



U.S. EPA National Stormwater Calculator

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Meet EPA Scientist Jason Berner

Jason Berner likes that his science makes a difference on a local level by helping communities use green infrastructure to reduce stormwater runoff.

Tell us about your background.

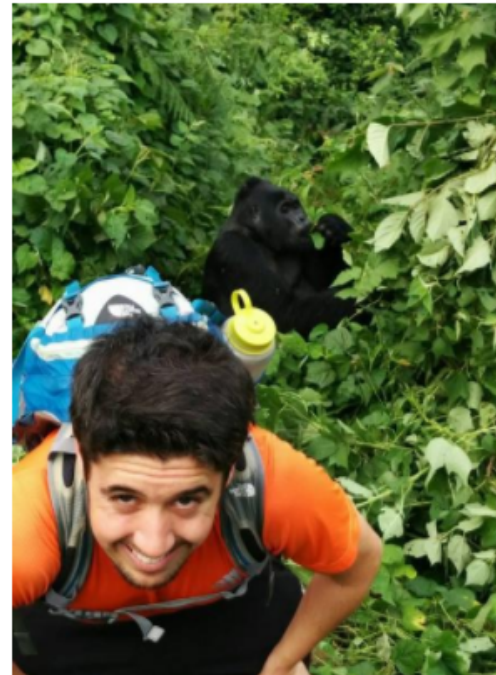
I have a BS in natural resources and environmental science, and a MLA (masters of landscape architecture) with a focus on ecological design from the University of Illinois at Urbana-Champaign. I started at EPA in 2007 working on wetlands protection in Region 2. I worked on watershed management in the New York City drinking watershed, based in the Catskills Mountains. From there, I started doing work on urban stormwater management and planning tools that communities and water utilities could use- such as the National Stormwater Calculator.

When did you first know you wanted to be a scientist?

I first knew sometime during the middle of undergraduate studies. I took a course on environmental science that was focused on how the University of Illinois campus could be more environmentally sustainable and how ecological restoration could be done on campus. It really helped me get a better understanding of how scientists could make an impact locally.

How does your science matter?

Green infrastructure looks at how urban environments can be designed and planned to mitigate and adapt to some of the impacts of climate change, such as increased flooding. My research helps communities implement green infrastructure practices and looks at how the




Outline

U.S. EPA National Stormwater Calculator

- **Stormwater Calculator Background Information**
- **Potential Applications**
- **Using the Calculator:** Baltimore, MD (Apr. 2017 Application)
- **Example Application:**
 - U.S. Climate Resilience Toolkit (Mount Rainier, MD)
- **Development of Mobile Web Application**
- **Discussion & Questions**

National Stormwater Calculator Website





 United States Environmental Protection Agency

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Related Topics: Water Research

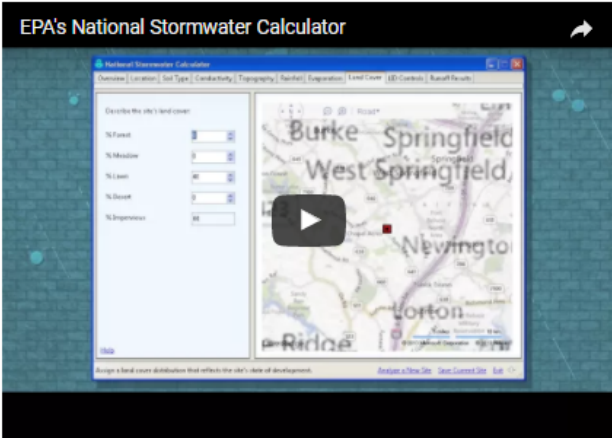
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National Stormwater Calculator

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>

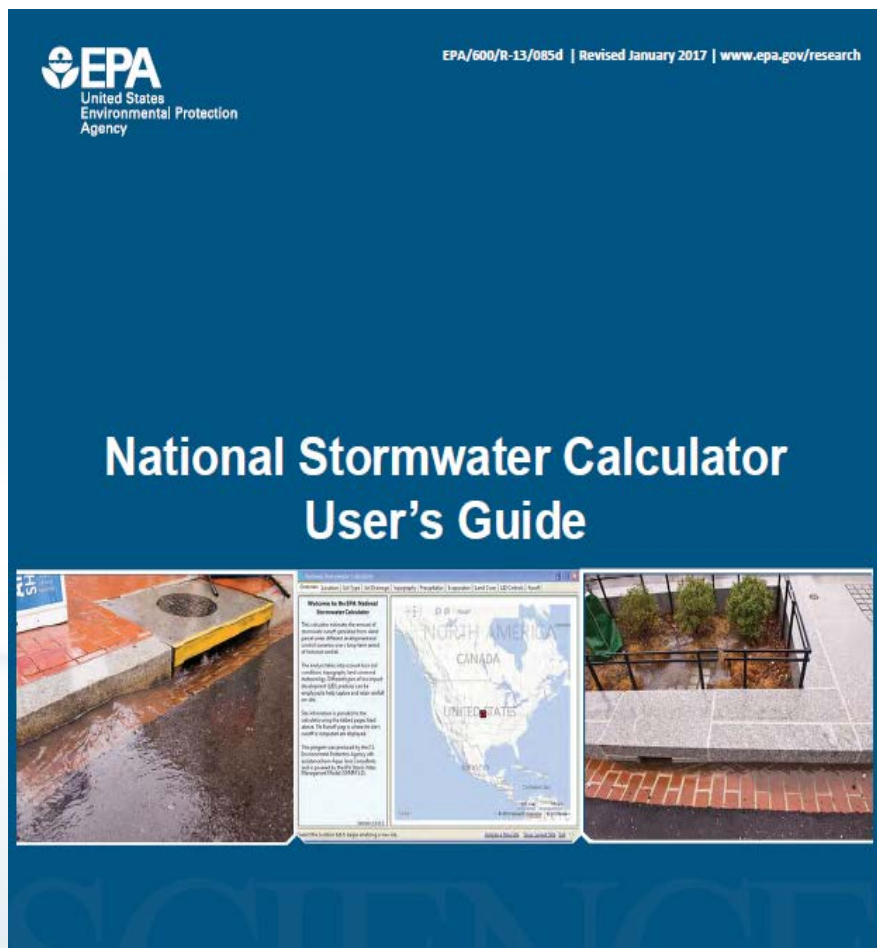
What Have We Created and Why?


- **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

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





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

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, sizing 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.



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.

Storm Water Management Model (SWMM)



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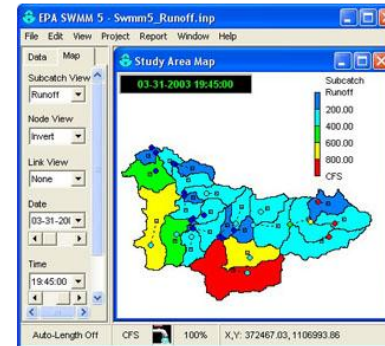
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Storm Water Management Model (SWMM)


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



Select the Location tab to begin analyzing a new site.

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

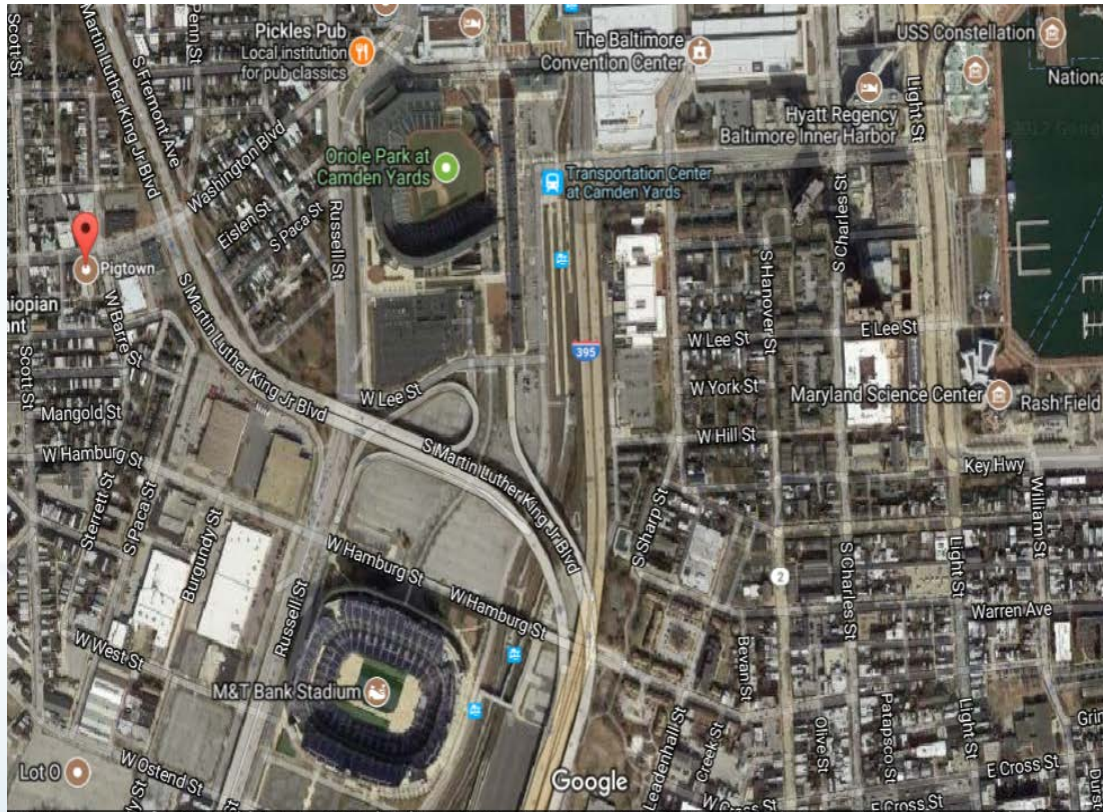
SWC:

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: Baltimore, MD (Pigtown Neighborhood)

Green & Complete Streets Workshop (Apr. 2017)

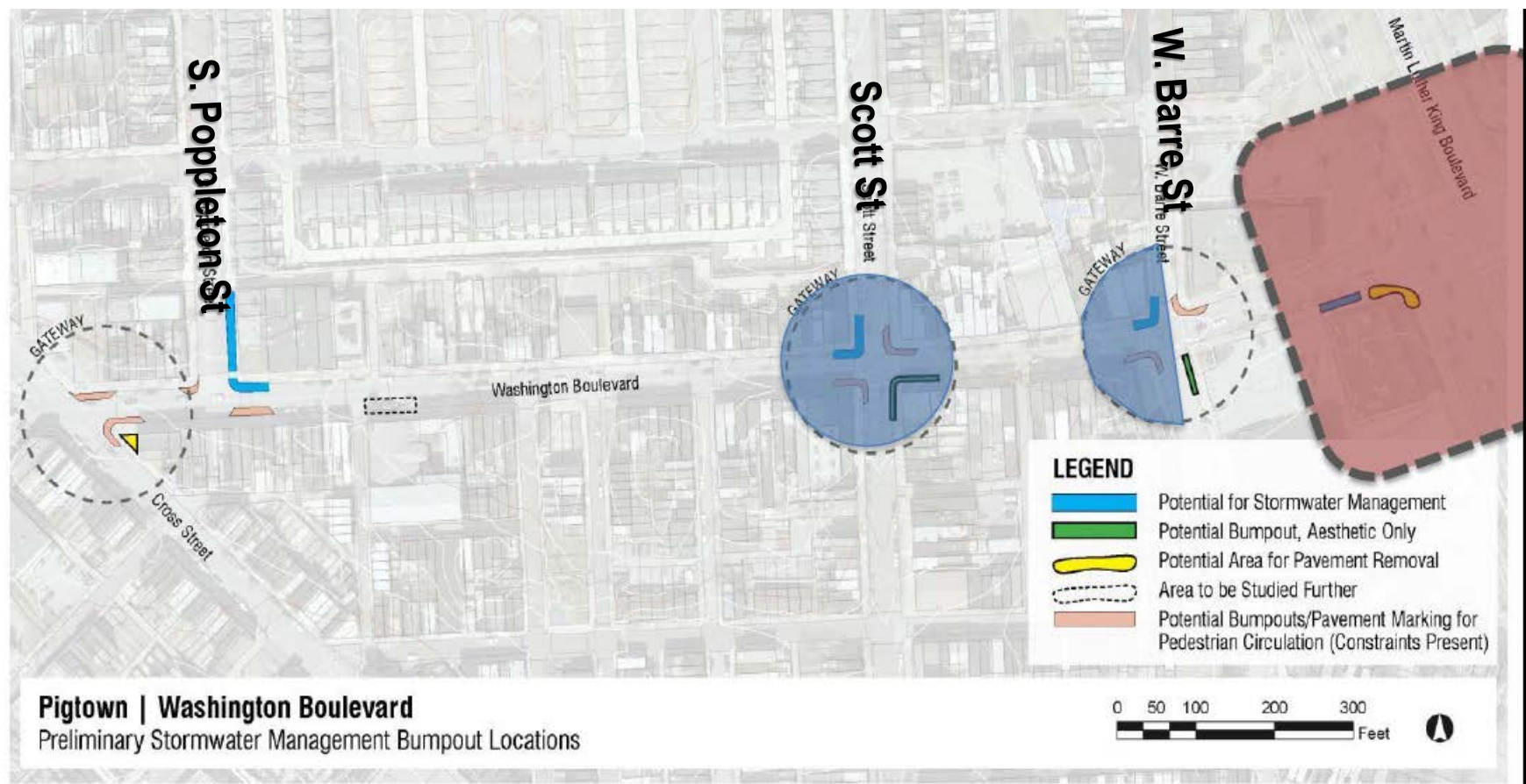


- Street planters as part of a complete street

SWC Analysis:

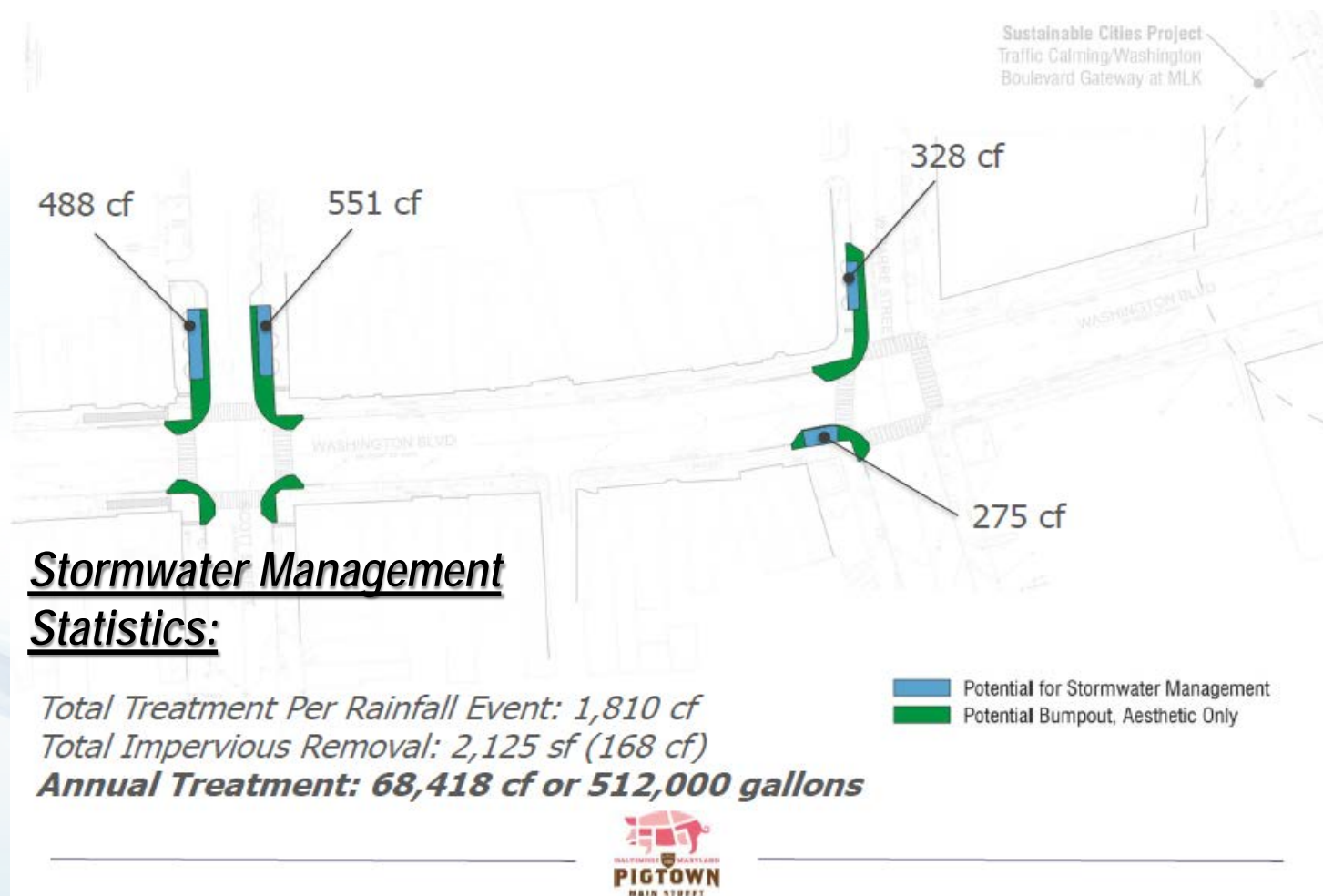
Green & Complete Streets Building Blocks Workshop (April, 2017)

Pigtown Neighborhood - Baltimore, MD



SWC Analysis:

Green & Complete Streets Building Blocks Workshop (April, 2017)
Pigtown Neighborhood - Baltimore, MD



Existing Planning Costs for Bio-retention at Scott Street

(Pigtown Mainstreet consultant team, 2017)

CAT 3 – STORMWATER								
ITEM	QTY (H)		EXCA	QTY	UNITS	COST	TOTAL COST	NOTES
MICROBIORETENTION AREAS	582	291	1.1	640	SF	\$35	\$22,407	includes plants

**Costs do not include annual maintenance and operations*

SWC Analysis: Scott Street

Project Location

National Stormwater Calculator

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

Site Name (Optional)
Pigtown - Scott St/Washington Blvd

Search for an address or zip code:

Site Location (Latitude, Longitude)
39.283098697392816, -76.62882260986901

Site Area (acres - Optional)
0.6

[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.

