



Great Lakes Integrated Sciences + Assessments - NOAA Regional Center: Climate and Weather Tools for Stormwater Planning In the Great Lakes Region Workshop



U.S. EPA National Stormwater Calculator (SWC)

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Office of Research and Development
Center for Environmental Solutions and Emergency Response
Water Infrastructure Division
Stormwater Management Branch



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National Stormwater Calculator (SWC)

Help prevent pollution by controlling stormwater runoff.

It's one of the greatest threats to clean water in America today.

Whether you're an urban planner, developer, landscape architect, or homeowner, this tool can help you balance land developments and landscaping with the right amount of green infrastructure.

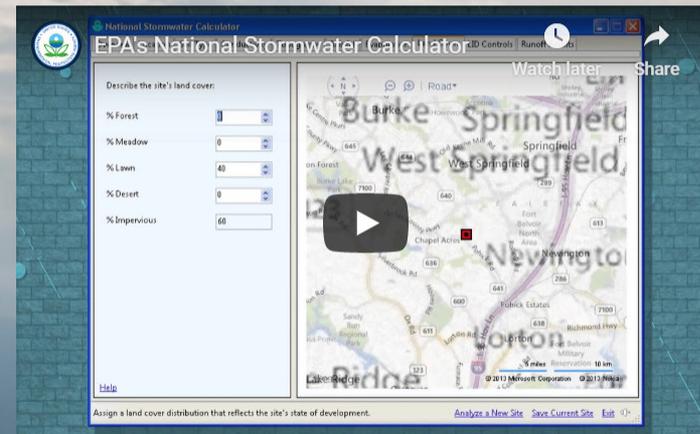
Name Your Site (Optional)

[Get Started >](#)

The SWC web app works best with the following browsers: Microsoft Edge, Google Chrome, Mozilla Firefox, and Apple Safari.

Please contact SWC@epa.gov with any questions, suggestions, or problems with this application.

Last updated on: December 10, 2019



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

What is the SWC?

- **Stormwater Management (Green Infrastructure/Low Impact Development (LID)) Design and Planning Tool**
 - Allow for screening-level analysis of various green infrastructure (GI) practices, including planning level costs (green roofs, rain gardens, cisterns, etc.) throughout the U.S.
 - Model post-construction urban stormwater runoff discharges
 - Effects of alternative GI controls
 - Effects of changes in weather/climate
 - Allow non-technical professionals to conduct screening level stormwater runoff for small to medium sized (less than 1 - 12 acres) urban sites

Storm Water Management Model (SWMM)

- SWMM: A dynamic rainfall-runoff simulation model for long-term simulation of runoff quantity. Is an industry standard for urban stormwater modeling.

- SWMM produces stormwater runoff estimates in the background of the SWC



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Storm Water Management Model (SWMM)

Helps predict runoff quantity and quality from drainage systems

EPA's Storm Water Management Model (SWMM) is used throughout the world for planning, analysis, and design related to stormwater runoff, combined and sanitary sewers, and other drainage systems. It can be used to evaluate gray infrastructure stormwater control strategies, such as pipes and storm drains, and is a useful tool for creating cost-effective green/gray hybrid stormwater control solutions. SWMM was developed to help support local, state, and national stormwater management objectives to reduce runoff through infiltration and retention, and help to reduce discharges that cause impairment of waterbodies.

Software, Compatibility, Manuals, and Other Documents

SWMM is a Windows-based desktop program. It is open source public software and is free for use worldwide. SWMM 5 was produced in a joint development effort with CDM, Inc., a global consulting, engineering, construction, and operations firm.

On this Page

- [Software, Compatibility, and Manuals](#)
- [Capabilities](#)
- [Applications](#)
- [Green Infrastructure as LID Controls](#)
- [Technical Support](#)
- [Resources](#)



SWC Web Application



Location

Directions >

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.

Use this polygon drawing tool to draw your project area on the map.

Search by address or zip code:

Enter number of acres for your site:

<https://swcweb.epa.gov/stormwatercalculator/>

SWC:

Site Parameters and Embedded 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 & potential evapotranspiration
- **Land-Cover/Use:** Menu driven by user
- **LID Practices & Costs:** Menu driven by user

SWC Application:

Northeast Ohio Regional Sewer District (NEORS D) Green Infrastructure Grants Program Kamm's Corners Public Parking Lot Retrofit Project

- SWC used by grant applicants for quantifying stormwater runoff reductions of proposed projects

