



EPA Tools and Resources webinar: National Stormwater Calculator

August 23, 2017

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Outline

U.S. EPA National Stormwater Calculator

- **Stormwater Calculator Background Information**
- **Potential Applications**
- **Using the Calculator: Manatee County, FL (May 2017 Application)**
- **Example Application:**
 - U.S. Climate Resilience Toolkit
- **Development of Mobile Web Application**
- **Discussion & Questions**

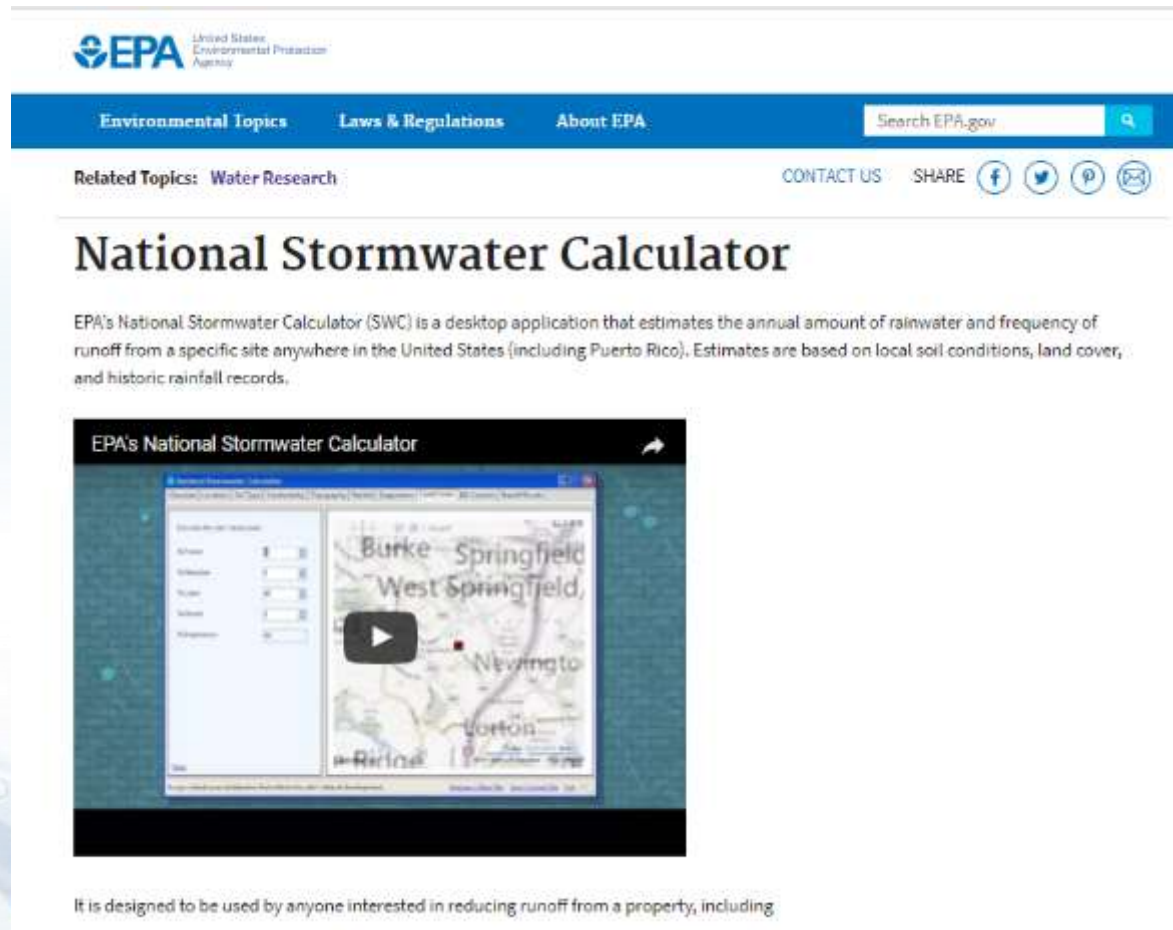


Typical Urban Stormwater Impacts

- **Water Quality:** Nutrient and insecticide runoff, fecal coliform bacteria, leading to impaired waters and beach closures
- **Hydrologic, Geomorphic, and Biological:** Flooding, stream bank erosion, impaired aquatic habitat, and sewer overflows
- **Flooding:** Transportation infrastructure and private property damages



National Stormwater Calculator Website



EPA United States Environmental Protection Agency

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National Stormwater Calculator


EPA's National Stormwater Calculator (SWC) is a desktop application that estimates the annual amount of rainwater and frequency of runoff from a specific site anywhere in the United States (including Puerto Rico). Estimates are based on local soil conditions, land cover, and historic rainfall records.

EPA's National Stormwater Calculator

It is designed to be used by anyone interested in reducing runoff from a property, including

<http://www2.epa.gov/water-research/national-stormwater-calculator>


What Have We Created and Why?

- **Stormwater Management (Green Infrastructure/Low Impact Development (LID)) Design and Planning Tool**
 - Model post-construction urban stormwater runoff discharges
 - Allow for screening-level analysis of various green infrastructure practices, including planning level costs (green roofs, rain gardens, cisterns, etc.) throughout the U.S.
 - Allow non-technical professionals to conduct screening level stormwater runoff for small to medium sized (less than 1 - 12 acres) sites
- 
- A decorative graphic at the bottom of the slide showing a splash of water with bubbles and droplets, rendered in shades of light blue and white against a light blue background.

Potential Applications


- State or MS4 (Municipal Separate Storm Sewer System) Post Construction Stormwater Design Standards
- Voluntary Stormwater Retrofits for private property owners
- Voluntary Programs: LEED (U.S. Green Building Council) and Sustainable Sites Initiative stormwater credits
- Climate Resiliency Planning: Rockefeller Foundation's 100 Resilient Cities
- LID/Green Infrastructure Design Competitions: Campus RainWorks Challenge, DC Water Green Infrastructure Challenge, etc.

Training and Outreach Materials: User's Guide & Fact Sheet

 EPA
United States
Environmental Protection
Agency


EPA/600/R-13/085d | Revised January 2017 | www.epa.gov/research

National Stormwater Calculator User's Guide



The National Stormwater Calculator shows users how land use decisions and green infrastructure practices affect the amount of stormwater runoff produced. Green infrastructure, such as the street planter and porous pavers shown above (Image 1), are low impact development controls that promote the natural movement of water within an ecosystem or watershed, instead of allowing it to wash into streets and down storm drains, as it does with traditional grey infrastructure shown above (Image 2).

These practices allow the stormwater to be used as a resource rather than a waste product. Having less water runoff into storm drains and roadways can help prevent contamination of waterways, infrastructure degradation, flooding, and overwhelming of treatment plants.

 EPA


www.epa.gov/research

science in ACTION


INNOVATIVE RESEARCH FOR A SUSTAINABLE FUTURE

National Stormwater Calculator (SWC)

Tool that helps users control runoff to promote the natural movement of water



(1) Green Infrastructure



(2) Traditional Grey Infrastructure

Stormwater discharges continue to cause impairment of our Nation's waterbodies. In order to reduce impairment, EPA has developed the National Stormwater Calculator (SWC) to help support local, state, and national stormwater management objectives and regulatory efforts to reduce runoff through infiltration and retention using green infrastructure practices as low impact development (LID) controls. The primary focus of the SWC is to inform site developers on how well they can meet a desired stormwater retention target with and without the use of green infrastructure. It can also be used by landscapers and homeowners.

Platform. The SWC is a Windows-based desktop program that requires an internet connection. A mobile web application version that will be compatible with all operating systems is currently being developed.


