LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT

VOLUME 2 –
EPA Stormwater Calculator

PRIDE • PRESERVATION • CONSERVATION
WALTON COUNTY, FLORIDA

WALTON COUNTY PLANNING
LIVE | WORK | PLAY

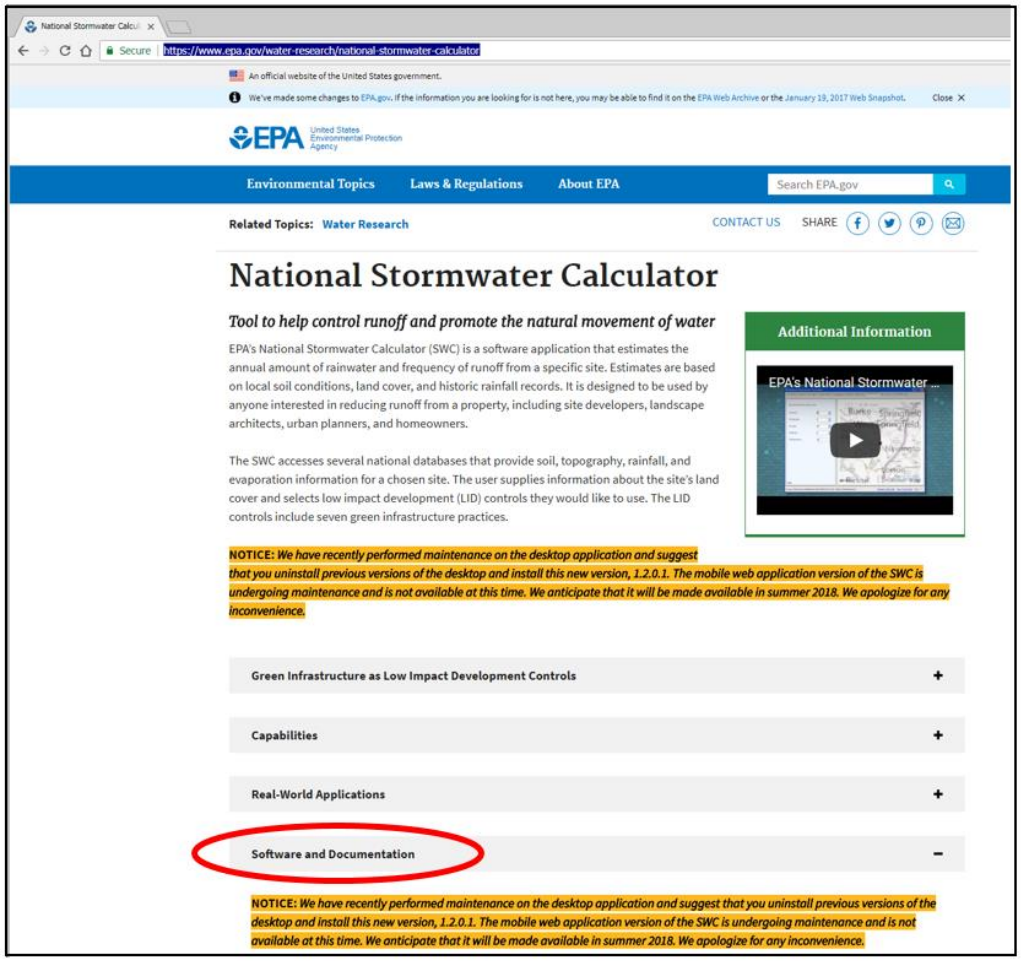
"Stormwater Management System (SMS) - A system that is designed and constructed or implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, over drainage, environmental degradation, and water pollution or otherwise affect the quantity and quality of discharges from the system."

We acknowledge Andrea Ward, P.E. and Rita Banhunyadi, P.E. contributing authors.

We thank Keli Frymire, P.L.A. for the wonderful images.
We thank Kristen Shell, A.I.C.P. for supervision and support.
We also thank many others for support and feedback.

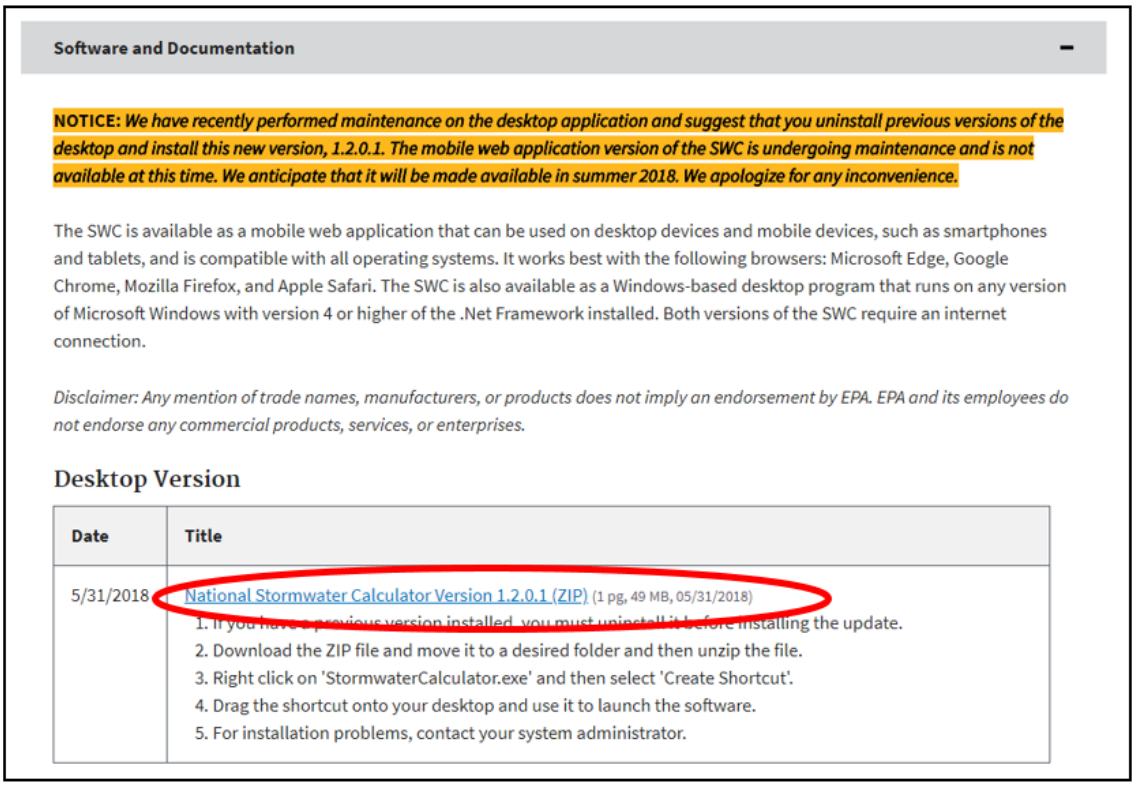
4.0 EPA LID Stormwater Evaluation

The Environmental Protection Agency (EPA) has generated a user friendly program designed to assist homeowners, landscapers, and local governments in expanding the use of green infrastructure. The program provides a user-friendly interface that can easily integrate site characteristics such as local precipitation, soil characteristics, natural terrain, and land cover to determine the effectiveness of a combination of LID SWMF approaches. It has access to multiple national databases that link information associated with local precipitation trends, soil characteristics, climate change data, as well as the cost to implement and maintain LID SWMFs. The user can choose from multiple LID SWMFs and can change the design parameters such as depth and volume to produce green infrastructure solutions.[5] The program allows users to compare pre-development runoff with proposed post-development runoff at the touch of a button. It can also determine the effectiveness of multiple LID SWMFs used within one site. To get started go to https://www.epa.gov/water-research/national-stormwater-calculator and click on "Software and Documentation".



[5] Environmental Protection Agency. PEA/6006F-13/095d. *National Stormwater Calculator (SWC), Tools that help users control runoff to promote the natural movement of water.* September 2017. https://www.epa.gov/sites/production/files/2017-09/documents/swc_technical_factsheet_update_final_9-28-17.pdf

1. Under “Desktop Version” click on “National Stormwater Calculator Version 1.2.0.1 (Zip)”.



Software and Documentation −

NOTICE: ***We have recently performed maintenance on the desktop application and suggest that you uninstall previous versions of the desktop and install this new version, 1.2.0.1. The mobile web application version of the SWC is undergoing maintenance and is not available at this time. We anticipate that it will be made available in summer 2018. We apologize for any inconvenience.***

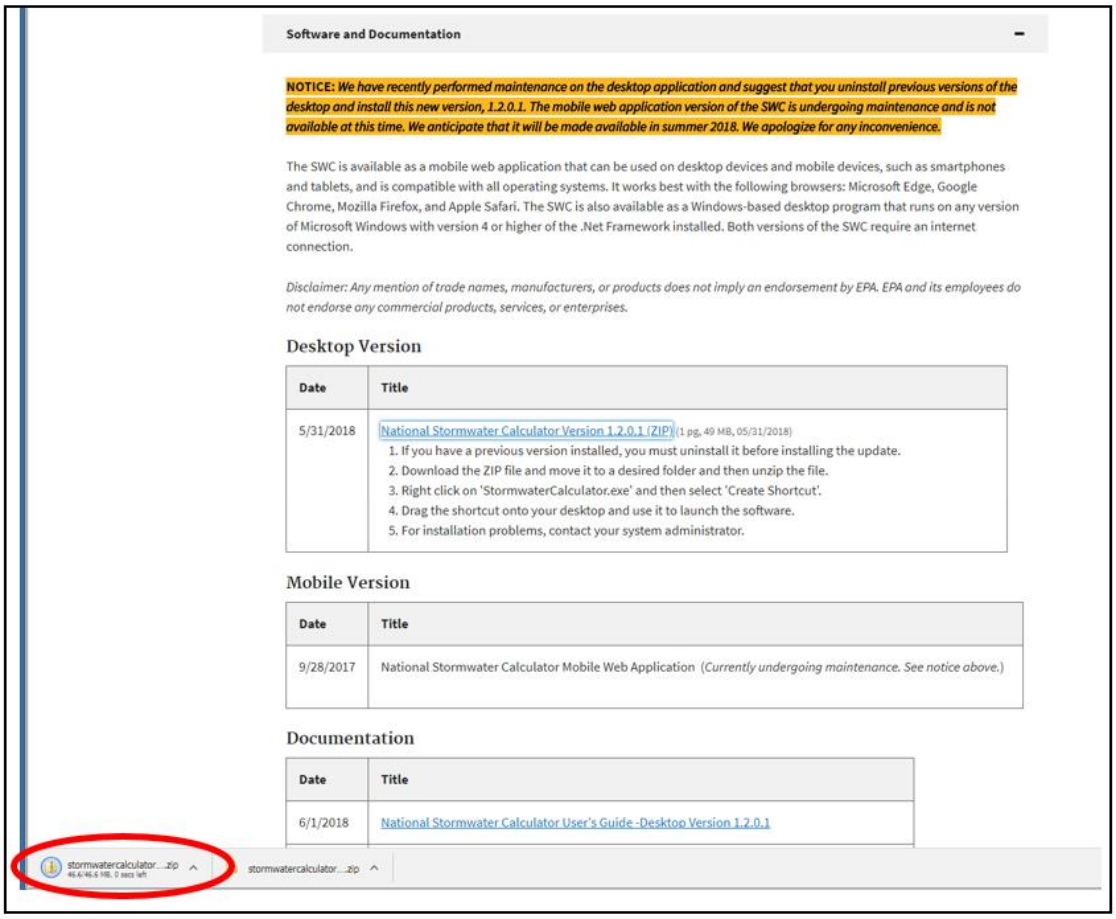
The SWC is available as a mobile web application that can be used on desktop devices and mobile devices, such as smartphones and tablets, and is compatible with all operating systems. It works best with the following browsers: Microsoft Edge, Google Chrome, Mozilla Firefox, and Apple Safari. The SWC is also available as a Windows-based desktop program that runs on any version of Microsoft Windows with version 4 or higher of the .Net Framework installed. Both versions of the SWC require an internet connection.

Disclaimer: Any mention of trade names, manufacturers, or products does not imply an endorsement by EPA. EPA and its employees do not endorse any commercial products, services, or enterprises.

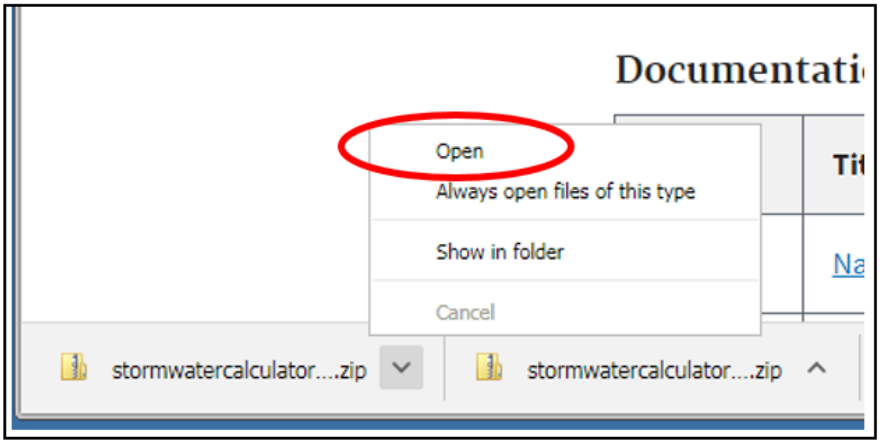
Desktop Version

Date	Title
5/31/2018	National Stormwater Calculator Version 1.2.0.1 (ZIP) (1 pg, 49 MB, 05/31/2018) 1. If you have a previous version installed, you must uninstall it before installing the update. 2. Download the ZIP file and move it to a desired folder and then unzip the file. 3. Right click on 'StormwaterCalculator.exe' and then select 'Create Shortcut'. 4. Drag the shortcut onto your desktop and use it to launch the software. 5. For installation problems, contact your system administrator.

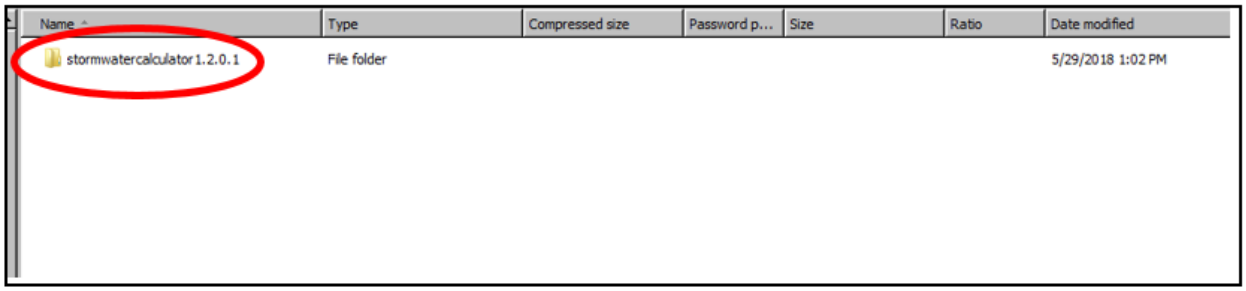
2. At the bottom of the screen, open the zip file.



