U.S. Environmental Protection Agency Region 2

Tools For Municipalities

May 2, 2013

Ensuring safe and clean water for all Americans

Healthy Watersheds ***Sustainable Communities***

What is Green Infrastructure?

- "Green infrastructure" refers to an array of technologies, approaches, and practices that protect and use natural systems or systems engineered to mimic natural processes, to manage rain water as a resource, to solve combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs), enhance environmental quality and achieve other economic and community benefits.

- Green infrastructure stormwater management approaches and technologies are characterized by *infiltration*, *evapo-transpiration*, and *capture & use* of stormwater.

A Paradigm Shift:
Rain as a Resource, rather than a Waste

- Improved water quality
- Enhanced water supply
- Increased groundwater recharge and base flow
- Reduced flooding to improve stream hydrology
- Habitat preservation, creation






Green Infrastructure's Community Health Benefits

- Improved air quality
- Water supply enhancement
- Decreased urban heat island effects
- Community wellness, recreation & aesthetic benefits

Heat Island Effects Illustration

Green Infrastructure's Community Economic Benefits

- Energy savings
- Cost savings
- Preserving capacity of the wastewater collection system
- Jobs creation
- Enhanced property values and commercial districts; neighborhood stabilization; higher tax base

Piping to maximize infiltration , NH

Example Practices

Rain Garden, Maplewood, MN

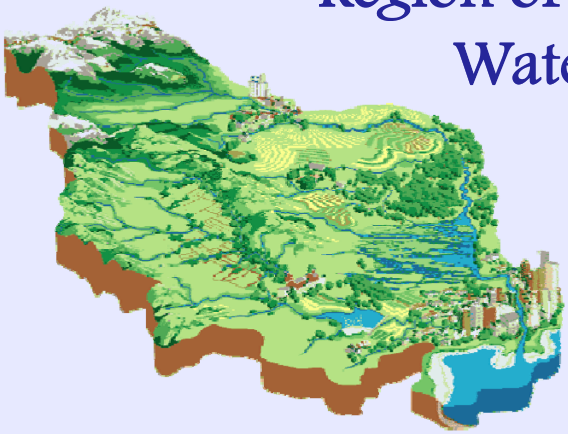
- Bioretention
- Permeable pavement
- Alternative parking & street designs
- Green roofs
- Rainwater harvesting
- Urban trees & land conservation

Bioswale, North Charleston, SC

Residential Cistern, AZ

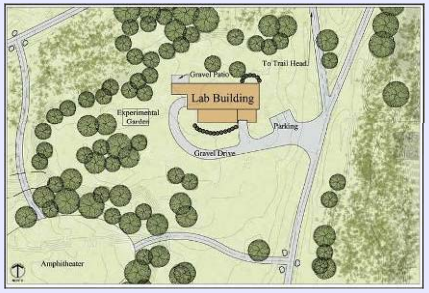
GI Approaches

Region or Watershed



Neighborhood

Site



EPA Policy Guides and Tools

- BASICS
- TOOLS
- CASE STUDIES
- RESEARCH
- LIBRARY
- CONTACTS

Cost Benefit Information

- New York City, Philadelphia , Milwaukee
- The Economics of Low-Impact Development: A Literature Review – ECONorthwest
- Low Impact Development at the Local Level: Developers' Experiences and City and County Support – ECONorthwest
- Green Values National Stormwater Calculator – Center for Neighborhood Technology

CaseStudies

- Portland, OR
  - Disconnected 49,000 downspouts
  - Cost $53 each – total $2.5 million
  - 80 - 85 % reduction in peak flow
- Milwaukee,WI
  - Address major concerns first
  - Locate demonstration projects in highly visible areas
  - Extensive public outreach
- Frederick County, Maryland
  - Cost savings described
  - Permitting can be a challenge
  - Designs to be used not accepted by public woks officials
  - Public outreach important

EPA's Municipal Handbook

- Funding Options
- Retrofit Options
- Green Streets
- Rainwater Harvesting
- Incentive Mechanisms

Water Quality Scorecard

Five Sections:

- **Protect Natural Resources (Including Trees) and Open Space**
- **Promote Efficient, Compact Development Patterns and Infill**
- **Design Complete, Smart Streets That Reduce Overall Imperviousness**
- **Encourage Efficient Parking**
- **Adopt Green Infrastructure Stormwater Management Provisions**

Example Scorecard Findings

- Evaluate thresholds
- Ground truth management practices before issuing COE
- Include incentives
- Have a minimum requirement for open space
- Review parking demand
- Review street design standards

URBAN DESIGN TOOLS
LOW IMPACT DEVELOPMEN

Home | Introduction | Start Design | Typical Landscapes | LID Techniques | Design Examples | Site Map | Contact

About the new Website design

Please view the **Site Map** if you need assistance locating a particular page on the LID Urban Design Tools Website.

This update is merely a design change. No content has been changed or updated.

Trouble with Website?

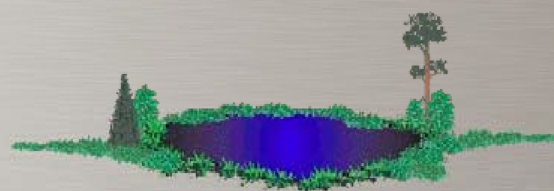
If you have any trouble accessing pages on this website, please **contact** us by email and we will get back to you as soon as possible.

Please include the URL (i.e. web page link) that you are referring to so that we may better assist you. Thanks.

Introduction to LID

Frequently Asked Questions

- What is LID?
- How did LID get started?
- Why should I use LID techniques?
- What are the costs associated with LID?
- Is LID reliable if it depends on property owners maintaining their on-site practices?
- What about flood control?
- How does LID relate to other practices such as Conservation Design, Better Site Design and Smart Growth?
- What are the "talking points" of LID?
- Where can I get more information?



What is LID?

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying and managing / treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. These landscape features, known as Integrated Management Practices (IMPs), are the building blocks of LID. Almost all components of the urban environment have the potential to serve as an IMP. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects.

Thursday April 25. 2013

WHEN YOU'RE READY,

Start Designing!

Click the "Start Designing" Button or click here.

Internet 100%

URBAN DESIGN TOOLS
LOW IMPACT DEVELOPMENT

Home | Introduction | Start Design | Typical Landscapes | LID Techniques | Design Examples | Site Map | Contact

Tuesday April 3

LID Urban Design Tools

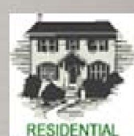
How to Use this Website

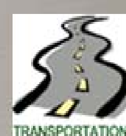
First use the icons on the left to view sketches of a number of LID techniques dispersed throughout general land use settings. Get a feel for what techniques might be appropriate for your site. *Areas representing LID techniques are colored in the black and white sketches. Hold the cursor over any LID area to identify the specific LID technique and the land use in which it is employed.*

Then return to this page and use the pull down menus on the right to access detailed design information for the specific technique and land use setting of interest.

LID can be used in a number of different settings. Follow the links to view general schematics for LID's implementation in urban and residential areas, as well as in transportation projects.

Keep in mind though that these are just some illustrative suggestions. The number of ways in which the landscape and existing infrastructure can be used in LID is limited only by the imagination of the designer! Click one of the pictures below to view more information.





Now that you've seen how LID can fit into your general land use plans...

- read about specific design concerns and caveats
- download detailed specifications
- determine a construction schedule
- understand the maintenance and cost requirements
- learn about how you will be helping to maintain your site's hydrology

Use the drop-down menus below to specify the land use and LID technique in which you are interested.

Step One:
Select LID Technique

Bioretention

Step Two:
Select landuse design link

Low Density Residential

Go!

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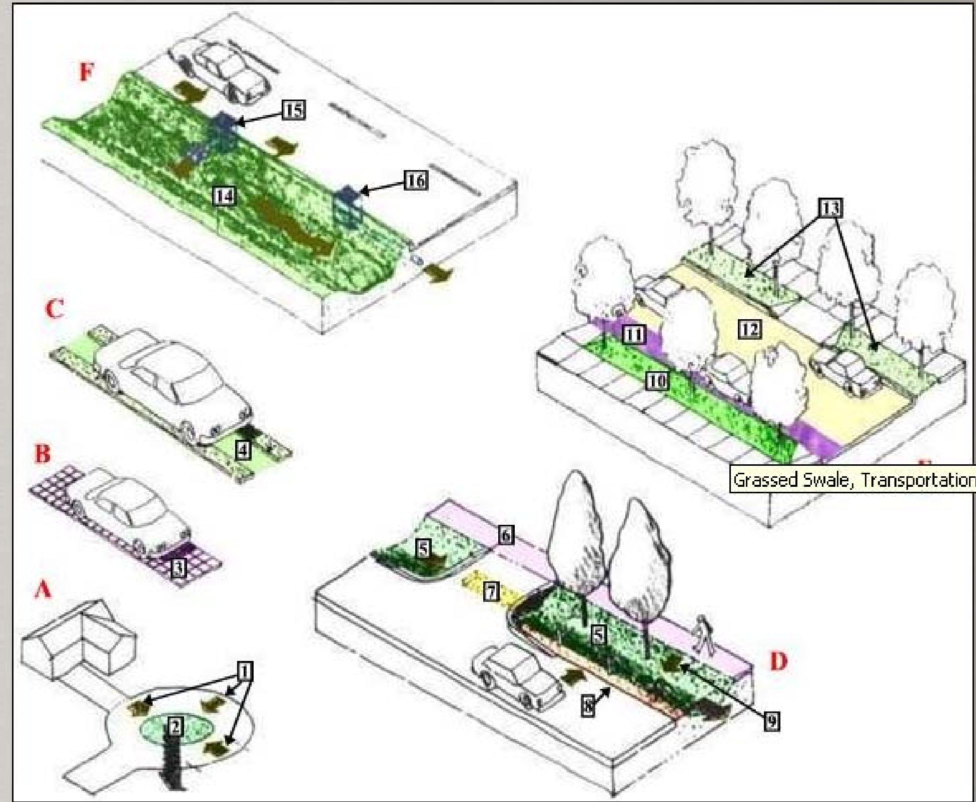
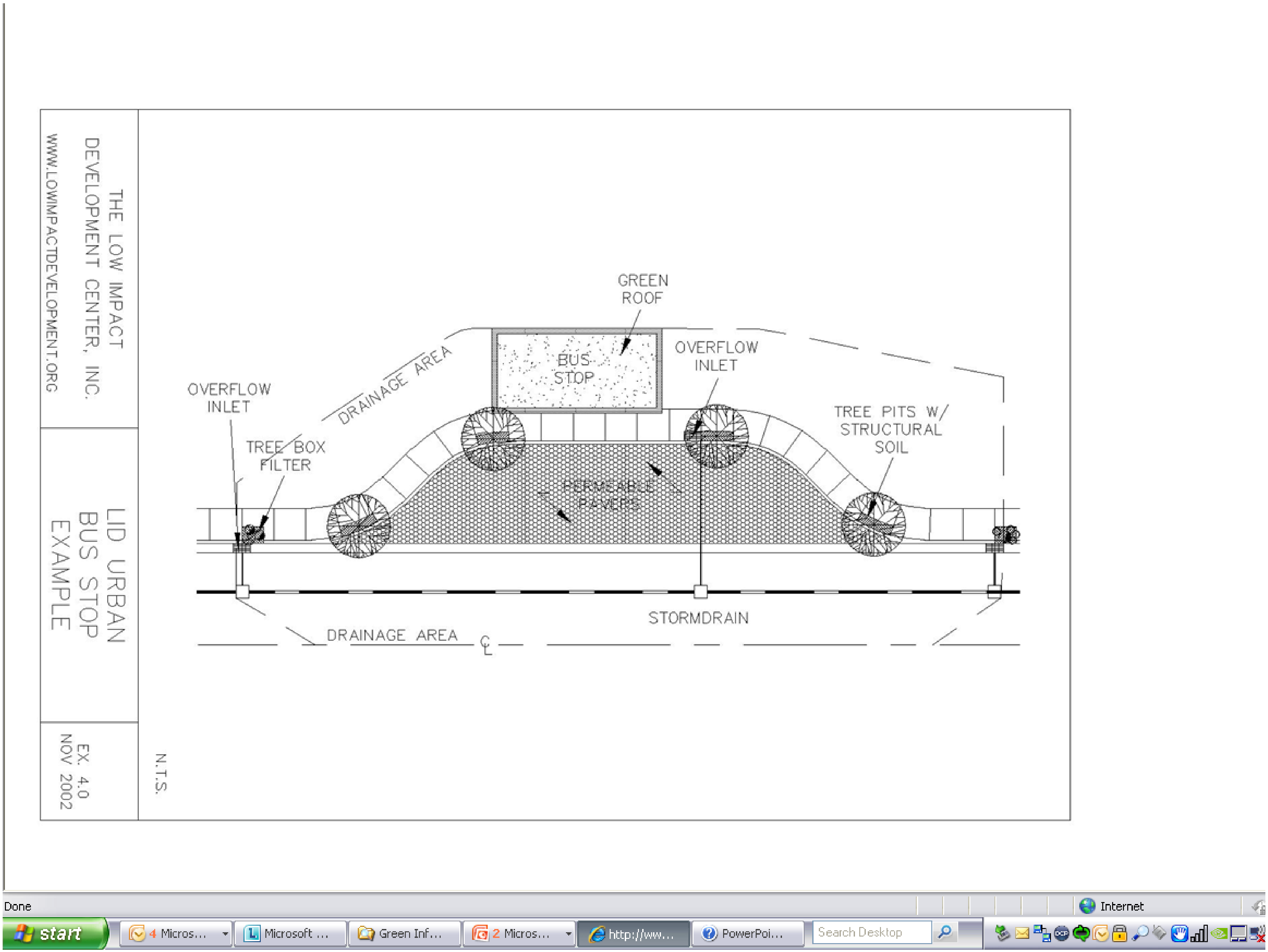
Transportation Uses of LID

Hold the mouse cursor over any colored part of the image to identify the LID technique that is being used in this setting. Click on this same area to go directly to the relevant design page.



