



U.S. EPA National Stormwater Calculator: Cost Module & Mobile Web App

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Outline

U.S. EPA National Stormwater Calculator

- Stormwater Calculator (SWC) Background Information
- Low Impact Development (LID) Cost Estimation Module
- SWC Web Application
- Example Application: Northport, MI
- Interpreting Results
- Training & Outreach
- Discussion & Questions

National Stormwater Calculator Website

EPA United States Environmental Protection Agency

Environmental Topics Laws & Regulations About EPA Search EPA.gov

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

National Stormwater Calculator

Register now for a [free webinar](#) on January 31, 2018 that will provide a demonstration and introduce new features.

Tool to help control runoff and promote the natural movement of water

EPA's National Stormwater Calculator (SWC) is a software application that estimates the annual amount of rainwater and frequency of runoff from a specific site. Estimates are based on local soil conditions, land cover, and historic rainfall records. It is designed to be used by anyone interested in reducing runoff from a property, including site developers, landscape architects, urban planners, and homeowners.

The SWC accesses several national databases that provide soil, topography, rainfall, and evaporation information for a chosen site. The user supplies information about the site's land cover and selects low impact development (LID) controls they would like to use. The LID controls include seven green infrastructure practices.

[Access the Mobile Web App](#)

Additional Information

- [Green Infrastructure as Low Impact Development Controls](#) +
- [Capabilities](#) +
- [Real-World Applications](#) +
- [Software and Documentation](#) +

EPA's National Stormwater Calculator

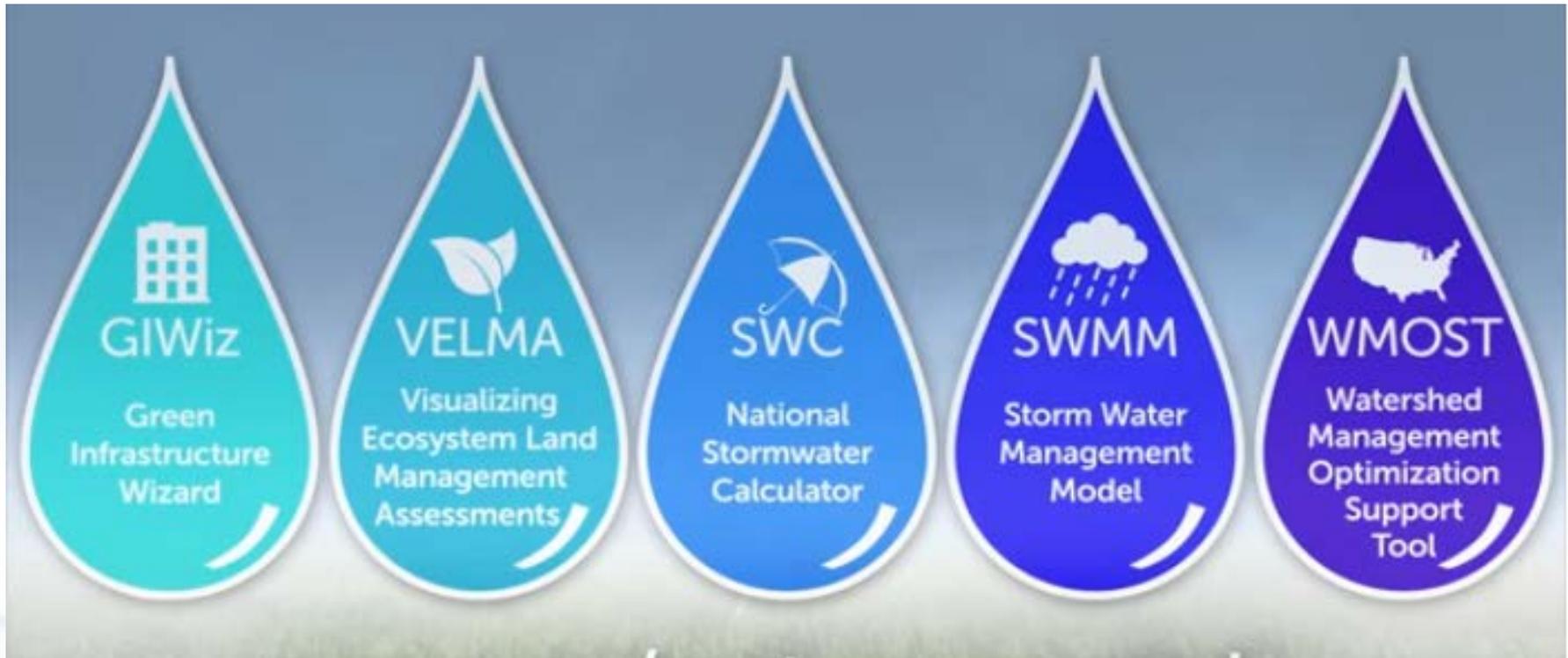
<http://www2.epa.gov/water-research/national-stormwater-calculator>

What We Developed and Why?

A Stormwater Management (Green Infrastructure/LID) Design and Planning Tool

- To estimate post-construction urban stormwater runoff discharges
- Screening-level stormwater runoff reduction and cost analyses of various green infrastructure/LID practices, including:
 - 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

Green Infrastructure Modeling Toolkit



Toolkit website: <https://www.epa.gov/water-research/green-infrastructure-modeling-toolkit>

***Toolkit video:** https://www.youtube.com/watch?time_continue=2&v=xHp-OeUneqQ

Potential Applications

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

Recent Examples of Urban Stormwater Management Projects: Great Lakes Region

- **Wisconsin:**
 - Manitowoc: rain garden along Blue Rail Marina Beach
 - Oak Creek: porous pavement parking area and bioretention along lakeside bluff
- **Michigan:**
 - Northport: pervious pavement, rain gardens, and tree box filters for Grand Traverse Bay
- **Indiana:**
 - Michigan City: green infrastructure streetscape (rain gardens & bioswales)

Communities using the SWC

- Northeastern Regional Ohio Sewer District (Cleveland, OH):

[Home](#) > [Stormwater](#) > [Green Infrastructure Grant Program](#)

