



U.S. EPA National Stormwater Calculator

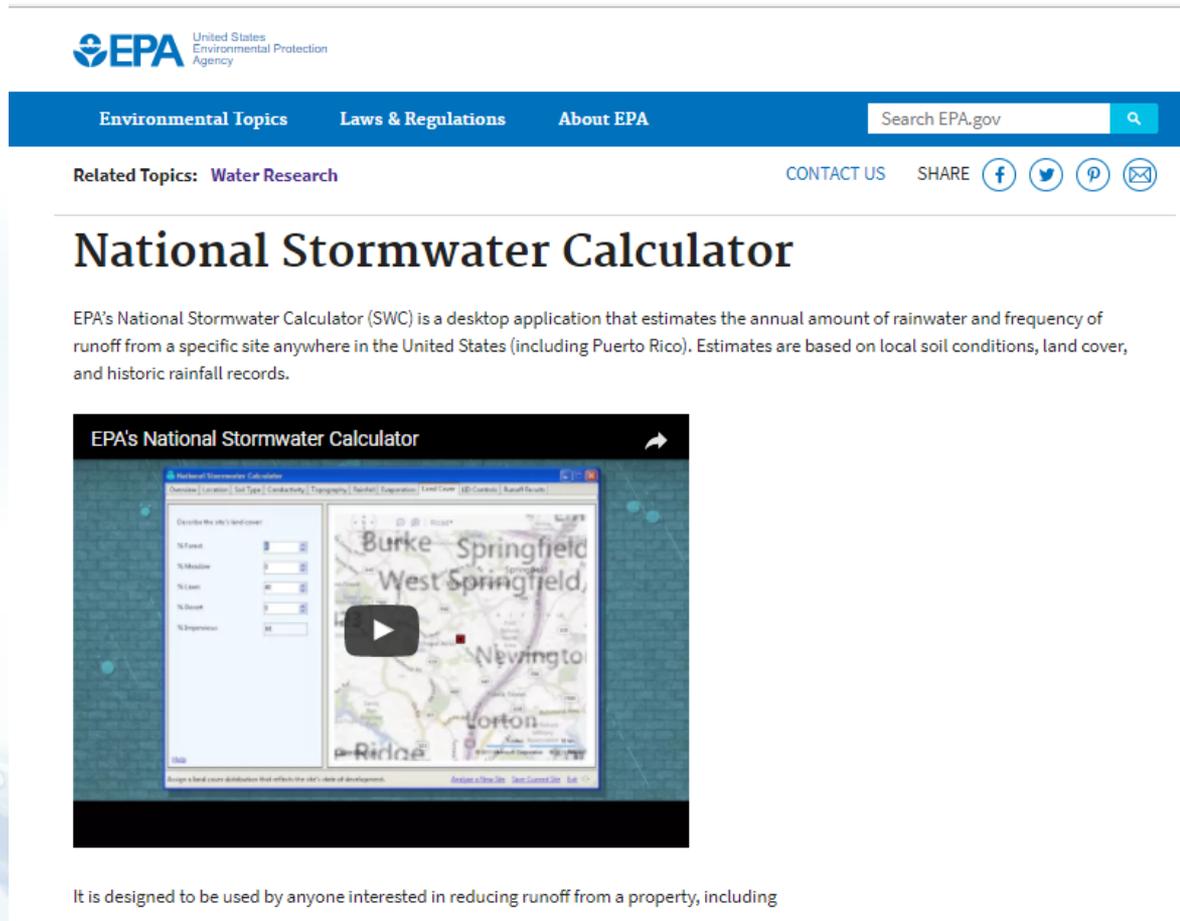
Jason Bernagros (Berner)
U.S. EPA's Office of Research and Development

Outline

U.S. EPA National Stormwater Calculator

- Stormwater Calculator Background Information
- LID Cost Estimation Module
- Development of Mobile Web Application
- Example Application: Northport, MI
- Interpreting Results
- Next Steps
- Discussion & Questions

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

The video shows the application interface with a map of the Springfield area and input fields for land cover percentages:

- % Forest: [dropdown]
- % Meadow: [dropdown]
- % Lawn: [dropdown]
- % Street: [dropdown]
- % Impervious: [dropdown]