Cost Module. An LID cost estimation module within the application allows planners and managers to evaluate LID controls based on comparison of regional and national project planning level cost estimates (capital and average annual maintenance) and predicted LID control performance. Cost estimation is accomplished based on user-identified size configuration of the LID control infrastructure and other key project and site-specific variables. This includes whether the project is being applied as part of new development or redevelopment and if there are existing site constraints.

Climate Scenarios. The SWC allows users to consider how runoff may vary based both on historical weather and potential future climate conditions. To better inform decisions, it is recommended that the user develop a range of SWC results with various assumptions about model inputs such as percent of impervious surface, soil type, slope of green infrastructure, as well as historical weather and future climate scenarios. Please check with local authorities about whether and how use of these tools may support local stormwater management goals.





The SWC is comprised of ten tabbed pages:

- 1-Location.** This step has an address lookup feature that allows the user to easily navigate to a site selected anywhere within the United States.
- 2-Soil Type.** In this step, soil type is identified and is used to infer infiltration properties. It can be selected based on local knowledge or from the online database.
- 3-Soil Drainage.** This step identifies how quickly water drains into the soil. Conductivity can be selected based on local knowledge or retrieved from the online database.
- 4-Topography.** Here, the site's surface topography is characterized, as measured by the surface slope. The user can rely on the slope data display as a guide or can use local knowledge to describe the site's topography.

Storm Water Management Model (SWMM)

 United States Environmental Protection Agency

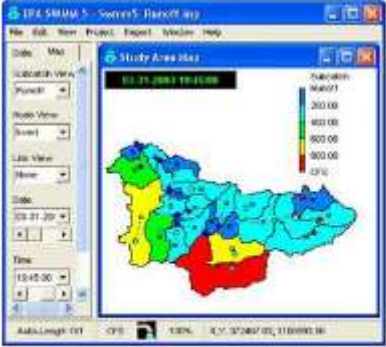
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Related Topics: [Water Research](#) CONTACT US SHARE    

Storm Water Management Model (SWMM)

Version 5.1.012 with Low Impact Development Controls

- [Description](#)
- [Capabilities](#)
- [Applications](#)
- [Add-in Tool](#)
- [Support](#)
- [Downloads](#)
- [Documentation](#)
- [Helpful Resources](#)
- [Contact](#)



- Calculator is based on SWMM: Dynamic rainfall-runoff simulation model for long-term simulation of runoff quantity
- SWMM produces stormwater runoff estimates in the background of the Stormwater Calculator

National Stormwater Calculator (SWC) Desktop Application

National Stormwater Calculator

Overview Location Soil Type Soil Drainage Topography Precipitation Evaporation Climate Change Land Cover LID Controls Results

Welcome to the EPA National Stormwater Calculator

This calculator estimates the amount of stormwater runoff generated from a land parcel under different development and control scenarios over a long-term period of historical rainfall.

The analysis takes into account local soil conditions, topography, land cover and meteorology. Different types of low impact development (LID) practices can be employed to help capture and retain rainfall on-site. Localized climate change scenarios can also be analyzed.

Site information is provided to the calculator using the tabbed pages listed above. The Results page is where the site's runoff is computed and displayed.

This program was produced by the U.S. Environmental Protection Agency and was subject to both internal and external technical review. Please check with local authorities about whether and how it can be used to support local stormwater management goals and requirements.

Release 1.2.0.0

bing

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Select the Location tab to begin analyzing a new site.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

SWC:

Site Parameters and Embedded GIS Data-sets

- **Location:** Bing Maps
- **Soils:** NRCS SSURGO
- **Slope:** NRCS SSURGO
- **Hydraulic Conductivity:** NRCS SSURGO
- **Precipitation and Temperature:** National Climate Center (NCDC)-NOAA from EPA's BASINS Model
- **Evaporation:** Calculation based on meteorological data
- **Climate Change Future Scenarios:** Precipitation & evaporation
- **Land-Cover/Use:** User provided
- **LID Practices (*new costing module available*):** User provided

SWC Application: Manatee County, FL Green & Complete Streets Workshop (May 2017)

National Stormwater Calculator

Overview Location **Soil Type** Soil Drainage Topography Precipitation Evaporation Climate Change Land Cover LID Controls Results

Site Name (Optional)
Manatee County, FL

Search for an address or zip code:
Manatee County, FL

Site Location (Latitude, Longitude)
27.482261204615355, -82.6062698364258

Site Area (acres - Optional)
0.0

[Open a previously saved site](#)

Bring your site into view on the map and then mark its exact location by clicking the mouse pointer over it.

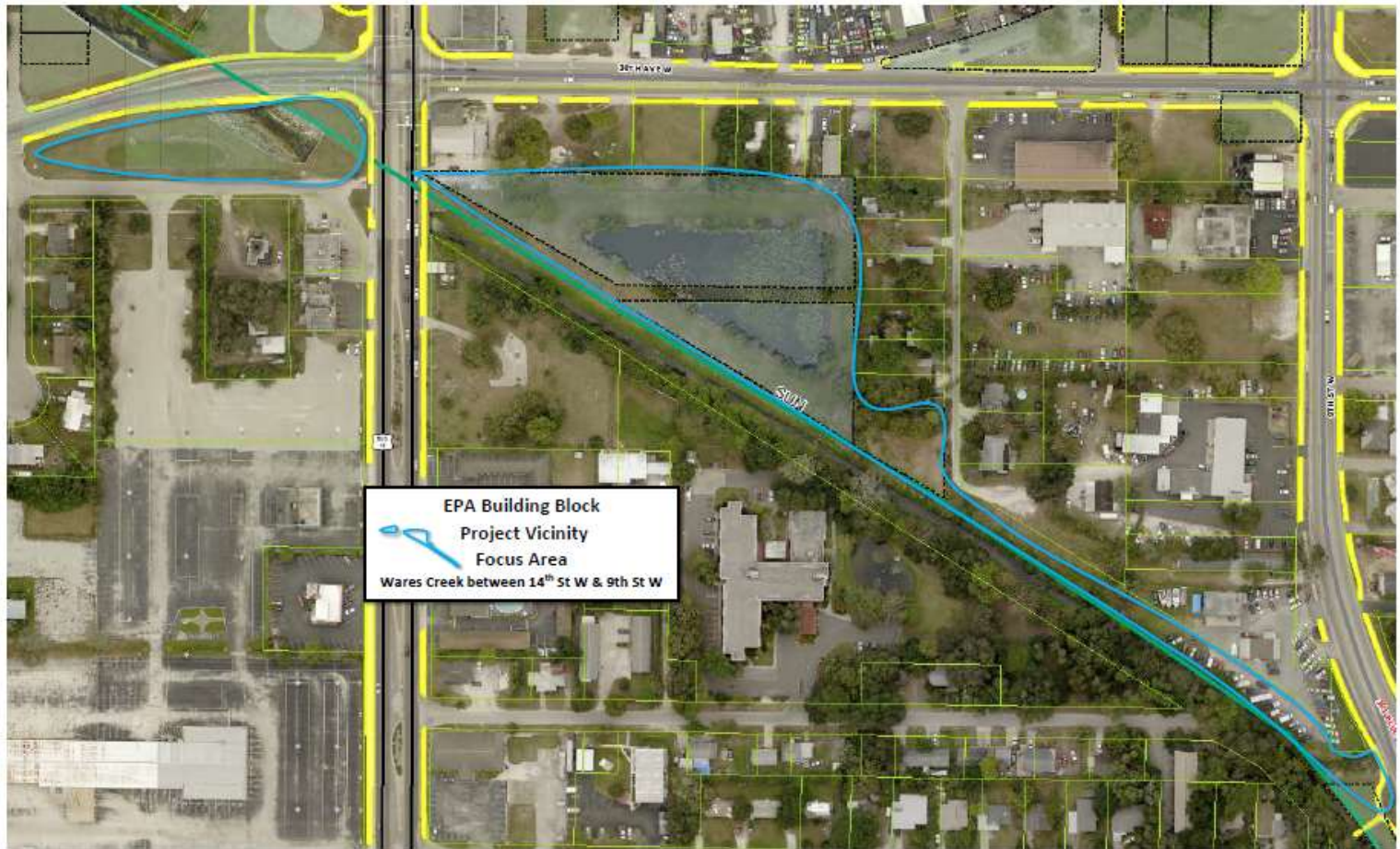
bing

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Locate the site on the map.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

SWC Analysis for Manatee County, FL: Potential Stormwater Management Areas (Wares Creek, 14th St. W. – 9th St. W.)



SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Project Location

National Stormwater Calculator

Overview Location Soil Type Soil Drainage Topography Precipitation Evaporation Climate Change Land Cover LID Controls Results

Site Name (Optional)
BBs Stormwater Project Site


Search for an address or zip code:
27.472829, -82.573505

Site Location (Latitude, Longitude)
27.473591222738285, -82.5760604299157

Site Area (acres - Optional)
4.0

[Open a previously saved site](#)

Bring your site into view on the map and then mark its exact location by clicking the mouse pointer over it.



30th Ave W

14th St W

33rd Ave W

11th St W

100 Feet

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Locate the site on the map.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Soil Rainfall Runoff Potential

National Stormwater Calculator

Overview Location **Soil Type** Soil Drainage Topography Precipitation Evaporation Climate Change Land Cover LID Controls Results

What type of soil is on your site?

View soil survey data

- A - low runoff potential
- B - moderately low
- C - moderately high
- D - high runoff potential

When soil survey data is displayed you can select a soil type directly from the map.

[Help](#)

Select a soil type for the site.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Soil Drainage

National Stormwater Calculator

Overview Location Soil Type **Soil Drainage** Topography Precipitation Evaporation Climate Change Land Cover LID Controls Results

How fast does standing water drain from your site (inches/hour)?

1104 (Default = 0.4)

View soil survey data

- ≤ 0.01 inches/hour
- > 0.01 to ≤ 0.1 inches/hour
- > 0.1 to ≤ 1.0 inches/hour
- > 1 inches/hour

When soil survey data is displayed you can select a value directly from the map.

Help

Bird's eye*

30th Ave W

14th St W

33rd Ave W

9th St W

100 feet 50 m

© 2017 Microsoft Corporation... FidoMap by Bird's Eye © 2017 FidoMap by International Corp. © 2017 HERE

Enter the soil's drainage rate.

Analyze a New Site Save Current Site Exit

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Topography

National Stormwater Calculator

Overview Location Soil Type Soil Drainage **Topography** Precipitation Evaporation Climate Change Land Cover LID Controls Results

Describe your site's topography:

- View soil survey data
- Flat (2% Slope)
- Moderately Flat (5% Slope)
- Moderately Steep (10% Slope)
- Steep (above 15% Slope)

When soil survey data is displayed you can select a slope category directly from the map.

[Help](#)

Bird's eye*

30th Ave W

14th St W

33rd Ave W

100 feet 0 50 ft

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Analyze a New Site Save Current Site Exit

Describe how steep the site is:

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Historical Precipitation

National Stormwater Calculator

Overview | Location | Soil Type | Soil Drainage | Topography | Precipitation | Evaporation | Climate Change | Land Cover | LID Controls | Results

Select a rain gage location to use as a source of hourly rainfall data:

- 1 - BRADENTON S ESE (1970-2006) 54.89"
- 2 - PARRISH (1970-2006) 53.25"
- 3 - ST PETERSBURG (1970-2006) 49.45"
- 4 - MYAKKA RIVER ST PK (1970-2006) 59.33"
- 5 - VENICE (1970-2006) 46.92"

[Save rainfall data for other uses](#)

[Help](#)

Select a source of long-term hourly rainfall data.

[Analyze a New Site](#) | [Save Current Site](#) | [Exit](#)

The screenshot shows a satellite map of the Tampa Bay area with five red location pins numbered 1 through 5. Pin 1 is near Bradenton, Pin 2 is near Parrish, Pin 3 is near St. Petersburg, Pin 4 is near Myakka City, and Pin 5 is near Venice. The software interface includes a sidebar with a list of these locations and their average annual precipitation from 1970-2006. The top navigation bar includes tabs for Overview, Location, Soil Type, Soil Drainage, Topography, Precipitation, Evaporation, Climate Change, Land Cover, LID Controls, and Results. The bottom of the window has a status bar with the text 'Select a source of long-term hourly rainfall data.' and navigation links for 'Analyze a New Site', 'Save Current Site', and 'Exit'.

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Historical Evaporation

National Stormwater Calculator

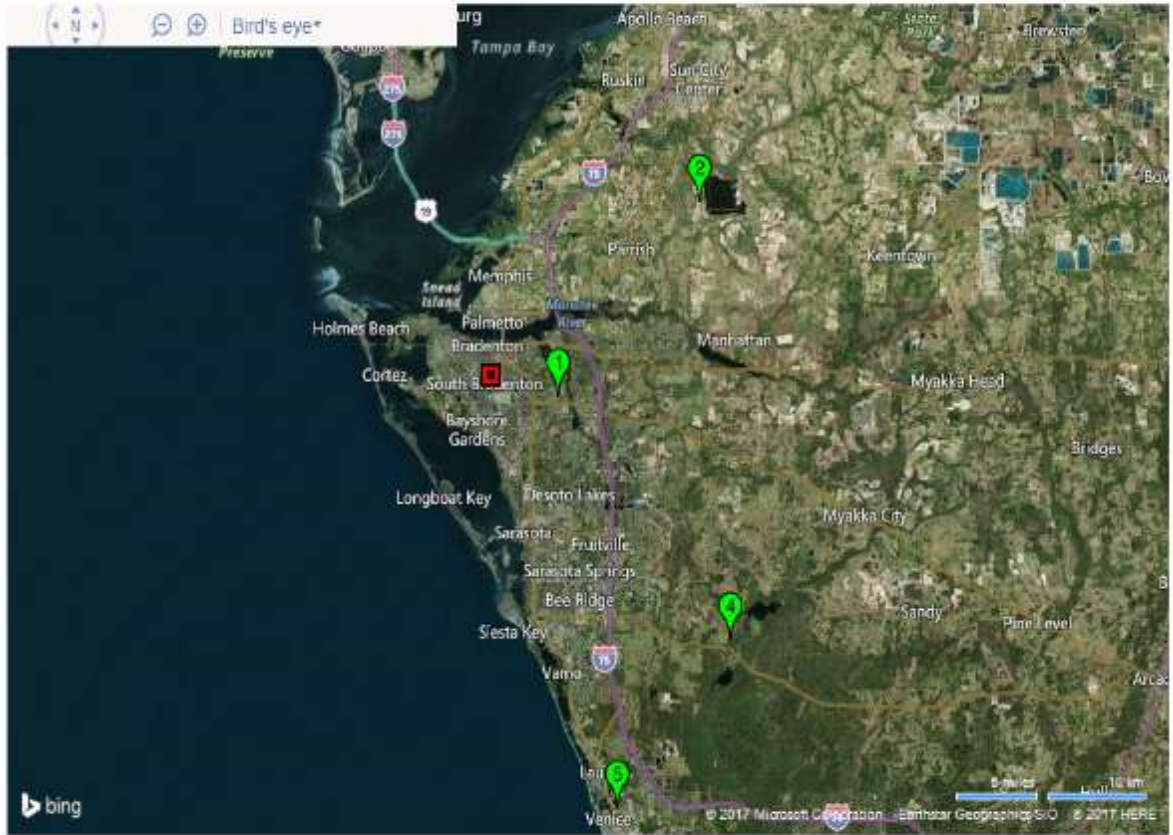
Overview | Location | Soil Type | Soil Drainage | Topography | Precipitation | Evaporation | Climate Change | Land Cover | LID Controls | Results

