements for InfoSWMM w ArcGIS, H2OMap SWMM does not need ArcGIS	
Compatible 32-bit OS:	Windows Server 2008 R2, Windows Server 2012 R2, Windows 7/8/8.1/10 pro or above
Compatible 64-bit OS:	Windows Server 2008 R2, Windows Server 2012 R2, Windows 7/8/8.1/10 pro or above
Compatible ArcGIS:	10.0, 10.1, 10.2 and 10.3 - 10.4 ( <a href="#">Check your PC ability to run ArcGIS</a> )
Prerequisites:	<a href="#">Microsoft Visual C++ 2008 Redistributable - x64 v9.0.30729.17/Microsoft Visual C++ 2008 Redistributable - x86 v9.0.30729.17</a> , <a href="#">Microsoft Visual C++ 2010 Redistributable - x86 v10.0.40219.1/Microsoft Visual C++ 2010 Redistributable - x64 v10.0.40219.1</a> and <a href="#">Windows Internet Explorer 7 or later</a>
Hardware Requirements:	<b>CPU Speed:</b> 2.2 GHz minimum or higher; Hyper-threading (HHT) or Multi-core recommended <b>Processor:</b> Intel Pentium 4, Intel Core Duo, or Xeon Processors; SSE2 (or greater) <b>Memory/RAM:</b> 2 GB or higher <b>Screen Resolution:</b> 1024 x 768 recommended or higher at Normal size (96dpi) <b>Disk Space:</b> 500 MB of free space to accommodate a full setup installation and additional disk space - keep as much free disk space available as possible. Its virtual memory system needs additional free disk space when working on large projects <b>Video/Graphics Adapter:</b> 64 MB RAM minimum, 256 MB RAM or higher recommended. NVIDIA, ATI and INTEL chipsets supported <b>Networking Hardware:</b> Simple TCP/IP, Network Card or Microsoft Loopback Adapter is required for the License Manager

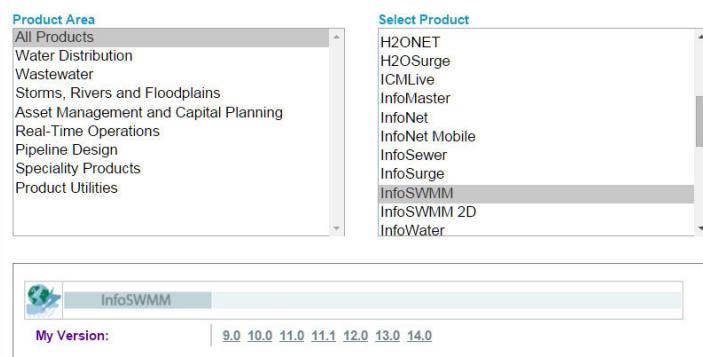
### [Installing Innovyze Software Add On's and Extensions](#)

Innovyze programs can only be installed from our Internet website. To install this program or a single user, perform the following procedure:

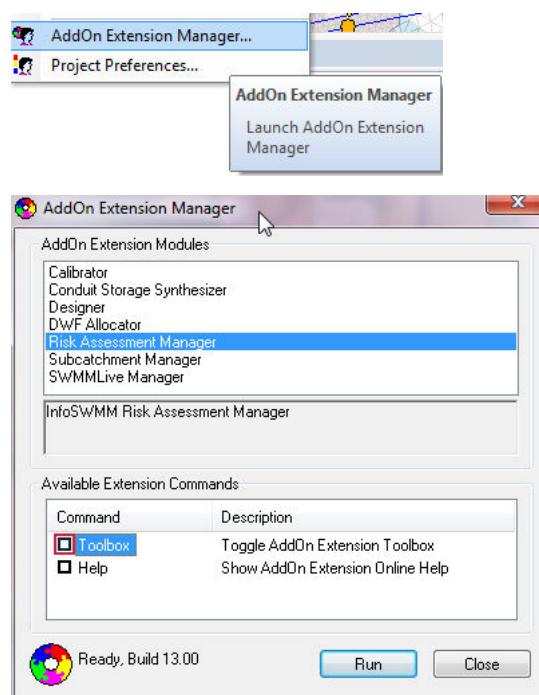
- Turn on your computer and start Windows. Close any other applications that are currently running.
- Start your Internet Browser software and go to <http://www.Innovyze.com>. Once on Innovyze® Inc's homepage, please go to <http://www.innovyze.com/updates/> Choose the *program* tab and click on the link. This will launch the File Download dialogue box.
- Choose the *SAVE THIS PROGRAM TO A Directory* option and follow the on-screen instructions. When saved on your hard drive run the Execute (\*.exe) file from the folder that was downloaded and follow the on-screen instructions.

### Product Updates

Our state-of-the-art technology, features and capabilities continue to improve and expand rapidly and periodic update is recommended. We are pleased to be at the forefront of this computer technology and to continue to advance it to an unprecedented level of reliability, comprehensiveness, and performance.

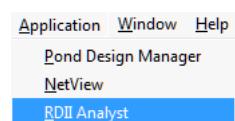


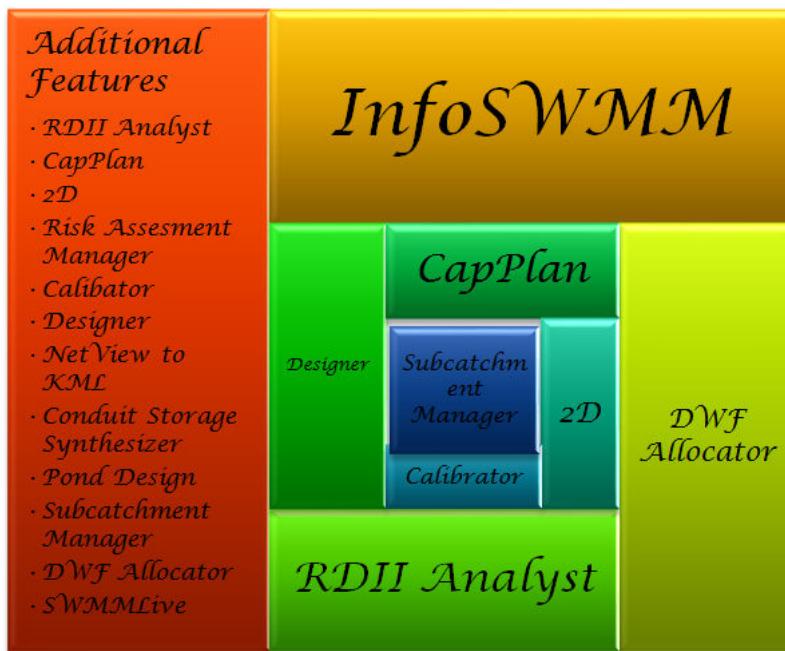
Upon successful installation of the program, the program is initialized from inside InfoSWMM by using the “AddOn Extension Manager” tool. From the Tool Menul, select an Add On as shown below.



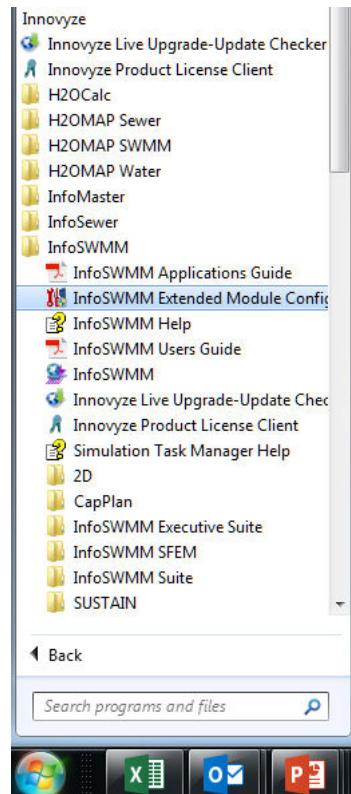
The selected run dialog appears, and it is now available for use. Section 2 discusses each icon and the menu shown below in detail. This program is part of the InfoSWMM Suite.

Or use the Application Window where there are additional AddOns for InfoSWMM





If you do not see the AddON's or Applications for the InfoSWMM Suite version of then you can use the InfoSWMMExtended Module Configuration from Windows Start.



## Using the On Line Help

Innovyze provides on-line Help with extensive information about modeling features and capabilities. The documentation includes numerous topics, each including narrative descriptions, illustrations, and diagrams describing the features of each program.

The on-line Help offers the ability to search for a desired topic rapidly or to move between related topics in a fast, efficient manner. An extensive index is available allowing you to search on any number of words, phrases, or commands. Innovyze Help includes several major sections, each identified by a magenta book in the Help Contents. Each section contains numerous related topics.

### Starting Innovyze Help

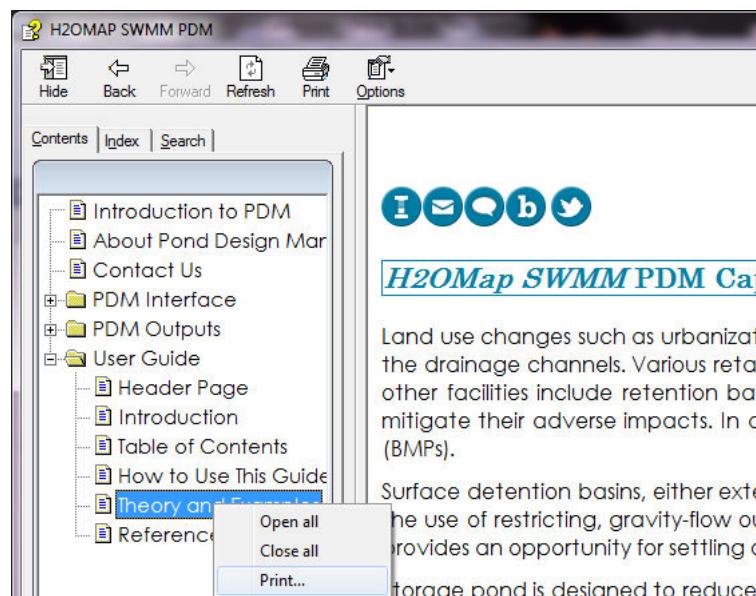
Innovyze Help is available by opening any Innovyze dialog box and pressing the F1 key. You may click on any portion of the dialog box in the help topic for more information.

### Navigating the On Line Help

Use either Innovyze Help Contents or the Index to navigate to the desired topic. Choose the Help Topic button in the upper left-hand corner of the Help window to access the Help contents and index. Embedded in the text of each topic are numerous *links*, identified as underlined blue text, to related topics. Simply click on the desired link text with the mouse to move immediately to the related topic.

### Printing the OnLine Help

You may print any Innovyze Help topics you desire. To do so, navigate to the desired Help topic and then choose the Print Topic command from the Help window File menu.



### Instructions to Renew the CD and License Keys for the Innovyze (MWH Soft) Floating License Server

Below are instructions to renew the CD and License Keys for the Innovyze (MWH Soft) Floating License Server and the floating licenses to reflect the current expiration date.

1. Open the Innovyze (MWH Soft) Floating License Server.
2. Go to the **Help -> About** menu in the upper left corner.
3. Go to the Request License Key On-line for dropdown menu and select Renewal. Press the **Go** button. This will open our On-Line License Registration page.

4. Complete the requested information and press the **Submit** button. This should return to you a new CD Key and License Key.
5. Copy and paste the new keys into the appropriate boxes in the **About** dialog box.
6. Press the **Apply License Changes** button. A new Subscription Expiration Date should appear.
7. Close the **About** box and the Innovuze (MWH Soft) Floating License Server.
8. Download and run the update for the Innovuze (MWH Soft) Floating License Server from the attached link:
  - [Innovuze Floating License Server 5.0 Update 020 \(22.03 MB\), 12/10/2015](#)
9. Open the Innovuze (MWH Soft) Floating License Server.
10. If your FLM is installed on a virtual server, go to the upper left corner and select **Action -> Register Virtual Environment ...**
11. Select the License Administration tab.
12. Go to the Request License Key On-Line for dropdown menu and select **Renewal**. Press the **Go** button. This will open our On-Line License Registration page.
13. Complete the requested information and press the **Submit** button. This should return to you a new CD Key and License Key.
14. Copy and paste the new keys into the appropriate boxes in the License Administration tab.
15. Press the **Apply** button. A new Expiration Date should appear.

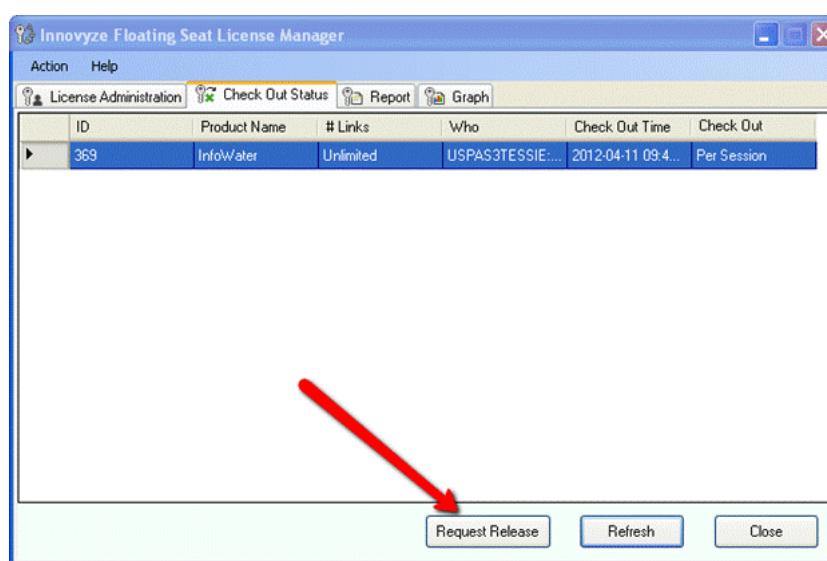
Press the Close button

**Please follow the instructions below to request a license release key for a floating license.**

Please follow the instructions below to request a license release key for a floating license. Most likely this will need to be forwarded to someone who has access to the Innovuze Floating Seat License Manager on a server.

Open the Innovuze Floating Seat License Manager and select the Check Out Status tab.

Select the license to release and press the Request Release button.



Copy the License Check Out Information generated and paste into an email to [support@innovyze.com](mailto:support@innovyze.com)



We will return to you a code to enter in to the second field.

Once both fields are populated in the Release License dialog box, press the OK button to release the license.

#### **Technical Support On the Web and by Email**

See the Help file Topic [Contact Us](#) for detailed Innovyze Technical Support information.

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## RAM Capabilities

Flood risk assessment is a multi-step process. It includes defining a range of potential hydraulic loading scenarios, finding areas with a potential for flooding under each scenario, and estimating the cost of damage under each scenario. This process yields a range of costs associated with each flooding scenario.

To design an appropriate flood risk reduction plan, the engineer should develop a range of solutions including source reduction, storage increases, conduit capacity improvements, inlet modifications and many others.

### InfoSWMM

Risk Assessment Manager is specifically designed to work closely with the InfoSWMM scenario manager and hydraulic engine along with digital topology data and property data making a very fast and efficient work flow for the flood risk assessment process.

When an overflow occurs it has a significant impact on the local area of inundation for both disruptions of services and damage to structures.

Every urban drainage system has a characteristic set of hydraulic loading data from measured rainfall estimates along with dry-weather flow data, and there are many reasonable approaches that estimate hydraulic loading from “design” storms. InfoSWMM provides all the necessary tools to manage these many and various types of loading scenarios.

estimate these loadings in a robust modeling environment. how to estimate a range of hydraulic loading data and Reasonable hydraulic loading values This area must be accurately estimated in a consistent manner to properly represent the extent and cost of damage.

When there is a potential for an area to flood, the challenge to find and fix the source of flooding is immense, requiring large amounts of repetitive calculations. Similar to the development of the flood extent estimation, the source estimation must be done in a consistent, reliable and repeatable way for engineering studies estimating potential capital projects to fix overloading or blockages.

The evolution of GIS and information management systems has led to the availability of efficient geospatial tools for examination, evaluation and elimination of urban drainage and collection system overflows. The InfoSWMM Risk Assessment Manager works synergistically with InfoSWMM, using advanced geometric polygon processing algorithms derived from computational geometry to create potential flood distribution maps, create flood damage extent maps, and delineate pond area.

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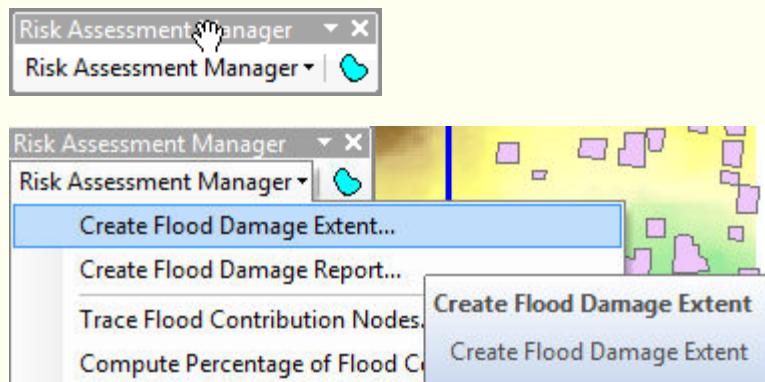
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# RISK ASSESSMENT MANAGER

The InfoSWMM Risk Assessment Manager is organized by risk assessment tasks. The risk assessment drop-down menu contains four commands. Each of these commands opens a new dialog box for further input.



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 InfoSWMM 

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## The Core Interface of InfoSWMM RAM

The InfoSWMM Risk Assessment Manager is designed to work synergistically with InfoSWMM to analyze and manage flood risks for any range of urban drainage, sewer collections and river systems.

To utilize the Risk Assessment Manager, all relevant data must first be added to the current InfoSWMM session. This is done by clicking the *Add Data*

icon  found under ArcMap's standard toolbar. Once the elevation and building data has been added to the current session, you can begin to create the InfoSWMM model. All tools are found under the *RISK ASSESSMENT MANAGER* menu.

