EPA NATIONAL STORMWATER CALCULATOR

Background

- Many states have developed post-construction SW standards that include quantitative retention requirements

Massachusetts	Maryland	Wisconsin
New Hampshire	Pennsylvania	Montana
Vermont	West Virginia	California
New Jersey	Florida	Alaska
New York	South Carolina	Oregon
Delaware	Tennessee	District of Columbia

- Example: In DC, sites that disturb 5,000 sf or more will be required to retain the stormwater from a 1.2 inch storm

Background

- Continuous simulation modeling offers many advantages in designing sites that meet these new standards
  - Can assess compliance with a range of standards (capture depth, % capture of annual runoff volume, % capture of annual storm events)
  - Accounts for sequence of precipitation events and antecedent moisture
- But continuous simulation modeling is challenging
  - Data requirements
  - Modeling expertise

Goals

- Analyze site hydrology over a continuous, long-term meteorological record
- Be intelligible to users without prior modeling experience or hydrology expertise
- Require only a minimum amount of readily available site information
- Produce technically sound and defensible results for screening level analysis

Basic Features

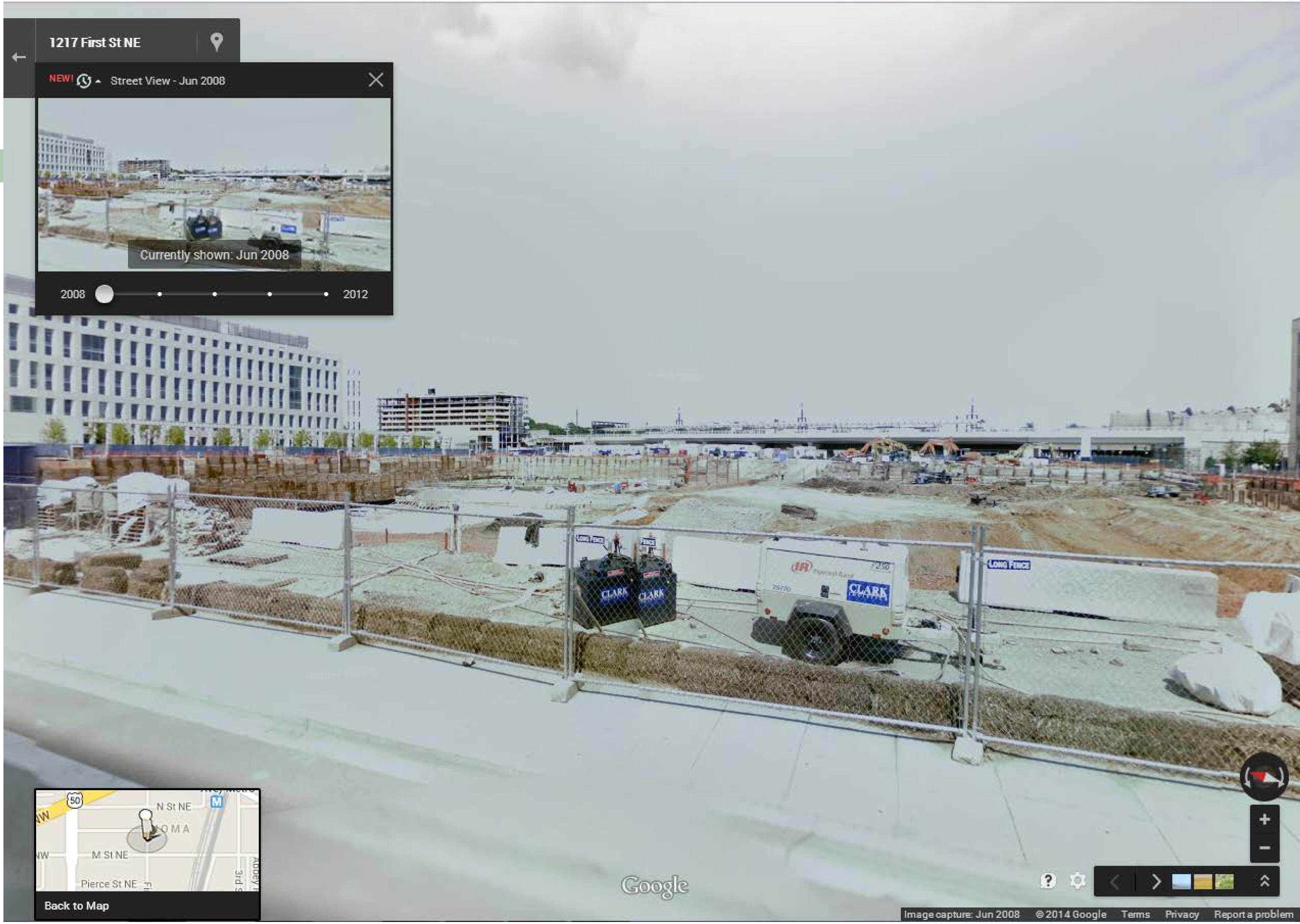
- SWMM modeling engine
- Simple map-based user interface
- Automated retrieval of meteorological, soil, slope data
- Automated calculation of rainfall and runoff statistics

Inputs

- Soil and slope data retrieved from Natural Resource Conservation Service (NRCS) SSURGO database.
- Precipitation retrieved from NWS rain gages. The Calculator can access data for 8,159 stations.
- Evaporation estimated based on temperature and precipitation data from NWS rain gages. The Calculator can access estimates for 5,236 stations.
- Climate change projections from EPA CREAT.
- Land cover data and BMP parameters input by user.

Outputs

- Average annual rainfall/runoff
- Partitioning of rainfall among runoff/infilt/evap
- Runoff by rainfall percentile
- Extreme event rainfall/runoff


