Teaming Up to Clean Up Lake Erie Beaches

- Lake Erie Watershed Protection Alliance (LEWPA)
- U.S. Environmental Protection Agency
- Ecology and Environment, Inc.
- NYS Department of Environmental Conservation
- NYS Office of General Services

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Chief Civil Engineer
Ecology and Environment, Inc.

LEWPA

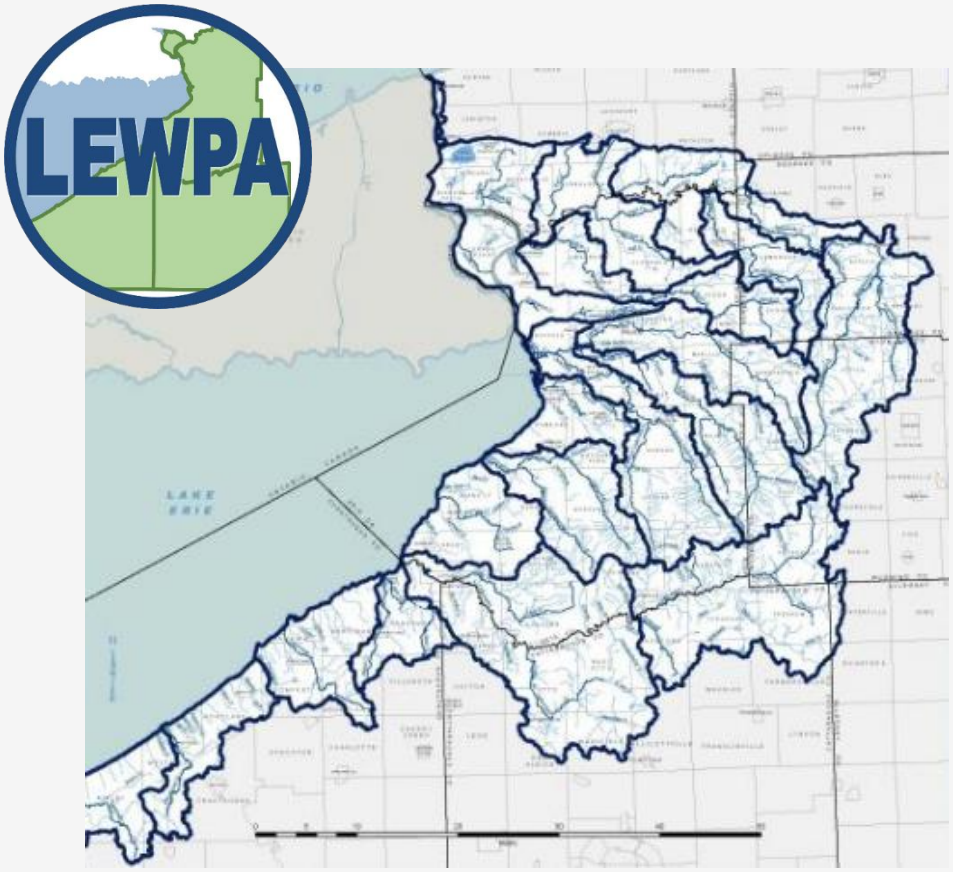
EPA United States Environmental Protection Agency

ecology and environment, inc. Global Environmental Specialists

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

NEW YORK STATE OF OPPORTUNITY. Office of General Services

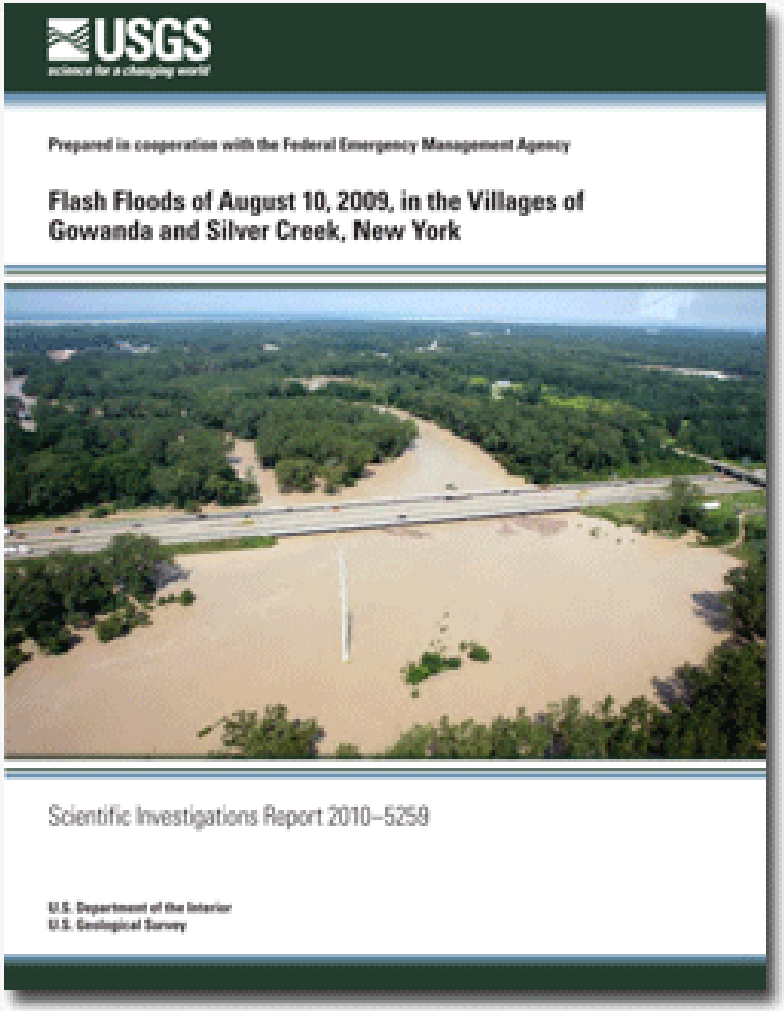
Lake Erie Watershed Protection Alliance



2009 Cattaraugus Creek Floods Instigate Collaboration

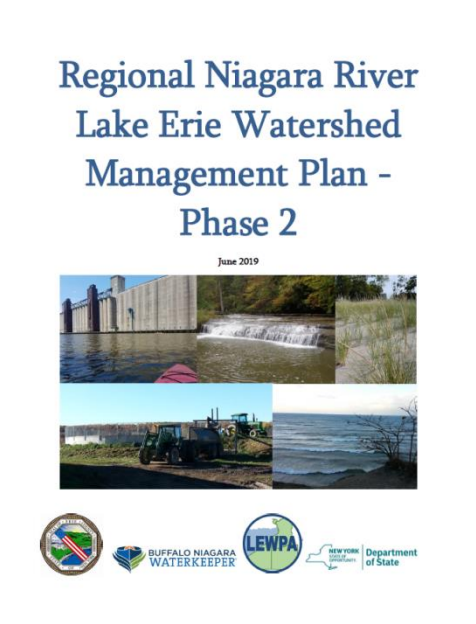
LEWPA Board of Directors includes representatives from each county in:

- Local government
- Regional government
- Soil & Water Conservation District



Watershed Management Plan

- Nine-element Watershed Management Plan for the Niagara River/Lake Erie Watershed
- Currently in Phase 3:
  - to assess completed water quality sampling by USGS and LEWPA
  - develop pollutant reduction goals
  - conduct stream assessments
  - determine implementation projects to achieve pollutant reduction targets.
- This will help direct water quality project implementation funds



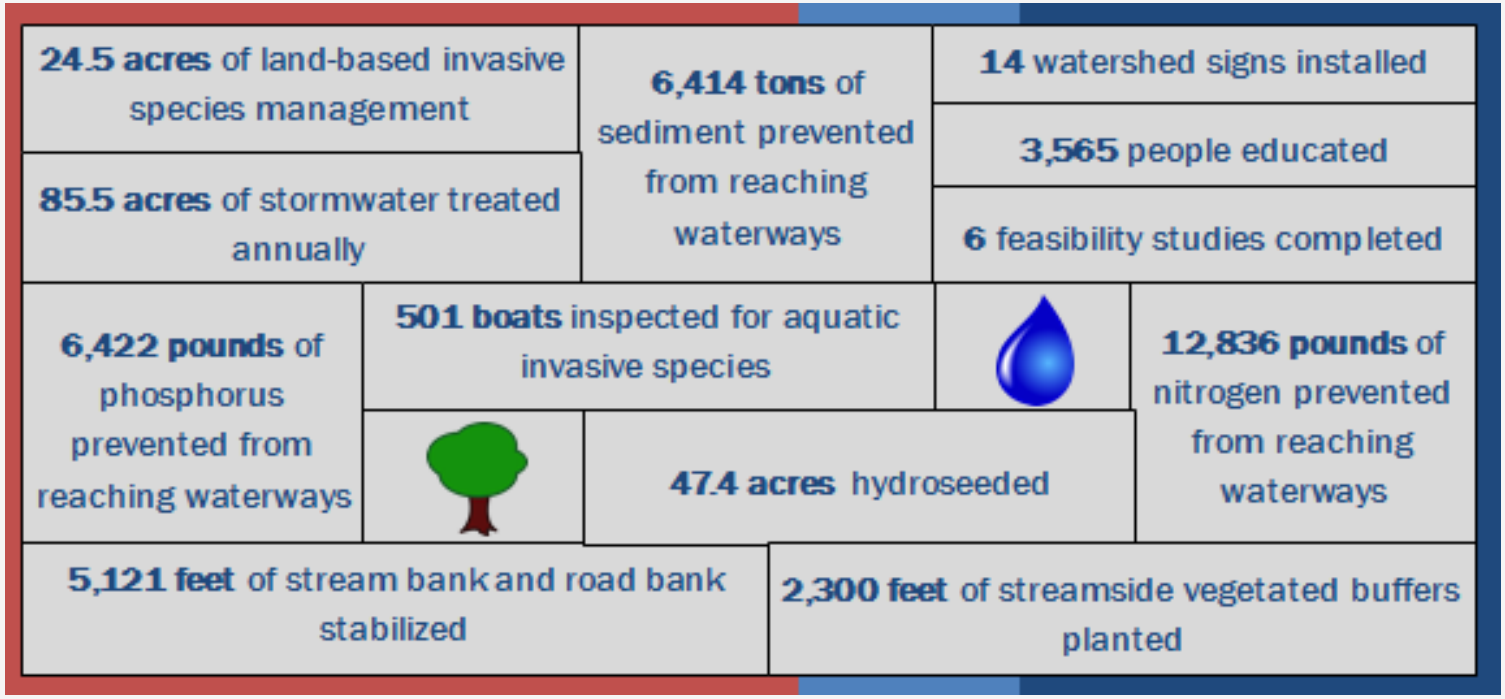
NEW YORK STATE OF OPPORTUNITY Department of State

