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

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U.S. EPA National Stormwater Calculator (SWC)

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Water Infrastructure Division
Stormwater Management Branch

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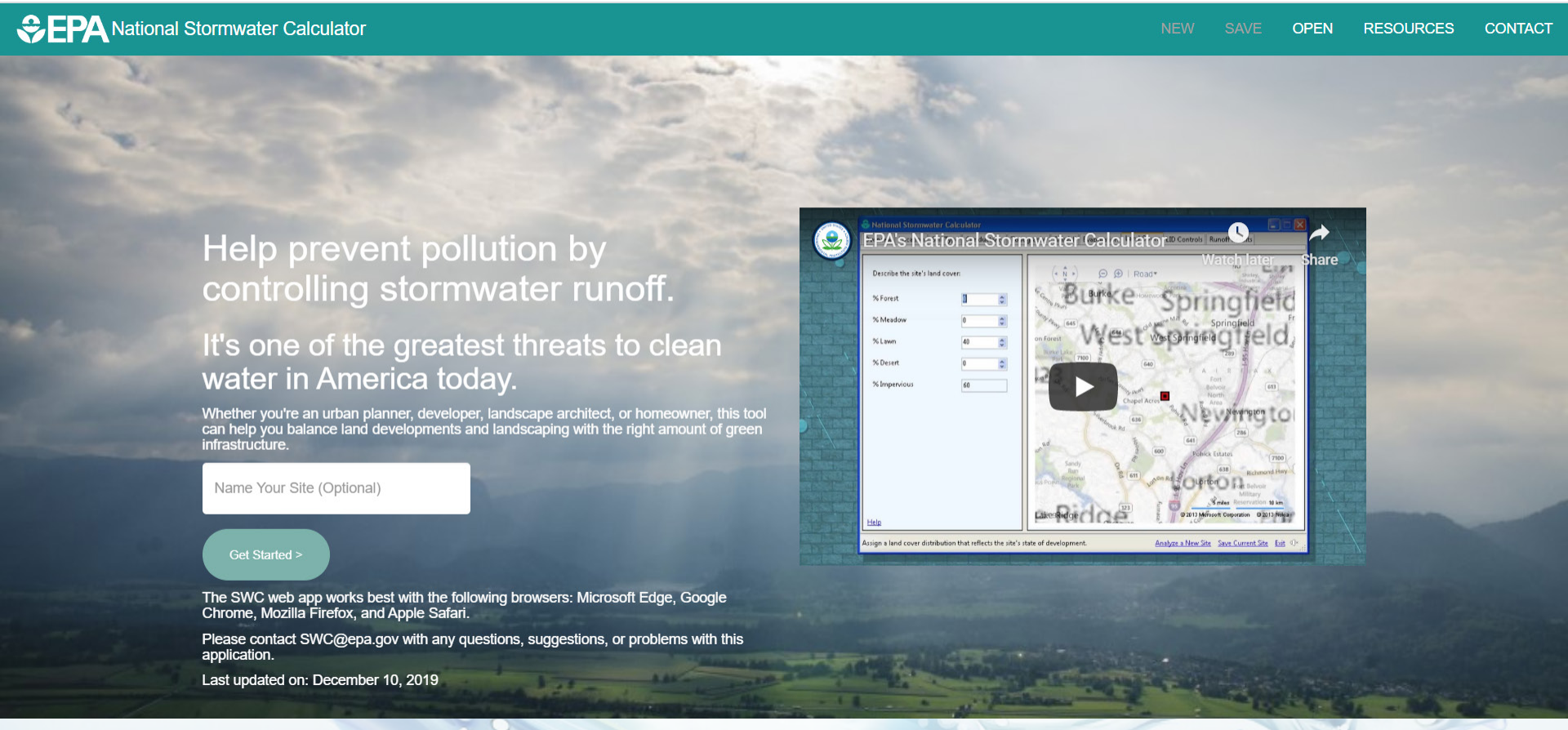
National Stormwater Calculator (SWC)



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

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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.

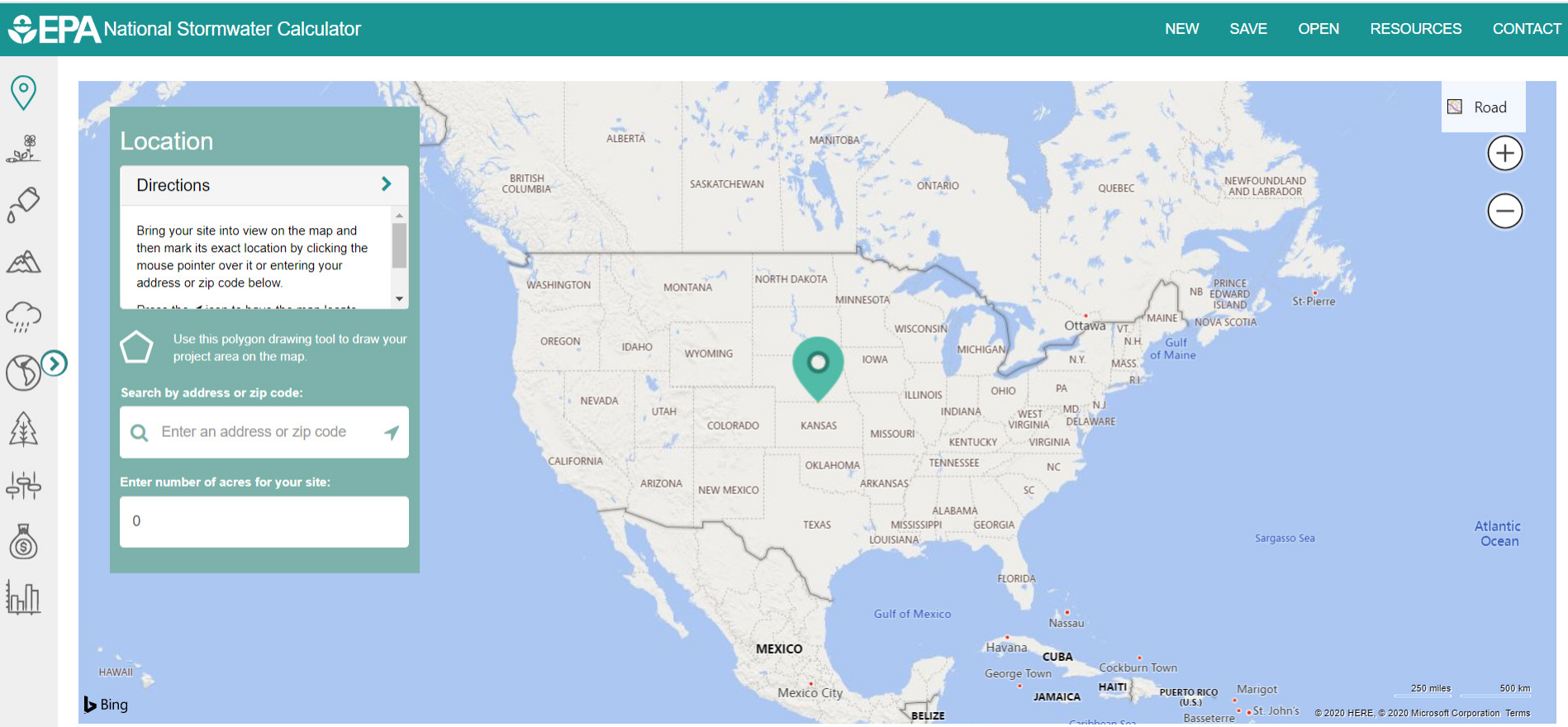
Software, Compatibility, Manuals, and Other Documents