Washington Blvd
Scott St
Eisle

Locate the site on the map.

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

SWC Analysis: Scott Street

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

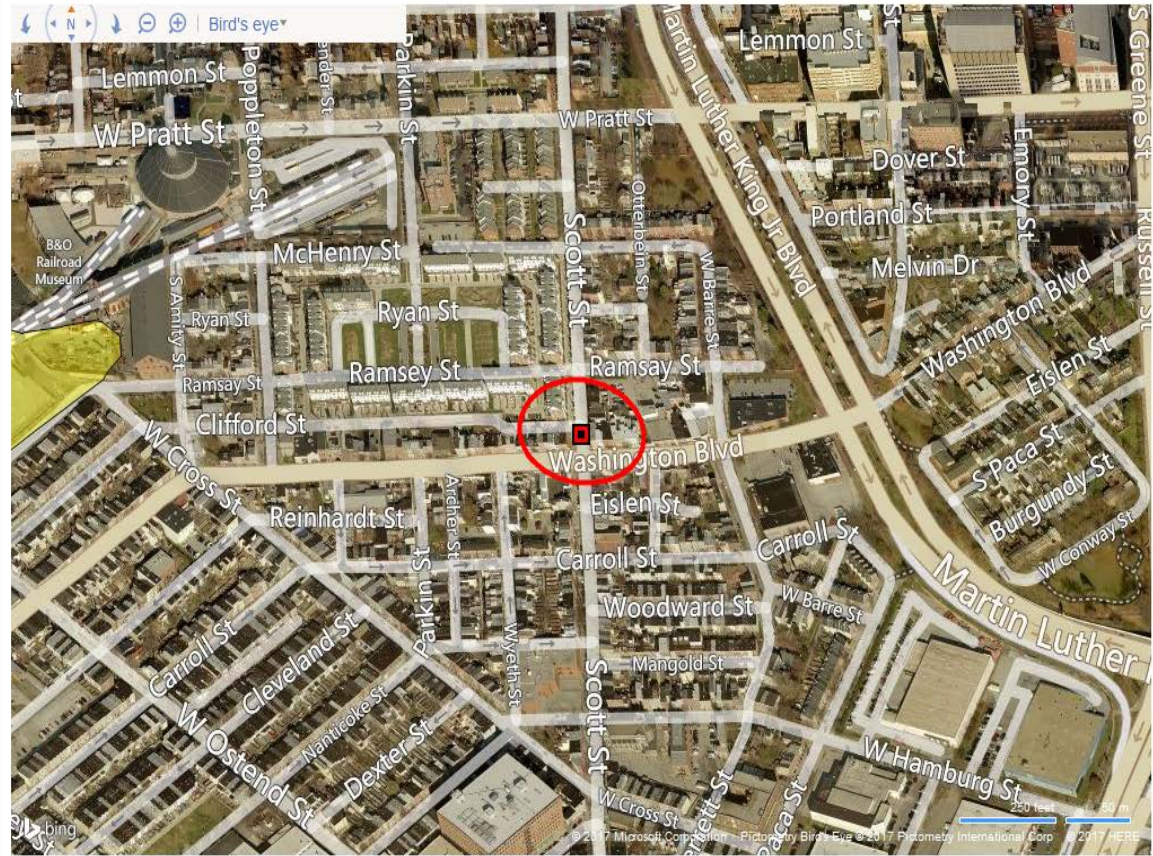
☐ D - high runoff potential

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

[Help](#)

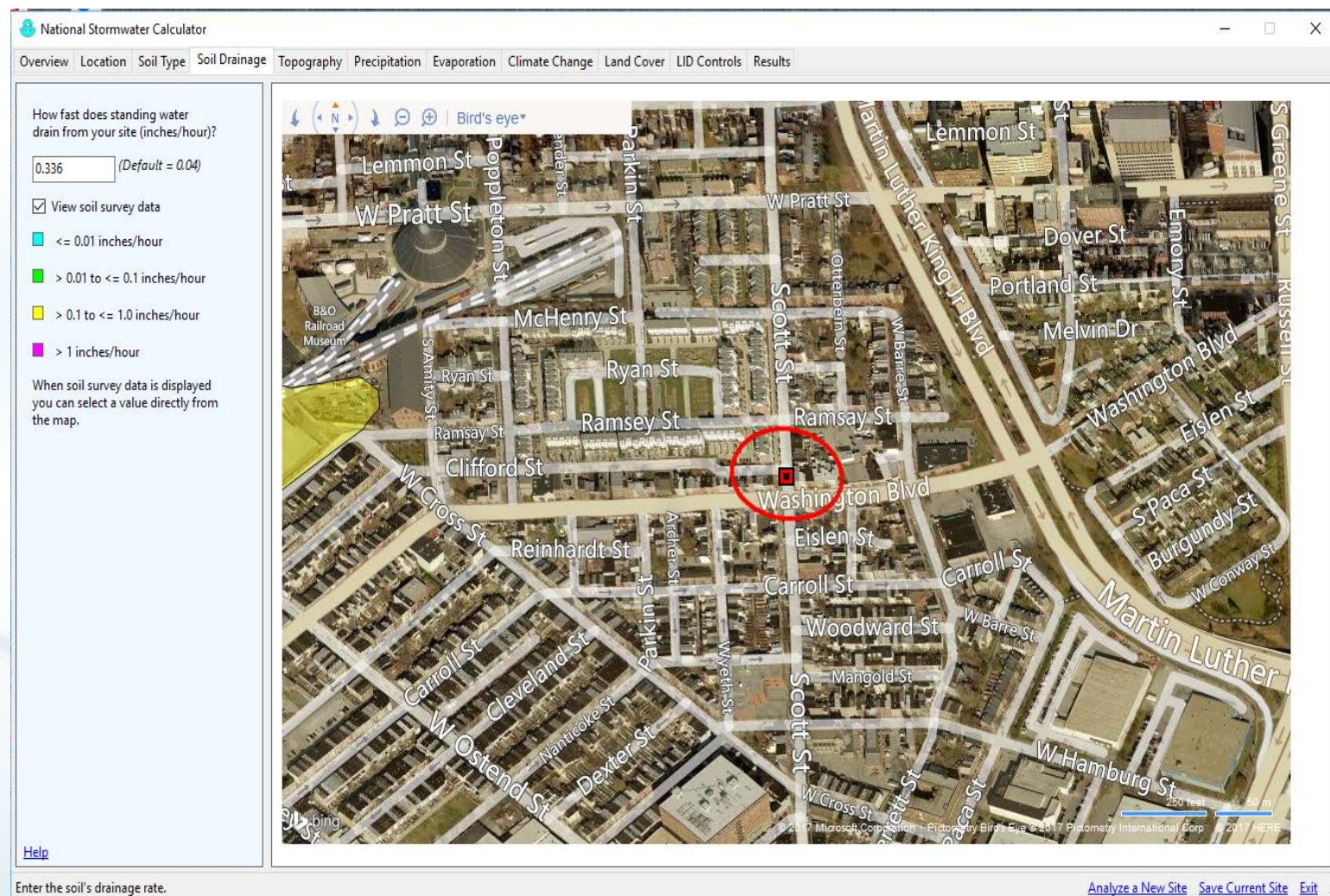
Select a soil type for the site.