NEORS D Green Infrastructure Grants Program Storymap



NEORS D Awarded Green Infrastructure Grants Projects

NEORS D Appendix 3 Green Infrastructure

Other Green Infrastructure Projects



24 2018 Kamm's Corners Public Parking Lot Retrofit



Applicant: City of Cleveland

Location: 16906 Albers Avenue

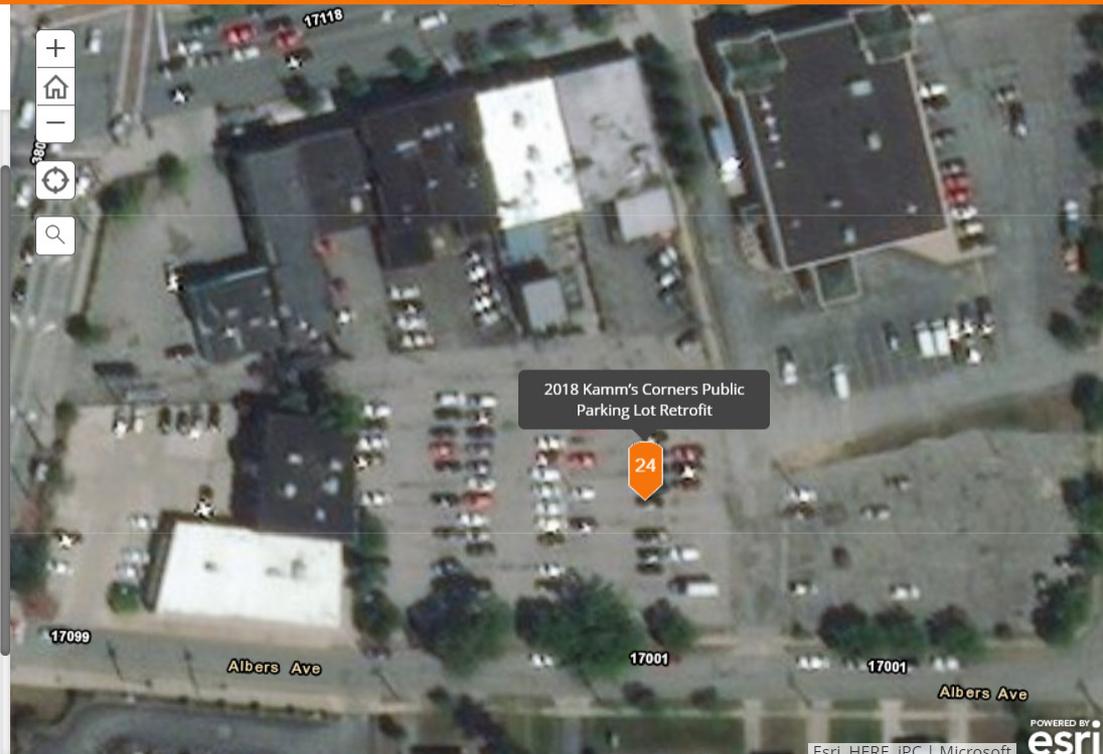
Community: Cleveland - Kamm's Corner Neighborhood

GI Project Type: Green Infrastructure Grants Program

Grant Award: \$249,583

Subwatershed: Rocky River

Summary: Bioretention cells



<https://neorsd.maps.arcgis.com/apps/Shortlist/index.html?appid=efd0ff60d52f4860978c5bb4098cb3d9>