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



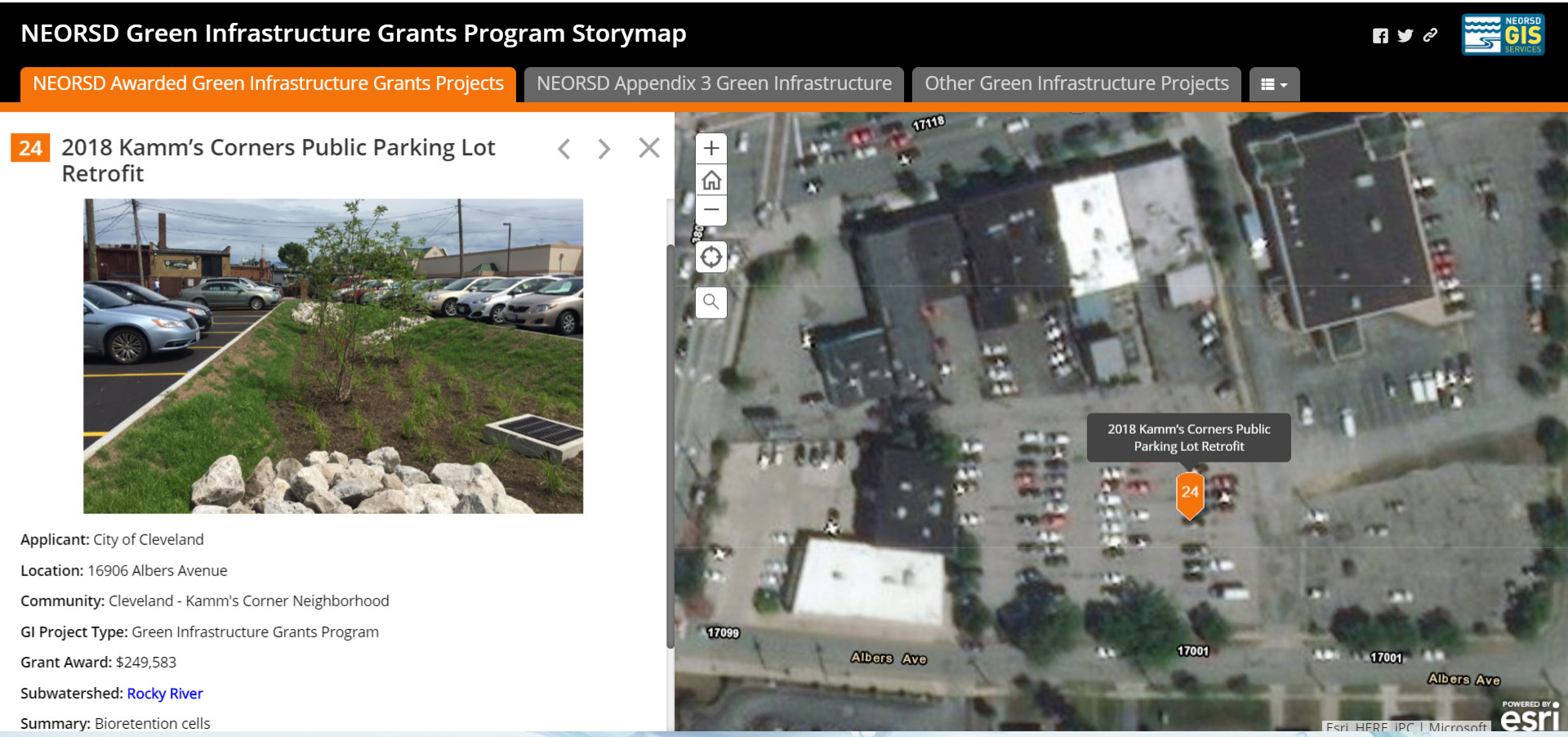
https://swcweb.epa.gov/stormwatercalculator/

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

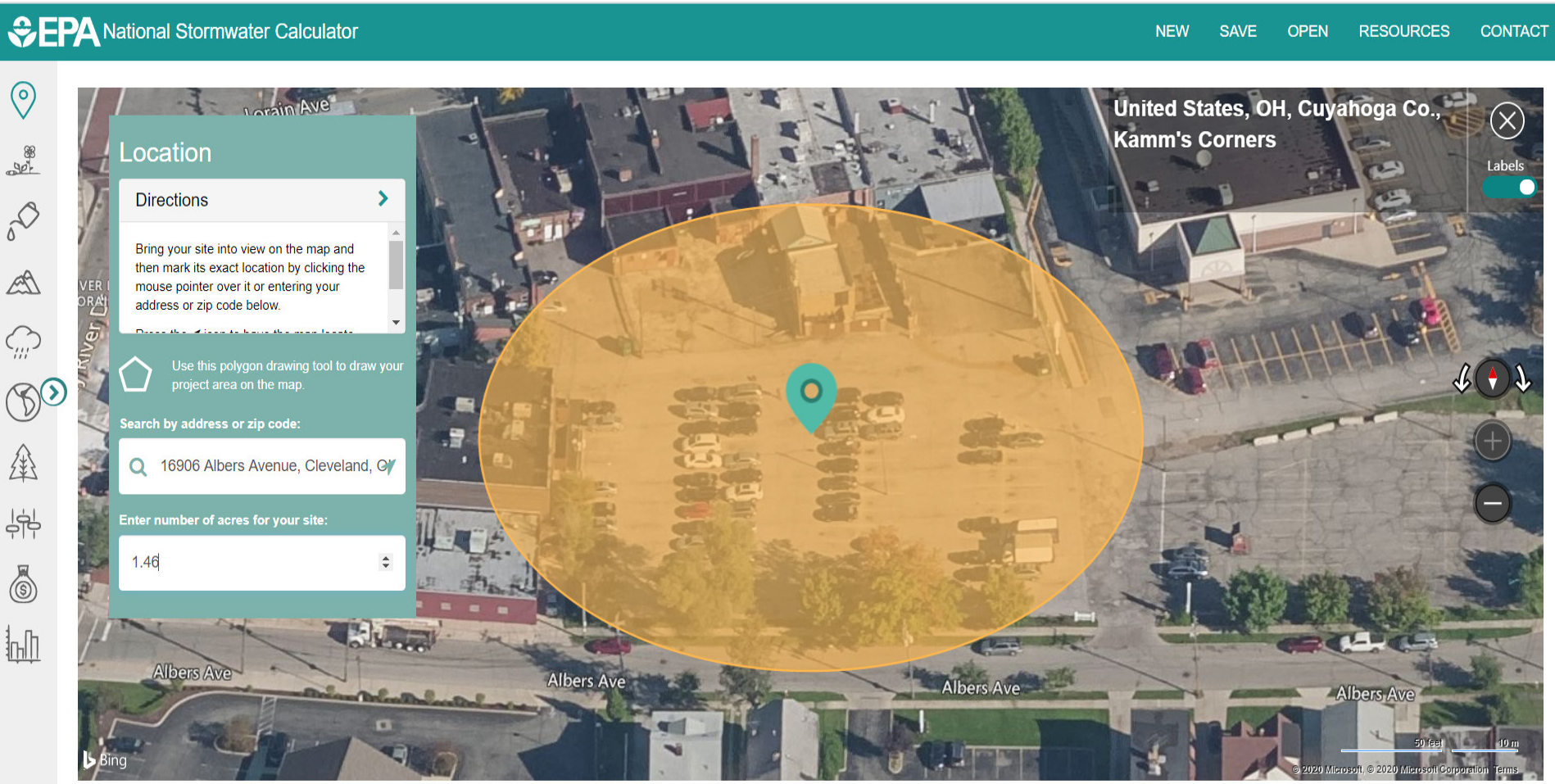
SWC Application:
Northeast Ohio Regional Sewer District (NEORSD)Green Infrastructure Grants Program Kamm's Corners Public Parking Lot Retrofit Project