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



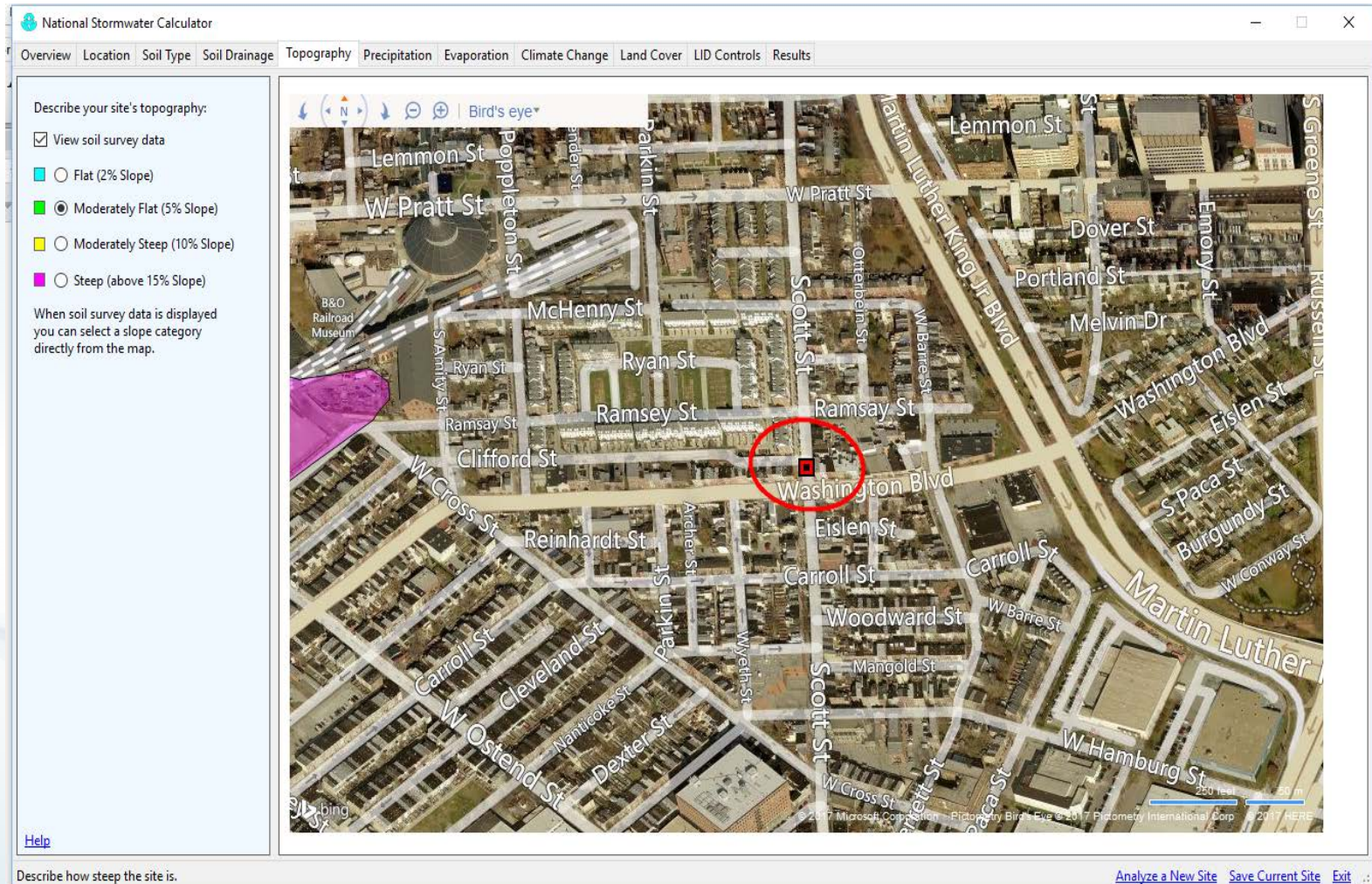
SWC Analysis: Scott Street

Soil Drainage



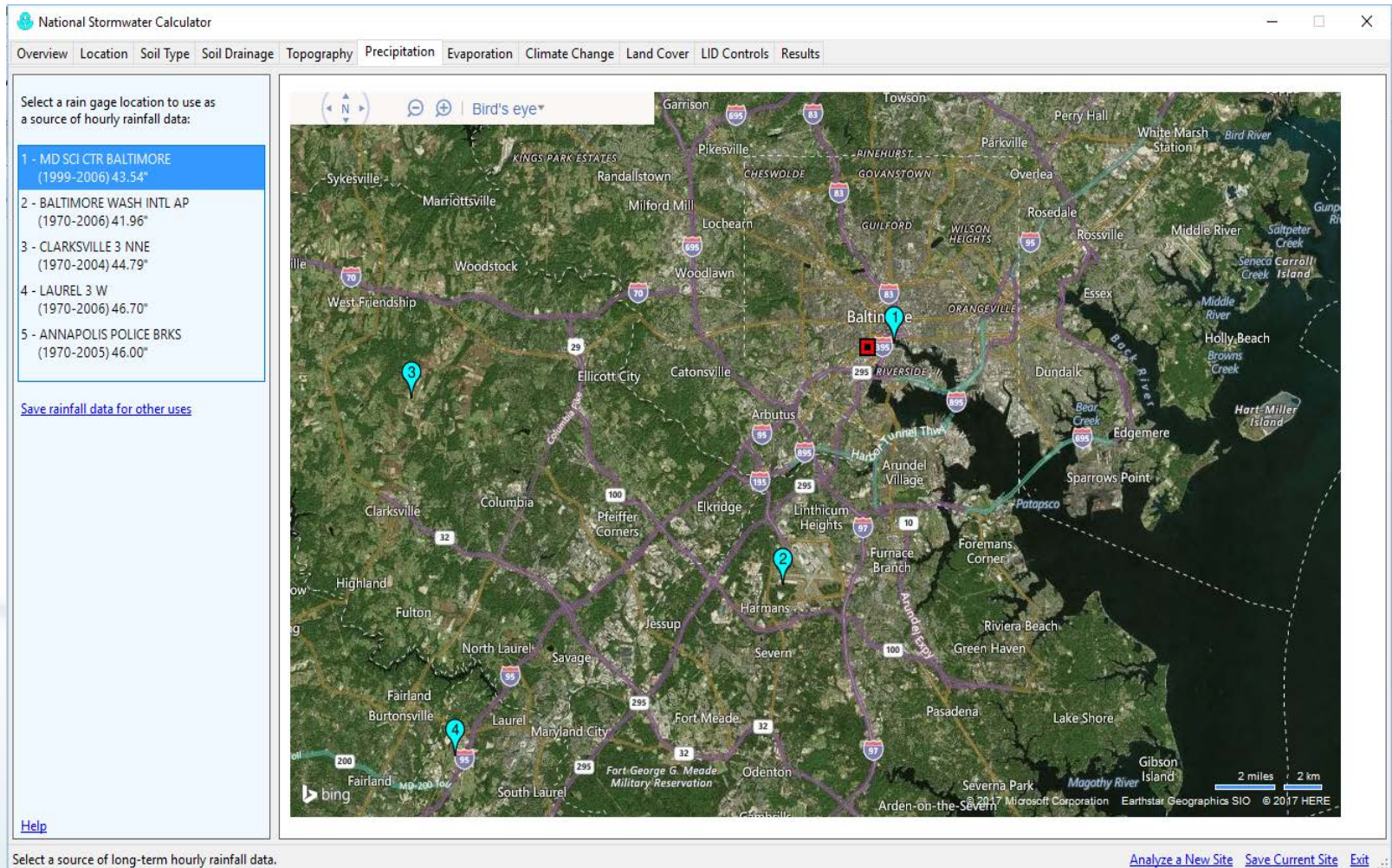
SWC Analysis: Scott Street