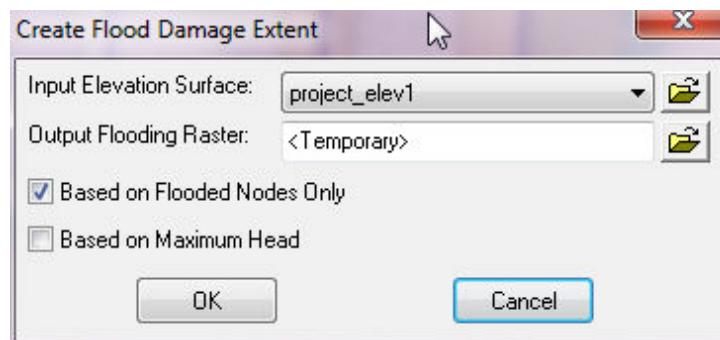


Because the Risk Assessment Manager utilizes Spatial Analyst, outputs are stored in a working directory. This directory should be specified before using the Risk Assessment Manager. Additional options can be set to reduce processing time and specify output parameters. Select *OPTIONS* from the *RISK ASSESSMENT MANAGER* menu. Refer to ArcGIS Spatial Analyst documentation and help for information on these options.

**NOTE:** Any changes made to the external shapefiles and rasters are automatically saved, even though you exit InfoSWMM without saving your current project.

Risk assessment using RAM begins with a successful InfoSWMM simulation. The simulation time should be adjusted to a point where there are several nodes flooding. Ideally, the simulation time will be the peak flood event for the area under consideration.

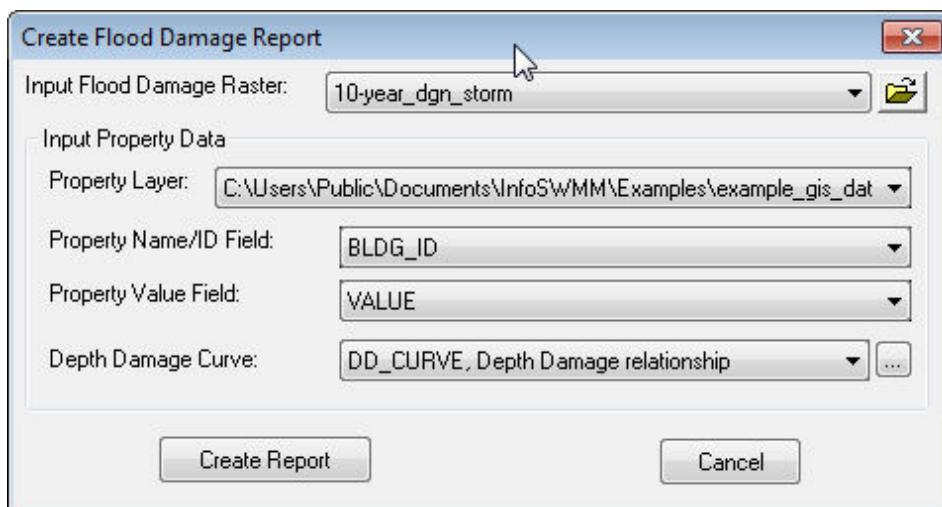
The elevation model must be a raster, and the building data must be a polygon. With these layers available in the GIS, we can open the *CREATE FLOOD DAMAGE EXTENT* dialog.



**Input Elevation Surface:** Elevation surface layer. This must be a raster.

**Output Flooding Raster:** This will automatically be assigned in a temporary location. Optionally, the user may decide to create a new file or overwrite an existing file by clicking on the file selection button.

**Based on Flooded Nodes Only** The default option selects to base the computation of the flood surface on the flooded nodes only. Otherwise the flood surface will include nodes that do not have flooding.



**Input Flood Damage Raster:** This is the raster created from the *CREATE FLOOD DAMAGE EXTENT* tool.

**Property Layer:** This layer is describes the location of the Buildings or structures subject to flooding. It must be a polygon layer with the same spatial references as the flood damage extent raster.

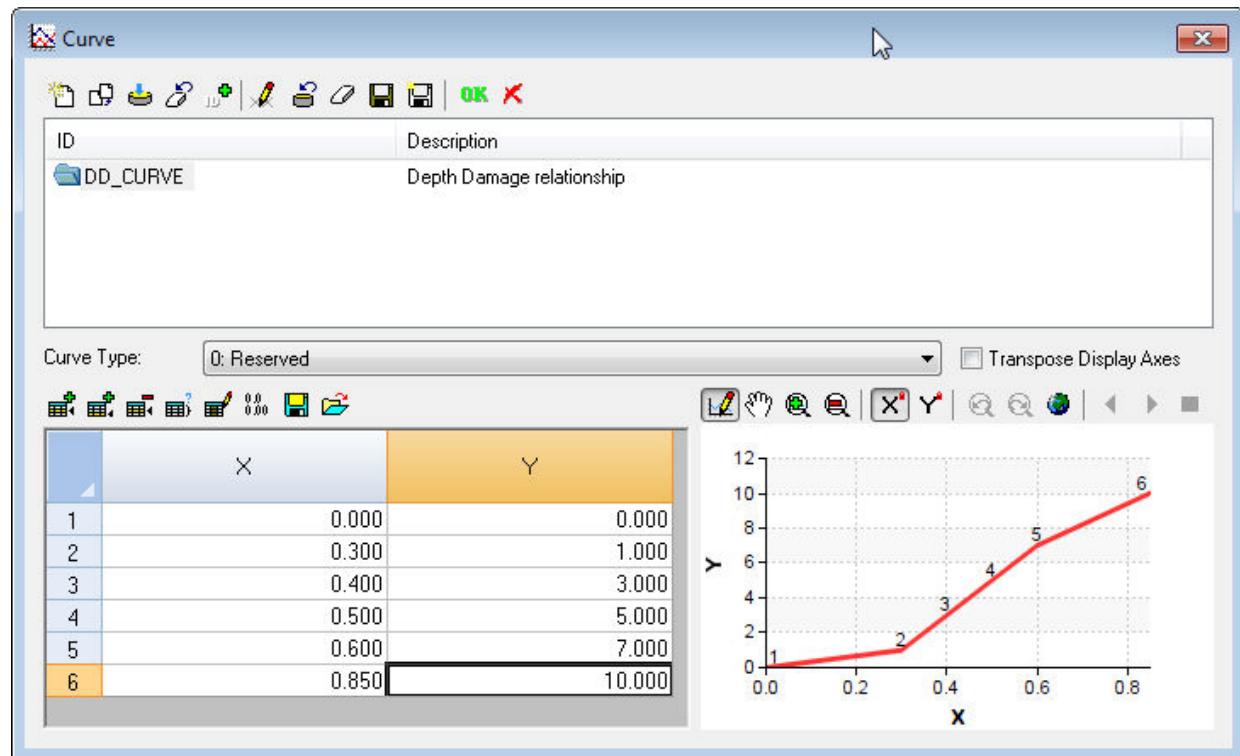
**Property Name/ID Field:** This is the field that contains unique identifiers for each property polygon.

**Property Value Field:** The property value field can contain any numerical field. Typically it would represent the present value of the object represented by the polygon. However, it could also represent any type of data subject to damage from flood waters. For example, it could be population or volume of hazardous materials.

#### Depth Damage Curve:

The depth damage curve is a curve that represents the percentage loss of value to each polygon based on the depth of flooding across the polygon. Pressing the ellipsis button  brings up the standard InfoSWMM curve editor dialog, shown below. For more information on using this dialog, please refer to the InfoSWMM Users Guide.

Three remaining tools work dynamically with user input. The sequences for the users input for each tool are described below:



**TRACE FLOOD CONTRIBUTION NODES:** After selecting this tool, the user must select a node to trace input upstream. The model will place all upstream nodes on the domain.

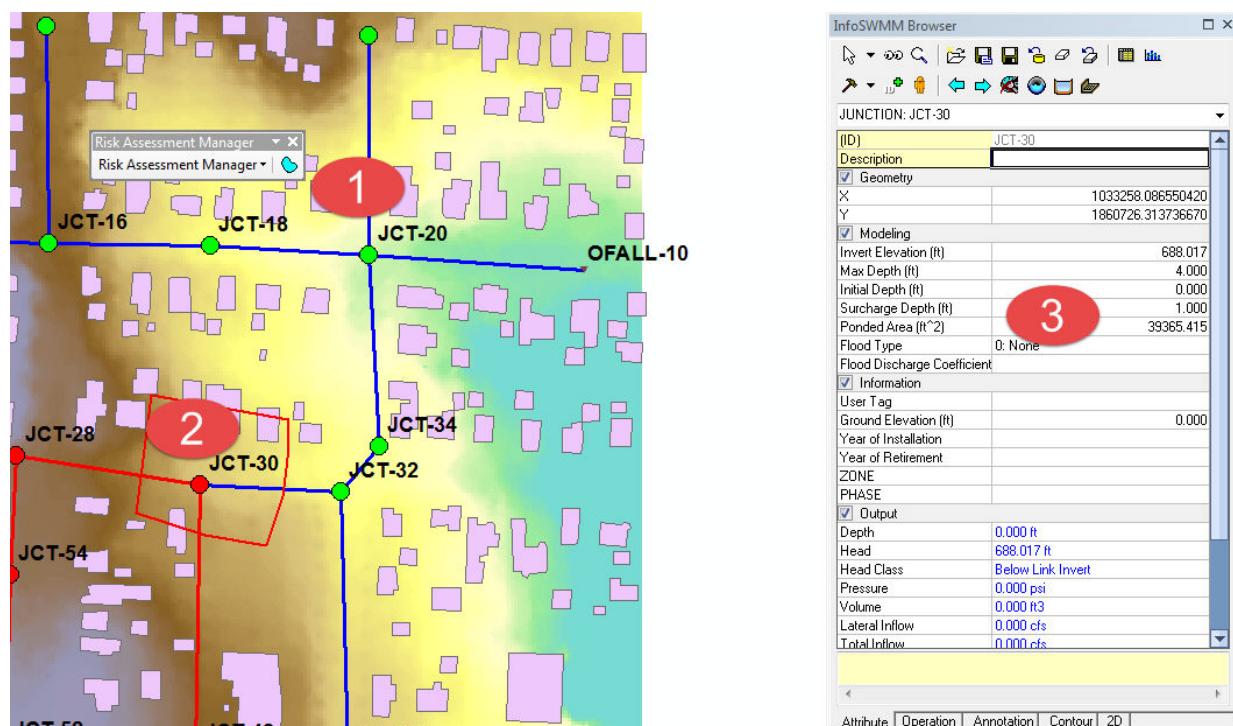
**COMPUTE PERCENTAGE OF FLOOD CONTRIBUTION:** After selecting this tool, the user must select a node. The model produces a table with of the lateral inflow from each node and the percentage of this inflow causing flooding at the selected node. The resultant table looks like this:

**Percentage of Flood Contribution**

ID	Lateral Flow	Percentage
1 JCT-28	0.25	8.23
2 JCT-54	0.32	10.54
3 JCT-52	0.38	12.51
4 JCT-26	0.30	9.88
5 JCT-24	0.34	11.20
6 JCT-50	0.83	27.33
7 JCT-22	0.62	20.41

**Close**

**DEFINE PONDED AREA** : After selecting this tool, the user first selects a flooded node, then sketches a polygon around that node representing the flooded area. This area will show up cross hatched and highlighted(2), and the ponded area value will be added to the selected node's attribute table (3).



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[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Risk Assessment Manager](#) > **1. Create flood damage extent**



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## 1. Create flood damage extent

The InfoSWMM Risk Assessment Manager is organized by risk assessment tasks. The risk assessment drop-down menu contains four commands. Each of these commands opens a new dialog box for further input. The following sections describe the functionality for each of these commands. Generally, these commands should be used in the order described below.

A flood damage extent map shows areas subject to flooding at the current simulation time of the network model. The current simulation time is shown on the InfoSWMM Output Toolbar, and it can be adjusted using the date and time drop-down selectors or the slider-bar.

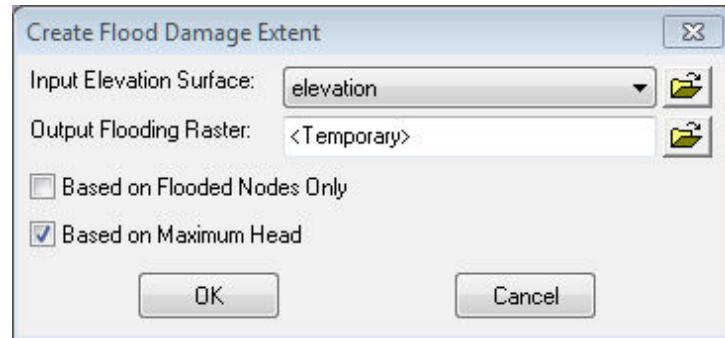


InfoSWMM calculates a flood flow for each node where the hydraulic depth is greater than the sum of the invert elevation, the maximum depth and the surcharge depth, provided the simulation does not model ponding. With ponding, the total flood volume is assumed to be contained in the ponded area where it will safely reenter the storm drainage system.

The flood damage extent only utilizes nodes that have a flood flow greater than zero to compute the flood surface. For these points, the hydraulic grade line (HGL) is interpolated between flooded nodes according to an inverse distance weighting scheme. The result of this interpolation is a flood elevation which may or may not rise above the ground surface as defined by the elevation raster layer. Any parts of the flood elevation above the surface elevation are flooded, and any below are dry.



Run the Model and Create the Flood Damage Extent using the Maximum Head at a Node Result.



The Flood Extent is shown in the Shapefiles starting with Flood.



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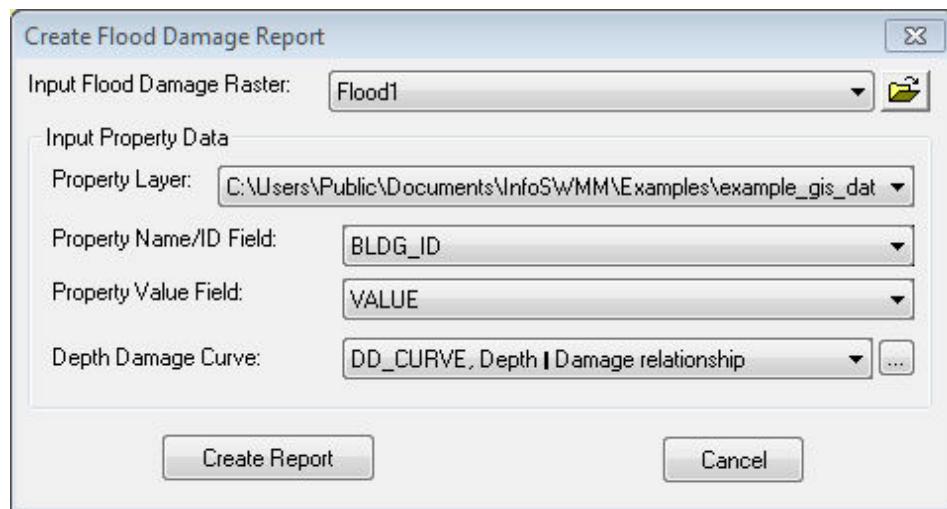
[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Risk Assessment Manager](#) > [2. Create flood damage report](#)

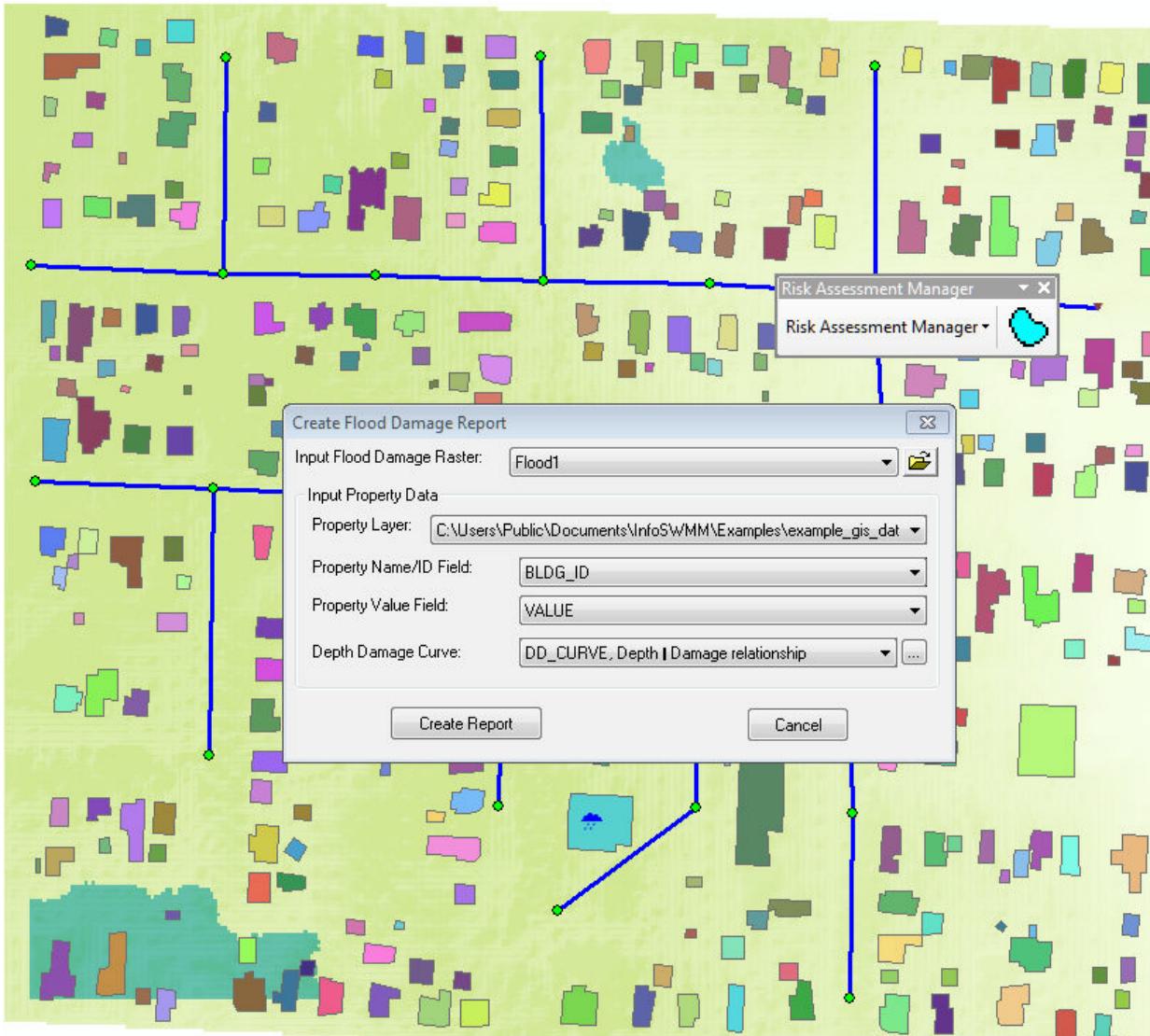


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## 2. Create flood damage report

A flood damage report shows the estimated total cost of damage to each structure from the flood. Once the spatial extent of flood damage is available, the risk assessment can begin to evaluate the cost in real dollars of the damage associate with flooding. The flood damage report takes the flood damage map and building value data to create a flood damage report. This report shows the loss at each structure and the total damage from the flood event.