Select a weather station to use as a source for evaporation rates:

- 1 - BRADENTON S ESE (1970-2006) 0.22 inches/day
- 2 - PARRISH (1970-2006) 0.22 inches/day
- 3 - ST PETERSBURG (1970-2005) 0.23 inches/day
- 4 - MYAKKA RIVER ST PK (1970-2006) 0.22 inches/day
- 5 - VENICE (1970-2006) 0.23 inches/day

[Save evaporation data for other uses](#)

[Help](#)

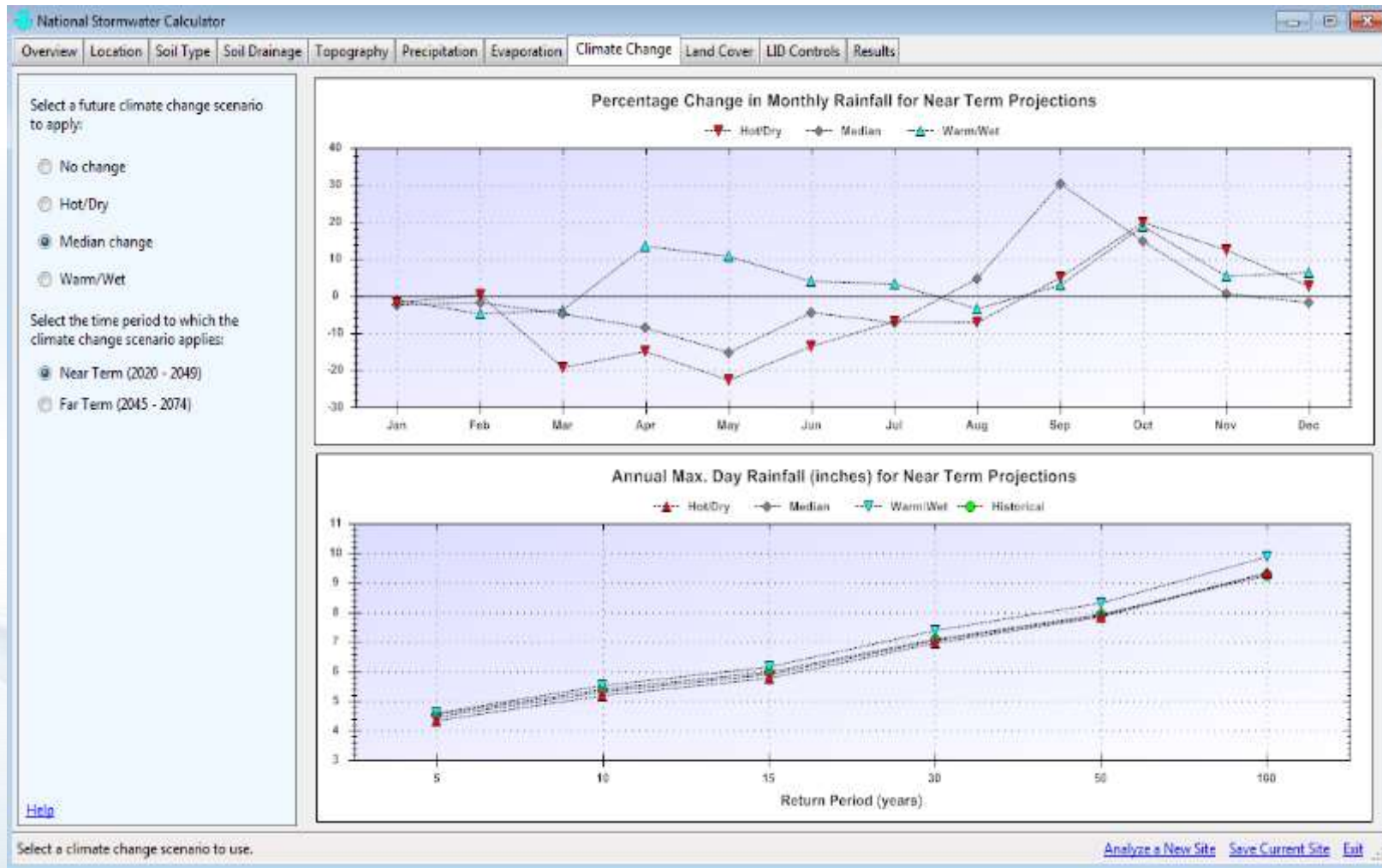


Select a source of monthly average evaporation rates.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Climate Change Scenarios



Climate Change Scenario Data: EPA's CREAT 2.0

CREAT 3.0 CLIMATE RESILIENCE EVALUATION & AWARENESS TOOL

GET STARTED RESOURCES HELP

J. Berner

Build Climate Resilience at Your Utility

The Climate Resilience Evaluation and Awareness Tool (CREAT) is a climate change risk assessment and planning application for water, wastewater and stormwater utilities.

CREAT helps water sector utilities understand and adapt to climate change.

Discover: Find out which extreme weather events pose significant challenges to your utility and build scenarios to identify potential impacts.

Assess: Identify your critical assets and the actions you can take to protect them from the consequences of climate change on utility operations.

Share: Generate reports describing the costs and benefits of your risk reduction.

Climate Resilience Evaluation and Awareness Tool (CREAT) Welcome ...

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<https://creat.epa.gov/creat/>

SWC Cost Analysis: Wares Creek, 14th St. W. – 9th St. W.

Climate Change Impacts for the Southeast



HIGHLIGHTS

REPORT

OUR CHANGING CLIMATE

SECTORS

REGIONS

RESPONSE STRATEGIES



Southeast and the Caribbean

Sea level rise poses widespread and continuing threats to the region's economy and environment. Extreme heat will affect health, energy, agriculture, and more. Decreased water availability will have economic and environmental impacts.

Explore how climate change is affecting the Southeast and Caribbean.



Vulnerability to Sea Level Rise



SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Existing Land Cover

National Stormwater Calculator

Overview | Location | Soil Type | Soil Drainage | Topography | Precipitation | Evaporation | Climate Change | **Land Cover** | LID Controls | Results


Describe the site's land cover for the development scenario being analyzed:

% Forest	10
% Meadow	0
% Lawn	65
% Desert	0
% Impervious	25

Hover the mouse over a cover category to see a more detailed description.

**~25%
Impervious
Surface**

Help



Describe the site's land cover.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Low Impact Development Controls (LID), Infiltration Basin

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	0
Rain Harvesting	0
Rain Gardens	0
Green Roofs	0
Street Planters	0
Infiltration Basins	75
Permeable Pavement	0

Design Storm for Sizing (inches) (see Help) 0.00

Click a practice to customize its design.

Verify cost-estimation variables below

Project is [Re-Development](#)
 Project is [New Development](#)

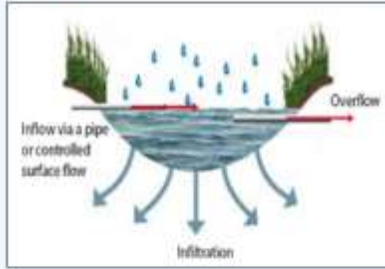
Site Suitability - [Poor](#)
 Site Suitability - [Moderate](#)
 Site Suitability - [Excellent](#)

[Cost Region](#) NATIONAL (NA) 1
Regional Multiplier 1

[Help](#)

LID Design


Infiltration Basin



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.