1217 First St NE
NEW!
Street View - Jun 2008
Currently shown: Jun 2008
2008
2012
CLARK
CLARK
CLARK
LONG FENCE
N St NE
M St NE
Pierce St NE
Back to Map
Google
Image capture: Jun 2008
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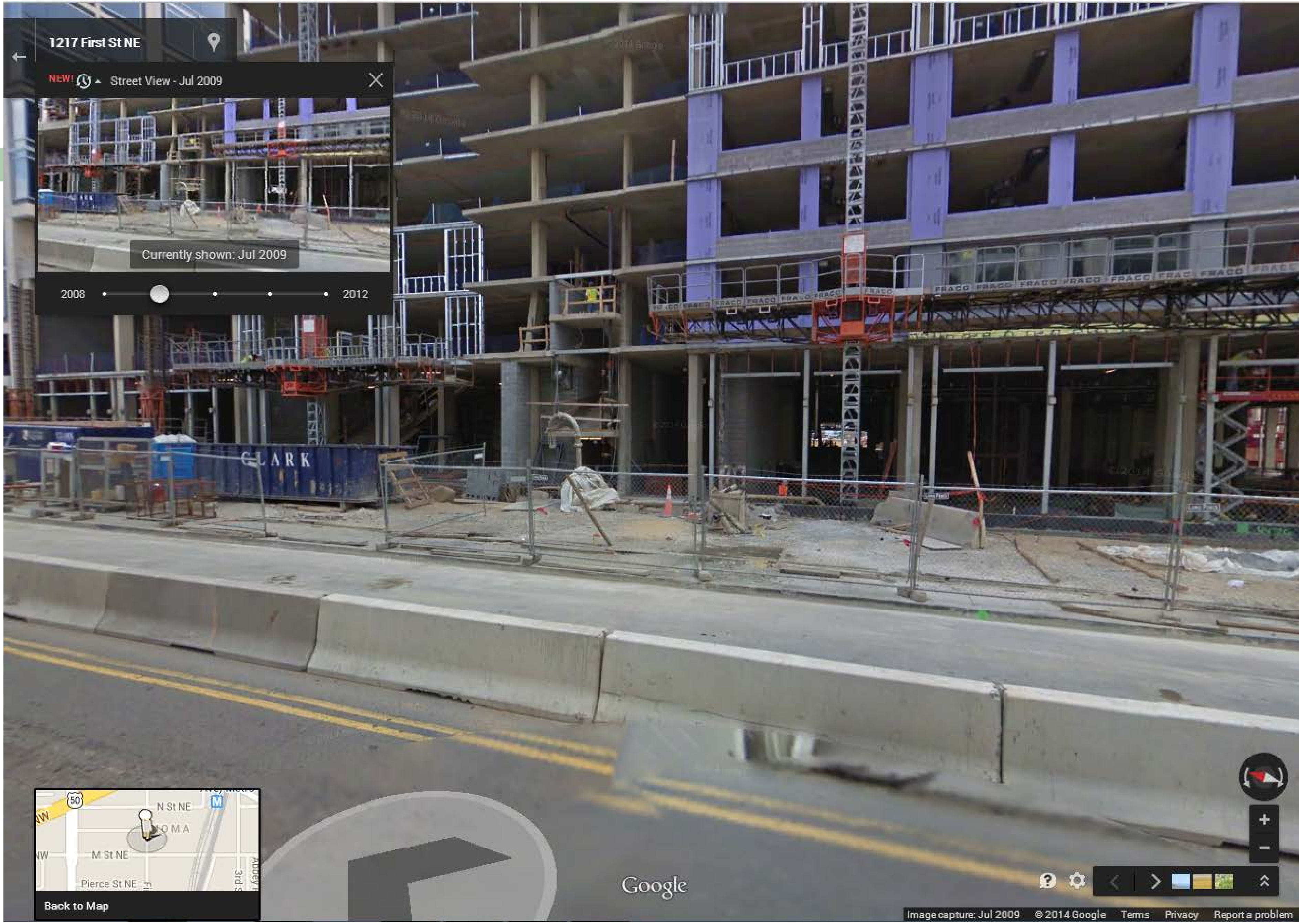
Report a problem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NEW!
Street View - Jul 2009
Currently shown: Jul 2009
2008
2012
CLARK
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M St NE
Pierce St NE
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Back to Map
Google
Image capture: Jul 2009
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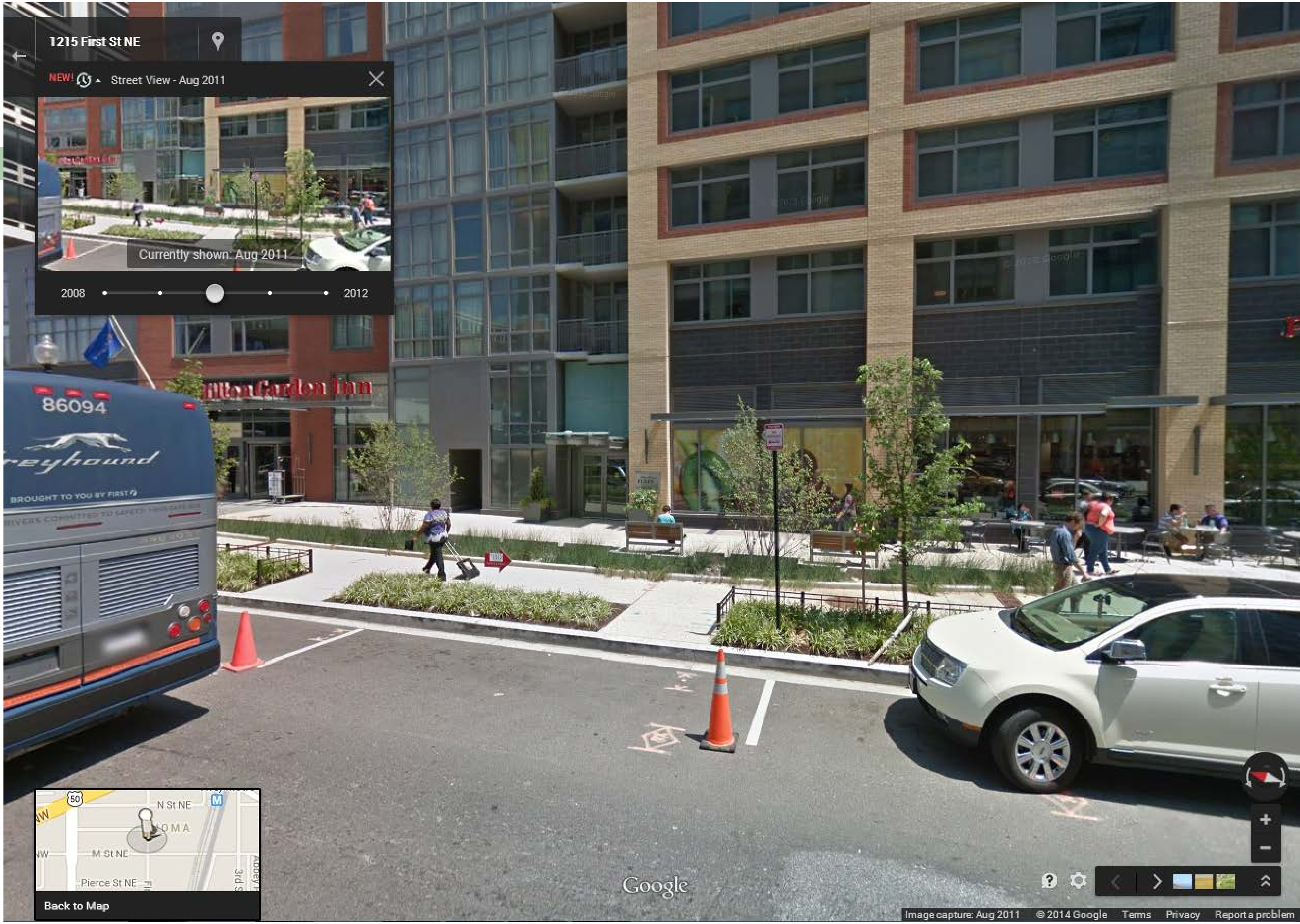
1215 First St NE
NEW!
Street View - Aug 2011
Currently shown: Aug 2011
2008
2012
86094
BROUGHT TO YOU BY FIRST
N St NE
M St NE
Pierce St NE
Back to Map
Google
Image capture: Aug 2011
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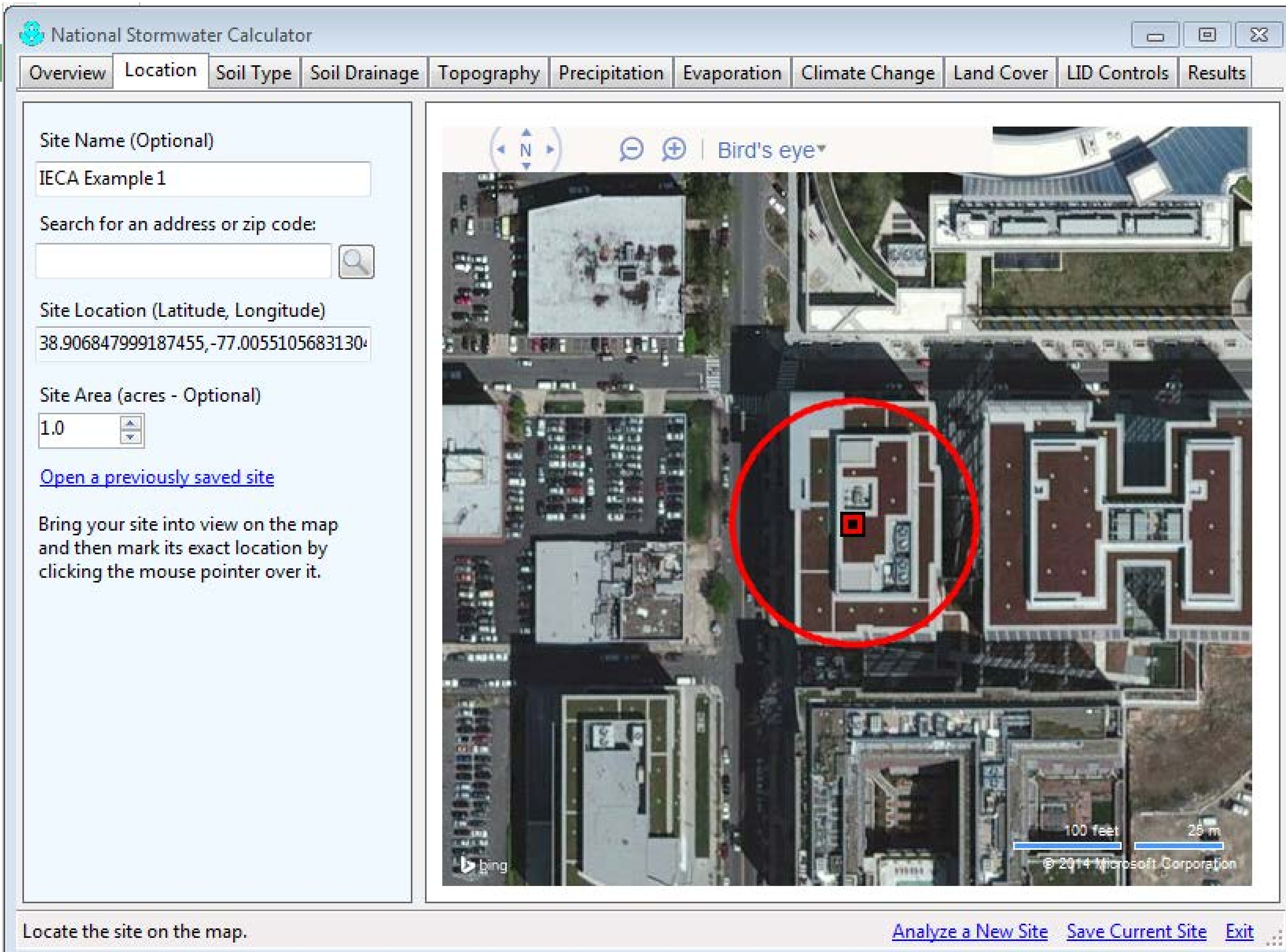
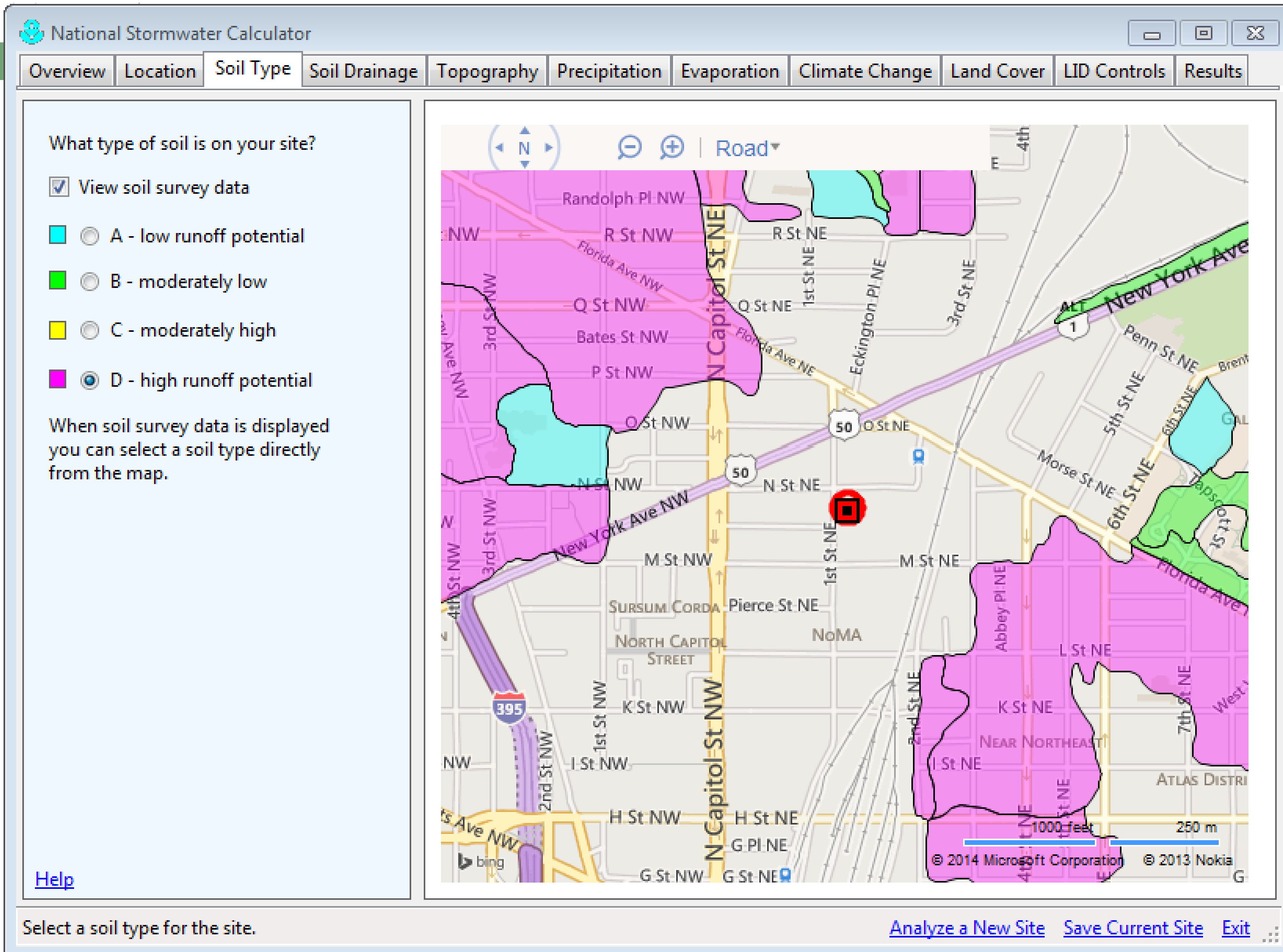
Fresh Foods