Green Infrastructure Grant Program



<https://www.neorsd.org/stormwater-2/green-infrastructure-grant-program>

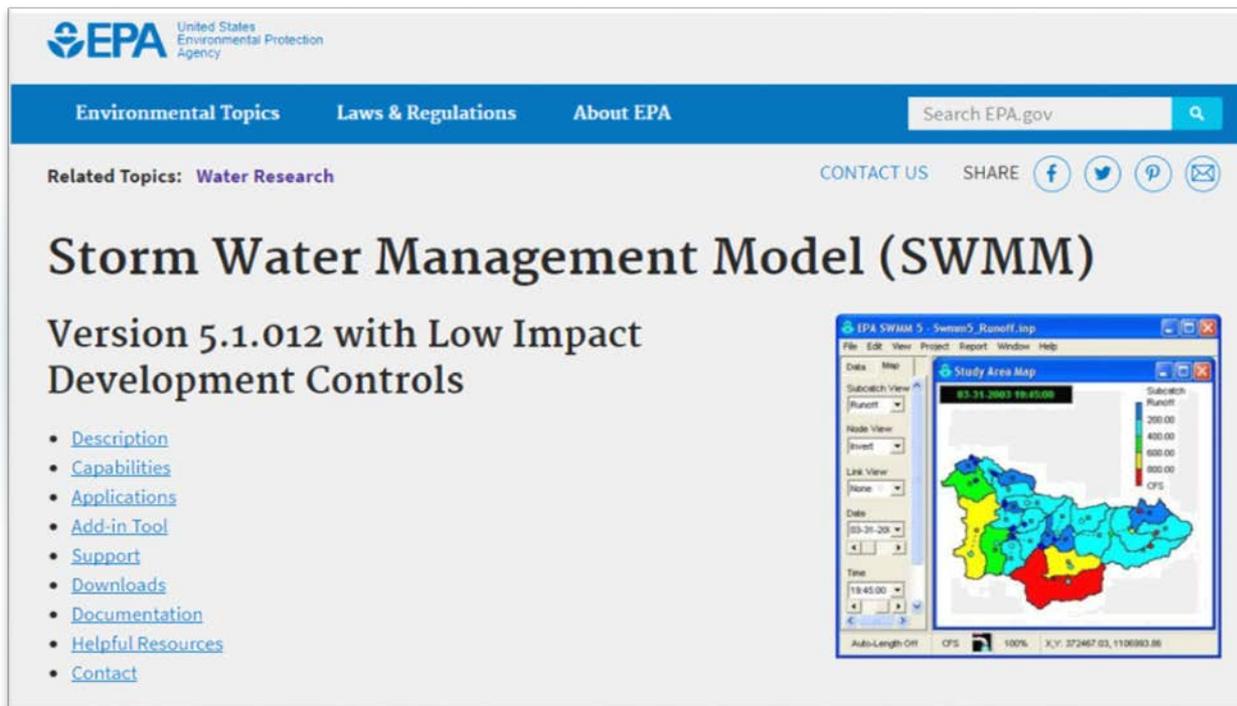
- EPA's Green & Complete Streets Building Blocks Program Recipients (2016- 2017):

- Manatee County, FL
- Baltimore, MD
- Central Falls, RI



<https://www.epa.gov/smartgrowth/building-blocks-sustainable-communities>

Storm Water Management Model (SWMM)



The screenshot shows the EPA website page for the Storm Water Management Model (SWMM). The page features the EPA logo and navigation links for Environmental Topics, Laws & Regulations, and About EPA. A search bar is located in the top right corner. Below the navigation bar, there are social media icons for Facebook, Twitter, and Pinterest, along with a CONTACT US button. The main heading is "Storm Water Management Model (SWMM)" followed by the subtitle "Version 5.1.012 with Low Impact Development Controls". A list of links is provided, including Description, Capabilities, Applications, Add-in Tool, Support, Downloads, Documentation, Helpful Resources, and Contact. An inset image shows a screenshot of the SWMM software interface, displaying a "Study Area Map" with a color-coded runoff simulation. The map shows a watershed area with runoff values ranging from 0 to 800.00 CFS. The software interface includes a menu bar (File, Edit, View, Project, Report, Window, Help) and various toolbars for data, subcatchment view, node view, link view, date, and time.

- SWC 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 SWC

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 Mobile Web App

The screenshot displays the EPA National Stormwater Calculator mobile web app. At the top, a green navigation bar contains the EPA logo and the text "National Stormwater Calculator" on the left, and the menu items "NEW", "SAVE", "OPEN", "RESOURCES", and "CONTACT" on the right. The main content area features a map of North America with a green location pin in the central United States. On the left side of the map, there is a vertical toolbar with icons for location, map, and various data inputs. A "Location" panel is overlaid on the map, containing a "Directions" section with instructions to bring the site into view and a search box for address or zip code. Below this is a section for drawing a polygon and a search box for address or zip code. At the bottom of the panel is a field to "Enter number of acres for your site:" with the value "0". The map itself shows state and provincial boundaries, major cities, and bodies of water like the Pacific Ocean, Gulf of Mexico, and Atlantic Ocean. A scale bar at the bottom right indicates 500 miles and 500 km.

LID Cost Estimation Module (Released May 2017):