All sketches adapted from Prince George's County, MD, LID IMP Guidance Document, 2002.

Legend:


THE LOW IMPACT DEVELOPMENT CENTER, INC.
WWW.LOWIMPACTDEVELOPMENT.ORG
LID URBAN BUS STOP EXAMPLE
EX. 4.0
NOV 2002
N.T.S.
GREEN ROOF
BUS STOP
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DRAINAGE AREA
OVERFLOW INLET
TREE BOX FILTER
TREE PITS W/ STRUCTURAL SOIL
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Microsoft ...
Green Inf...
2 Micros...
http://ww...
PowerPoi...
Search Desktop

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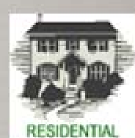

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Bioretention

Step Two:
Select landuse design link

Low Density Residential

Go!

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Thanks.

Bioretention

Low Density Residential

Bioretention cells, also known as rain gardens, have been successfully implemented in a number of typical suburban developments. For example, the developer of Somerset community[1, 2] in Prince George's County, Maryland, was able to save more than $4,000 per lot using bioretention cells instead of conventional BMP pond technology. Six additional lots were recovered due to lower stormwater management space requirements, and the community was marketable as environmentally friendly and ingeniously landscaped. In such developments, rain gardens are a natural stormwater management solution. Planted in low-lying areas, the gardens contain specific layers of soil, sand, and organic mulch. These layers naturally filter the site's runoff, substantially reducing common homeowner pollutants such as lawn fertilizers and driveway oils and providing protection for the receiving waterways.

Designing with rain gardens in a low density residential area can[3]

- establish a unique sense of place by featuring plants native to the area
- encourage environmental stewardship and community pride
- provide a host of additional environmental benefits (habitat for wildlife and native plant varieties, improved air quality, mitigation of urban climates)
- increase real estate values by the use of aesthetically pleasing landscape

References

[1] *Growing Greener in your Rappahannock River Watershed*
Contact Friends of the Rappahannock, http://www.riverfriends.org/

[2] U.S. Environmental Protection Agency, 1995: *Maryland developer grows 'Rain Gardens' to control residential runoff.* Nonpoint Source News-Notes, 42 (August/September), http://www.epa.gov/OWOW/info/NewsNotes/index.html

Disclaimer

BUILD IT!

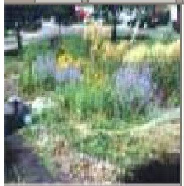
AUTOCAD #1
AUTOCAD #2
JPEG #1
JPEG #2
SPECIFICATIONS
SIZING

RELATED INFO

SCHEDULE
COSTS
MAINTENANCE

WHY?

BENEFITS



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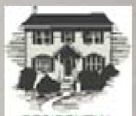

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Step Two:
Select landuse/design link

Low Density Residential

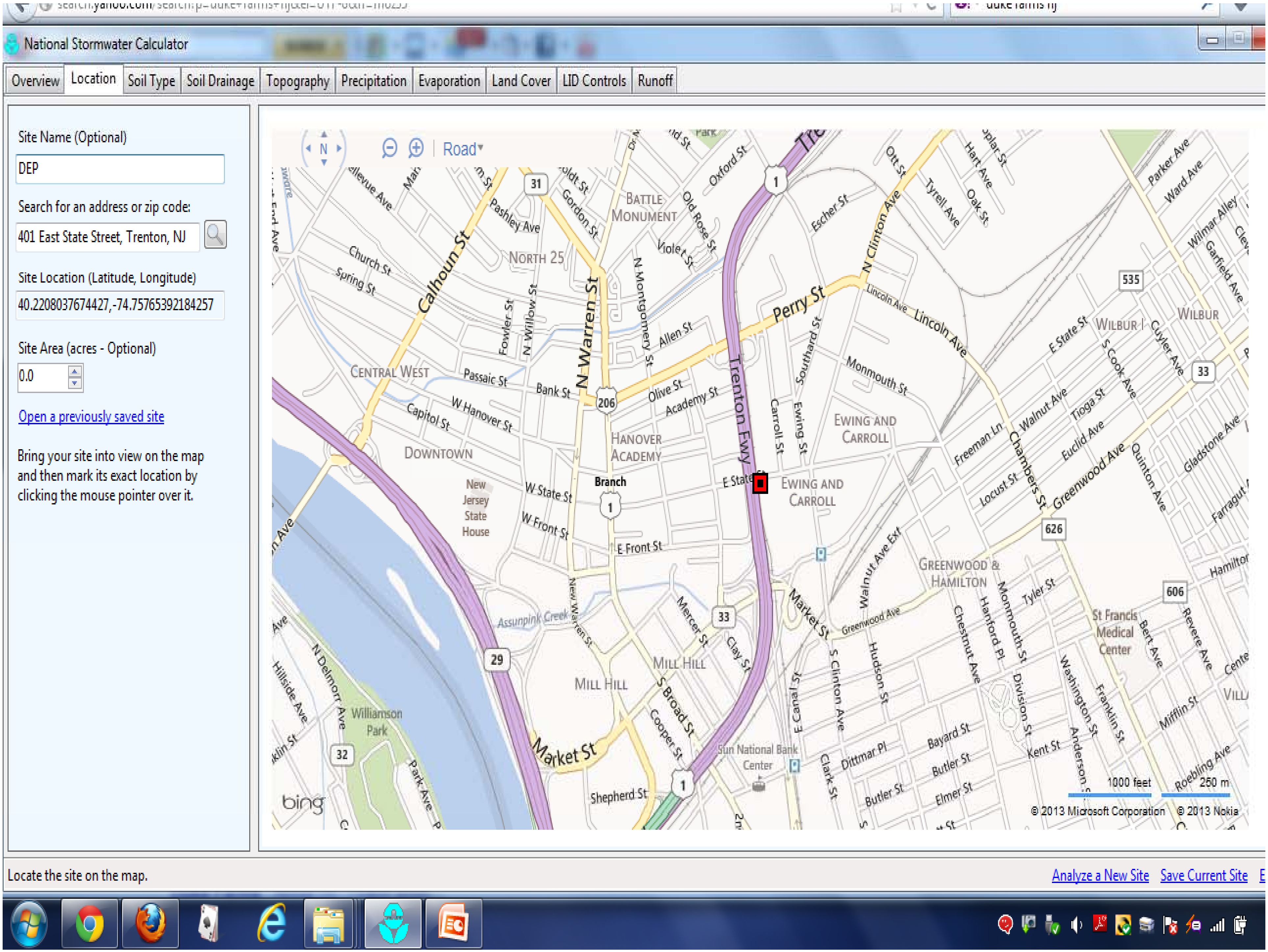
Go!

EPA National SW Calculator

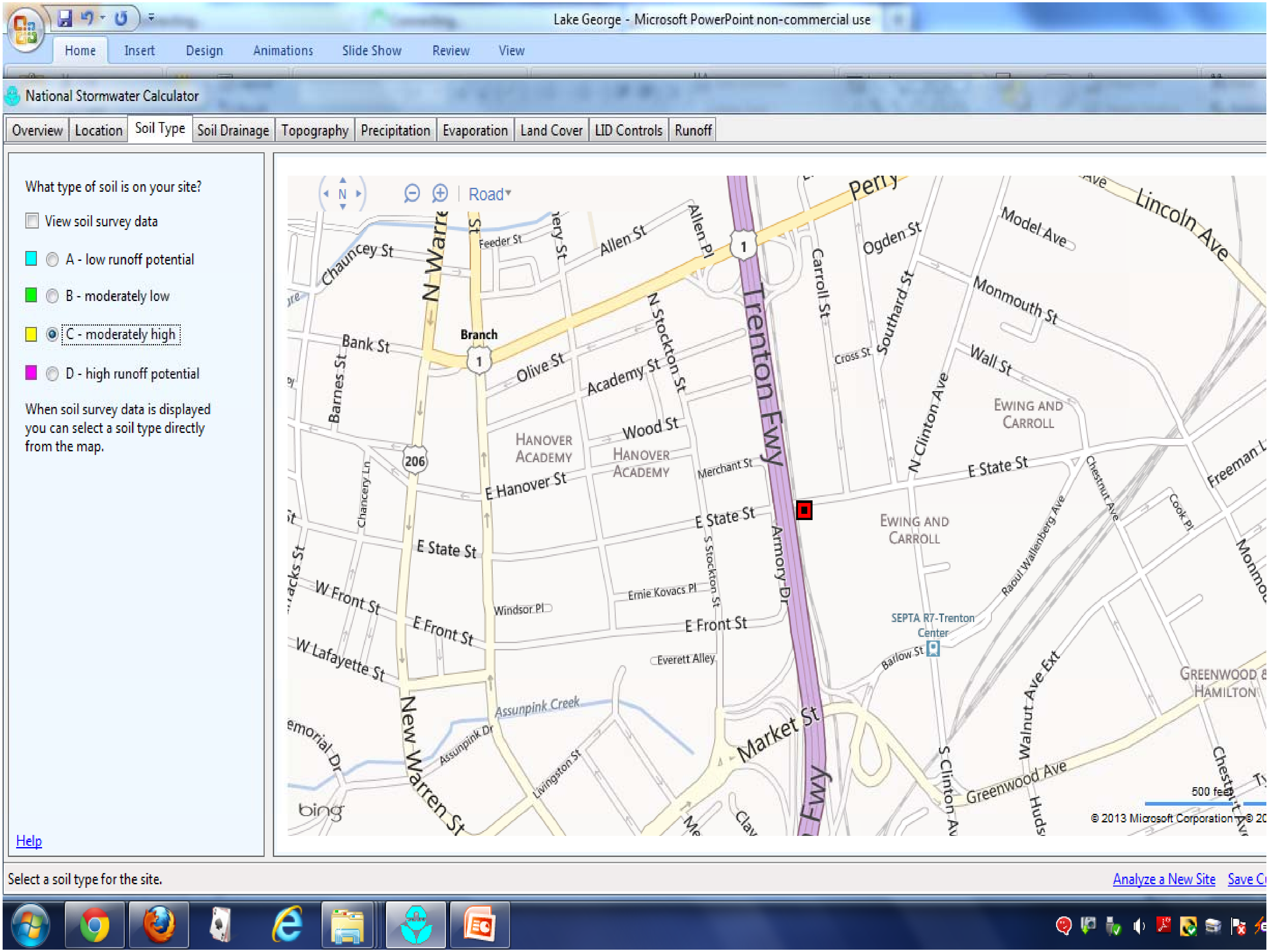
- Desktop application to estimate runoff.
- Seven GI practices ca be evaluated.

Disconnection	Rain harvesting
Green roofs	Street Planters
Rain gardens	Infiltration basins
Porous Pavement	

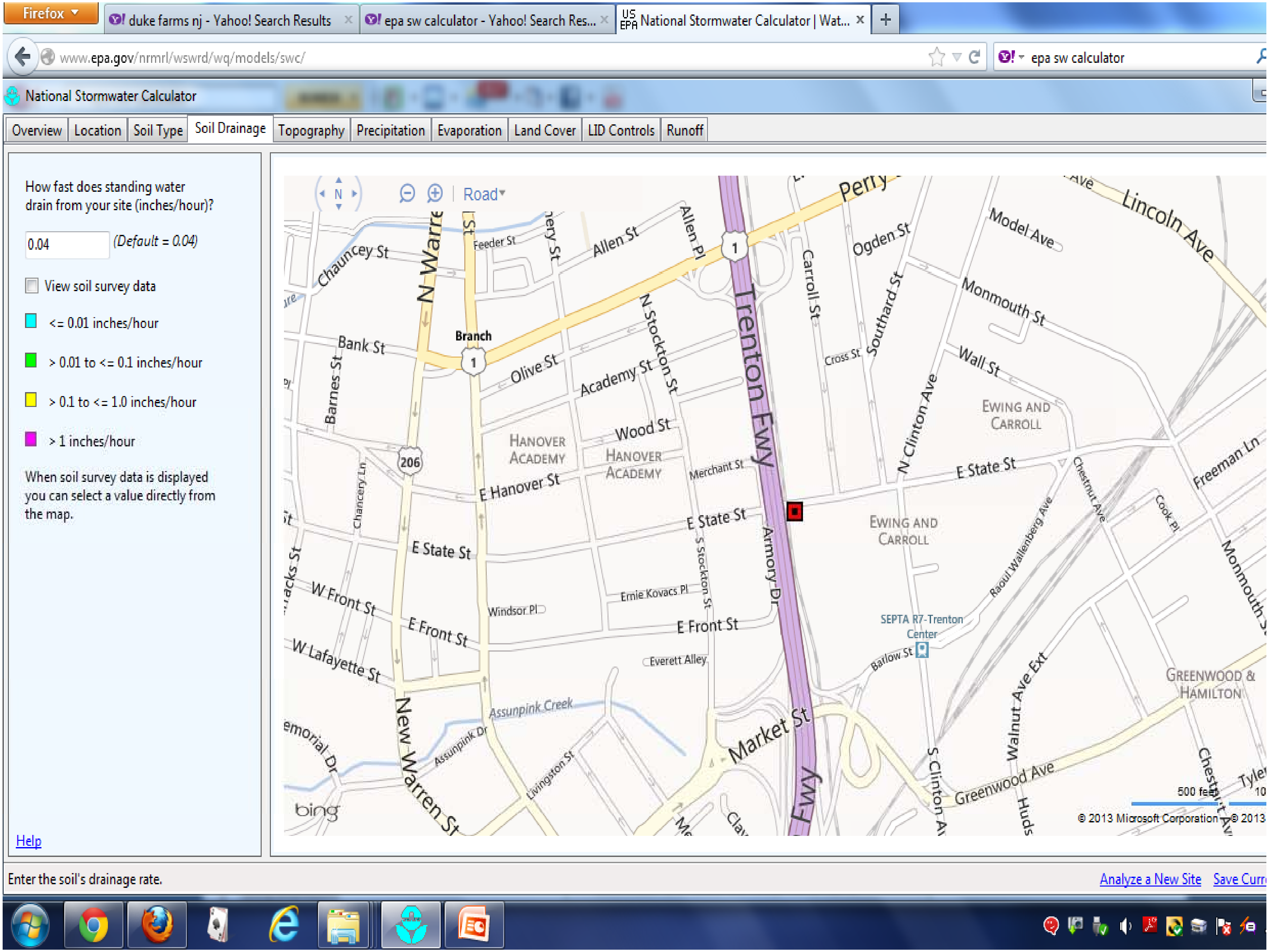
- Utilizes soil conditions, topography, land cover, historic rainfall records and evaporation rates.