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

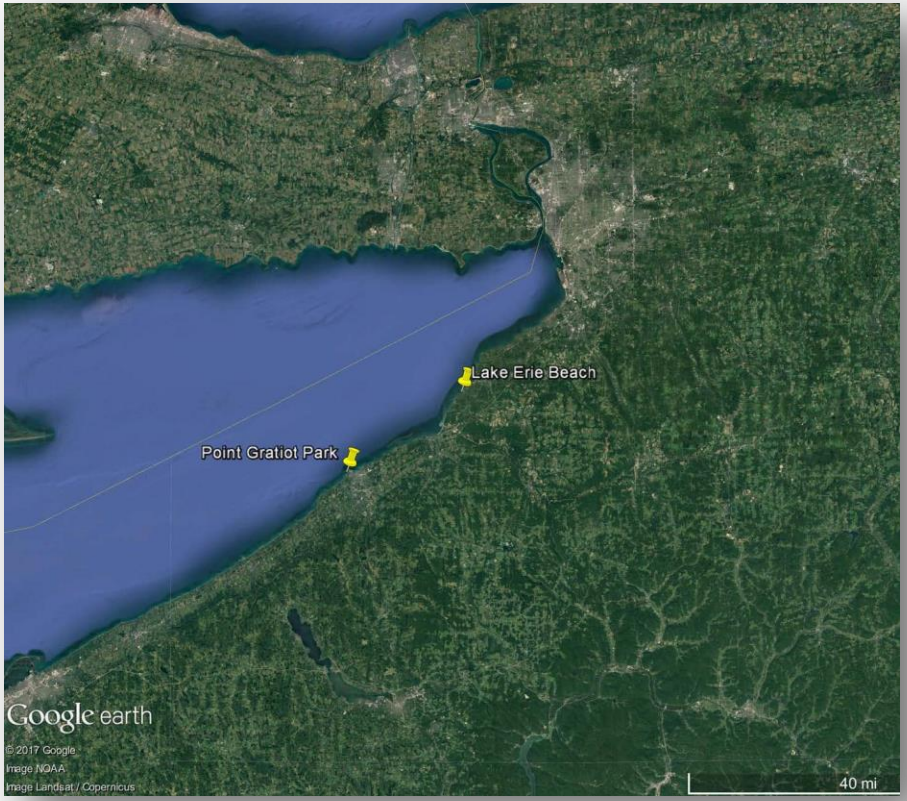
NYS Environmental Protection Fund

Example implementation projects include:

- Streambank restoration
- Hydroseeding and planting buffers
- Invasive species management and prevention
- Project feasibility studies
- Green infrastructure



Lake Erie Beach Projects



- Green infrastructure projects were designed by Ecology and Environment, Inc. to capture and treat stormwater runoff
- Commissioned by NYS Department of Environmental Conservation
- Funded by NYS Office of General Services
- The Lake Erie Watershed Protection Alliance was able to accept funding from the U.S. Environmental Protection Agency to implement construction
- Lake Erie Beach in Evans, NY (Erie County)
- Point Gratiot Beach in Dunkirk, NY (Chautauqua County)

Lake Erie Beach Closures

- *E. coli* is used as an indicator of potential harmful bacteria
- Outfalls near the beaches can carry contaminated runoff to beach areas

Lake Erie Beach:

- Closed 160 times between 2008 and 2016 due to high *E. coli*
- Closed an average 18% of season from 2011-2014

Point Gratiot Beach:

- Up to 28 closed days per season since 2008
- Closed between 13% and 40.5% of each season 2008-2014

Discussion Outline

- Introduction to Rain Gardens & Bioswales
- Rain Garden/Bioswale Site Evaluation & Design
- Pilot Projects
  - Point Gratiot Park, Dunkirk, NY
  - Lake Erie Beach, Evans, NY
- Closing Comments
- Q & A

Introduction to Rain Gardens & Bioswales

Image Source: Fairfax County, VA

Image Source: Soils.org

Introduction to Rain Gardens & Bioswales

Rain Gardens

Image Source: The Nature Conservancy

- Collect stormwater runoff from small areas
- Promote sediment removal through settling
- Infiltration of runoff, decreased discharge to streams/sewers
- Increase in infiltration through native plantings
- Short-term ponding

Introduction to Rain Gardens & Bioswales

Bioswales/Vegetated Swales

- Convey stormwater runoff away from impervious surfaces
- Promote sediment removal through settling
- Infiltration of runoff, decreased discharge to streams/sewers
- Increase in infiltration through native plantings
- Decrease flow velocities, erosion

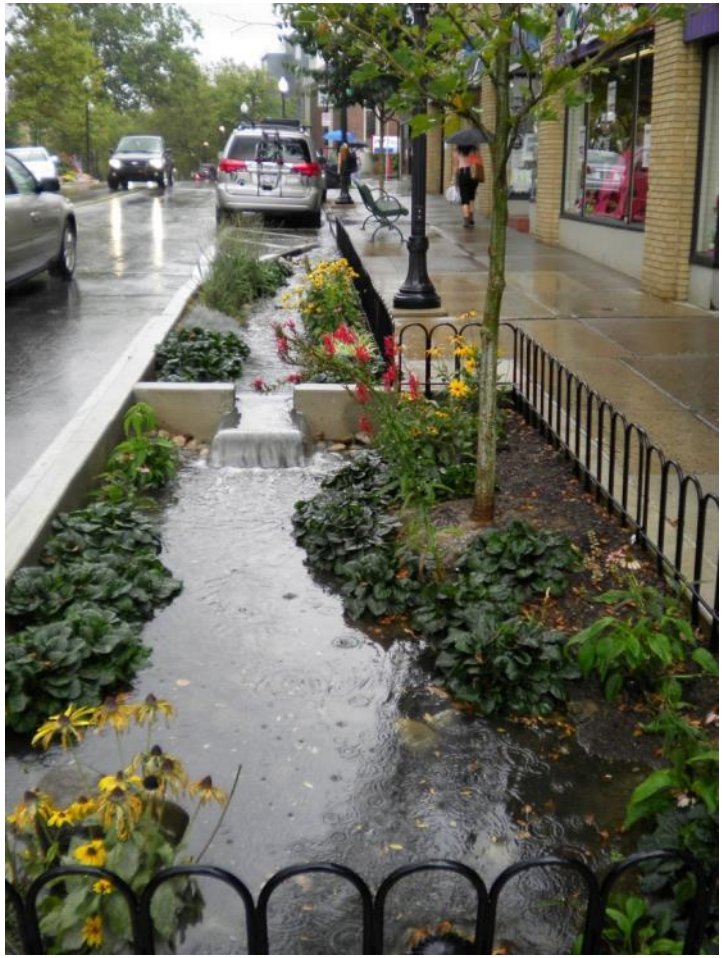
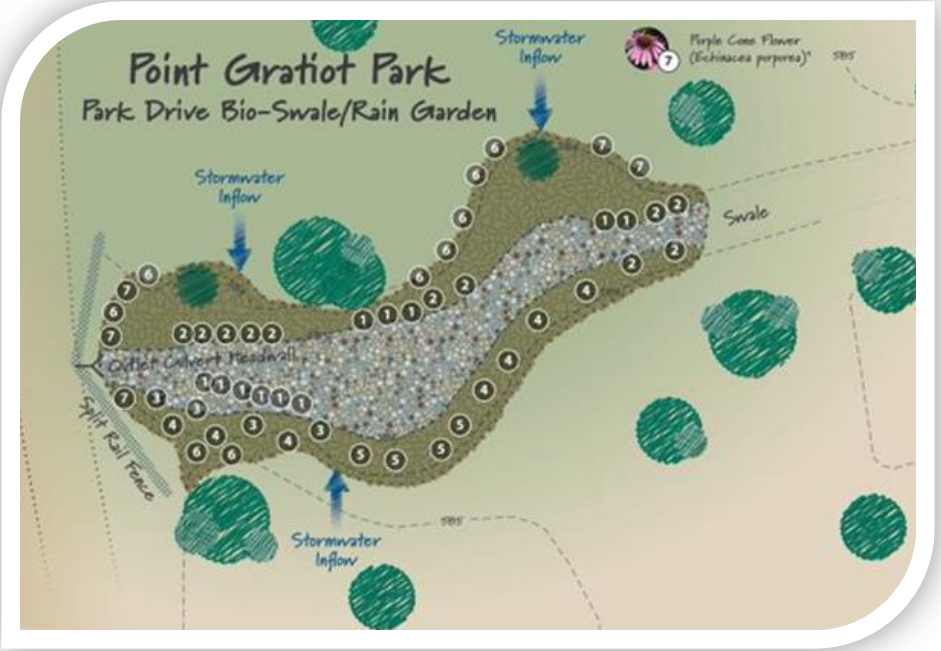