- **Intended Uses:**

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

- **Limitations:**

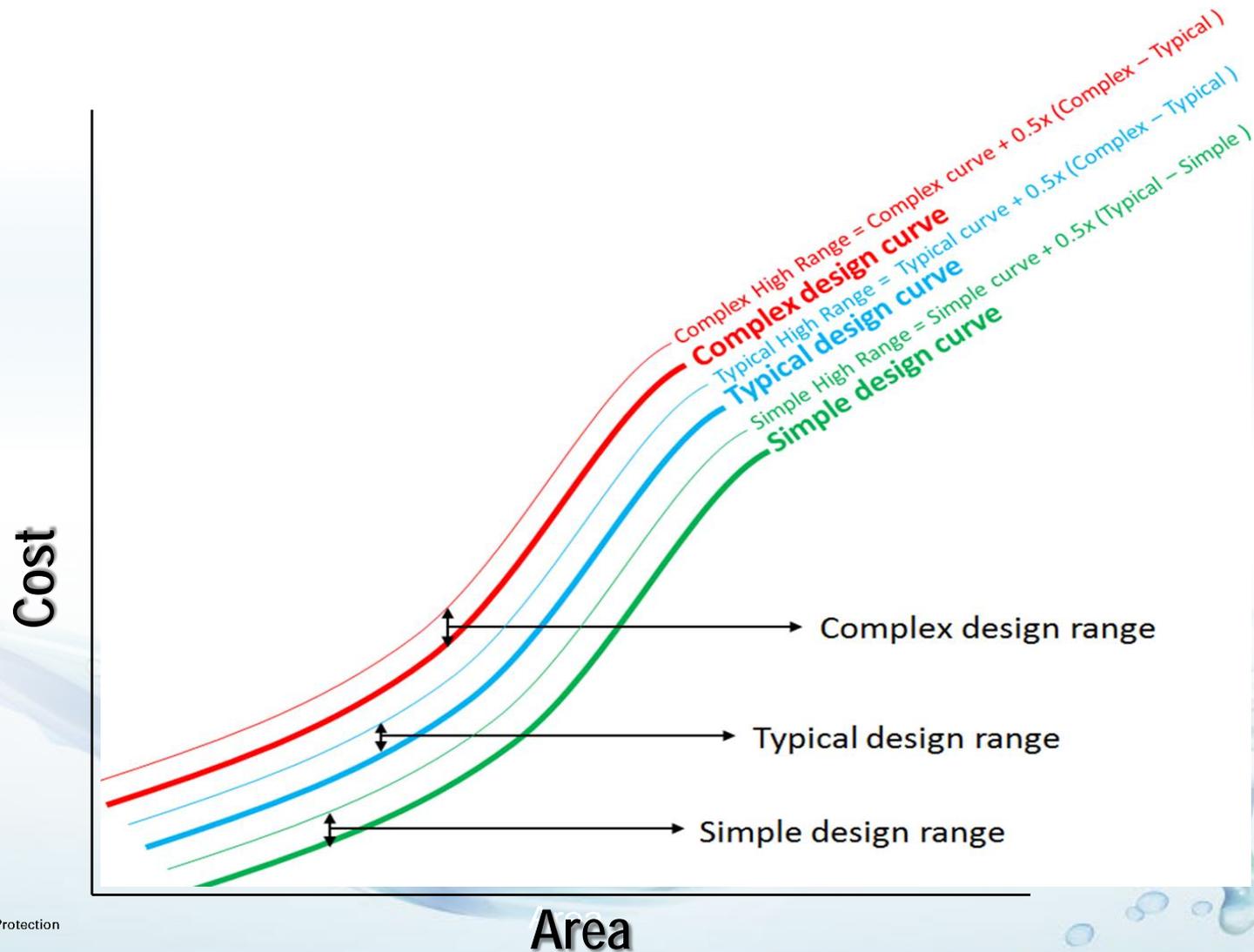
- Doesn't provide final construction costs

- Doesn't provide lifecycle costs (gives annual operation and maintenance (O & M) costs, not replacement costs)

- Regional costs not available for all areas of the US (many of the Western states)

LID Cost Estimation Module:

Accounting for Uncertainty with Cost Estimates (Regression Cost Curves)



LID Cost Estimation Module:

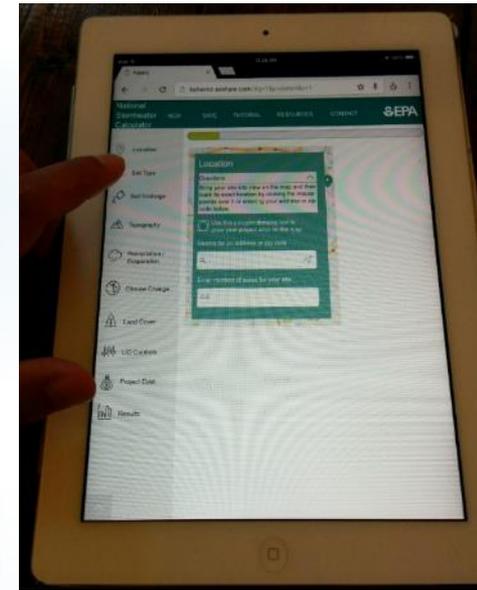
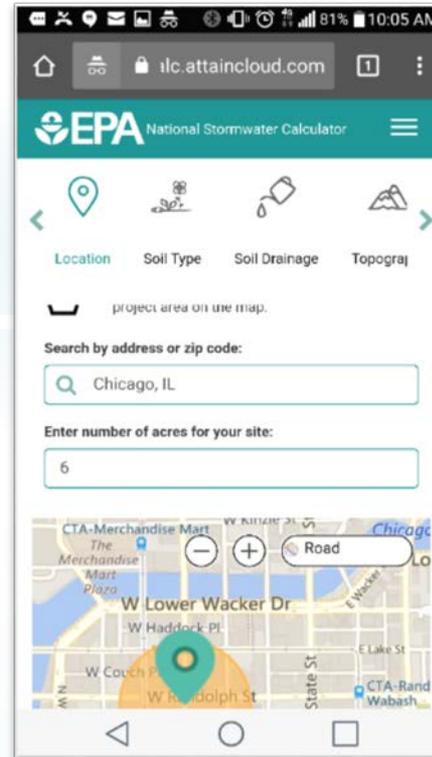
Development of Regionalized LID/Green Infrastructure Costs

- **Utilization of Bureau of Labor Statistics (BLS) Data for regional costs**
 - National Producer Price Index: outputs of service, construction, utilities, and other goods producing entities
 - Examples include: concrete storm sewer pipe, construction sand and gravel, etc.
 - Consumer Price Index: regional/city data (23 major US cities)
 - Examples include: fuels and utilities, energy, and diesel fuel
- **Data easily updated and maintained annually by EPA**
- **Development of regional costs comparable to Engineering News Record (ENR) and RS Means**

Release of SWC Web App

Sept. 2017

- Ability to function on any web browser
- Mobile friendly design (tablets and smartphones)
- Platform neutral: functions on Windows, Apple, and Linux computers
- Not found in an “app store” (Google Play or Apple Store)
 - Save it as a “favorite” website
- Requires a live Internet connection