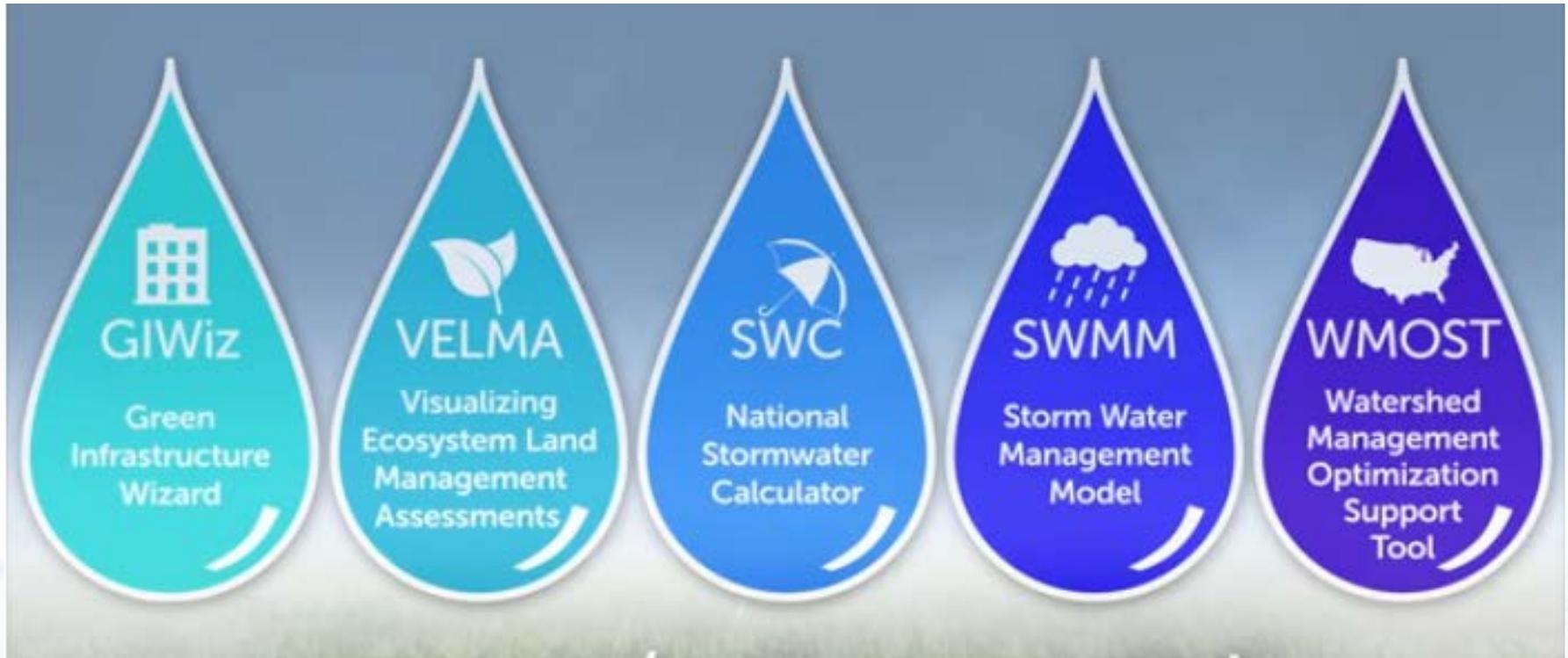
It is designed to be used by anyone interested in reducing runoff from a property, including

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

What Have We Created and Why?

- **A Stormwater Management (Green Infrastructure/Low Impact Development (LID)) Design and Planning Tool**
 - To model post-construction urban stormwater runoff discharges
 - Screening-level stormwater runoff reduction and cost analyses of various green infrastructure/low impact development (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



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

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.

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>

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



 EPA

science in ACTION

INNOVATIVE RESEARCH FOR A SUSTAINABLE FUTURE

www.epa.gov/research

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 slope. The user can rely on the slope data display as a guide or can use local knowledge to describe the site's topography.



(1) Green Infrastructure



(2) Traditional Grey Infrastructure

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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Laws & Regulations

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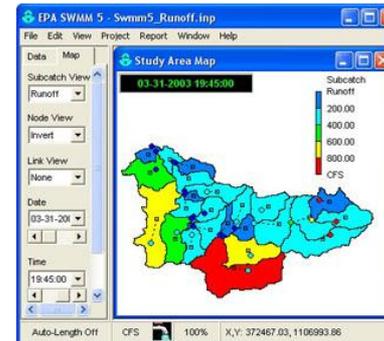
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Storm Water Management Model (SWMM)

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 Mobile Web App

The screenshot displays the EPA National Stormwater Calculator mobile web app. At the top, the EPA logo and the text "National Stormwater Calculator" are on the left, and navigation links for "NEW", "SAVE", "OPEN", "RESOURCES", and "CONTACT" are on the right. A vertical toolbar on the left side contains icons for location, map, and various environmental factors. The main content area features a map of North America with a green location pin in the central United States. A green overlay box on the left contains the following sections:

- Location**
 - Directions** (dropdown menu)
 - Bring your site into view on the map and then mark its exact location by clicking the mouse pointer over it or entering your address or zip code below.
- Polygon Drawing Tool**
 - Use this polygon drawing tool to draw your project area on the map.
- Search by address or zip code**
 - Search input field: Enter an address or zip code
- Enter number of acres for your site**
 - Input field: 0.0

The map shows "CANADA" and "UNITED STATES" with state and provincial boundaries. Major cities like Ottawa, Washington, and Mexico City are labeled. The map includes a scale bar (0 to 500 miles/km) and copyright information for HERE and Microsoft Corporation.