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



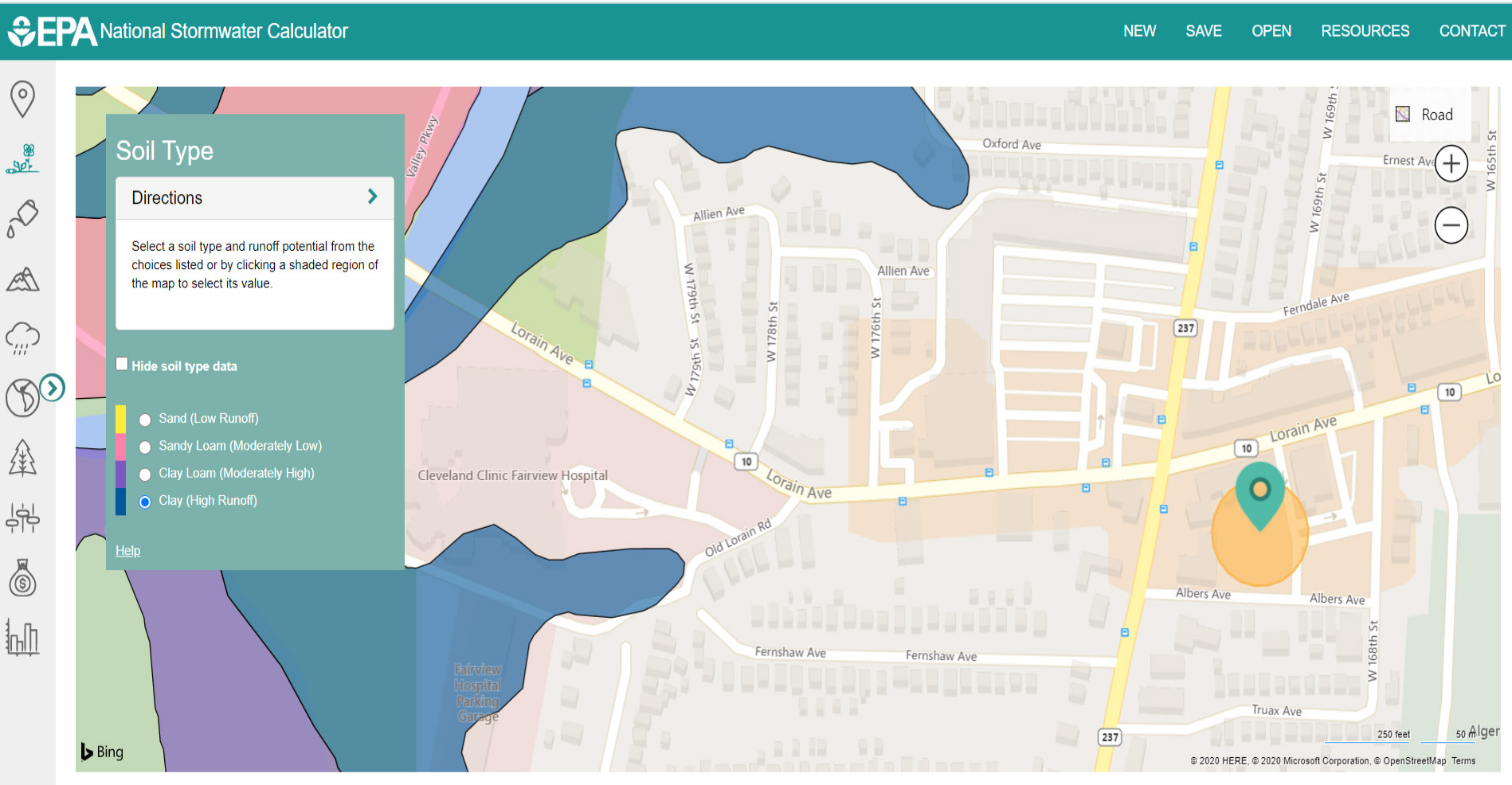
https://neorsd.maps.arcgis.com/apps/Shortlist/index.html?appid=efd0ff60d52f4860978c5bb4098cb3d9