Example views from smartphone and tablet

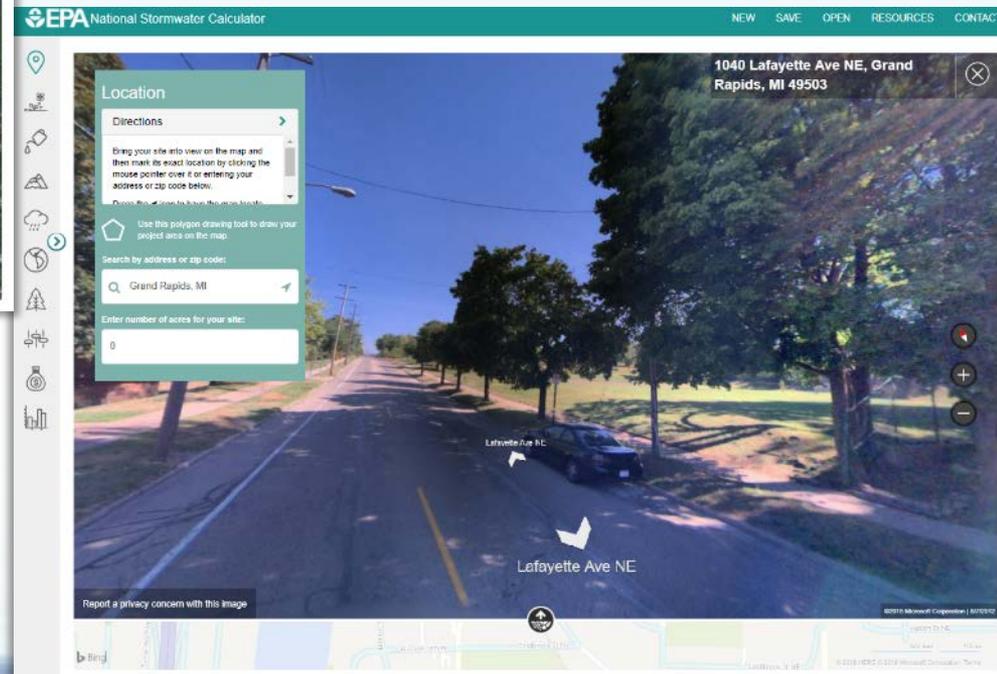
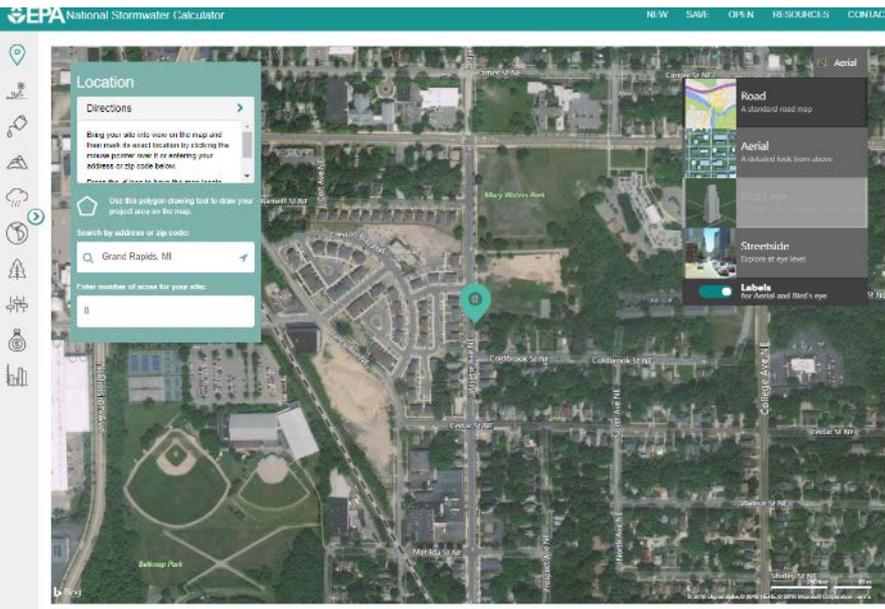
SWC Mobile Web App Application (Northport, MI)

Location:

The screenshot displays the EPA National Stormwater Calculator interface. At the top, the EPA logo and "National Stormwater Calculator" are on the left, and navigation links "NEW", "SAVE", "OPEN", "RESOURCES", and "CONTACT" are on the right. A vertical toolbar on the left contains icons for location, drawing, and various environmental features. The main map area shows an aerial view of Northport, MI, with a yellow polygon highlighting a project area along E Main St and E 2nd St. A search panel on the left includes a "Location" section with a "Directions" button, a polygon drawing tool, a search bar containing "Northport, MI", and an "Enter number of acres for your site" field with the value "1.90". The map labels include "Waukazoo St", "E Main St", "E 2nd St", "E 3rd St", "N Mills St", "Rose St", "Bay St", "E Magonaba St", "Haserot Park", and "Grand Traverse Bay". A scale bar at the bottom right indicates 100 feet and 25 meters. Copyright information at the bottom reads "© 2017 HERE © 2017 Microsoft Corporation Available Exclusively by DigitalGlobe".

Bing Maps:

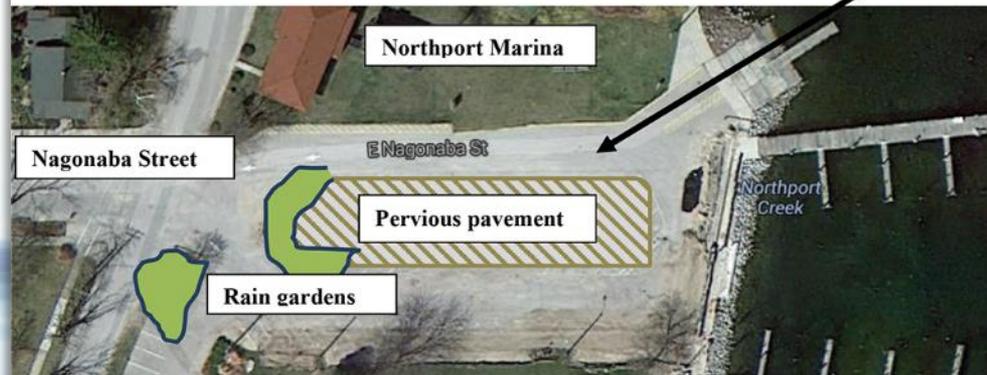
*new streetside view for major urban areas



SWC Mobile Web App Application (Northport, MI)



The Watershed Center Grand Traverse Bay (2016)



Soil Runoff Potential:

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

Soil Type

Directions ▾

Select a soil type and runoff potential from the choices listed or by clicking a shaded region of the map to select its value.

Hide soil type data

- Sand (Low Runoff)
- Sandy Loam (Moderately Low)
- Clay Loam (Moderately High)
- Clay (High Runoff)

Help

Grand Traverse Bay

100 feet 25 m

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Soil Infiltration Capacity:

The screenshot displays the EPA National Stormwater Calculator interface. At the top, the EPA logo and "National Stormwater Calculator" are on the left, and navigation links "NEW", "SAVE", "OPEN", "RESOURCES", and "CONTACT" are on the right. A vertical toolbar on the left contains icons for location, map, and various data layers. The main map shows an aerial view of a residential area with a semi-transparent blue overlay representing soil drainage capacity. A green location pin is placed on the map. A settings panel titled "Soil Drainage" is overlaid on the left side of the map. It includes a "Directions" dropdown, a text input field for conductivity, a "Hide soil drainage data" checkbox, and a legend for runoff rates. The legend shows four color-coded categories: yellow for ≤ 0.01 inches/hour, orange for > 0.01 to ≤ 0.1 inches/hour, purple for > 0.1 to ≤ 1.0 inches/hour, and dark blue for > 1 inches/hour. The map also shows street names like "E 3rd St", "E 2nd St", "Rose St", "Bay St", "W Main St", and "E Main St", and "Grand Traverse Bay". A scale bar at the bottom right indicates 100 feet and 25 meters. Copyright information at the bottom reads "© 2017 HERE © 2017 Microsoft Corporation Available Exclusively by DigitalGlobe".