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/build 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)

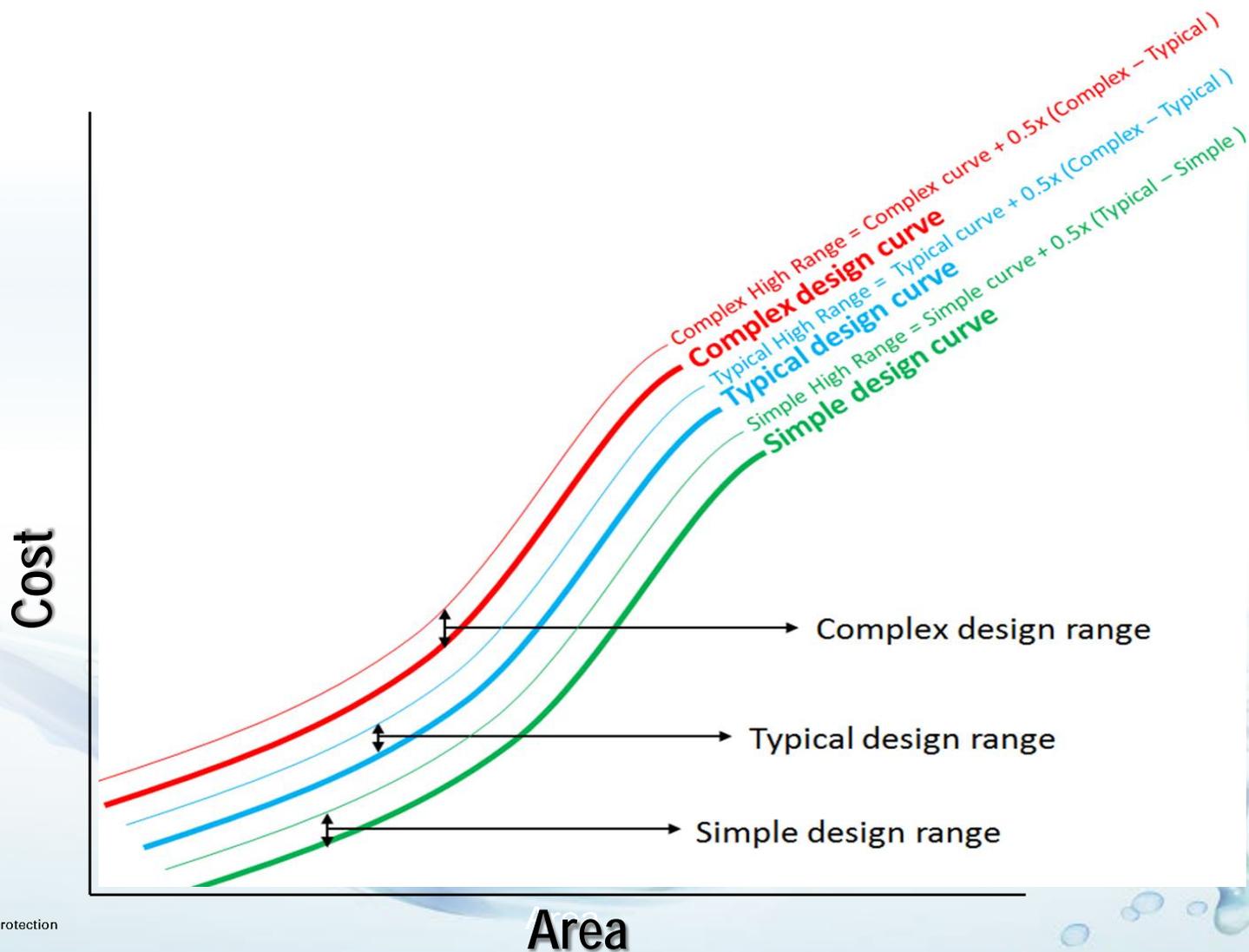
LID Cost Estimation Module:

Site Complexity Effects on Costs of Stormwater Projects

Criteria	Degree of Complexity		
	Simple	Typical	Complex
New vs. existing development	New	Existing	Existing
<i>(Pretreatment)</i> Outflow and overflow discharge safety constraints	Safe & unconstrained	Slightly constrained & may require some grading or pipe infrastructure for safe discharge	Likely constrained & may require significant grading or pipe infrastructure for safe discharge
Equipment accessibility	Easy access	Fairly easy	Difficult access
Slope for LID control placement	Flat to moderately flat (0 – 4%)	Moderately flat (4 – 7%)	Steeper slope (greater than 7%)
Soil infiltration rate	High infiltration (HSG: A)	Moderate infiltration (HSG: B)	Low infiltration (HSG: C and D)

LID Cost Estimation Module:

Accounting for Uncertainty with Cost Estimates (Regression Cost Curves)