Topography



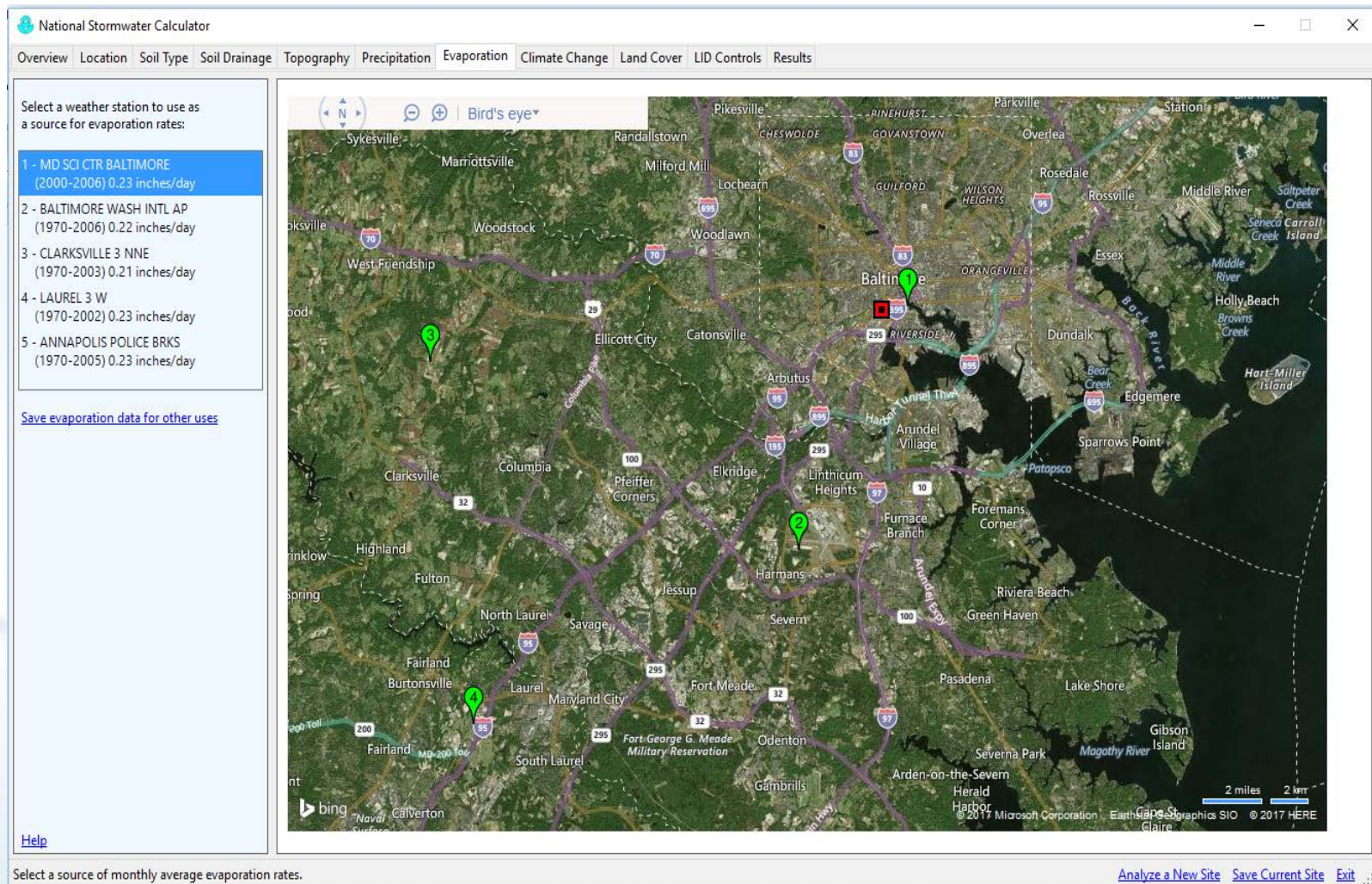
SWC Analysis: Scott Street

Historical Precipitation



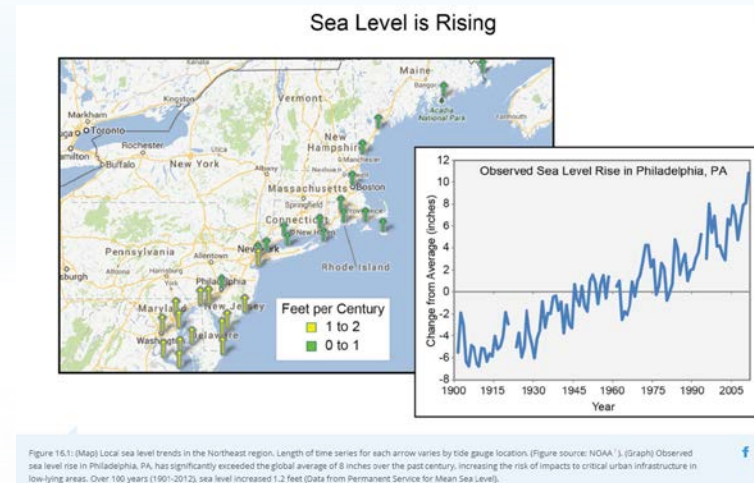
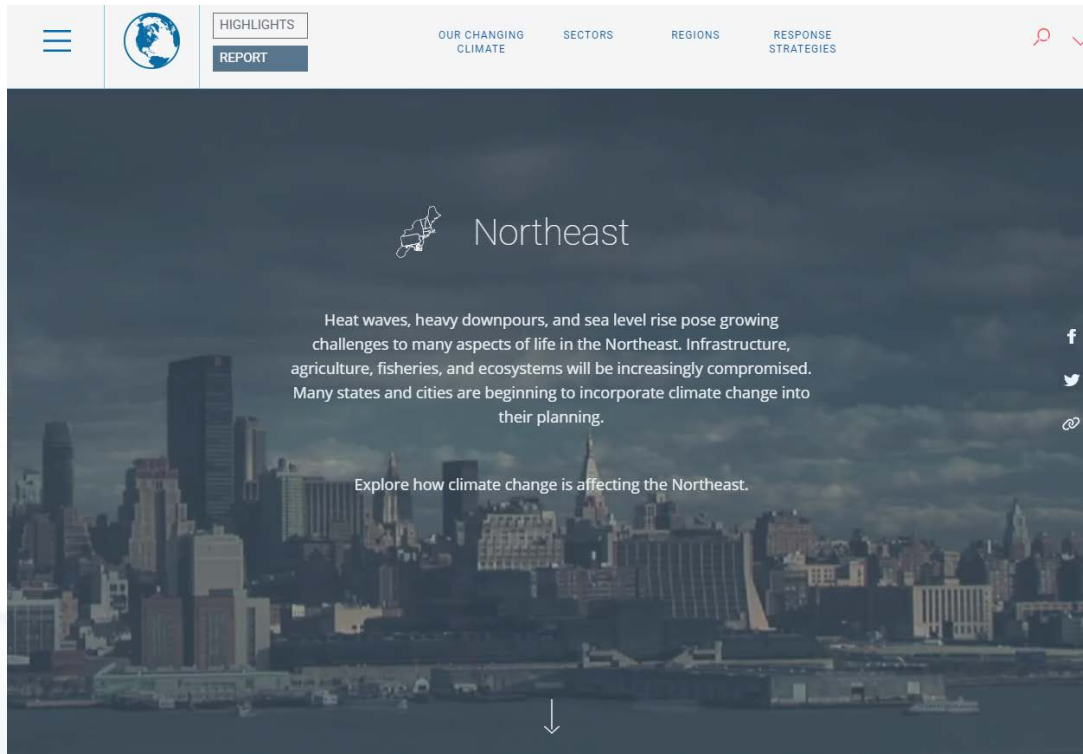
SWC Analysis: Scott Street