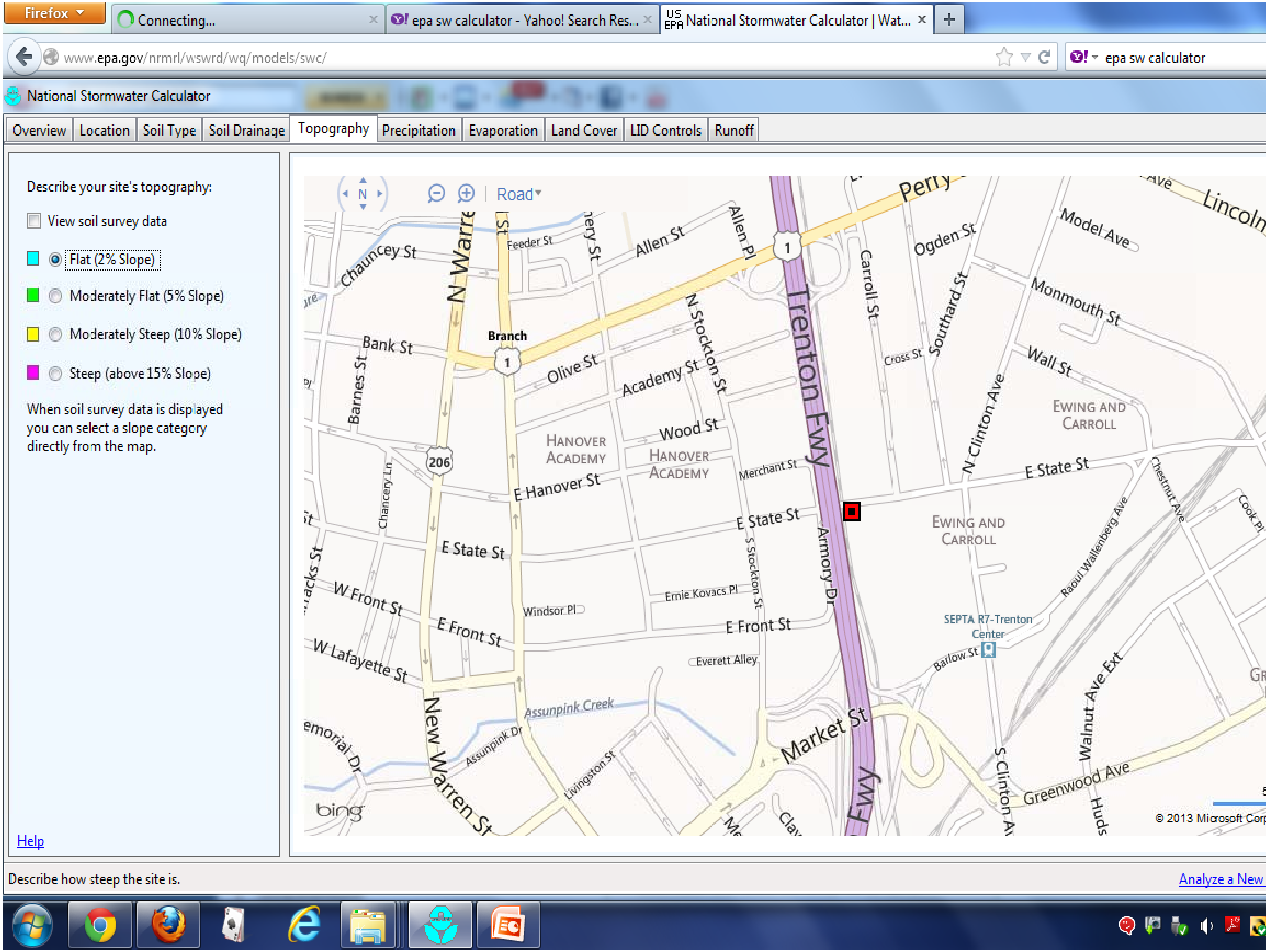


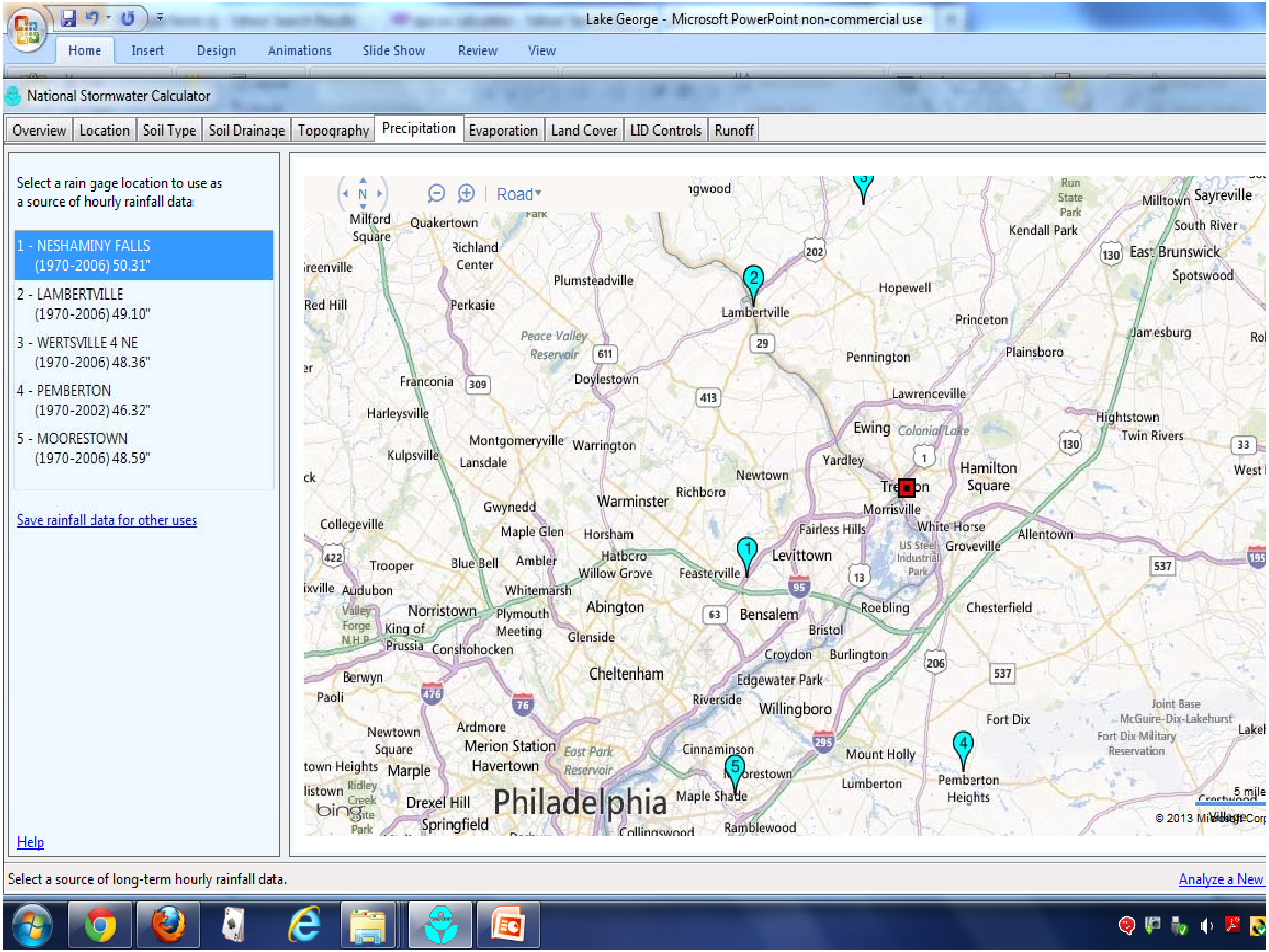
National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Land Cover
LID Controls
Runoff
Site Name (Optional)
DEP
Search for an address or zip code:
401 East State Street, Trenton, NJ
Site Location (Latitude, Longitude)
40.2208037674427,-74.75765392184257
Site Area (acres - Optional)
0.0
Open a previously saved site
Bring your site into view on the map and then mark its exact location by clicking the mouse pointer over it.
Road
bing
© 2013 Microsoft Corporation © 2013 Nokia
1000 feet
250 m
Locate the site on the map.
Analyze a New Site
Save Current Site



Lake George - Microsoft PowerPoint non-commercial use
Home
Insert
Design
Animations
Slide Show
Review
View
National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Land Cover
LID Controls
Runoff
What type of soil is on your site?
View soil survey data
A - low runoff potential
B - moderately low
C - moderately high
D - high runoff potential
When soil survey data is displayed you can select a soil type directly from the map.
Help
Road
Branch
Hanover Academy
Ewing and Carroll
Greenwood & Hamilton
Trenton Fwy
E State St
Market St
Greenwood Ave
SEPTA R7-Trenton Center
Assunpink Creek
500 feet
© 2013 Microsoft Corporation
bing
Select a soil type for the site.
Analyze a New Site


Firefox
duke farms nj - Yahoo! Search Results
epa sw calculator - Yahoo! Search Res...
National Stormwater Calculator | Wat...
www.epa.gov/nrmrl/wswrd/wq/models/swc/
epa sw calculator
National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Land Cover
LID Controls
Runoff
How fast does standing water drain from your site (inches/hour)?
0.04
(Default = 0.04)
View soil survey data
<= 0.01 inches/hour
> 0.01 to <= 0.1 inches/hour
> 0.1 to <= 1.0 inches/hour
> 1 inches/hour
When soil survey data is displayed you can select a value directly from the map.
Help
Road
Perry
Lincoln Ave
Model Ave
Ogden St
Allen St
Chauncey St
N Warre
Feeder St
Allen Pl
Carroll St
Southard St
Monmouth St
Branch
Bank St
Olive St
Academy St
N Stockton St
Trenton Fwy
Cross St
Wall St
Barnes St
Hanover Academy
Wood St
Hanover Academy
N Clinton Ave
Ewing and Carroll
206
Merchant St
E State St
E Hanover St
Freeman Ln
Chancery Ln
E State St
Ewing and Carroll
E State St
Armory Dr
Chestnut Ave
Cook Pl
Raoul Wallenberg Ave
Monmouth St
W Front St
E Front St
Windsor Pl
Ernie Kovacs Pl
S Stockton St
E Front St
SEPTA R7-Trenton Center
W Lafayette St
Everett Alley
Barlow St
Walnut Ave Ext
Greenwood & Hamilton
Assunpink Creek
Market St
Memorial Dr
New Warren St
Assunpink Dr
Livingston St
Fwy
S Clinton Av
Greenwood Ave
Chestnut Ave
bing
500 feet
© 2013 Microsoft Corporation
Enter the soil's drainage rate.
Analyze a New Site
Save Curr