EPA National Stormwater Calculator

NEW SAVE OPEN RESOURCES CONTACT

Soil Drainage

Directions

Enter your own conductivity value directly into the input field below or click a shaded region on the map to select its conductivity value. If you leave the edit box blank, the default conductivity associated with the

Hide soil drainage data

How fast does rainwater runoff from previous areas of your site (inches/hour)?

≤ 0.01 inches/hour

> 0.01 to ≤ 0.1 inches/hour

> 0.1 to ≤ 1.0 inches/hour

> 1 inches/hour

Help

Grand Traverse Bay

100 feet 25 m

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Topography/Slope:

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

Topography

Directions ▾

Select a slope from the choices listed below or click a shaded region on the map to select its value.

Hide topography data

- Flat (2% Slope)
- Moderately Flat (5% Slope)
- Moderately Steep (10% Slope)
- Steep (Above 15% Slope)

Help

Map labels: Waukazoo, Bay St, Rose St, E 2nd St, E 3rd St, W Main St, E Main St, Haserot Park, Grand Traverse Bay.

Scale: 100 feet / 25 m

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Historical Weather (precipitation & evaporation):

The screenshot displays the EPA National Stormwater Calculator interface. The main panel is titled "Precipitation/Evaporation" and contains the following information:

- Directions:** Select a rain gage location to use as a source of hourly rainfall data and a weather station to use as a source for evaporation rates. Select the checkbox if you would like the...
- Rain Gage:** CHARLEVOIX
- Weather Station:** CHARLEVOIX
- Rainfall Information:**
 - Record Start Date: 1987/05/31
 - Record End Date: 2006/12/31
 - Annual Rainfall: 32.17
- [Download rainfall/evaporation data](#)
- [Help](#)

The interface also features a map of the Charlevoix area with several weather station icons (green and orange) overlaid. The map includes labels for various locations such as Stutsmanville, Harbor Springs, Petoskey, Bear Creek Township, Zenth Heights, Clarion, Boyne City, Ironton, Barnard, Abbeville, Eastport, Pleasant Valley, Belleaire, Wetzel, Ots, Rapid City, Leetsville, Darragh, Frederic, Whitewater Township, Kalkaska, East Bay Township, Traverse City, Gailfield Township, Greilickville, Elmwood Township, Solon, Cedar Run, Long Lake Township, Peninsula Township, Elk Rapids, Grand Traverse Bay, Ansoctown, Sleeping Bear Dunes National Lakeshore, North Manitow, Sleeping Bear Dunes National Lakeshore, North Manitow, Sleeping Bear Dunes National Lakeshore, and Sleeping Bear Dunes National Lakeshore. The map also shows roads, a scale bar (0 to 10 miles), and a copyright notice: "Cotton © 2018 HERE © 2018 Microsoft Corporation Terms".

Climate Change Scenarios & Extreme Storm Events:

HIGHLIGHTS
REPORT

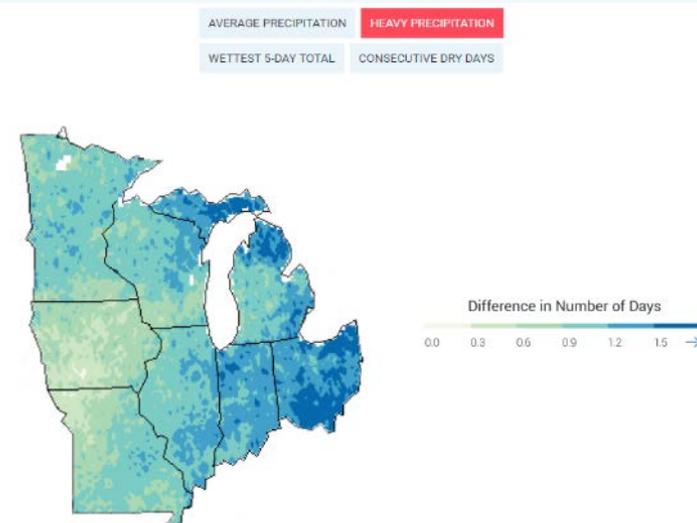
OUR CHANGING CLIMATE SECTORS REGIONS RESPONSE STRATEGIES

Midwest INTRO 1 2 3 4 5 6 Download Chapter

Key Message 5: Increased Rainfall and Flooding

Extreme rainfall events and flooding have increased during the last century, and these trends are expected to continue, causing erosion, declining water quality, and negative impacts on transportation, agriculture, human health, and infrastructure.

Supporting Evidence



Climate Change Scenarios & Extreme Storm Events:

National Stormwater Calculator
NEW SAVE OPEN RESOURCES CONTACT

-
-
-
-
-
-
-
-
-
-

Climate Change

Directions

Helpful Resources

- [Scenarios for Climate Assessment and Adaptation - Regions](#)
- [GlobalChange.gov - Regions & Topics](#)
- [US Environmental Protection Agency - Future of Climate Change](#)
- [World Climate Research Programme](#)

Select a future climate change scenario to apply:

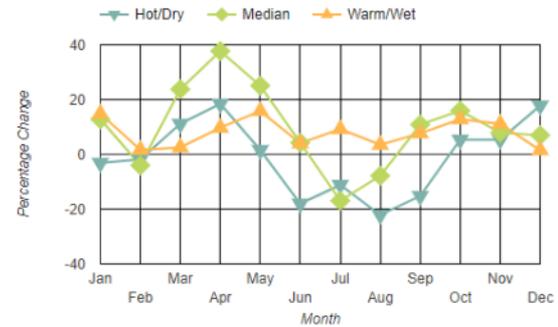
- No Change
- Hot/Dry
- Median Change
- Warm/Wet

Select the time period to which the climate change scenario applies:

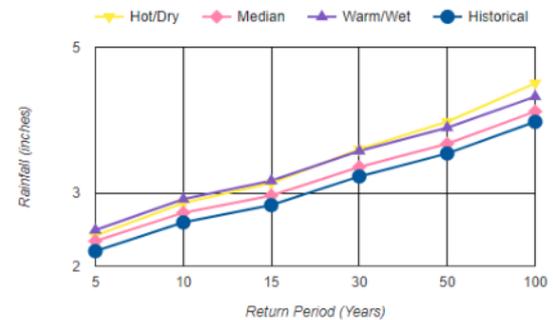
- Near Term (2020 - 2049)
- Far Term (2045 - 2074)