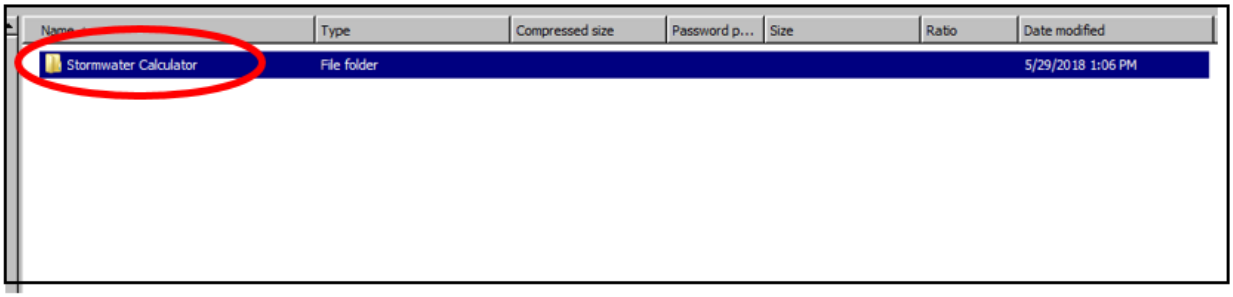
3. Open the zip file.



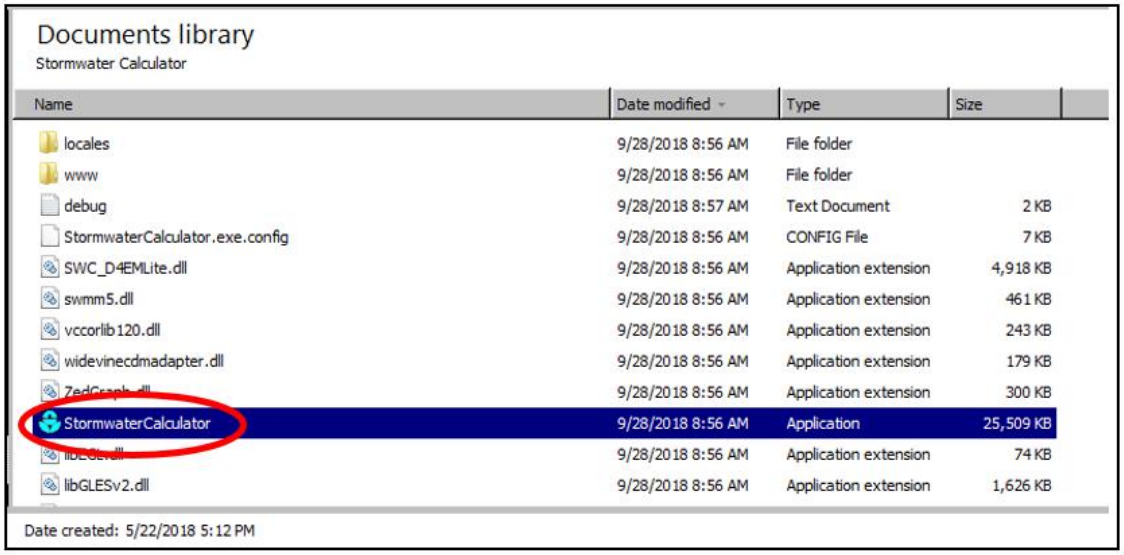
4. Open the folder that says “stormwatercalculator 1.2.0.1.



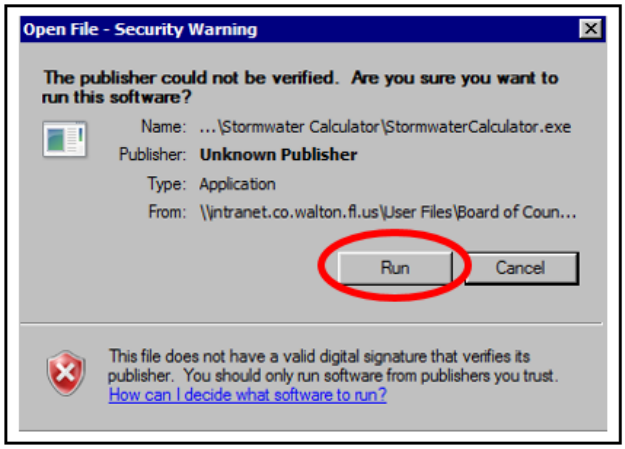
5. Open the folder labeled “Stormwater Calculator”.



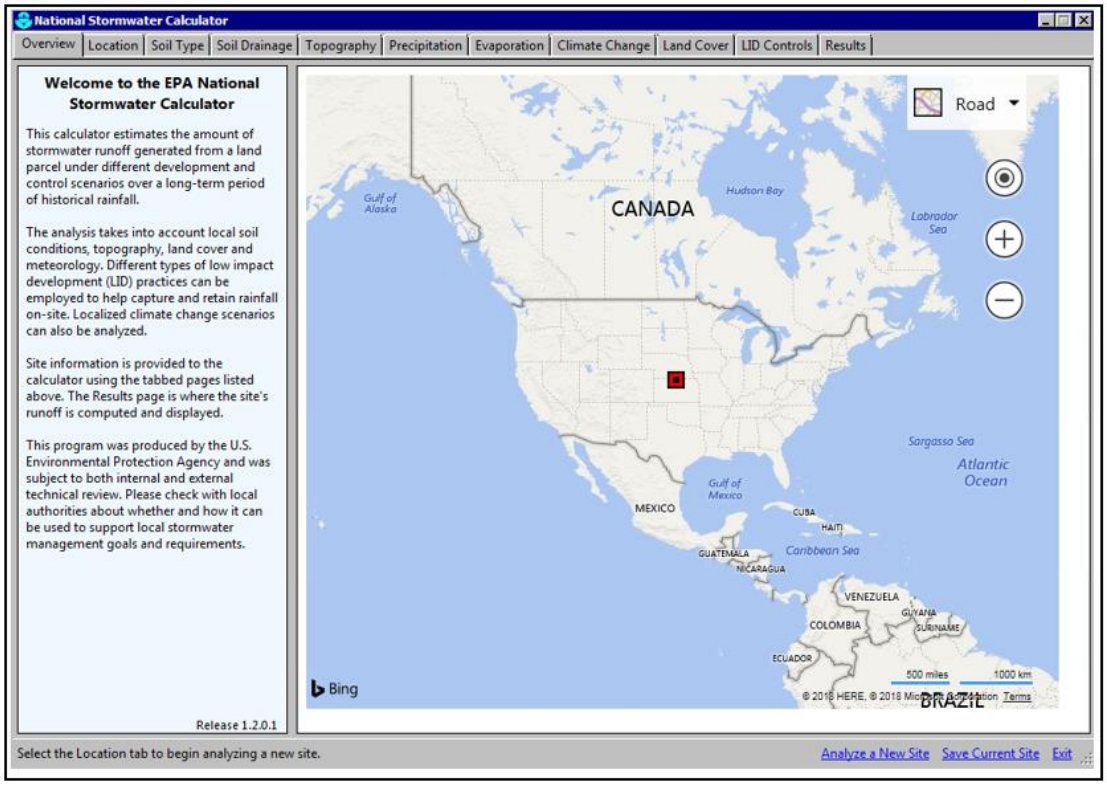
6. Once the file opens, scroll down to the “StormwaterCalculator”.



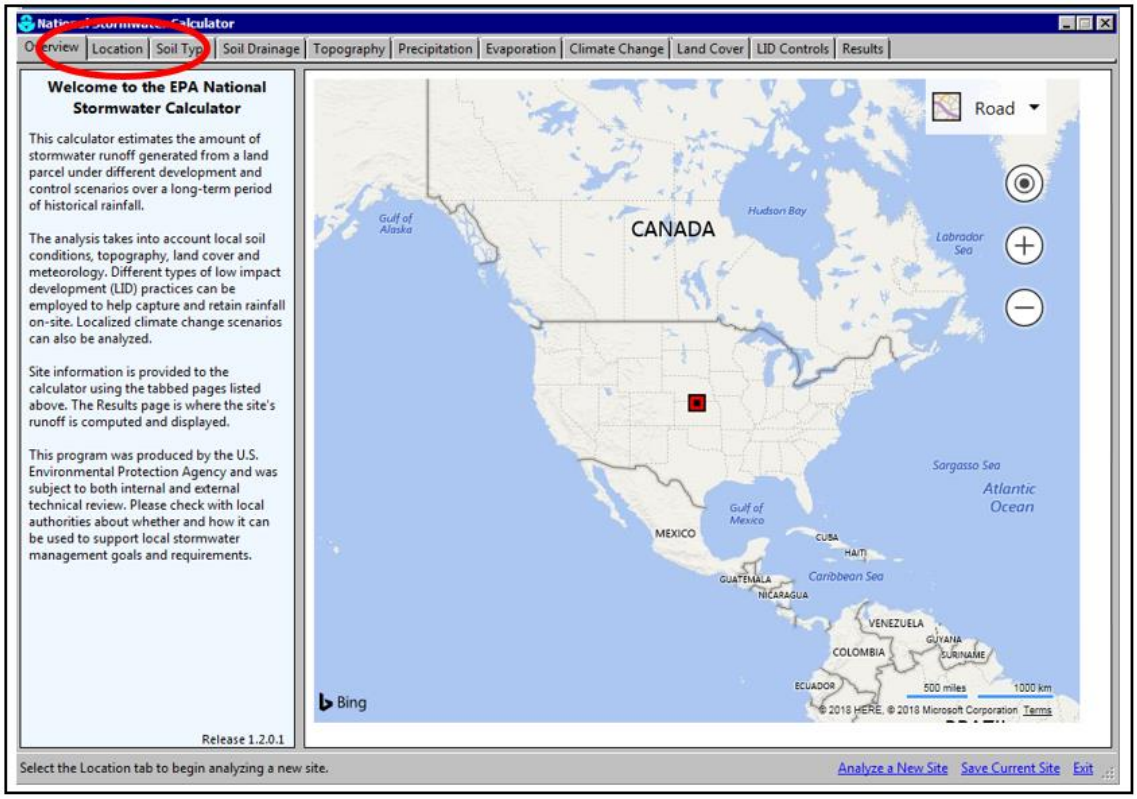
7. When the following screen pops up, click on “Run”.



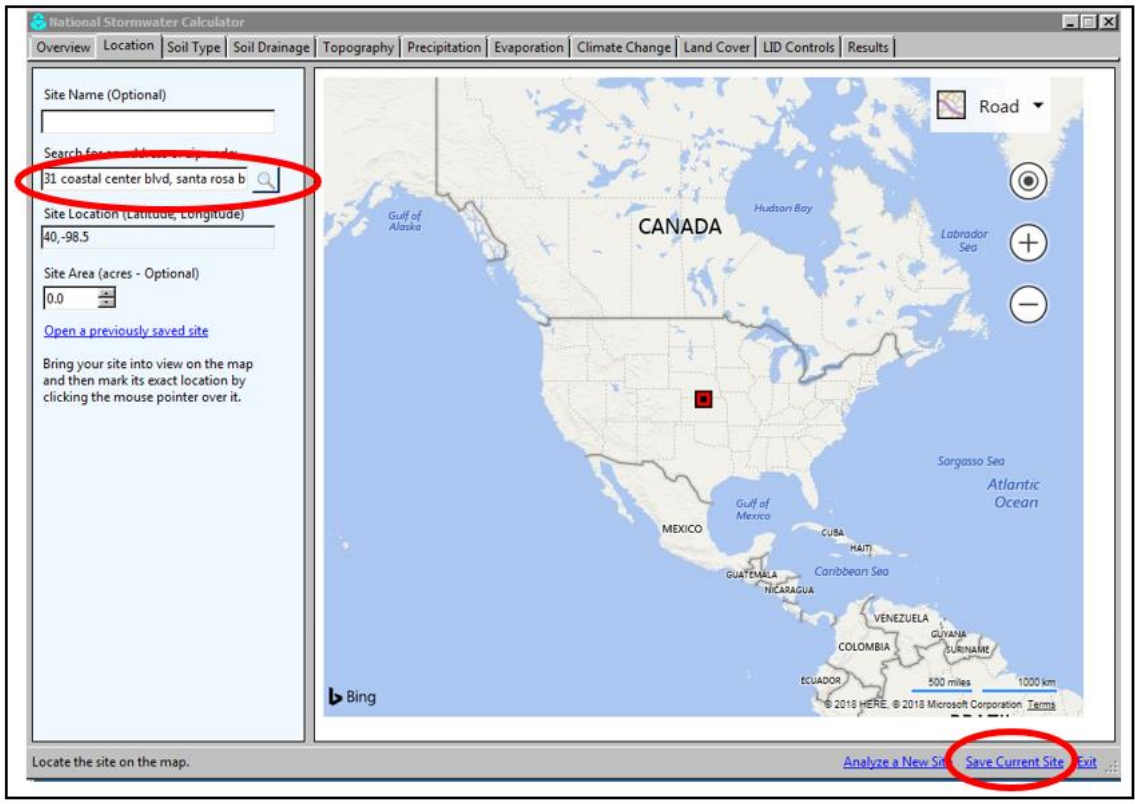
8. The program will open to the following screen:



9. Click on the tab that says “Locations” at the top left corner of the program.

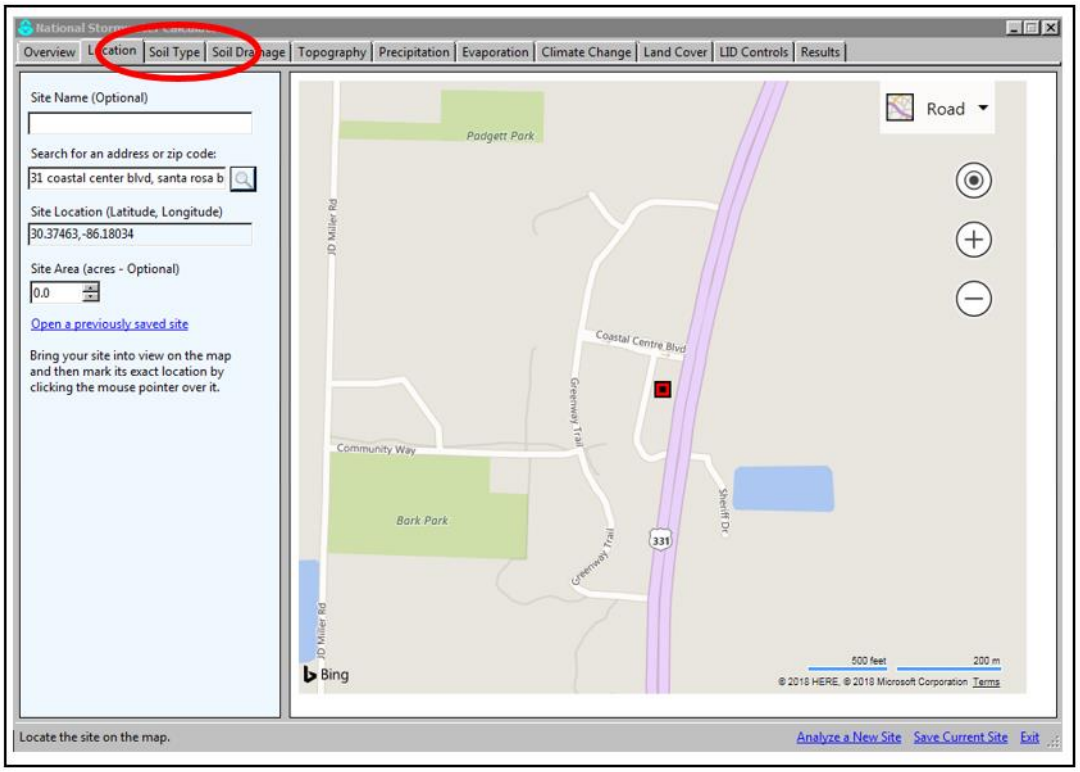


10. Enter your address in the box that says “Search for address or zip code”.

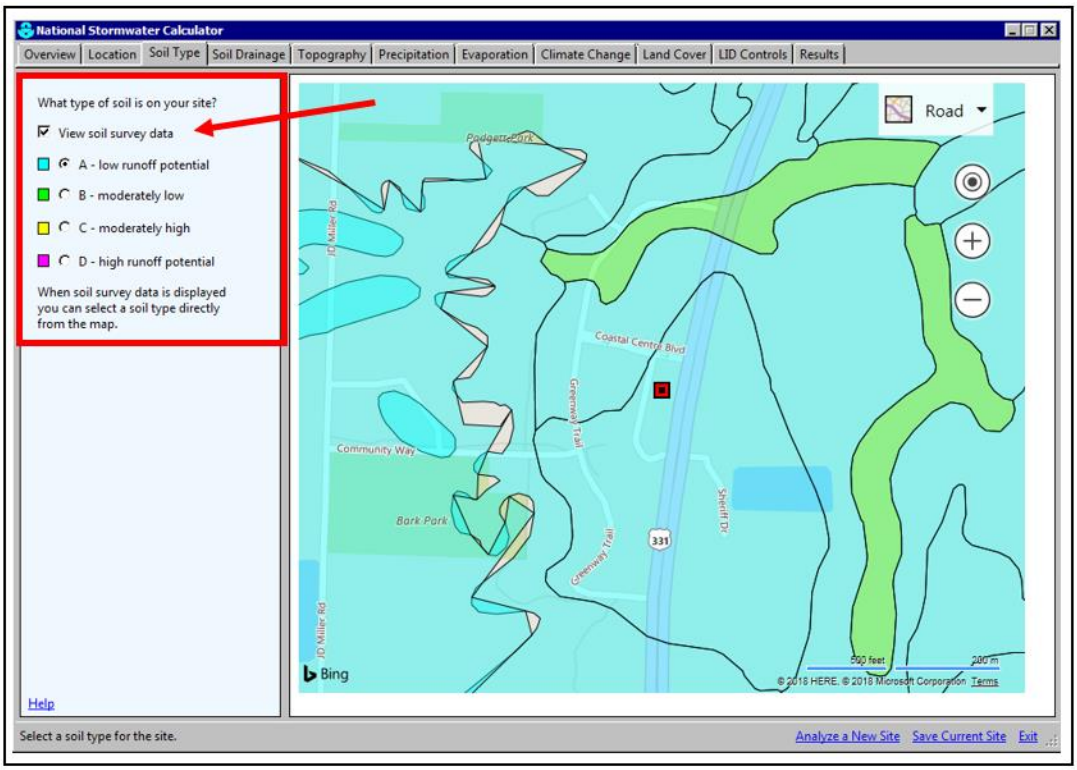


important **Don't forget to save you work periodically as you design your LID SWMF.**

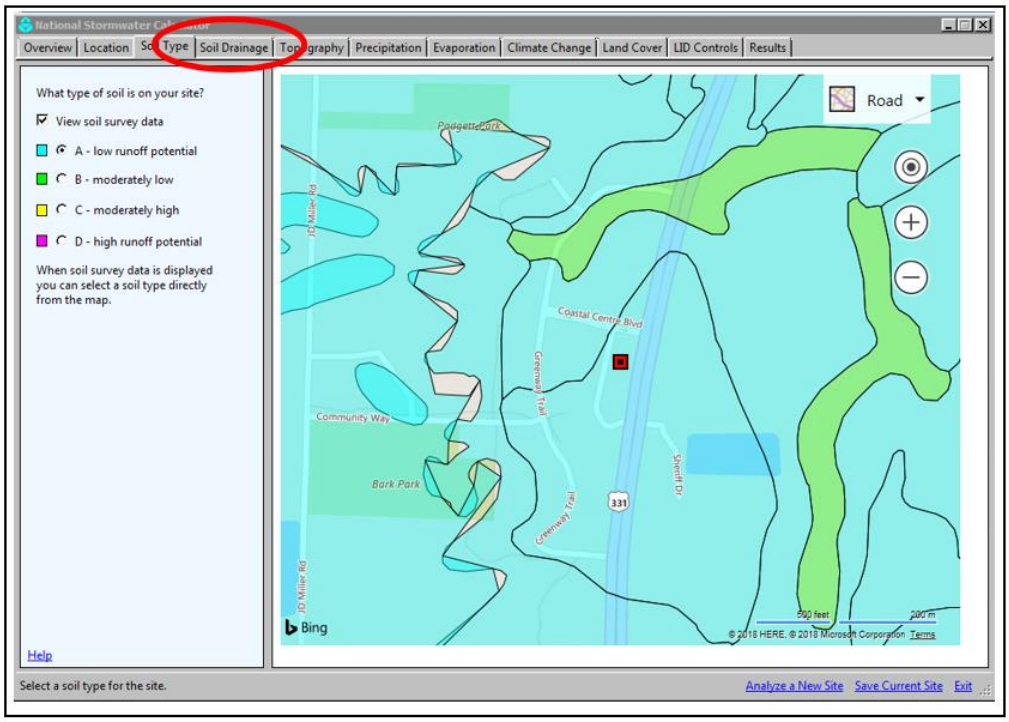
11. Once the program identifies your property, click on the "Soils Type" located next to the "Location" tab at the top left corner of the screen.



12. Now check the box next to “View soil survey data”. Once the soil map is displayed, check the circle next to the type of soil at your location by matching the color on the map to the colored boxes.

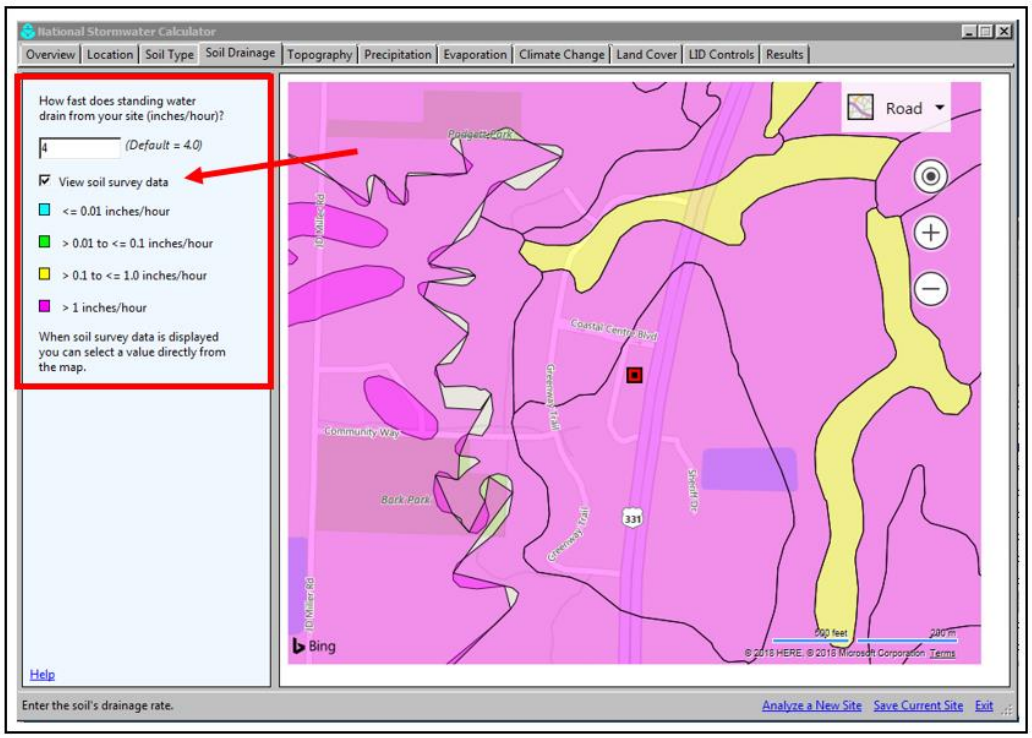


13. Click on the “Soil Drainage” tab located at the top of the screen.

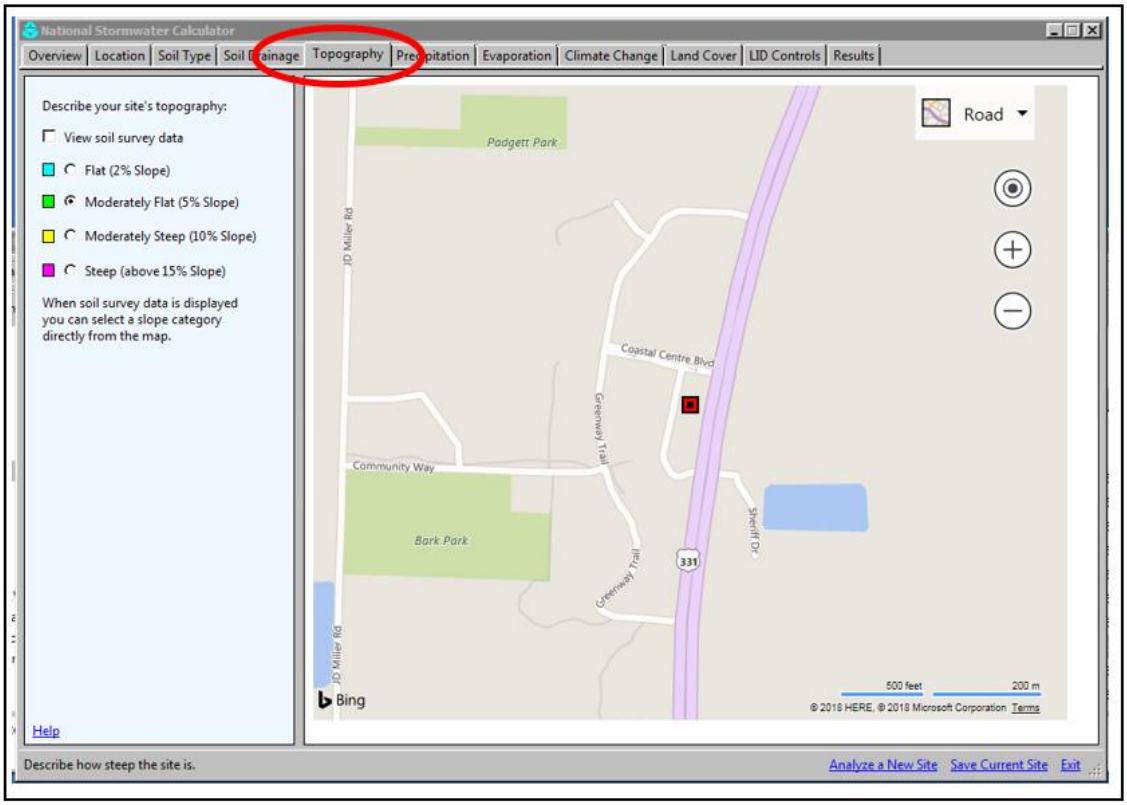


14. Check the box next to “View soil survey data” and identify which type of drainage characteristics are at your location by matching the color on the map to the colored boxes. Then enter the numerical value in the box provided. You can use the default value if the area is depicted in pink. Another option is to follow the procedure presented in Section 2.4 to determine the soil characteristics provided in the Web Soil

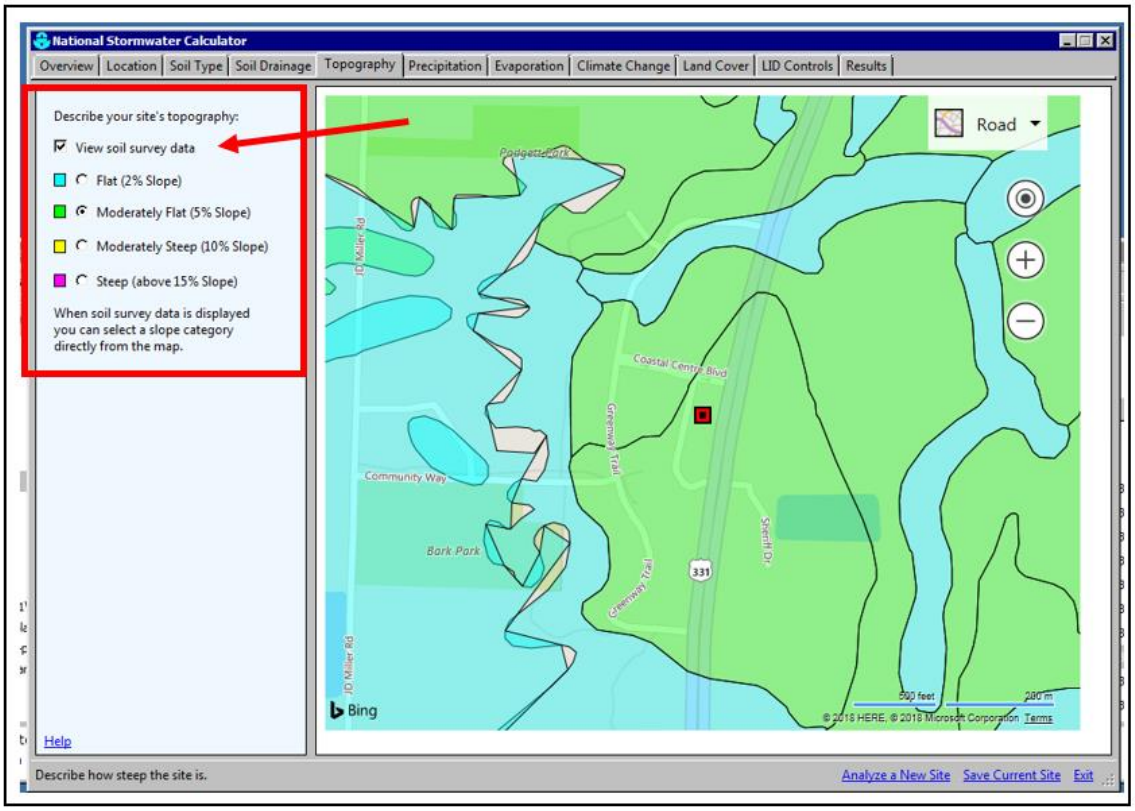
Survey page. If you choose to use the web soil survey, remember to divide the initial value by a safety factor of 2 before entering it into the box.