Firefox
Connecting...
epa sw calculator - Yahoo! Search Res...
National Stormwater Calculator | Wat...
www.epa.gov/nrmrl/wswrd/wq/models/swc/
epa sw calculator
National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Land Cover
LID Controls
Runoff
Describe your site's topography:
View soil survey data
Flat (2% Slope)
Moderately Flat (5% Slope)
Moderately Steep (10% Slope)
Steep (above 15% Slope)
When soil survey data is displayed you can select a slope category directly from the map.
Help
Road
Perry
Lincoln
Model Ave
Allen St
Allen Pl
Chauncey St
Feeder St
Ogden St
Carroll St
Monmouth St
Trenton Fwy
Southard St
Branch
Bank St
Olive St
Academy St
N Stockton St
Cross St
Wall St
Barnes St
Hanover Academy
Wood St
Ewing and Carroll
N Clinton Ave
E Hanover St
Merchant St
E State St
Chancery Ln
Chestnut Ave
E State St
Armory Dr
Raoul Wallenberg Ave
W Front St
Ernie Kovacs Pl
S Stockton St
E Front St
Windsor Pl
E Front St
SEPTA R7-Trenton Center
W Lafayette St
Everett Alley
Ballow St
Assunpink Creek
Walnut Ave Ext
Assunpink Dr
Livingston St
Market St
New Warren St
S Clinton Av
Greenwood Ave
bing
© 2013 Microsoft Corp
Describe how steep the site is.
Analyze a New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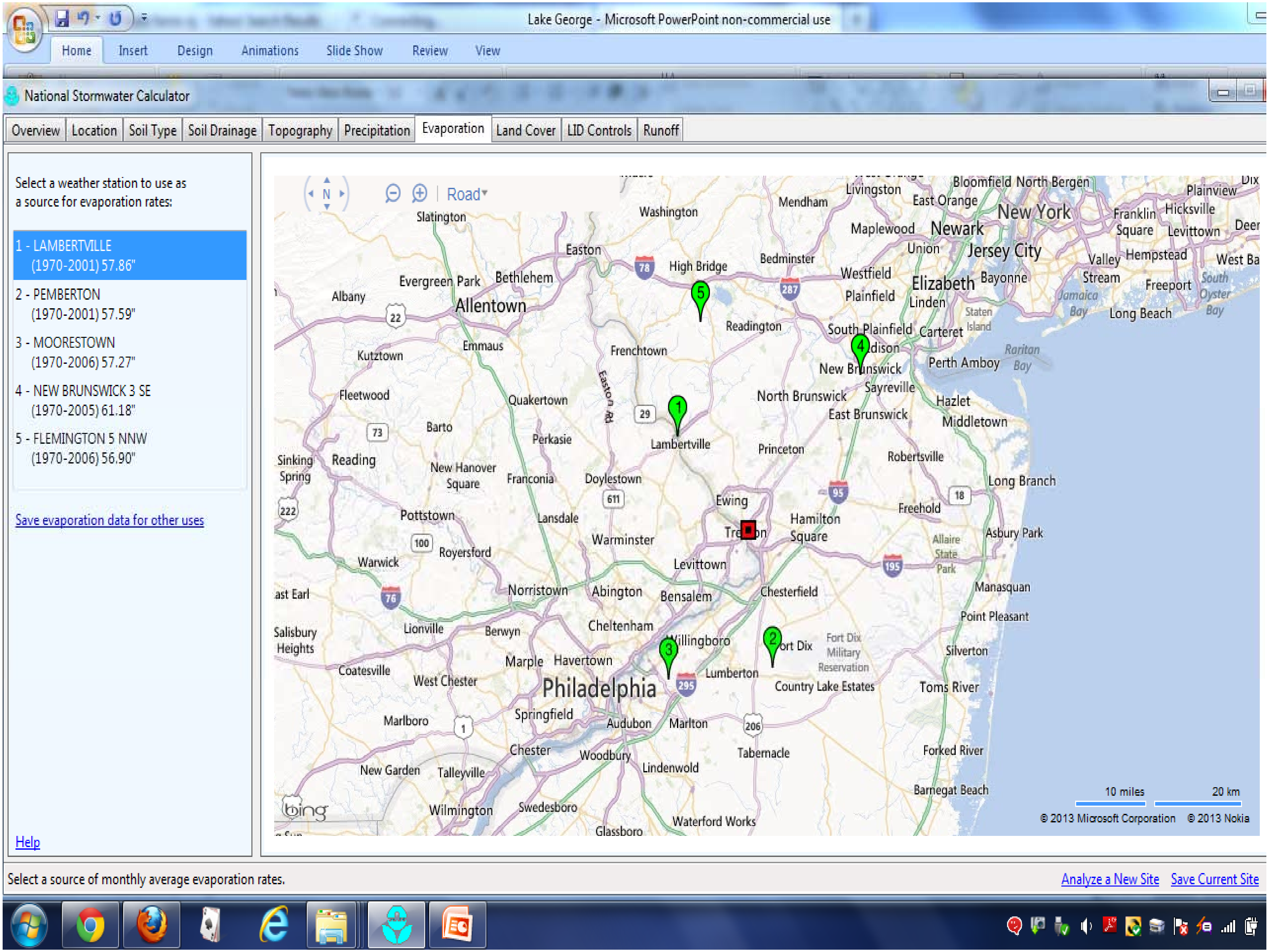
Home
Insert
Design
Animations
Slide Show
Review
View
National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Land Cover
LID Controls
Runoff
Select a rain gage location to use as a source of hourly rainfall data:
1 - NESHAMINY FALLS (1970-2006) 50.31"
2 - LAMBERTVILLE (1970-2006) 49.10"
3 - WERTSVILLE 4 NE (1970-2006) 48.36"
4 - PEMBERTON (1970-2002) 46.32"
5 - MOORESTOWN (1970-2006) 48.59"
Save rainfall data for other uses
Help
Road
Philadelphia
© 2013 Microsoft Corp
Select a source of long-term hourly rainfall data.
Analyze a New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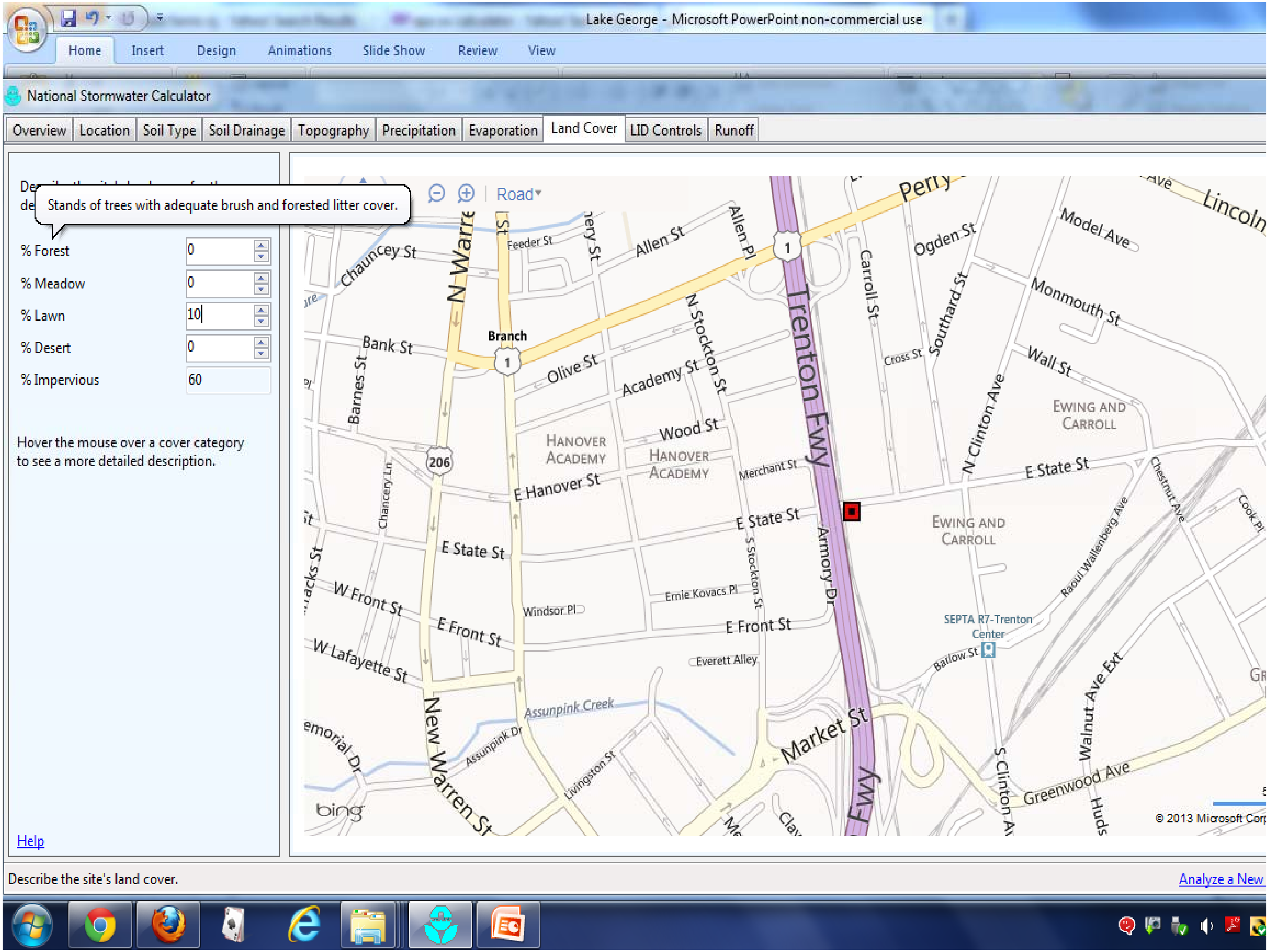
Slide Show
Review
View
National Stormwater Calculator
Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Land Cover
LID Controls
Runoff
Select a weather station to use as a source for evaporation rates:
1 - LAMBERTVILLE (1970-2001) 57.86"
2 - PEMBERTON (1970-2001) 57.59"
3 - MOORESTOWN (1970-2006) 57.27"
4 - NEW BRUNSWICK 3 SE (1970-2005) 61.18"
5 - FLEMINGTON 5 NNW (1970-2006) 56.90"
Save evaporation data for other uses
Help
Road
Allentown
Philadelphia
New York
Newark
Jersey City
Elizabeth
Lambertville
Princeton
Trenton
Ewing
Hamilton Square
Levittown
Bensalem
Norristown
Reading
Bethlehem
Easton
High Bridge
Frenchtown
Doylestown
New Brunswick
Perth Amboy
Long Branch
Asbury Park
Toms River
Wilmington
10 miles
20 km
© 2013 Microsoft Corporation
© 2013 Nokia
bing
Select a source of monthly average evaporation rates.
Analyze a New Site
Save Current Site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Overview
Location
Soil Type
Soil Drainage
Topography
Precipitation
Evaporation
Land Cover
LID Controls
Runoff
Stands of trees with adequate brush and forested litter cover.
% Forest
0
% Meadow
0
% Lawn
10
% Desert
0
% Impervious
60
Hover the mouse over a cover category to see a more detailed description.
Help
Road
Trenton Fwy
Market St
E State St
E Hanover St
E Front St
Hanover Academy
Ewing and Carroll
SEPTA R7-Trenton Center
Greenwood Ave
Assunpink Creek
bing
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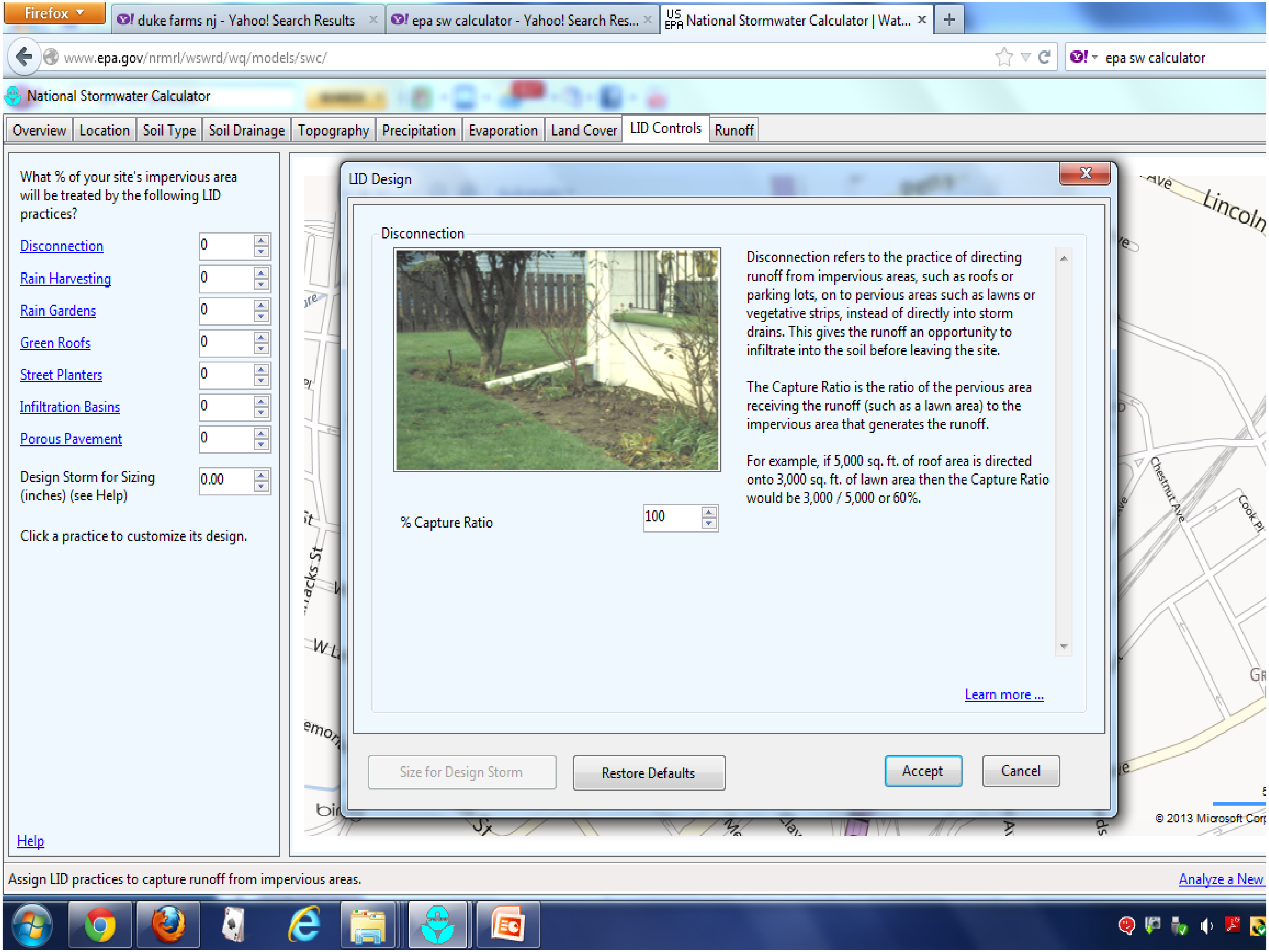
Describe the site's land cover.
Analyze a New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What % of your site's impervious area will be treated by the following LID practices?
Disconnection 0
Rain Harvesting 0
Rain Gardens 0
Green Roofs 0
Street Planters 0
Infiltration Basins 0
Porous Pavement 0
Design Storm for Sizing (inches) (see Help) 0.00
Click a practice to customize its design.
Help
LID Design
Disconnection
Disconnection refers to the practice of directing runoff from impervious areas, such as roofs or parking lots, on to pervious areas such as lawns or vegetative strips, instead of directly into storm drains. This gives the runoff an opportunity to infiltrate into the soil before leaving the site.
The Capture Ratio is the ratio of the pervious area receiving the runoff (such as a lawn area) to the impervious area that generates the runoff.
For example, if 5,000 sq. ft. of roof area is directed onto 3,000 sq. ft. of lawn area then the Capture Ratio would be 3,000 / 5,000 or 60%.
% Capture Ratio 100
Learn more ...
Size for Design Storm
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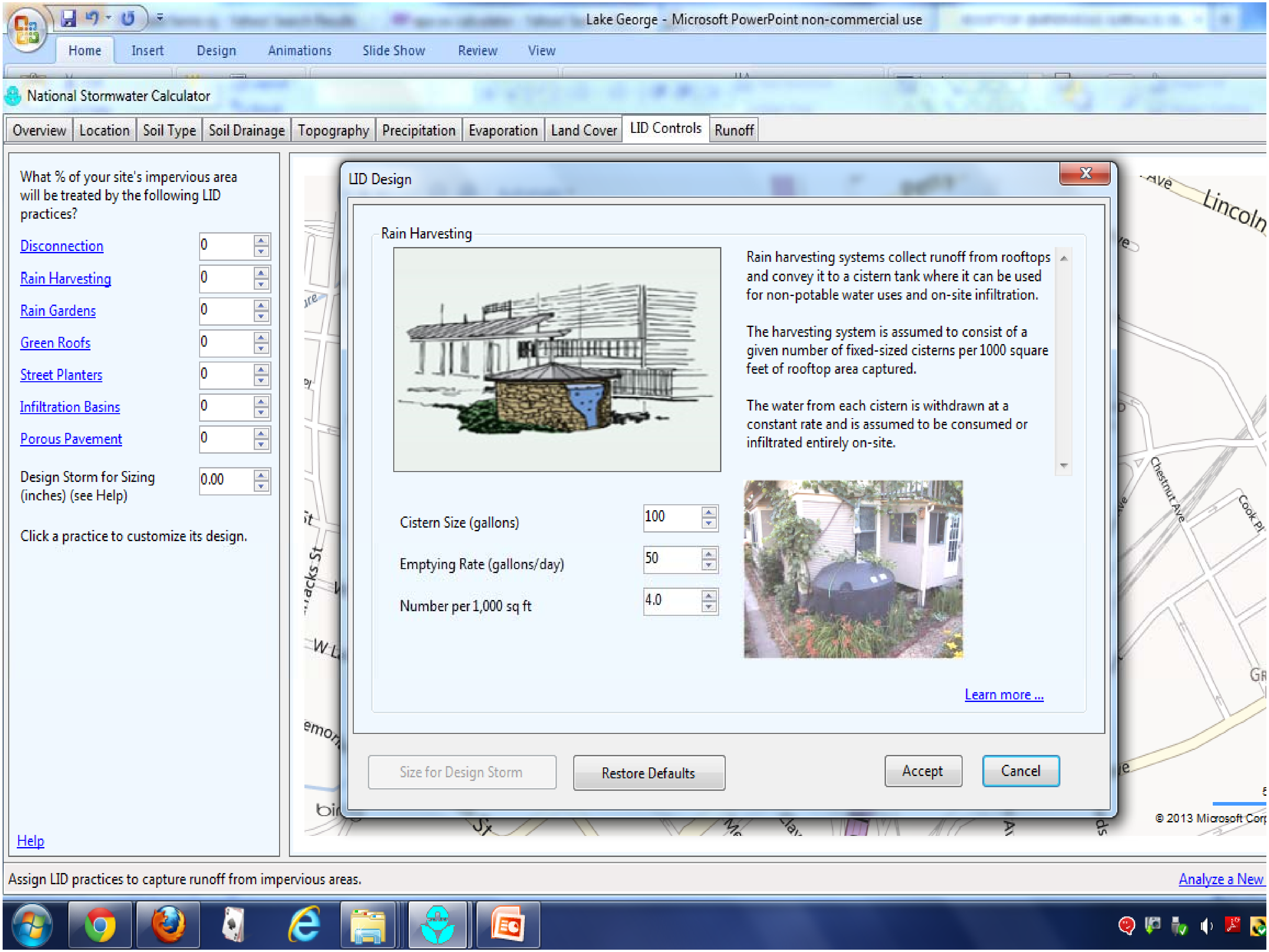
Assign LID practices to capture runoff from impervious areas.
Analyze a New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Rain Gardens 0
Green Roofs 0
Street Planters 0
Infiltration Basins 0
Porous Pavement 0
Design Storm for Sizing (inches) (see Help) 0.00
Click a practice to customize its design.
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LID Design
Rain Harvesting
Rain harvesting systems collect runoff from rooftops and convey it to a cistern tank where it can be used for non-potable water uses and on-site infiltration.
The harvesting system is assumed to consist of a given number of fixed-sized cisterns per 1000 square feet of rooftop area captured.
The water from each cistern is withdrawn at a constant rate and is assumed to be consumed or infiltrated entirely on-site.
Cistern Size (gallons) 100
Emptying Rate (gallons/day) 50
Number per 1,000 sq ft 4.0
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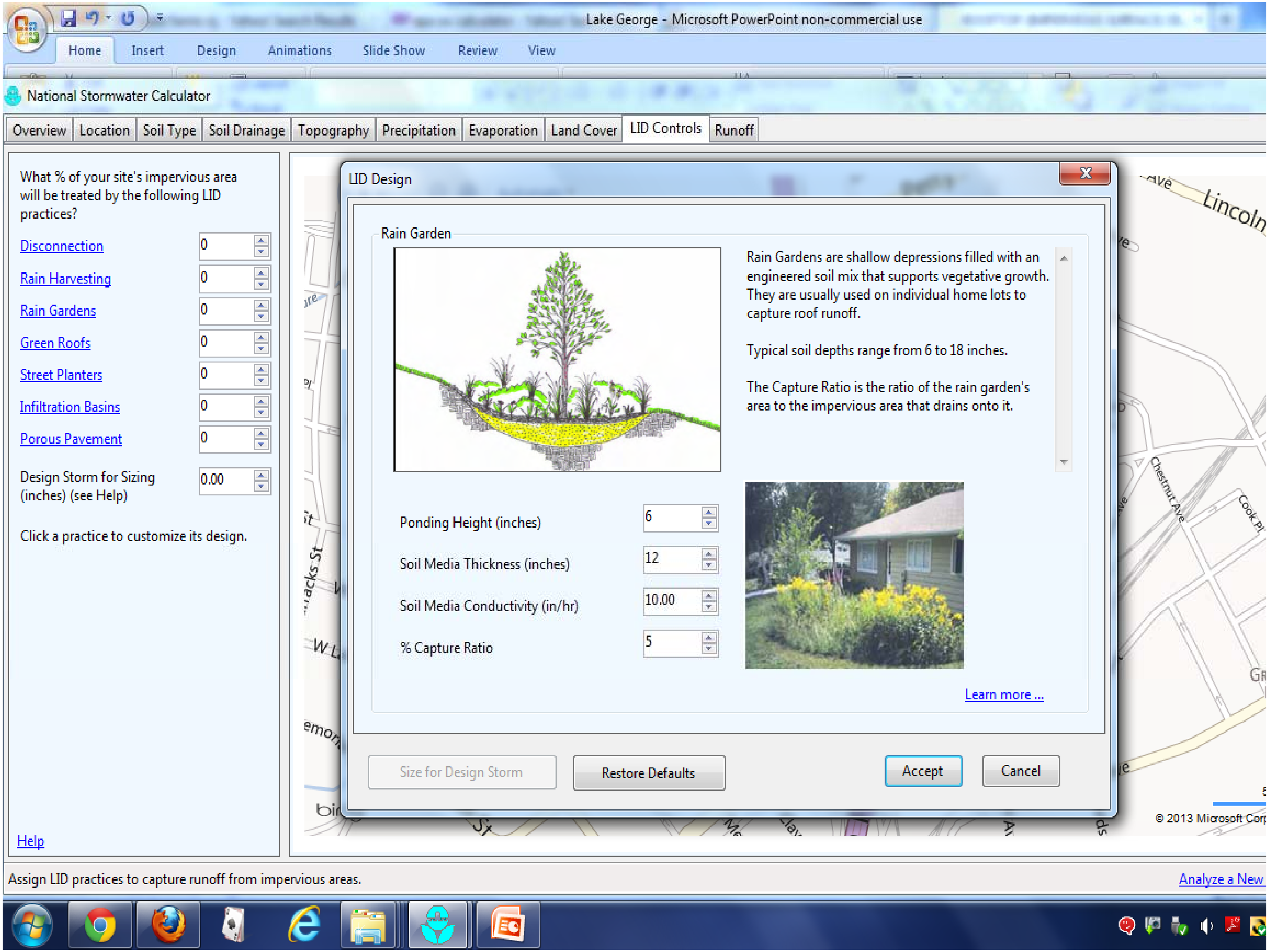