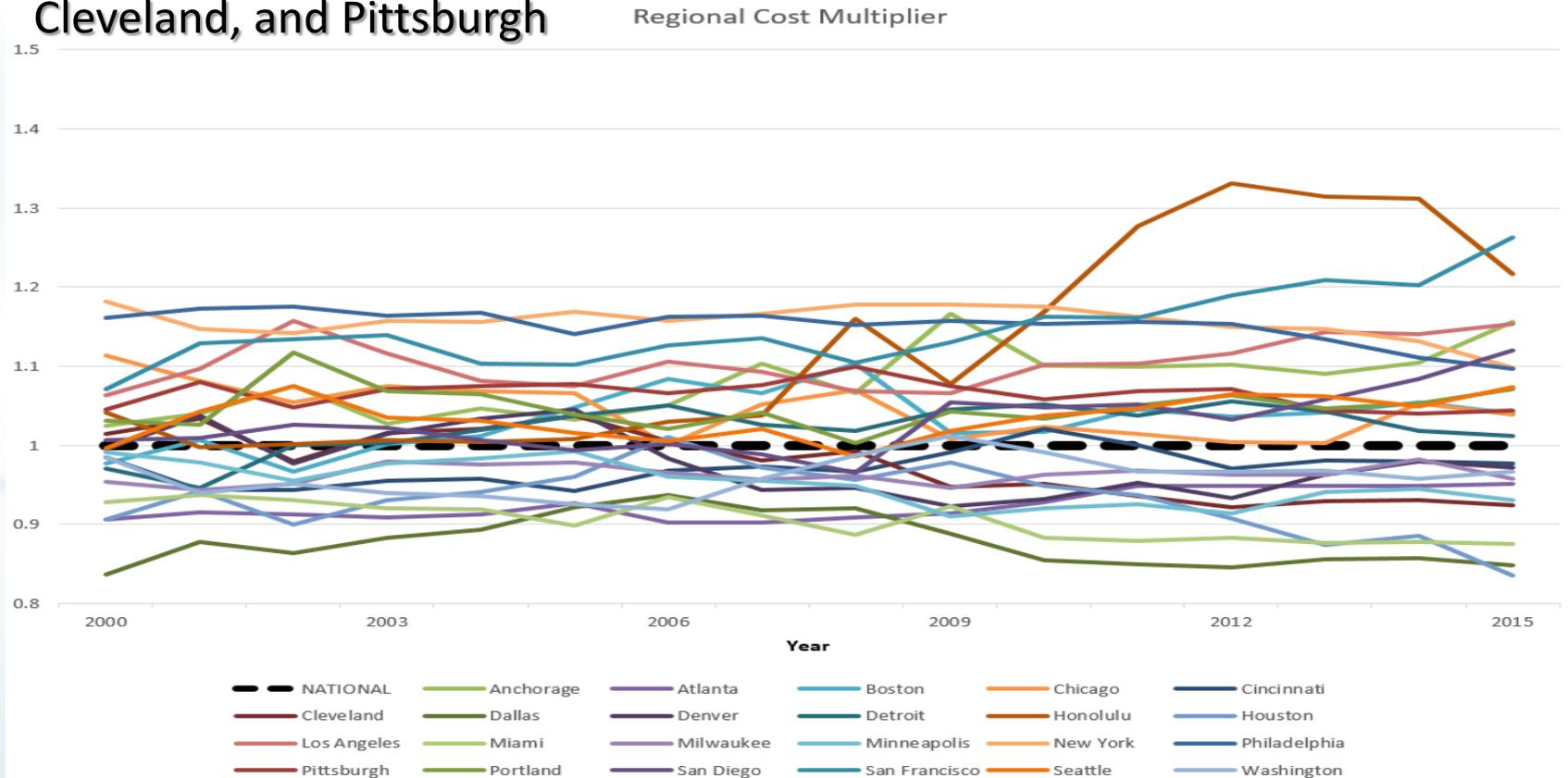
LID Cost Estimation Module:

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**

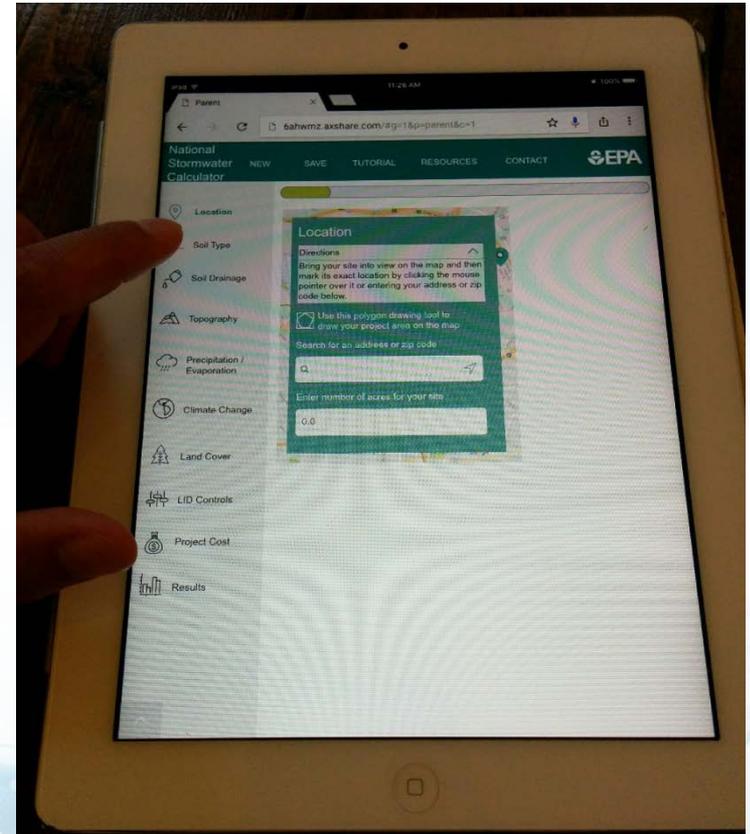
LID Cost Estimation Module: Development of Regionalized LID/Green Infrastructure Costs

- Modeled regional cost multipliers (2000 - 2015)
- Great Lakes Cost Centers: Minneapolis, Milwaukee, Chicago, Detroit, Cleveland, and Pittsburgh



Mobile Web App Development: 2016 - 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