Image Source: Borough of State College, PA

Raingarden/Bioswale Site Evaluation & Design

Element 1) Visual Site Assessment

Element 2) Topographic Survey and Soils Investigation



Element 3) Plant Selection

Element 4) Maintenance

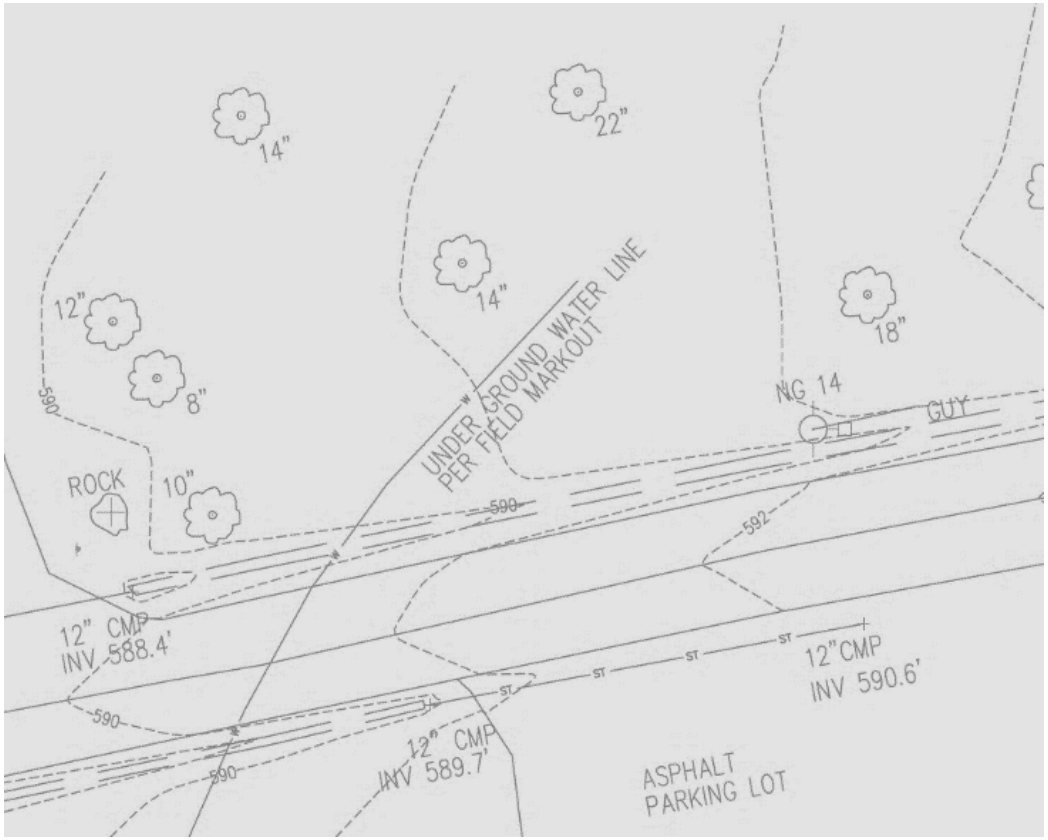
Element 5) Design Resources

Raingarden/Bioswale Site Evaluation & Design

Site Visit

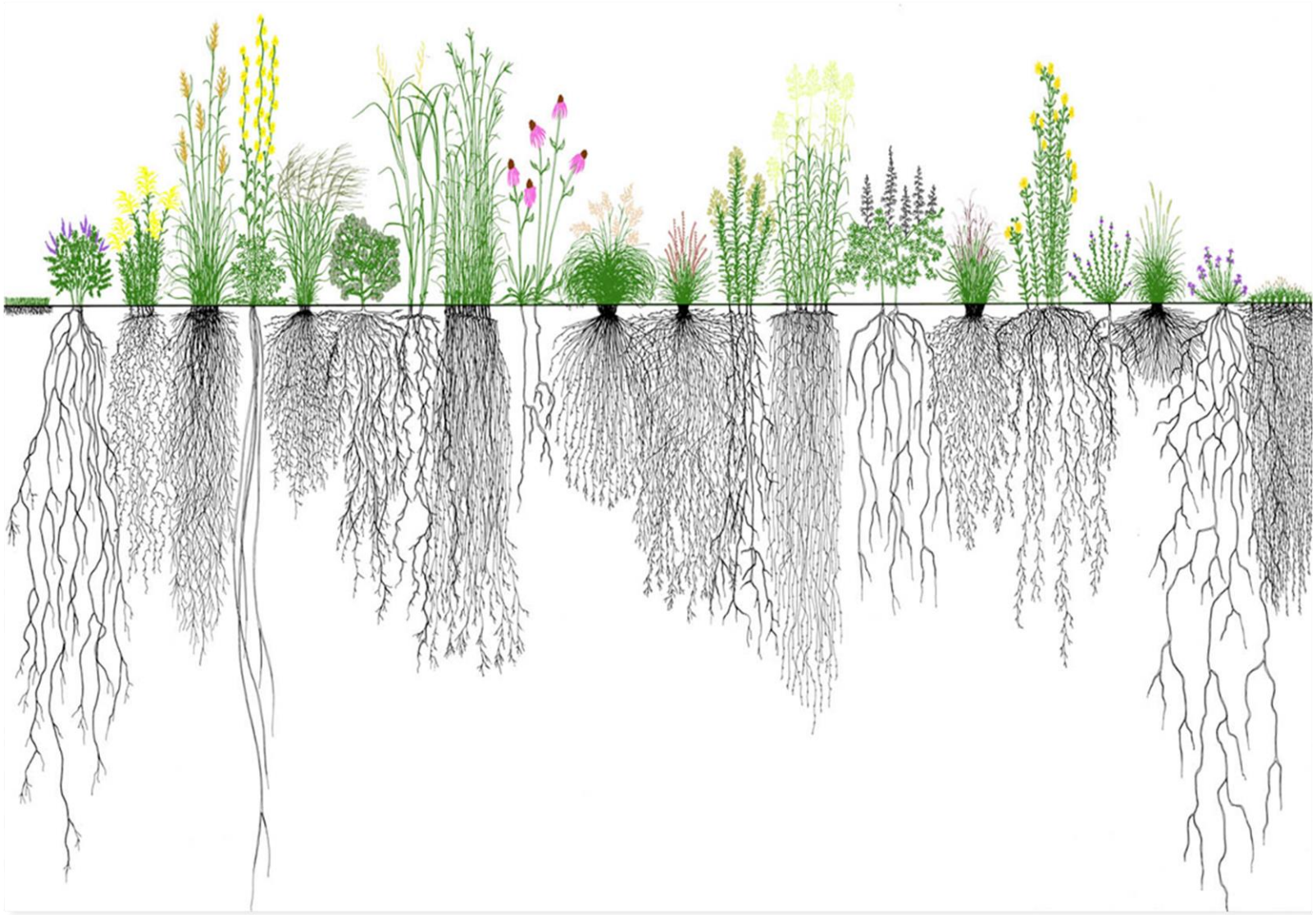