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Disconnection 0
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Rain Gardens 0
Green Roofs 0
Street Planters 0
Infiltration Basins 0
Porous Pavement 0
Design Storm for Sizing (inches) (see Help) 0.00
Click a practice to customize its design.
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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) 6
Soil Media Thickness (inches) 12
Soil Media Conductivity (in/hr) 10.00
% Capture Ratio 5
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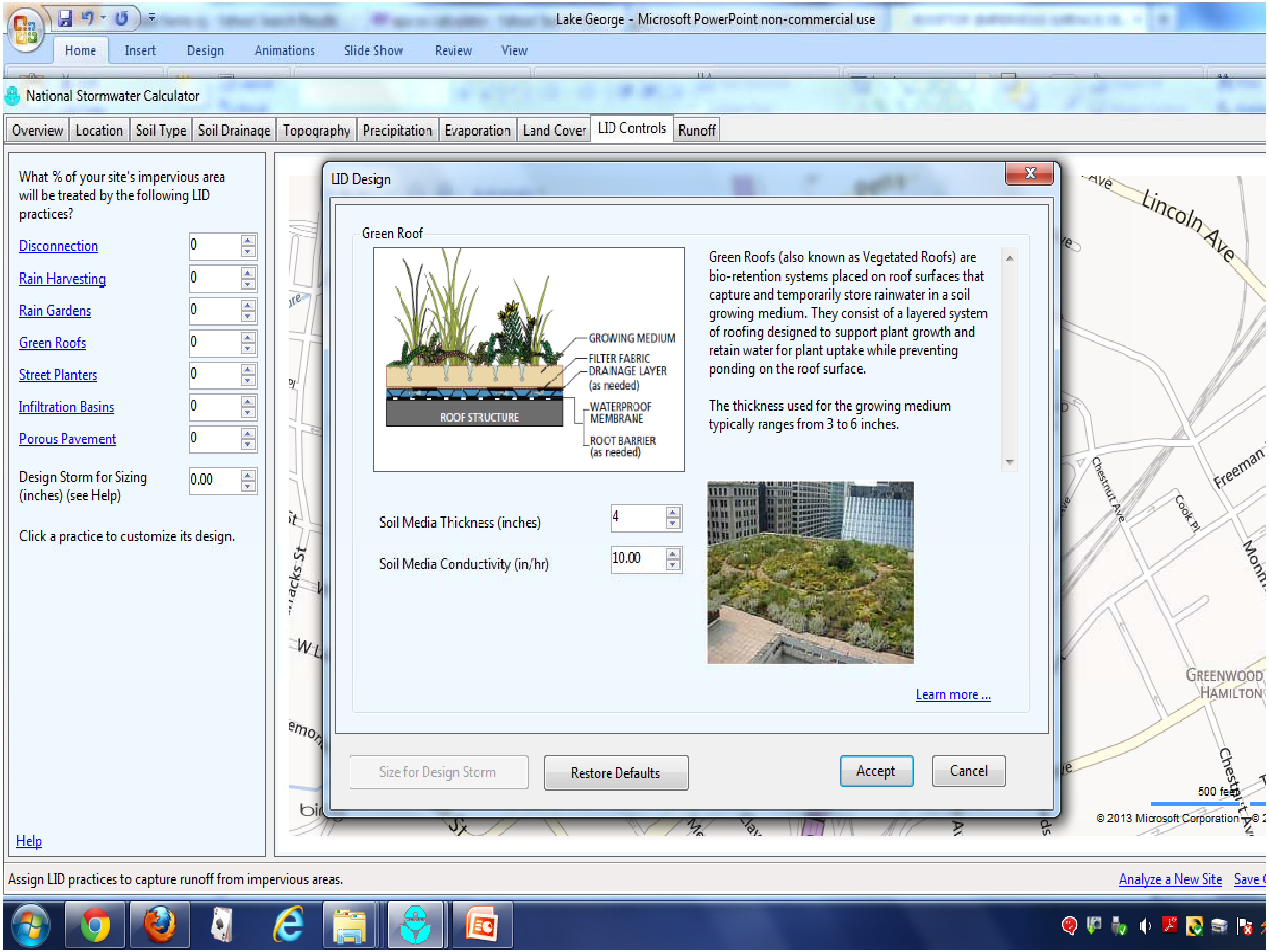
Assign LID practices to capture runoff from impervious areas.
Analyze a New