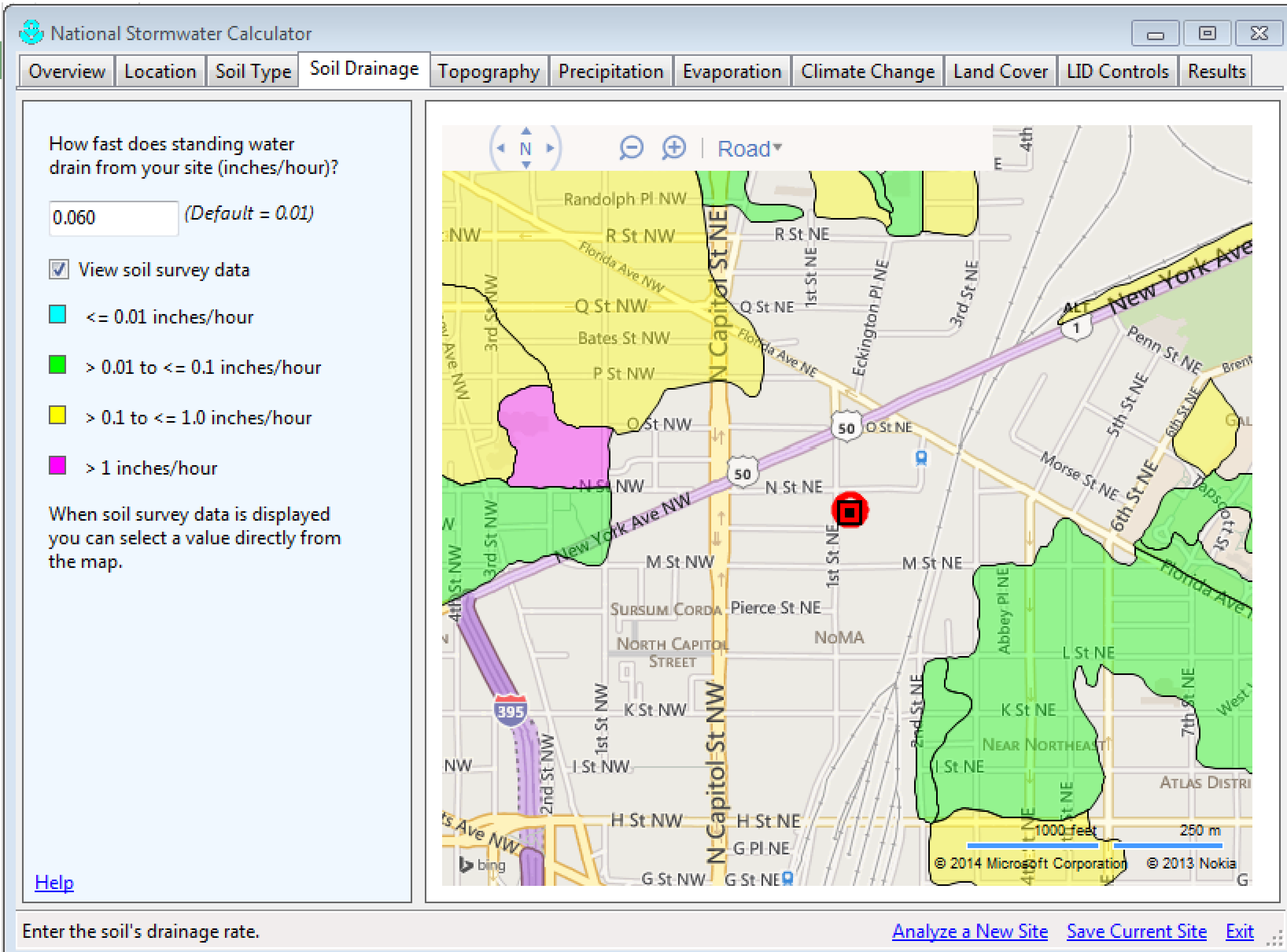
Step 1: Set Location



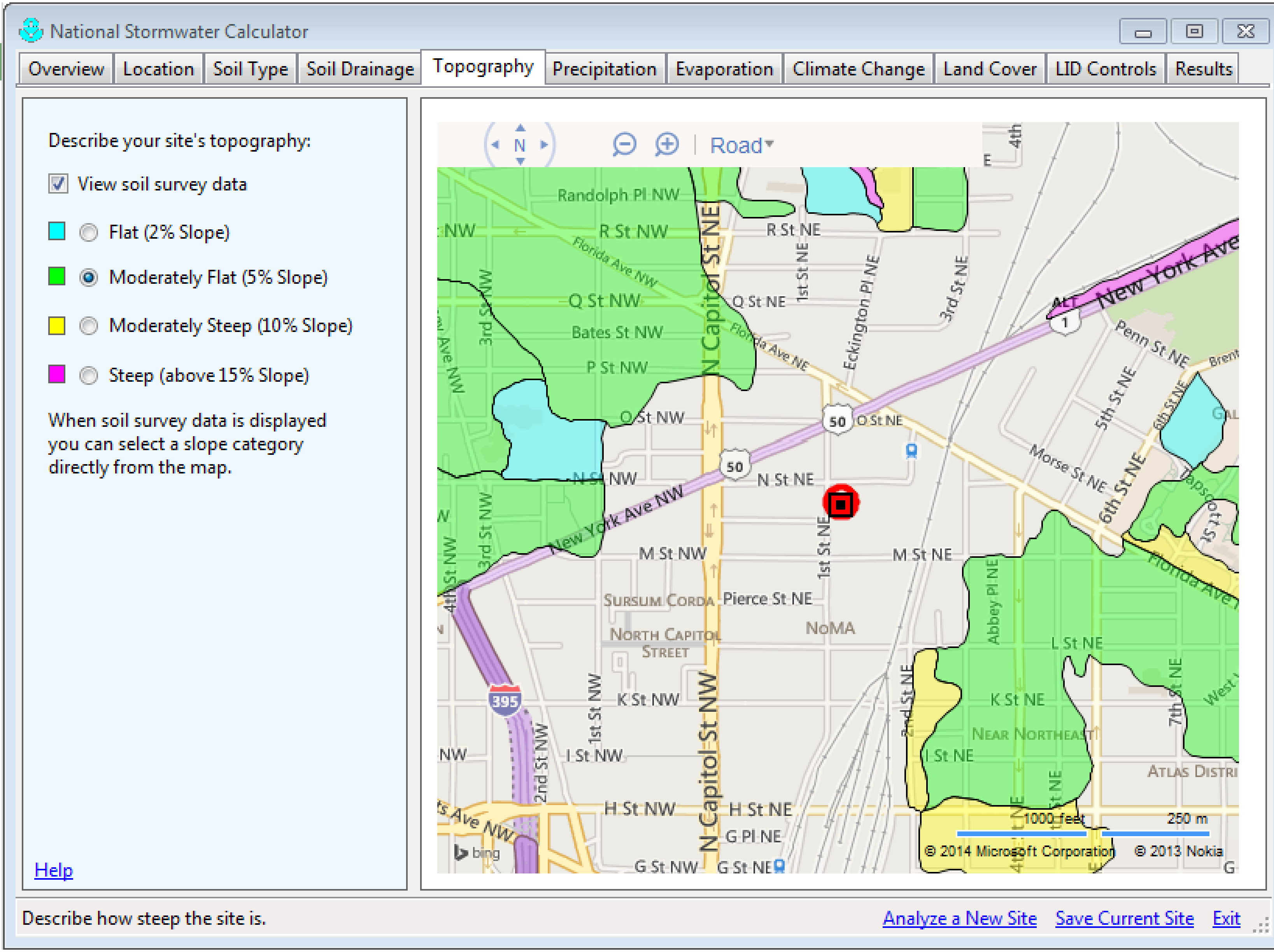
Step 2: Set Soil Group



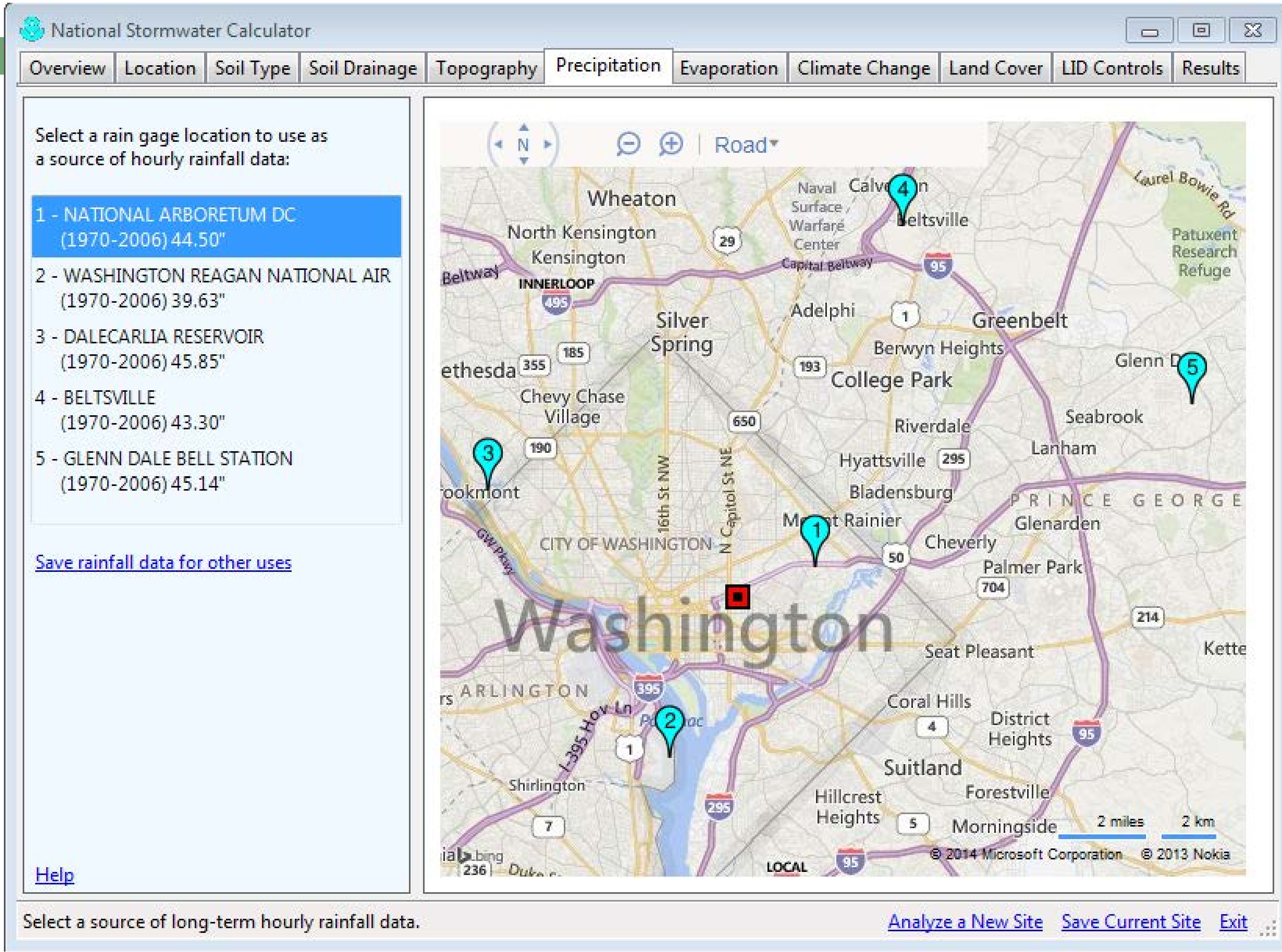
Step 3: Set Soil Drainage



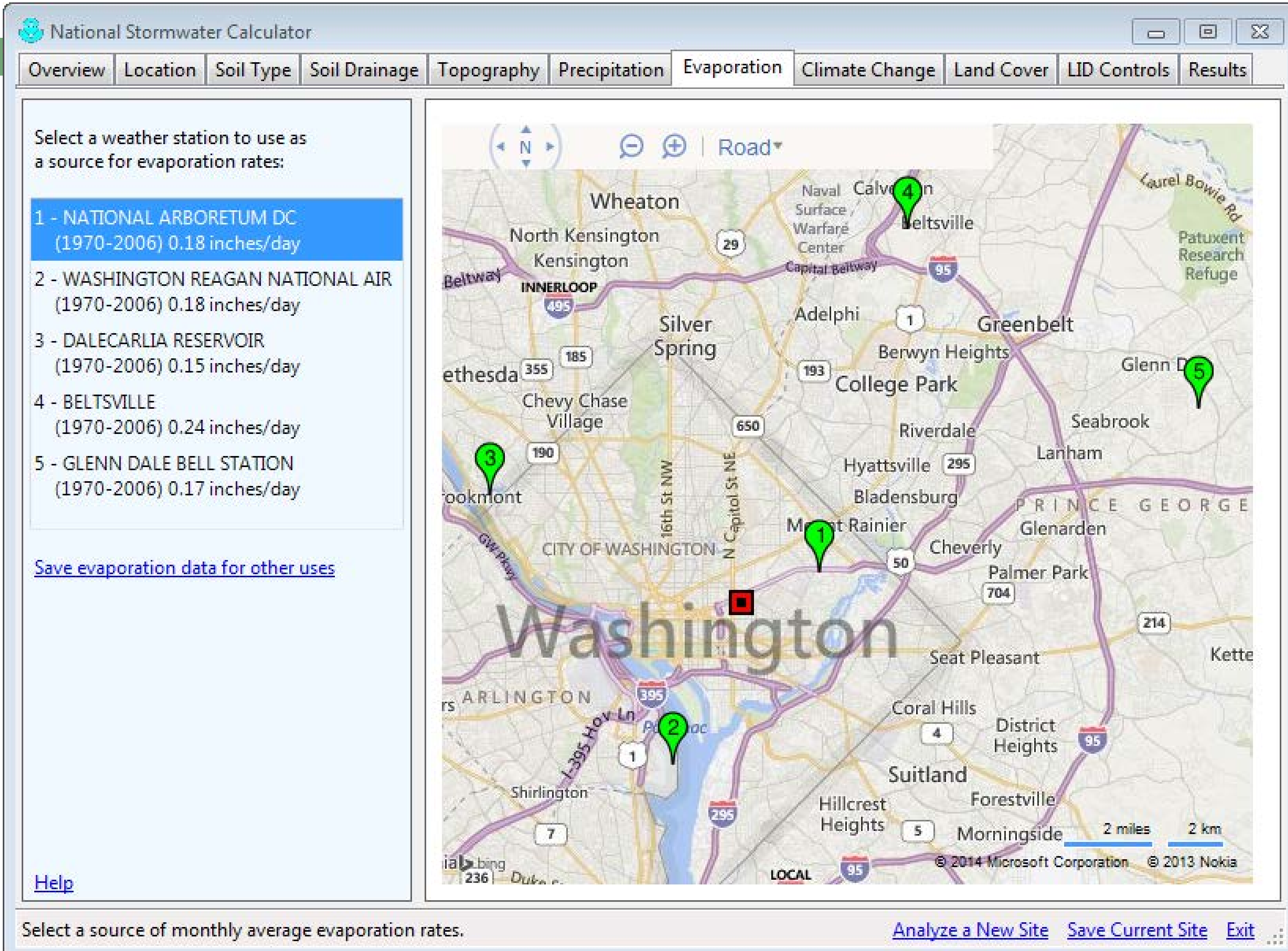
Step 4: Set Slope



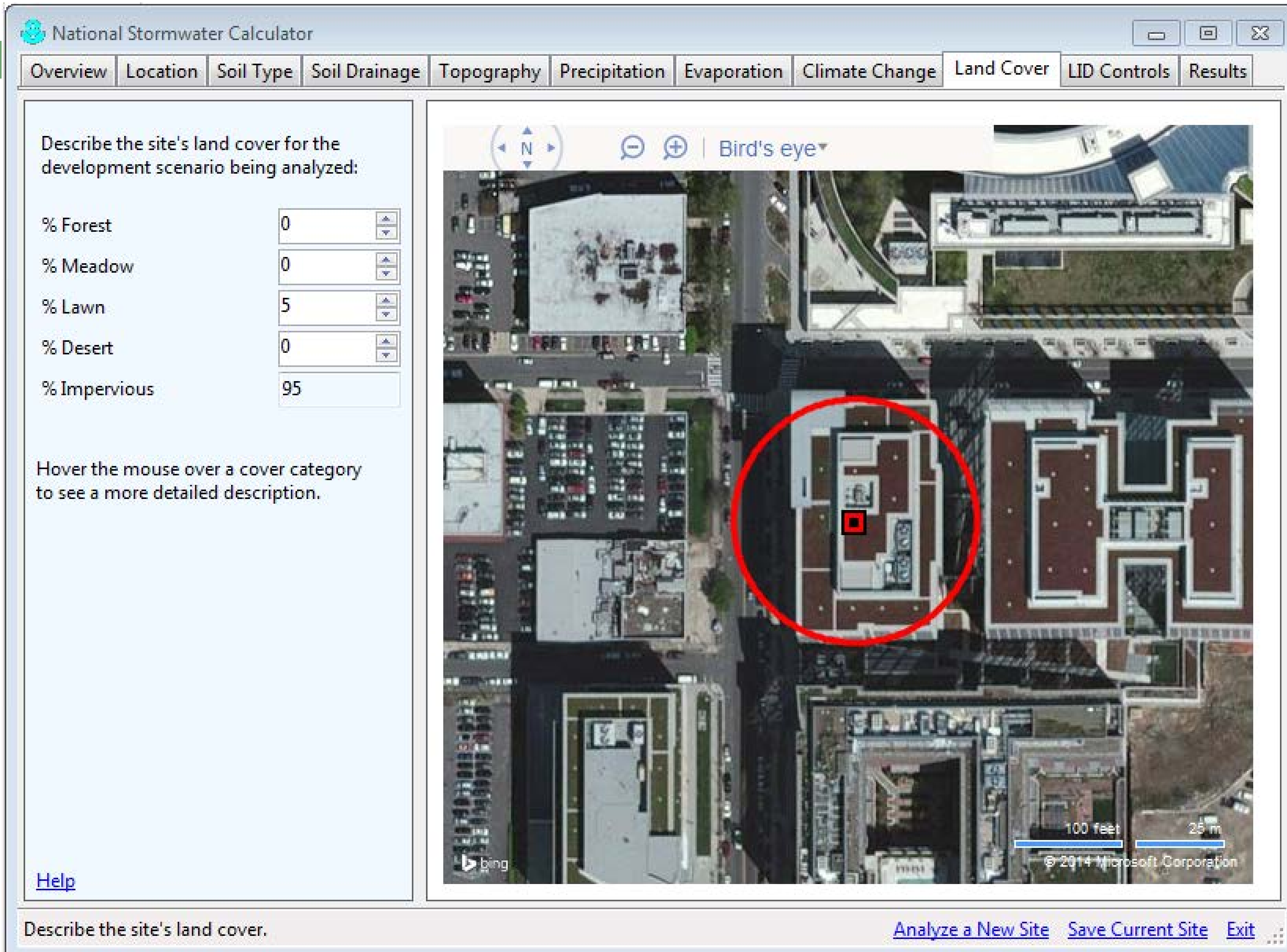
Step 5: Select Precipitation Record



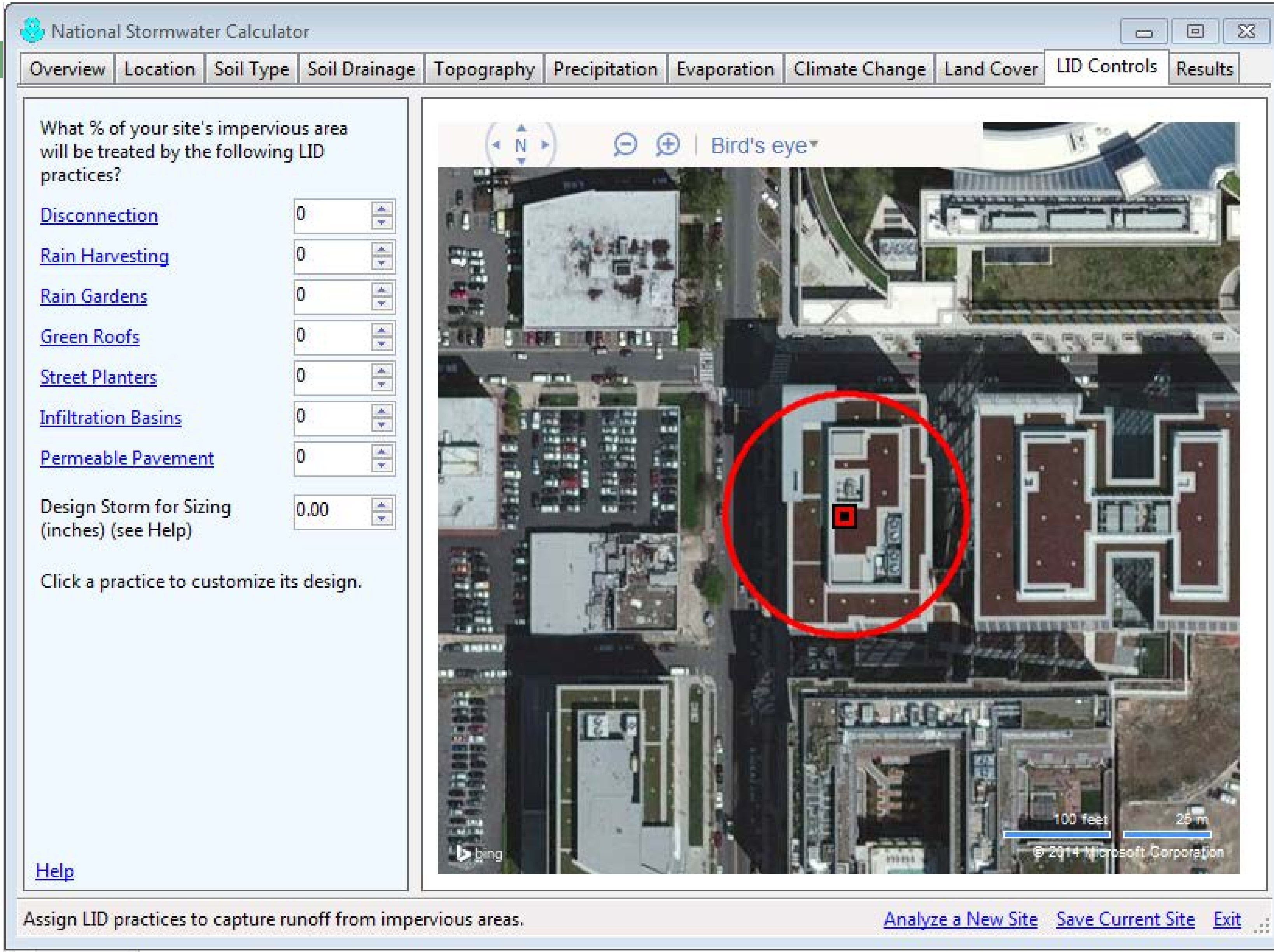
Step 6: Select Evaporation Record



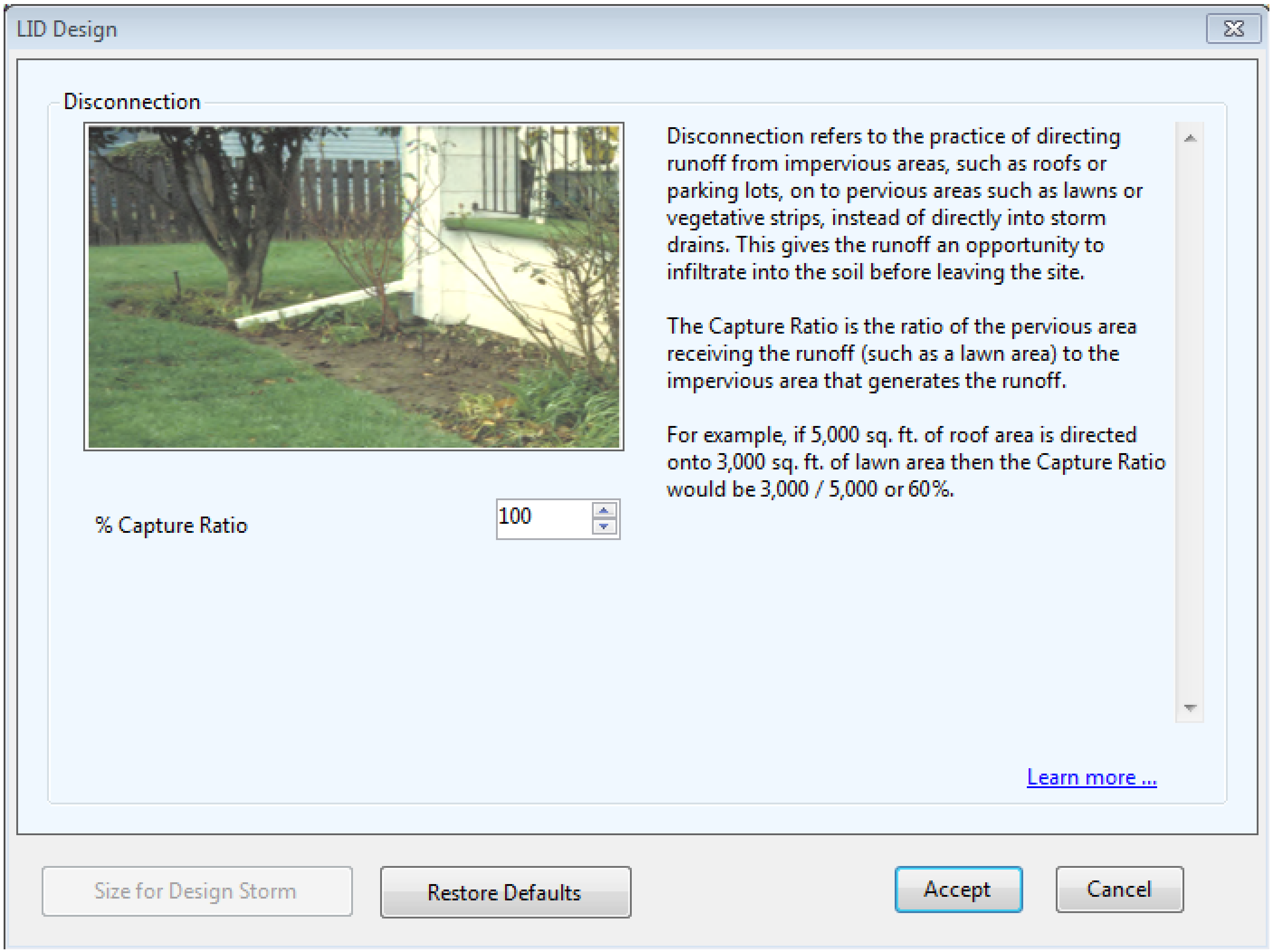
Step 7: Set Land Cover



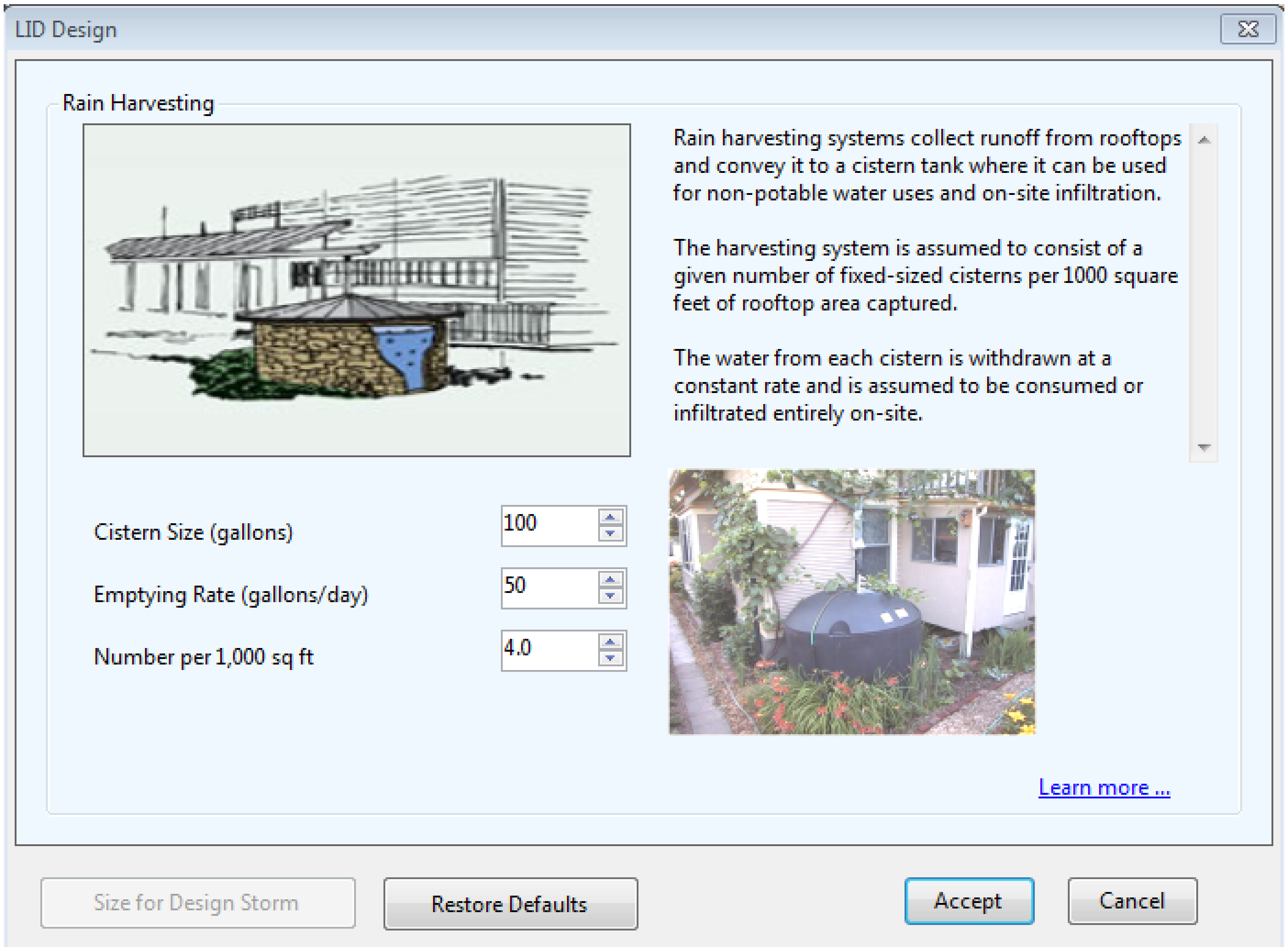
Step 8: Set LID Controls



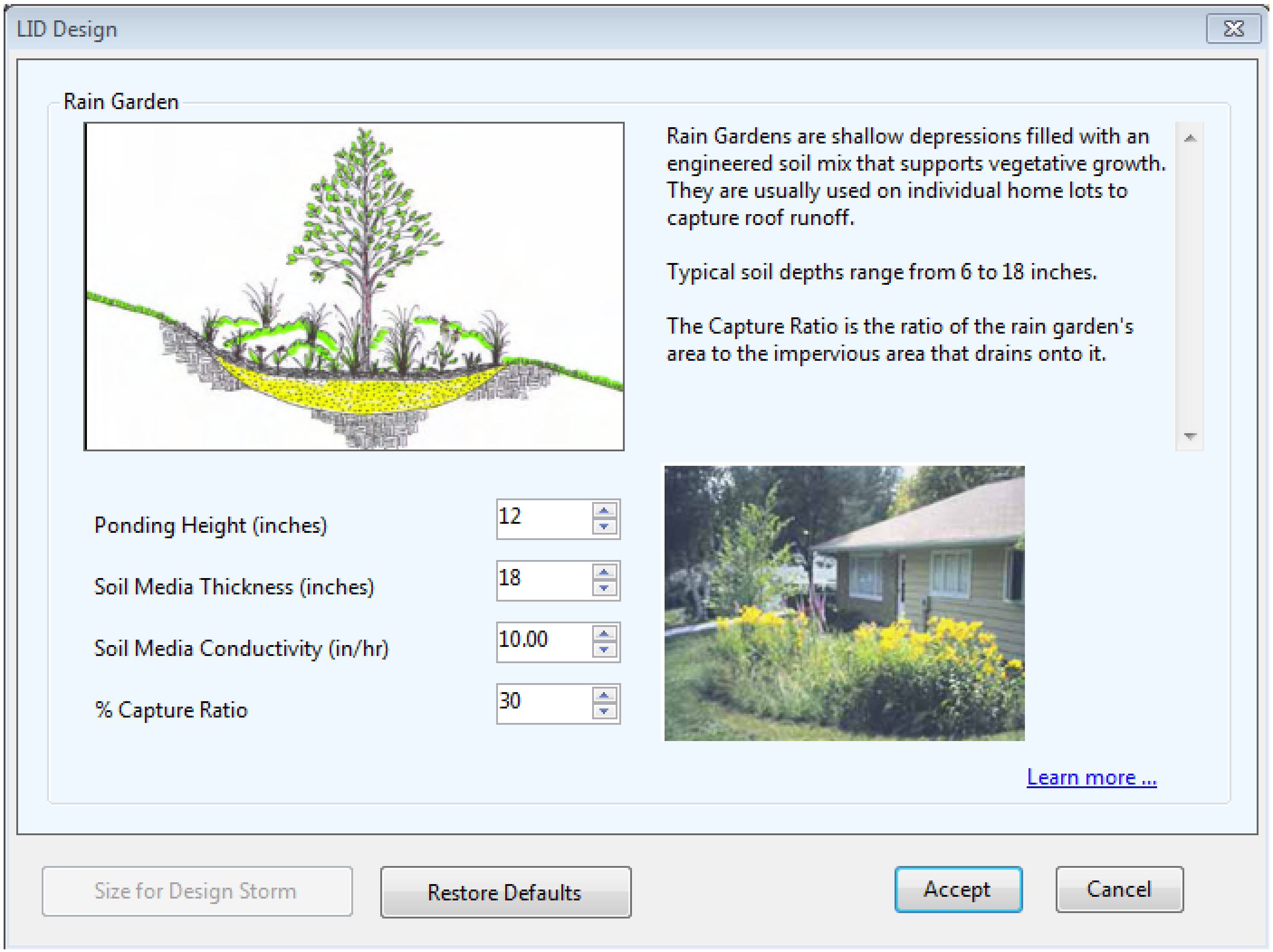
Disconnection



Rainwater Harvesting



Rain Garden

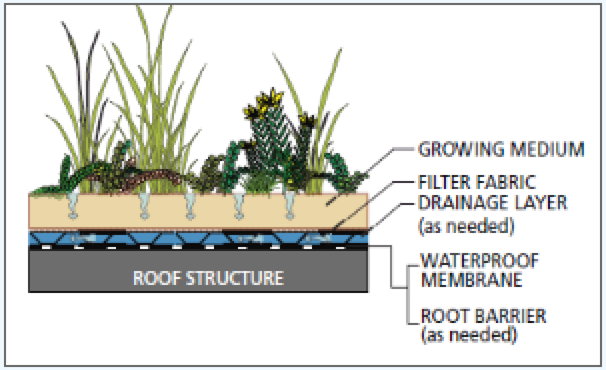


LID Design
Rain Garden