Save charts as PDF

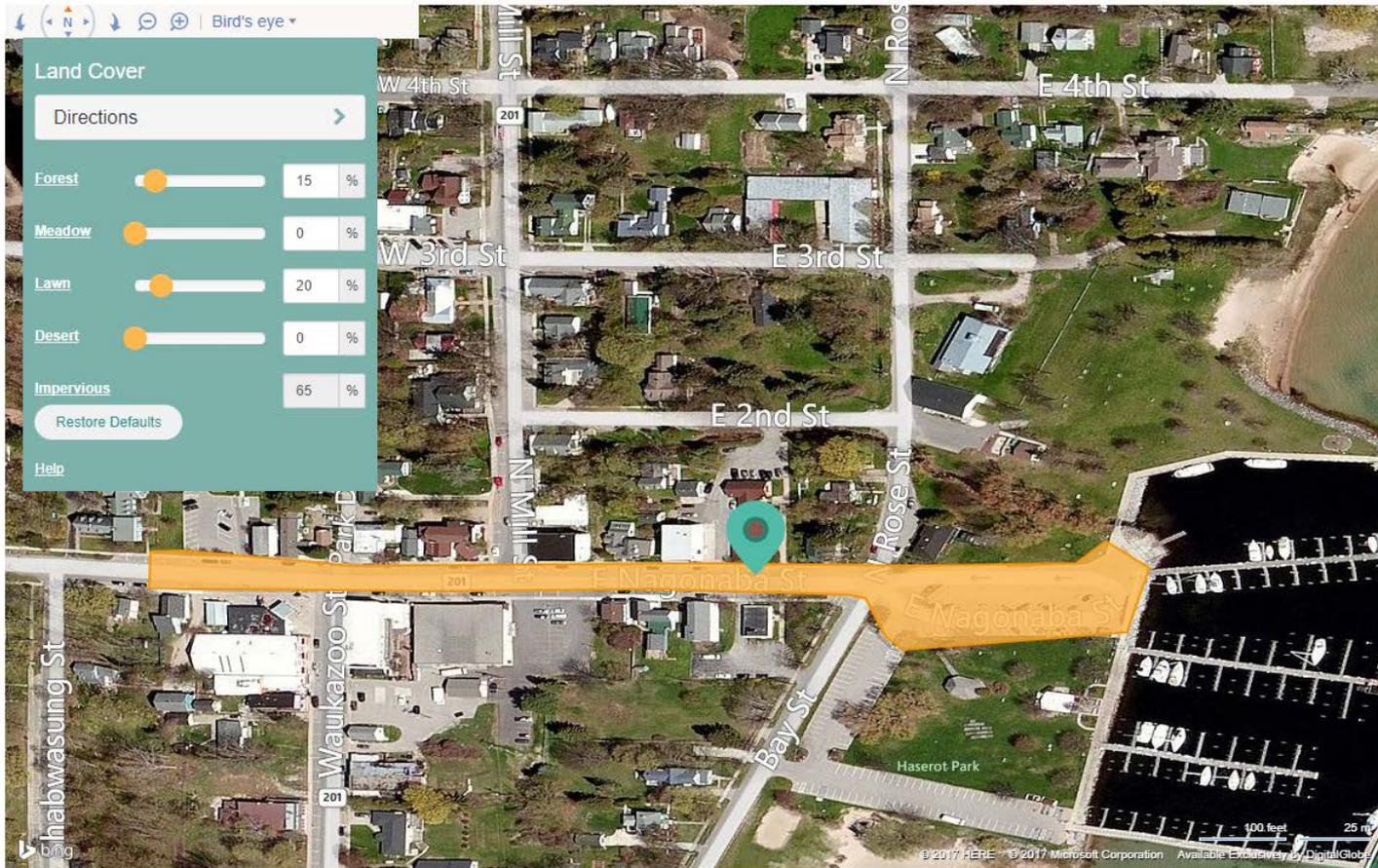
Percentage Change in Monthly Rainfall for Far Term Projections



Annual Max. Day Rainfall (inches) for Far Term Projections



Land Cover:



LID Controls:

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

LID Controls

Directions ➤

- Disconnection 0 %
- Rain Harvesting 0 %
- Rain Gardens 10 %
- Green Roofs 0 %
- Street Planters 55 %
- Infiltration Basins 0 %
- Permeable Pavement 20 %

Design Storm for Sizing: 1.0 in.

[Restore Defaults](#)

[Help](#)

Permeable Pavement

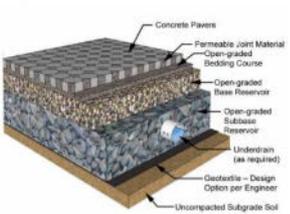
Continuous Permeable Pavement systems are excavated areas filled with gravel and paved over with a porous concrete or asphalt mix. Modular block systems are similar except that permeable block pavers are used instead.

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 while the gravel storage layer is typically 6 to 18 inches high.

The Capture Ratio is the percent of the treated area (street or parking lot) that is replaced with permeable pavement.

[Learn More](#)




Pavement Thickness: 5 in.

Gravel Layer Thickness: 18 in.