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Disconnection 0
Rain Harvesting 0
Rain Gardens 0
Green Roofs 0
Street Planters 0
Infiltration Basins 0
Porous Pavement 0
Design Storm for Sizing (inches) (see Help) 0.00
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LID Design
Green Roof
GROWING MEDIUM
FILTER FABRIC
DRAINAGE LAYER (as needed)
WATERPROOF MEMBRANE
ROOT BARRIER (as needed)
ROOF STRUCTURE
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) 4
Soil Media Conductivity (in/hr) 10.00
Learn more ...
Size for Design Storm
Restore Defaults
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Lincoln Ave
Freeman
Chestnut Ave
Cook Pl
Greenwood
Hamilton
500 feet
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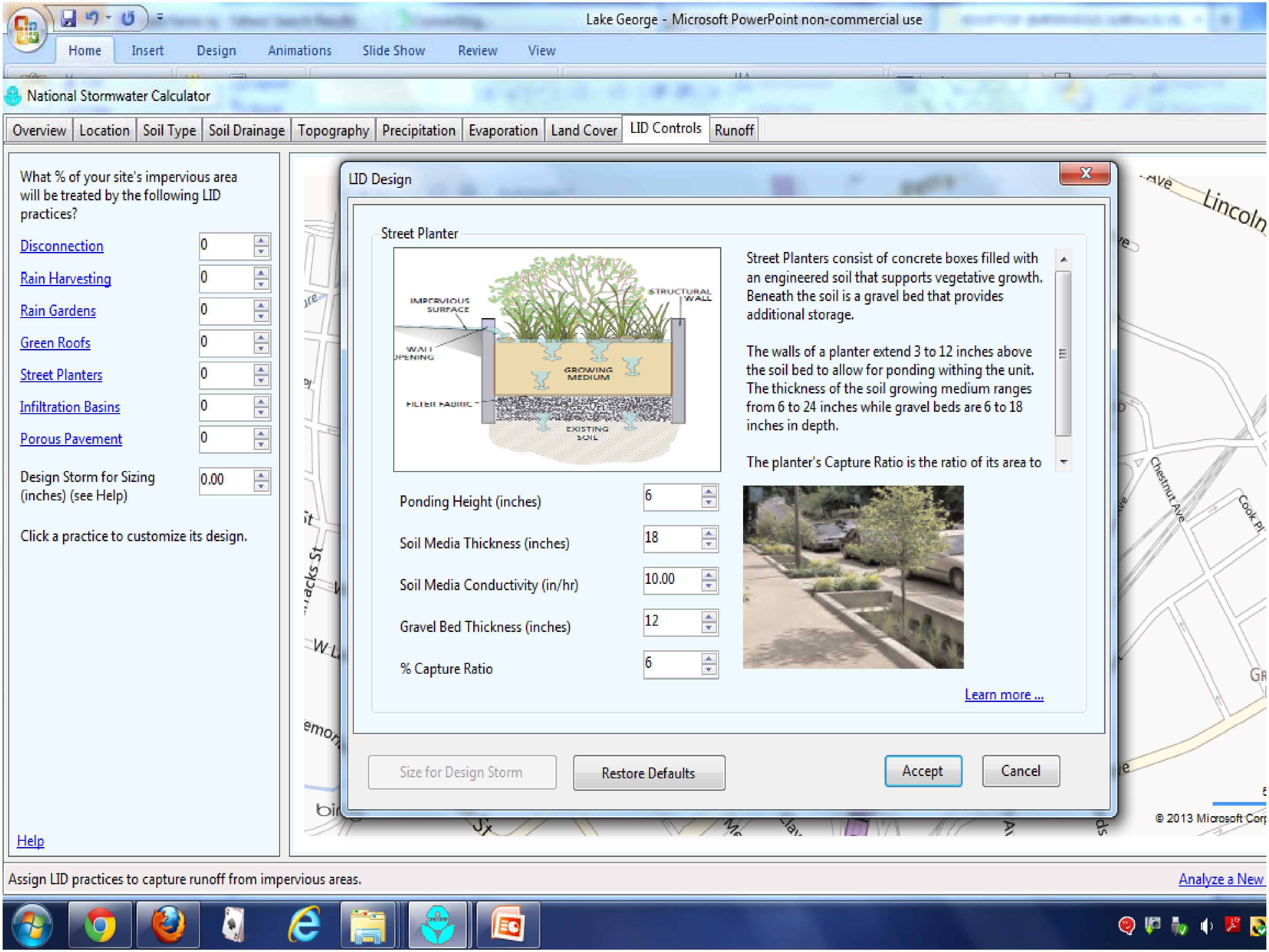
Assign LID practices to capture runoff from impervious areas.
Analyze a New Site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Disconnection 0
Rain Harvesting 0
Rain Gardens 0
Green Roofs 0
Street Planters 0
Infiltration Basins 0
Porous Pavement 0
Design Storm for Sizing (inches) (see Help) 0.00
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LID Design
Street Planter
IMPERVIOUS SURFACE
STRUCTURAL WALL
GROWING MEDIUM
GRAVEL
FILTER FABRIC
EXISTING SOIL
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
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Cancel
Lincoln
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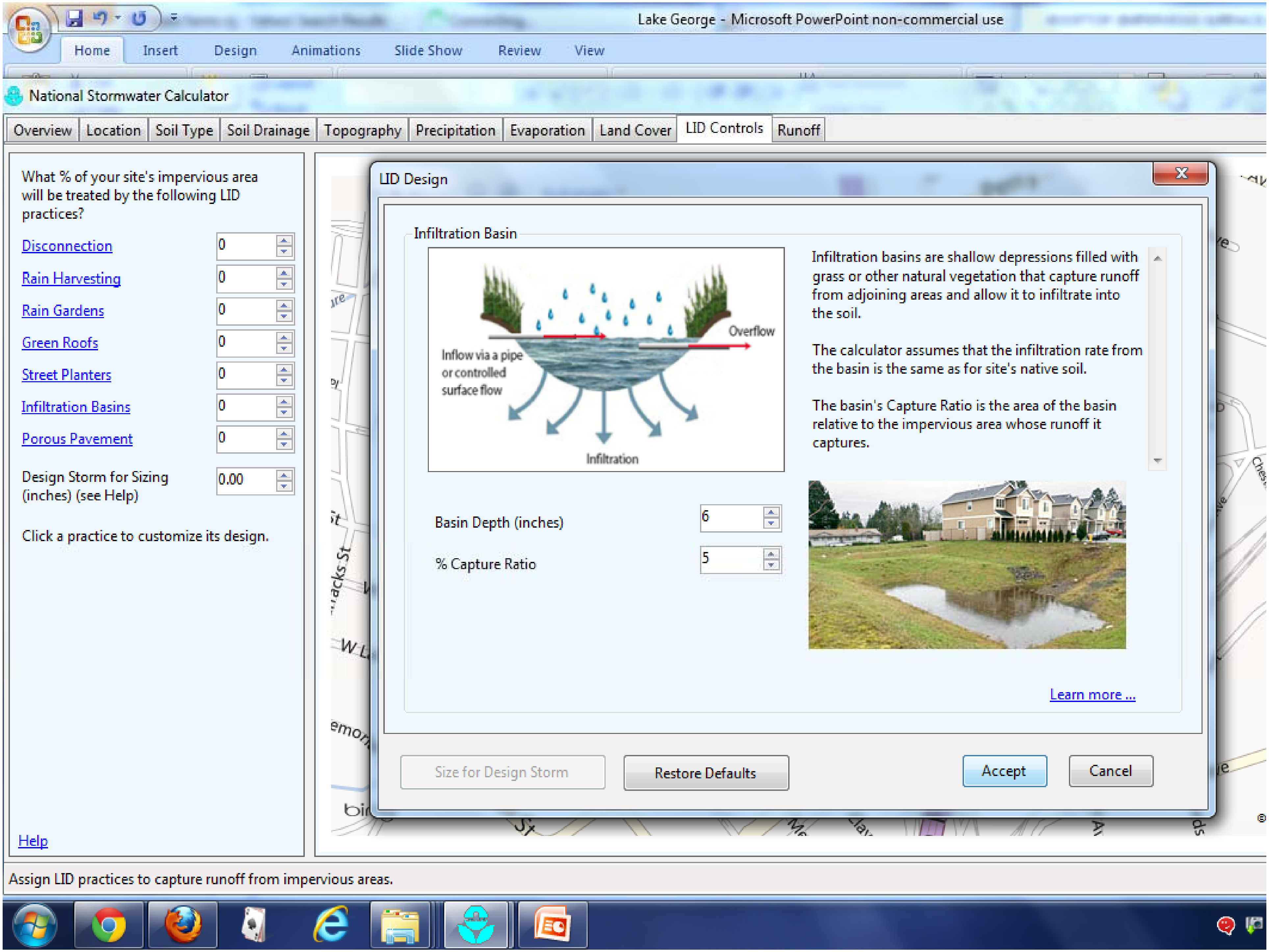
Assign LID practices to capture runoff from impervious areas.
Analyze a New



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Rain Harvesting 0
Rain Gardens 0
Green Roofs 0
Street Planters 0
Infiltration Basins 0
Porous Pavement 0
Design Storm for Sizing (inches) (see Help) 0.00
Click a practice to customize its design.
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LID Design
Infiltration Basin
Inflow via a pipe or controlled surface flow
Overflow
Infiltration
Infiltration basins are shallow depressions filled with grass or other natural vegetation that capture runoff from adjoining areas and allow it to infiltrate into the soil.
The calculator assumes that the infiltration rate from the basin is the same as for site's native soil.
The basin's Capture Ratio is the area of the basin relative to the impervious area whose runoff it captures.
Basin Depth (inches) 6
% Capture Ratio 5
Learn more ...
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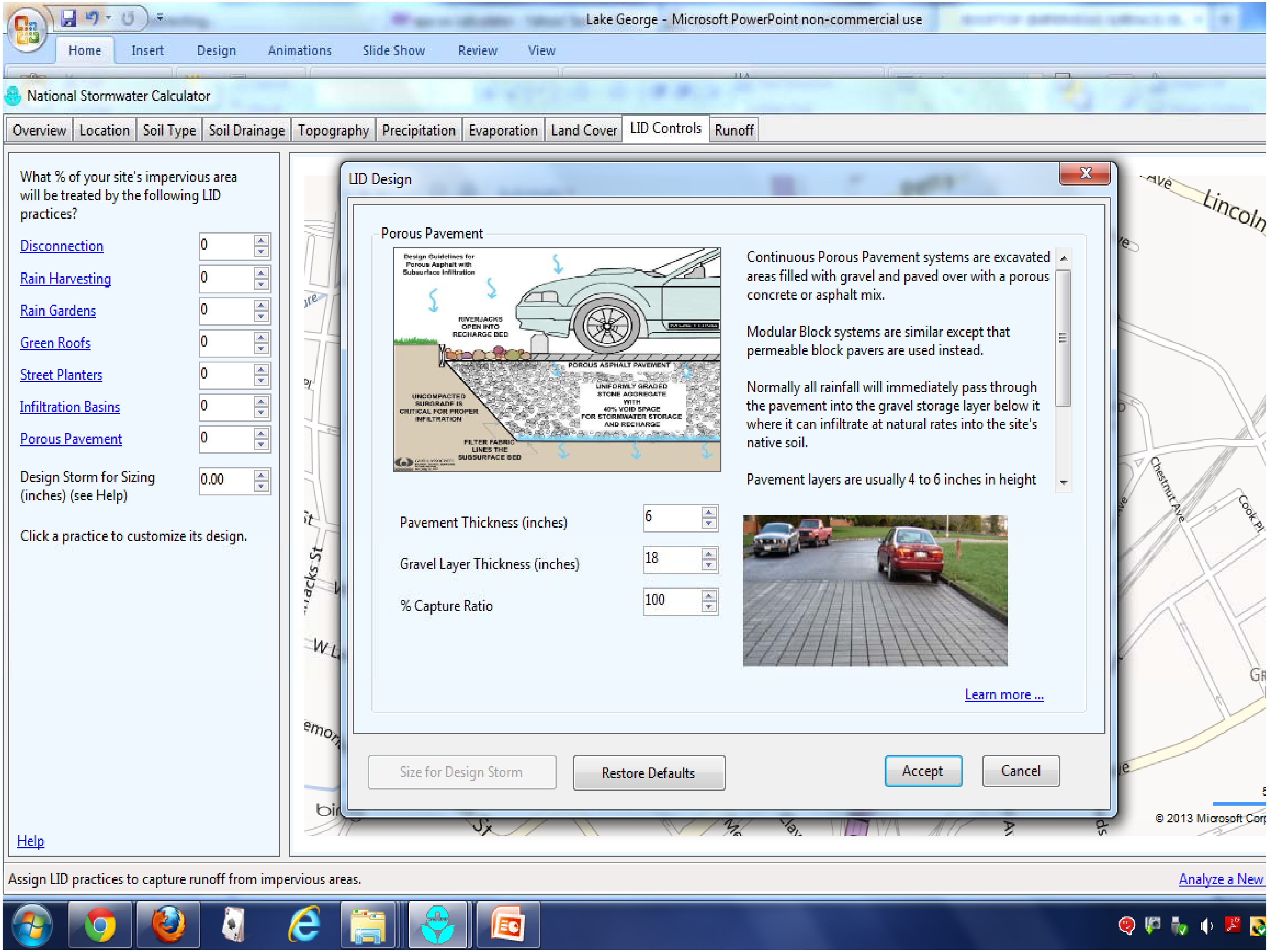
Cancel
Assign LID practices to capture runoff from impervious areas.