Rain Gardens are shallow depressions filled with an engineered soil mix that supports vegetative growth. They are usually used on individual home lots to capture roof runoff.
Typical soil depths range from 6 to 18 inches.
The Capture Ratio is the ratio of the rain garden's area to the impervious area that drains onto it.
Ponding Height (inches)
12
Soil Media Thickness (inches)
18
Soil Media Conductivity (in/hr)
10.00
% Capture Ratio
30
Learn more ...
Size for Design Storm
Restore Defaults
Accept
Cancel

Green Roofs

LID Design

Green Roof



Green Roofs (also known as Vegetated Roofs) are bio-retention systems placed on roof surfaces that capture and temporarily store rainwater in a soil growing medium. They consist of a layered system of roofing designed to support plant growth and retain water for plant uptake while preventing ponding on the roof surface.

The thickness used for the growing medium typically ranges from 3 to 6 inches.

Soil Media Thickness (inches)	12
Soil Media Conductivity (in/hr)	10.00

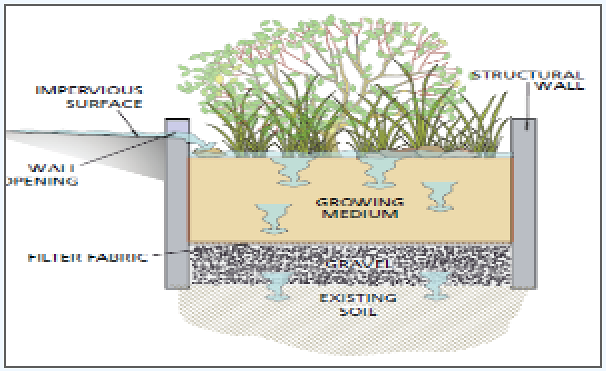
Learn more ...

Size for Design Storm | Restore Defaults | Accept | Cancel

Street Planters

LID Design

Street Planter



Street Planters consist of concrete boxes filled with an engineered soil that supports vegetative growth. Beneath the soil is a gravel bed that provides additional storage.

The walls of a planter extend 3 to 12 inches above the soil bed to allow for ponding withing the unit. The thickness of the soil growing medium ranges from 6 to 24 inches while gravel beds are 6 to 18 inches in depth.