The data requirements to create the flood damage report include a polygon layer of the property subject to flooding. In this example, we show homes and building as the properties. However, a user could just as easily show levees or public works facilities as the properties subject to flooding.

The Depth Damage curve allows the user to selectively determine how the flood depth impacts the repair cost for a structure. For example, a residential two-story home with flooding on the first floor may be valued at a 30% loss from its total value, while if the flooding reaches above the second floor, the loss will be much higher—in this example 85%.

Depth damage curve for two-story single family residential structure

Flood Damage Report

	Property Name	Flood Depth	Property Value	Loss
1	52436	1.99	66902.77	30024.78
2	11359	0.78	22219.31	0.00
3	11050	0.09	42663.50	0.00
4	10378	0.49	7526.83	0.00
5	10423	0.05	20637.51	0.00
6	52773	1.23	70969.63	23767.72
7	11033	0.60	11973.28	0.00
8	11044	1.55	36808.60	14086.64
9	11061	1.91	11105.82	4846.12
10	10994	1.19	6357.50	2089.49

Total Loss: 107,086.20

[Close](#)

The depth damage curve below captures these levels of loss for this type of structure. Scenarios can be set to vary the depth damage curve for the entire simulation.

The final flood damage report shows the flood depth, total property value and the loss for each structure with some flooding. This report also sums these values to quickly evaluate the total losses for the entire flooded region.



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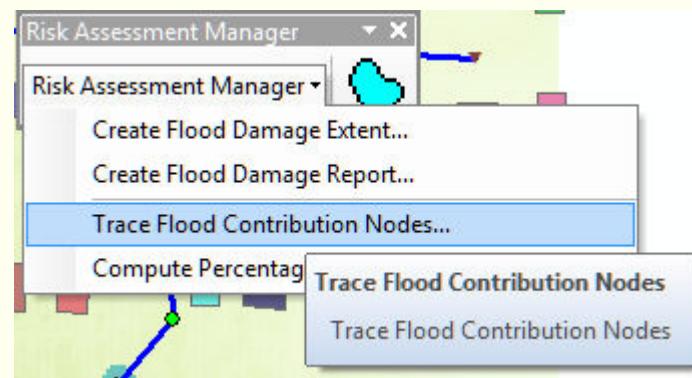
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[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Risk Assessment Manager](#) > **3. Trace flood contribution nodes**

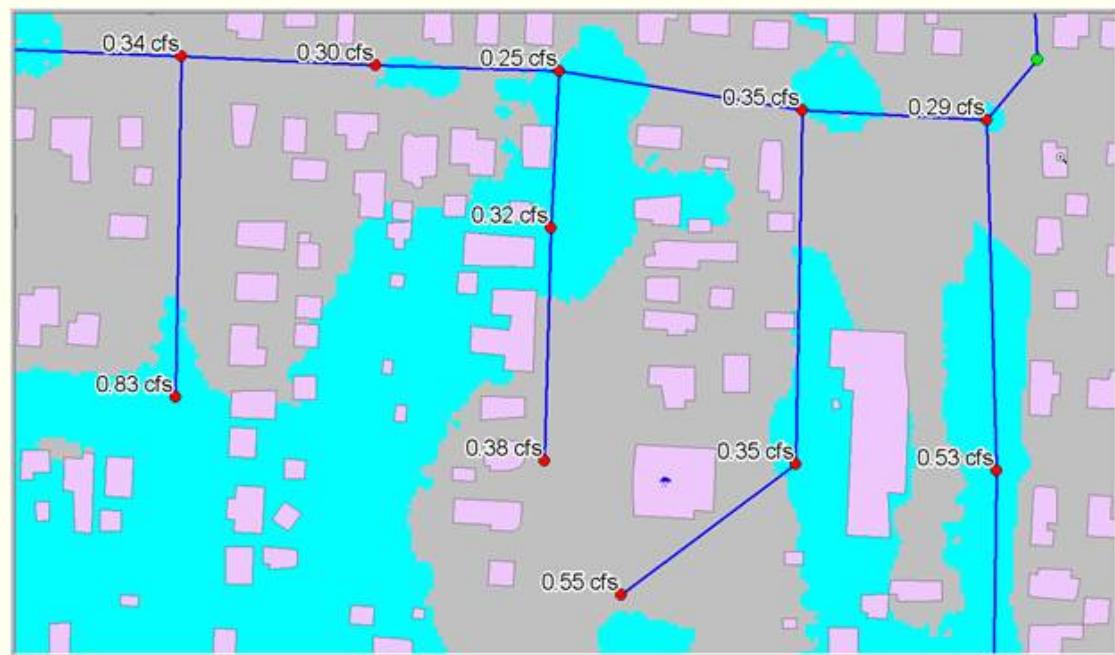


### 3. Trace flood contribution nodes

The InfoSWMM Risk Assessment Manager provides a routine to find the nodes upstream from a flooded node. This tool helps pinpoint areas with high inflows that are causing downstream flooding. Using this tool along with the others can help find solutions to urban and small stream flooding problems.



The user selects a node in the network with flooding, and the tool traces the network upstream from a flooded node and adding those nodes to the domain for further analysis.



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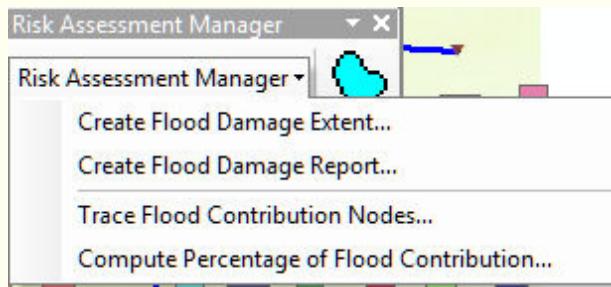
[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Risk Assessment Manager](#) > **4. Compute Percentage of Flood Contribution**



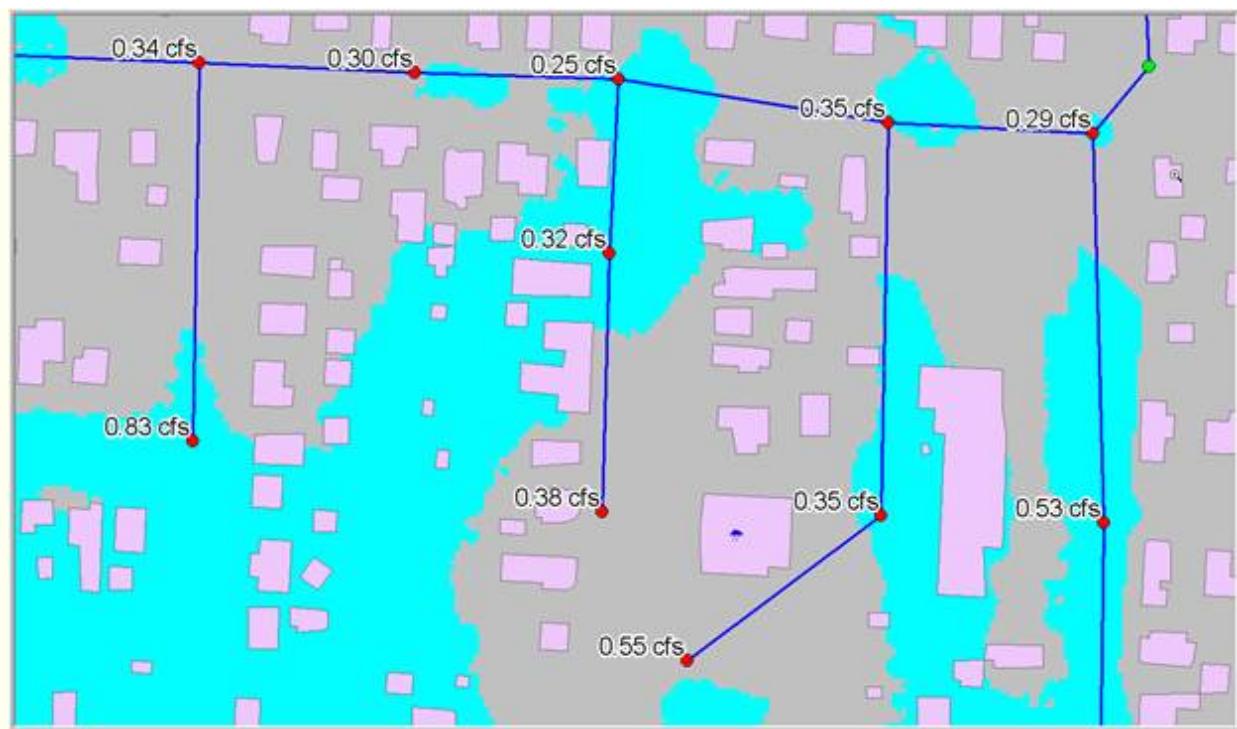
## 4. Compute Percentage of Flood Contribution

Each node shown in the plot above contributes flow to the area that is flooded.

The flow that enters each node is the “lateral inflow”. It is this inflow that contributes, as a percentage, of flooding to the flooded node. This tool finds all of the inflow tributary to a flooded node and builds a table showing the percent contribution of flow from each node.



The lateral inflow values at any given time step can provide a good indication of where some of the significant sources of inflow are upstream from a flood point. The network topology can create flooded nodes in unanticipated areas, and often when this occurs it is because of an unexpectedly high source of inflow from upstream nodes.



The resulting table of lateral inflows can be sorted, copied and pasted into other applications.

**Percentage of Flood Contribution**

ID	Lateral Flow	Percentage
1 JCT-30	0.36	8.32
2 JCT-42	0.35	8.09
3 JCT-40	0.56	12.94
4 JCT-28	0.25	5.78
5 JCT-54	0.32	7.40
6 JCT-52	0.39	9.02
7 JCT-26	0.30	6.93
8 JCT-24	0.34	7.86
9 JCT-50	0.84	19.42
10 JCT-22	0.63	14.56

Close

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[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Risk Assessment Manager](#) > **5. Defining Ponded Area**



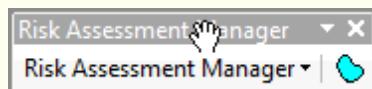
## 5. Defining Ponded Area

One

tool InfoSWMM has available for quickly evaluating flood reduction measures surface ponding. Surface ponding activates when a user defines a ponded area for a node. The flooded volume is safely stored in the ponded area until capacity returns to the system and the flood water reenters the system. With a ponded area defined and ponding enabled in the simulation options, water in the simulation that leaves the top of a manhole no longer creates a flood, rather it is safely contained in the ponded area.

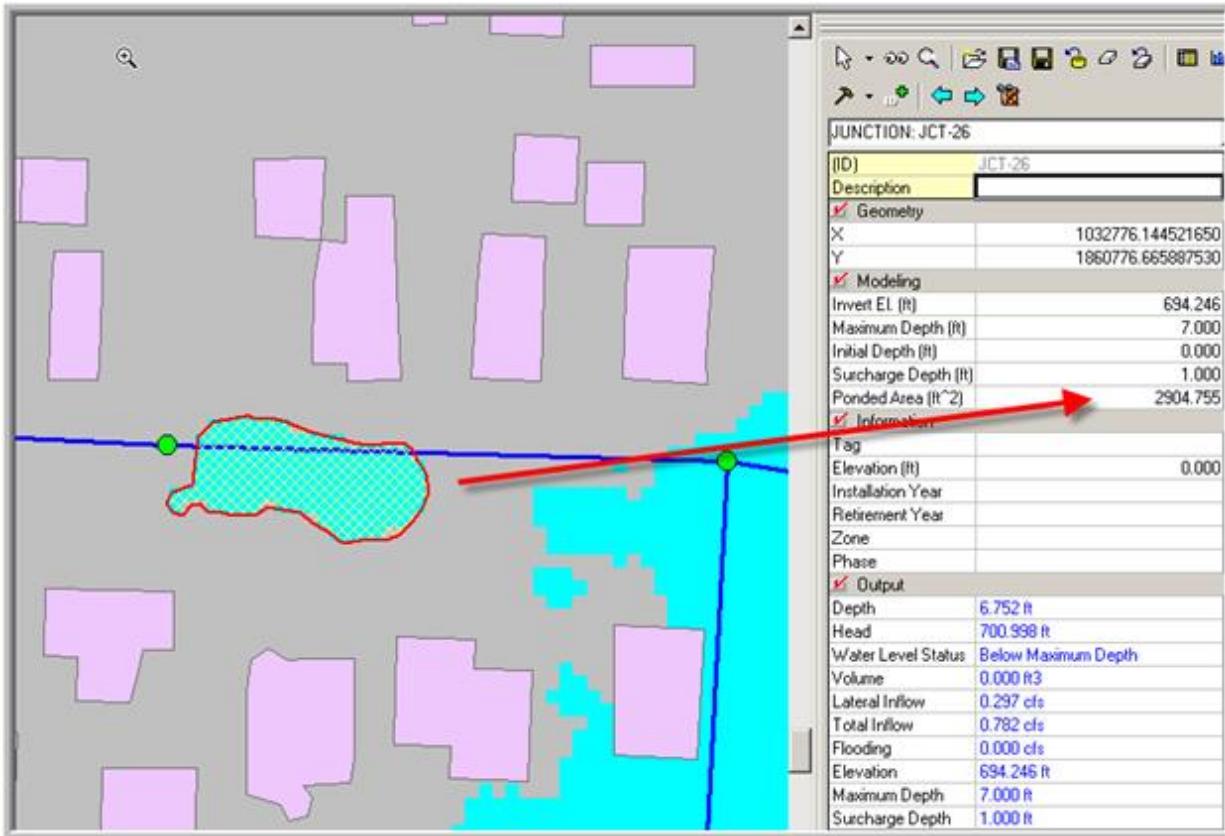
InfoSWMM

Risk Assessment Manager provides a tool to rapidly outline potential areas for flood relief utilizing ponding. This tool is accessed with an icon on the RAM toolbar quick access. It creates a ponded area for the delineated shape of the polygon.



After clicking

the ponding area calculator tool, the user simply selects a node to activate a sketch tool. Using the sketch tool to draw a polygon over a flooded area the result is automatically placed into the appropriate data table on the object's attribute list.



The sample

exercise shows how effectively this technology can be utilized to mitigate sources of flooding in the network and protect property from damage.

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## Quick-Start Tutorial

The Quick-Start tutorial is designed for first-time users of InfoSWMM Risk Assessment Manager and provides a guided tour to core commands and functions used for performing flood risk assessment and evaluating flood mitigation tactics.

The Quick Start tutorial will help first-time users become familiar with the core set of InfoSWMM Risk Assessment Manager features and should be used as a launching point to a more comprehensive understanding of the program.

The estimated time to complete the Quick Start tutorial is approximately 30 minutes.