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Disconnection 0
Rain Harvesting 0
Rain Gardens 0
Green Roofs 0
Street Planters 0
Infiltration Basins 0
Porous Pavement 0
Design Storm for Sizing (inches) (see Help) 0.00
Click a practice to customize its design.
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LID Design
Porous Pavement
Design Guidelines for Porous Asphalt with Subsurface Infiltration
RIVERJACKS OPEN INTO RECHARGE BED
POROUS ASPHALT PAVEMENT
UNIFORMLY GRADED STONE AGGREGATE WITH 40% VOID SPACE FOR STORMWATER STORAGE AND RECHARGE
UNCOMPACTED SUBGRADE IS CRITICAL FOR PROPER INFILTRATION
FILTER FABRIC LINES THE SUBSURFACE BED
Continuous Porous 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
Pavement Thickness (inches) 6
Gravel Layer Thickness (inches) 18
% Capture Ratio 100
Learn more ...
Size for Design Storm
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Chestnut Ave
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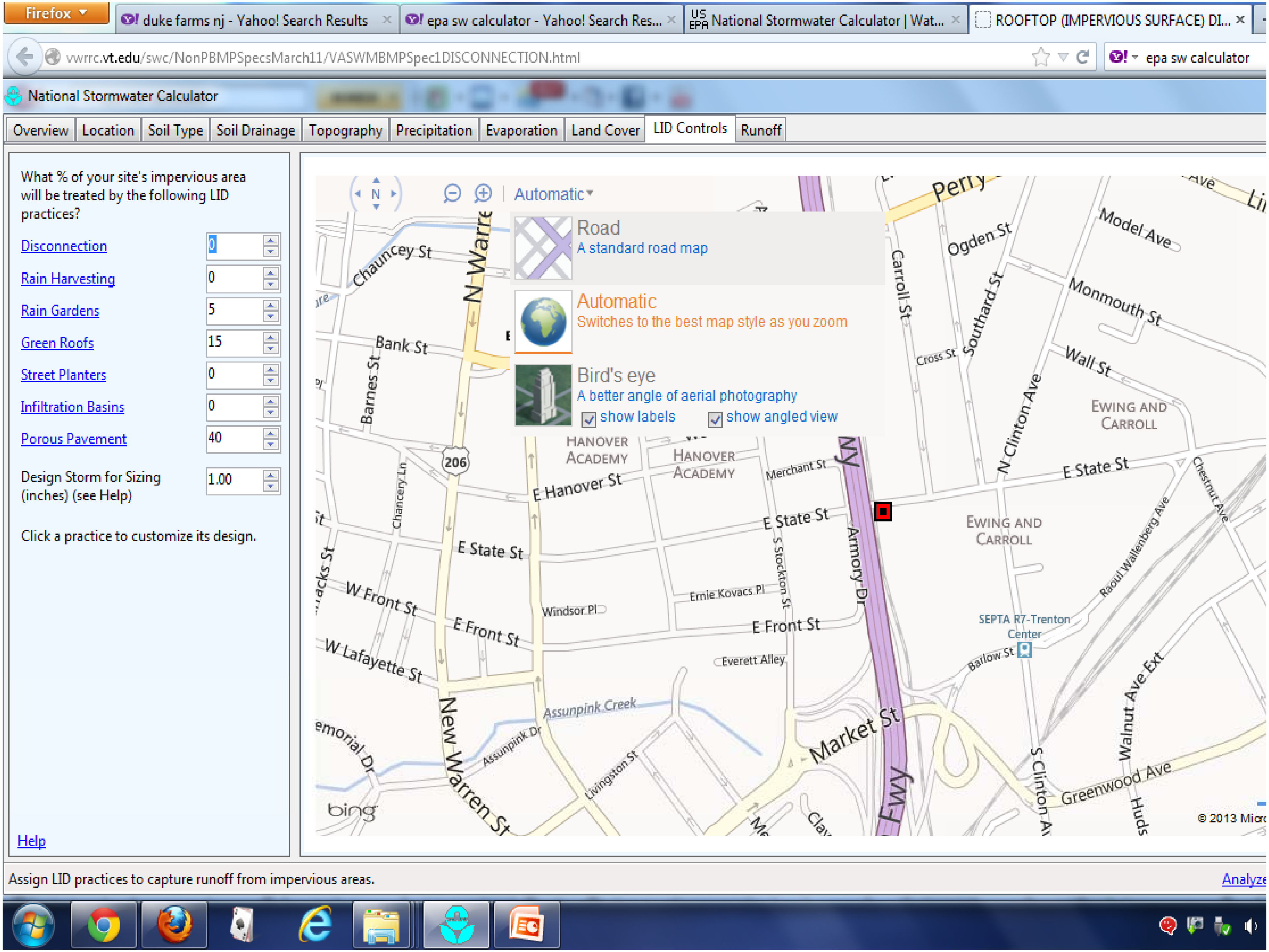
Assign LID practices to capture runoff from impervious areas.
Analyze a New



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Disconnection 0
Rain Harvesting 0
Rain Gardens 5
Green Roofs 15
Street Planters 0
Infiltration Basins 0
Porous Pavement 40
Design Storm for Sizing (inches) (see Help) 1.00
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Automatic
Road
A standard road map
Automatic
Switches to the best map style as you zoom
Bird's eye
A better angle of aerial photography
show labels
show angled view
Chauncey St
Bank St
Barnes St
Hanover Academy
E Hanover St
Merchant St
E State St
Windsor Pl
Ernie Kovacs Pl
W Front St
E Front St
W Lafayette St
Everett Alley
Assunpink Creek
Assunpink Dr
Livingston St
New Warren St
Market St
Armory Dr
Carroll St
Ogden St
Southard St
Cross St
Model Ave
Monmouth St
Wall St
N Clinton Ave
Ewing and Carroll
SEPTA R7-Trenton Center
Ballow St
Raoul Wallenberg Ave
Chestnut Ave
Walnut Ave Ext
S Clinton Av
Greenwood Ave
206
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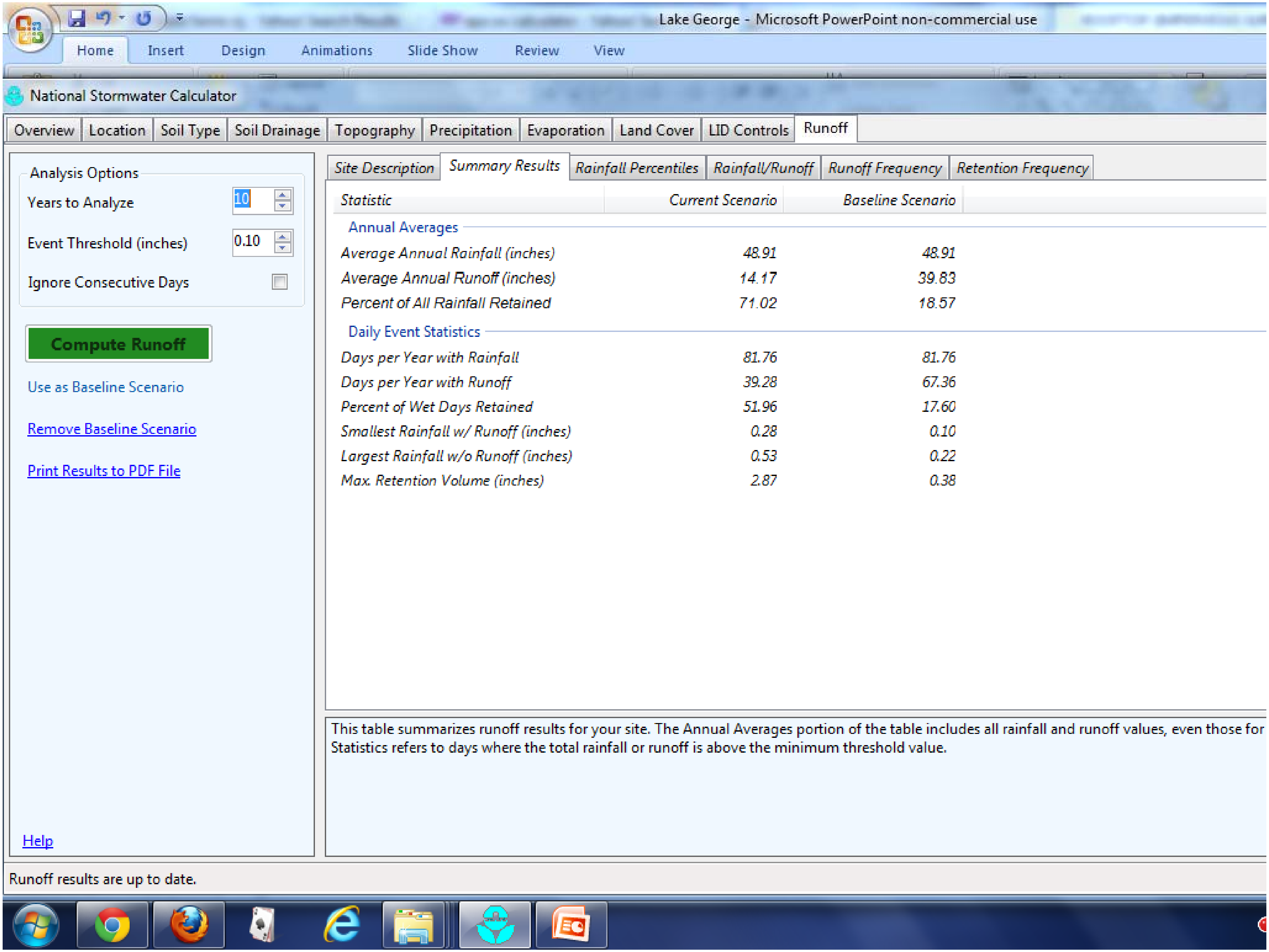
Assign LID practices to capture runoff from impervious areas.
Analyze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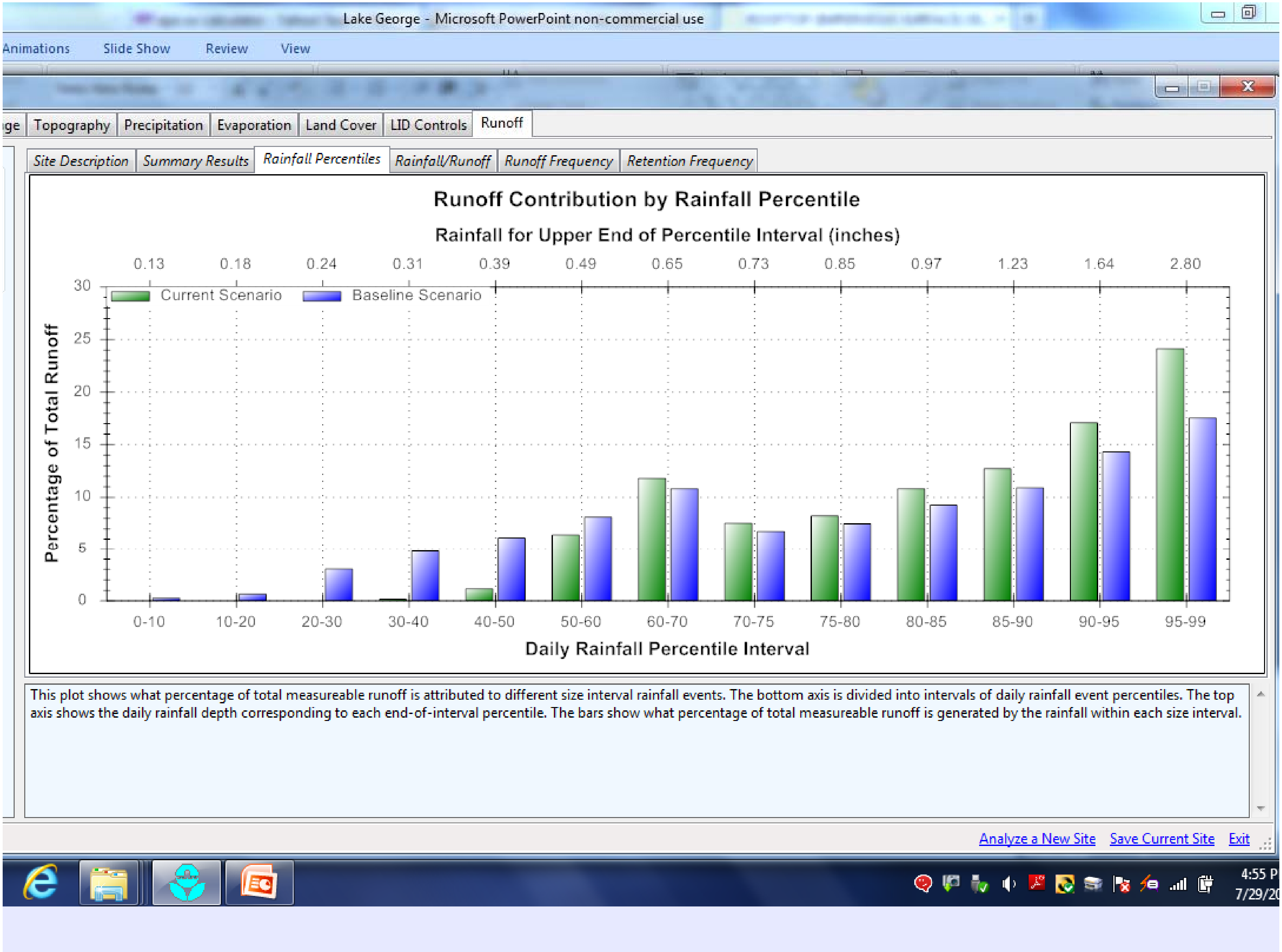
Analysis Options
Years to Analyze 10
Event Threshold (inches) 0.10
Ignore Consecutive Days
Compute Runoff
Use as Baseline Scenario
Remove Baseline Scenario
Print Results to PDF File
Help
Site Description
Summary Results
Rainfall Percentiles
Rainfall/Runoff
Runoff Frequency
Retention Frequency
Statistic
Current Scenario
Baseline Scenario
Annual Averages
Average Annual Rainfall (inches) 48.91 48.91
Average Annual Runoff (inches) 14.17 39.83
Percent of All Rainfall Retained 71.02 18.57
Daily Event Statistics
Days per Year with Rainfall 81.76 81.76
Days per Year with Runoff 39.28 67.36
Percent of Wet Days Retained 51.96 17.60
Smallest Rainfall w/ Runoff (inches) 0.28 0.10
Largest Rainfall w/o Runoff (inches) 0.53 0.22
Max. Retention Volume (inches) 2.87 0.38
This table summarizes runoff results for your site. The Annual Averages portion of the table includes all rainfall and runoff values, even those for
Statistics refers to days where the total rainfall or runoff is above the minimum threshold value.
Runoff results are up to date.