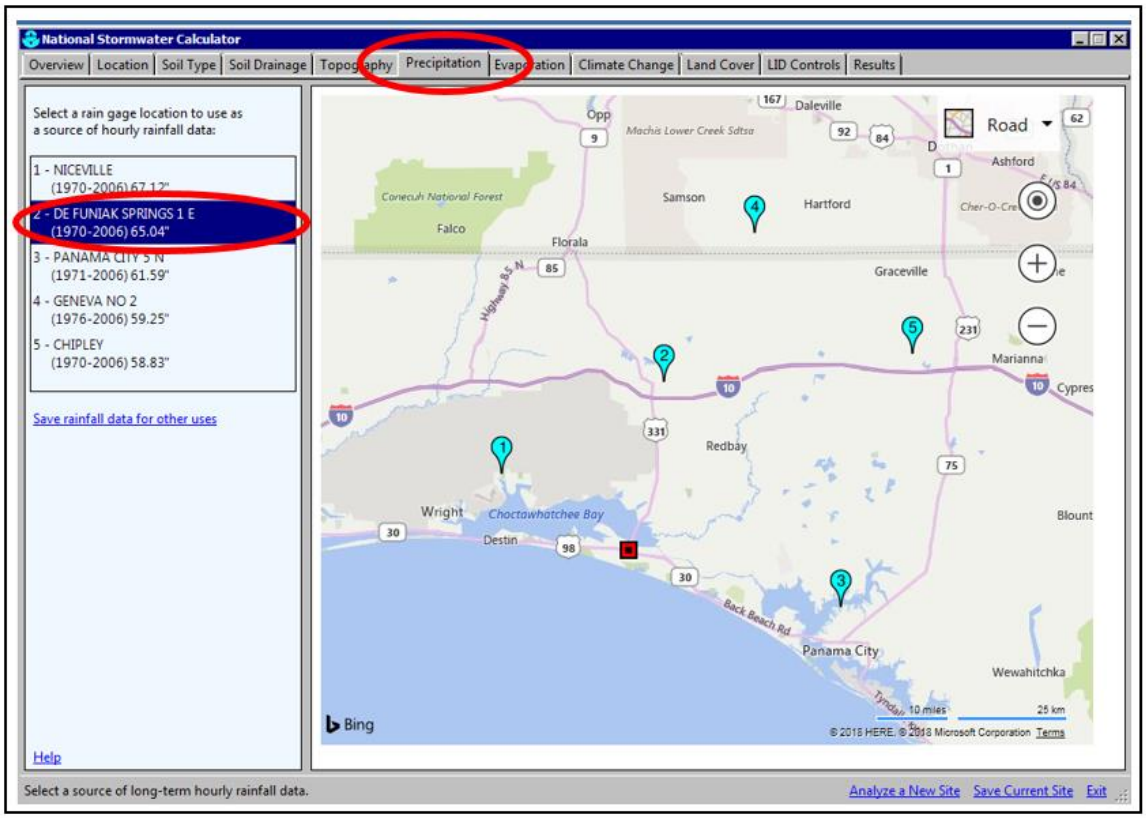
15. Once you have this information, click on the tab at the top of the screen labeled “Topography”.



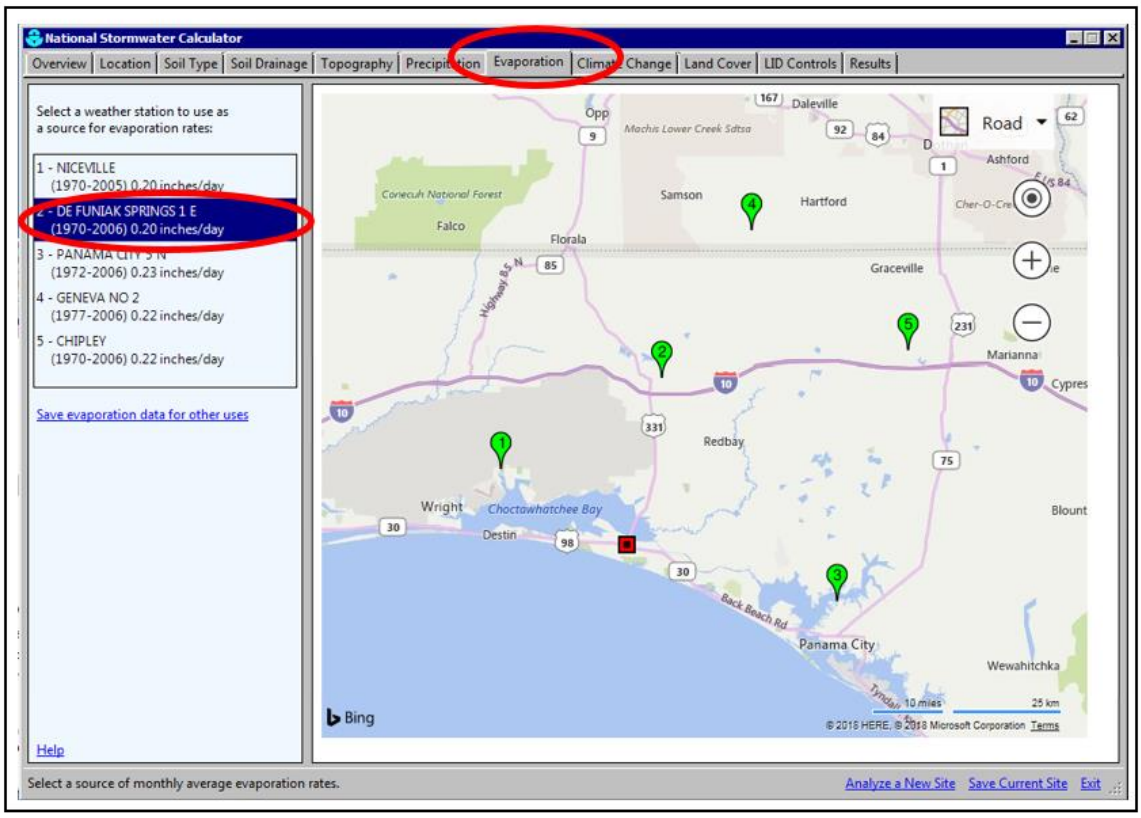
16. Check the box next to “View soil survey data” and identify the slope of your property by matching the color on the map to the colored boxes. Then check the circle with the matching color.



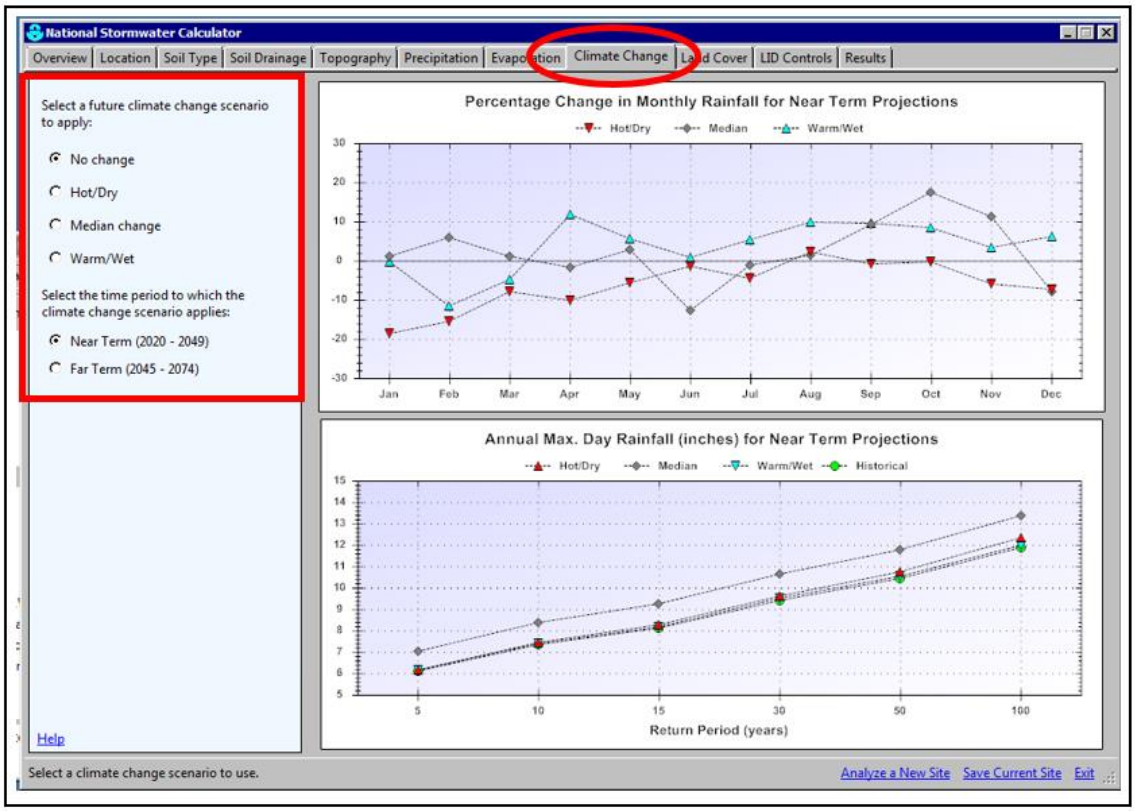
17. Once you have this information, click on the tab at the top of the screen labeled “Precipitation” and find the rain gage that is the closest to your property and click on it.



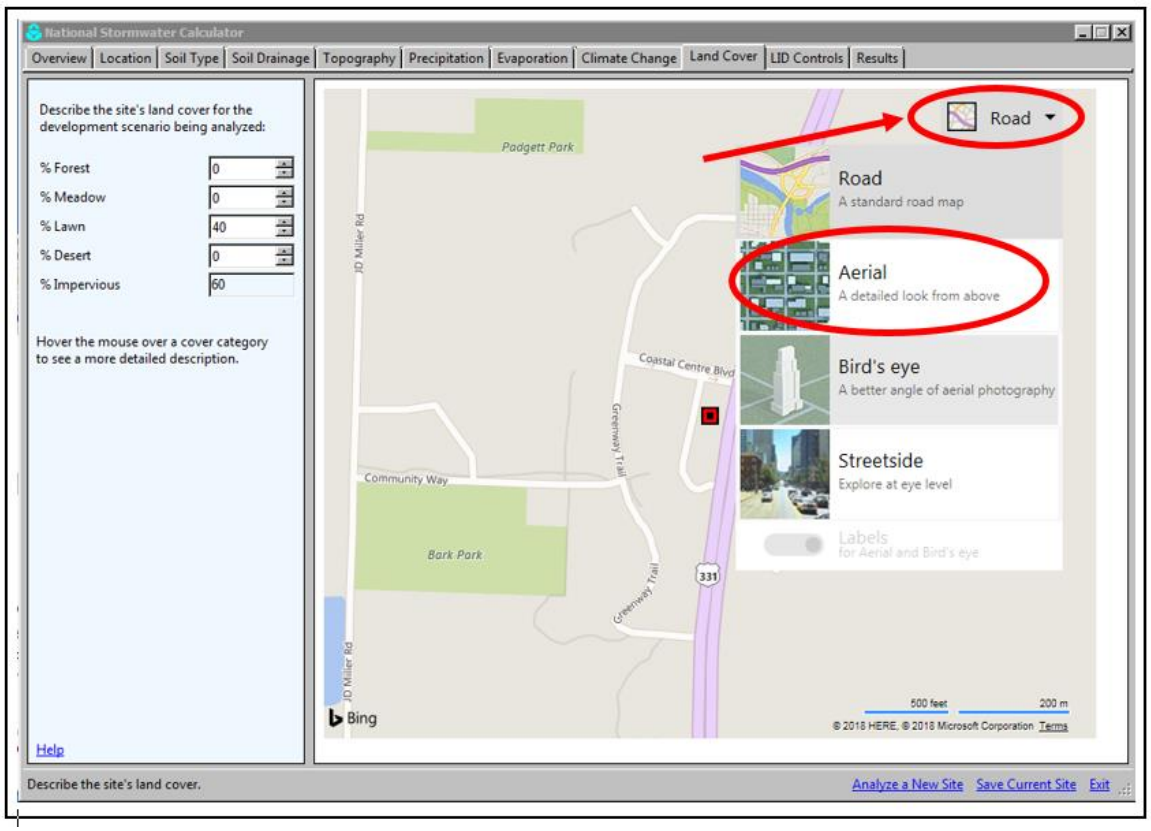
18. Next, click on the tab at the top of the screen labeled “Evaporation” and find the location that is the closest to your property and click on it.

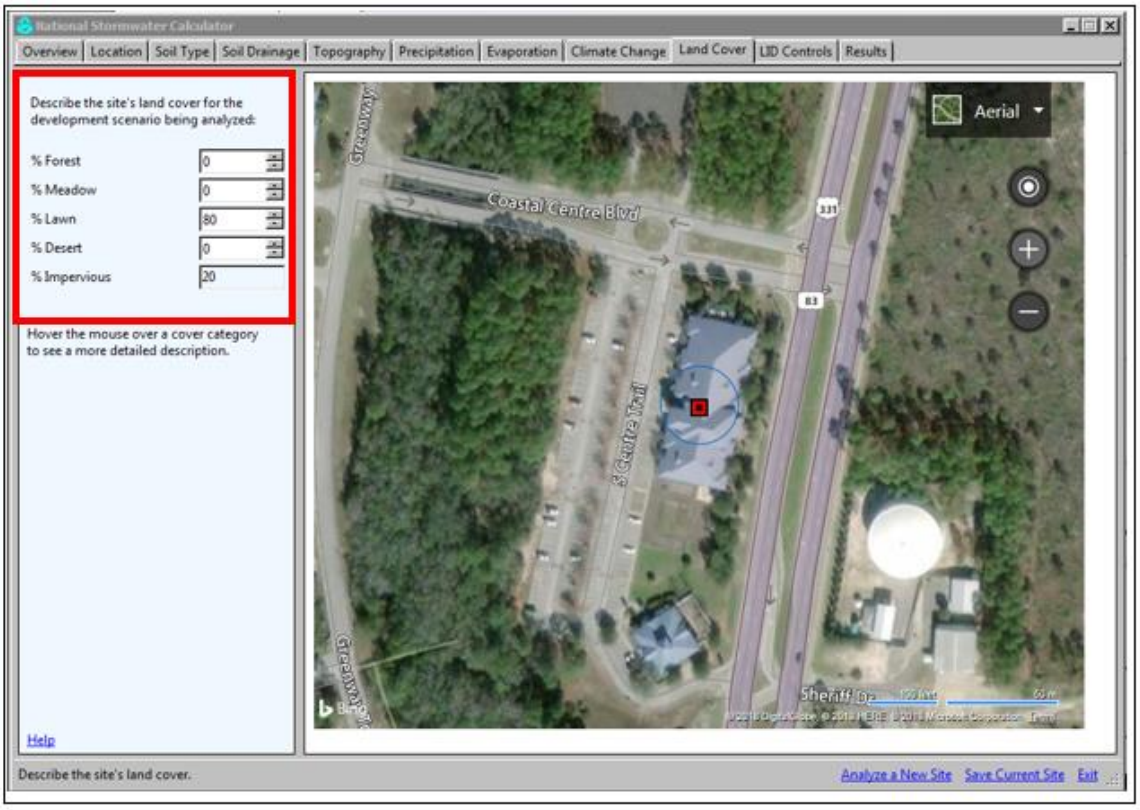


19. Click on the tab at the top of the screen labeled “Climate Change”. For this example we will keep it simple and leave it on the default settings.