The Quick Start tutorial will help first-time users become familiar with the following:

- Batch simulate two different flooding scenarios
- Define flood damage extent maps for both scenarios
- Calculate total property losses for each scenario
- Locate high sources for downstream flooding
- Create a new scenario to eliminate flooding using ponded areas

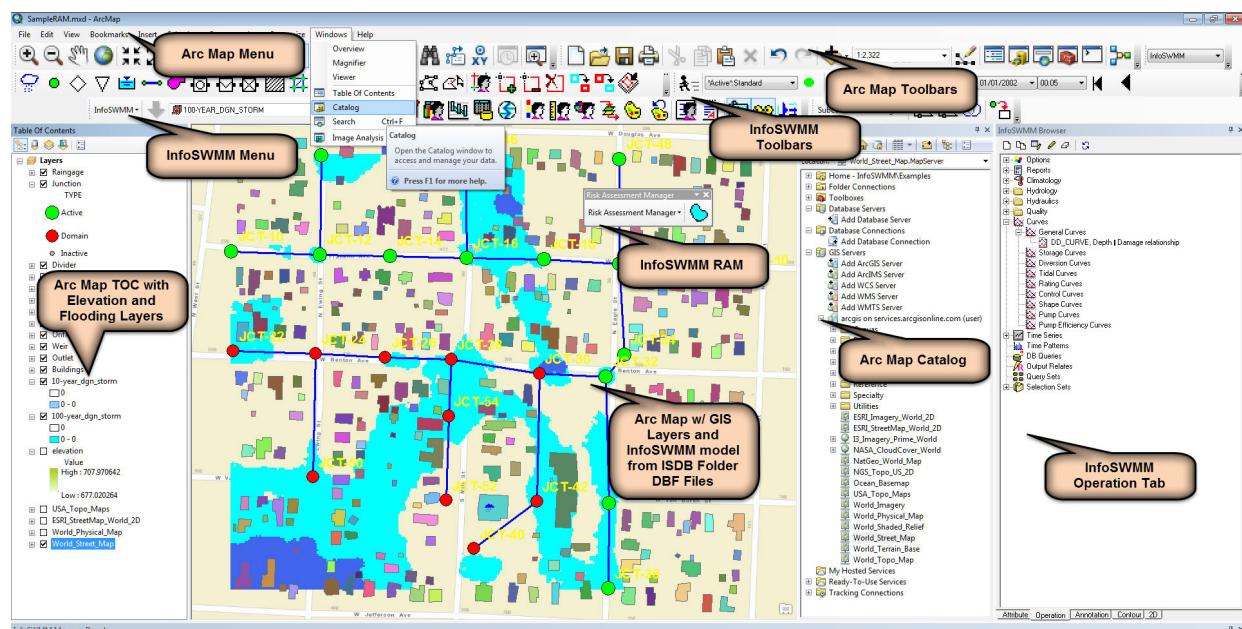
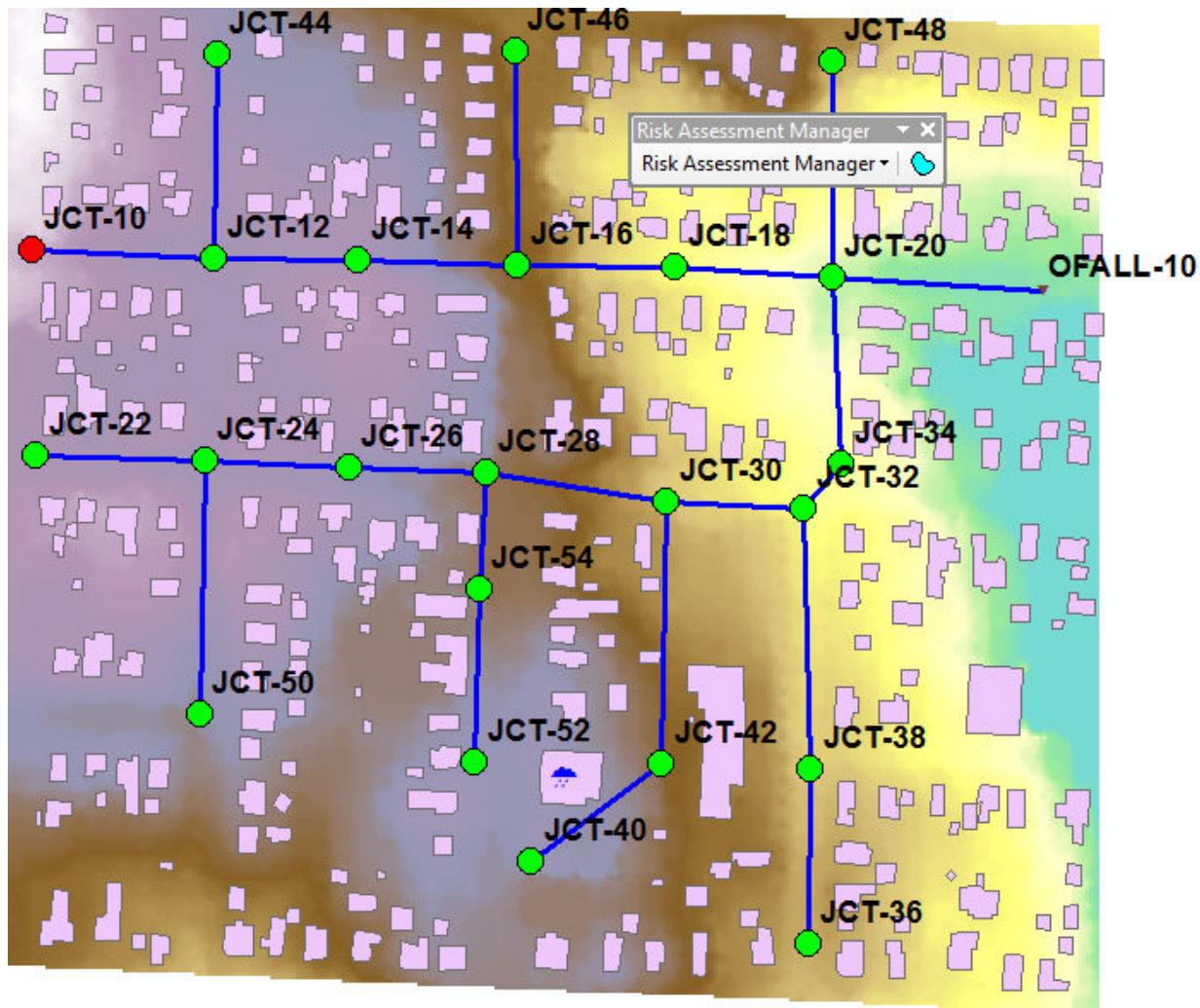
During the Quick Start tutorial, the user will modify a project named “**SampleRAM**”. This project is provided with InfoSWMM Risk Assessment Manager Software installation and can be found in the InfoSWMM Examples directory:

C:\Users\Public\Documents\InfoSWMM\SampleRAM.mxd

(May be different for custom installations).

The “**SampleRAM**” project modified in this tutorial illustrates how the InfoSWMM Risk Assessment Manager determines the extent of flooding, automatically calculates flood losses, and quickly evaluates flood mitigation measures.

The “**SampleRAM**” data is shown below. In addition to the standard InfoSWMM layers, this project includes a polygon layer representing the buildings and an elevation raster of the ground surface elevation. The data consists of the following components:



Elevation and Building data

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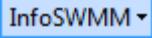


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## Step 1: Open the SAMPLERAM Project

The first step is to open the InfoSWMM project.

- 1. From the Windows “Start” menu, select Programs and navigate to the *InfoSWMM x* program group. Once there, open *InfoSWMM*.
- 2. In the *ARCMAP* window, select *AN EXISTING MAP* option in the *START USING ARCMAP WITH* area and then click on “OK” button. If the *ARCMAP* window is not shown, simply choose *OPEN* command from the *FILE* menu.
- 3. On the *OPEN* dialog box, navigate to the directory containing the “SampleRAM” project and choose that file.
- C:\Users\Public\Documents\InfoSWMM\ **SampleRAM.mxd** (the path may be different for custom installations)
- 4. Go to the *VIEW* menu, choose *TOOLBARS* and then click on the *INFOSWMM CONTROL CENTER* command to view the *INFOSWMM CONTROL CENTER* toolbar. Repeat the above step, to view the *INFOSWMM EDIT NETWORK* toolbar and the *INFOSWMM OUTPUT* toolbar.
- 5. Click on the *ATTRIBUTE BROWSER* icon  and the *MESSAGE BOARD* icon  from the *INFOSWMM CONTROL CENTER* toolbar to view the *ATTRIBUTE BROWSER* window and *MESSAGE BOARD* window.
- 6. Go to the *TOOLS* menu, choose *EXTENSIONS* and then click on the *INFOSWMM* checkbox. Click on the *MAGENTA DOWN ARROW* icon  to initialize InfoSWMM. When initialized, the icons on the InfoSWMM toolbars will be enabled for use.
- 7. Before continuing, save the “SampleRAM” project to a new project name. If you wish to restart the tutorial, the original project will be available. Choose the *SAVE AS* command from the *FILE* menu. On the dialog box enter the new project name “**Tutorial**”. This becomes the active project.

- 8. Click on the InfoSWMM button  and then from the *TOOLS* menu choose *ADD-ON EXTENSION MANAGER*. With the *ADD-ON EXTENSION MANAGER* dialog box open, select *RISK ASSESSMENT MANAGER* from the drop down list and click the “Run” button. This will load the InfoSWMM Risk Assessment Manager Toolbar.

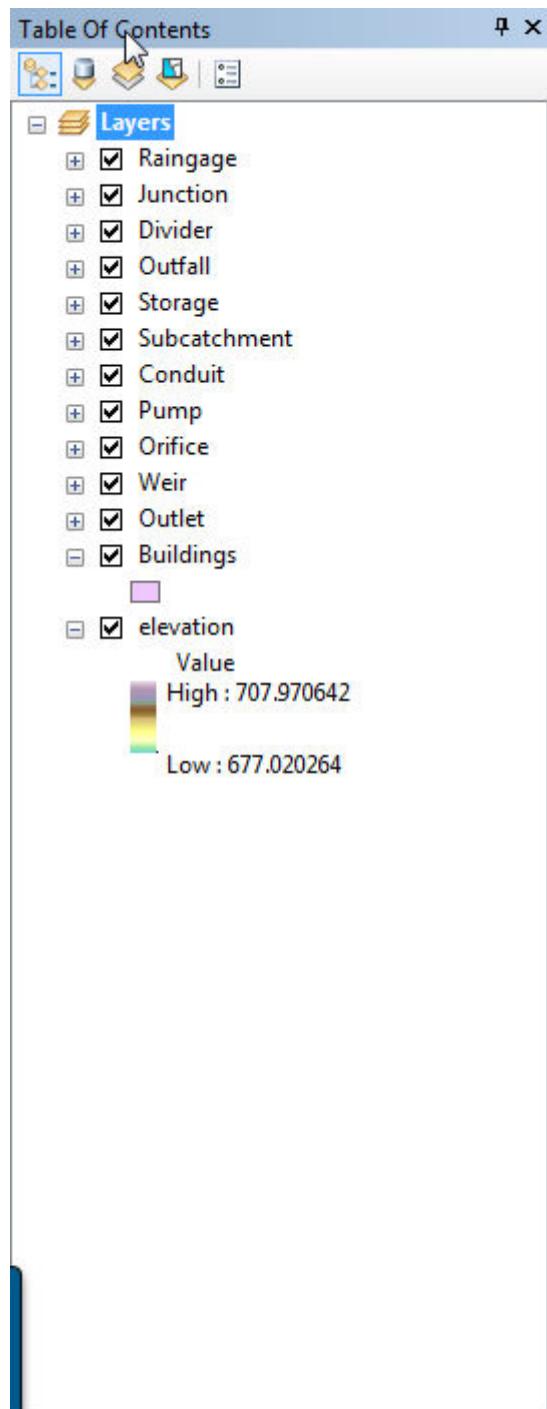


- 9. Click on the *Add Data* icon  found under ArcMap's standard toolbar. In the *ADD DATA* dialog box, navigate to the directory containing the following two files and select those files.

C:\Users\Public\Documents\InfoSWMM\buildings.shp

C:\Users\Public\Documents\InfoSWMM\elevation.shp

(The path may be different for custom installations)



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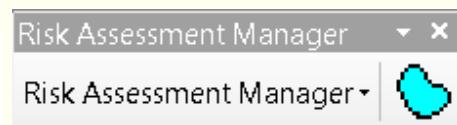
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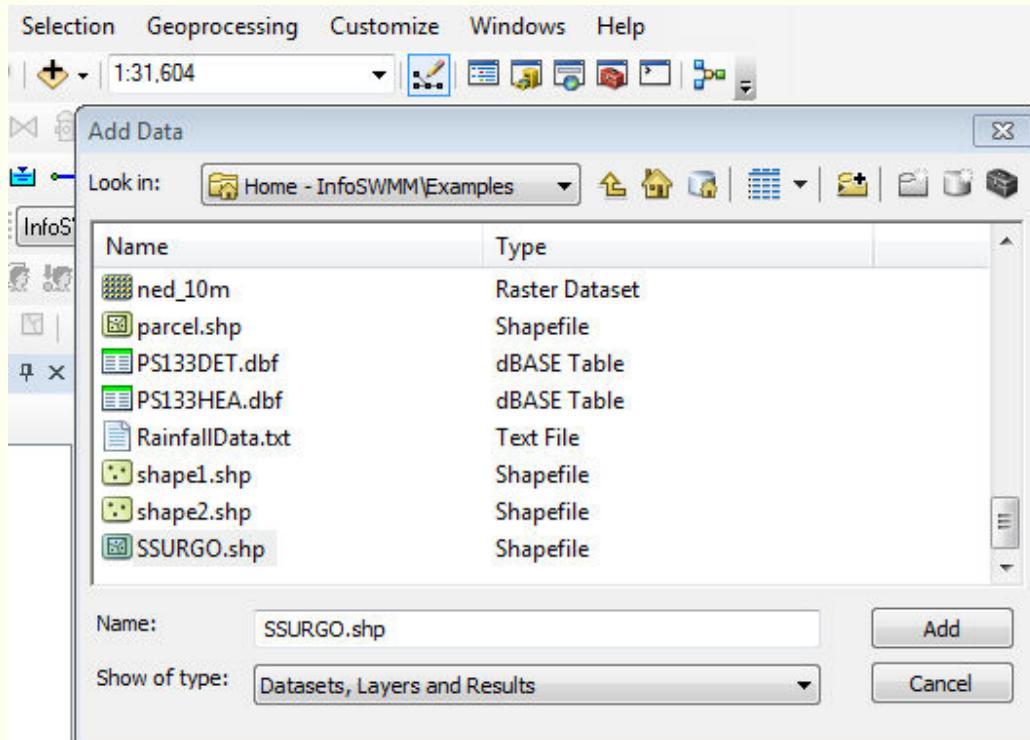
[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Quick Start Tutorial](#) > Step 2: Set the Arc Map Options

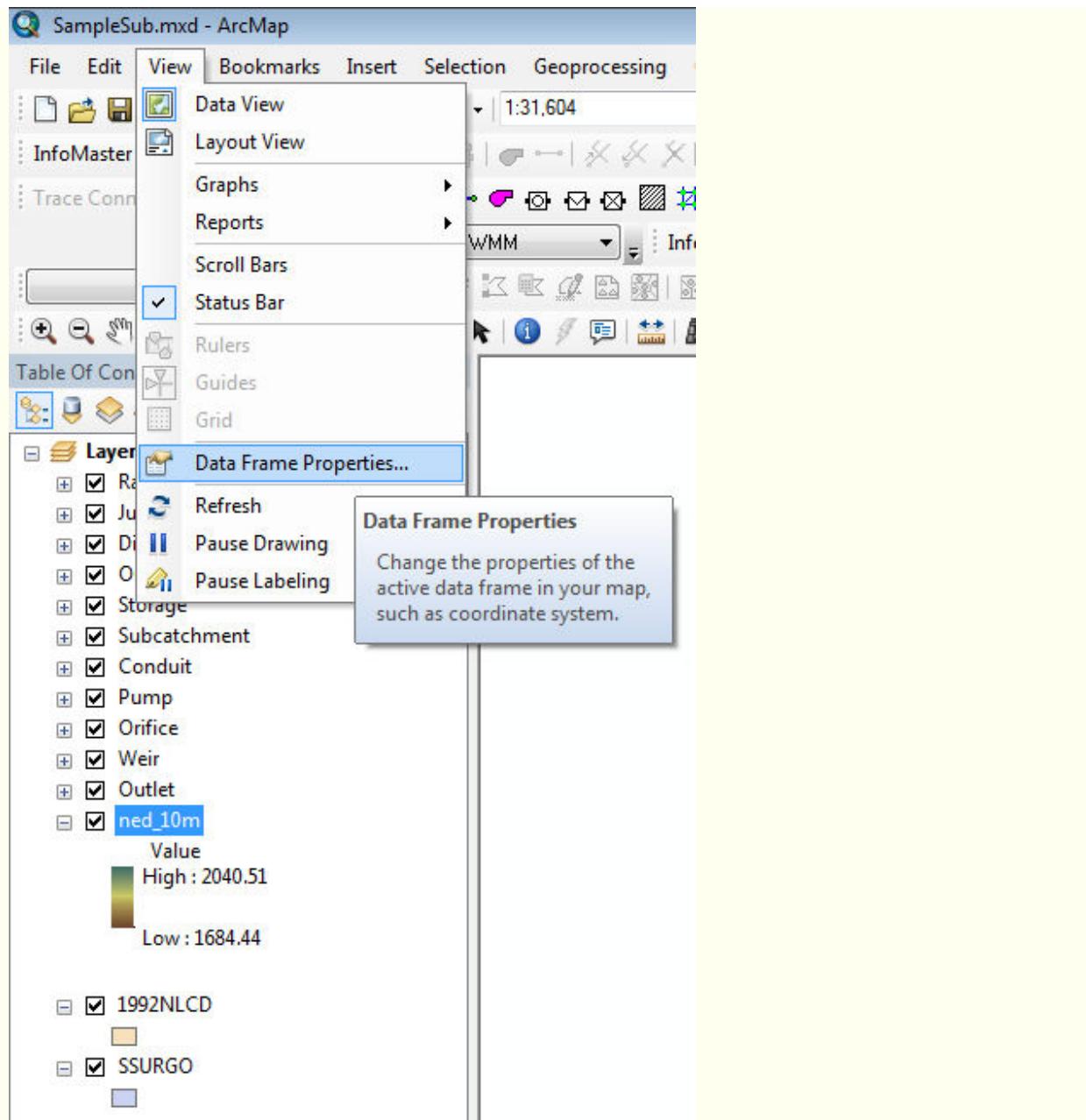


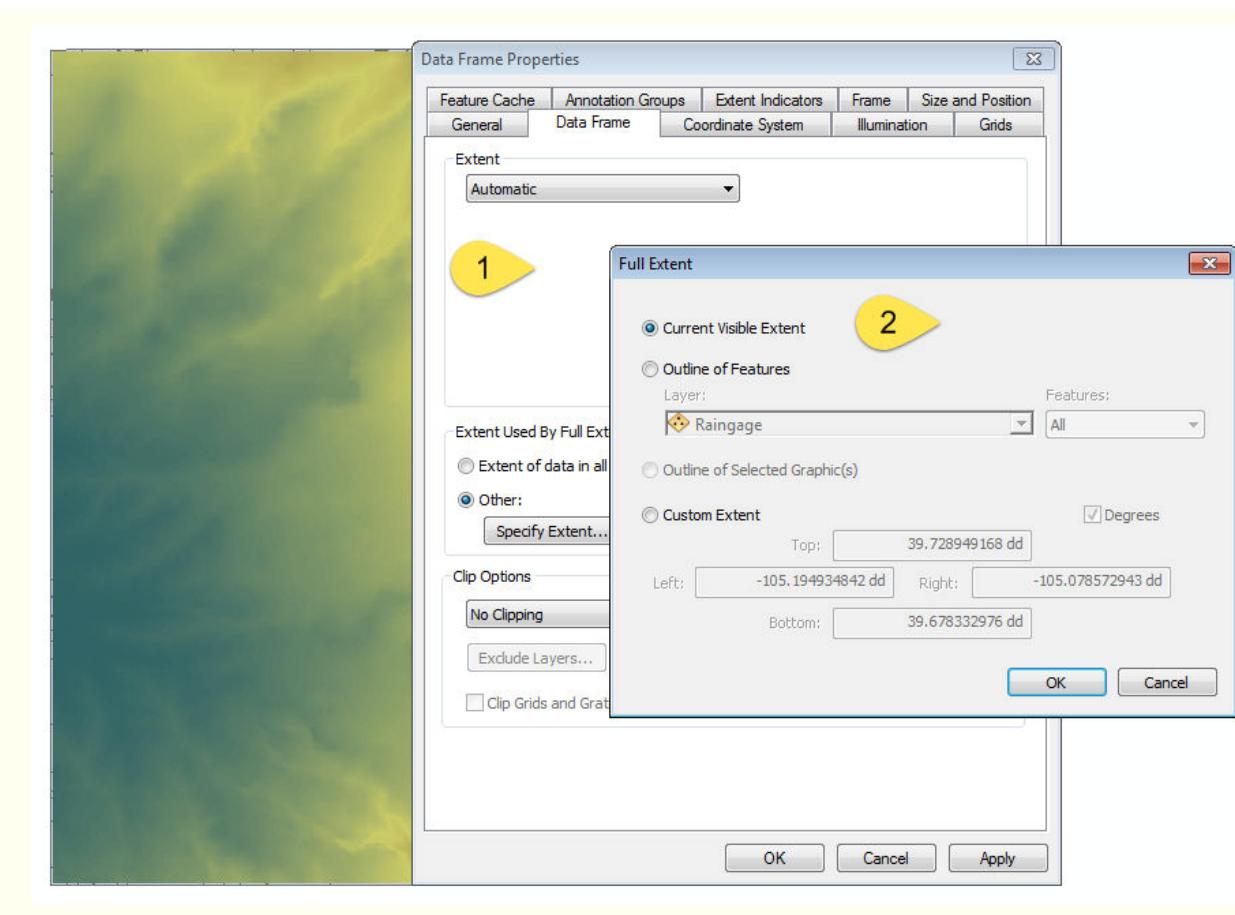
## Step 2: Set the Arc Map Options

The next step in the RAM generation process is to set the working directory and analysis options. The working directory is the location that each shapefile or raster created will be stored. The analysis settings improve processing time.