[Learn more...](#)

Basin Depth (inches) 6
% Capture Ratio 5
[Has Pre-treatment](#)

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

SWC Analysis: Wares Creek, 14 St. W. – 9 St. W.

Low Impact Development Controls (LID): Pre-treatment

The screenshot displays the National Stormwater Calculator software interface. The main window has a tabbed menu at the top with the following tabs: Overview, Location, Soil Type, Soil Drainage, Topography, Precipitation, Evaporation, Climate Change, Land Cover, LID Controls, and Results. The 'LID Controls' tab is currently selected.

On the left side of the main window, there is a section titled "What % of your site's impervious area will be treated by the following LID practices?". It lists several practices with corresponding input fields:

- Disconnection: 0
- Rain Harvesting: 0
- Rain Gardens: 0
- Green Roofs: 0
- Street Planters: 0
- Infiltration Basins: 75
- Permeable Pavement: 0

Below this list, there is a "Design Storm for Sizing (inches) (see Help)" field set to 0.00. A "Click a practice to customize its design." instruction is present. Under "Verify cost-estimation variables below", there are radio buttons for "Project is: Re-Development" (selected) and "Project is: New Development". There are also radio buttons for "Site Suitability - Poor", "Site Suitability - Moderate", and "Site Suitability - Excellent". A "Cost Region" dropdown is set to "NATIONAL (NA) 1", and a "Regional Multiplier" field is set to 1. A "Help" link is at the bottom left.


The "LID Design" window is open in the center, showing information about "Pre-treatment".

LID Design


Pre-treatment
Pre-treatment is often necessary to extend the life of LID controls and reduce maintenance of infiltration or filtration components by capturing materials before entering the control. Pre-treatment can affect total implementation costs depending on the kind of pre-treatment. Complex designs are associated with higher costs and simple designs are associated with lower costs. Moderate designs would be in between.

Examples:

Complex
Proprietary and non-proprietary devices



Moderate
Forebays



Simple
Vegetated filter strips or swales, screens, and sumps



Pre-treatment combined with information on site suitability, topography, and soil drainage determines whether complex, typical, or simple cost curves apply. See User Guide for more information.

The background of the software shows an aerial view of a residential area with a road labeled "30th A". At the bottom of the software window, there is a status bar with the text "Assign LID practices to capture runoff from impervious areas." on the left and "Analyze a New Site Save Current Site Exit" on the right. Copyright information for Microsoft Corporation and Bentley Systems, Inc. is also visible.

SWC: Cost Estimation Module

- **Intended Uses:**
 - Planning level cost estimates (magnitude of costs between planning scenarios)
- **Limitations:**
 - Not final construction costs
 - Not lifecycle costs (gives annual operations & maintenance (O&M) costs, not replacement costs)

Development of Regionalized Low Impact Development/Green Infrastructure Costs

- **Utilization of Bureau of Labor Statistics (BLS) Data for regional costs**
 - Outputs of service, construction, utilities, and other goods producing entities
 - Examples include: concrete storm sewer pipe, construction sand and gravel, etc.
 - Regional/city data (23 major U.S. cities)
 - Examples include: fuels and utilities, energy, and diesel fuel

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

LID: Redevelopment Project

The screenshot displays the National Stormwater Calculator software interface. The main window is titled "National Stormwater Calculator" and has several tabs: Overview, Location, Soil Type, Soil Drainage, Topography, Precipitation, Evaporation, Climate Change, Land Cover, LID Controls, and Results. The "LID Controls" tab is active.

On the left side, there is a list of LID practices with input fields for their percentage of the site's impervious area:

- Disconnection: 0
- Rain Harvesting: 0
- Rain Gardens: 0
- Green Roofs: 0
- Street Planters: 0
- Infiltration Basins: 75
- Permeable Pavement: 0

Below this list, there is a "Design Storm for Sizing (inches) (see Help)" field set to 0.00. There are also radio buttons for "Project is Re-Development" (selected) and "Project is New Development". Site suitability is set to "Poor". The "Cost Region" is "NATIONAL (NA) 1" and the "Regional Multiplier" is 1. A "Help" link is at the bottom left.

The main content area is titled "LID Design" and contains the following text:

Re-Development
Re-Development is construction that is a change in existing development (land cover, land use, or similar development alteration) which requires new or alteration of existing stormwater management facilities.

Costs of removal, decommissioning, or alteration of existing structures or additional (new) infrastructure is typically required to connect existing structures and results in costs that are greater than what would be anticipated with a new development site.

Below the text are two side-by-side images labeled "before" and "after". The "before" image shows a street with a concrete curb and gutter. The "after" image shows the same street with a permeable pavement surface and a tree planter.

Further down, the text states: "Re-development and extensive retrofit costs are typically higher than new development costs because existing structures might have to be removed or new structures may be required but may not be located in a preferred location."

It also notes: "Selecting 'Re-development' on the 'LID Controls' tab of the National Stormwater Calculator influences the site complexity, and shifts the costs towards a higher complexity cost estimation."

Finally, it says: "Re-development combined with information on site suitability, topography, and soil drainage determines whether complex, typical, or simple cost curves apply. See User Guide for more information."

On the right side of the software window, there is a satellite view of an urban area with a street labeled "30th A". At the bottom right, there are links for "Analyze a New Site", "Save Current Site", and "Exit".

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

LID: Site Suitability (Moderate)

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	0
Rain Harvesting	0
Rain Gardens	0
Green Roofs	0
Street Planters	0
Infiltration Basins	75
Permeable Pavement	0

Design Storm for Sizing (inches) (see Help) 0.00

Click a practice to customize its design.

Verify cost-estimation variables below

Project is [Re-Development](#)

Project is [New Development](#)

Site Suitability - [Poor](#)

Site Suitability - [Moderate](#)

Site Suitability - [Excellent](#)

[Cost Region](#) NATIONAL (NA) 1

Regional Multiplier 1

[Help](#)

Assign LID practices to capture runoff from impervious areas.


LID Design

Moderate Site Suitability

Site suitability is a measure of construction feasibility and includes factors such as topography, soil type, slope, and other physical features that might result in higher implementation costs.

Moderate site suitability refers to sites that have several of the following characteristics:

- Few physical obstructions
- Few utility conflicts,
- Other features that may make construction of stormwater management infrastructure challenging and likely more costly, but less than a site with poor site suitability.



Sites determined to have moderate suitability for LID practices may result in higher costs because of the potential need for additional excavation, accommodation for physical obstructions including utilities, required retaining walls, moderately challenging access, limited dewater, the addition of engineered or custom media blends, or need to address geotechnical or groundwater concerns.

Selecting "Site Suitability - Moderate" on the "LID Controls" tab of the National Stormwater Calculator influences the site complexity, and may shift the costs towards a higher complexity cost estimation compared to.

Moderate site suitability combined with information on development type, topography, and soil drainage determines whether complex, typical, or simple cost curves apply. See User Guide for more information.

30th A

bing

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Analyze a New Site Save Current Site Exit

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

LID: US Bureau of Labor Stastics Regional Cost Centers

The screenshot displays the National Stormwater Calculator software interface. The main window is titled "National Stormwater Calculator" and has a menu bar with options: Overview, Location, Soil Type, Soil Drainage, Topography, Precipitation, Evaporation, Climate Change, Land Cover, LID Controls, and Results. The "LID Controls" tab is active.