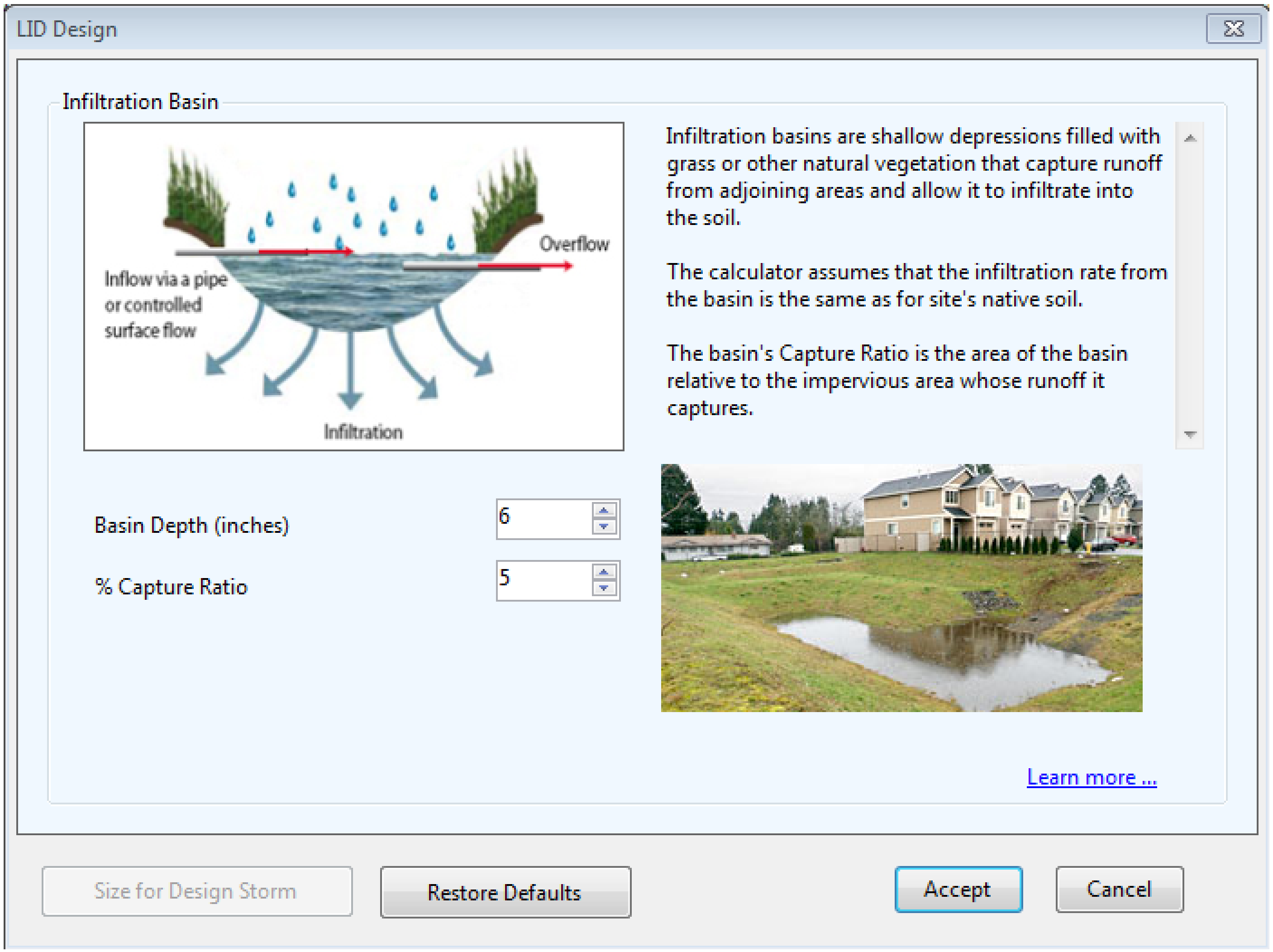
The planter's Capture Ratio is the ratio of its area to

Ponding Height (inches)	6
Soil Media Thickness (inches)	18
Soil Media Conductivity (in/hr)	10.00
Gravel Bed Thickness (inches)	12
% Capture Ratio	6

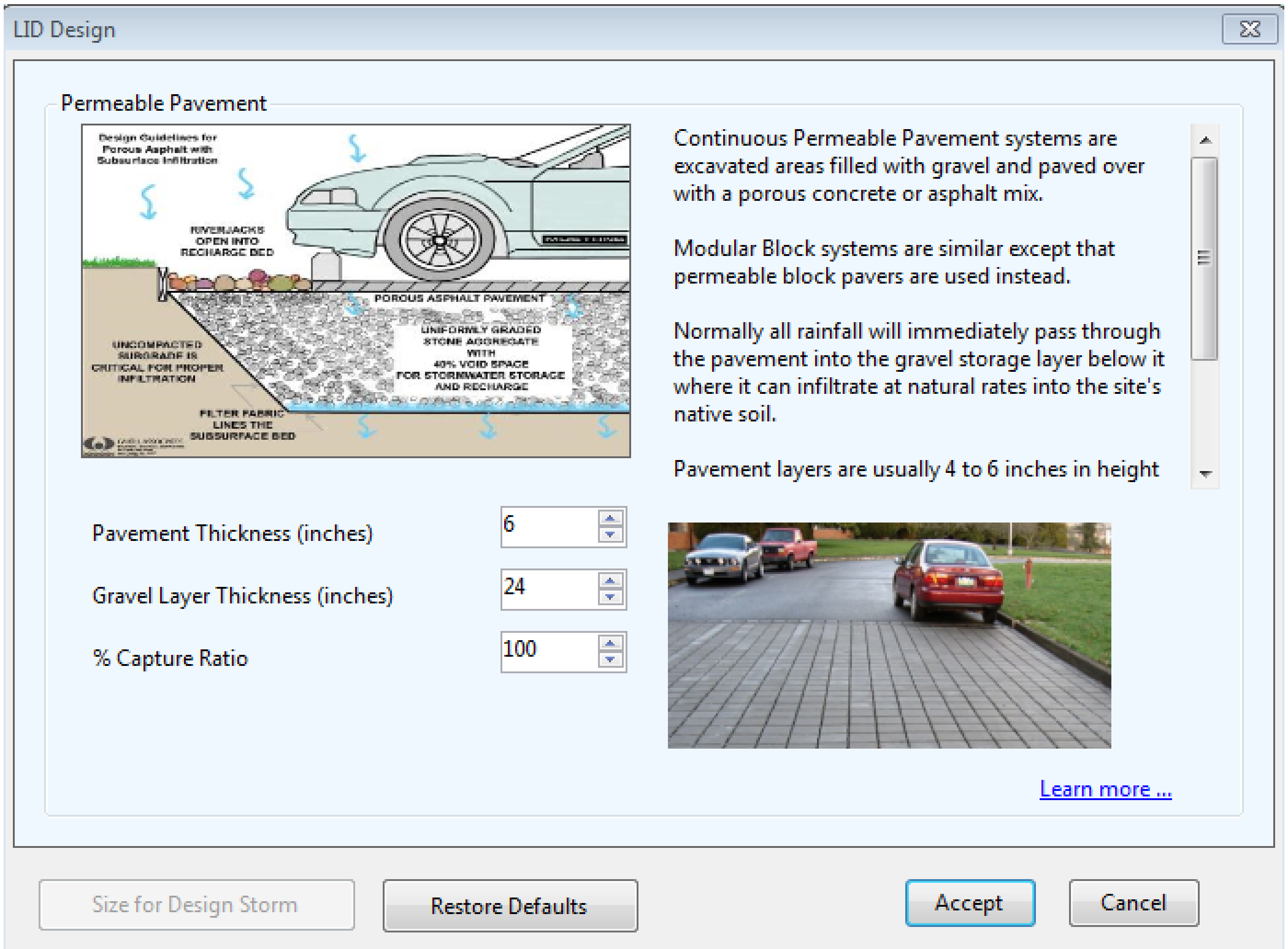
Learn more ...