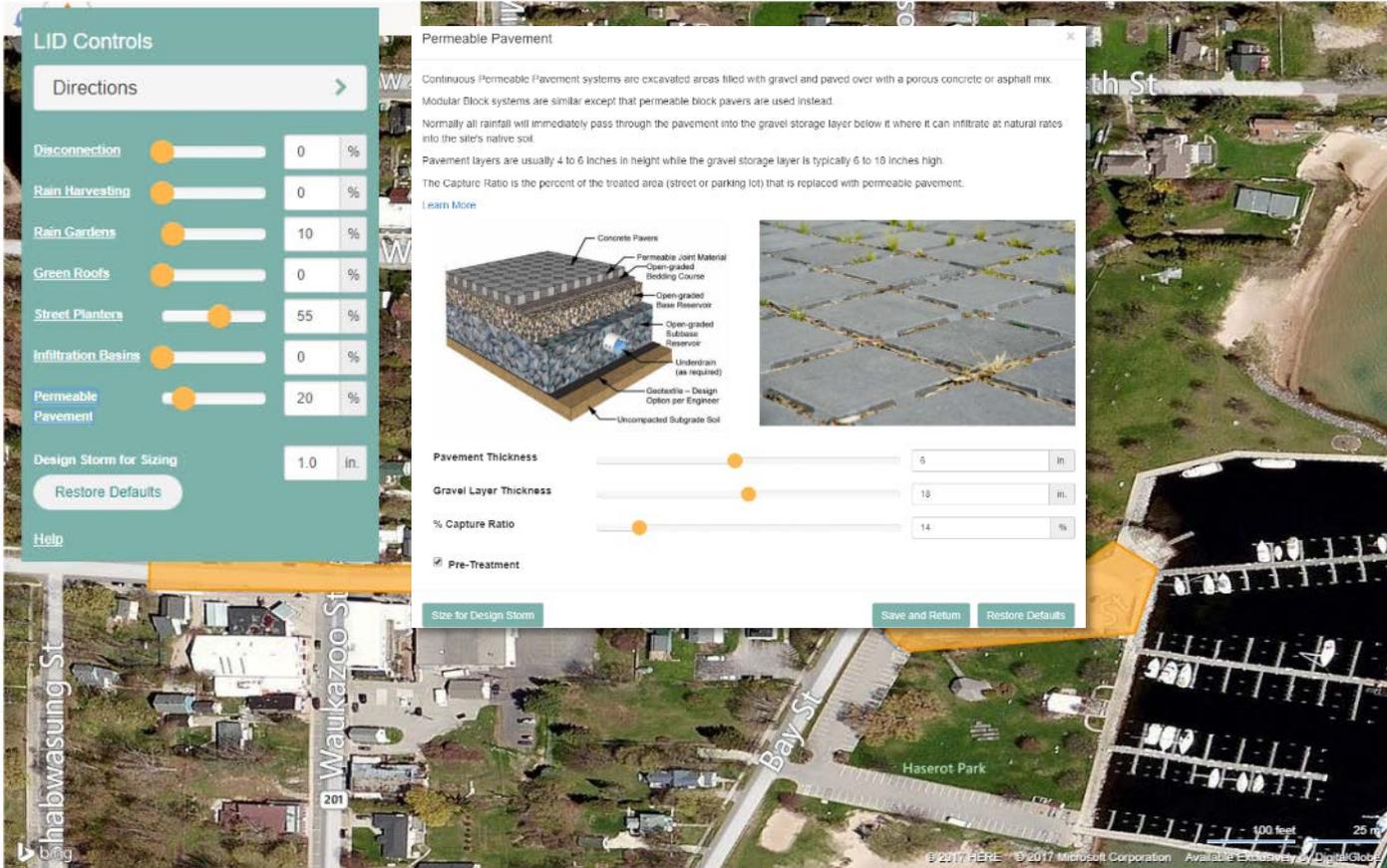
% Capture Ratio: 14 %

Pre-Treatment

[Size for Design Storm](#)

[Save and Return](#)

[Restore Defaults](#)



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Project Cost (Development Type):

The screenshot displays the EPA National Stormwater Calculator interface. The top navigation bar includes the EPA logo, the text "National Stormwater Calculator", and links for "NEW", "SAVE", "OPEN", "RESOURCES", and "CONTACT". On the left, a vertical toolbar contains icons for location, map, and various environmental factors. The main content area is divided into a settings sidebar on the left and a main information panel on the right.

Project Cost Settings Sidebar:

- Directions:** A dropdown menu with a downward arrow.
- Verify cost estimation variables below. Click on each option to learn more.**
- Choose a Project Type:**
 - Re-Development
 - New Development
- Choose your Site Suitability:**
 - Poor
 - Moderate
 - Excellent
- Choose your Cost Region:**
 - Cost Region: Milwaukee(190.0 miles)
 - Regional Multiplier: 1

Re-Development Information Panel:

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 "Project Cost" 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.

The background of the interface is an aerial satellite view of a residential area with streets labeled "Waukegan", "Waukegan", "Bay St", and "E 4th St". A yellow highlighted area on the map is labeled "Haberot Park". A scale bar at the bottom right indicates 100 feet and 25 meters. Copyright information at the bottom reads "© 2017 HERE © 2017 Microsoft Corporation Available Exclusively by DigitalGlobe".

Project Cost (Site Suitability):

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

Project Cost

Directions ▼

Verify cost estimation variables below. Click on each option to learn more.

Choose a Project Type

- Re-Development
- New Development

Choose your Site Suitability

- Poor
- Moderate
- Excellent

Choose your Cost Region

Cost Region: Milwaukee(190.0 miles)

Regional Multiplier: 1

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.

Few physical obstacles **Underground utilities present** **Parking closures**

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.

Close

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Project Cost (Bureau of Labor Statistics Cost Region):

The screenshot displays the EPA National Stormwater Calculator interface. The top navigation bar includes the EPA logo, the title "National Stormwater Calculator", and links for "NEW", "SAVE", "OPEN", "RESOURCES", and "CONTACT". On the left, a vertical toolbar contains icons for location, map, and various environmental factors.

The main content area is divided into two primary sections:

- Project Cost:** This section includes a "Directions" dropdown menu, a note to "Verify cost estimation variables below. Click on each option to learn more.", and several selection options:
 - Choose a Project Type:** Radio buttons for "Re-Development" (selected) and "New Development".
 - Choose your Site Suitability:** Radio buttons for "Poor", "Moderate", and "Excellent".
 - Choose your Cost Region:** A dropdown menu currently showing "Milwaukee(190.0 miles)".
 - Regional Multiplier:** A text input field containing the value "1".
- Cost Regions:** A modal window with a close button. It contains a text block explaining that the region is determined from the Location tab using Bureau of Labor Statistics (BLS) data. It states that a multiplier is computed representing regional differences compared to national costs. It notes that three regions are reported from 20 major cities, and users can select "National" or "Other" to apply their own multiplier. It also mentions that light blue circles on the map represent areas within a 100-mile radius of each major city.

The background of the interface is an aerial satellite view of a residential area with streets labeled "Waukegan" and "Waukegan". A "Close" button is visible at the bottom right of the "Cost Regions" modal window.

Results (Summary):

National Stormwater Calculator
NEW SAVE OPEN RESOURCES CONTACT

Results

Directions ▼

Options:

Years to Analyze:

10

Event Threshold:

0.1

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 Exceedance Frequency
- Rainfall Retention Frequency
- Runoff Contribution by Rainfall Percentile
- Extreme Event Rainfall / Runoff
- Cost Summary

Current Scenario

Annual Rainfall: 34.96 inches

● Runoff
● Infiltration
● Evaporation

Baseline Scenario

Annual Rainfall: 34.96 inches

● Runoff
● Infiltration
● Evaporation

Statistic	Current	Baseline
Average Annual Rainfall (inches)	34.96	34.96
Average Annual Runoff (inches)	3.41	18.13
Days per Year With Rainfall	148.22	148.22
Days per Year With Runoff	104.84	104.84
Percent of Wet Days Retained	29.27	29.27
Smallest Rainfall w/ Runoff (inches)	0.01	0.01
Largest Rainfall w/o Runoff (inches)	0.07	0.07
Max Rainfall Retained (inches)	2.22	1.03