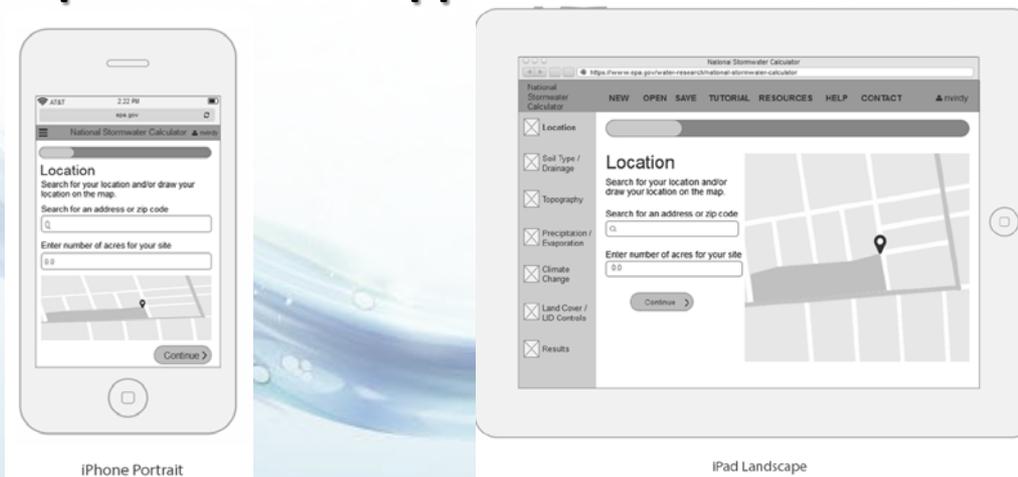


Mobile Web App Development: 2016 - 2017

- Gathered user information on existing desktop application of the SWC (Spring 2016)



- Wireframe Development of web app user interface (Spring – Summer 2016)



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

SWC Mobile Web App Application (Northport, MI)

Location:

The screenshot displays the EPA National Stormwater Calculator mobile web app 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 progress bar shows "10%". On the left side, there is a vertical toolbar with icons for location, map, drawing, search, and other functions. The main area features a map of Northport, MI, with a green location pin and an orange highlighted area along E Nagonaba St. A teal overlay box contains the following information:

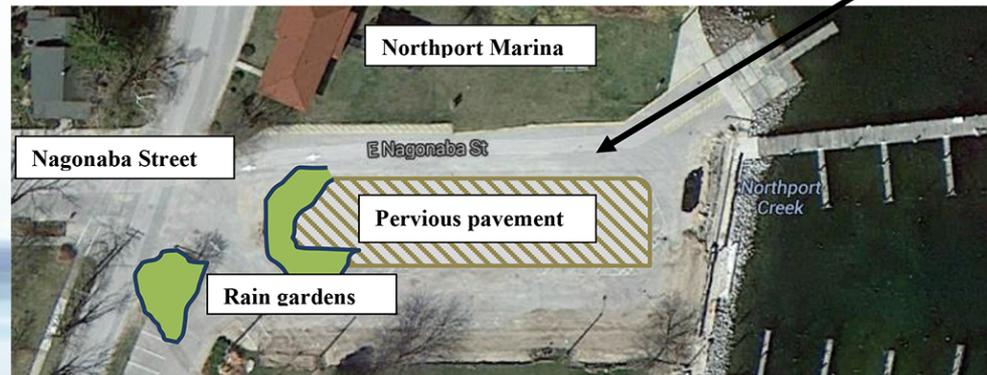
- Location**
- Directions** >
- Use this polygon drawing tool to draw your project area on the map.
- Search by address or zip code**
- Search input: Nahonaba, Northport, MI
- Enter number of acres for your site**
- Input: 1.9036617766219754

The map shows streets including Waukazoo St, E Main St, E 2nd St, E 3rd St, Bay St, Rose St, and E Nagonaba St. A marina with several boats is visible on the right side of the map, adjacent to 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.