Raingarden/Bioswale Site Evaluation & Design

Topographic Survey & Soils Investigation



Raingarden/Bioswale Site Evaluation & Design

Plant Selection



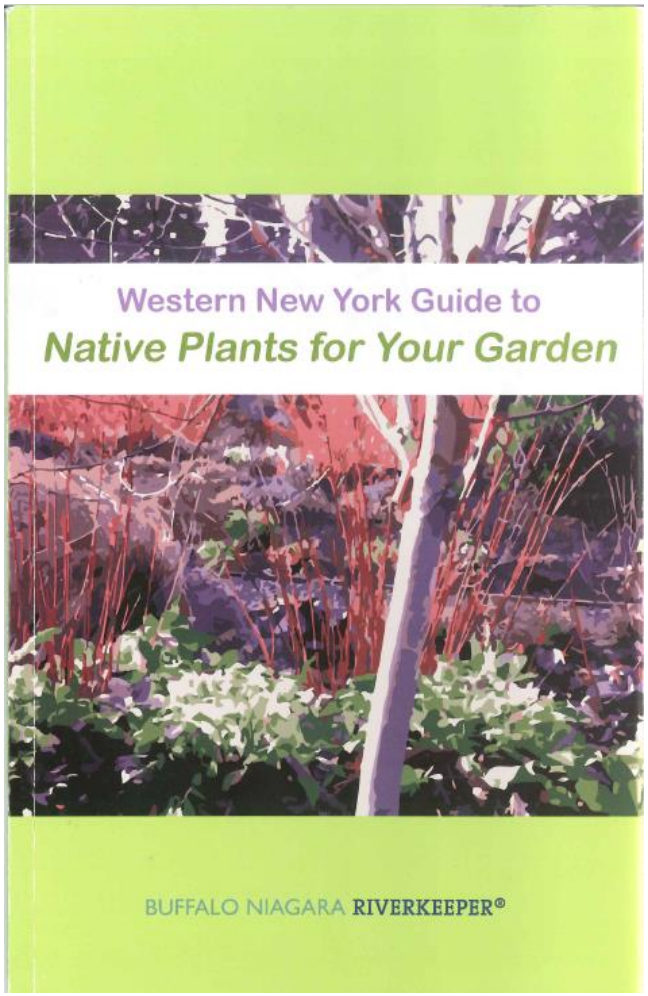
Raingarden/Bioswale Site Evaluation & Design

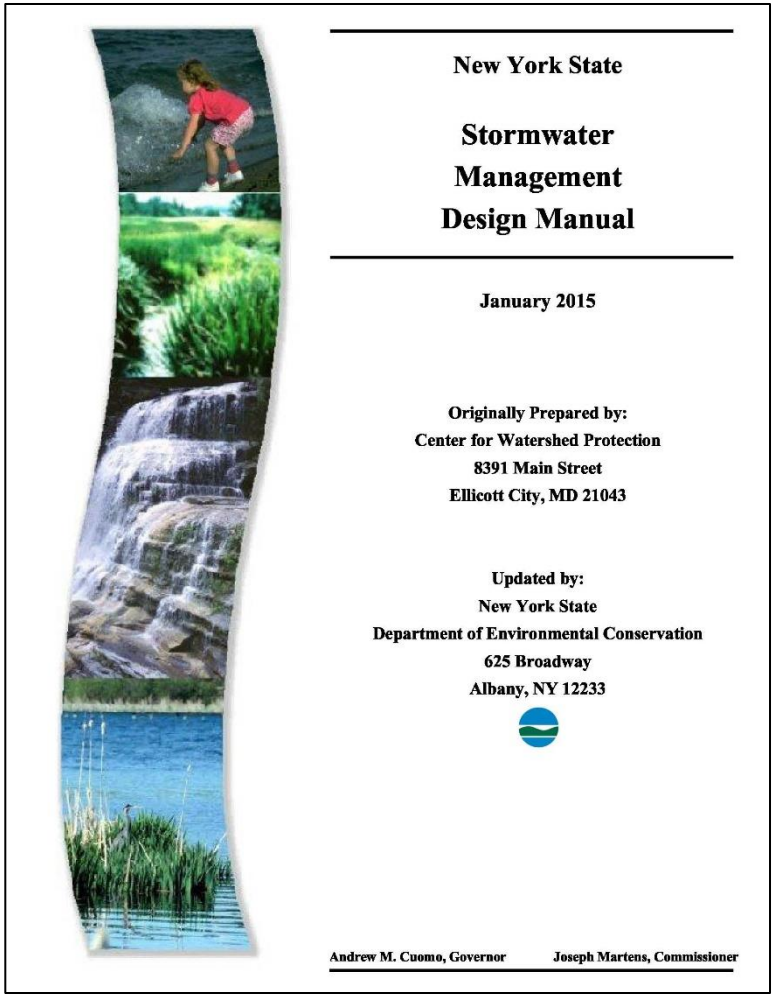
Maintenance

- Water Plants (until establishment)
- Weeding
- Pruning
- Cleanout Sediment Accumulation
- Do Not Mow