Flooded shapefiles cannot be delineated outside of the DEM. Therefore, Land Use and Soils data outside the spatial limit of the DEM do not need to be considered.







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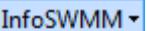
[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Quick Start Tutorial](#) > Step 3: Batch Run InfoSWMM Scenarios



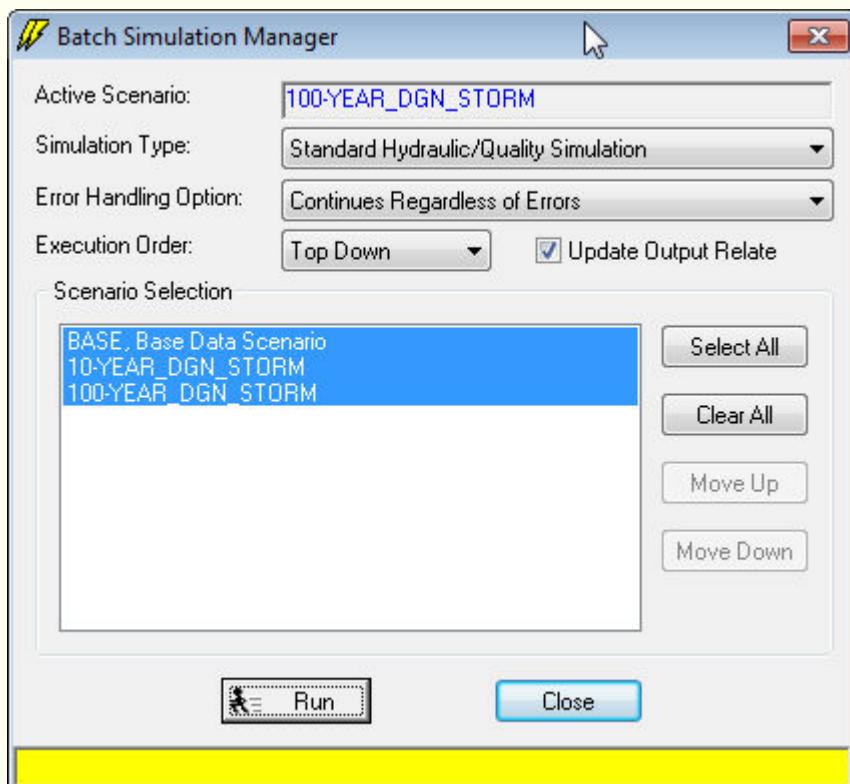
## Step 3: Batch Run InfoSWMM Scenarios

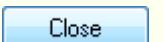
### The InfoSWMM

RAM tools need InfoSWMM output available before they will work. The following steps create output results for two scenarios.

- 1. Click on the InfoSWMM button  and then from the *TOOLS* menu choose *BATCH SIMULATION*.
- 2. In the *BATCH SIMULATION MANAGER* dialog box, hold the “shift” key select first the “10-YEAR\_DGN\_STORM” scenario then the “100-YEAR\_DGN\_STORM”

scenario and press the “RUN” button . The two scenarios will now execute consecutively.



- 3. Press the “Close” button .

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**Step 4: Create 10-Year Flood Extents**

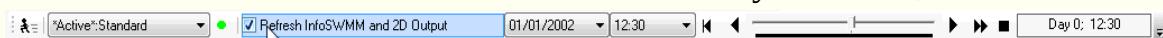


## Step 4: Create 10-Year Flood Extents

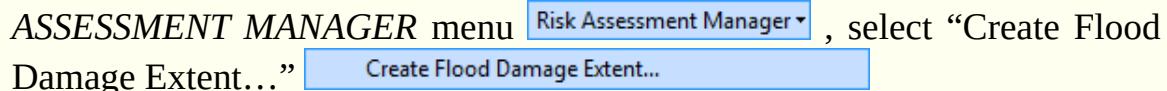
- 1. In the *INFOSWMM CONTROL CENTER* toolbar *SCENARIO SELECTOR* drop-down, select the “10-YR\_DGN\_STORM” scenario.



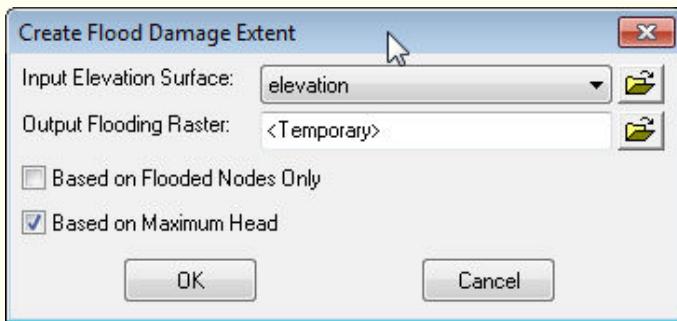
- 2. In the *INFOSWMM OUTPUT* toolbar *OUTPUT SOURCE* drop-down, select “\*Active\*:Standard” as the output source and set the time to “Day 0; 12:30”



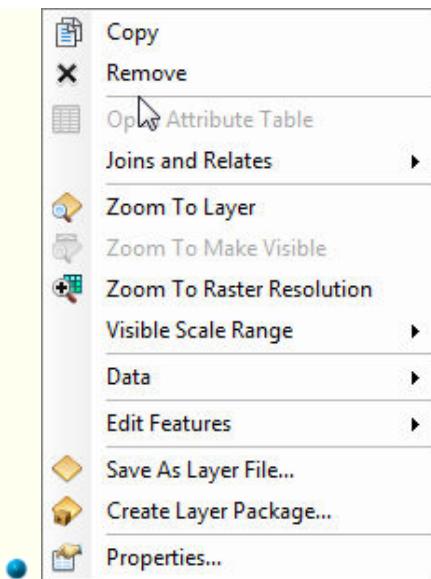
- 3. In the *RISK ASSESSMENT MANAGER* menu *Risk Assessment Manager*, select “Create Flood Damage Extent...”



- 4. The *CREATE FLOOD DAMAGE EXTENT* dialog pops up. In this dialog, select “elevation” as the input elevation surface, and **uncheck** the *BASED ON FLOODED NODES ONLY* box and check the Based on Maximum Head flooding surface option.

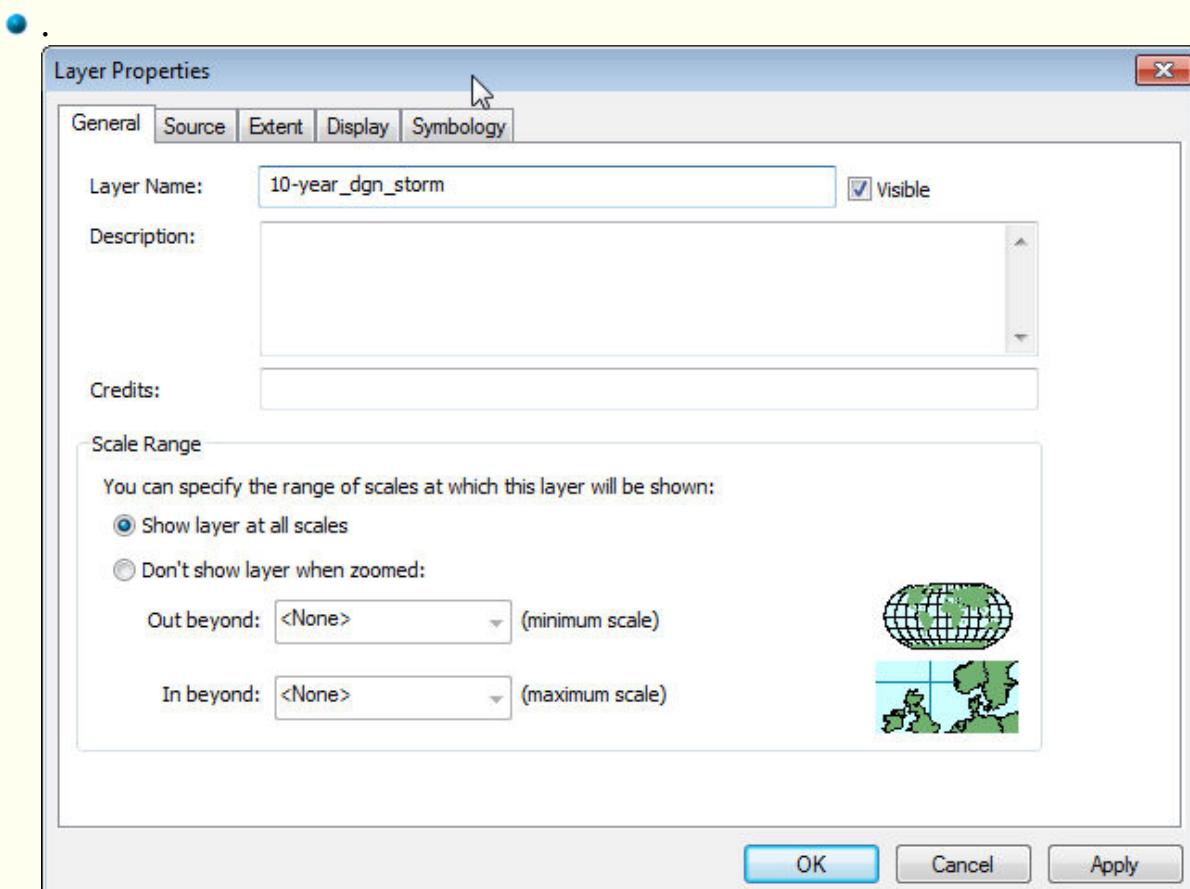


- 5. Click on the “OK” button to close the dialog box and create the new flood extent raster named “Flood1”.
- 6. Right-click on the name of the “Flood1” raster in the *TABLE OF CONTENTS* toolbar and select “Properties” from the drop down menu.



● 7. In

the “General” tab rename the raster to “10-year\_dgn\_storm”



- 8. Click on the “OK” button to close the LAYER

*PROPERTIES* dialog.



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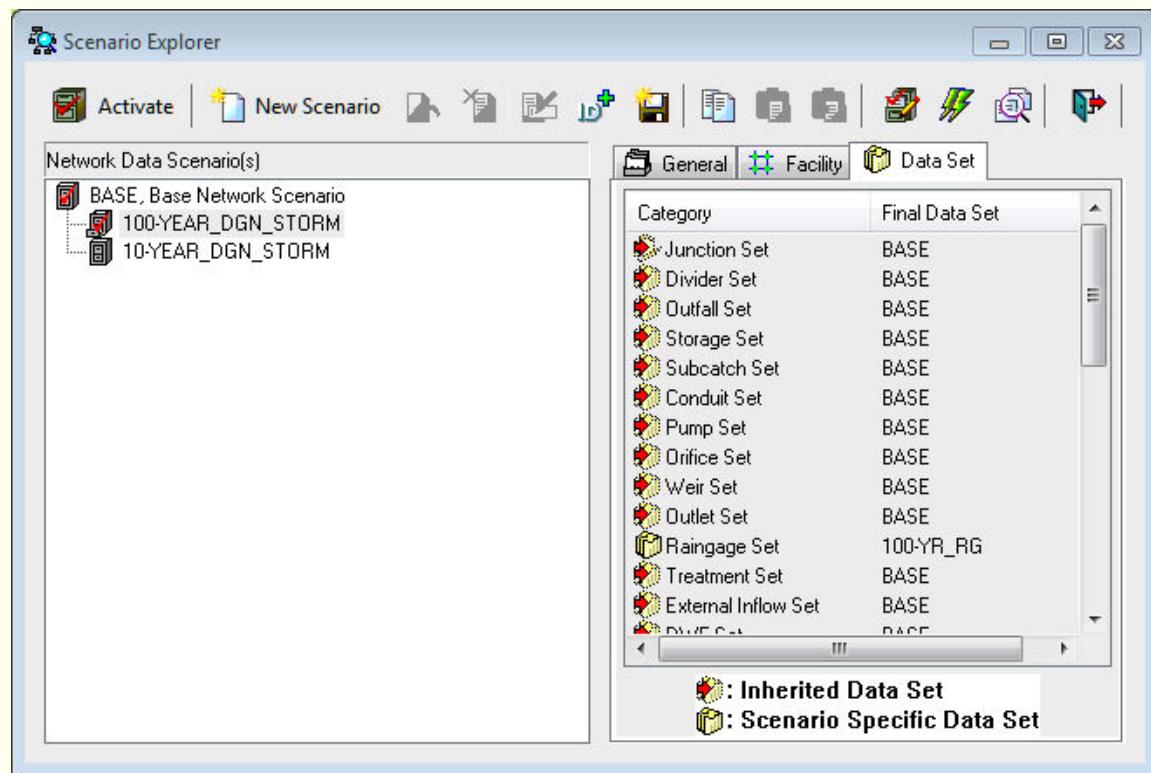
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**Step 5: Create 100-Year Flood Extents**



## Step 5: Create 100-Year Flood Extents

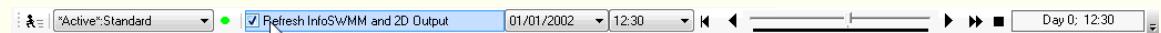
- 1. In

the *INFOSWMM CONTROL CENTER* toolbar *SCENARIO SELECTOR* drop-down, select the “100-YR\_DGN\_STORM” scenario.