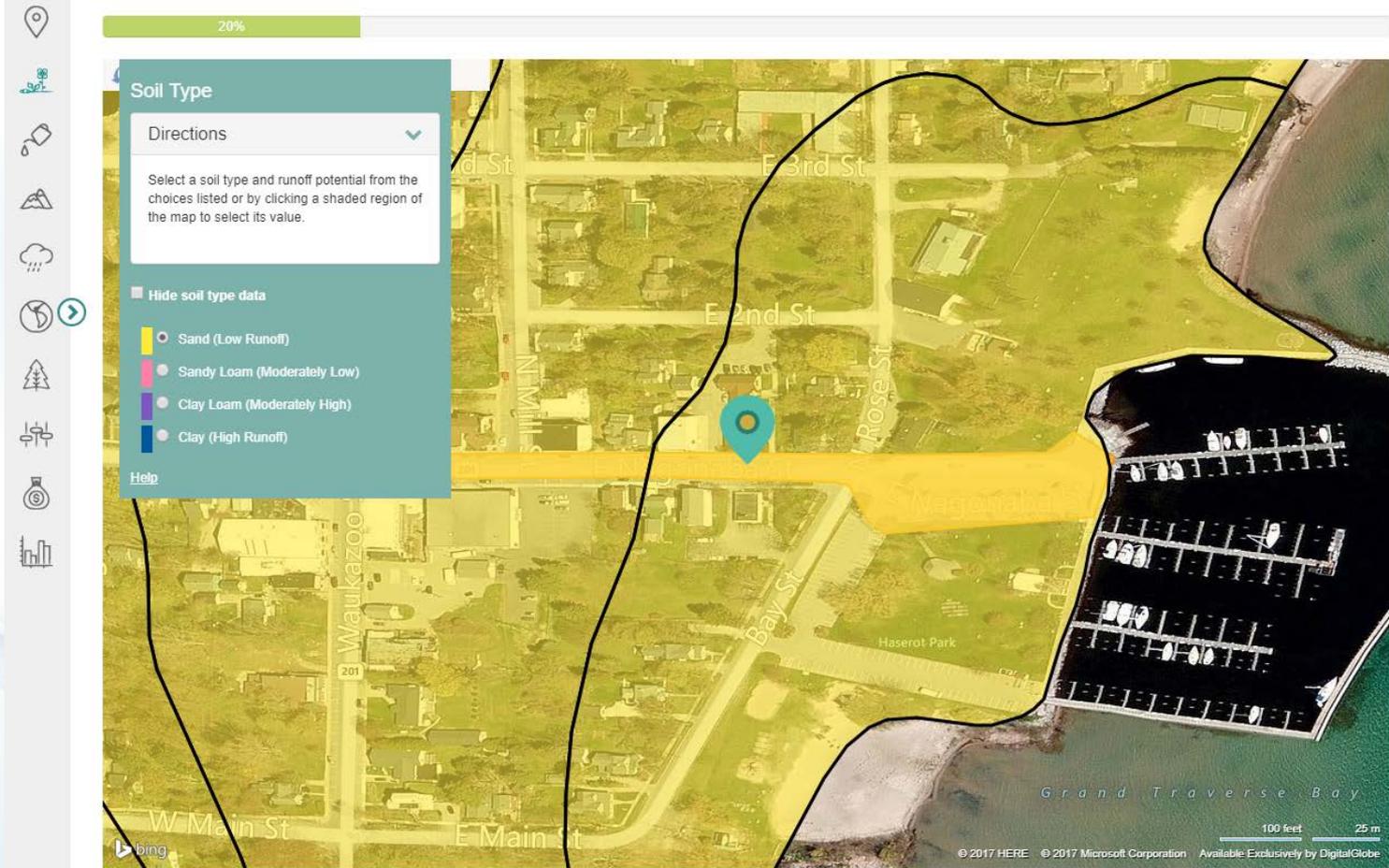
SWC Mobile Web App Application (Northport, MI)



The Watershed Center Grand Traverse Bay (2016)



Soil Runoff Potential:



Soil Infiltration Capacity:

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

20%

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](#)

Topography/Slope:

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

30%

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 3rd St, E 2nd St, Haserot Park, Grand Traverse Bay, W Main St, E Main St.

Scale: 100 feet / 25 m

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Historical Weather (precipitation & evaporation):

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

75%

Precipitation/Evaporation

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.

Rain Gage

CHARLEVOIX

Weather Station

CHARLEVOIX

Rainfall Information

Record Start Date: 1970/01/01
Record End Date: 2006/12/31
Annual Rainfall: 32.85"

Download rainfall/evaporation data

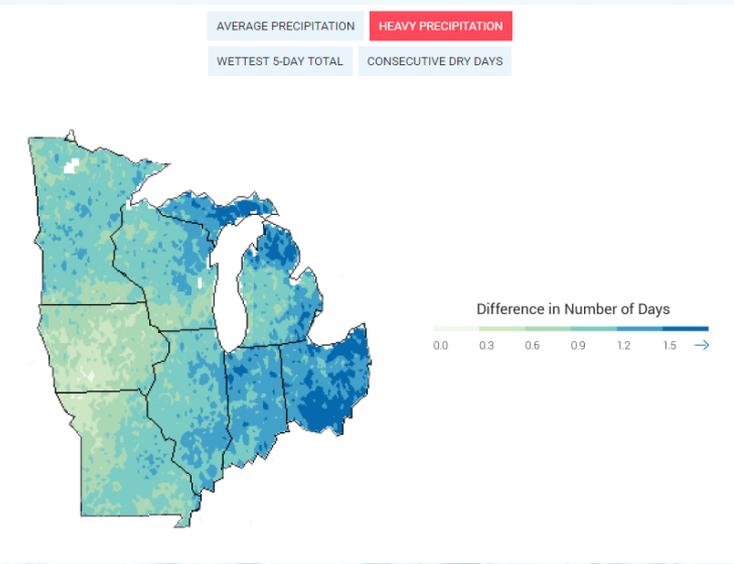
Help

bing

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Climate Change Scenarios & Extreme Storm Events:

The screenshot shows the top navigation bar with a globe icon, 'HIGHLIGHTS', 'REPORT', 'OUR CHANGING CLIMATE', 'SECTORS', 'REGIONS', and 'RESPONSE STRATEGIES'. Below this is a sub-navigation bar for the 'Midwest' region, with tabs for 'INTRO', '1', '2', '3', '4', '5', and '6'. A 'Download Chapter' button is visible on the right. The main content area features a dark background image of a flooded industrial building. The text reads: '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.' Social media icons for Facebook, Twitter, and LinkedIn are on the right, and a 'Supporting Evidence' link is at the bottom.