Raingarden/Bioswale Site Evaluation & Design

Design Resource





Pilot Projects

Point Gratiot Park, Dunkirk, NY

Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design

- Site visit conducted on November 9, 2016
- Four areas identified for potential green infrastructure implementation:
  1) Park Drive Swale
  2) West Oak Street Swale
  3) Asphalt Path

Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design

- Field verification of drainage patterns
- Site visit on April 6, 2017 during rain event
  - On-site soils saturated
  - 0.64 inches over a 12-hour period

Existing Park Drive swale

Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design – Area 1: Park Drive Swale

Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design – Area 3: Asphalt Path

Pilot Projects: Point Gratiot Park, Dunkirk, NY

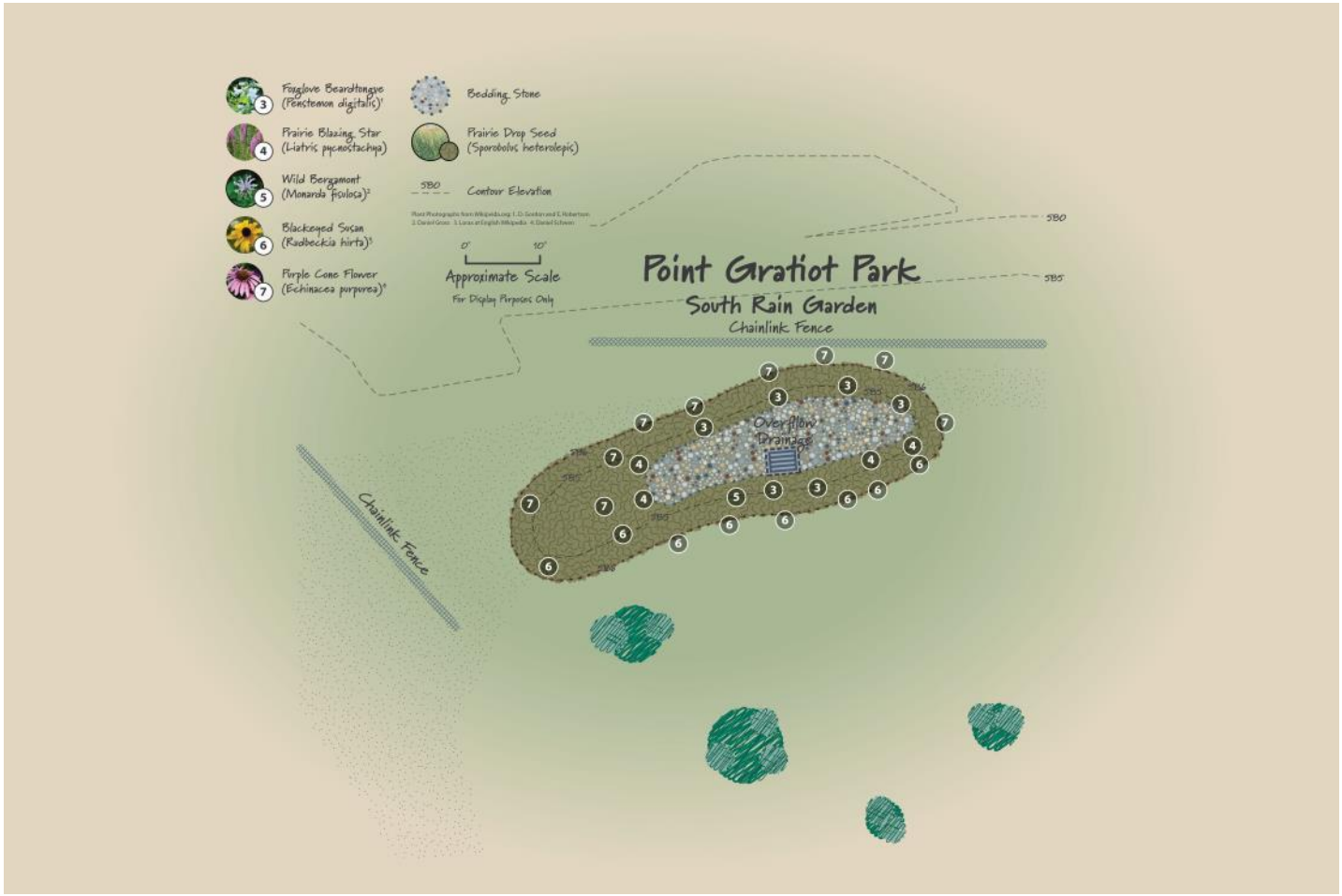
Site Evaluation & Design – Area 3: Asphalt Path

4. Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design – Area 3: Asphalt Path