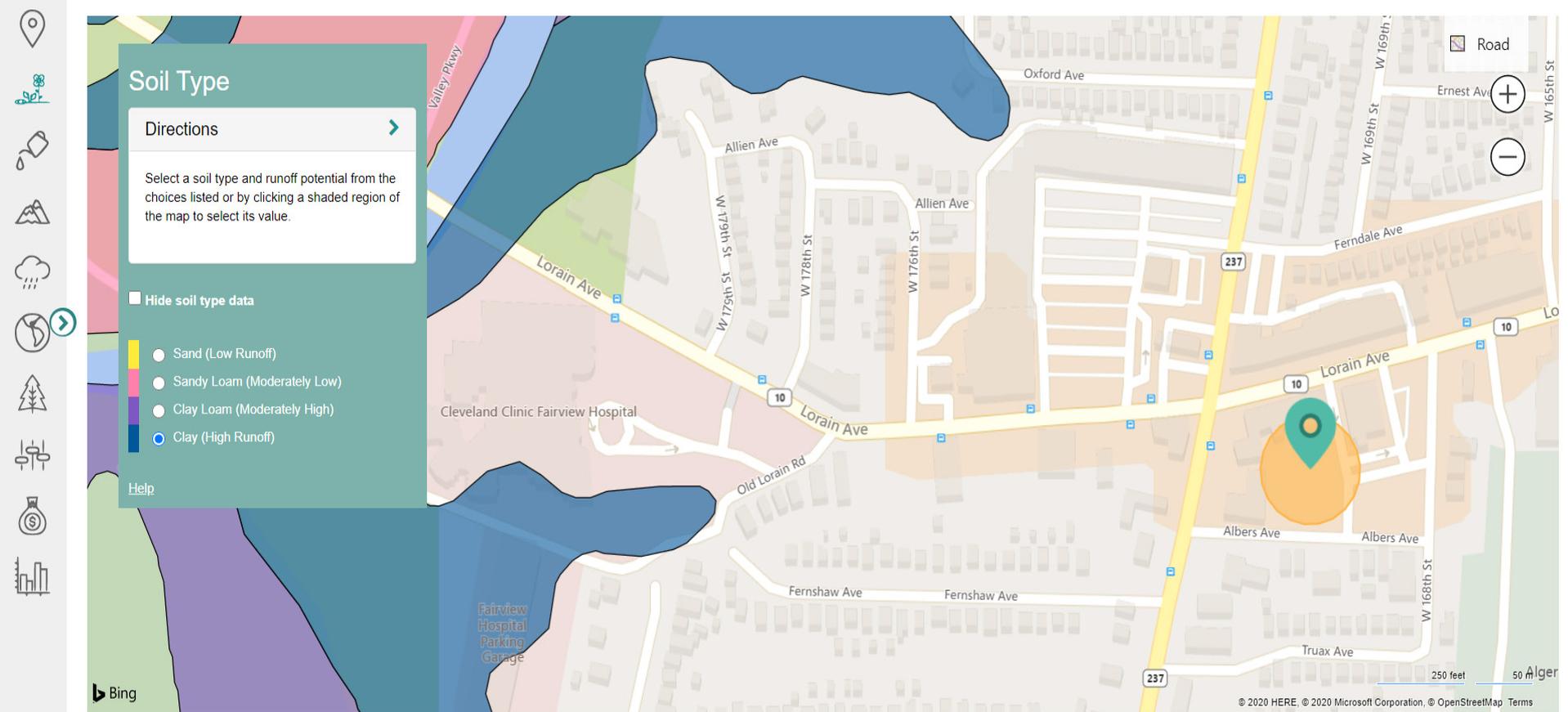
SWC Analysis: Project Location



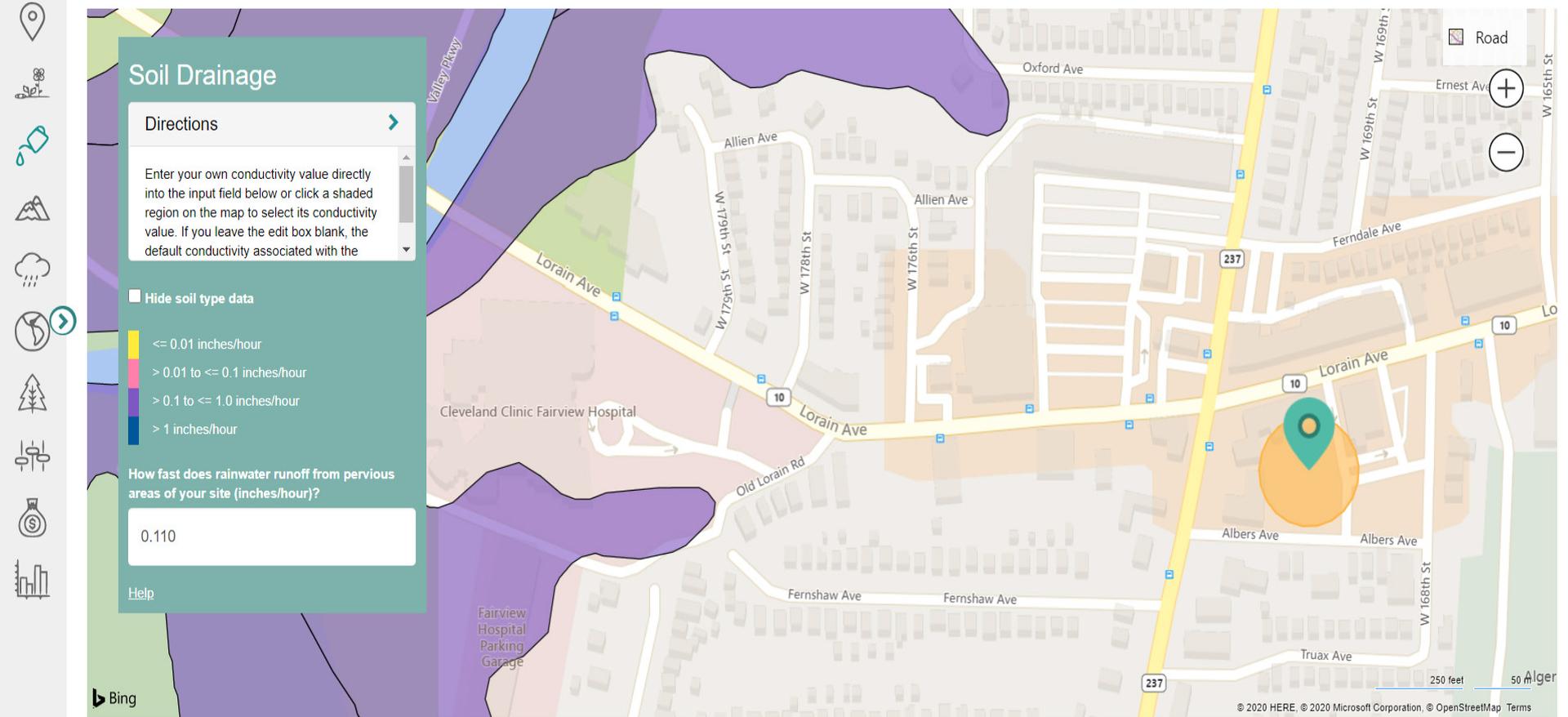
A screenshot of the EPA National Stormwater Calculator interface. The main map shows an aerial view of a residential and commercial area in Kamm's Corners, OH, with a yellow polygon highlighting a project area. A teal location pin is placed within the polygon. On the left, a 'Location' panel contains a 'Directions' button, instructions on how to mark a location, a search box with the address '16906 Albers Avenue, Cleveland, OH', and an input field for the number of acres, currently set to '1.46'. The top right of the map shows the location 'United States, OH, Cuyahoga Co., Kamm's Corners' and a 'Labels' toggle. The bottom right of the map includes a scale bar (50 feet / 10 m) and copyright information for Microsoft.

SWC Analysis:

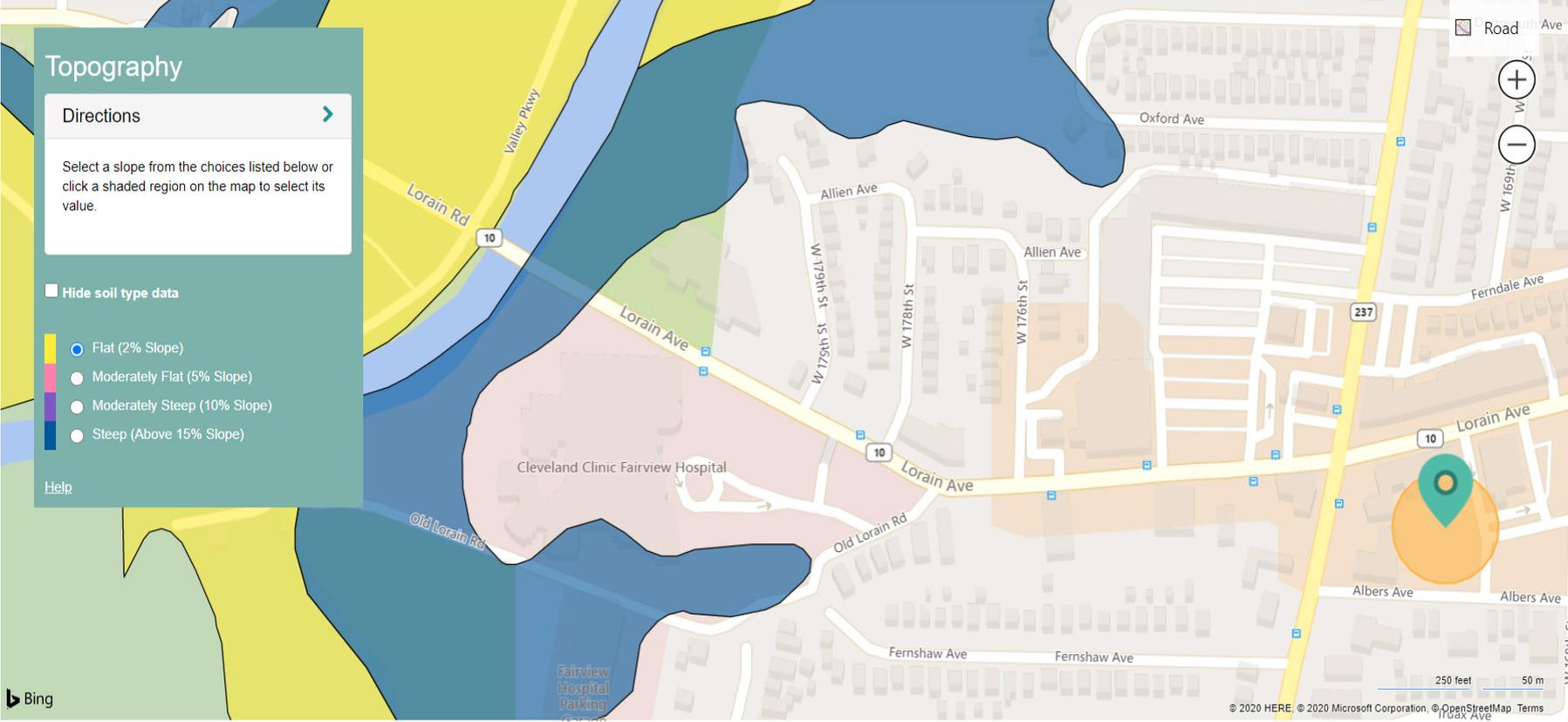
Soil Type: Rainfall Runoff Potential



SWC Analysis: Soil Drainage (infiltration rate)

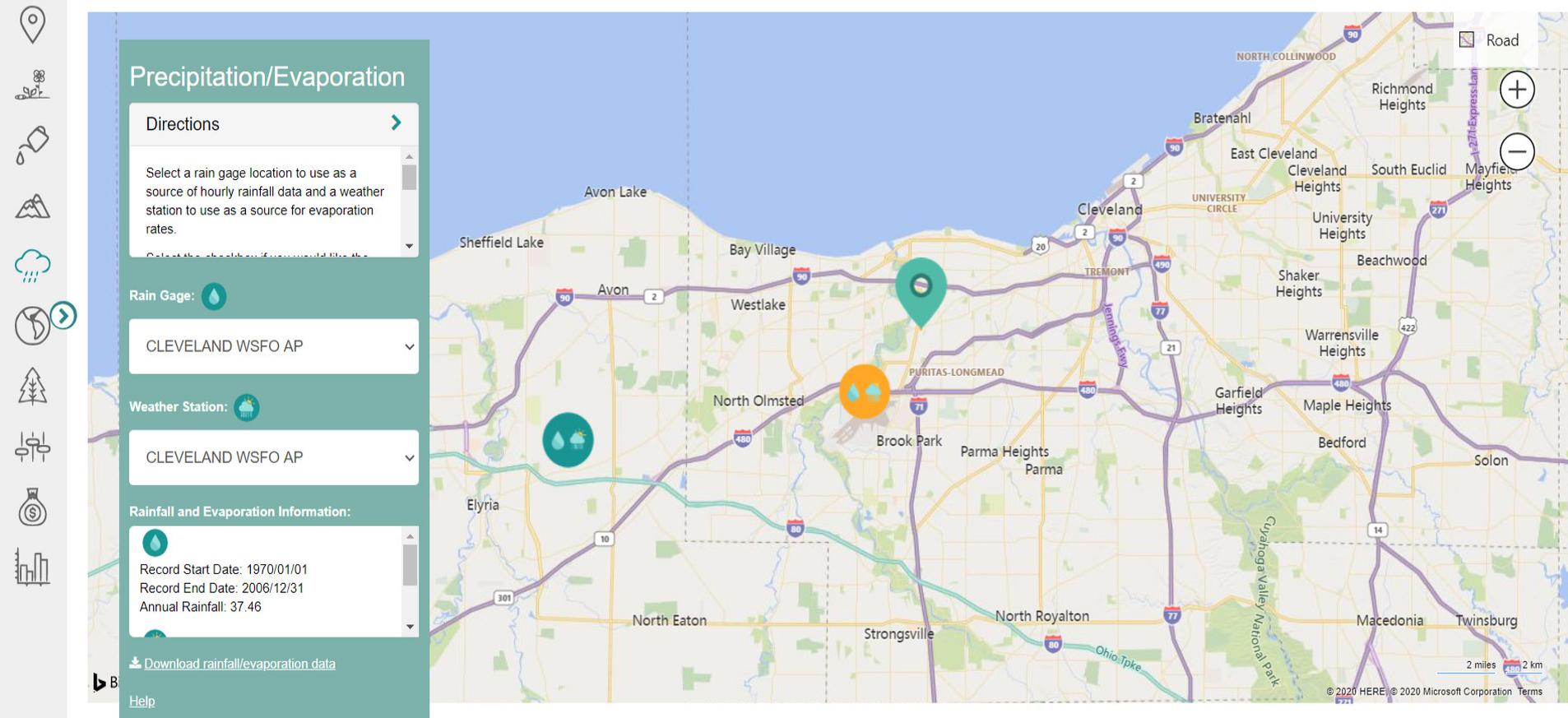


SWC Analysis: Topography



SWC Analysis:

Historical Precipitation & Potential Evapotranspiration



SWC Analysis: Existing Land Cover



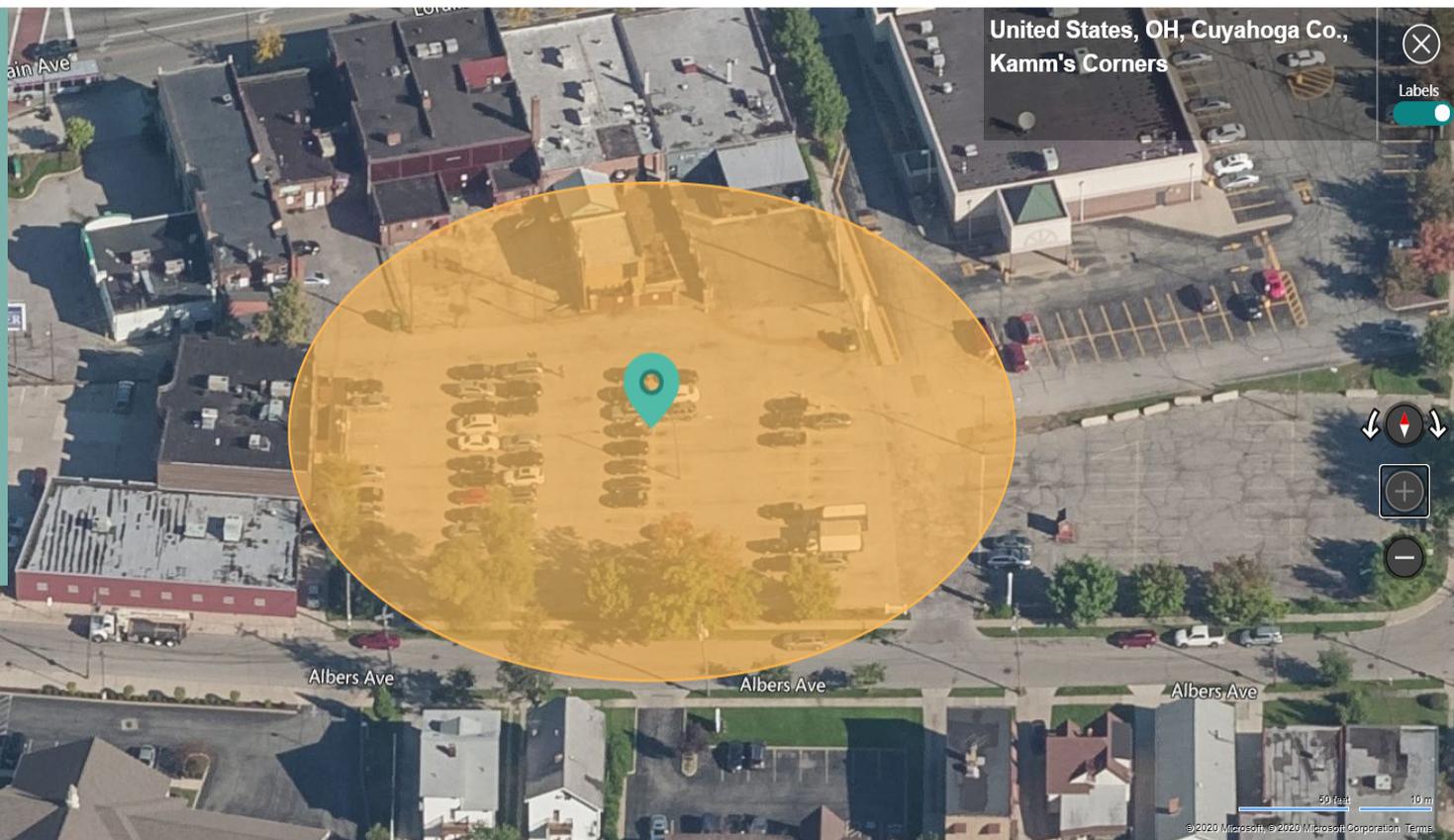
Land Cover

Directions

Describe the site's land cover for the development scenario being analyzed.
Click on a category to see a more detailed description.

Forest:	<input type="range"/>	4	%
Meadow:	<input type="range"/>	0	%
Lawn:	<input type="range"/>	3	%
Desert:	<input type="range"/>	0	%
Impervious:	<input type="range"/>	93	%

Help





SWC Analysis:

Extreme Weather Impacts: State of Ohio – 2019

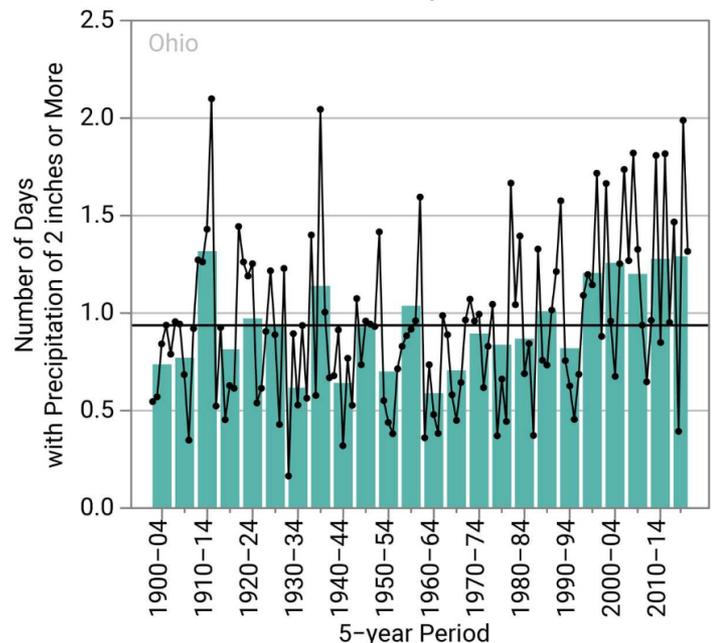


NOAA State Climate Summaries:
<https://statesummaries.ncics.org/chapter/oh/>

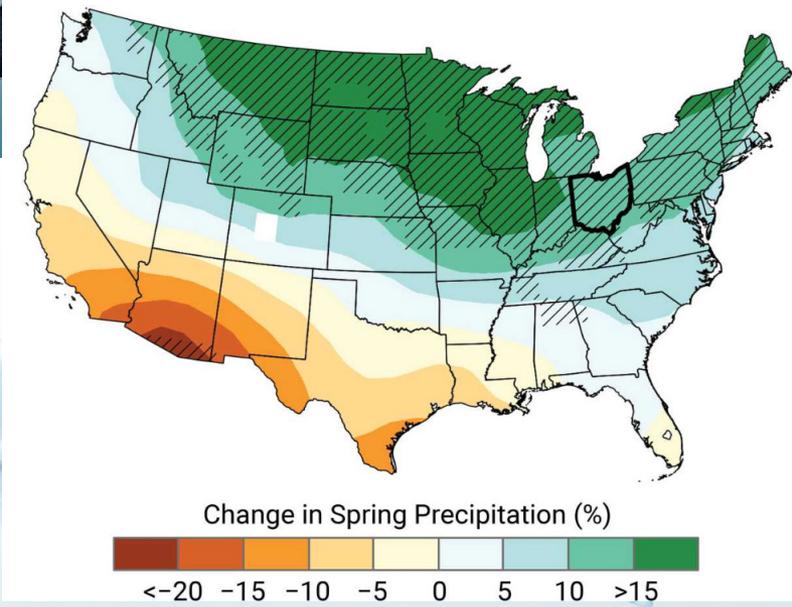
KEY MESSAGE 2

Ohio has experienced a significant increase in heavy rain events. Increases in winter and spring precipitation are projected and will raise the risk of springtime flooding.

Observed Number of Extreme Precipitation Events

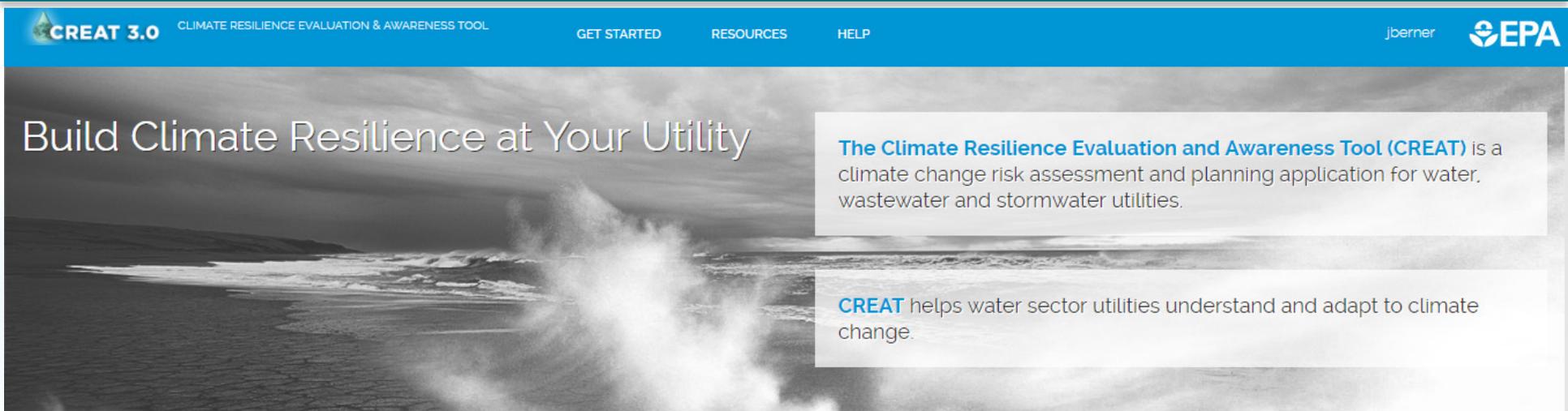


Projected Change in Spring Precipitation





Extreme Weather Scenario Data: U.S. EPA's Climate Resilience Evaluation & Awareness Tool (CREAT) 2.0



- Climate scenarios derived from a range of outcomes of the World Climate Research Programme's CMIP3 multi-model dataset.
- Contains a database of climate change effects across the US localized to a grid of 0.5 degrees in latitude and longitude (about 30 by 30 miles).

SWC Analysis: Climate Change Scenarios & Extreme Storm Events

Climate Change

Directions ▼

Helpful Resources ➤

Select a future climate change scenario to apply:

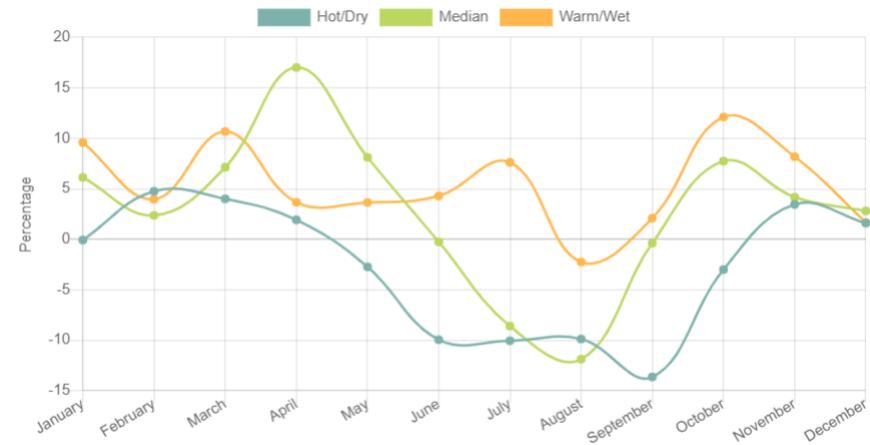
No Change
 Hot/Dry
 Median Change
 Warm/Wet