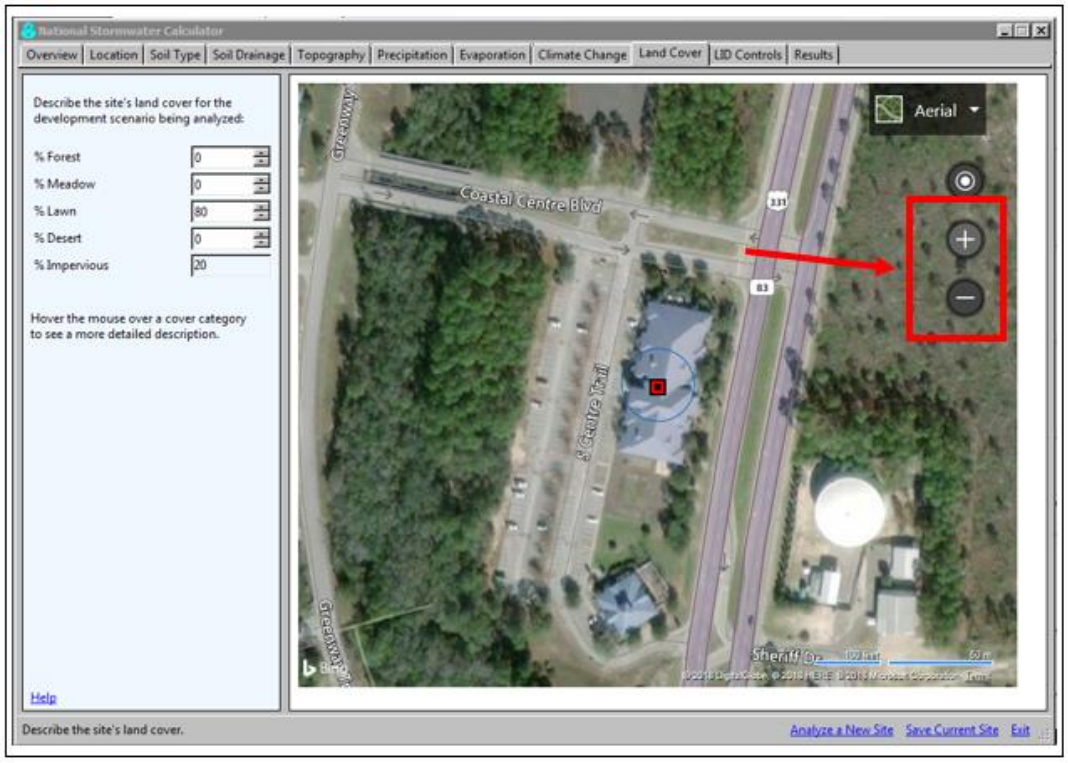


20. You can change the type of map that is depicted in this program by hovering the mouse over the “Road” icon located at the top right corner of the screen. Choose “Aerial” from the drop down menu.

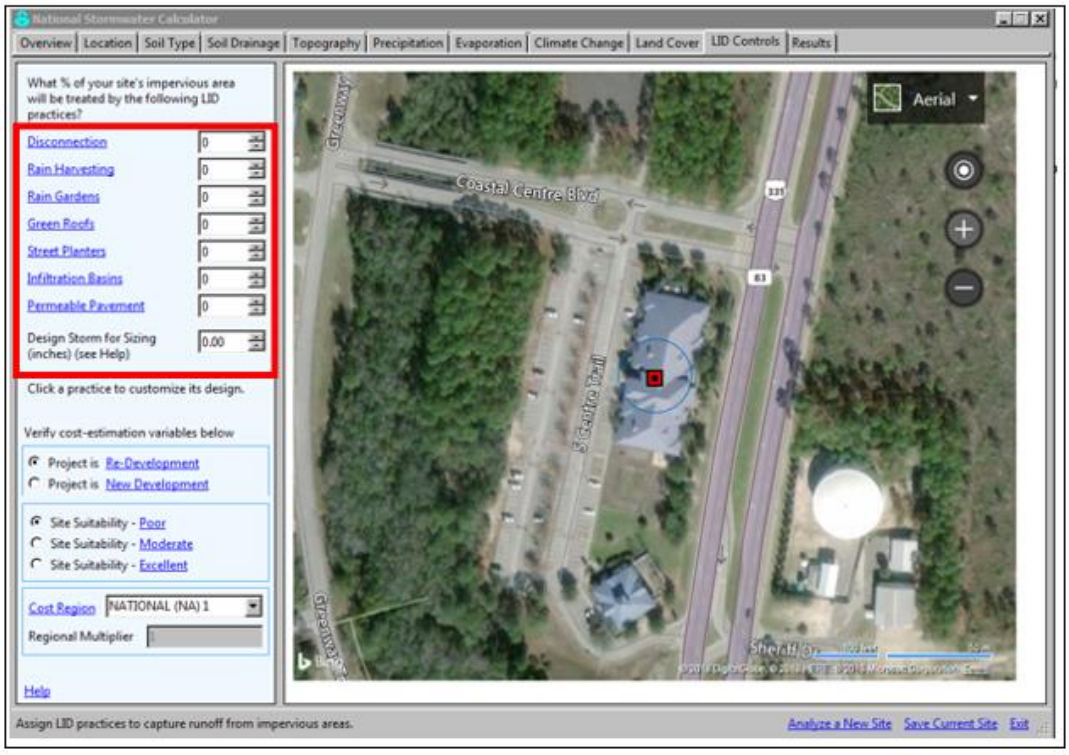




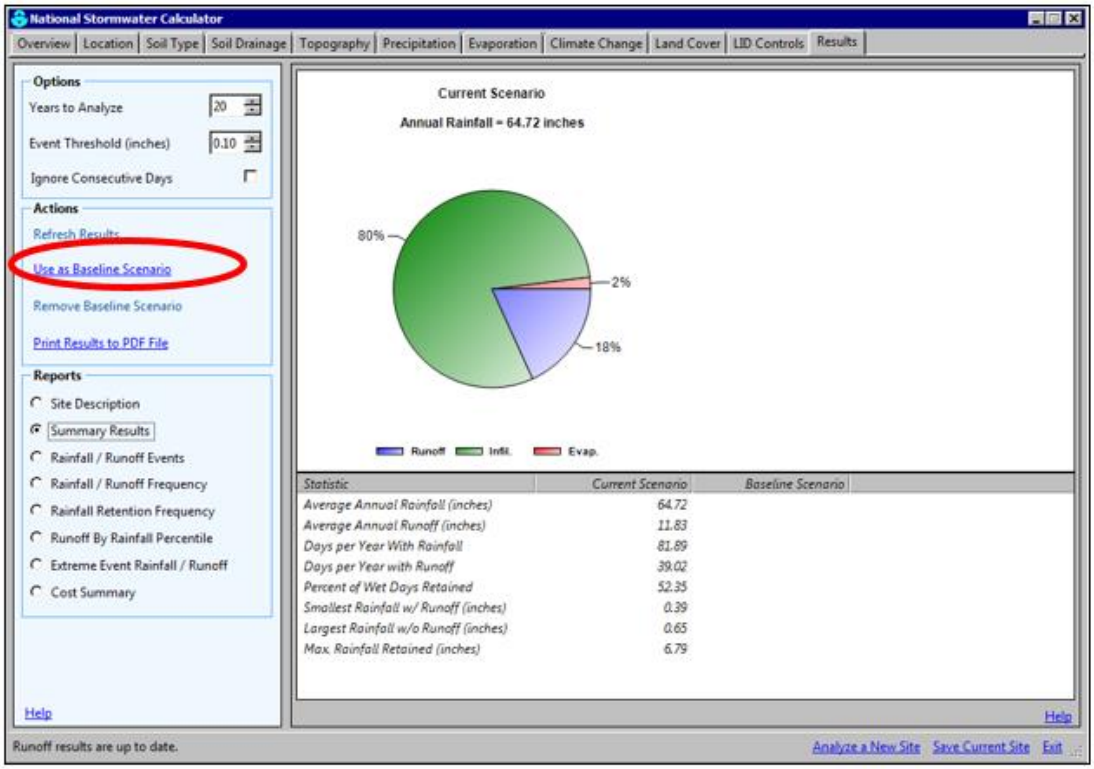
21. You can also zoom into your property by using the "+" and zoom out using the "-" features in the program depicted on the right hand side of the screen. These features might assist you with determining the percentage of different land cover.



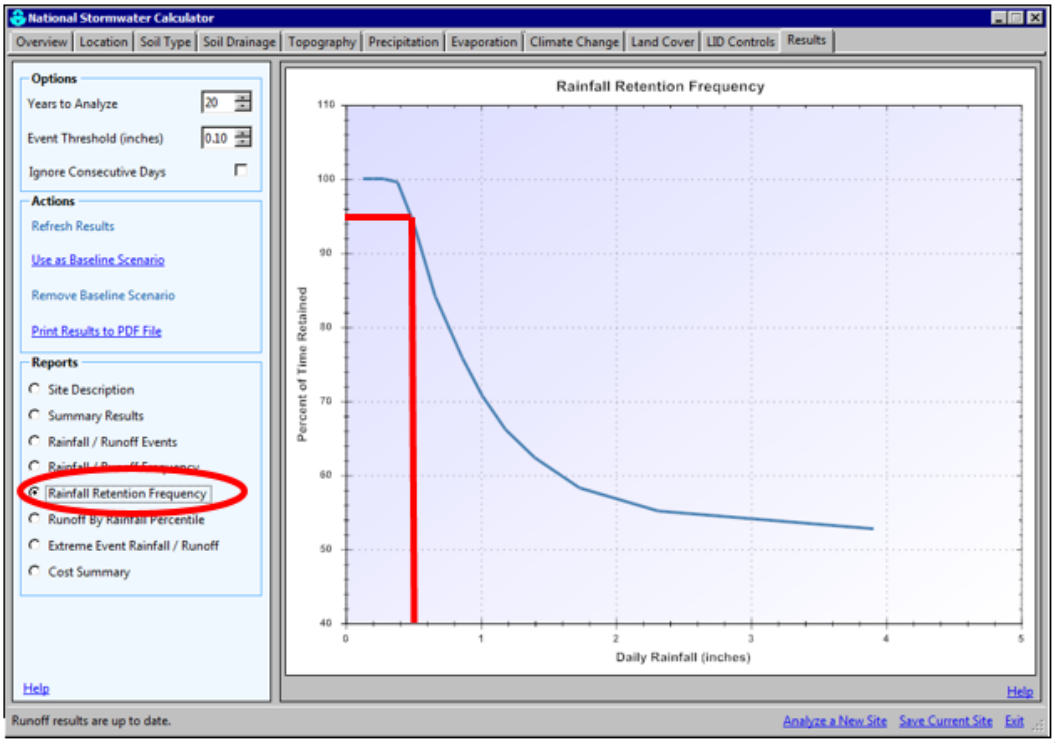
22. Now click on the tab at the top of the screen labeled "LID Controls" and make sure all the values are set to zero so we can establish a baseline for our site.



23. Next you will establish the baseline that will be use to compare the proposed LID SWMF by clicking on the tab at the top of the screen labeled “Results”. You will need to click on “Use as Baseline Scenario” located in the middle left portion of the screen.

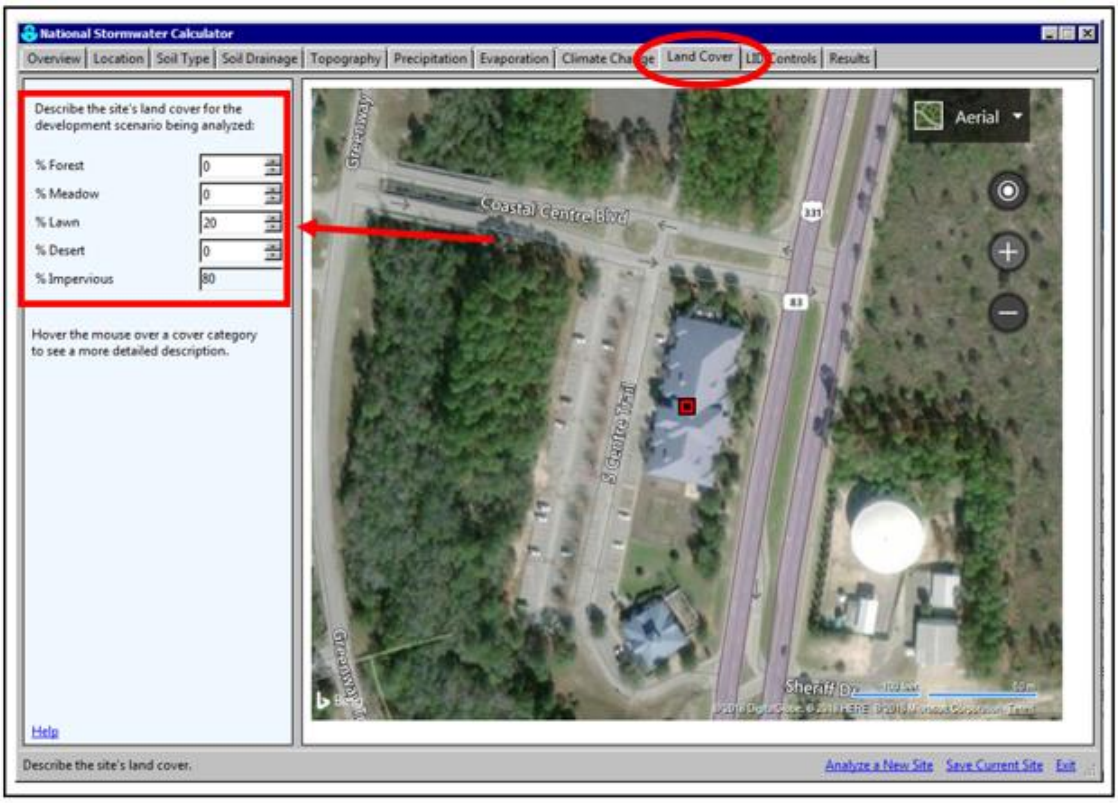


24. The goal when applying LID green infrastructure at a site is to get post-development stormwater runoff conditions as close as possible to pre-development stormwater runoff conditions. We will use the 95th percentile of rainfall retention for pre-development conditions to determine how much stormwater we will need to treat through LID SWMF. To determine the treatment value click on the “Rainfall Retention Frequency” button located on the left side of the screen. The curve generated from the baseline scenario will assist us in determining the criteria to enter for the design storm when sizing the LID system.