- 2. In the *INFOSWMM OUTPUT* toolbar *OUTPUT*

SOURCE drop-down, select “\*Active\*:Standard” as the output source and set the time to “Day 0; 12:30”



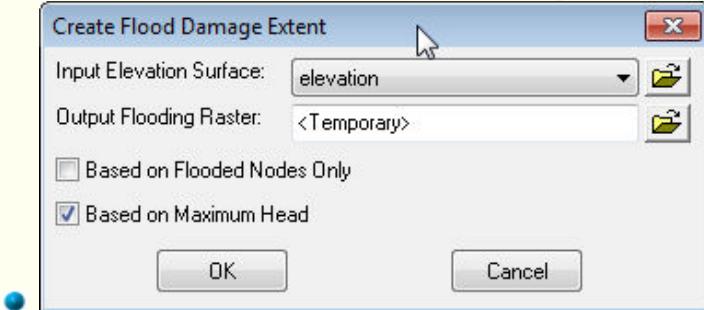
- 3. In the *RISK*

*ASSESSMENT MANAGER* menu *Risk Assessment Manager*, select “Create Flood Damage Extent...” *Create Flood Damage Extent...*

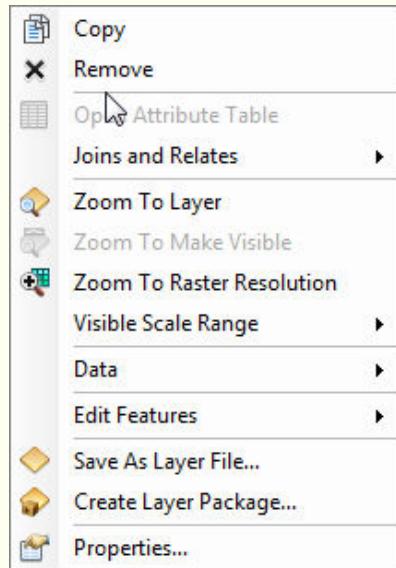
- 4. The

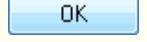
*CREATE FLOOD DAMAGE EXTENT* dialog pops up. In this

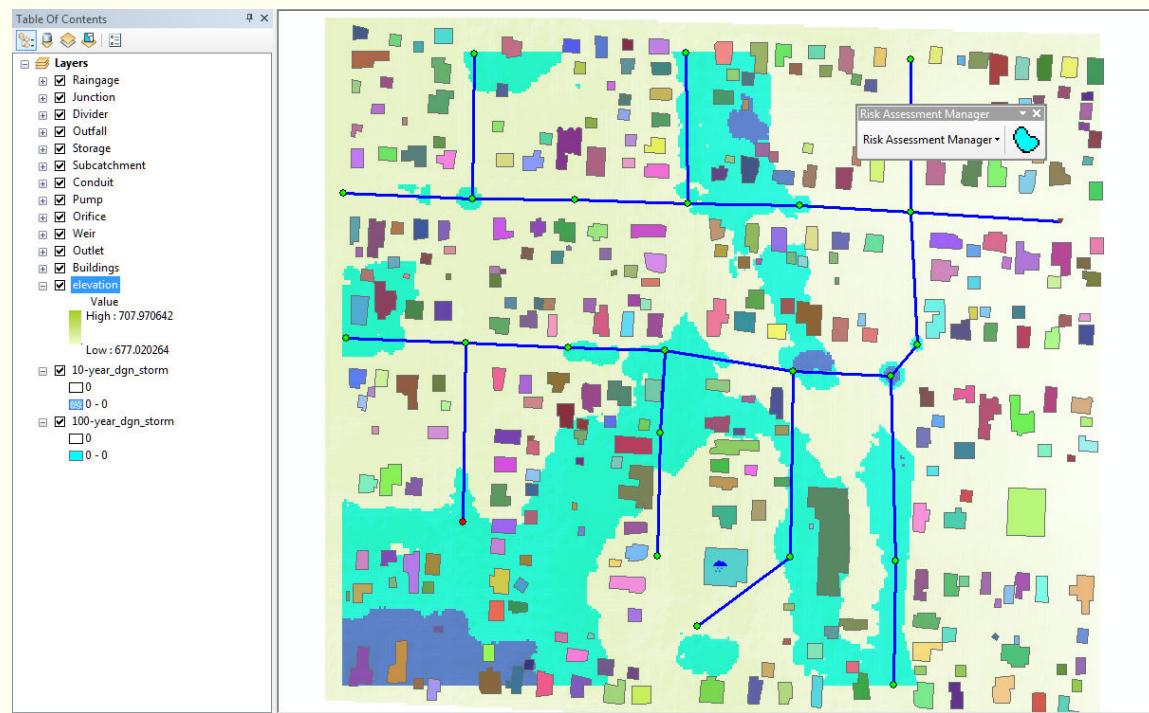
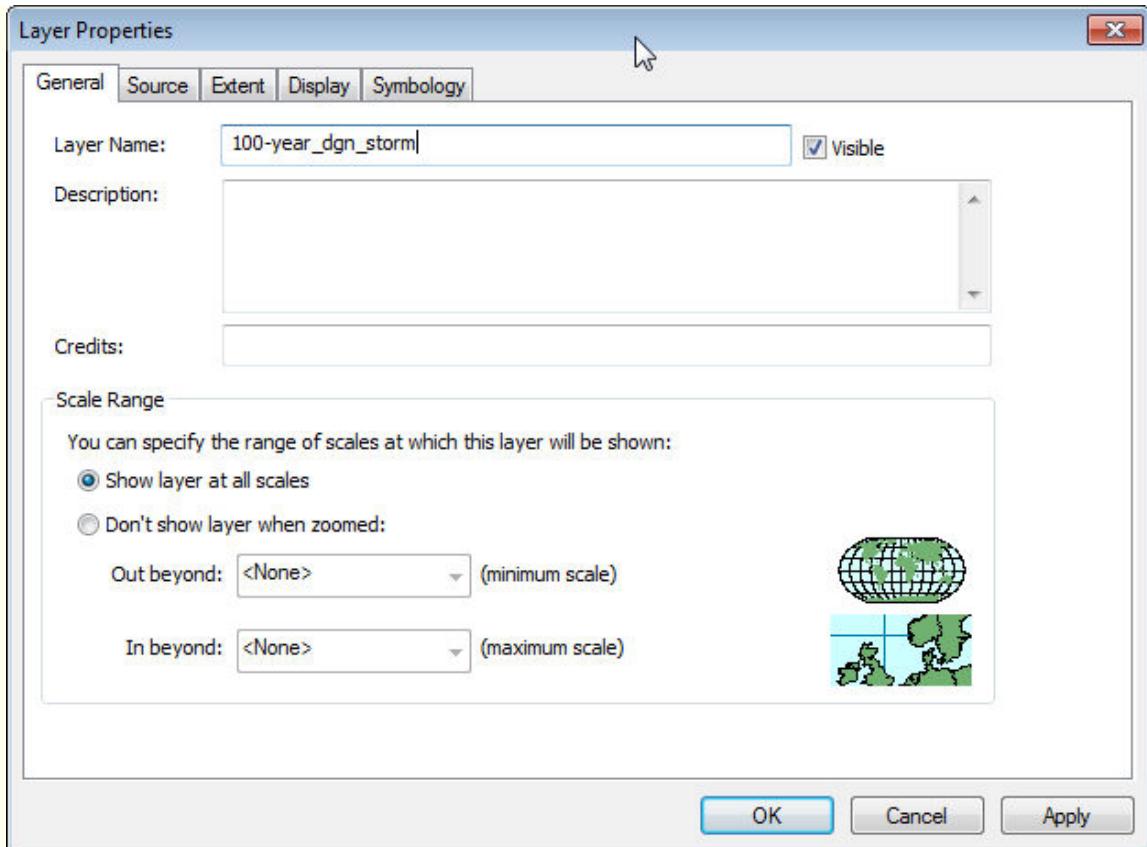
dialog, select “elevation” as the input elevation surface, and **uncheck** the *BASED ON FLOODED NODES ONLY* box and check the Based on Maximum Head flooding surface option.



- 5. Click on the “OK” button  to close the dialog box and create the new flood extent raster named “Flood1”.
- 6. Right-click on the name of the “Flood1” raster in the *TABLE OF CONTENTS* toolbar and select “Properties” from the drop down menu.



- 7. In the “General” tab rename the raster to “100-year\_dgn\_storm”.
- 8. Click on the “OK” button  to close the *LAYER PROPERTIES* dialog.



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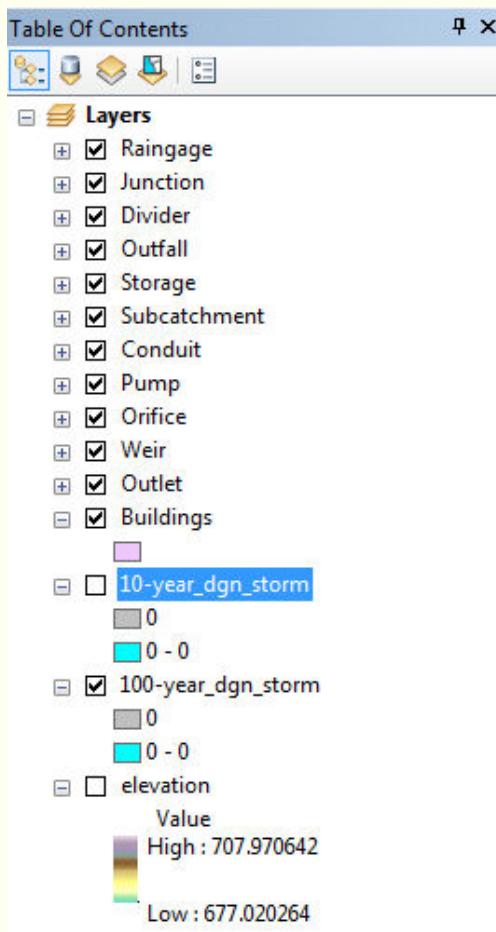
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**Step 6: Compare Flood Extents**

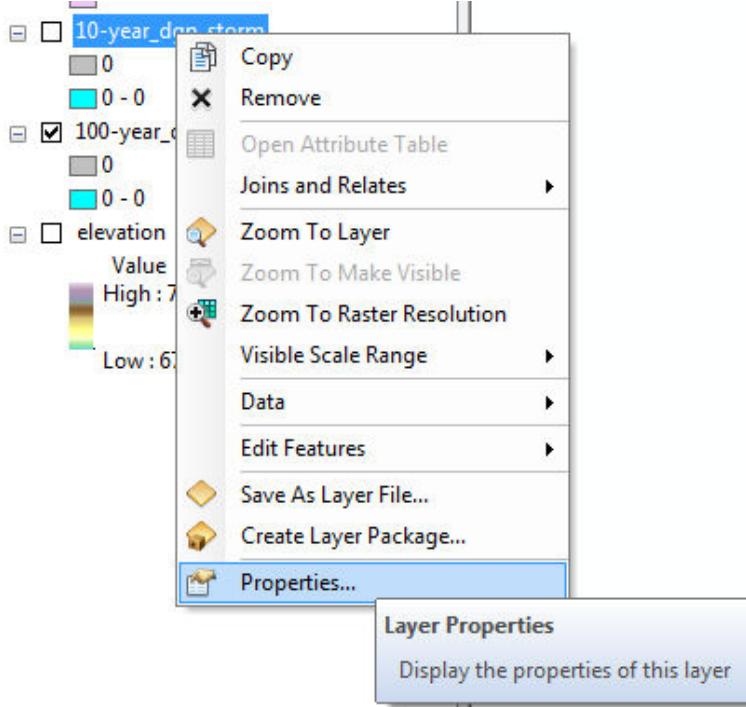


## Step 6: Compare Flood Extents

- 1. By changing display properties in the *LAYER PROPERTIES* dialog, we can compare the extent of flooding. In the *TABLE OF CONTENTS*, arrange the “10-year\_dgn\_storm” raster above the “100-year\_dgn\_storm” raster with both above the “elevation” raster.



- 2. Right-click on the name of the “10-year\_dgn\_storm” raster in the *TABLE OF CONTENTS* toolbar and select “Properties” from the drop down menu.

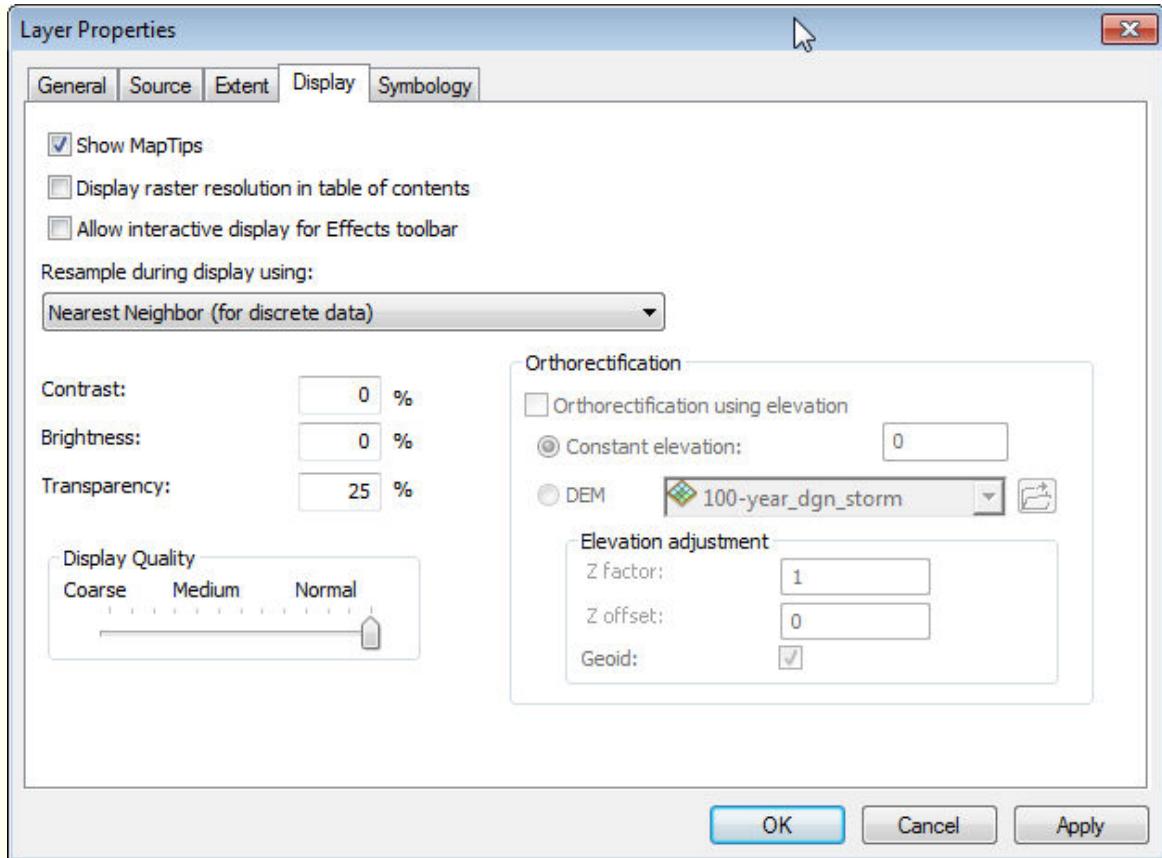


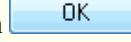
- 3. Select the display tab and set the “Transparent” property

Transparency:

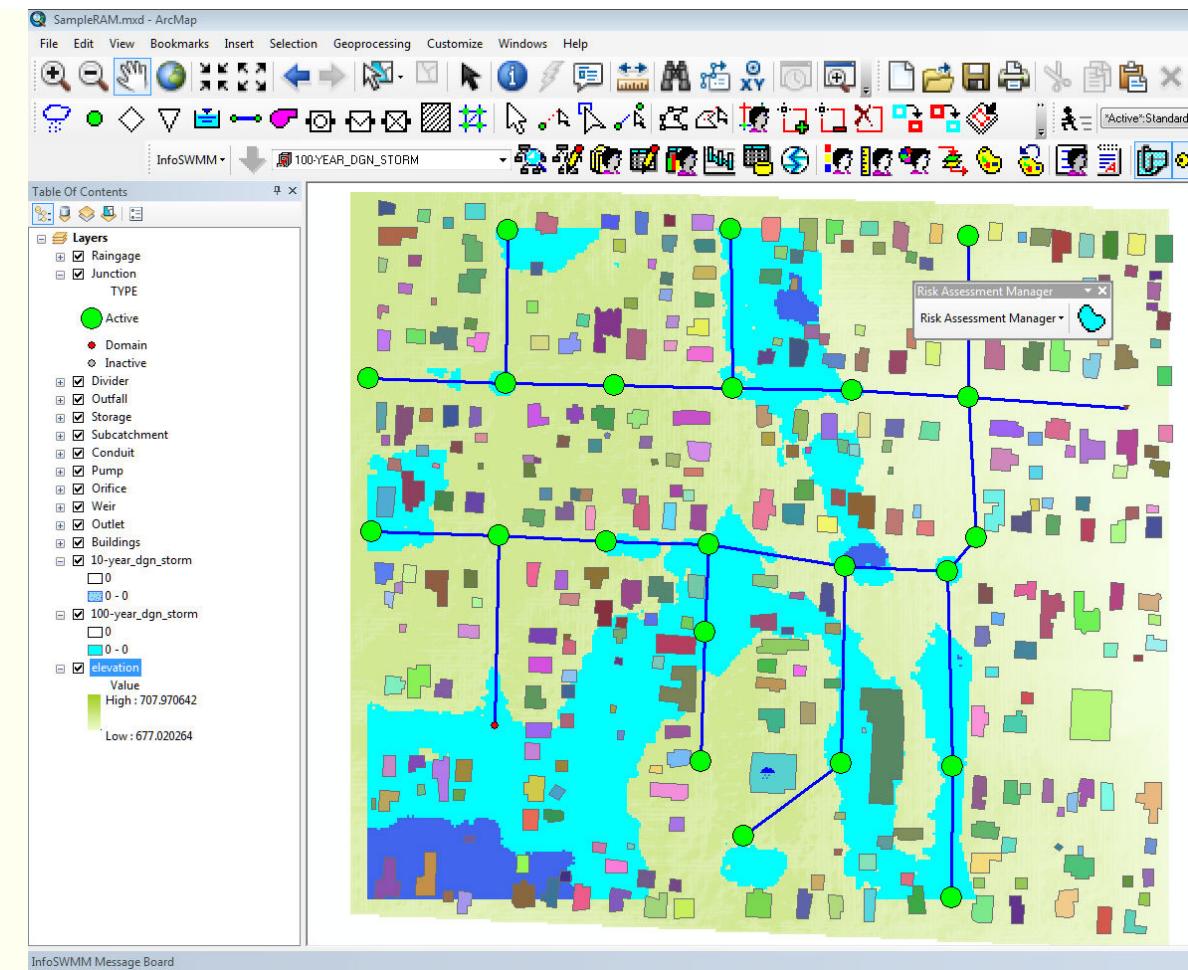
25 %

to 25%.



- 4. Click on the “OK” button  to close the dialog.

The two flood extent rasters are now both visible with the faded blue areas as the 100-year flood extent and the brighter areas as the 10-year flood extent.