On the left side, there is a list of LID practices with input fields for their percentage of use:

- Disconnection: 0
- Rain Harvesting: 0
- Rain Gardens: 0
- Green roofs: 0
- Street Planters: 0
- Infiltration Basins: 75
- Permeable Pavement: 0

Below this list, there are fields for "Design Storm for Sizing (inches) (see Help)" set to 0.00 and a "Click a practice to customize its design." button.

Under "Verify cost-estimation variables below", there are radio buttons for "Project is Re-Development" (selected) and "Project is New Development". There are also radio buttons for "Site Suitability - Poor", "Site Suitability - Moderate" (selected), and "Site Suitability - Excellent".

The "Cost Region" dropdown is set to "Miami (170 miles) 0.86". The "Regional Multiplier" field is set to 0.86.

A "Help" link is located at the bottom left of the left panel.

The main content area shows a "LID Design" window with the following text:

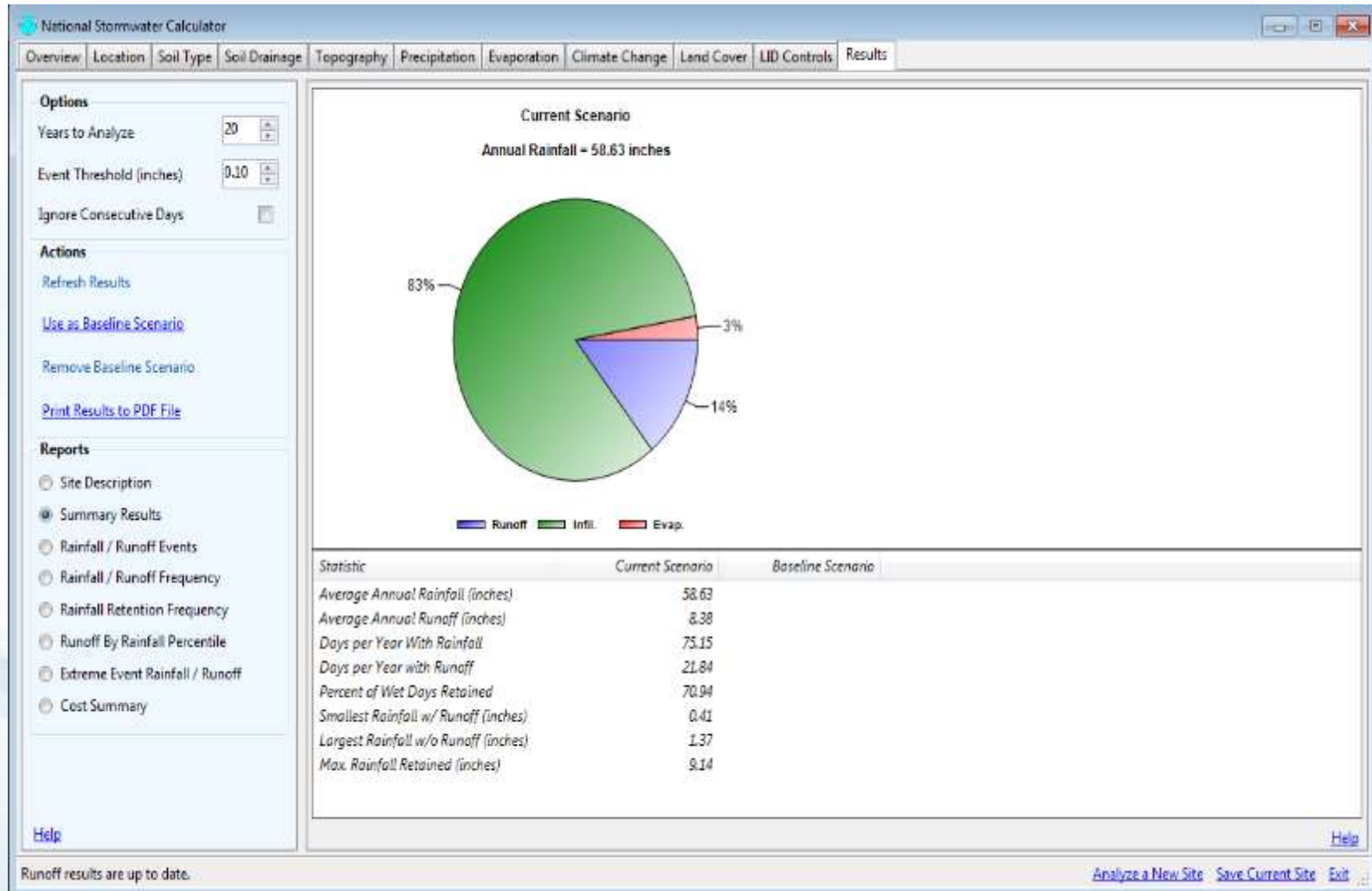
Cost Region
Your "region" has been determined from the Location tab. Using data from the Bureau of Labor Statistics (BLS) a multiplier has been computed representing the relative regional differences in costs for your nearest region (unless "National" is shown) compared to National costs. Three regions are reported from 20 of the major cities for which BLS data is available. Users can select another region or select "National" to apply a multiplier of 1, representing a national average. If you prefer to apply your own multiplier, select "Other" and enter the multiplier in the Regional Multiplier field (a multiplier >1 would adjust above the National average, while a multiplier <1 would adjust below the National average). The default multiplier for your region is shown in the Regional Multiplier box. The light blue circles in the figure below represent areas within a 100-mile radius of each major city. See User Guide for more information.

Below the text is a map of the United States with light blue circles indicating 100-mile radius areas around major cities. The map shows the United States with state boundaries and major cities marked with light blue circles. The circles are centered on major cities across the country, including Seattle, Portland, San Francisco, Los Angeles, San Diego, Dallas, Houston, Chicago, New York, Philadelphia, Washington D.C., Atlanta, Miami, and others. The map is overlaid on a satellite view of the project site, which shows a street intersection of 14th St W and 9th Ave W.

At the bottom of the software window, there is a status bar with the text "Assign LID practices to capture runoff from impervious areas." and navigation buttons: "Analyze a New Site", "Save Current Site", and "Exit".

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Runoff Reduction Results



SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Runoff Results: Extreme Storm Events

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:

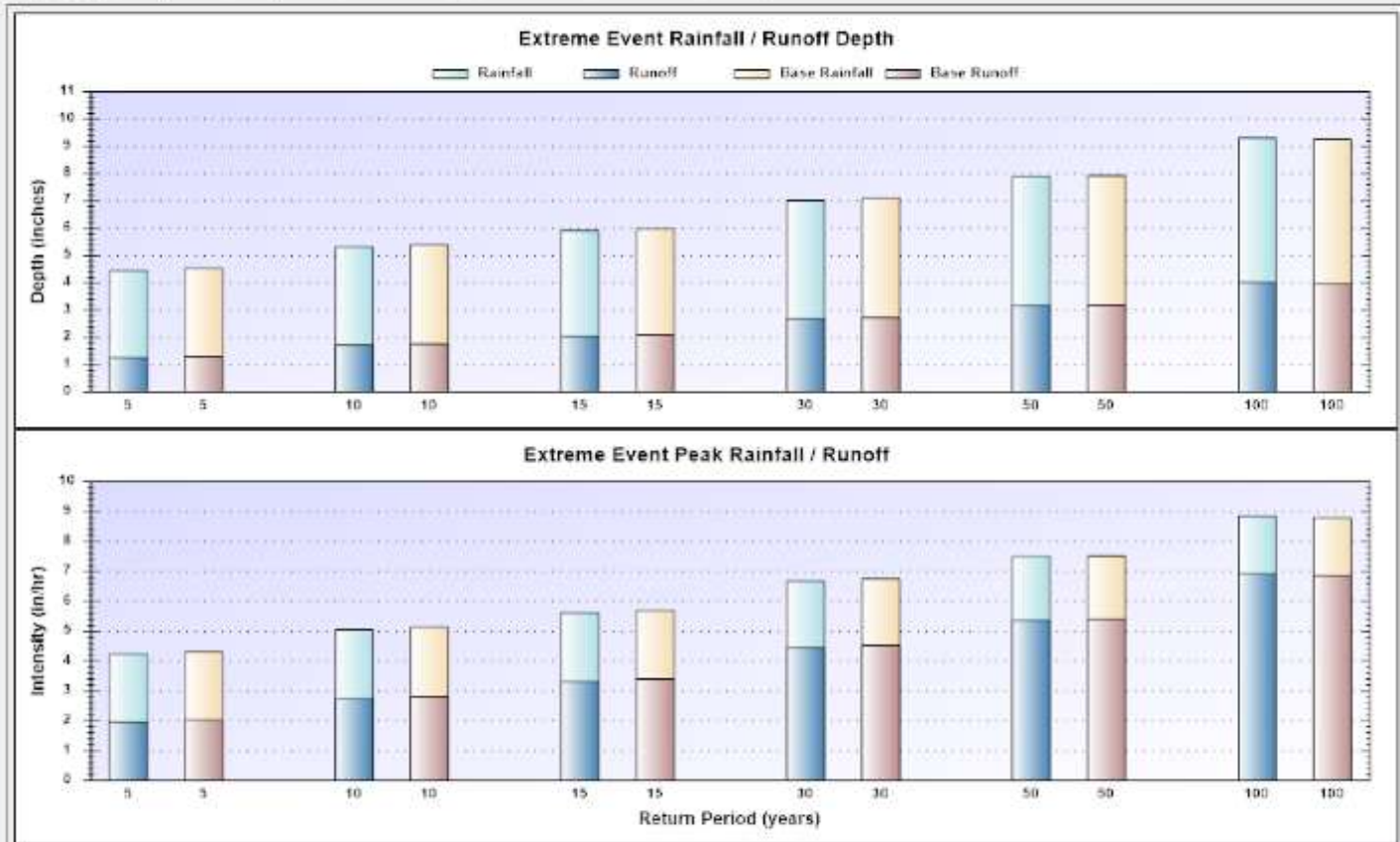
Actions

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](#)



Runoff results are up to date.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Capital Costs Summary

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](#)

Runoff results are up to date.

[Analyze a New Site](#) [Save Current Site](#) [Exit](#)

Estimate of Probable Capital Costs (estimates in 2016 US.\$)

[Maintenance Costs](#) | [Graphical View](#)

Cost By LID Control Type	Drainage Area %	Has Pre-trt?	Current Scenario (C) Area Treated 4.00 ac		Baseline Scenario (B) Area Treated ac		Difference (C - B) Area Treated 4.00 ac	
			Low	High	Low	High	Low	High
Disconnection	NA / NA	No / NA	\$0	\$0	-	-	-	-
Rainwater Harvesting	NA / NA	No / NA	\$0	\$0	-	-	-	-
Rain Gardens	NA / NA	No / NA	\$0	\$0	-	-	-	-
Green Roofs	NA / NA	No / NA	\$0	\$0	-	-	-	-
Street Planters	NA / NA	No / NA	\$0	\$0	-	-	-	-
Infiltration Basins	75 / NA	No / NA	\$7,761	\$19,390	-	-	-	-
Permeable Pavement	NA / NA	No / NA	\$0	\$0	-	-	-	-
Total	75 / NA	Varies	\$7,761	\$19,390	-	-	-	-

Note: site complexity variables that affect cost shown below:

Current Scenario	Baseline Scenario
Dev. Type Re-development	-
Site Suitability Moderate	-
Topography Flat (2% Slope)	-
Soil Type B	-
Cost Region Miami (170 miles) 0.86	-

Cost Range: \$7,761 - \$19,390

[Help](#)

SWC Analysis: Wares Creek, 14th St. W. – 9th St. W.

Annual Maintenance Costs Summary

O&M Costs of Existing Stormwater Ponds For Project Area:
\$300 – \$3,084.9

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

Runoff results are up to date.

Analyze a New Site | Save Current Site | Exit

Estimate of Probable Maintenance Costs (estimates in 2016 US.\$)

[Capital Costs](#) | [Graphical View](#)

Cost By LID Control Type	Current Scenario (C)		Baseline Scenario (B)		Difference (C - B)	
	Low	High	Low	High	Low	High
Disconnection	\$0	\$0	-	-	-	-
Rainwater Harvesting	\$0	\$0	-	-	-	-
Rain Gardens	\$0	\$0	-	-	-	-
Green Roofs	\$0	\$0	-	-	-	-
Street Planters	\$0	\$0	-	-	-	-
Infiltration Basins	\$263	\$9,542	-	-	-	-
Permeable Pavement	\$0	\$0	-	-	-	-
Total	\$263	\$9,542	-	-	-	-

Note: site complexity variables that affect cost shown below:

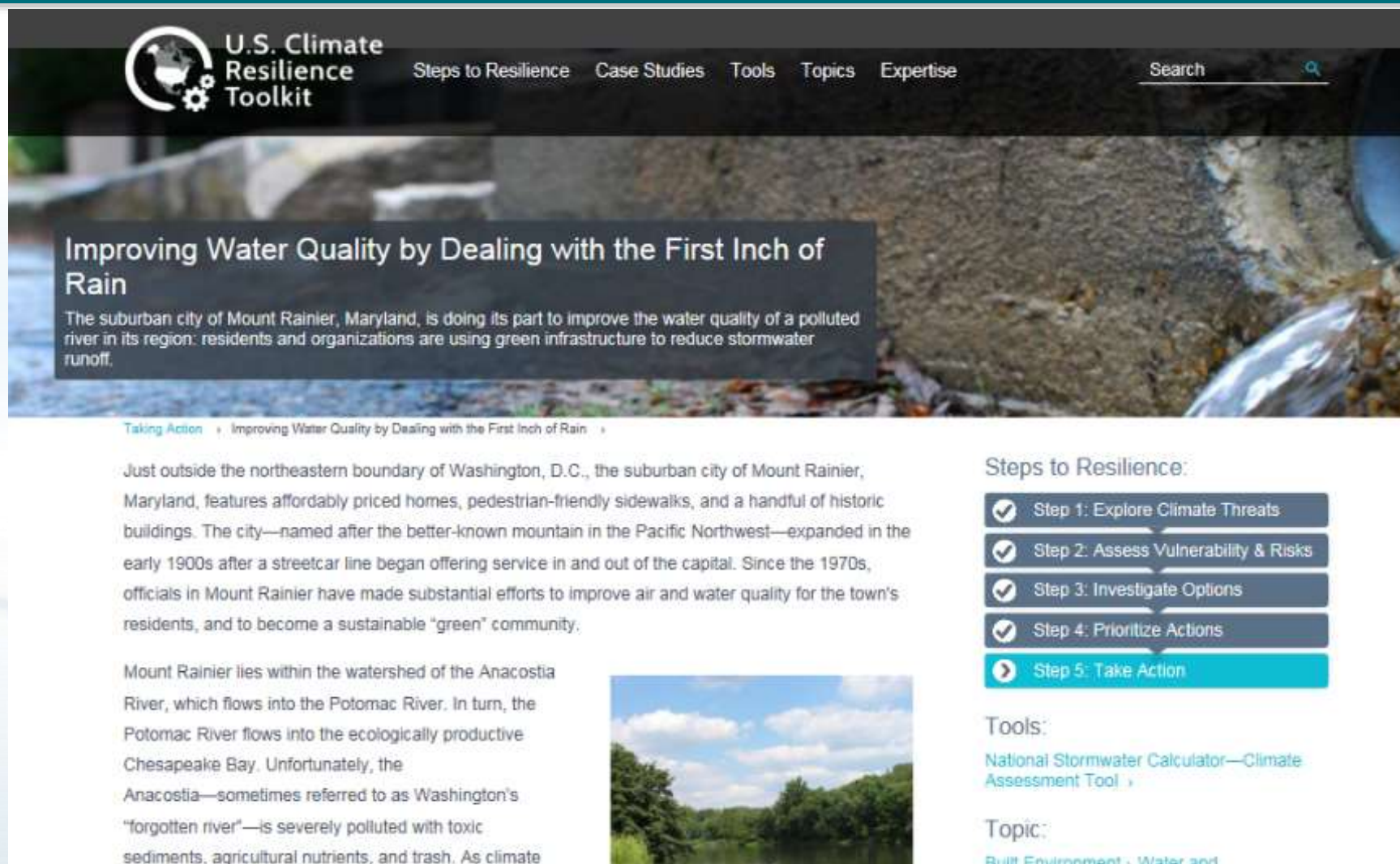
Current Scenario	Baseline Scenario
Dev. Type: Re-development	-
Site Suitability: Moderate	-
Topography: Flat (2% Slope)	-
Soil Type: B	-
Cost Region: Miami (170 miles) 0.86	-