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

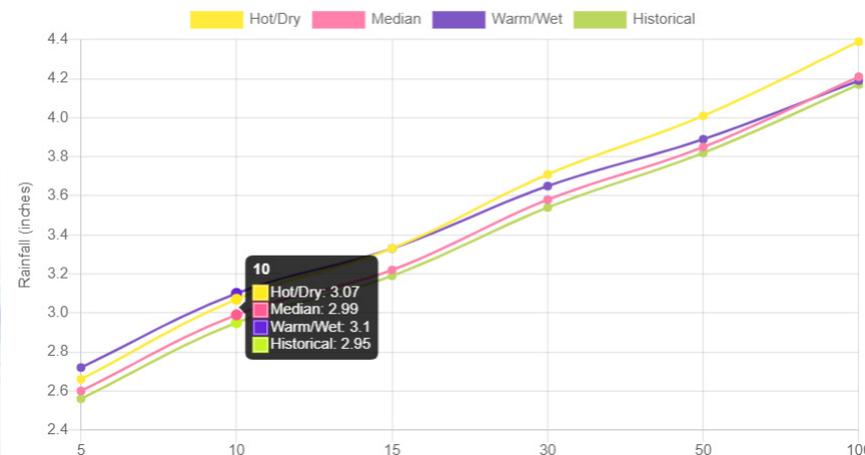
Near Term (2020 - 2049)
 Far Term (2045 - 2074)

Print Charts to PDF File

Percentage Change in Monthly Rainfall for Near Term Projections



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



- CREAT 2.0 regional grid results encompass each of the SWC's rain gage and weather station locations.

SWC Analysis: Baseline Results



Results

Directions ▼

Options:

Years to Analyze:

20

Event Threshold:

0.1

Ignore Consecutive Days

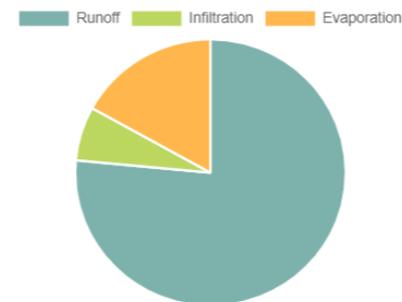
Actions:

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

Summary Results

Current Scenario
Annual Rainfall: 38.63 in.



Statistic	Current Scenario
Average Annual Rainfall (inches)	38.63
Average Annual Runoff (inches)	29.64
Days per Year with Rainfall	81.39
Days per Year with Runoff	64.11
Percent of Wet Days Retained	21.24
Smallest Rainfall w/ Runoff (inches)	0.10
Largest Rainfall w/o Runoff (inches)	0.20
Max Rainfall Retained (inches)	0.49

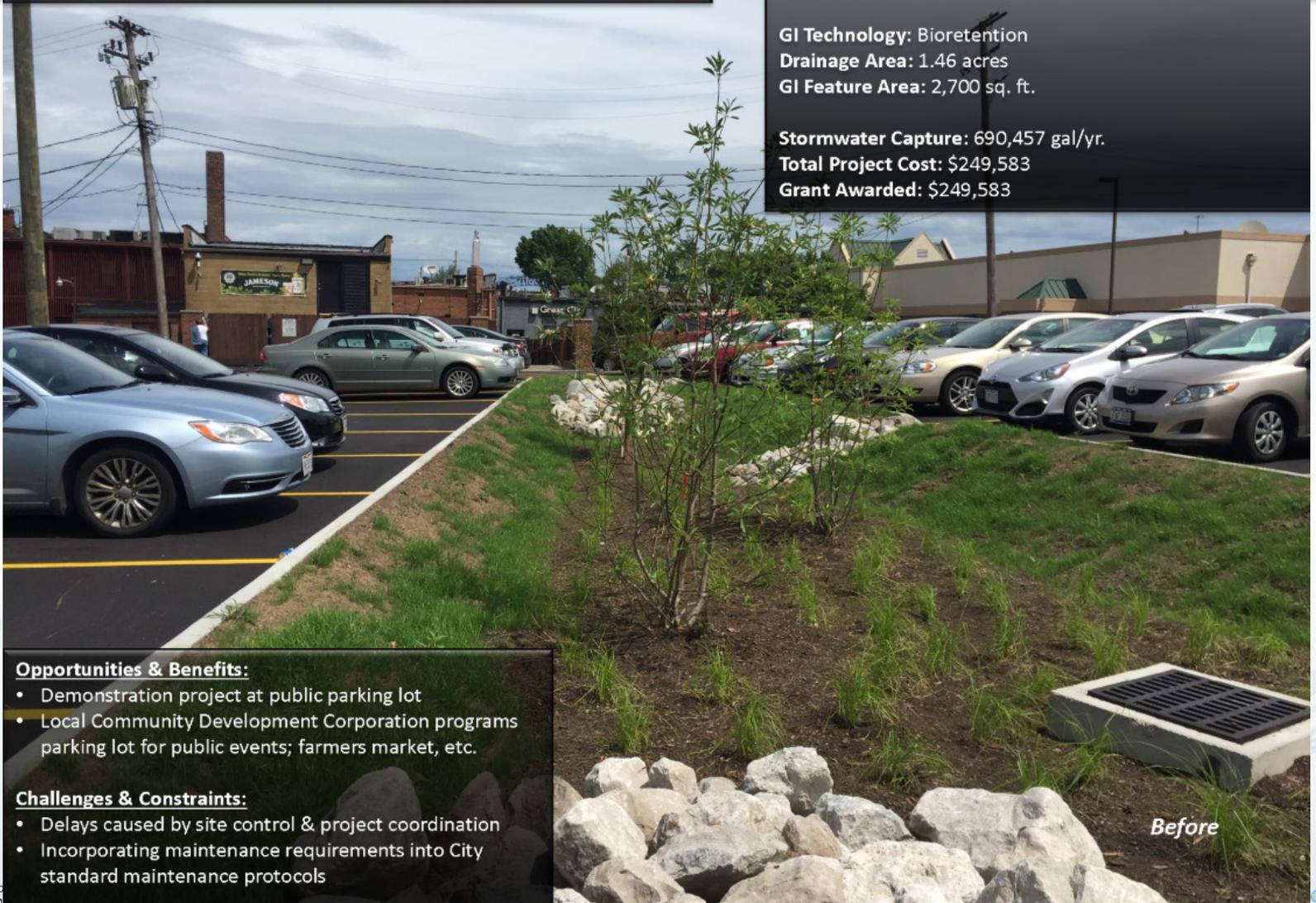
Kamm's Corners Public Parking Lot Retrofit Project (NEORSD)