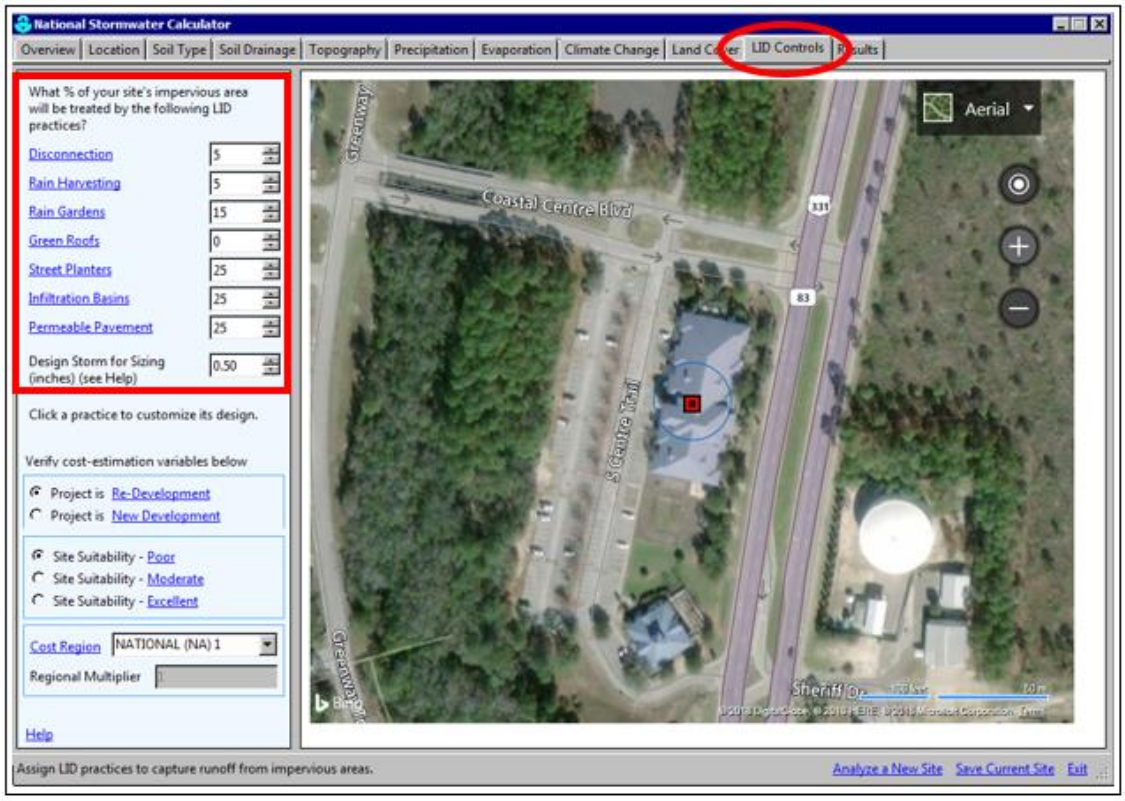


The Rainfall Retention Frequency curve for this scenario shows this value to be approximately 0.5-inches.

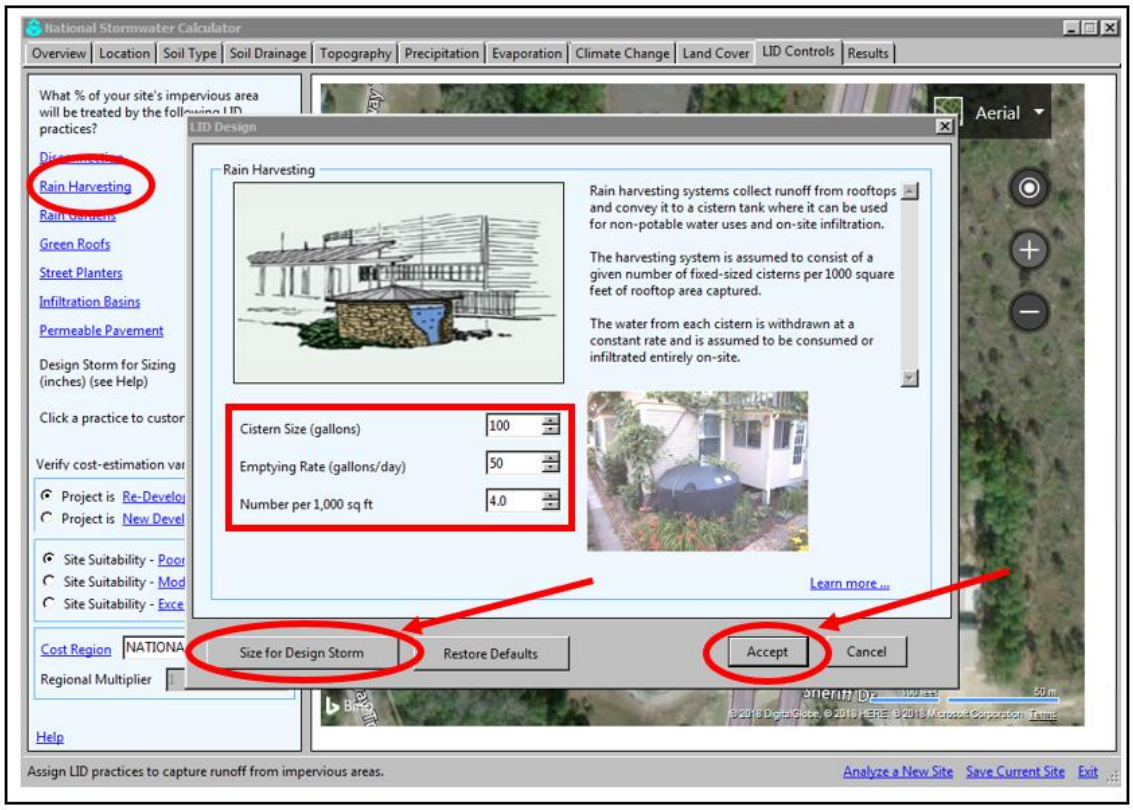
25. Once you have set your baseline and determined the quantity of rainfall that is currently reatined on your property, go back and click on the tab at the top of the screen labeled “Land Cover” and update the values for the proposed improvements. You will decrease the percentage of pervious area to reflect the area associated with the improvements.

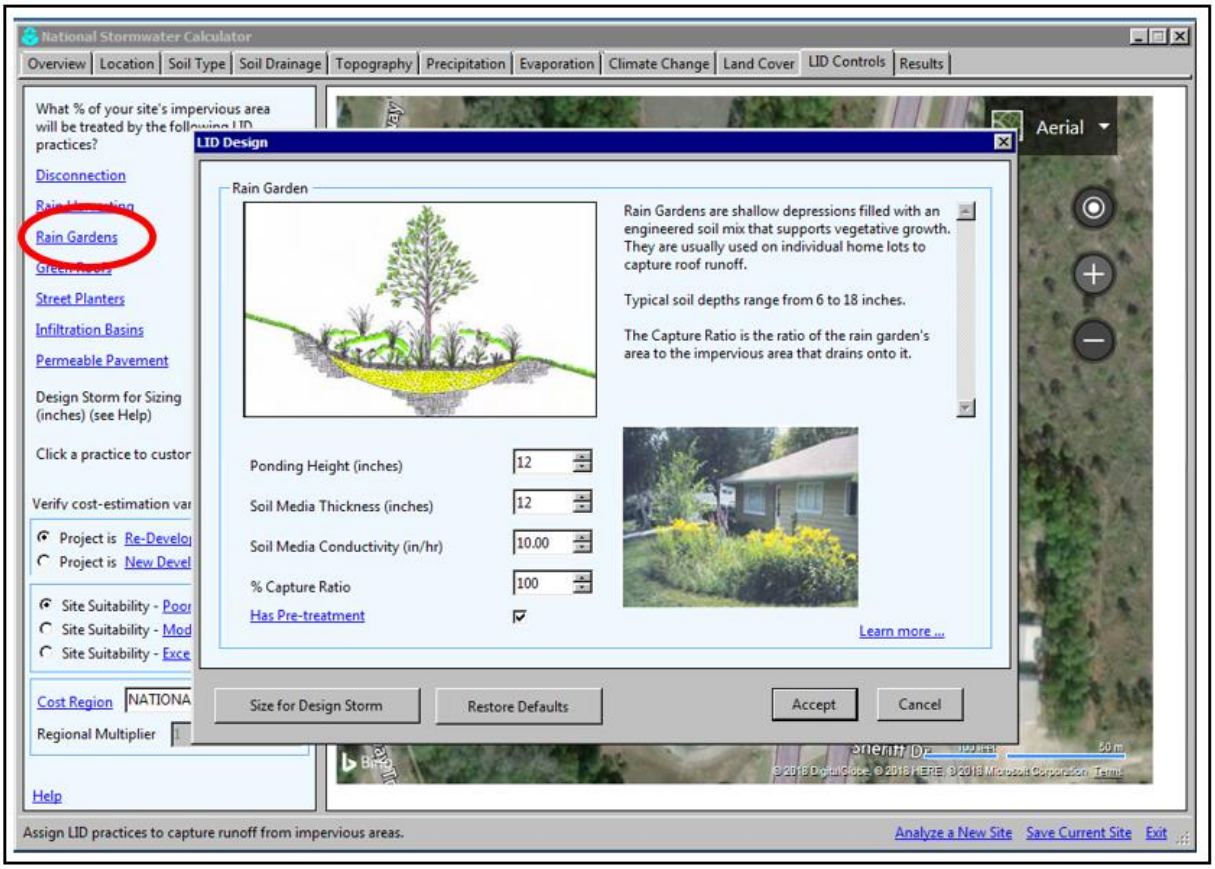


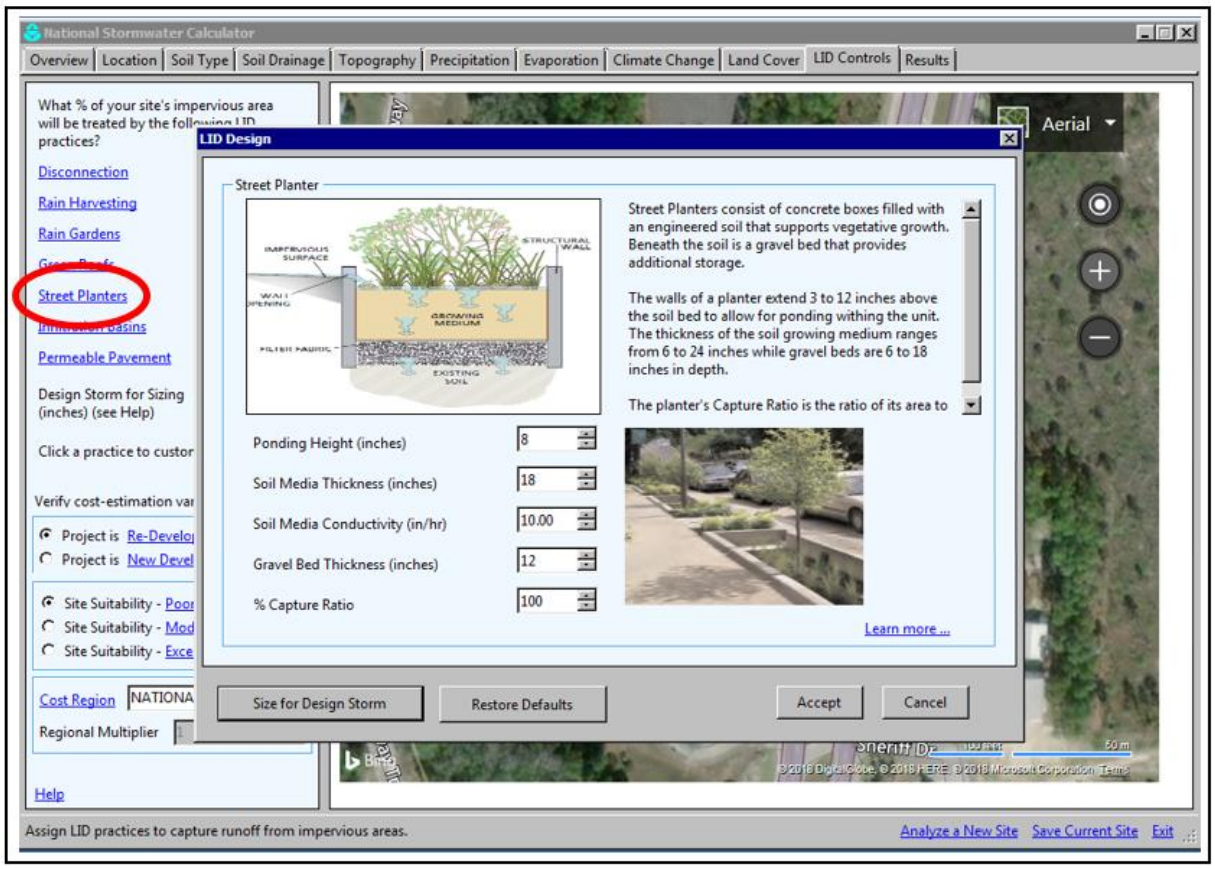
26. Next click on the tab at the top of the screen labeled “LID Controls” and enter the approximate percentage of impervious area that each LID SWMF will receive. You will also want to enter the value from the rainfall retention frequency curve, for this example we had determined this value to be 0.5-inches.



27. You can customize the design parameteres of each LID SWMF by clicking on each one individually. You will be presented with options to change the volume, length, width, or depth for each LID; this will allow you to design each LID according to available space and a wide variety of other site characteristics. Once you change a parameter be sure to click on the box that says “Size for Design Storm” and then on the box that says “Accept” to save the changes.