Cost Range: \$263 - \$9,542

Interpreting the Results

- Informing next steps for finalizing costs of stormwater projects and construction plans/designs
- Comparing the relative magnitude of planning level costs for different stormwater management solutions
- Comparisons may be made between national and regional cost estimates:
 - Using local knowledge in selection of regional BLS cost multipliers
 - Other nearby cities: Atlanta, Houston, etc.

Climate Resiliency Planning Application



U.S. Climate Resilience Toolkit

Steps to Resilience Case Studies Tools Topics Expertise Search


Improving Water Quality by Dealing with the First Inch of Rain

The suburban city of Mount Rainier, Maryland, is doing its part to improve the water quality of a polluted river in its region: residents and organizations are using green infrastructure to reduce stormwater runoff.

Taking Action » Improving Water Quality by Dealing with the First Inch of Rain »

Just outside the northeastern boundary of Washington, D.C., the suburban city of Mount Rainier, Maryland, features affordably priced homes, pedestrian-friendly sidewalks, and a handful of historic buildings. The city—named after the better-known mountain in the Pacific Northwest—expanded in the early 1900s after a streetcar line began offering service in and out of the capital. Since the 1970s, officials in Mount Rainier have made substantial efforts to improve air and water quality for the town's residents, and to become a sustainable “green” community.

Mount Rainier lies within the watershed of the Anacostia River, which flows into the Potomac River. In turn, the Potomac River flows into the ecologically productive Chesapeake Bay. Unfortunately, the Anacostia—sometimes referred to as Washington’s “forgotten river”—is severely polluted with toxic sediments, agricultural nutrients, and trash. As climate



Steps to Resilience:

- Step 1: Explore Climate Threats
- Step 2: Assess Vulnerability & Risks
- Step 3: Investigate Options
- Step 4: Prioritize Actions
- Step 5: Take Action

Tools:

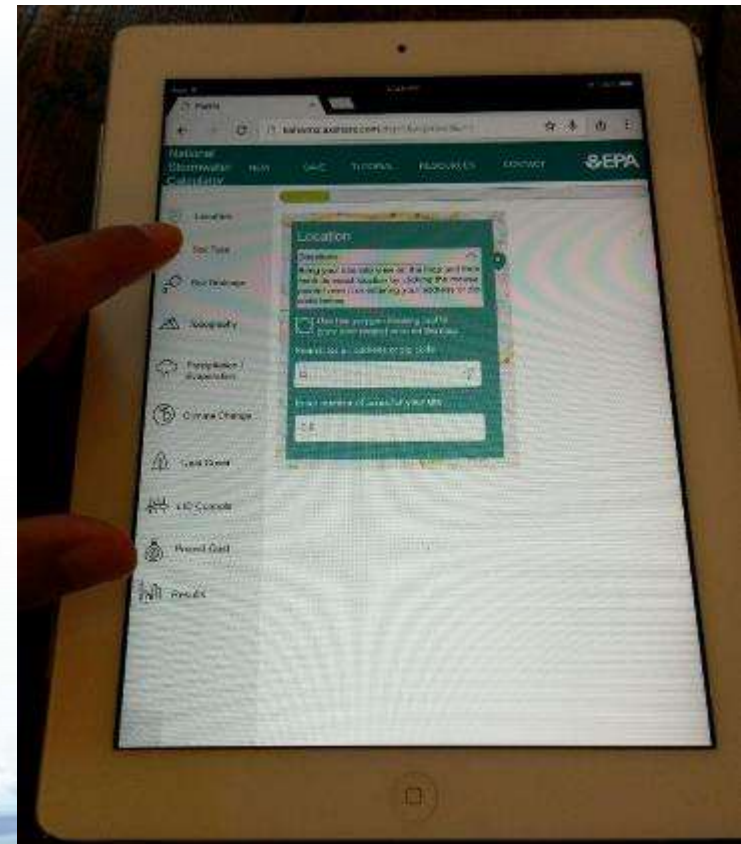
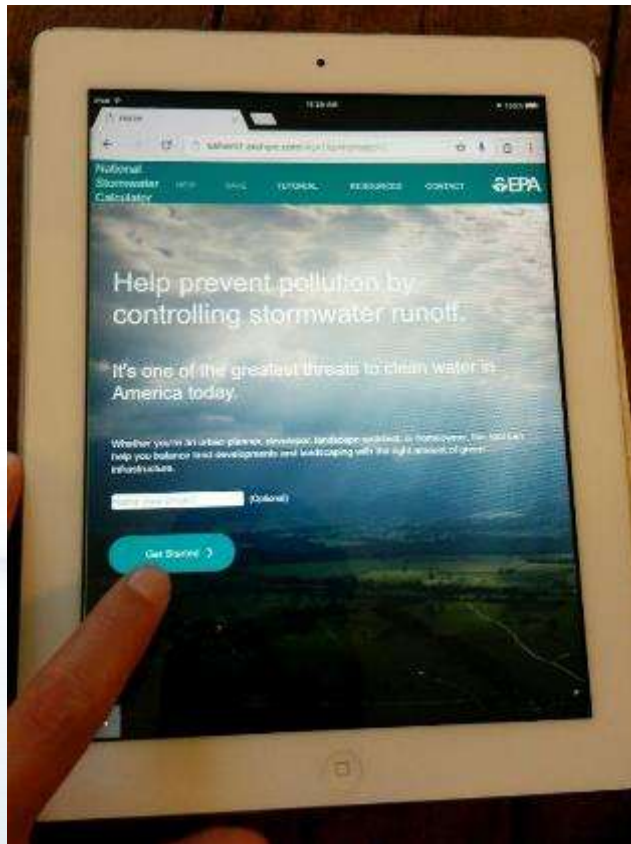
National Stormwater Calculator—Climate Assessment Tool »

Topic:

Built Environment » Water and

Mobile Web App Development: Public Release Expected in Fall 2017

Live demonstrations at WEFTEC 2017 Stormwater Pavilion, Oct. 2 - 3 (Chicago, IL)



Discussion and Questions

Thank You!

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National Stormwater Calculator Website:

<https://www.epa.gov/water-research/national-stormwater-calculator>

Contact: SWC@epa.gov