Historical Evaporation




SWC Analysis: Scott Street

Climate Change Impacts for the Northeast



Climate Change Scenario Data: EPA's CREAT 2.0

 **CREAT 3.0**


CLIMATE RESILIENCE EVALUATION & AWARENESS TOOL

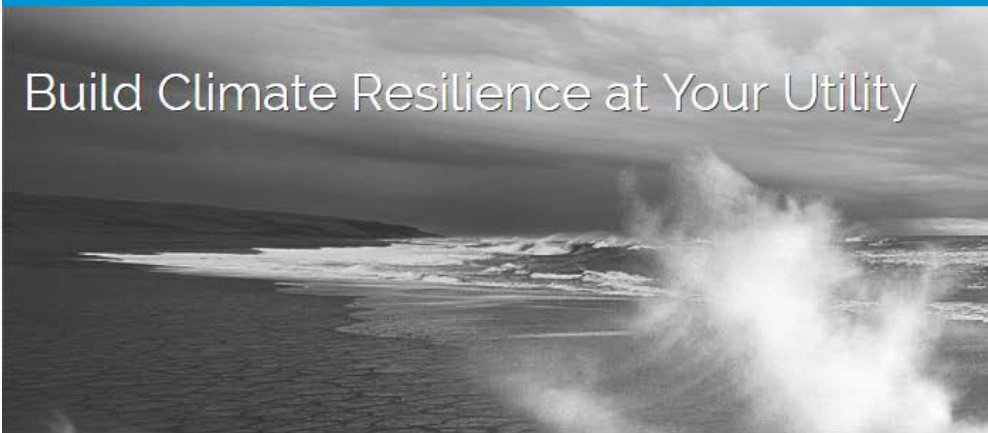
GET STARTED

RESOURCES

HELP

jberner





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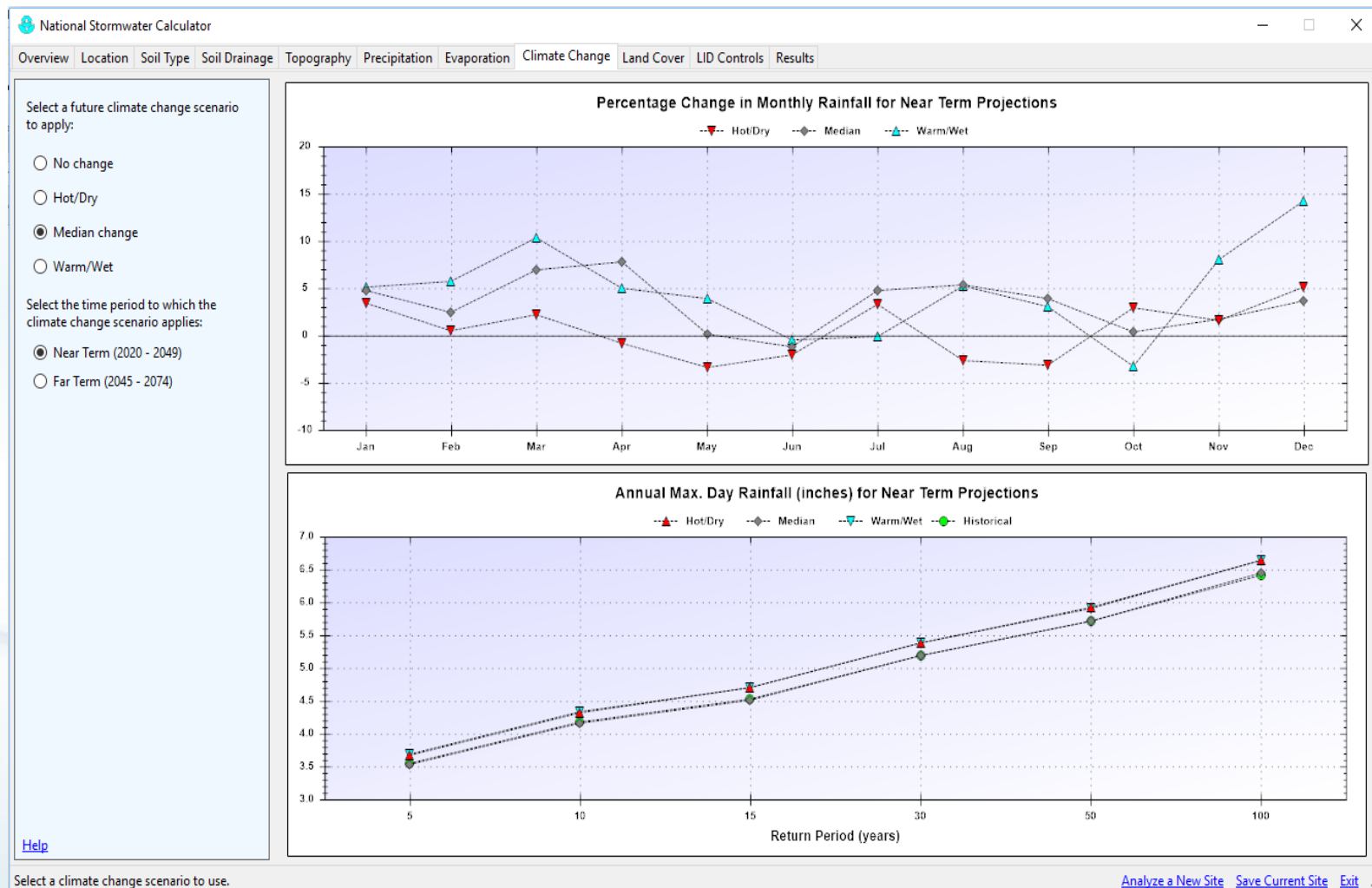
<https://creat.epa.gov/creat/>

 United States Environmental Protection Agency

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SWC Analysis: Scott Street

Climate Change Scenarios



SWC Analysis: Scott Street

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	5
% Meadow	5
% Lawn	5
% Desert	0
% Impervious	85


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

~85% Impervious Surface

Help

Describe the site's land cover.

Bird's eye



St Scott St Washington Blvd

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Analyze a New Site Save Current Site Exit

SWC Analysis: Scott Street

LID Controls

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](#) 75

[Infiltration Basins](#) 0

[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](#)

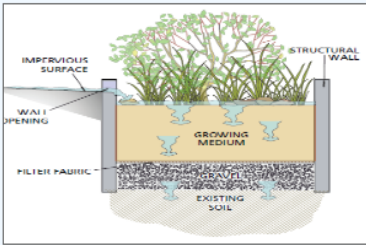
[Cost Region](#) Washington (40 miles) 0

Regional Multiplier 0.92

[Help](#)

LID Design

Street Planter



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 within 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) 6

Soil Media Thickness (inches) 18

Soil Media Conductivity (in/hr) 10.00

Gravel Bed Thickness (inches) 12

% Capture Ratio 6

[Learn more...](#)

Size for Design Storm Restore Defaults Accept Cancel

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Assign LID practices to capture runoff from impervious areas.

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

SWC Analysis: Scott Street

LID Controls: Pre-treatment

Pretreatment:
Rain garden,
infiltration basin,
and permeable
pavement

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 practices?

[Disconnection](#)
[Rain Harvesting](#)
[Rain Gardens](#)
[Green Roofs](#)
[Street Planters](#)
[Infiltration Basins](#)
[Permeable Pavement](#)

Design Storm for Size (inches) (see Help)

Click a practice to customize

Verify cost-estimation

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

☐ Site Suitability - Poor
☒ Site Suitability - Moderate
☐ Site Suitability - Excellent

[Cost Region](#) Washington

Regional Multiplier 1

[Help](#)

LID Design

Permeable Pavement

Design Guidelines for Porous Asphalt with Subsurface Infiltration

OVERLAYS OPEN INTO RECHARGE BED

UNCOMPACTED SURGRADE IS CRITICAL FOR PROPER INFILTRATION

FILTER FABRIC LINES THE SUBSURFACE BED

Pavement Thickness

Gravel Layer Thickness

% Capture Ratio



[Has Pre-treatment](#)

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.

Assign LID practices to capture runoff from impervious areas.

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

SWC: Cost Estimation Module

- **Intended Uses:**

- Planning level cost estimates (magnitude of costs between planning scenarios)

- **Limitations:**

- Doesn't provide final construction costs
- Doesn't provide 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: Scott Street

LID: Redevelopment Project

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	75
Infiltration Basins	0
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](#) Washington (40 miles) 0 ▾

Regional Multiplier 0.92

[Help](#)


Assign LID practices to capture runoff from impervious areas.

LID Design

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.



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.

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.

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.

Analyze a New Site | Save Current Site | Exit

SWC Analysis: Scott Street

LID: Site Suitability (Poor)

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	75
Infiltration Basins	0
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](#) Washington (40 miles) 0

Regional Multiplier 0.92

[Help](#)

Assign LID practices to capture runoff from impervious areas.

Analyze a New Site Save Current Site Exit

LID Design

Poor 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.

Poor site suitability refers to sites that have a number of the following characteristics:

- Physical obstructions,
- Utility conflicts,
- Other features that are likely to make construction of stormwater management infrastructure challenging and more costly.

Distant haul

Physical obstructions

Existing utility conflicts

Sites determined to have poor suitability for LID practices are typically higher in cost because of the potential need for additional excavation, accommodation for physical obstructions, required retaining walls, challenging access, distant haul locations, required dewatering, the addition of engineered or custom media blends, and need to address geotechnical or groundwater concerns.

Selecting "Site Suitability - Poor" on the "LID Controls" tab of the National Stormwater Calculator influences the site complexity, and shifts the costs towards a higher complexity cost estimation.

Poor 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.

*A lot of existing infrastructure/buildings and utilities present; compacted soil.

SWC Analysis: Scott Street

LID: US Bureau of Labor Statistics Regional Cost Centers

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	75
Infiltration Basins	0
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](#) Washington (40 miles) 0 ▾

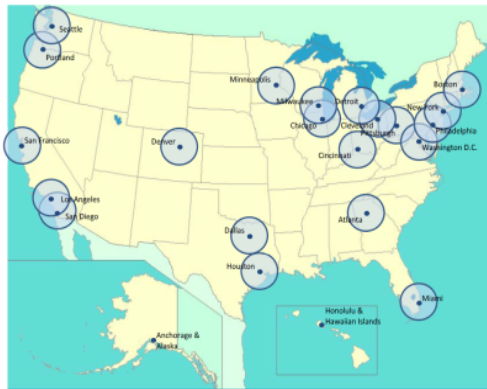
Regional Multiplier 0.92

[Help](#)

LID Design

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.