Results (Cost Summary):

EPA National Stormwater Calculator

[NEW](#) [SAVE](#) [OPEN](#) [RESOURCES](#) [CONTACT](#)

Results

Directions ▼

Options:

Years to Analyze:

10

Event Threshold:

0.1

Ignore Consecutive Days

Actions:

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Remove Baseline Scenario

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- Extreme Event Rainfall / Runoff
- Cost Summary

Cost Summary

[Tabular View](#) | [Graphical View](#)

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

LID Control Type	Drainage Area %	Has Pre-Treatment?	Current Scenario (C)		Baseline Scenario (B)		Difference (C - B)	
			Current	Baseline	Low	High	Low	High
Disconnection	0	No	\$0	\$0	\$0	\$0	\$0	\$0
Rainwater Harvesting	0	No	\$0	\$0	\$0	\$0	\$0	\$0
Rain Gardens	10	Yes	\$4,867	\$9,329	\$0	\$0	\$4,867	\$9,329
Green Roofs	0	No	\$0	\$0	\$0	\$0	\$0	\$0
Street Planters	55	No	\$8,766	\$23,274	\$0	\$0	\$8,766	\$23,274
Infiltration Basins	0	No	\$0	\$0	\$0	\$0	\$0	\$0
Permeable Pavement	20	Yes	\$12,761	\$17,391	\$0	\$0	\$12,761	\$17,391
Total	85%	0%	\$26,394	\$49,994	\$0	\$0	\$26,394	\$49,994

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

LID Control Type	Current Scenario (C)		Baseline Scenario (B)		Difference (C - B)	
	Low	High	Low	High	Low	High
Disconnection	\$0	\$0	\$0	\$0	\$0	\$0
Rainwater Harvesting	\$0	\$0	\$0	\$0	\$0	\$0
Rain Gardens	\$50	\$1,218	\$0	\$0	\$50	\$1,218
Green Roofs	\$0	\$0	\$0	\$0	\$0	\$0
Street Planters	\$103	\$2,439	\$0	\$0	\$103	\$2,439
Infiltration Basins	\$0	\$0	\$0	\$0	\$0	\$0
Permeable Pavement	\$131	\$714	\$0	\$0	\$131	\$714
Total	\$284	\$4,371	\$0	\$0	\$284	\$4,371

Note: Site complexity variables that affect cost shown below.

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

SWC Analysis: Potential Next Steps

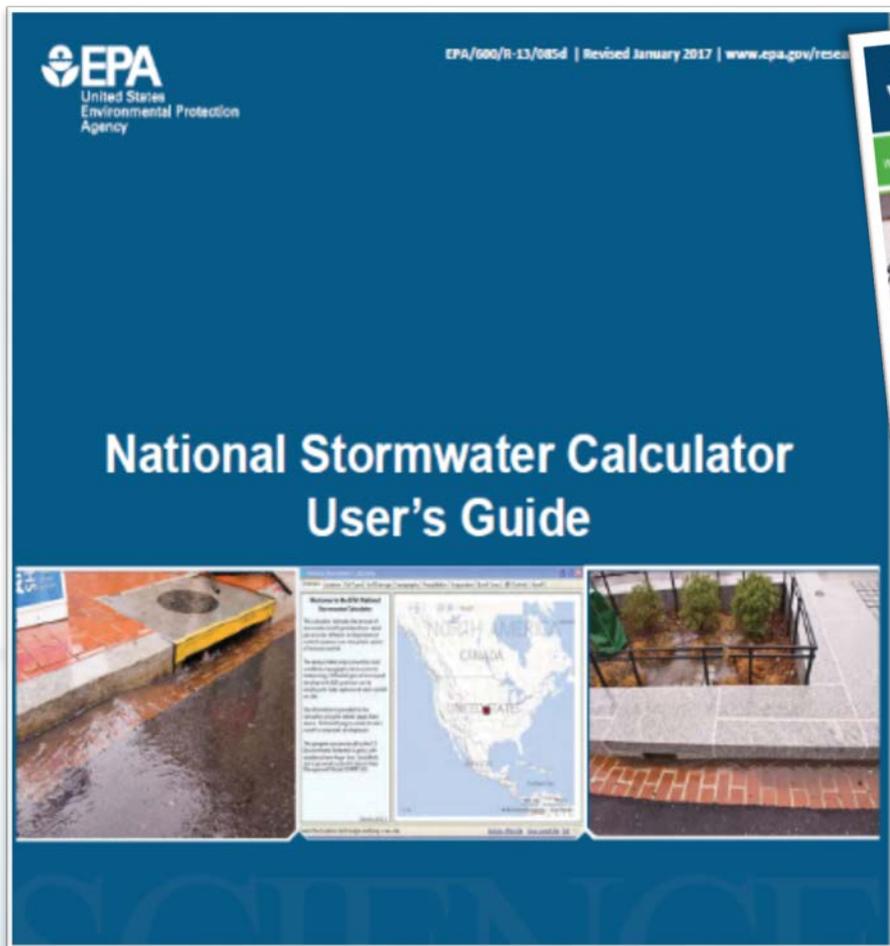
- Sharing planning results with decision-makers
- Applying for funding
- Developing construction plans/designs



The screenshot shows the homepage of the Maryland Department of Natural Resources website. The header features the Maryland state logo and the text "MARYLAND .gov" and "DEPARTMENT OF NATURAL RESOURCES". A search bar is located in the top right corner. Below the header is a green navigation bar with the following menu items: HOME, LANDS, WATERS, PARKS, FISHING, HUNTING, BOATING, WILDLIFE, and TREES. The main content area is divided into two columns. The left column is titled "News" and contains a list of categories with blue arrows pointing to the right: Boating, Education, Fishing, Forestry, Hunting, Lands, Parks, Police, Waters, Wildlife, and Events. The right column features a news article 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: "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." Below the text is a photograph of a group of people standing in front of a building, holding a large check. 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/>

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



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

SWC:

Site Parameters and Embedded GIS Data-sets

- **Location:** Bing Maps
- **Soils:** NRCS SSURGO (*web service*)
- **Slope:** NRCS SSURGO
- **Hydraulic Conductivity:** NRCS SSURGO
- **Precipitation and Temperature:** National Climate Center (NCDC)-NOAA (*EPA's BASINS Model*)
- **Evaporation:** Calculation based on meteorological data
- **Climate Change Future Scenarios:** Precipitation & evaporation (*EPA's CREAT 2.0*)
- **Land-Cover/Use:** User provided
- **LID Practices (*new costing module available*):** User provided