Kamm's Corner Green Infrastructure Parking Lot Retrofit

Green Infrastructure 2018 Project Awarded

GI Technology: Bioretention
Drainage Area: 1.46 acres
GI Feature Area: 2,700 sq. ft.

Stormwater Capture: 690,457 gal/yr.
Total Project Cost: \$249,583
Grant Awarded: \$249,583



Opportunities & Benefits:

- Demonstration project at public parking lot
- Local Community Development Corporation programs parking lot for public events; farmers market, etc.

Challenges & Constraints:

- Delays caused by site control & project coordination
- Incorporating maintenance requirements into City standard maintenance protocols

SWC Analysis: Runoff Reduction Results

Results

Directions ▼

Options:

Years to Analyze:

20

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

Summary Results

Current Scenario

Annual Rainfall: 38.63 in.



Baseline Scenario

Annual Rainfall: 38.63 in.



Statistic	Current Scenario	Baseline Scenario
Average Annual Rainfall (inches)	38.63	38.63
Average Annual Runoff (inches)	12.21	29.64
Days per Year with Rainfall	81.39	81.39
Days per Year with Runoff	21.84	64.11
Percent of Wet Days Retained	73.17	21.24
Smallest Rainfall w/ Runoff (inches)	0.13	0.10
Largest Rainfall w/o Runoff (inches)	0.73	0.20
Max Rainfall Retained (inches)	0.90	0.49

Estimated runoff reduction of 17.43 inches/year ~ 690,457 gal./year

SWC Analysis:

Runoff Results: Extreme Storm Events



Results

Directions ▼

Options:

Years to Analyze:

20

Event Threshold:

0.1

Ignore Consecutive Days

Actions:

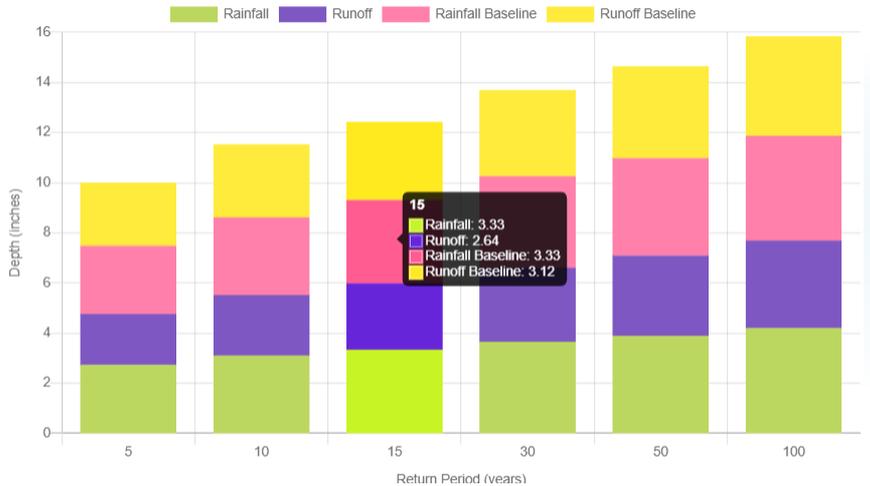
[Refresh Results](#)
[Use as Baseline Scenario](#)
[Remove Baseline Scenario](#)
[Print Results to PDF File](#)

Reports:

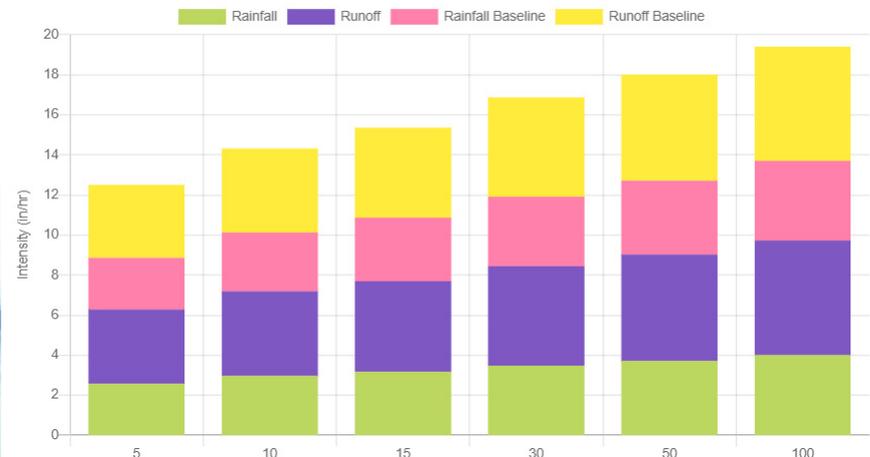
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- Cost Summary

Extreme Event Rainfall / Runoff

Extreme Event Rainfall / Runoff Depth



Extreme Event Peak Rainfall / Runoff



Discussion and Questions

Thank You!

National Stormwater Calculator Website:

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

Contact: SWC@epa.gov

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