SWC Analysis:
Project Location

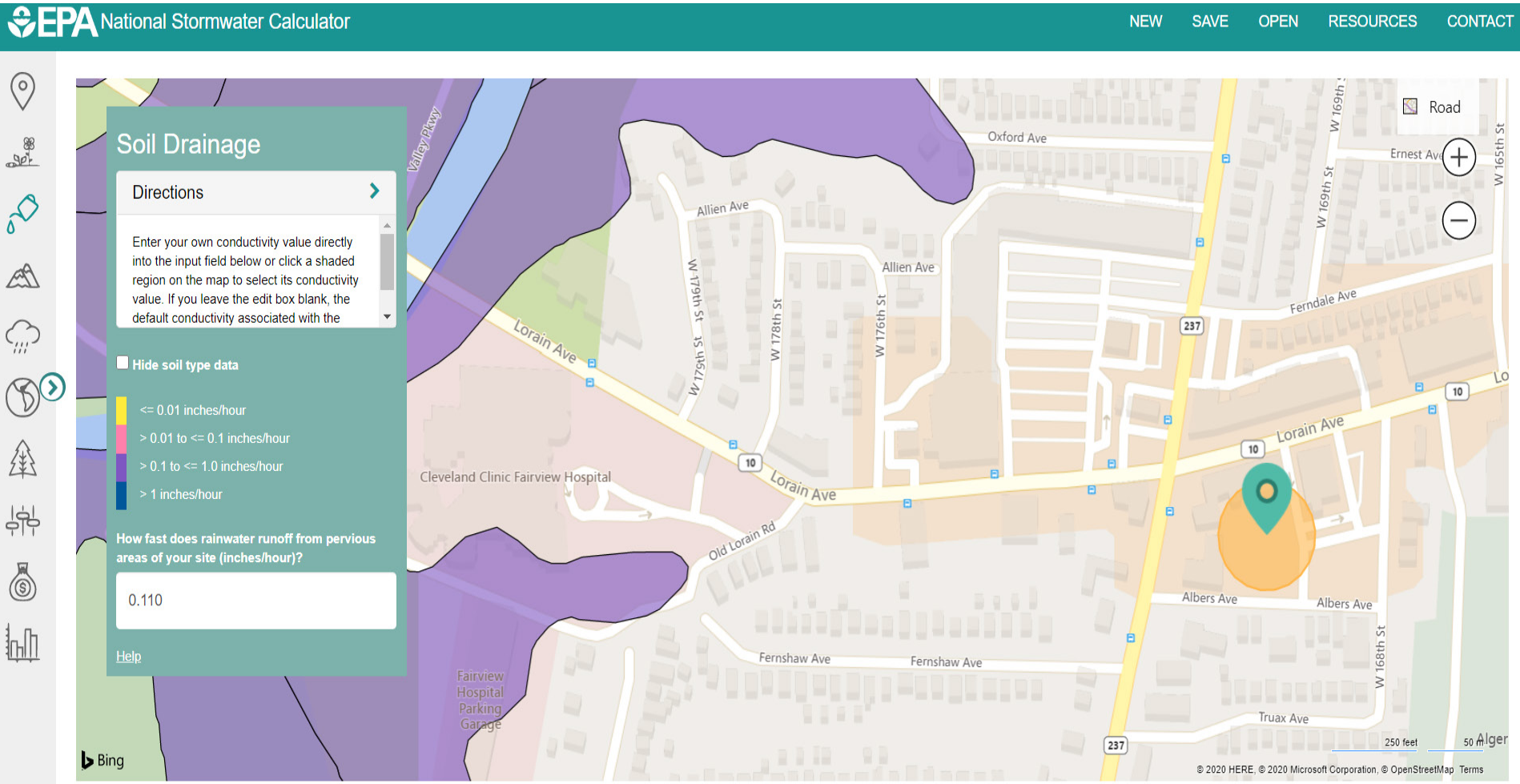


SWC Analysis:

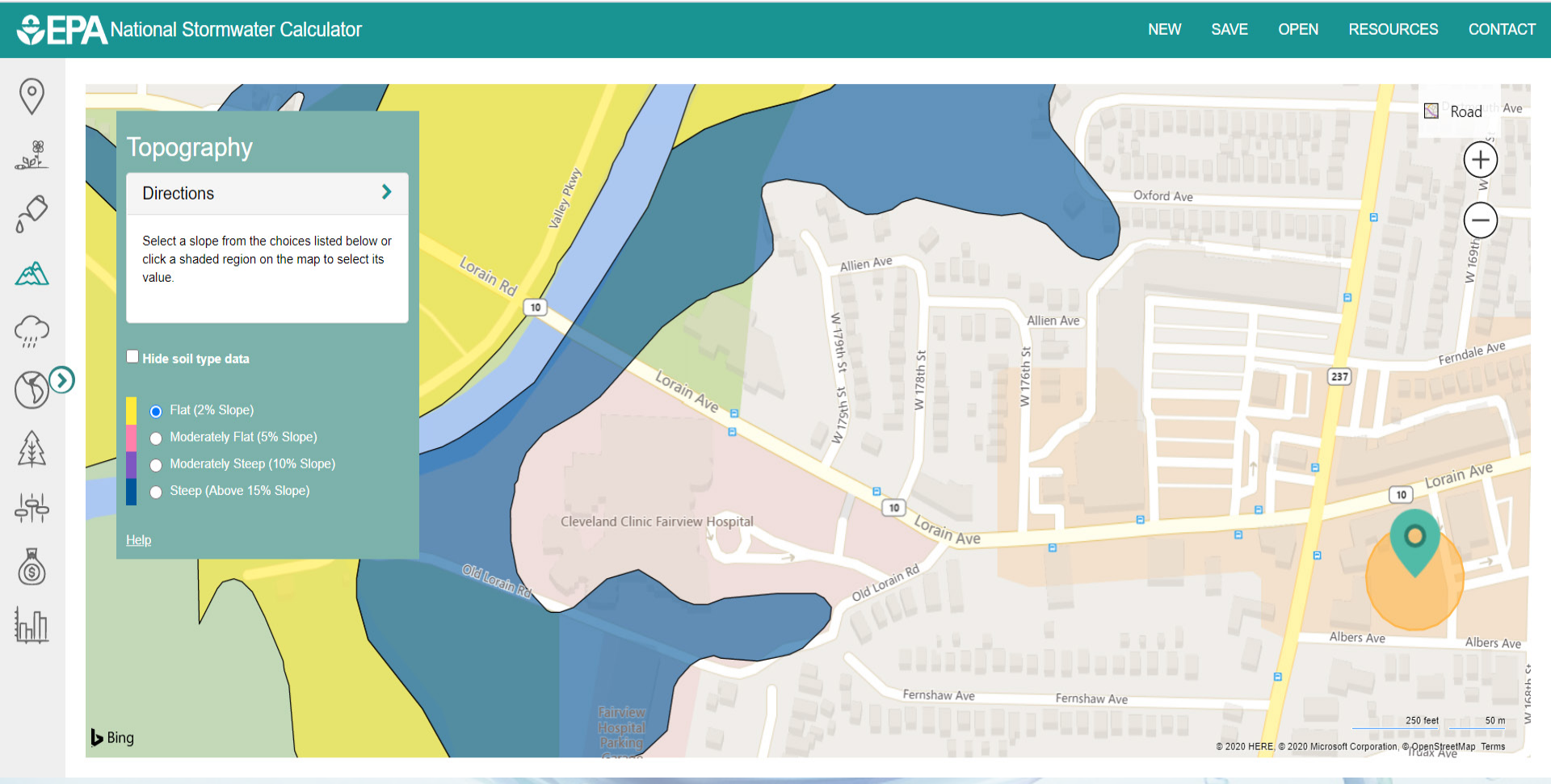
Soil Type: Rainfall Runoff Potential



SWC Analysis:
Soil Drainage (infiltration rate)