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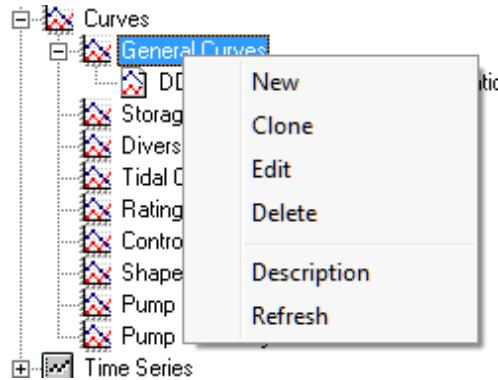
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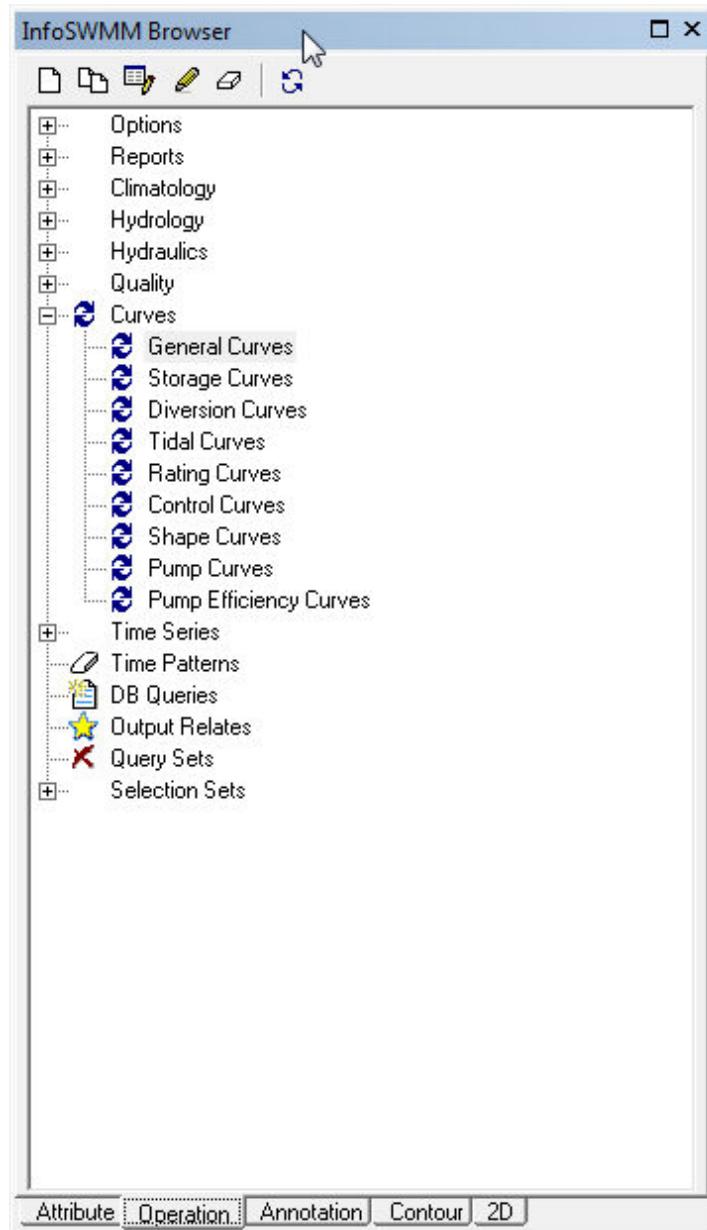


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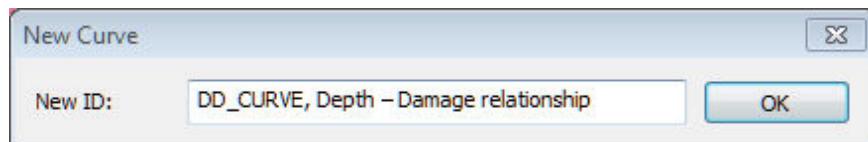
## Step 7: Create Damage Depth Curves

- 1. In the *INFOSWMM BROWSER*, select the “Operation” tab.
- 2. Extend the “Curves” tree by clicking plus (+) sign next to the “Curves” operation.
- 3. Highlight the “General Curves” branch by clicking on it.
- 4. Press the “New” menu item o create a new general curve.



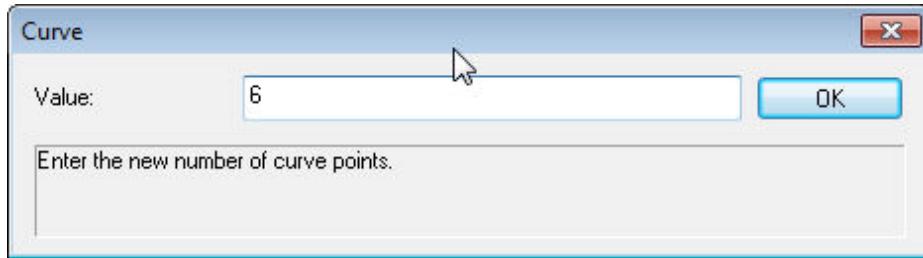


- 5. Assign “DD\_CURVE, Depth – Damage relationship” as the new curve ID.



- 6. Click on the “OK” button to close the dialog box and create the new curve.

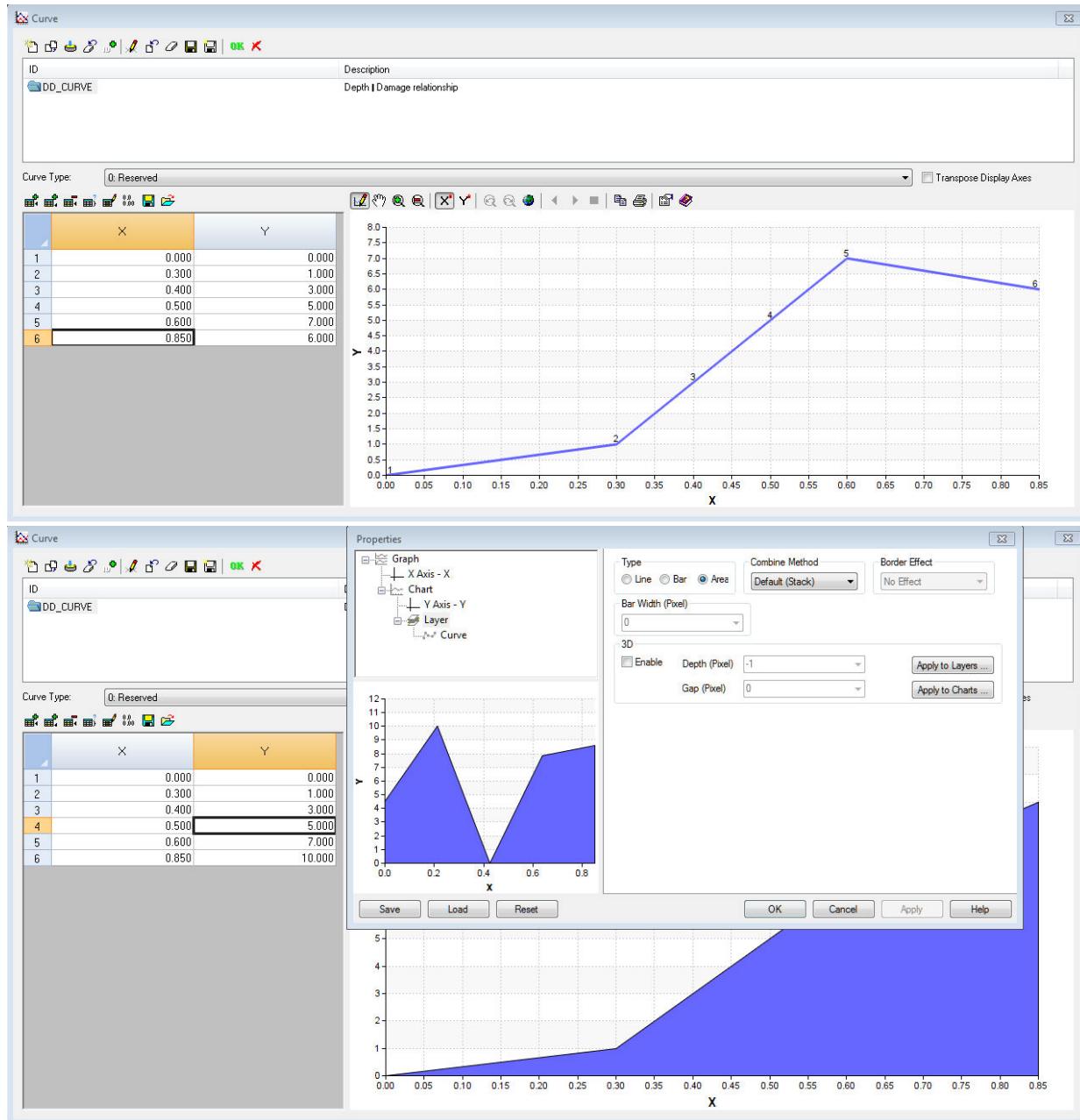
- 7. The *CURVE* editor dialog opens. Set the curve type to “0: Reserved”, and click the “Set Rows” button .
- 8. Enter a value of “6” in this dialog, and Click on the “OK” button  to close the dialog box and create six new lines to define the curve.



- 9. Enter the following data for the X and Y values:

X	Y
0	0
0.3	1
0.4	3
0.5	5
0.6	7
0.85	10

- 10. The final curve represents the percentage of damage applied to each building according to the depth. Press the “OK” button  to close the *CURVE* editor dialog.



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[Home](#) > [Innovyze InfoSWMM RAM Help File and User Guide](#) > [User Guide](#) > [Quick Start Tutorial](#) > **Step 8: Create Two Flood Damage Reports**

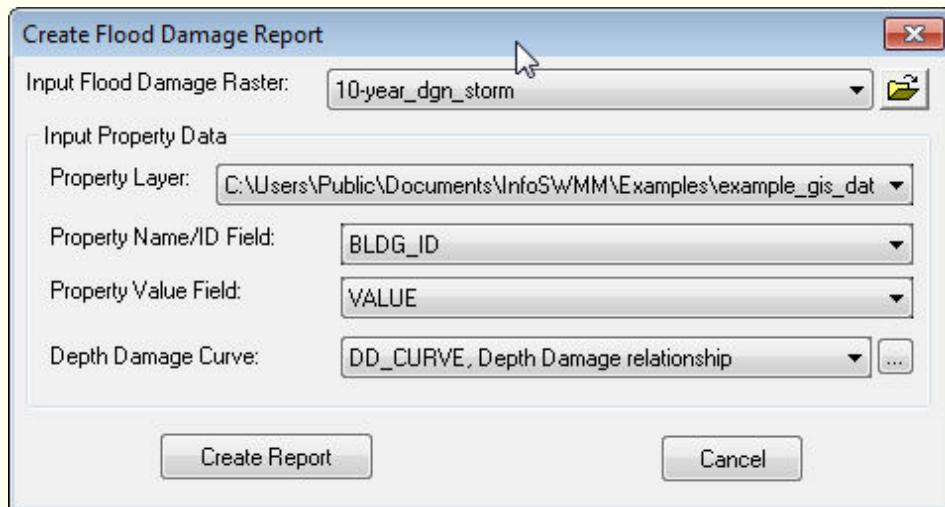


## Step 8: Create Two Flood Damage Reports

- 1. In the *RISK ASSESSMENT MANAGER*

 menu **Risk Assessment Manager**, select “Create Flood Damage Report...” **Create Flood Damage Report...**.

- 2. The *CREATE FLOOD DAMAGE REPORT* dialog pops up. In this dialog, select “10-year\_dgn\_storm” as the input flood damage raster and the appropriate Input Property Data as shown below.



- 3. Click on “Create Report” **Create Report** to create the flood damage report. This report shows that the 10-year storm event did \$107,086.20 loss for 12 buildings.

Flood Damage Report

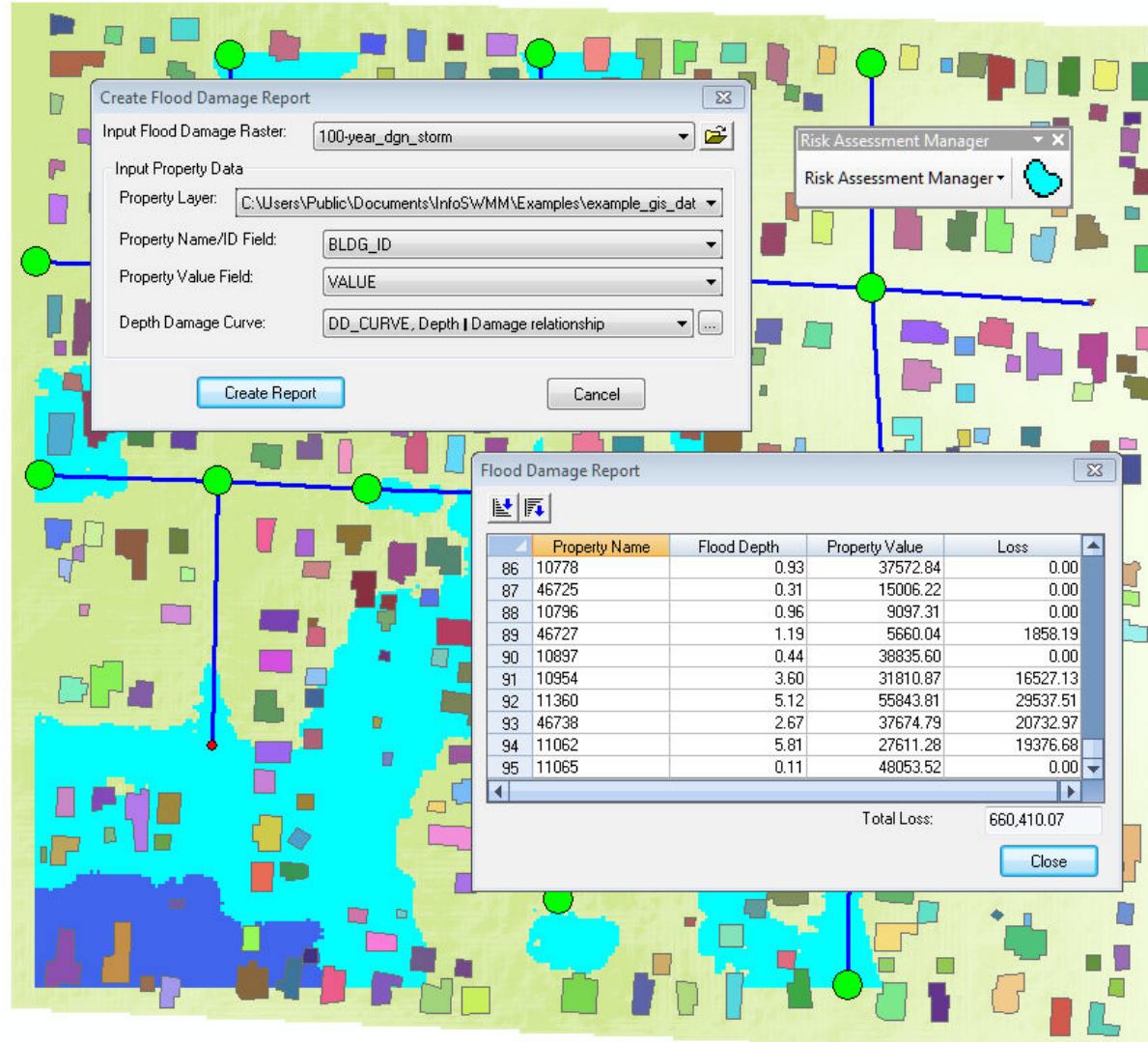
The screenshot shows a Windows application window titled "Flood Damage Report". The main content is a grid table with 10 rows of data. The columns are labeled "Property Name", "Flood Depth", "Property Value", and "Loss". The first row (Property Name 52436) is highlighted with a yellow background. The total loss for all properties is displayed as "107,086.20". There are navigation arrows at the bottom of the grid and a "Close" button.

	Property Name	Flood Depth	Property Value	Loss
1	52436	1.99	66902.77	30024.78
2	11359	0.78	22219.31	0.00
3	11050	0.09	42663.50	0.00
4	10378	0.49	7526.83	0.00
5	10423	0.05	20637.51	0.00
6	52773	1.23	70969.63	23767.72
7	11033	0.60	11973.28	0.00
8	11044	1.55	36808.60	14086.64
9	11061	1.91	11105.82	4846.12
10	10994	1.19	6357.50	2089.49

Total Loss: 107,086.20

Close

- 4. Generating the same report for the 100-year storm event shows \$660,410.07 loss for 95 buildings.



- 5. Click on the “Close” button to close the *FLOOD DAMAGE REPORT*.

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**Step 9: Trace 100 Year Flood Sources**



## Step 9: Trace 100 Year Flood Sources

- 1. In the *INFOSWMM CONTROL CENTER* toolbar *SCENARIO SELECTOR* drop-down, select the “100-YR\_DGN\_STORM”

scenario.