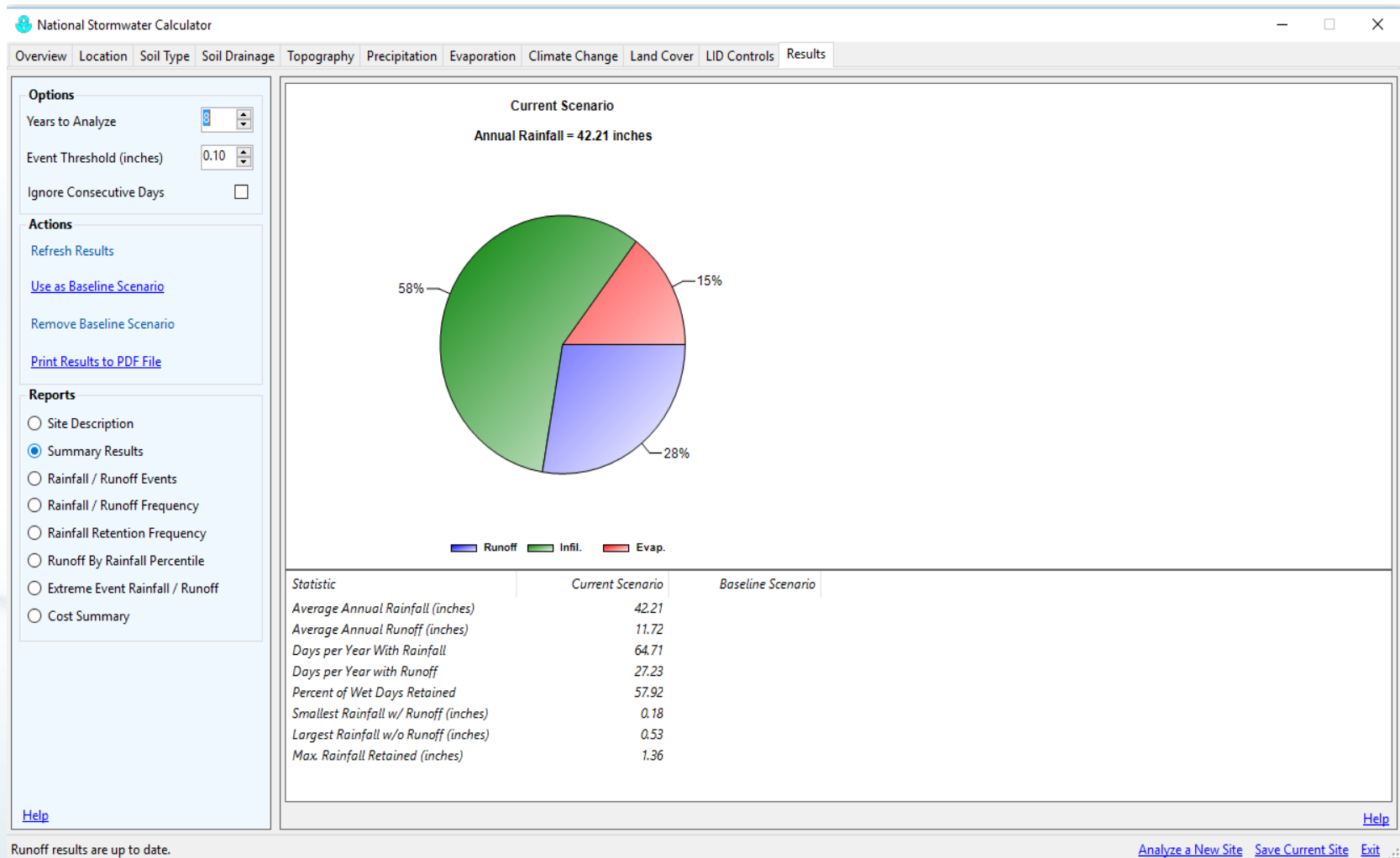


Assign LID practices to capture runoff from impervious areas.

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

SWC Analysis: Scott Street

Runoff Reduction Results



SWC Analysis: Scott Street

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

8

Event Threshold (inches)

0.10

Ignore Consecutive Days



Actions

[Refresh Results](#)

[Use as Baseline Scenario](#)

[Remove Baseline Scenario](#)

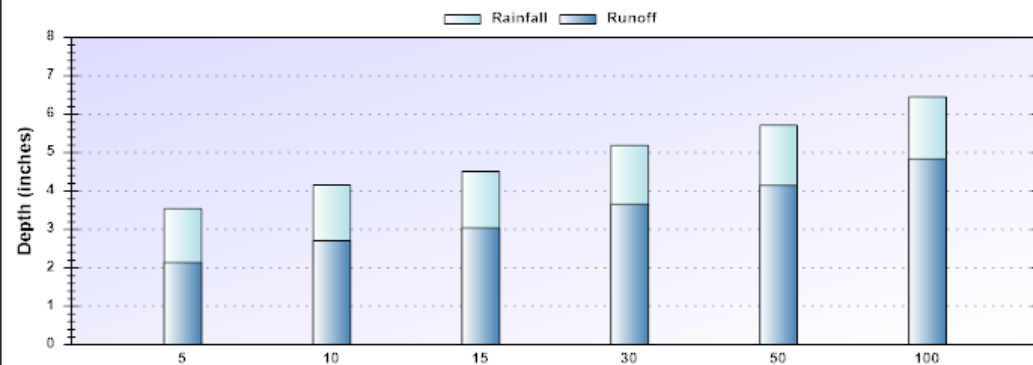
[Print Results to PDF File](#)

Reports

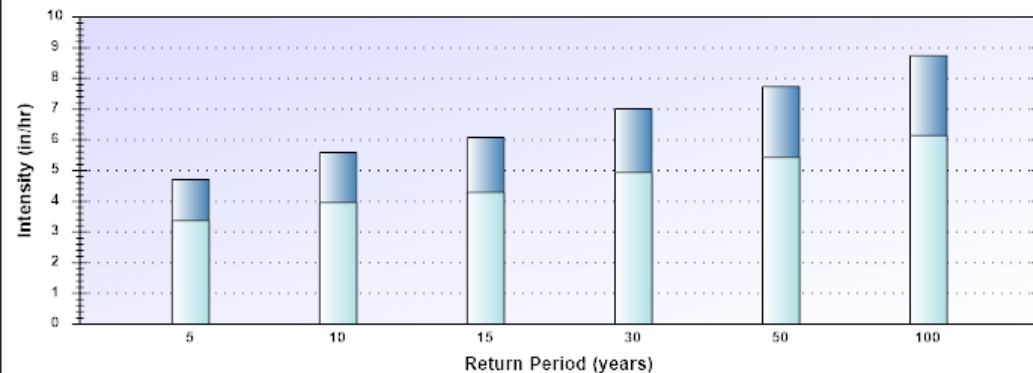
- ☐ Site Description
- ☐ Summary Results
- ☐ Rainfall / Runoff Events
- ☐ Rainfall / Runoff Frequency
- ☐ Rainfall Retention Frequency
- ☐ Runoff By Rainfall Percentile
- ☒ Extreme Event Rainfall / Runoff
- ☐ Cost Summary

[Help](#)

Extreme Event Rainfall / Runoff Depth



Extreme Event Peak Rainfall / Runoff



[Help](#)

Runoff results are up to date.

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

SWC Analysis: Scott Street

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 60
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](#)

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 0.60 ac		Baseline Scenario (B) Area Treated ac		Difference (C - B) Area Treated 0.60 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	75 / NA	No / NA	\$24,478	\$34,036	-	-	-	-
Infiltration Basins	NA / NA	No / NA	\$0	\$0	-	-	-	-
Permeable Pavement	NA / NA	No / NA	\$0	\$0	-	-	-	-
Total	75 / NA	Varies	\$24,478	\$34,036	-	-	-	-

Note: site complexity variables that affect cost shown below:

Current Scenario	Baseline Scenario
Dev. Type Re-development	-
Site Suitability Poor	-
Topography Mod. Flat (5% Slope)	-
Soil Type C	-
Cost Region Washington (40 miles) 0.92	-

Poor site suitability costs are in-line (\$24,478 - \$34,036) with the Pigtown Jan. 2017 planning level costs for Scott Street (\$22,407).

[Help](#)

Runoff results are up to date.

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

SWC Analysis: Scott Street

Annual Maintenance 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
8

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](#)

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	\$49	\$1,169	-	-	-	-
Infiltration Basins	\$0	\$0	-	-	-	-
Permeable Pavement	\$0	\$0	-	-	-	-
Total	\$49	\$1,169	-	-	-	-

Note: site complexity variables that affect cost shown below:

Current Scenario	Baseline Scenario
Dev. Type Re-development	-
Site Suitability Poor	-
Topography Mod. Flat (5% Slope)	-
Soil Type C	-
Cost Region Washington (40 miles) 0.92	-

[Help](#)

Runoff results are up to date.

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

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
 - Finding least cost option(s) while meeting performance goals
- Comparisons may be made between national and regional cost estimates:
 - Using local knowledge in selection of regional BLS cost multipliers
 - Other nearby cities: Philadelphia, etc.

SWC Analysis:

Potential Next Steps (Pigtown – Baltimore, MD)

- Applying for funding
- Construction plans/designs
- Final construction costs
- Construction



The screenshot shows the Maryland Department of Natural Resources (DNR) website. The header includes the Maryland state logo, the text "MARYLAND .gov", and "DEPARTMENT OF NATURAL RESOURCES". A search bar is in the top right, and social media icons for Facebook, Twitter, YouTube, and a general share icon are below it. A green navigation bar contains links: HOME, LANDS, WATERS, PARKS, FISHING, HUNTING, BOATING, WILDLIFE, and TREES. The main content area features a "News" section with a list of categories: Boating, Education, Fishing, Forestry, Hunting, Lands, Parks, Police, Waters, Wildlife, and Events. The featured article is titled "Over \$800,000 Announced to Support Local Green Infrastructure Projects to Improve Communities and Provide Jobs", dated June 29, 2017. The article text states that the Chesapeake Bay Trust, in partnership with the U.S. Environmental Protection Agency (EPA), Maryland Department of Natural Resources (DNR), and the City of Baltimore Office of Sustainability, announced \$843,486 in funding for the Chesapeake Bay Green Streets-Green Jobs-Green Towns Grant Program. The goal of the grants is to help communities develop and implement plans that reduce stormwater runoff, increase the number and amount of green spaces in urban areas. To the right of the text is a photograph of a group of people standing in front of a large, pink, pig-shaped sculpture in an urban setting. One person is holding a large check from the EPA.