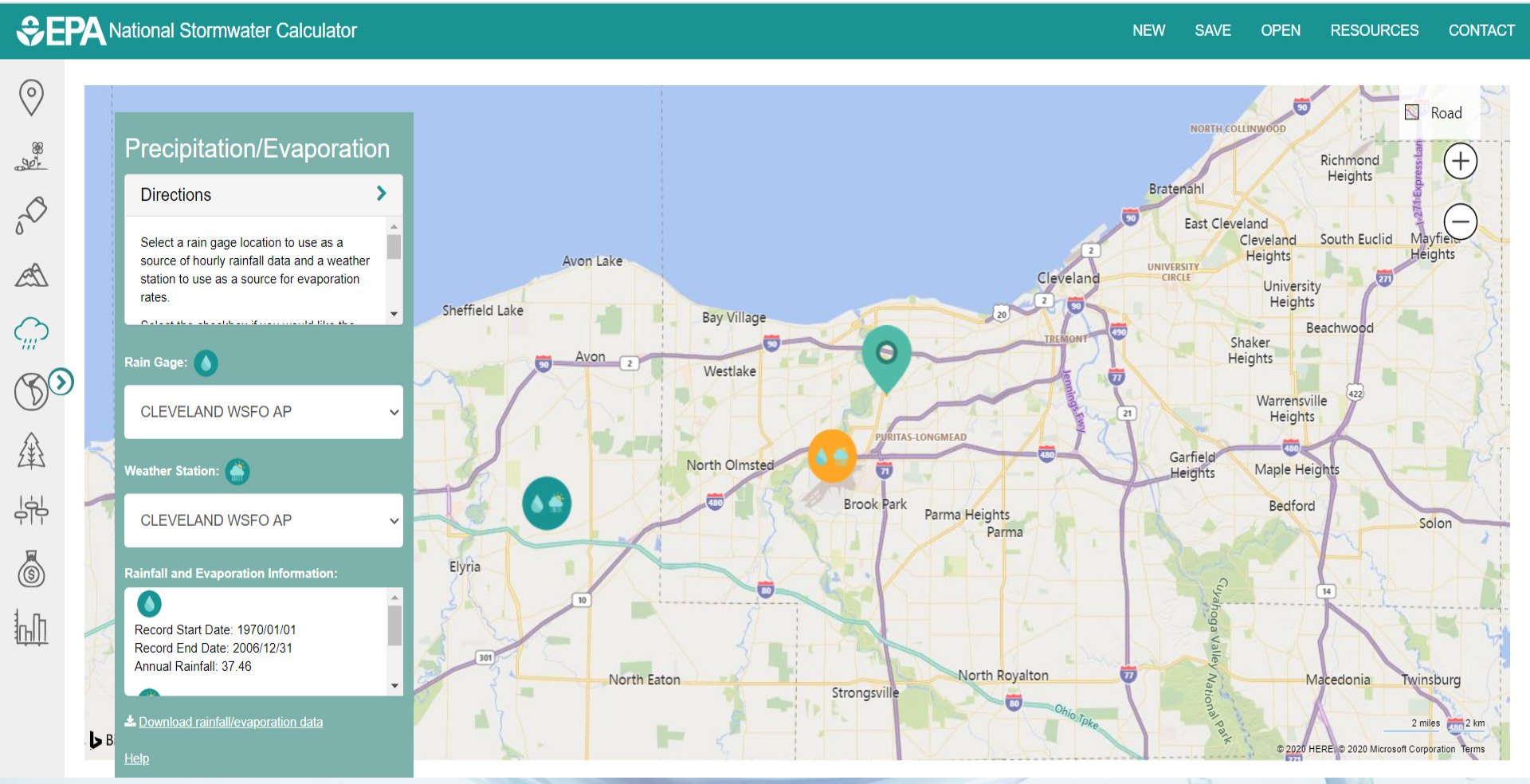


SWC Analysis:
Topography



SWC Analysis:

Historical Precipitation & Potential Evapotranspiration

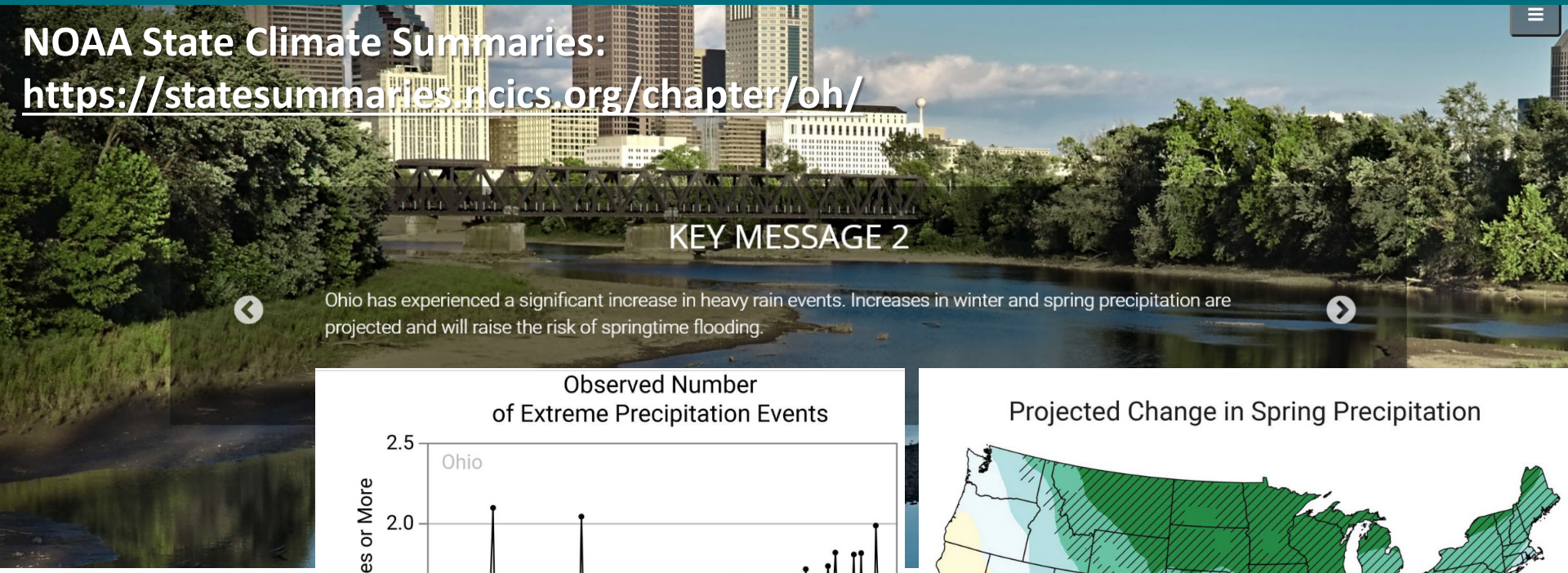


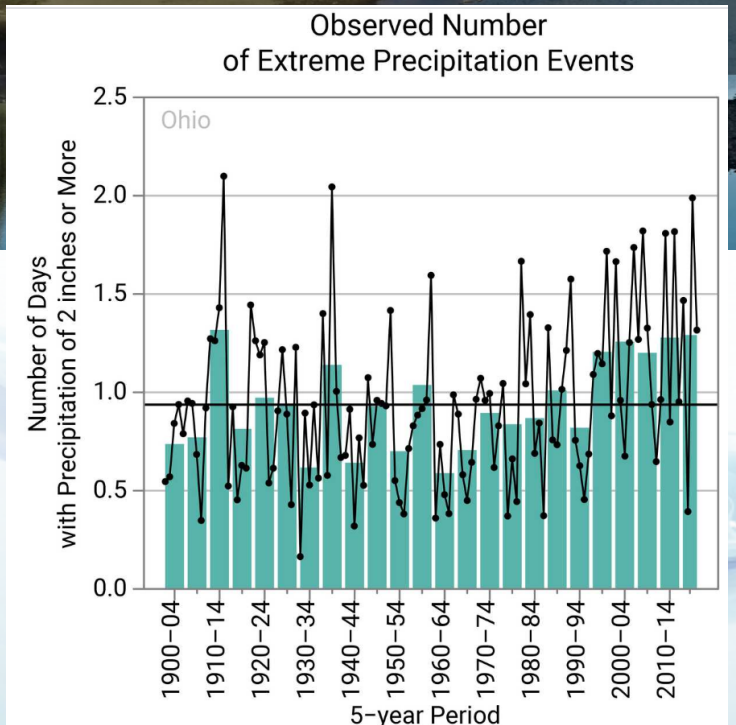
SWC Analysis:
Existing Land Cover

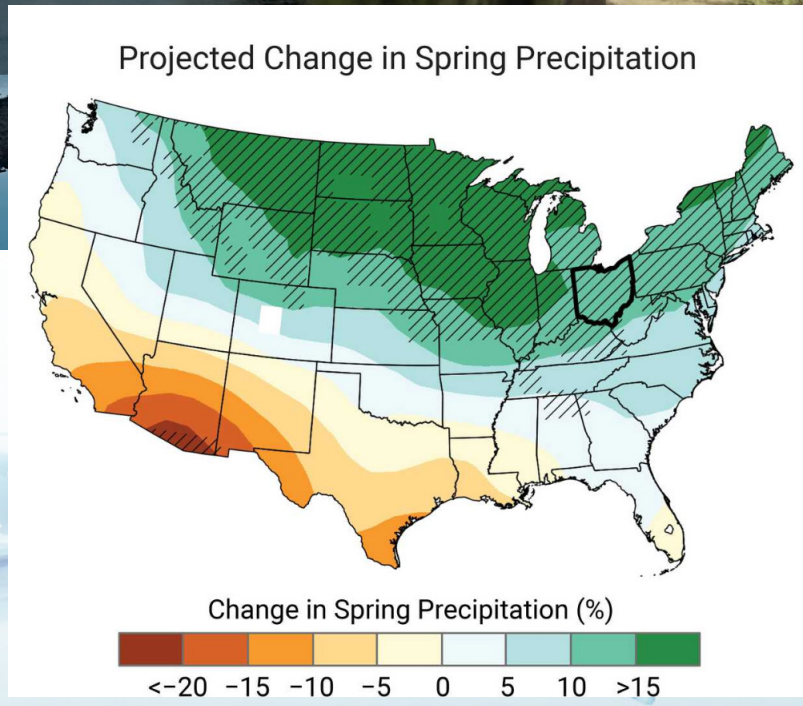
SWC Analysis:

Extreme Weather Impacts: State of Ohio – 2019

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







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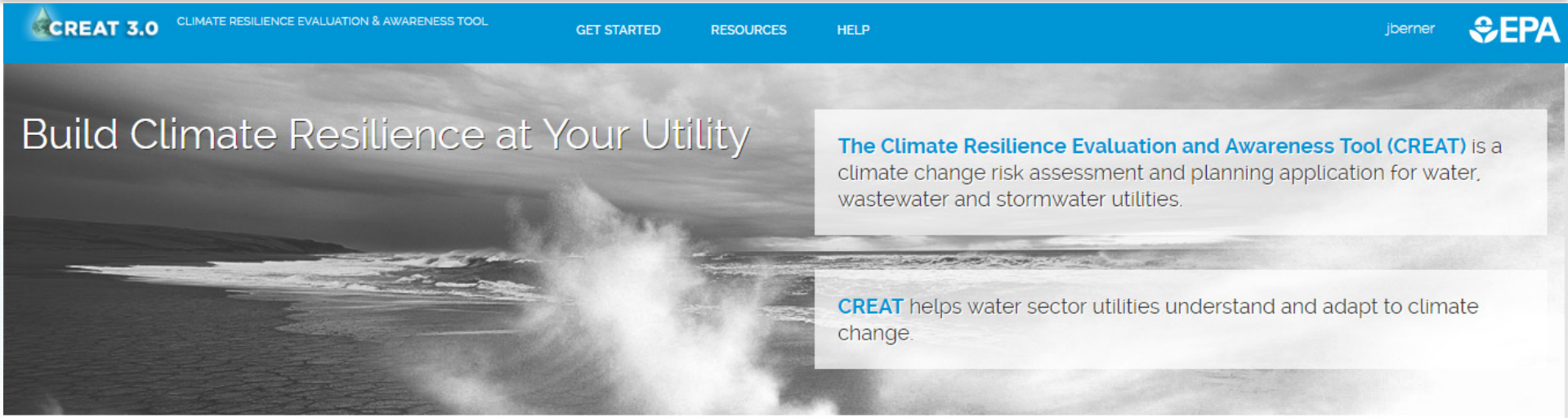
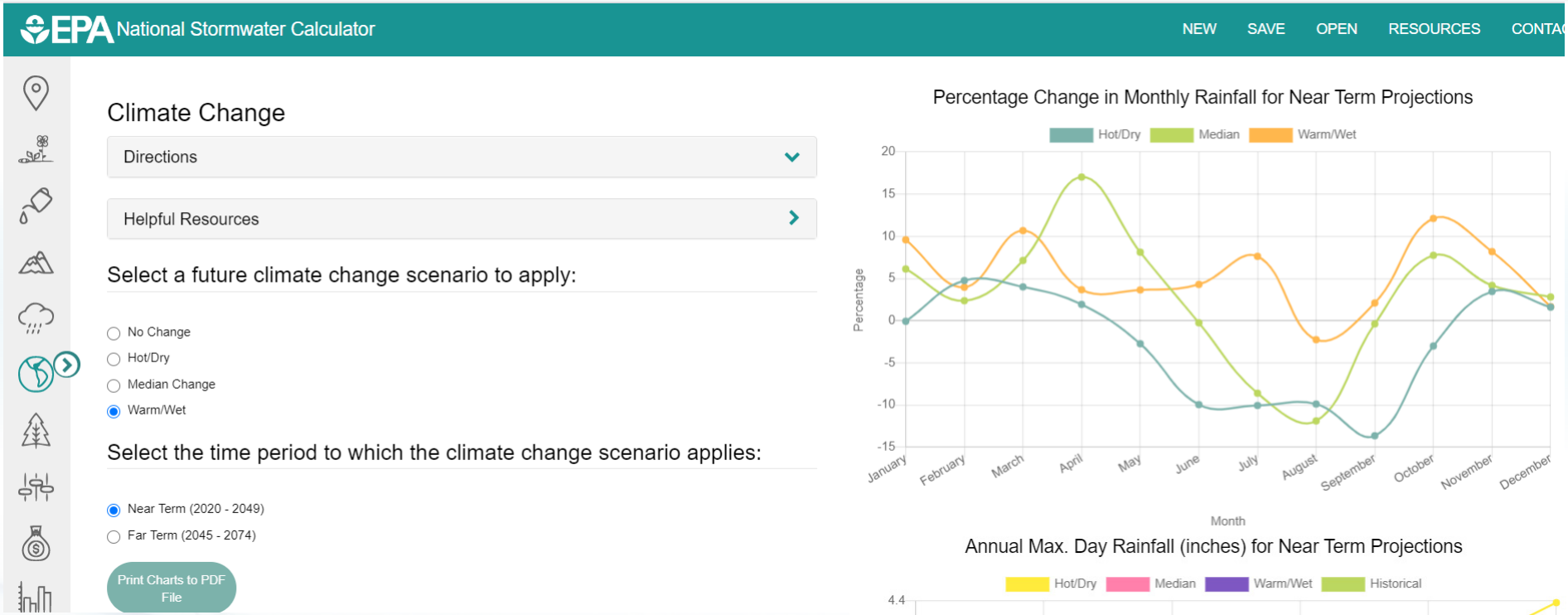
Extreme Weather Scenario Data:
U.S. EPA's Climate Resilience Evaluation & Awareness Tool (CREAT) 2.0