Climate Change Scenarios & Extreme Storm Events:



85%



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

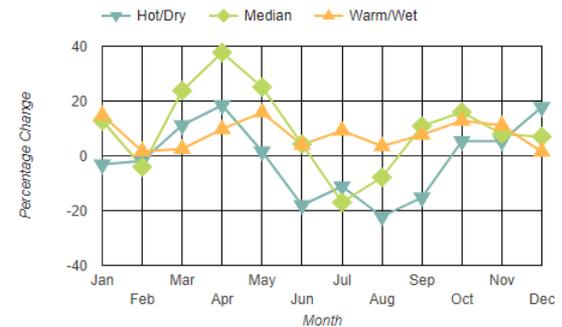


Select the time period to which the climate change scenario applies:

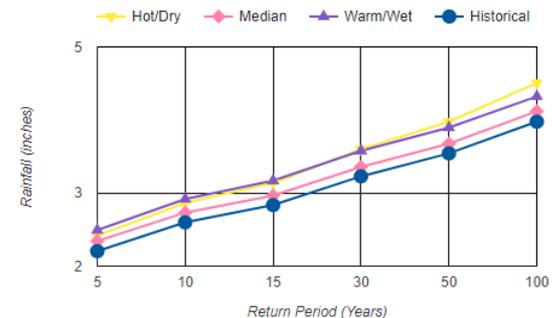
- Near Term (2020 - 2049)
- Far Term (2045 - 2074)

Save charts as PDF

Percentage Change in Monthly Rainfall for Far Term Projections



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



Land Cover:

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

85%

Land Cover

Directions

Forest	<input type="range"/>	15 %
Meadow	<input type="range"/>	0 %
Lawn	<input type="range"/>	20 %
Desert	<input type="range"/>	0 %
Impervious		65 %

Restore Defaults

Help

LID Controls:

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: in.

Gravel Layer Thickness: in.

% Capture Ratio: %

Pre-Treatment

Size for Design Storm
Save and Return
Restore Defaults

Project Cost (Development Type):

The screenshot displays the EPA National Stormwater Calculator interface. The top navigation bar includes 'NEW', 'SAVE', 'OPEN', 'RESOURCES', and 'CONTACT'. The main interface is divided into a left sidebar with navigation icons and a central content area. The 'Project Cost' panel is active, showing the following settings:

- Directions:** A dropdown menu.
- Verify cost estimation variables below. Click on each option to learn more.**
- 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 set to 'Milwaukee(190.0 miles)'.
- Regional Multiplier:** A text input field set to '1'.

A 'Re-Development' popup window is overlaid on the right side of the interface. It 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.

The popup includes two side-by-side images labeled 'before' and 'after' showing a street scene with a car. Below the images, it 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 provides instructions: '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.' and '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 calculator shows an aerial map of a residential area with streets labeled 'Waukegan St', 'Bay St', and 'E 4th St'. A yellow highlighted area on the map indicates the project location. A 'Close' button is visible in the bottom right corner of the popup.

Project Cost (Site Suitability):

The screenshot displays the EPA National Stormwater Calculator interface. On the left is a vertical toolbar with icons for location, map, and various site characteristics. The main panel is divided into several sections: 'Project Cost' with a 'Directions' dropdown and a note to verify cost estimation variables; 'Choose a Project Type' with radio buttons for 'Re-Development' and 'New Development'; 'Choose your Site Suitability' with radio buttons for 'Poor', 'Moderate', and 'Excellent'; and 'Choose your Cost Region' with a dropdown set to 'Milwaukee(190.0 miles)'. A 'Regional Multiplier' input is set to '1'. A modal window titled 'Moderate Site Suitability' is open, providing a definition of site suitability and a list of characteristics: 'Few physical obstructions', 'Few utility conflicts', and 'Other features that may make construction of stormwater management infrastructure challenging and likely more costly, but less than a site with poor site suitability.' Below the text is an aerial photograph of a site with callouts for 'Parking closures', 'Few physical obstacles', and 'Underground utilities present'. The modal also includes a 'Close' button and copyright information for 2017 HERE and Microsoft Corporation.

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

110%

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.

Parking closures

Few physical obstacles

Underground utilities present

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):

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

110%

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

Cost Regions

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.

Close

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Results (Summary):

 National Stormwater Calculator
NEW SAVE OPEN RESOURCES CONTACT

135%

Options:

Years to analyze:

Event threshold (inches):

Ignore Consecutive Days

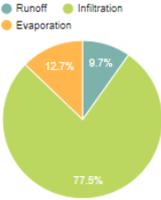
Actions:

Display a report:

- 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

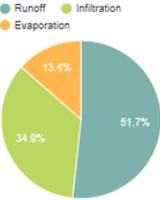
Current Scenario

Annual Rainfall: 34.96 inches



Baseline Scenario

Annual Rainfall: 34.96 inches



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 (Runoff Contribution by Rainfall Percentile):

EPA National Stormwater Calculator NEW SAVE OPEN RESOURCES CONTACT

135%

Results

Directions >

Options:

Years to analyze:

Event threshold (inches):

Ignore Consecutive Days

Actions:

[Refresh Results](#)

[Use as Baseline Scenario](#)

[Remove as Baseline Scenario](#)

[Print Results to PDF File](#)

Display a report:

- 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

Runoff Contribution by Rainfall Percentile

■ Current ■ Baseline

Daily Rainfall Percentile	Current (%)	Baseline (%)
40	1	0
45	3	0
50	4	0
55	8	0
60	12	0
65	15	0
70	18	0
75	20	0
80	22	0
85	24	0
90	25	0
95	25	0
100	25	0