News

- › Boating
- › Education
- › Fishing
- › Forestry
- › Hunting
- › Lands
- › Parks
- › Police
- › Waters
- › Wildlife
- › Events

Media Tools

- › Press Releases & News

Over \$800,000 Announced to Support Local Green Infrastructure Projects to Improve Communities and Provide Jobs

June 29, 2017

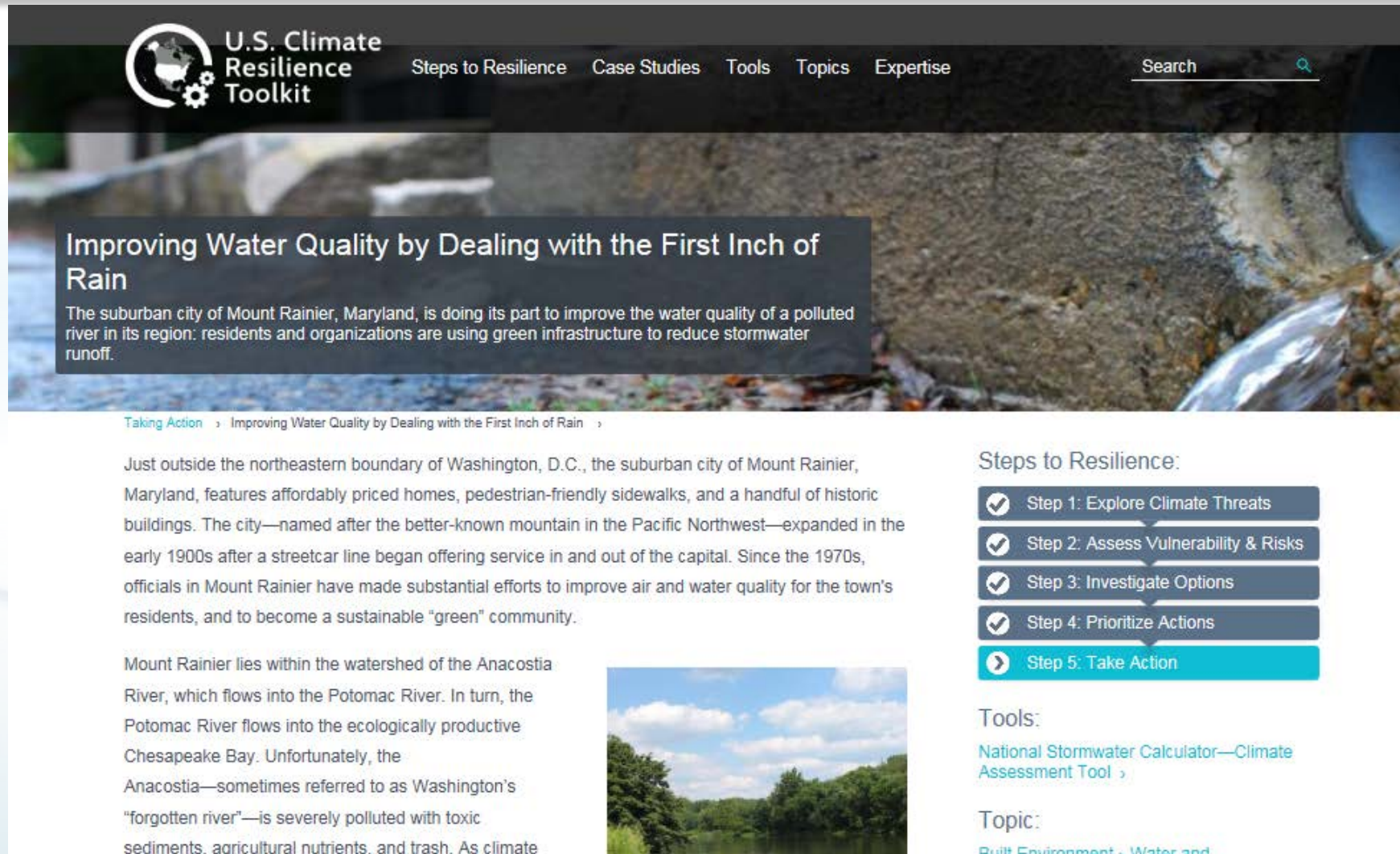
Today the Chesapeake Bay Trust in partnership with the U.S. Environmental Protection Agency (EPA), [Maryland Department of Natural Resources](#) (DNR), and the City of Baltimore Office of Sustainability announce \$843,486 in funding for the Chesapeake Bay Green Streets-Green Jobs-Green Towns Grant Program.

The goal of the grants is to help communities develop and implement plans that reduce stormwater runoff, increase the number and amount of green spaces in urban areas.



<http://news.maryland.gov/dnr/2017/06/29/over-800000-announced-to-support-local-green-infrastructure-projects-to-improve-communities-and-provide-jobs/>

Climate Resiliency Planning Application: Mount Rainier, MD



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:

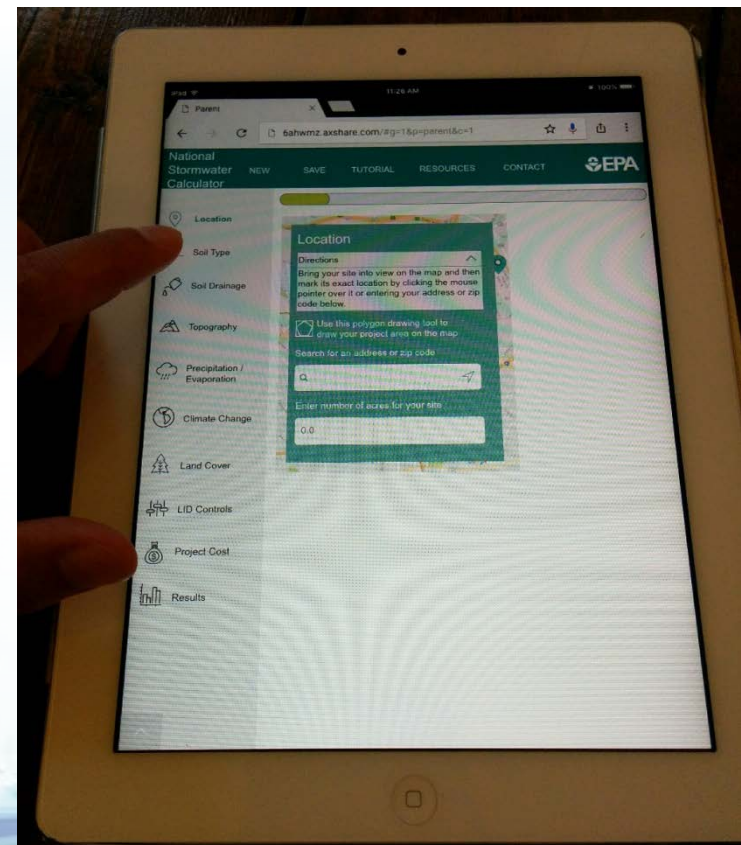
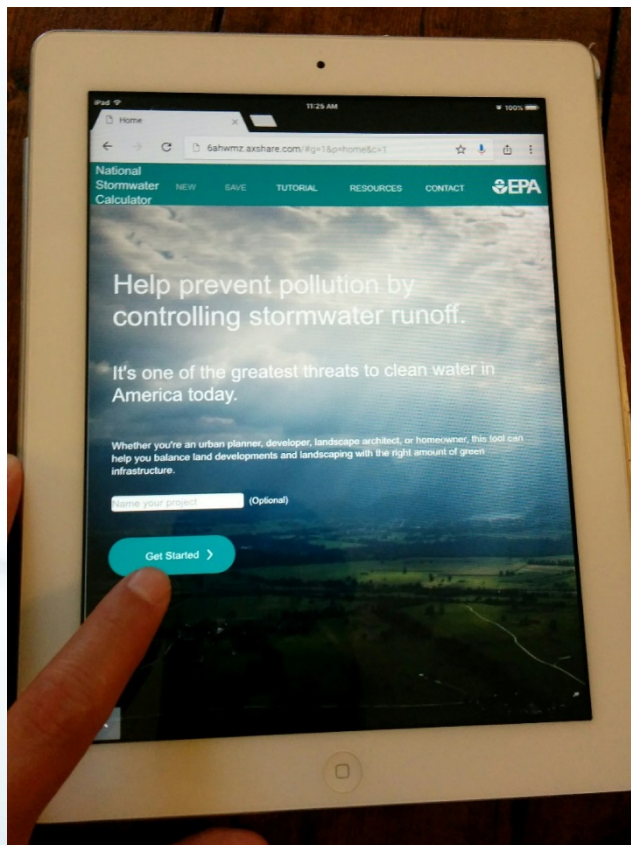
[National Stormwater Calculator—Climate Assessment Tool](#) >

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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berner.jason@epa.gov

National Stormwater Calculator Website:

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

Contact: SWC@epa.gov