Size for Design Storm | Restore Defaults | Accept | Cancel

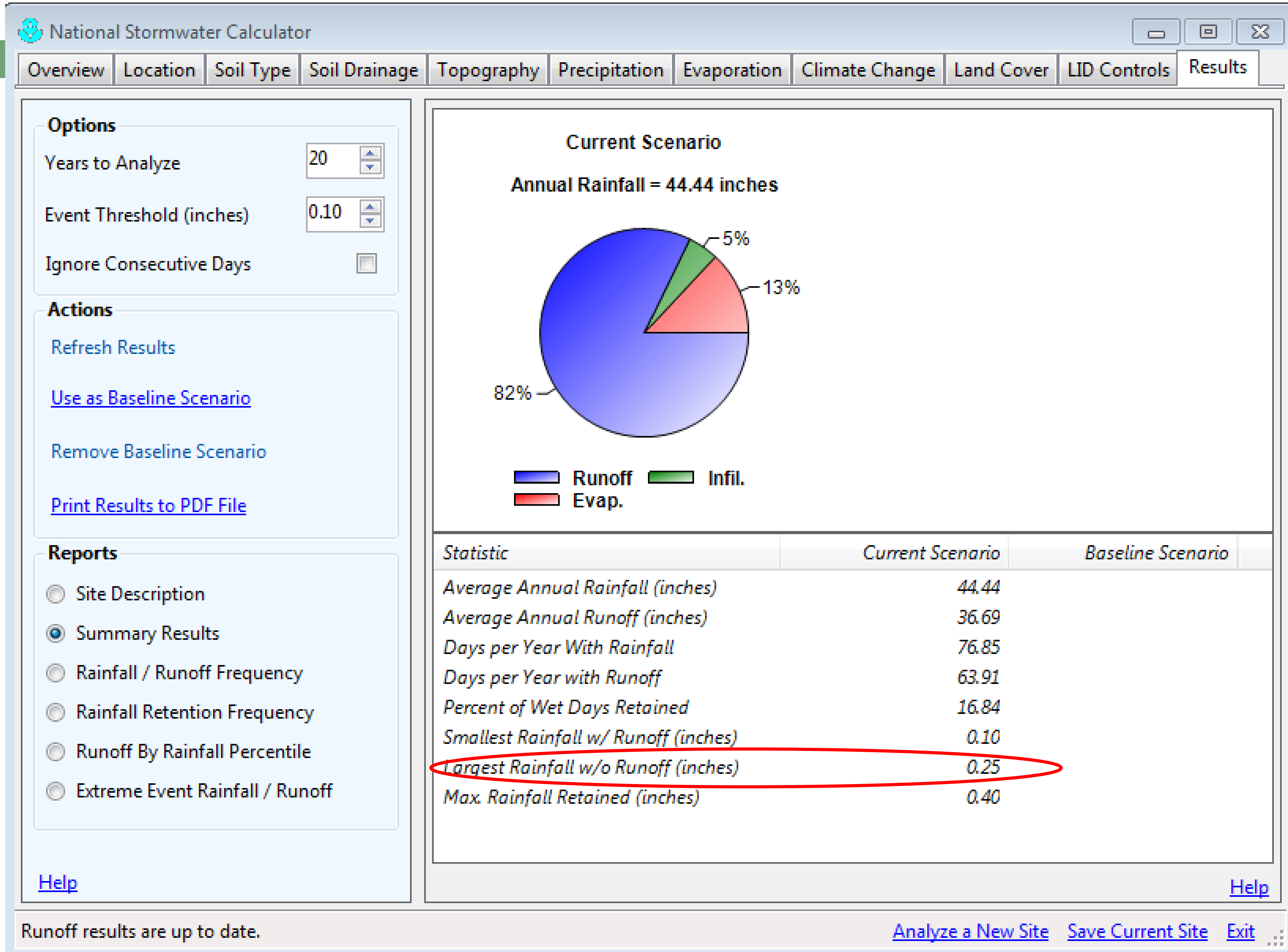
Infiltration Basin



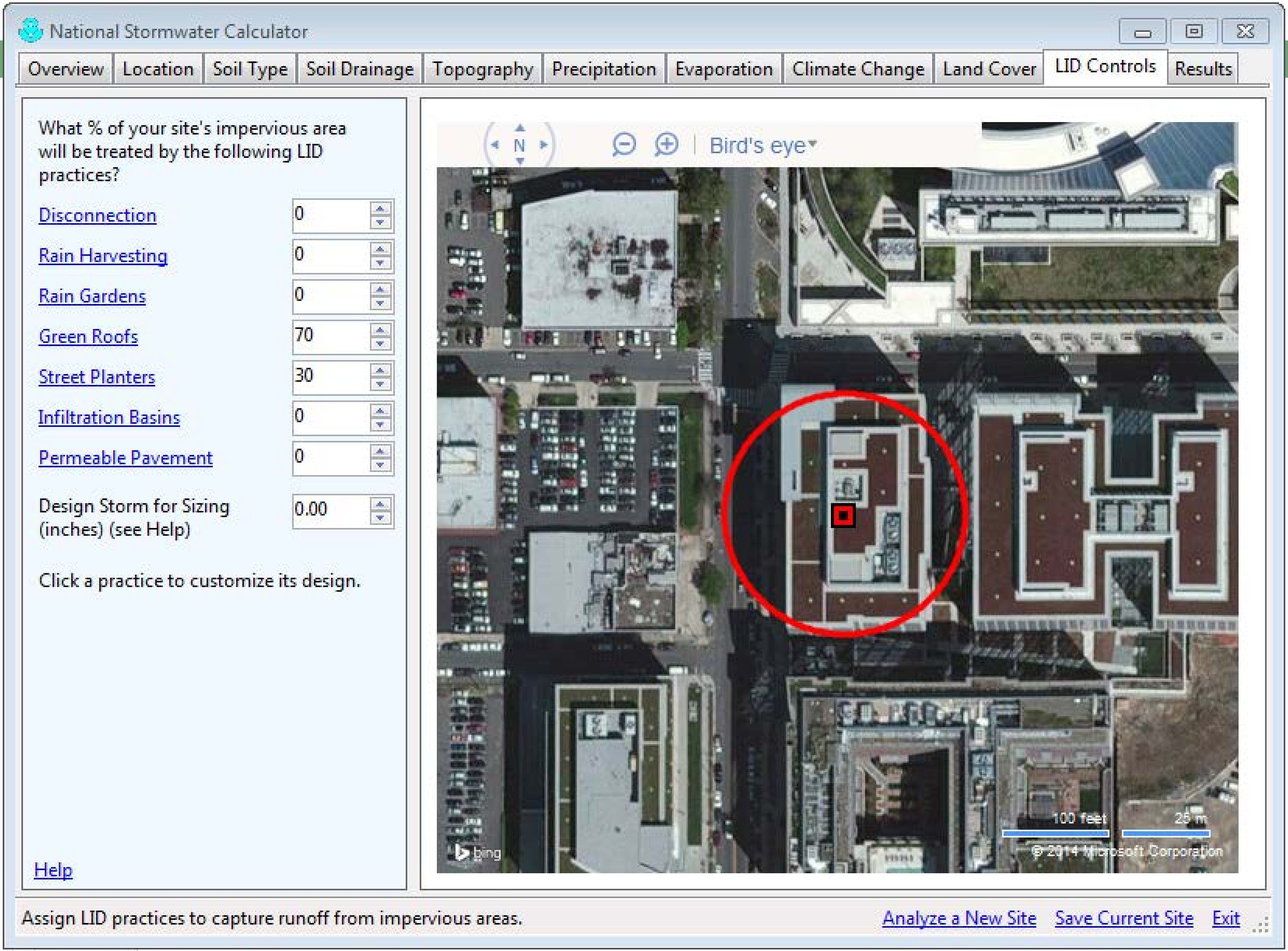
Permeable Pavement



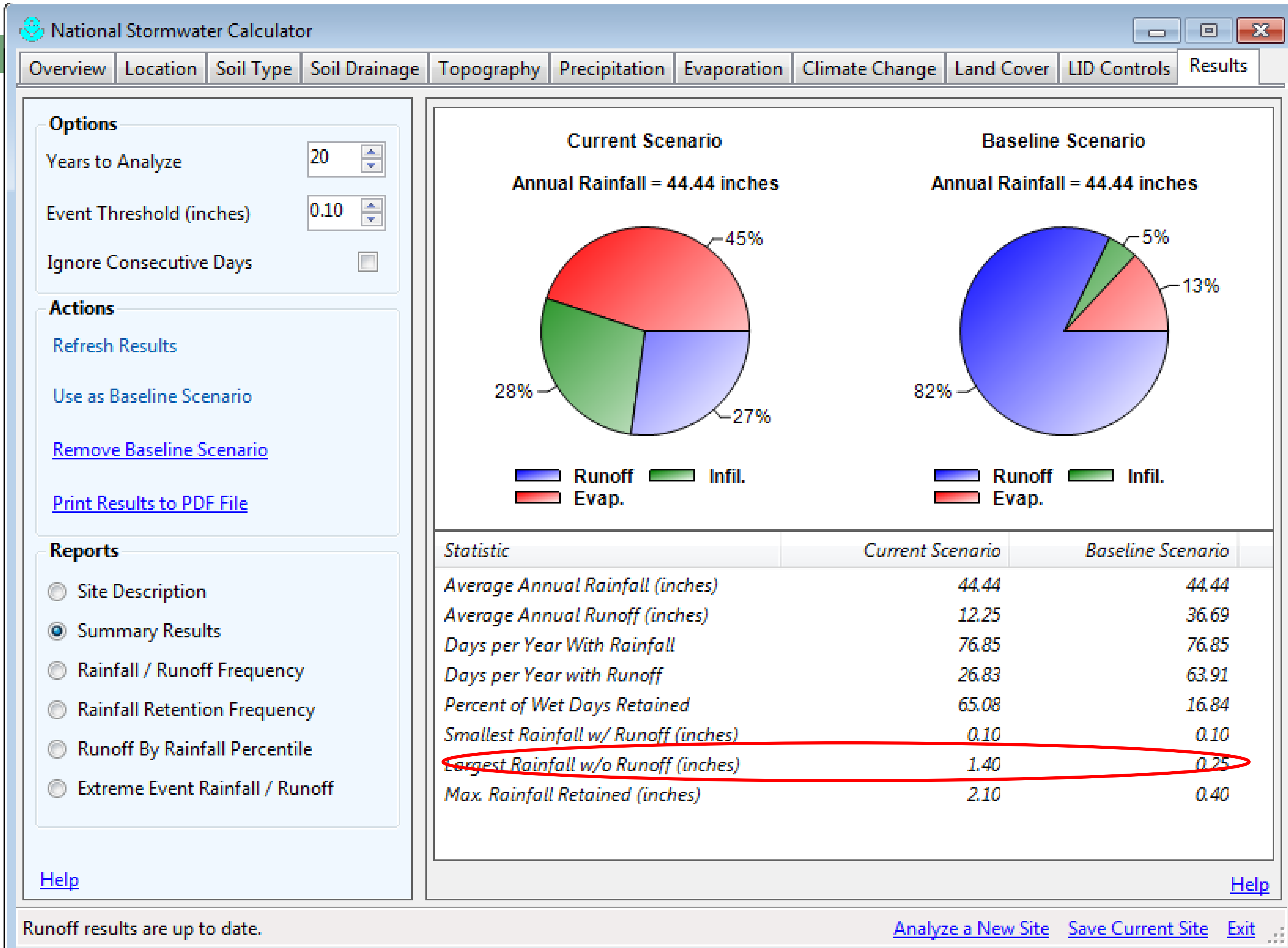
Step 9: Compute Runoff Results



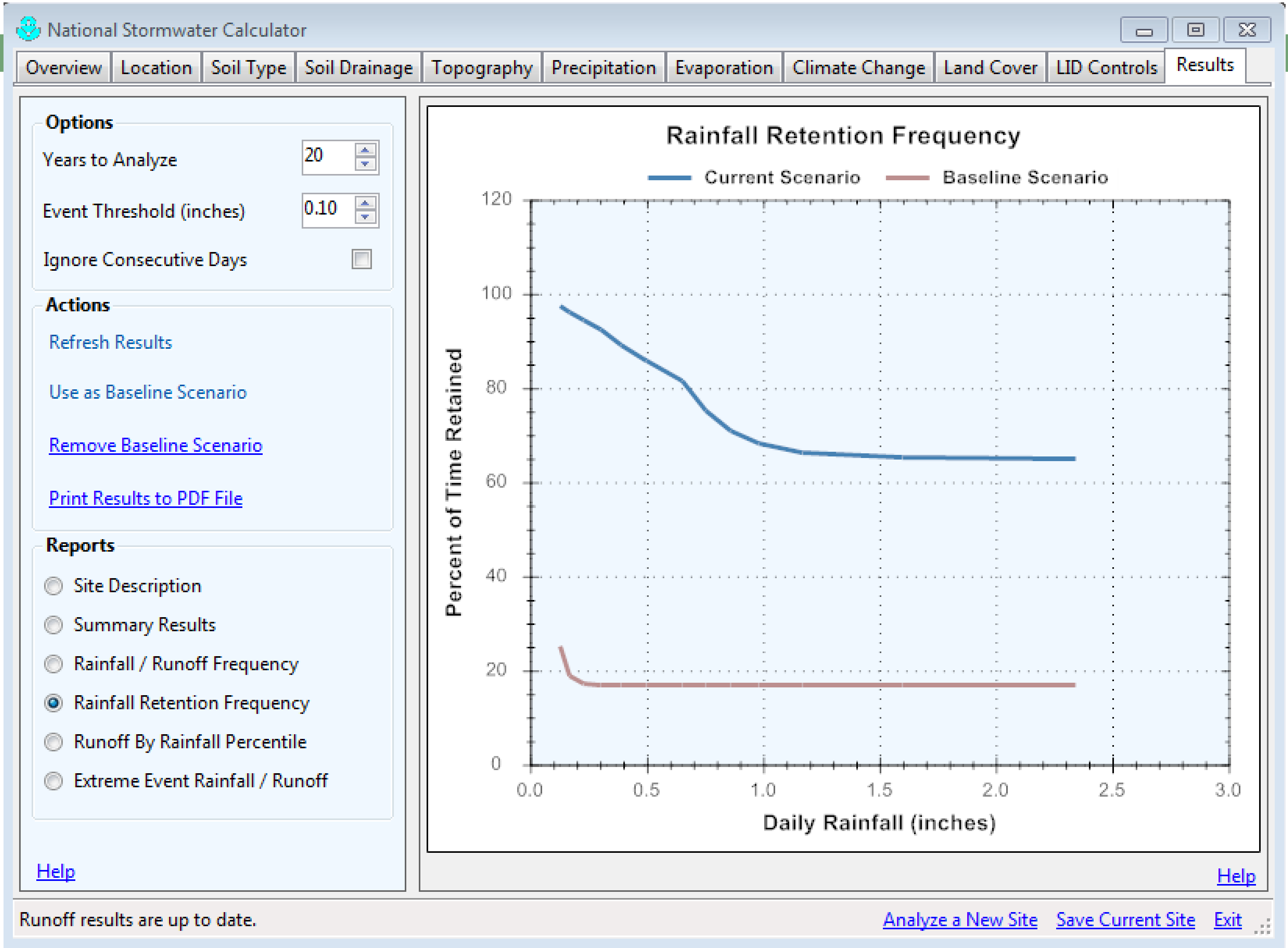
Example with LID Controls



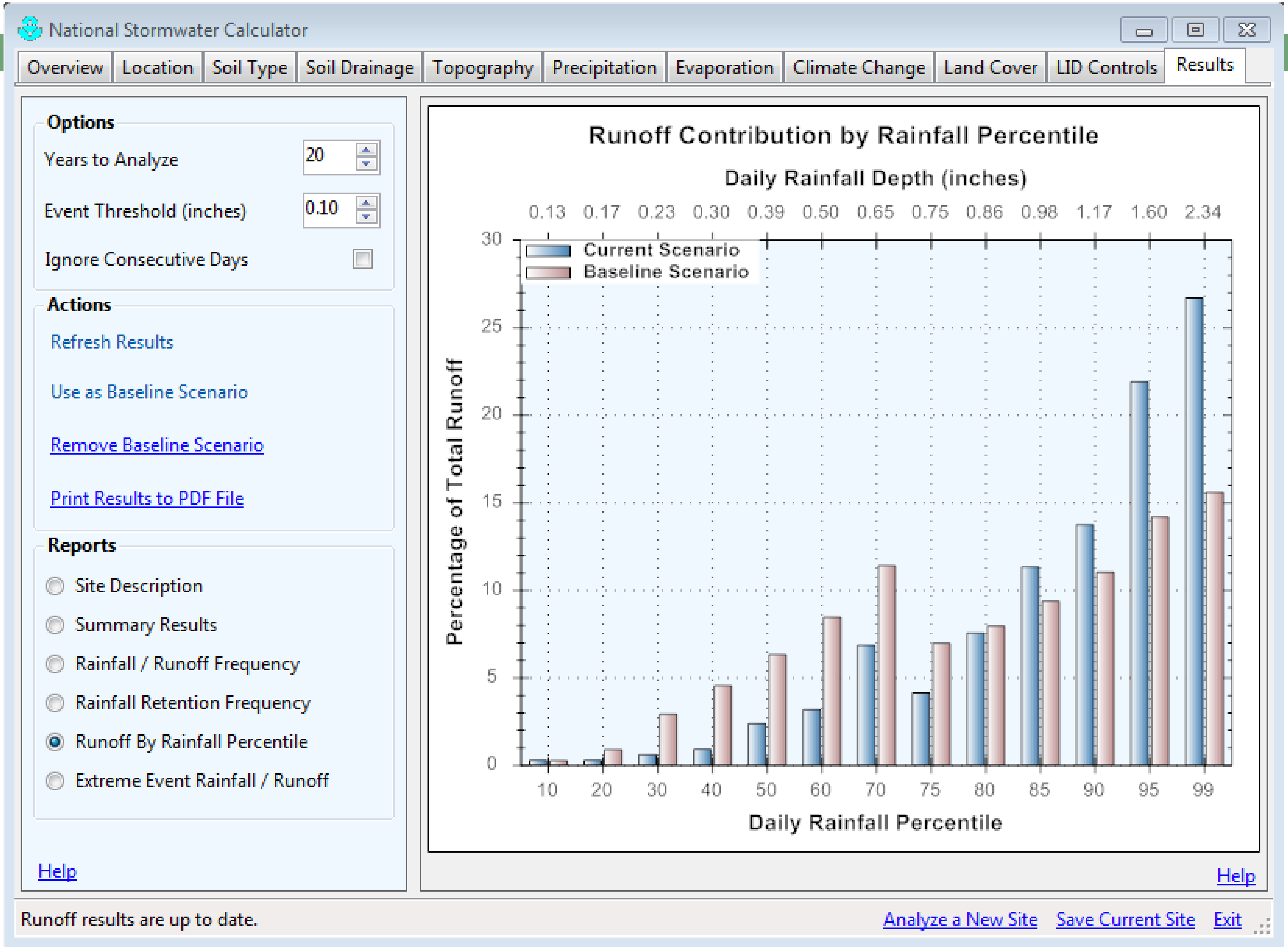
With LID vs Without LID



With LID vs. Without LID



With LID vs. Without LID



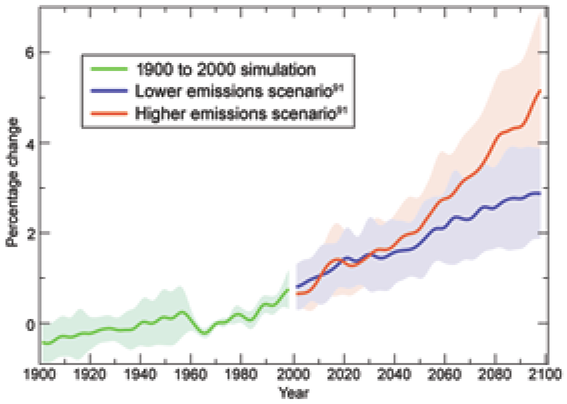
Climate Change Extension

- The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) states that the earth's climate is unequivocally changing.

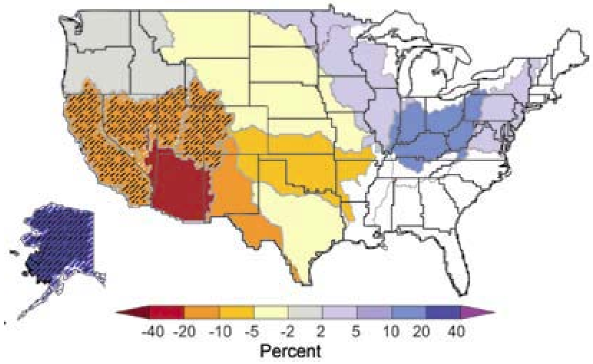
- The resulting impacts on small scale hydrology include:
  - changes in seasonal precipitation patterns
  - more frequent occurrence of high intensity storm events