- 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



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

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SWC Analysis:
Baseline Results

EPA National Stormwater Calculator

NEW SAVE OPEN RESO

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

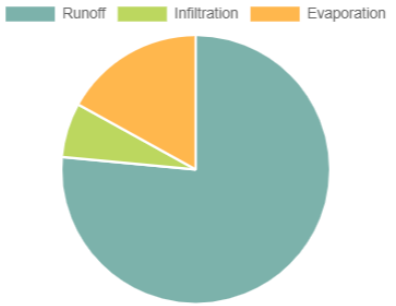
Reports:

- ○ Site Description
- ◉ Summary Results
- ○ 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

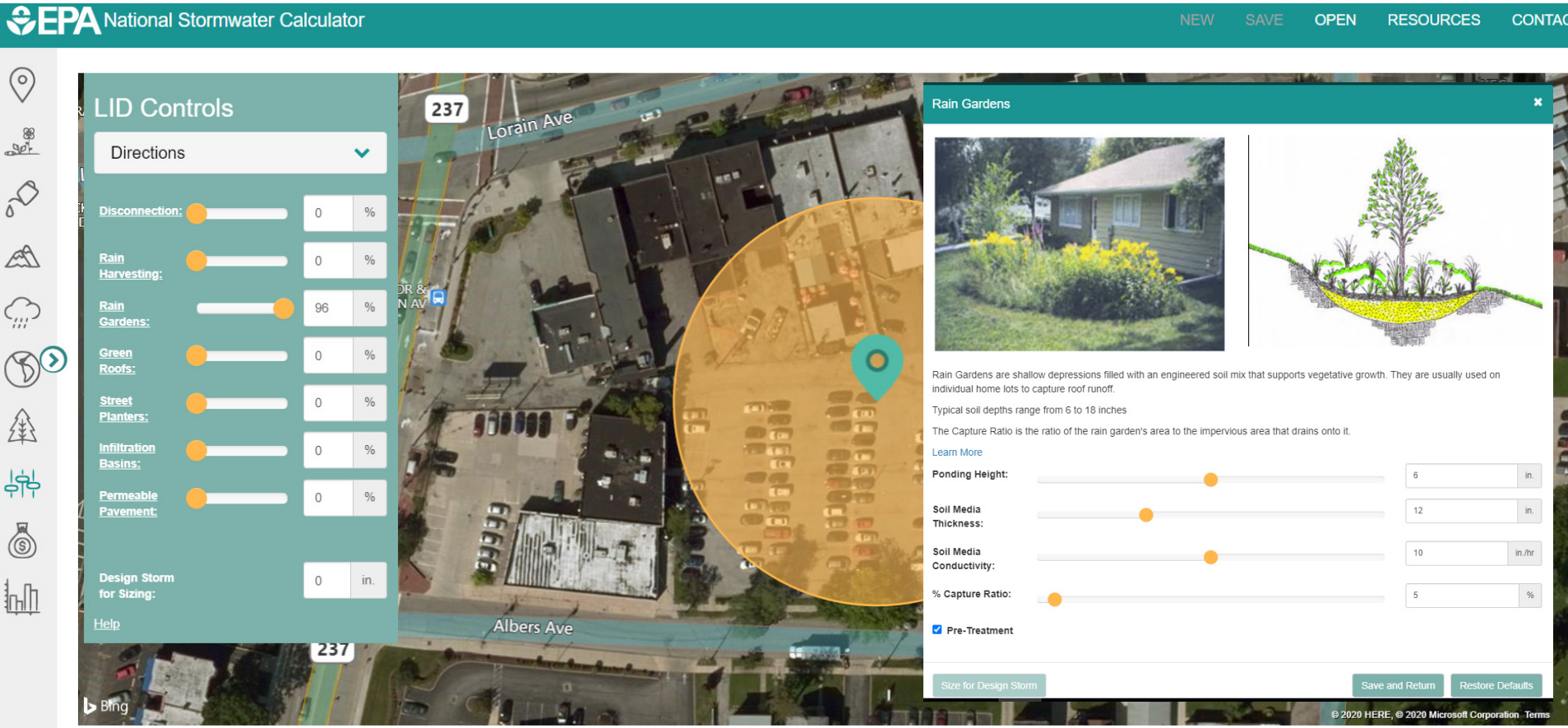
LID Controls:

Fact Sheet

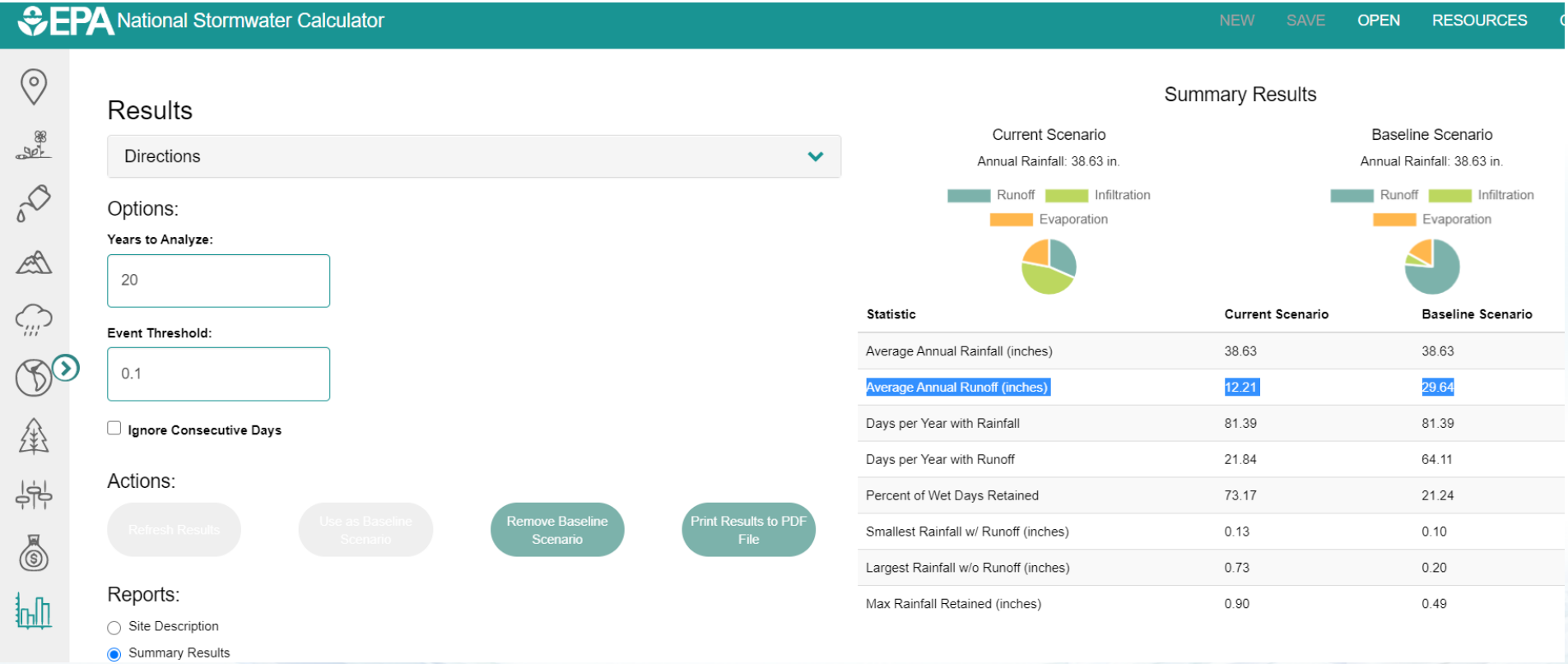
Kamm's Corners Public Parking Lot Retrofit Project (NEORSD)

https://gis2.neorsd.org/storymap/SW_GIG_GRANTS/GIG_2014CURRENT/2018kamms.png

SWC Analysis:
LID: Redevelopment Project



SWC Analysis:
Runoff Reduction Results



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

EPA National Stormwater Calculator

NEW SAVE OPEN RESOURCES CO

Results

Directions

Options:

Years to Analyze:

20

Event Threshold:

0.1

Ignore Consecutive Days

Actions:

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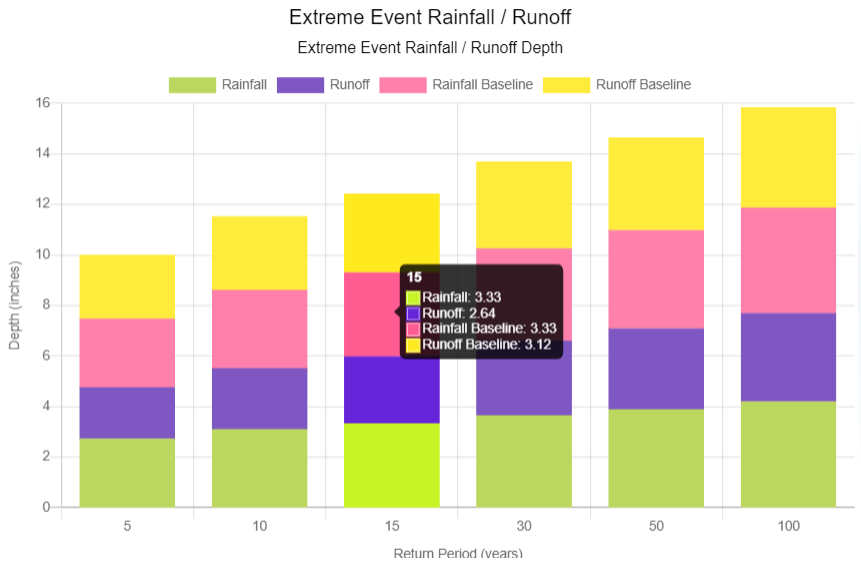

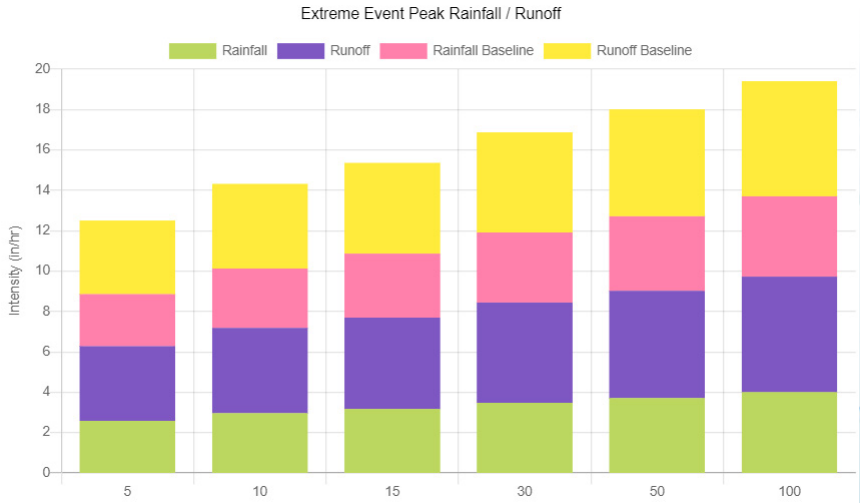

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Discussion and Questions

Thank You!

National Stormwater Calculator Website:

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

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