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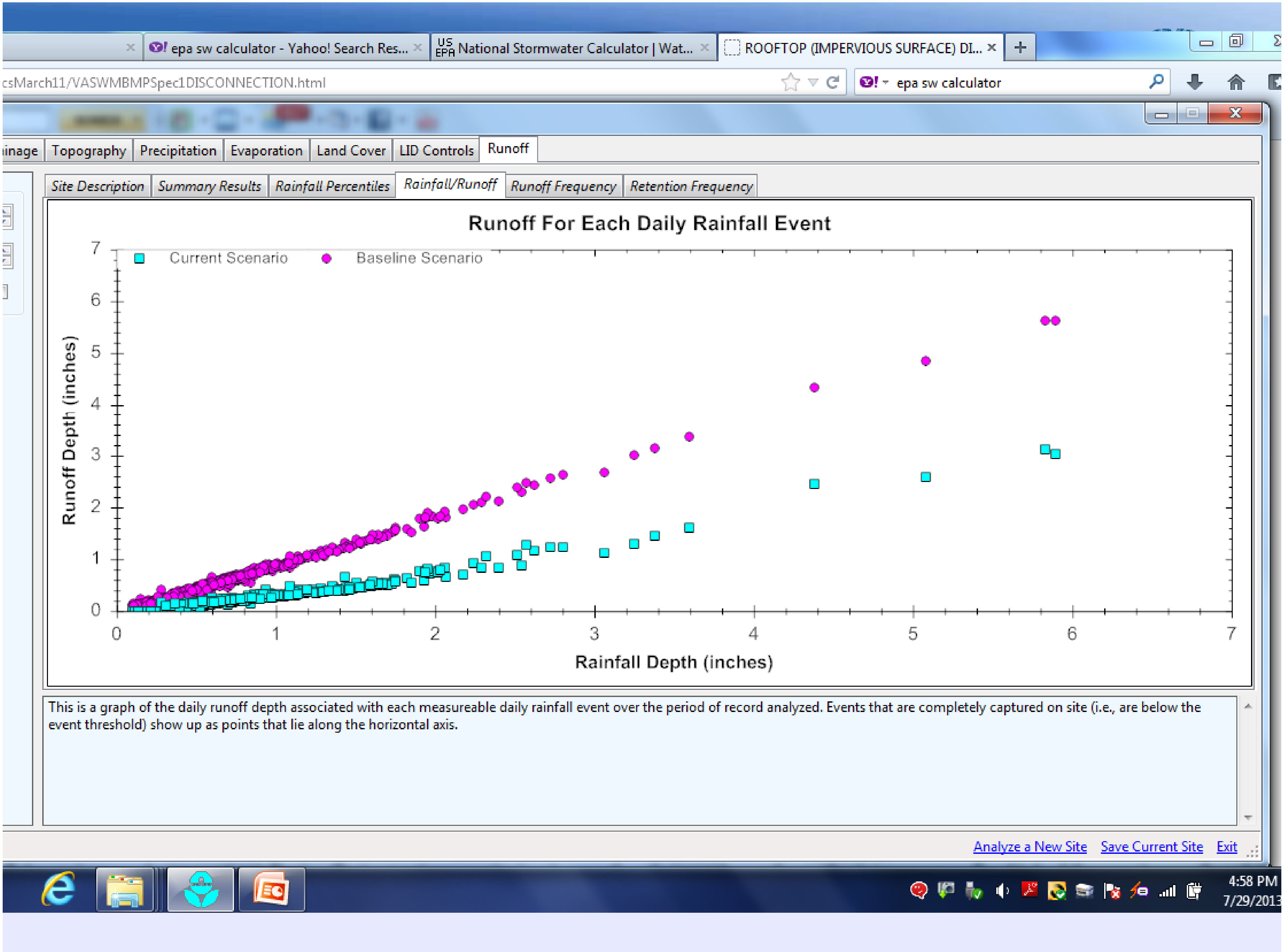
Summary Results
Rainfall Percentiles
Rainfall/Runoff
Runoff Frequency
Retention Frequency
Runoff Contribution by Rainfall Percentile
Rainfall for Upper End of Percentile Interval (inches)
0.13 0.18 0.24 0.31 0.39 0.49 0.65 0.73 0.85 0.97 1.23 1.64 2.80
Current Scenario
Baseline Scenario
Percentage of Total Runoff
0 5 10 15 20 25 30
0-10 10-20 20-30 30-40 40-50 50-60 60-70 70-75 75-80 80-85 85-90 90-95 95-99
Daily Rainfall Percentile Interval
This plot shows what percentage of total measureable runoff is attributed to different size interval rainfall events. The bottom axis is divided into intervals of daily rainfall event percentiles. The top axis shows the daily rainfall depth corresponding to each end-of-interval percentile. The bars show what percentage of total measureable runoff is generated by the rainfall within each size interval.
Analyze a New Site
Save Current Site
Exit
4:55 P
7/29/20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Rainfall Percentiles
Rainfall/Runoff
Runoff Frequency
Retention Frequency
Runoff For Each Daily Rainfall Event
Current Scenario
Baseline Scenario
Runoff Depth (inches)
Rainfall Depth (inches)
0
1
2
3
4
5
6
7
This is a graph of the daily runoff depth associated with each measureable daily rainfall event over the period of record analyzed. Events that are completely captured on site (i.e., are below the event threshold) show up as points that lie along the horizontal axis.
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Save Current Site
Exit
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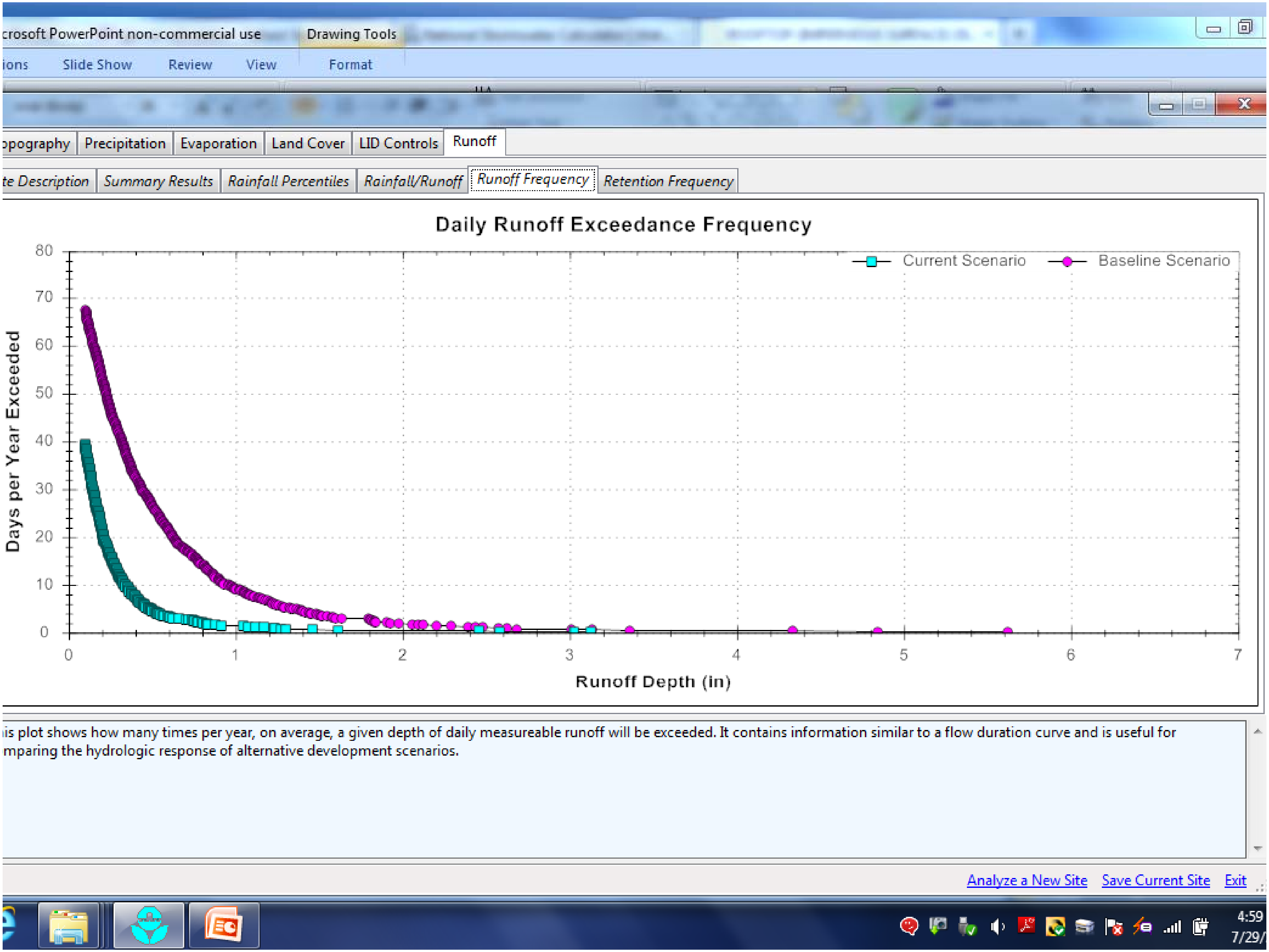
7/29/2013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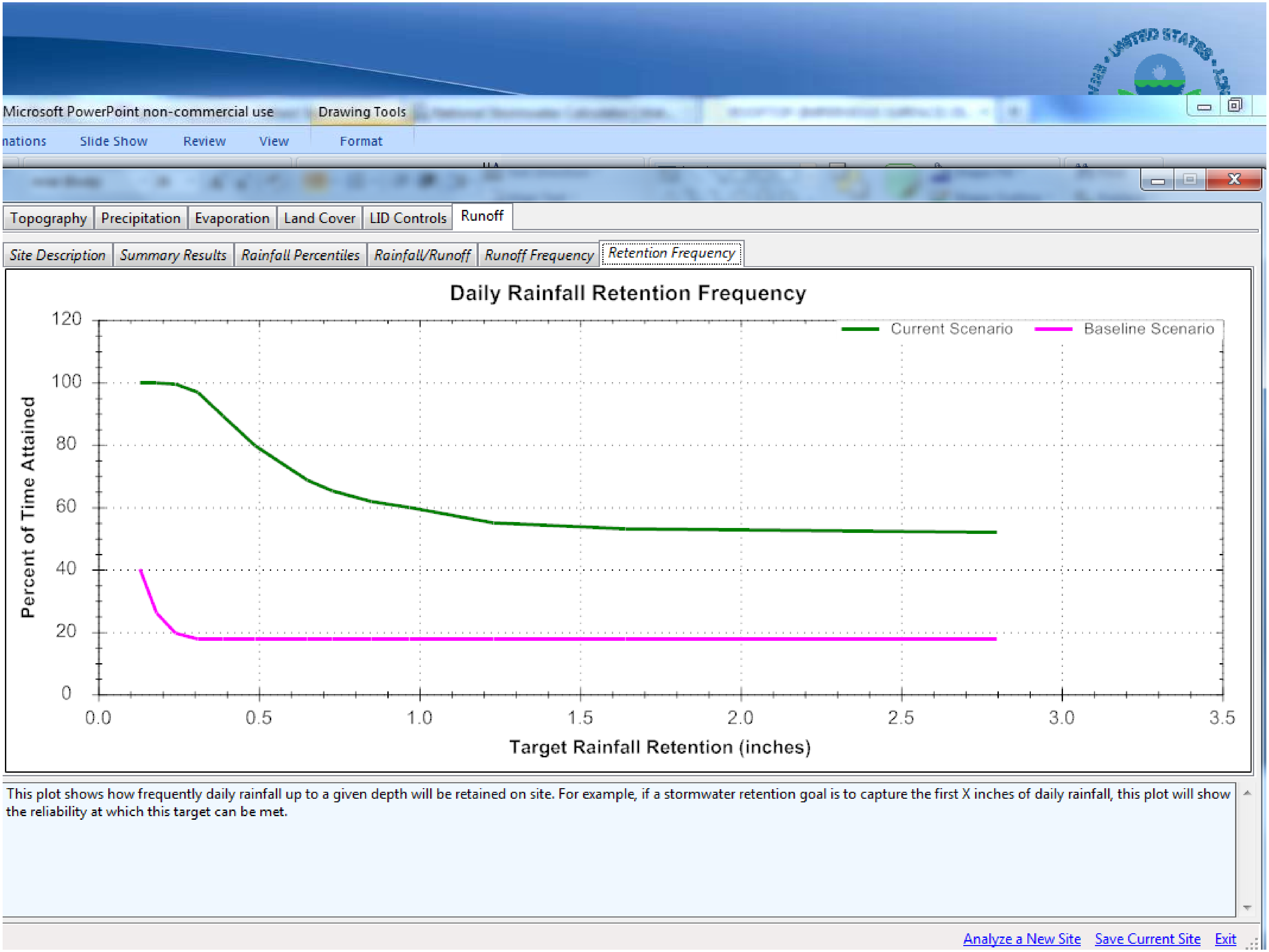
Rainfall/Runoff
Runoff Frequency
Retention Frequency
Daily Runoff Exceedance Frequency
Current Scenario
Baseline Scenario
Days per Year Exceeded
Runoff Depth (in)
0
10
20
30
40
50
60
70
80
0
1
2
3
4
5
6
7
is plot shows how many times per year, on average, a given depth of daily measureable runoff will be exceeded. It contains information similar to a flow duration curve and is useful for
mparing the hydrologic response of alternative development scenarios.
Analyze a New Site
Save Current Site
Exit
4:59
7/29/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Rainfall/Runoff
Runoff Frequency
Retention Frequency
Daily Rainfall Retention Frequency
Current Scenario
Baseline Scenario
Percent of Time Attained
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Target Rainfall Retention (inches)
This plot shows how frequently daily rainfall up to a given depth will be retained on site. For example, if a stormwater retention goal is to capture the first X inches of daily rainfall, this plot will show the reliability at which this target can be met.
Analyze a New Site
Save Current Site
Exit

Relationship of GI Agenda to other EPA efforts

- Urban Waters
- Environmental Justice
- Sustainable Communities
- Healthy Watersheds
- Climate Change
- Smart Growth
- Brownfields Redevelopment
- Stormwater Permits
- CSO Long Term Control Plans

Questions/Contact

EPA Green Infrastructure Website

http://water.epa.gov/infrastructure/greeninfrastructure

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