National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Climate Change
Land Cover
LID Controls
Results
What % of your site's impervious area will be treated by the following LID practices?
Disconnection
Rain Gardens
Street Planters
Infiltration Basins
Permeable Pavement
Design Storm for Sizing (inches) (see Help)
Click a practice to custor
Verify cost-estimation var
Project is Re-Develo
Project is New Devel
Site Suitability - Poor
Site Suitability - Mod
Site Suitability - Exce
Cost Region
NATIONA
Regional Multiplier
Help
Aerial
LID Design
Rain Garden
Rain Gardens are shallow depressions filled with an engineered soil mix that supports vegetative growth. They are usually used on individual home lots to capture roof runoff.
Typical soil depths range from 6 to 18 inches.
The Capture Ratio is the ratio of the rain garden's area to the impervious area that drains onto it.
Ponding Height (inches)
12
Soil Media Thickness (inches)
12
Soil Media Conductivity (in/hr)
10.00
% Capture Ratio
100
Has Pre-treatment
Learn more ...
Size for Design Storm
Restore Defaults
Accept
Cancel
Assign LID practices to capture runoff from impervious areas.
Analyze a New Site
Save Current Site
Exit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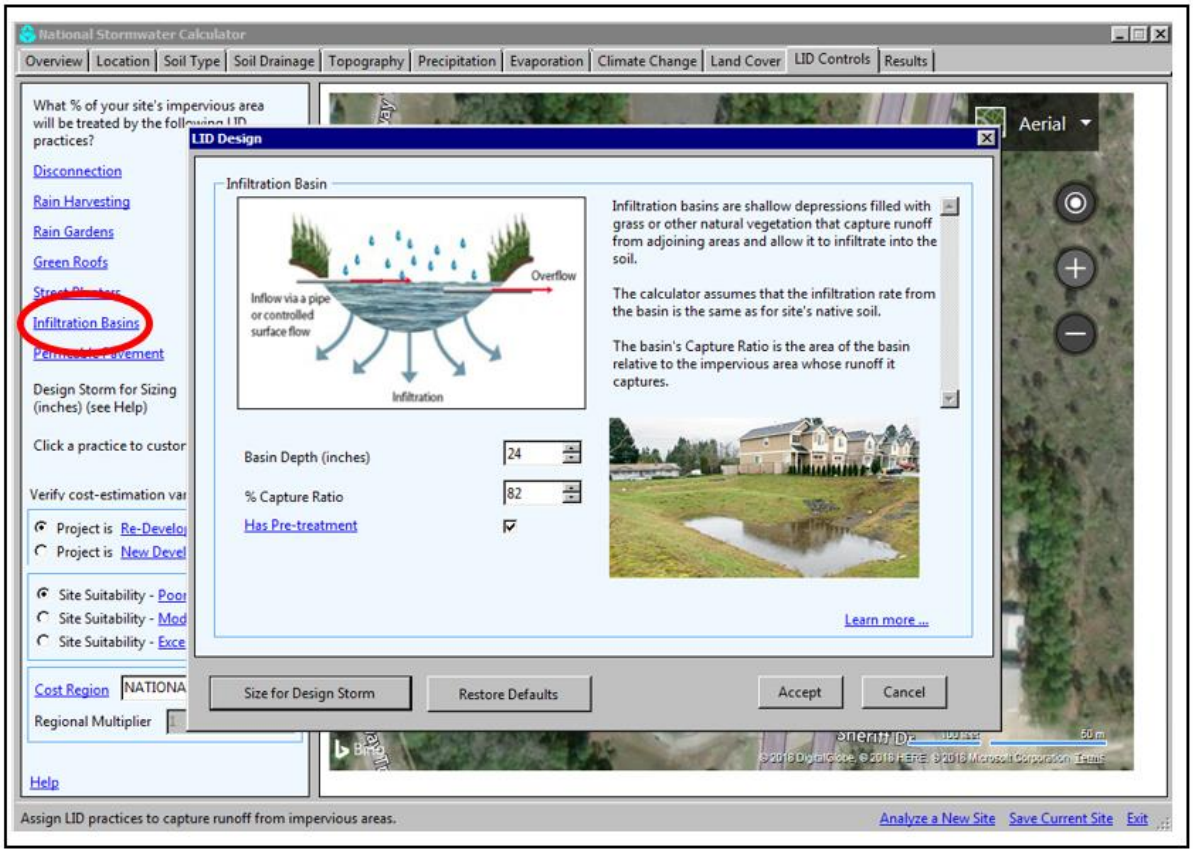
Help
Aerial
LID Design
Street Planter
IMPERVIOUS SURFACE
STRUCTURAL WALL
GROWING MEDIUM
EXISTING SOIL
Street Planters consist of concrete boxes filled with an engineered soil that supports vegetative growth. Beneath the soil is a gravel bed that provides additional storage.
The walls of a planter extend 3 to 12 inches above the soil bed to allow for ponding withing the unit. The thickness of the soil growing medium ranges from 6 to 24 inches while gravel beds are 6 to 18 inches in depth.
The planter's Capture Ratio is the ratio of its area to
Ponding Height (inches)
8
Soil Media Thickness (inches)
18
Soil Media Conductivity (in/hr)
10.00
Gravel Bed Thickness (inches)
12
% Capture Ratio
100
Learn more ...
Size for Design Storm
Restore Defaults
Accept
Cancel
Assign LID practices to capture runoff from impervious areas.
Analyze a New Site
Save Current Site
Exit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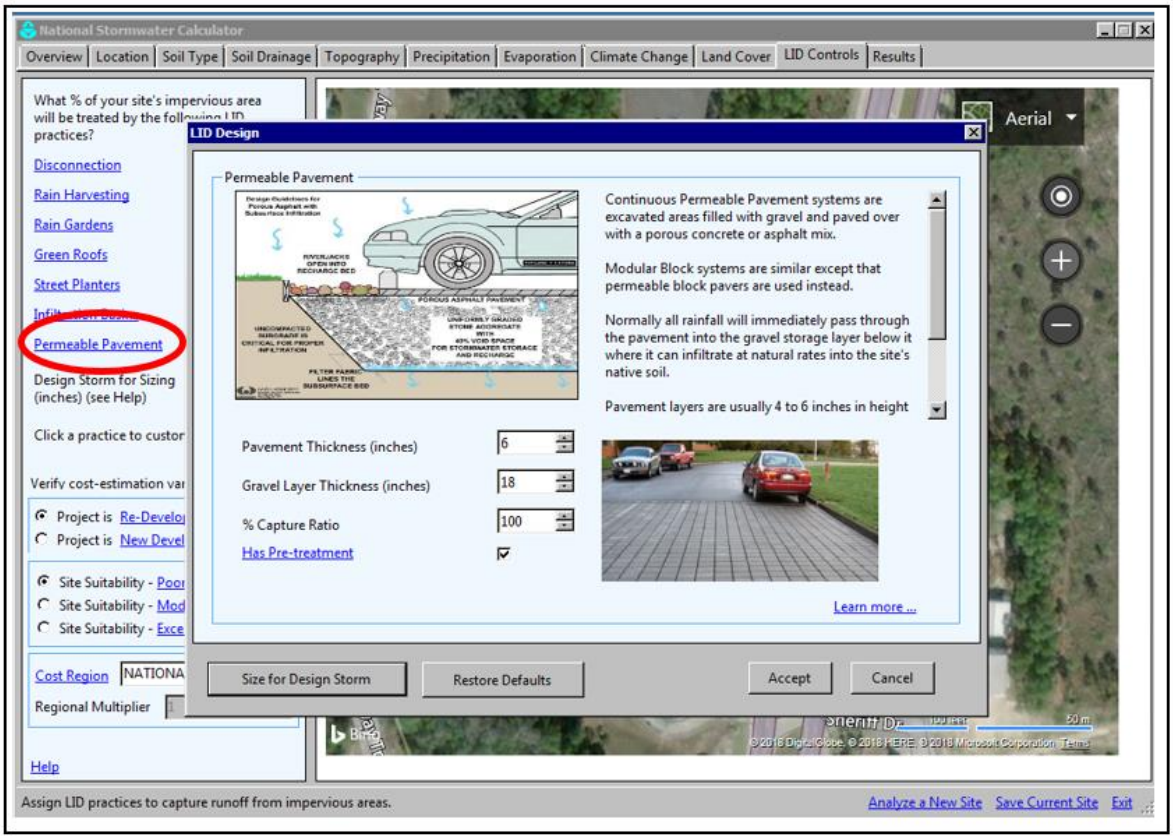
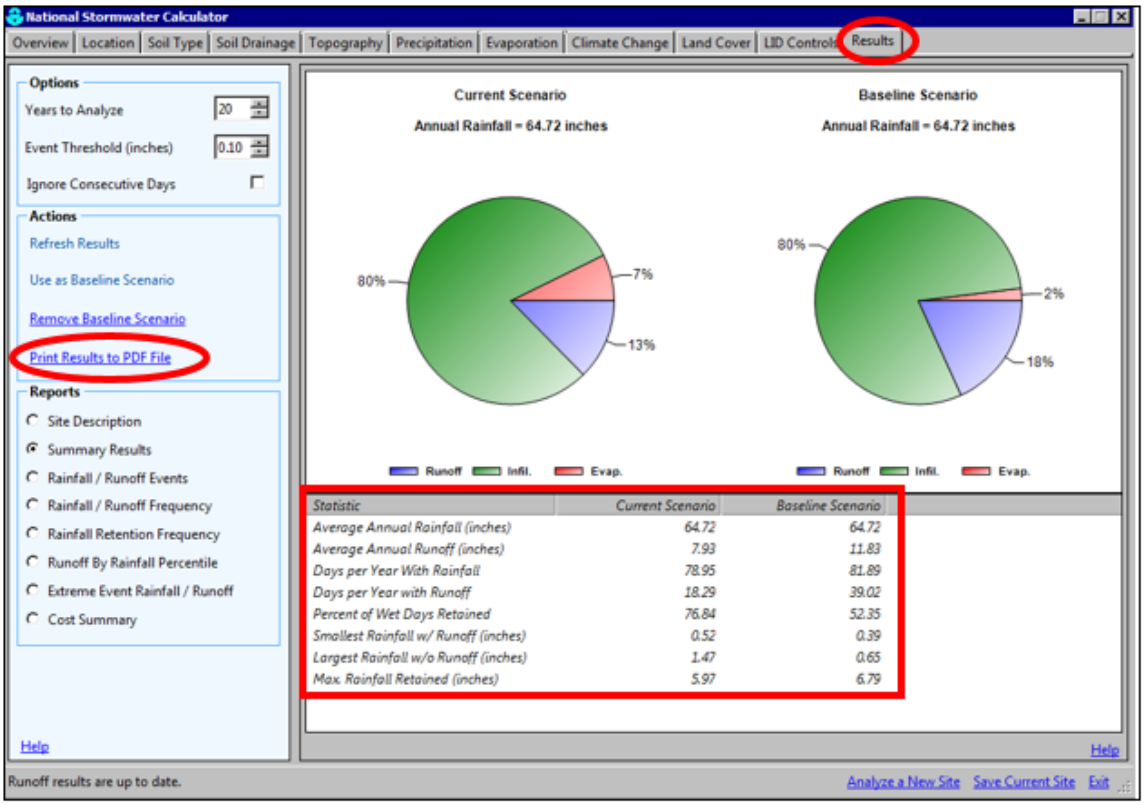
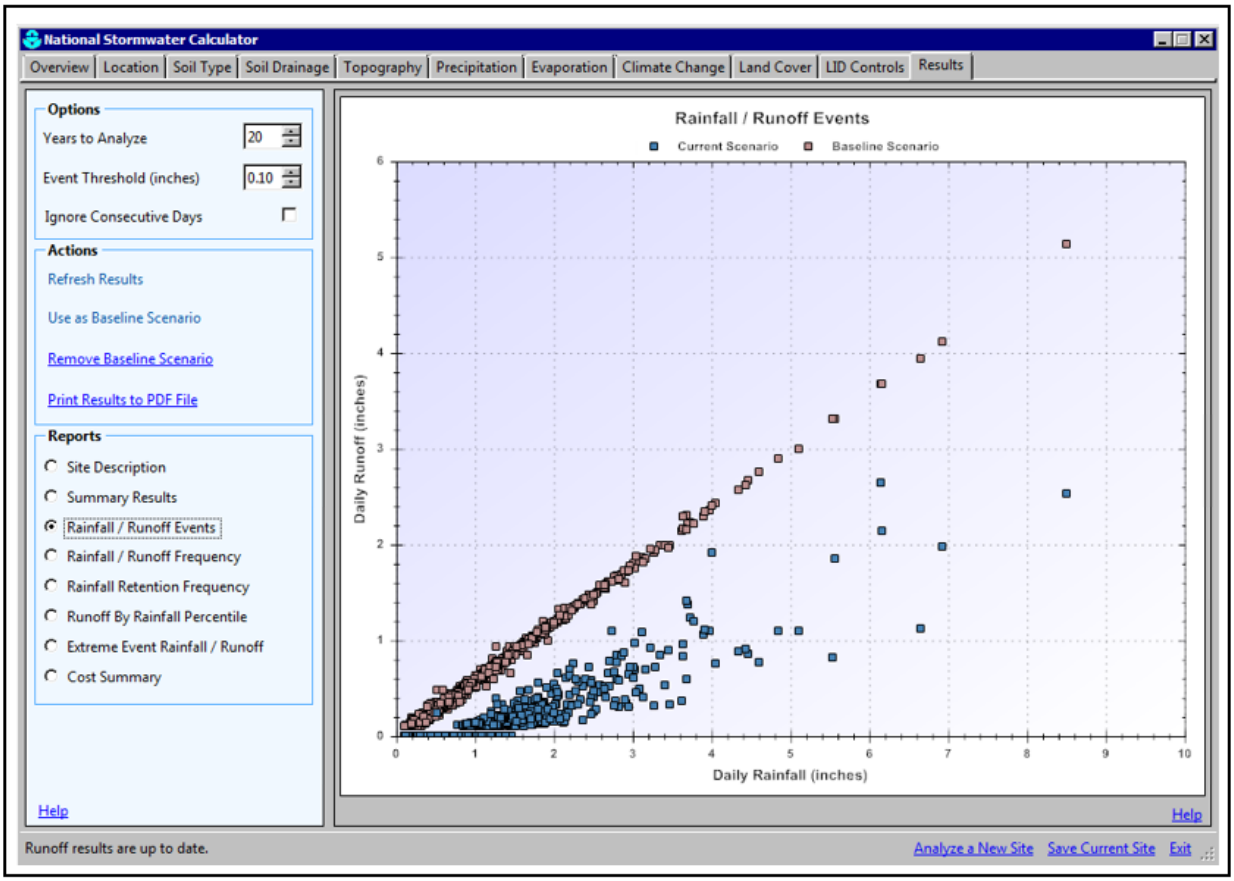
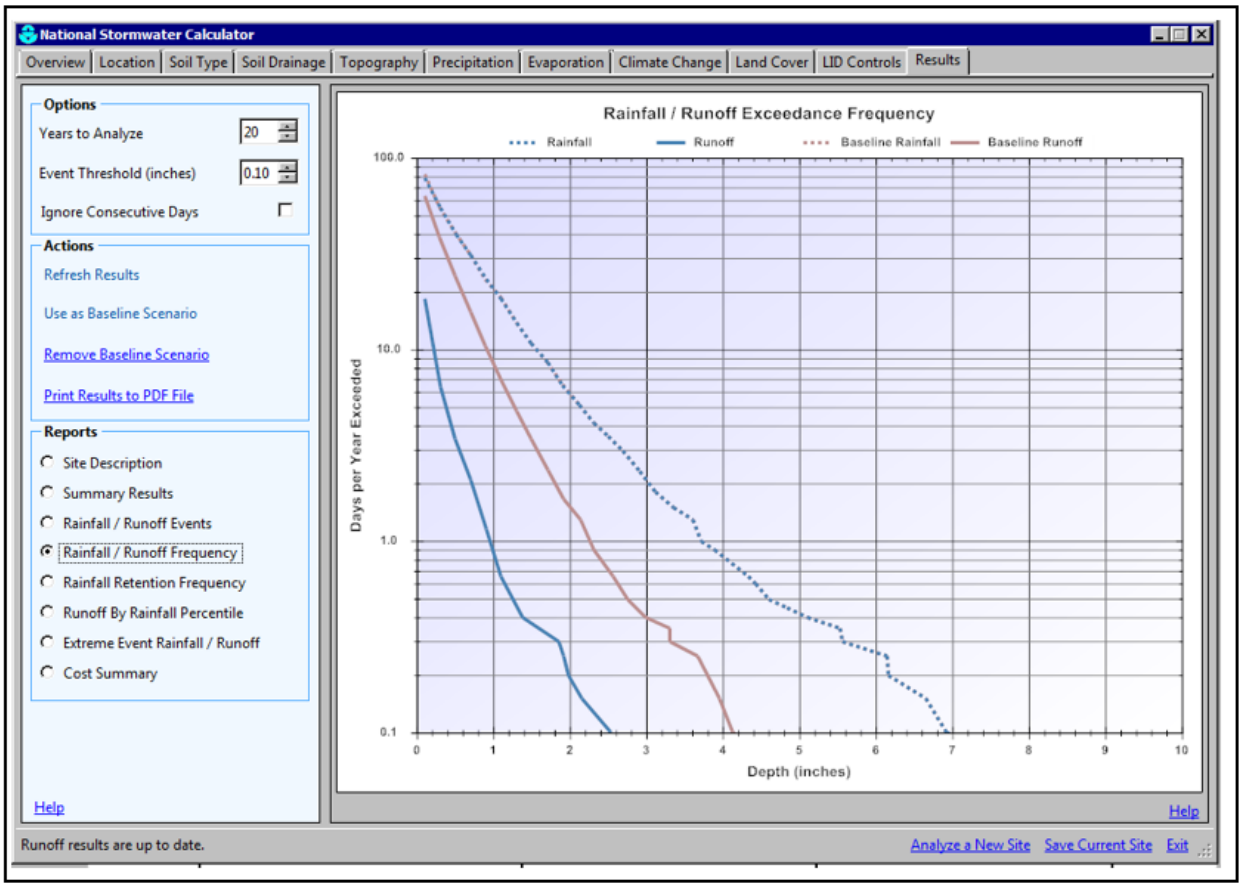
Regional Multiplier
Help
Aerial
LID Design
Infiltration Basin
Inflow via a pipe or controlled surface flow
Overflow
Infiltration
Infiltration basins are shallow depressions filled with grass or other natural vegetation that capture runoff from adjoining areas and allow it to infiltrate into the soil.
The calculator assumes that the infiltration rate from the basin is the same as for site's native soil.
The basin's Capture Ratio is the area of the basin relative to the impervious area whose runoff it captures.
Basin Depth (inches)
24
% Capture Ratio
82
Has Pre-treatment
Learn more ...
Size for Design Storm
Restore Defaults
Accept
Cancel
Assign LID practices to capture runoff from impervious areas.
Analyze a New Site
Save Current Site
Exit