Results (Cost Summary):

National Stormwater Calculator

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Directions >

Options:

Years to analyze:

Event threshold (inches):

Ignore Consecutive Days

Actions:

Display a report:

- 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

135%

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	Current	Baseline	Low	High	Low	High	Low	High
Disconnection	0	0	No	No	\$0	\$0	\$0	\$0	\$0	\$0
Rainwater Harvesting	0	0	No	No	\$0	\$0	\$0	\$0	\$0	\$0
Rain Gardens	10	0	Yes	No	\$4,867	\$9,329	\$0	\$0	\$4,867	\$9,329
Green Roofs	0	0	No	No	\$0	\$0	\$0	\$0	\$0	\$0
Street Planters	55	0	No	No	\$8,766	\$23,274	\$0	\$0	\$8,766	\$23,274
Infiltration Basins	0	0	No	No	\$0	\$0	\$0	\$0	\$0	\$0
Permeable Pavement	20	0	Yes	No	\$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.\$)

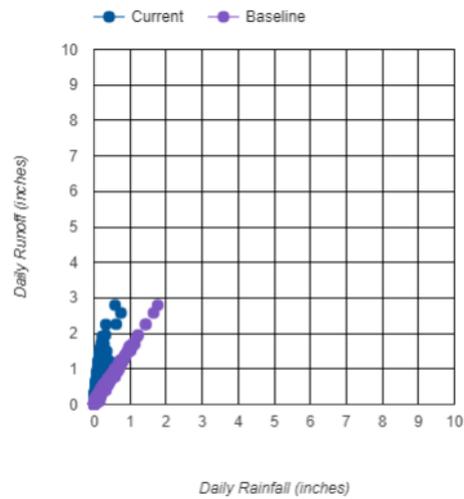
LID Control Type	Current Scenario (C)		Baseline Scenario (B)		Difference (C - B)	
	Low	High	Low	High	Low	High
Disconnection	\$0	\$0	\$0	\$0	\$0	\$0
Rainwater Harvesting	\$0	\$0	\$0	\$0	\$0	\$0
Rain Gardens	\$50	\$1,218	\$0	\$0	\$50	\$1,218
Green Roofs	\$0	\$0	\$0	\$0	\$0	\$0
Street Planters	\$103	\$2,439	\$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:

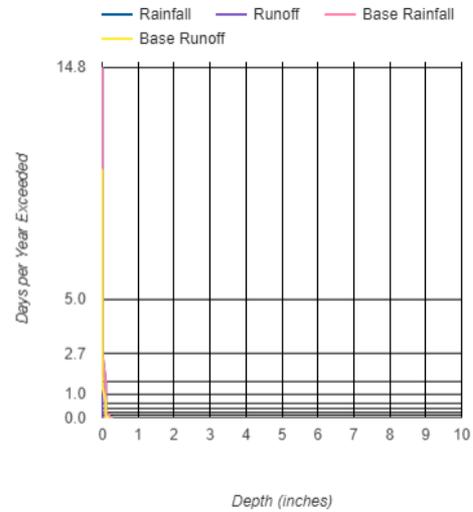
Results (PDF Report):

National Stormwater Calculator Report Results

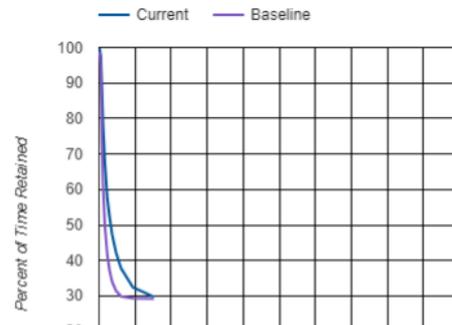
Rainfall / Runoff Events



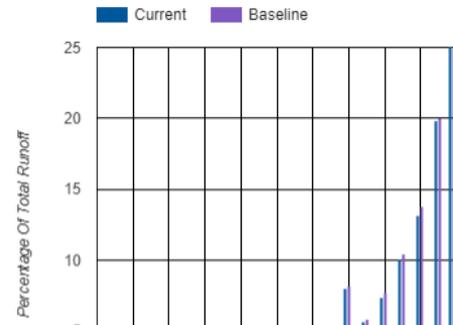
Rainfall / Runoff Exceedance Frequency



Rainfall Retention Frequency



Runoff Contribution by Rainfall Percentile



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
- Final construction costs
- Construction



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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/>

SWC Next Steps

- Training on using the mobile web app
- Updating historical weather data (web services)
- Improving mobile web app based on user feedback
- Phasing out of the SWC desktop application

Fall 2017 Webinar



EPA's Office of Research and Development (ORD)
invites you to a free webinar

Safe and Sustainable Water Resources Research Program

A monthly webinar series focused on EPA water research

National Stormwater Calculator for Managing Runoff Using Green Infrastructure

Wednesday, November 15, 2017 2:00 to 3:00 pm EDT

Registration: <https://attendee.gotowebinar.com/register/5929804033268092674>



A certificate of
attendance will be
provided for attending
this webinar

Discussion and Questions

Thank You!

Jason Bernagros (Berner)

Landscape Architect

U.S. EPA Office of Research and Development (ORD)

(202) 566-1671

berner.jason@epa.gov

National Stormwater Calculator Website:

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

Contact: SWC@epa.gov