  - changes in evaporation rates

- A climate change component has been added to the calculator to help assess how resilient source controls will be to future meteorological conditions.

Global Increase in Heavy Ppt. Events



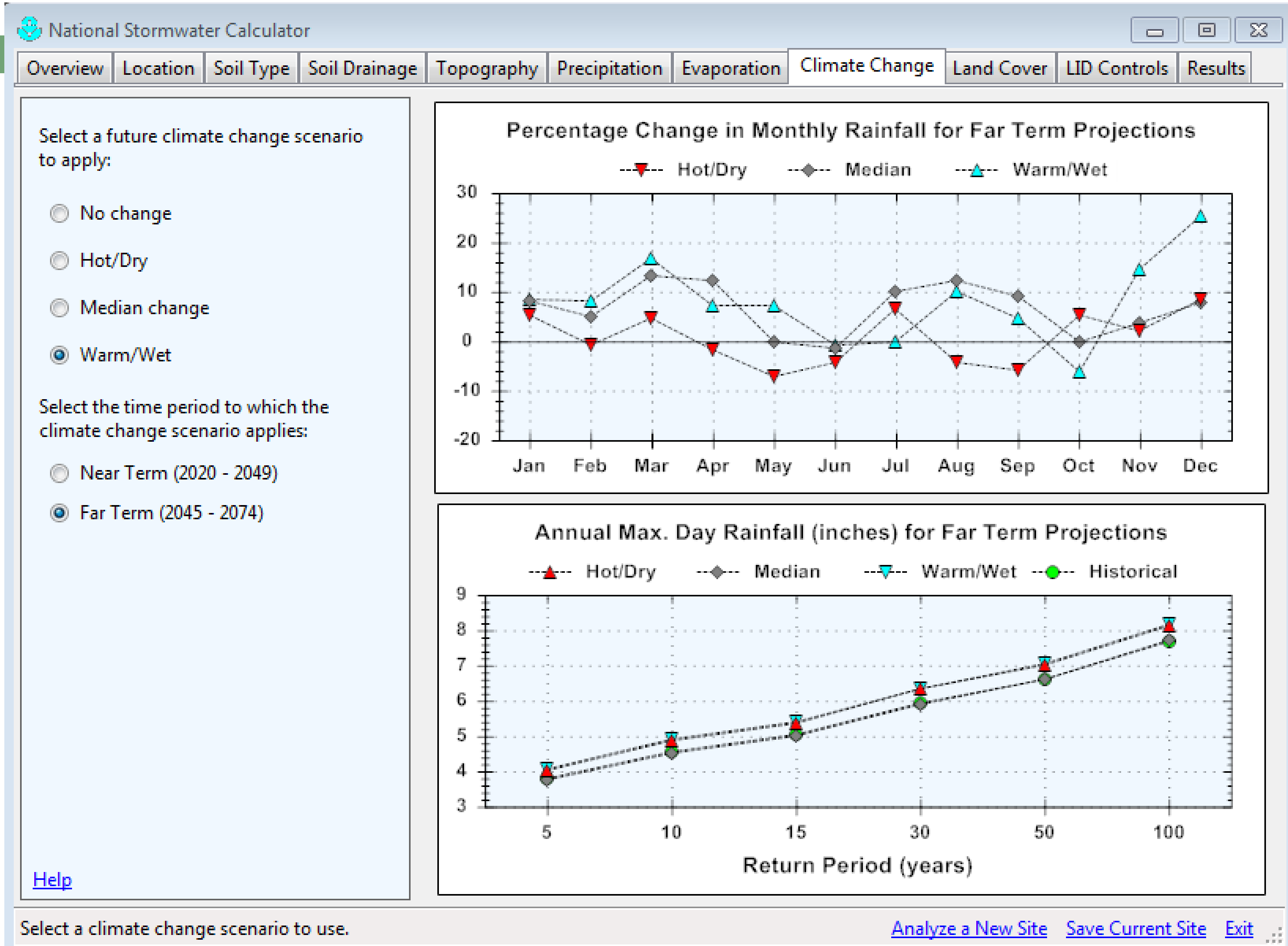
Projected Changes in Annual Runoff



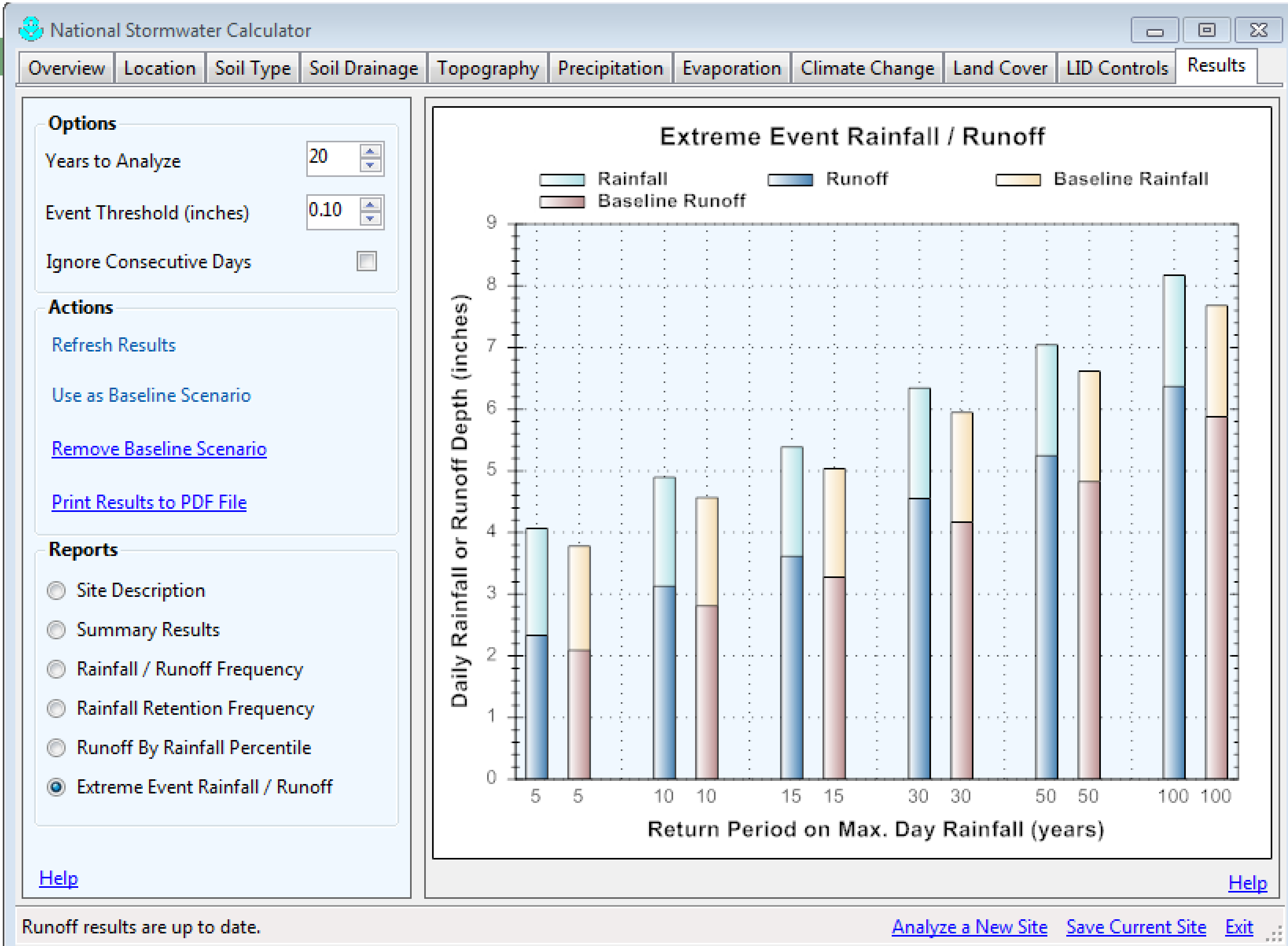
Climate Change Extension

- Climate change scenarios are taken from EPA's CREAT tool (based on downscaled CMIP3 GCM results used in the IPCC AR4).
- Calculates the long-term hydrologic response of the site to a modified rainfall record
- Also calculates the response of the site to the climate-induced max. 24-hour rainfall at different return periods.

Example with Climate Change



With vs. Without Climate Change



TAMARA MITTMAN
Mittman.Tamara@epa.gov
(202) 564-1093