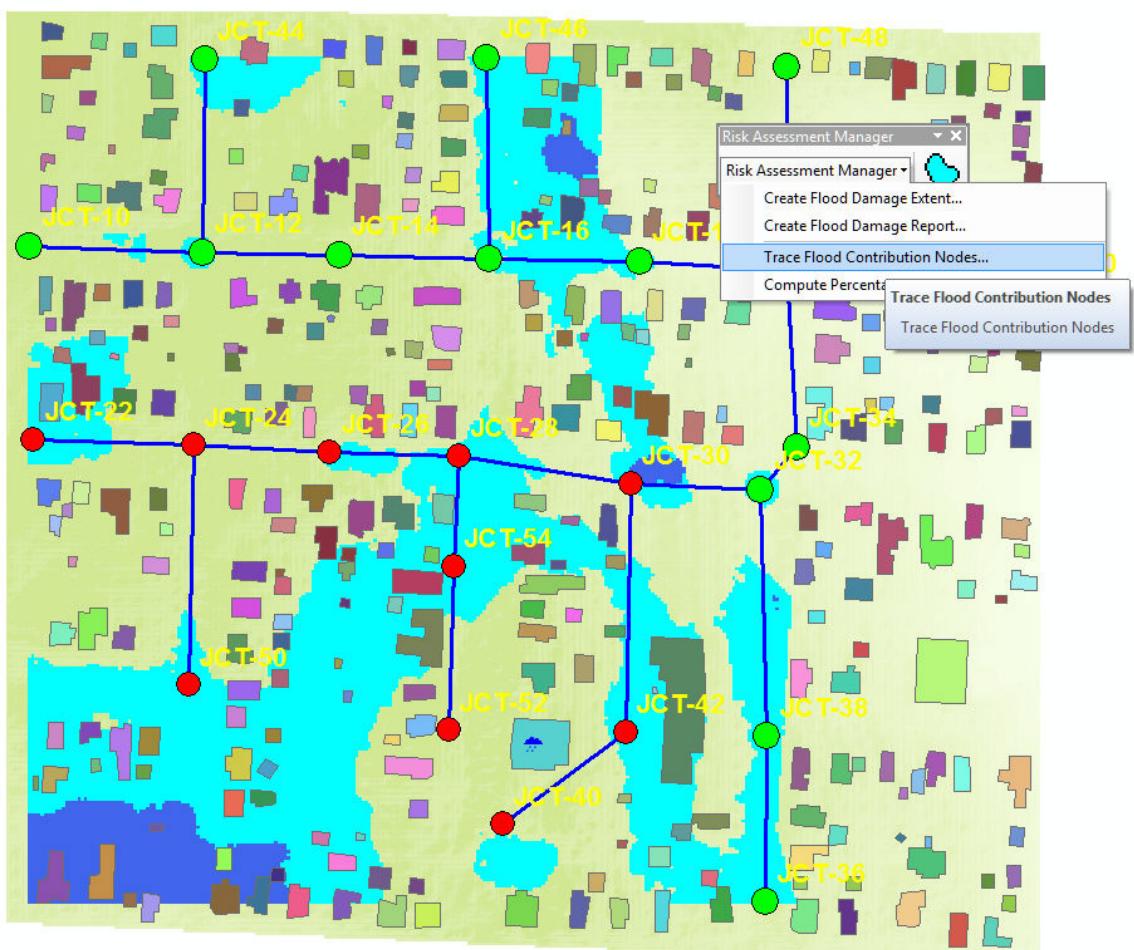
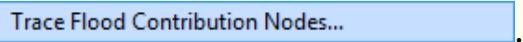
- 2. In the *INFOSWMM OUTPUT* toolbar *OUTPUT*

SOURCE drop-down, select “\*Active\*:Standard” as the output source and set the time to “Day 0; 12:30”



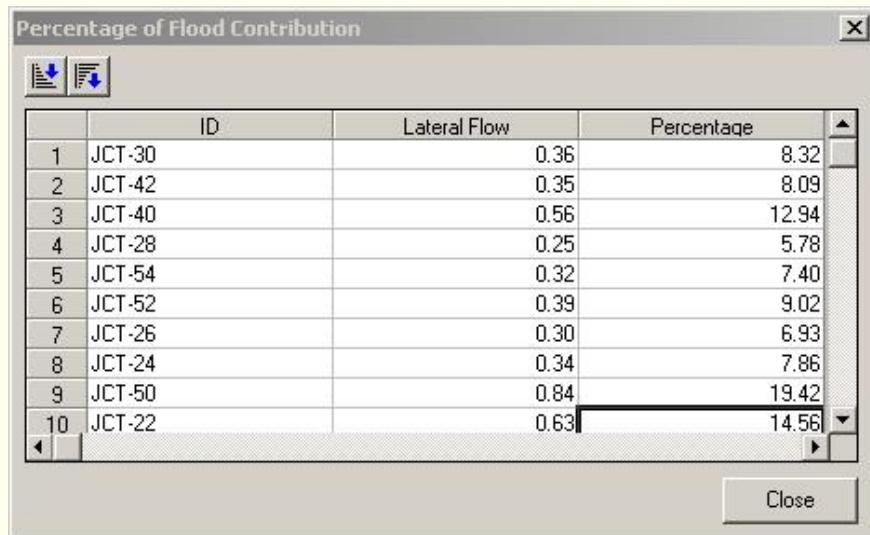
- 3. In the *RISK ASSESSMENT MANAGER* menu

*Risk Assessment Manager* , select “Trace Flood Contribution Nodes...”



- 4. Select node “JCT-30”. All of the nodes tributary to “JCT-30” are now on the domain.
- 5. In the *RISK ASSESSMENT MANAGER* menu, select “Compute Percentage of Flood Contribution...” and select node JCT-30. This produces a report detailing the lateral inflow contribution from each node tributary to JCT-30.

*RISK ASSESSMENT MANAGER* menu **Risk Assessment Manager**, select “Compute Percentage of Flood Contribution...” **Compute Percentage of Flood Contribution...**, and select node JCT-30. This produces a report detailing the lateral inflow contribution from each node tributary to JCT-30.

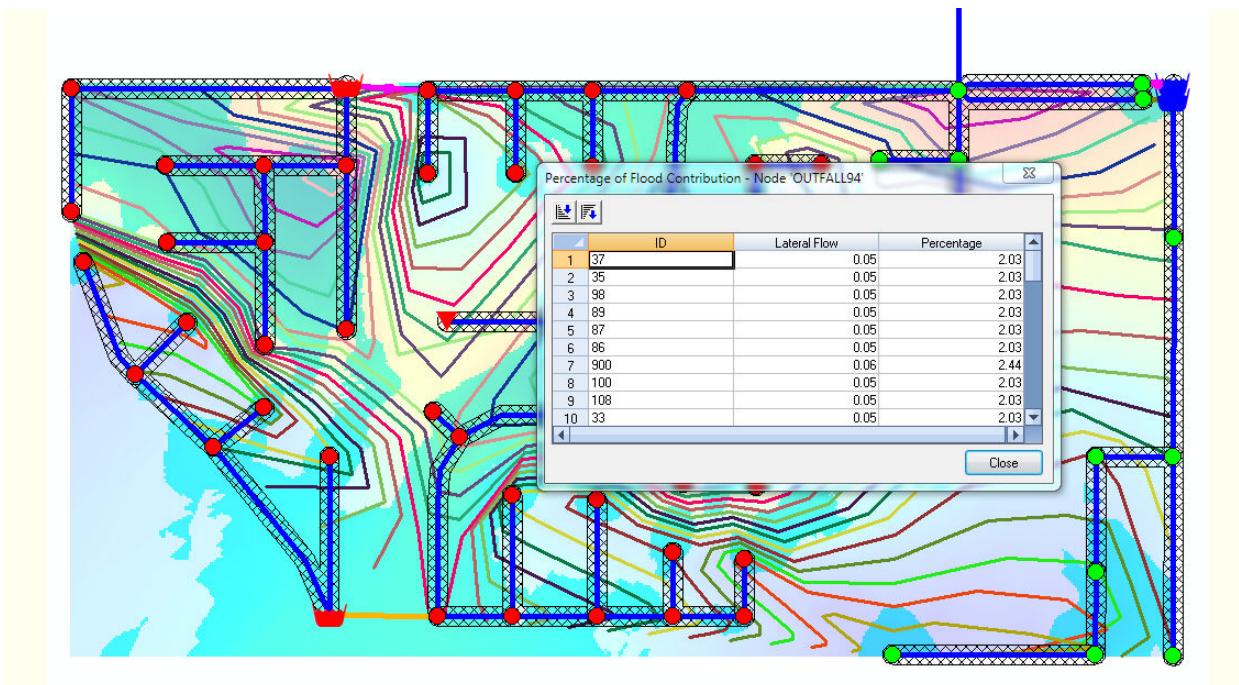


The dialog box has a title bar "Percentage of Flood Contribution" and two buttons at the top left: a magnifying glass icon and a sort descending icon. The main area is a table with columns: ID, Lateral Flow, and Percentage. The table shows the following data:

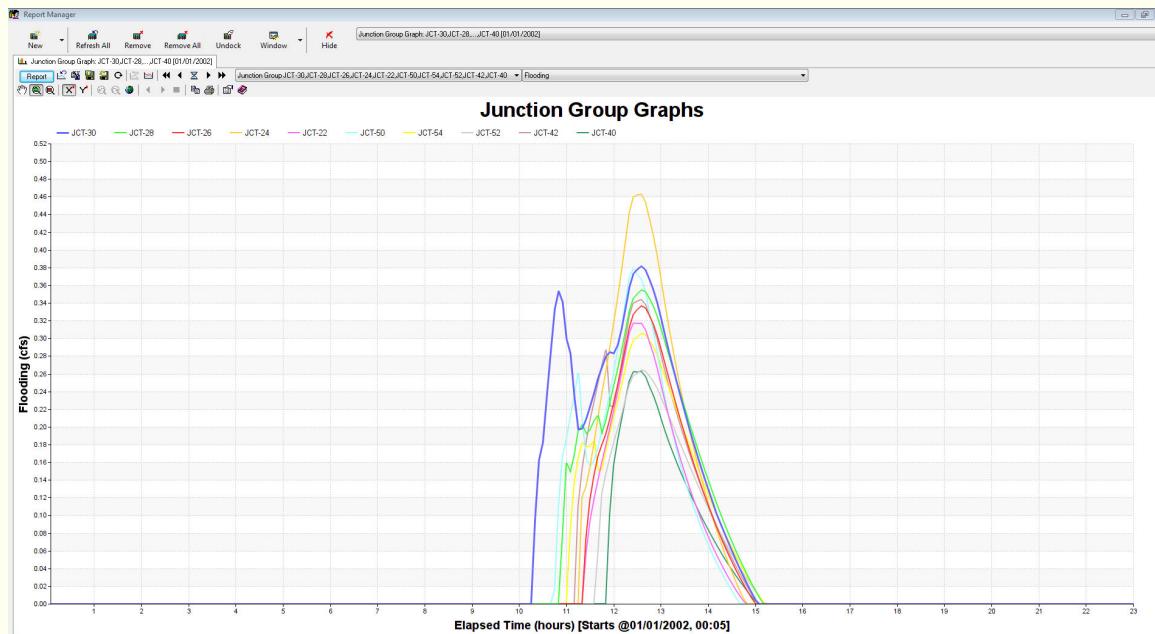
	ID	Lateral Flow	Percentage
1	JCT-30	0.36	8.32
2	JCT-42	0.35	8.09
3	JCT-40	0.56	12.94
4	JCT-28	0.25	5.78
5	JCT-54	0.32	7.40
6	JCT-52	0.39	9.02
7	JCT-26	0.30	6.93
8	JCT-24	0.34	7.86
9	JCT-50	0.84	19.42
10	JCT-22	0.63	14.56

At the bottom right is a "Close" button.

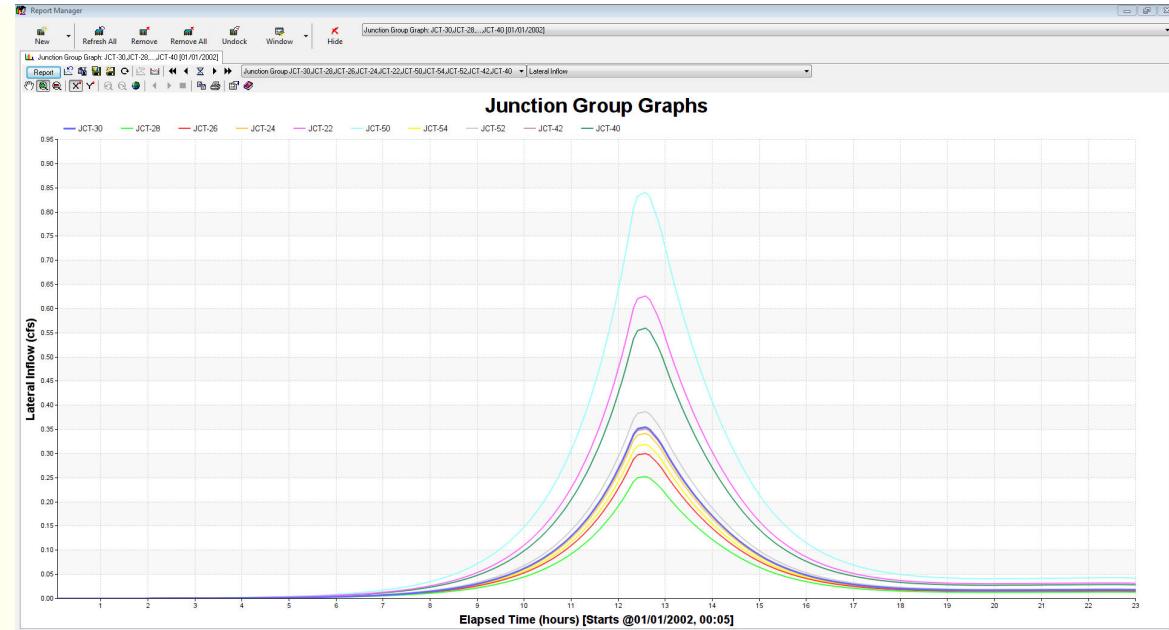
- 6. Highlight the “Percentage” column by clicking on the header box. Click the “sort descending”  button to view the top flow contributors by percentage for flooding at JCT-30.



- 7. Click on the “Close” button to close the Percentage of Flood Contribution report.

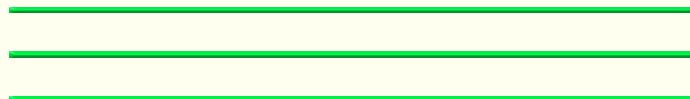


- 8. Click on the Output Report Manager to see all of the Lateral Inflow to the Domain Nodes.



## Congratulations!

You have now completed the Quick-Start tutorial. Please refer to the InfoSWMM User's Guide for assistance with creating and modifying a network model.



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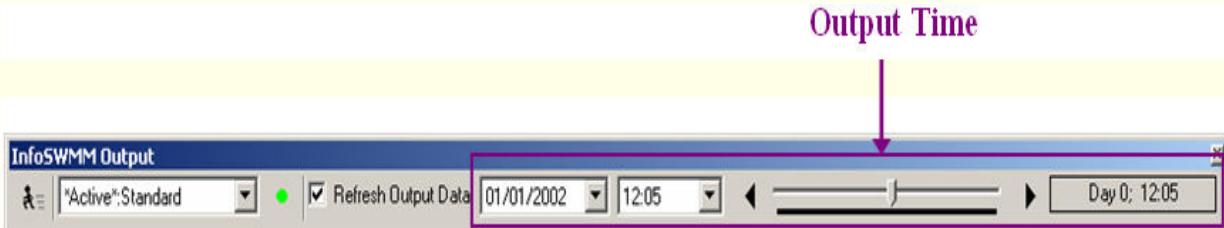
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[Home](#) > [Output Time](#)



## Output Time

The output time refers to the time to which the InfoSWMM output toolbar is set. An example is shown below, where the output time is 12:05 of day 01/01/2002:



Please refer to the InfoSWMM helpfile for more information on the output toolbar and time setting.

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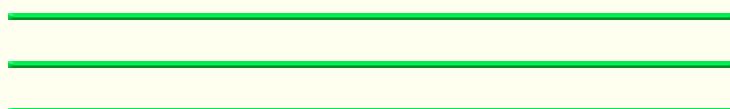
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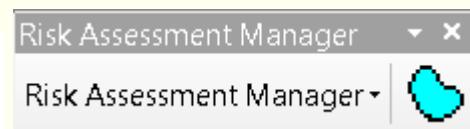
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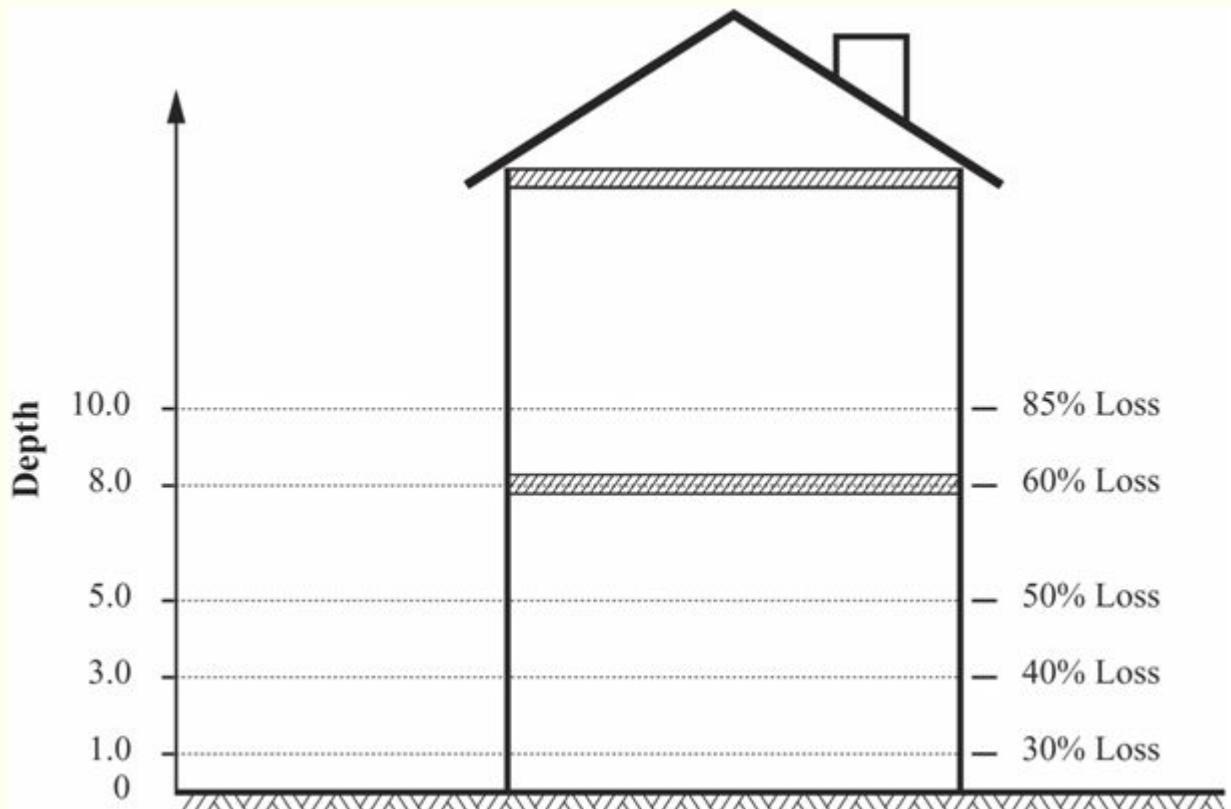
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[Home](#) > Example Depth Damage Curve



## Example Depth Damage Curve

A residential two-story home with flooding on the first floor may be valued at a 30% loss from its total value, while if the flooding reaches above the second floor, the loss will be much higher—in this example 85%.



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