National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Climate Change
Land Cover
LID Controls
Results
What % of your site's impervious area will be treated by the following LID practices?
Disconnection
Rain Harvesting
Rain Gardens
Green Roofs
Street Planters
Permeable Pavement
Design Storm for Sizing (inches) (see Help)
Click a practice to custor
Verify cost-estimation var
Project is Re-Develo
Project is New Devel
Site Suitability - Poor
Site Suitability - Mod
Site Suitability - Exce
Cost Region
NATIONA
Regional Multiplier
Help
Aerial
LID Design
Permeable Pavement
Continuous Permeable Pavement systems are excavated areas filled with gravel and paved over with a porous concrete or asphalt mix.
Modular Block systems are similar except that permeable block pavers are used instead.
Normally all rainfall will immediately pass through the pavement into the gravel storage layer below it where it can infiltrate at natural rates into the site's native soil.
Pavement layers are usually 4 to 6 inches in height
Pavement Thickness (inches)
6
Gravel Layer Thickness (inches)
18
% Capture Ratio
100
Has Pre-treatment
Learn more ...
Size for Design Storm
Restore Defaults
Accept
Cancel
Assign LID practices to capture runoff from impervious areas.
Analyze a New Site
Save Current Site
Exit

28. Now you are ready to compare the proposed LID SWMF results with the current baseline. Click on the tab at the top of the screen labeled “Results” and then click on “Refresh Results” to run the analysis. You will need to click on “Print results to PDF File” and submit the information with your application. Make sure to include the dimensions of each LID SWMF that you are proposing for your property.




National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Climate Change
Land Cover
LID Controls
Results
Options
Years to Analyze
20
Event Threshold (inches)
0.10
Ignore Consecutive Days
Actions
Refresh Results
Use as Baseline Scenario
Remove Baseline Scenario
Print Results to PDF File
Reports
Site Description
Summary Results
Rainfall / Runoff Events
Rainfall / Runoff Frequency
Rainfall Retention Frequency
Runoff By Rainfall Percentile
Extreme Event Rainfall / Runoff
Cost Summary
Help
Rainfall / Runoff Events
Current Scenario
Baseline Scenario
Daily Runoff (inches)
Daily Rainfall (inches)
Help
Runoff results are up to date.
Analyze a New Site
Save Current Site
Exit


National Stormwater Calculator
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Options
Years to Analyze
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Remove Baseline Scenario
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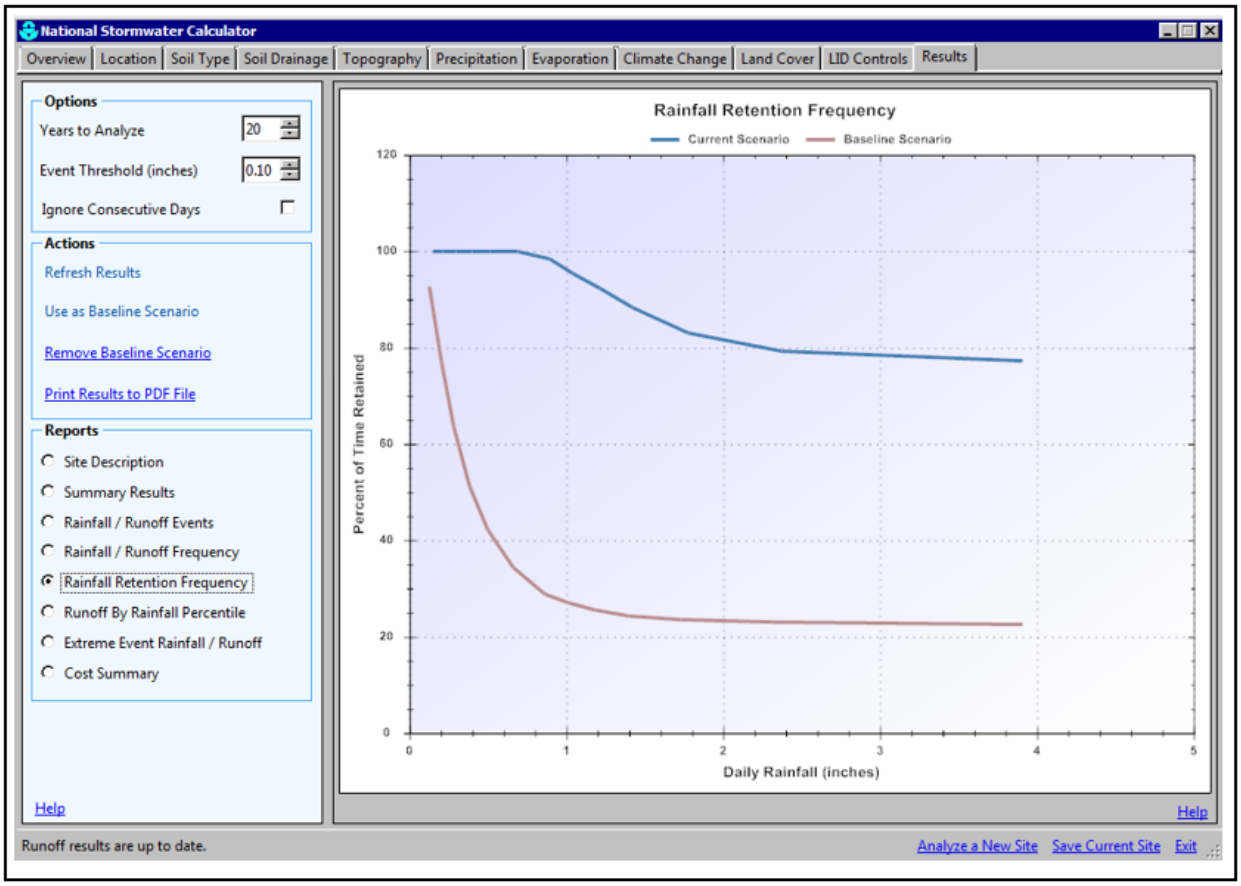
Rainfall / Runoff Frequency
Rainfall Retention Frequency
Runoff By Rainfall Percentile
Extreme Event Rainfall / Runoff
Cost Summary
Help
Rainfall / Runoff Exceedance Frequency
Rainfall
Runoff
Baseline Rainfall
Baseline Runoff
100.0
10.0
1.0
0.1
Days per Year Exceeded
0
1
2
3
4
5
6
7
8
9
10
Depth (inches)
Help
Runoff results are up to date.
Analyze a New Site
Save Current Site
Exit


National Stormwater Calculator
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Years to Analyze
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Remove Baseline Scenario
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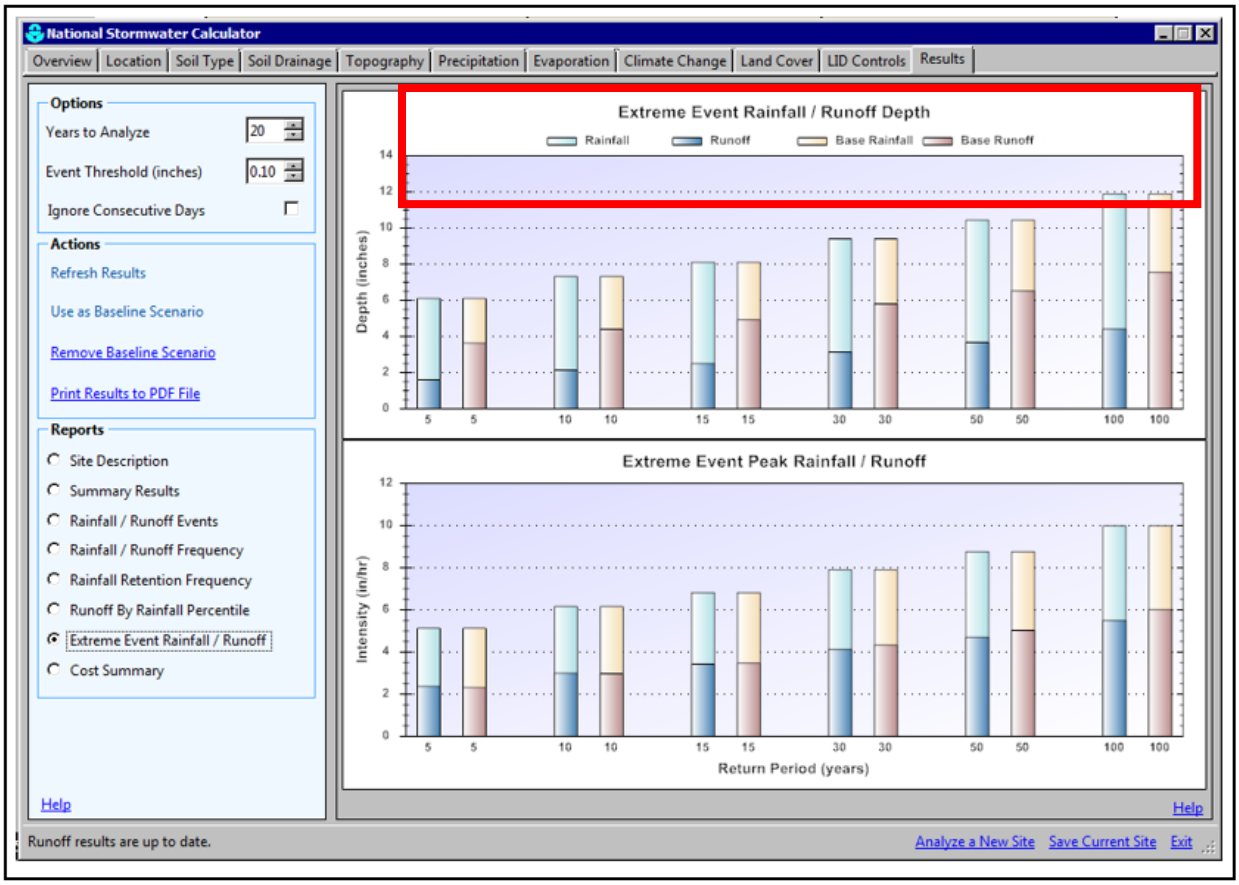
Summary Results
Rainfall / Runoff Events
Rainfall / Runoff Frequency
Rainfall Retention Frequency
Runoff By Rainfall Percentile
Extreme Event Rainfall / Runoff
Cost Summary
Help
Rainfall Retention Frequency
Current Scenario
Baseline Scenario
Percent of Time Retained
Daily Rainfall (inches)
Help
Runoff results are up to date.
Analyze a New Site
Save Current Site
Exit



Additional information about this program is available in the user's guide and can be accessed at the following link: https://www.epa.gov/sites/production/files/2018-06/documents/swc_users_guide_desktop_v1.2.0.1_june_2018.pdf[6]

[6] Environmental Protection Agency. EPA/600/R-13/085e. *National Stormwater Calculator User's Guide.* https://www.epa.gov/water-research/national-stormwater-calculator-users-guide. June 2018.

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