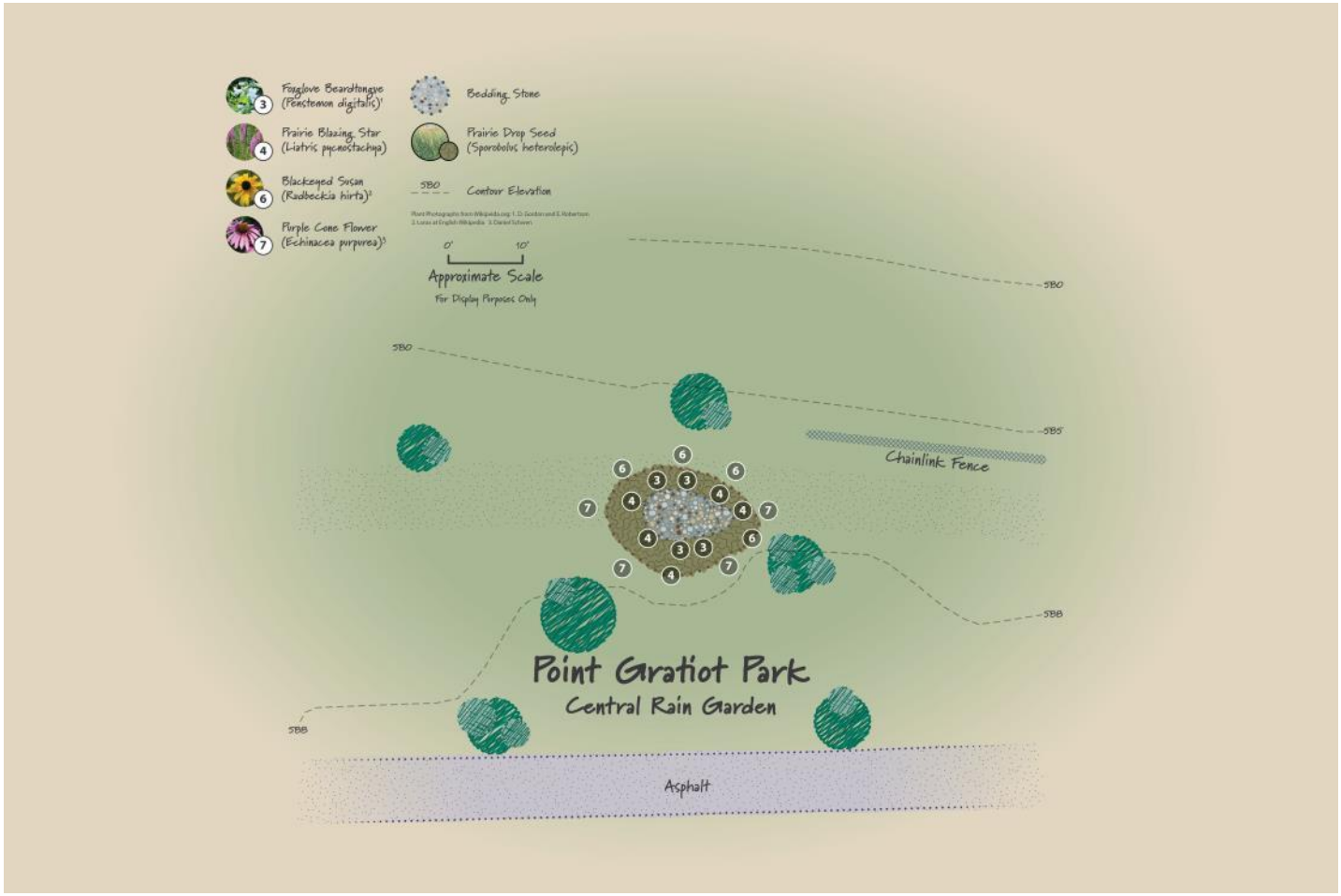
Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design – Area 3: Asphalt Path



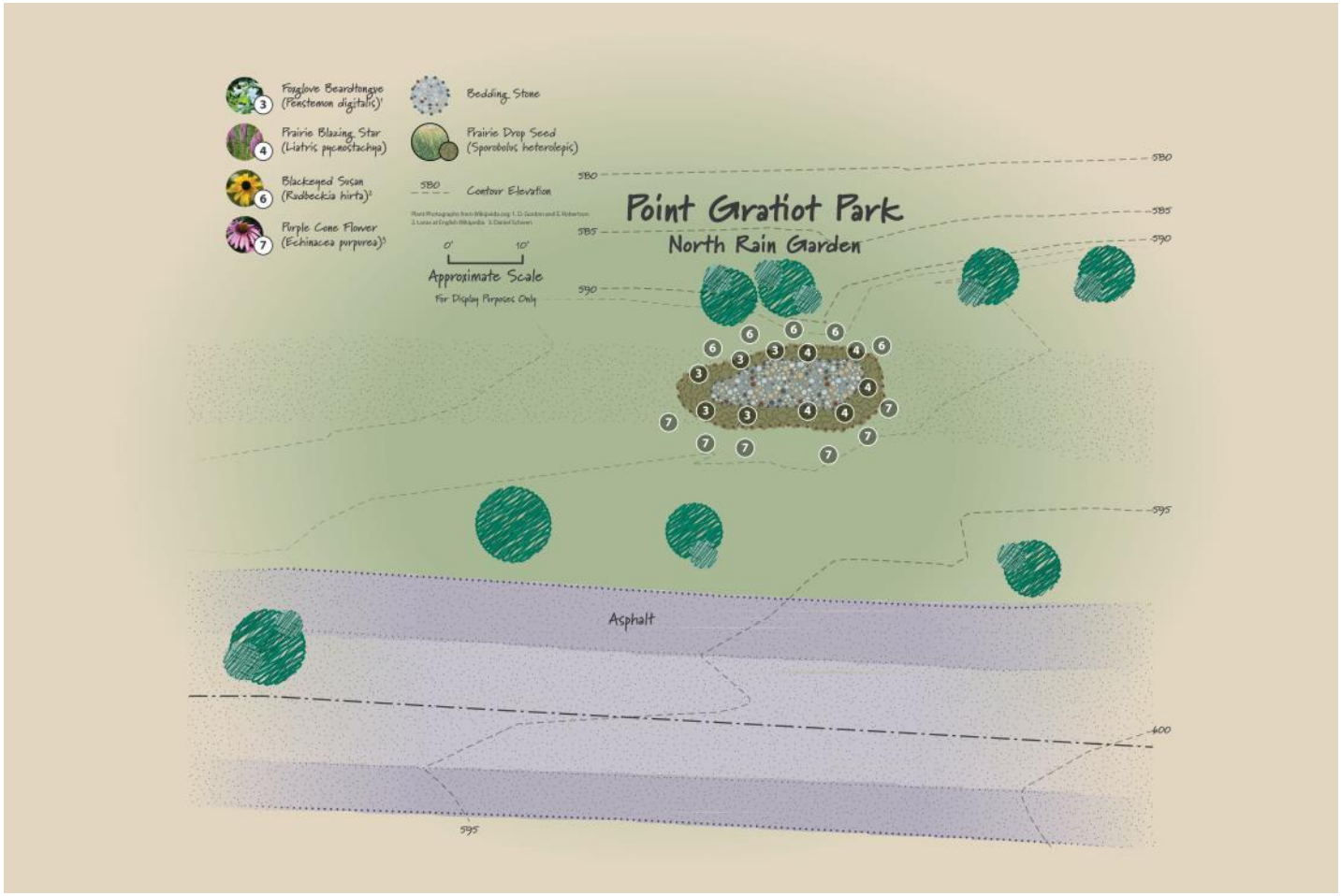
Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design – Area 3: Asphalt Path



Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design – Area 3: Asphalt Path



Pilot Projects: Point Gratiot Park, Dunkirk, NY

Site Evaluation & Design – Summary

- Primary Benefits
  - 25-50% TSS Removal
  - 40-60% Nitrogen Removal
  - >75% Fecal Coliform Reduction

- Additional Benefits
  - Reduced Beach Erosion
  - Decreased Discharge Velocity
  - Increased Pervious Area
  - Aesthetic Improvement

Pilot Projects

Lake Erie Beach, Evans, NY

Pilot Projects: Lake Erie Beach, Evans, NY

Site Evaluation & Design

- Site visit conducted on November 9, 2016
- Four areas identified for potential green infrastructure implementation:
  1) South Parking Lot
  2) Muddy Creek Walkway
  3) Main Parking Lot Swale

Pilot Projects: Lake Erie Beach, Evans, NY

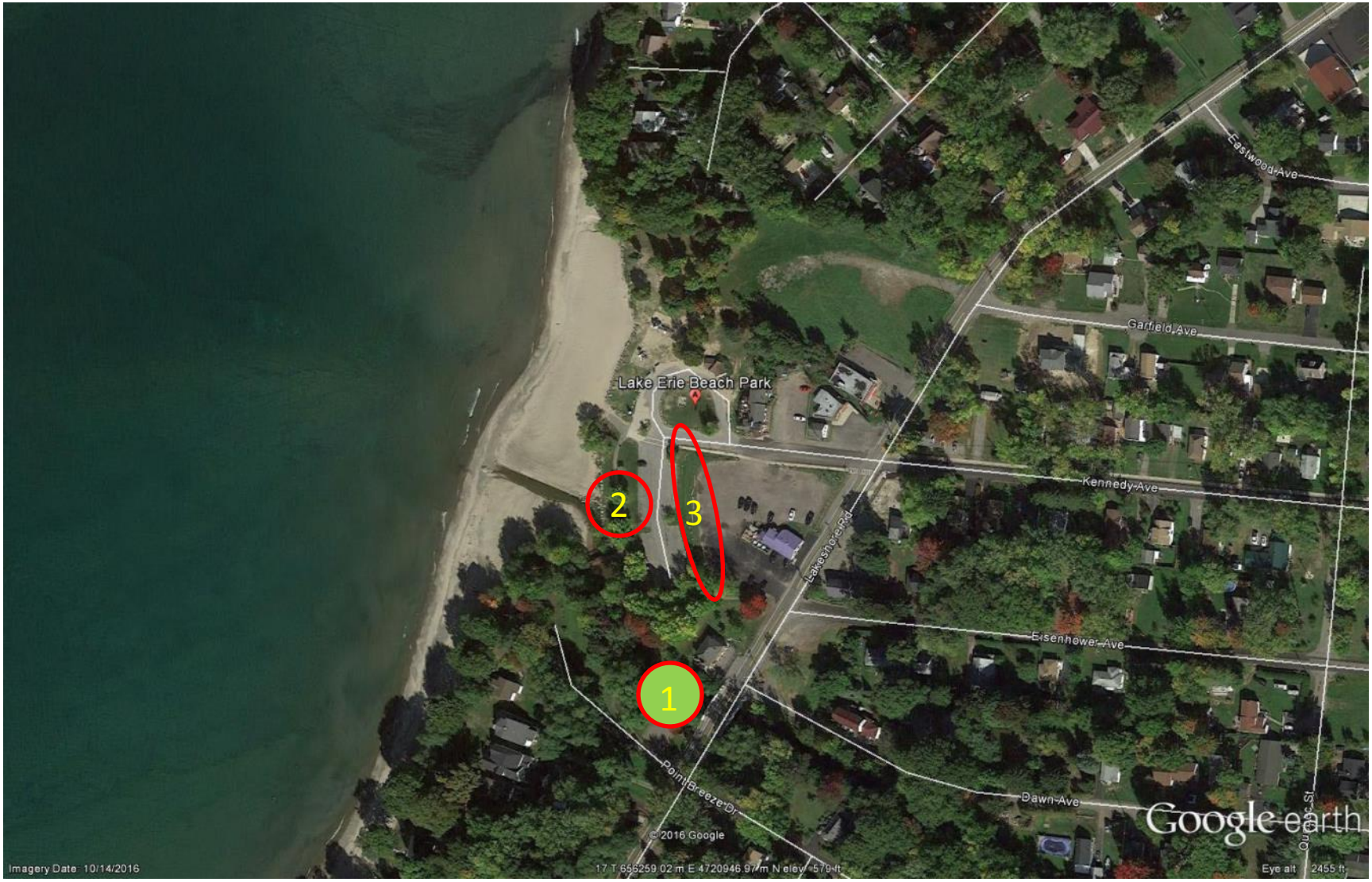
Site Evaluation & Design

- Field verification of drainage patterns
- Site visit on April 6, 2017 during large rain event
  - On-site soils saturated
  - Approximately 0.75 inches of rain over a 12-hour period

Main Parking Lot Swale

Pilot Projects: Lake Erie beach, Evans, NY

Site Evaluation & Design – Area 1: South Parking Lot



Pilot Projects: Lake Erie beach, Evans, NY

Site Evaluation & Design – Area 1: South Parking Lot

Pilot Projects: Lake Erie beach, Evans, NY

Site Evaluation & Design – Area 1: South Parking Lot

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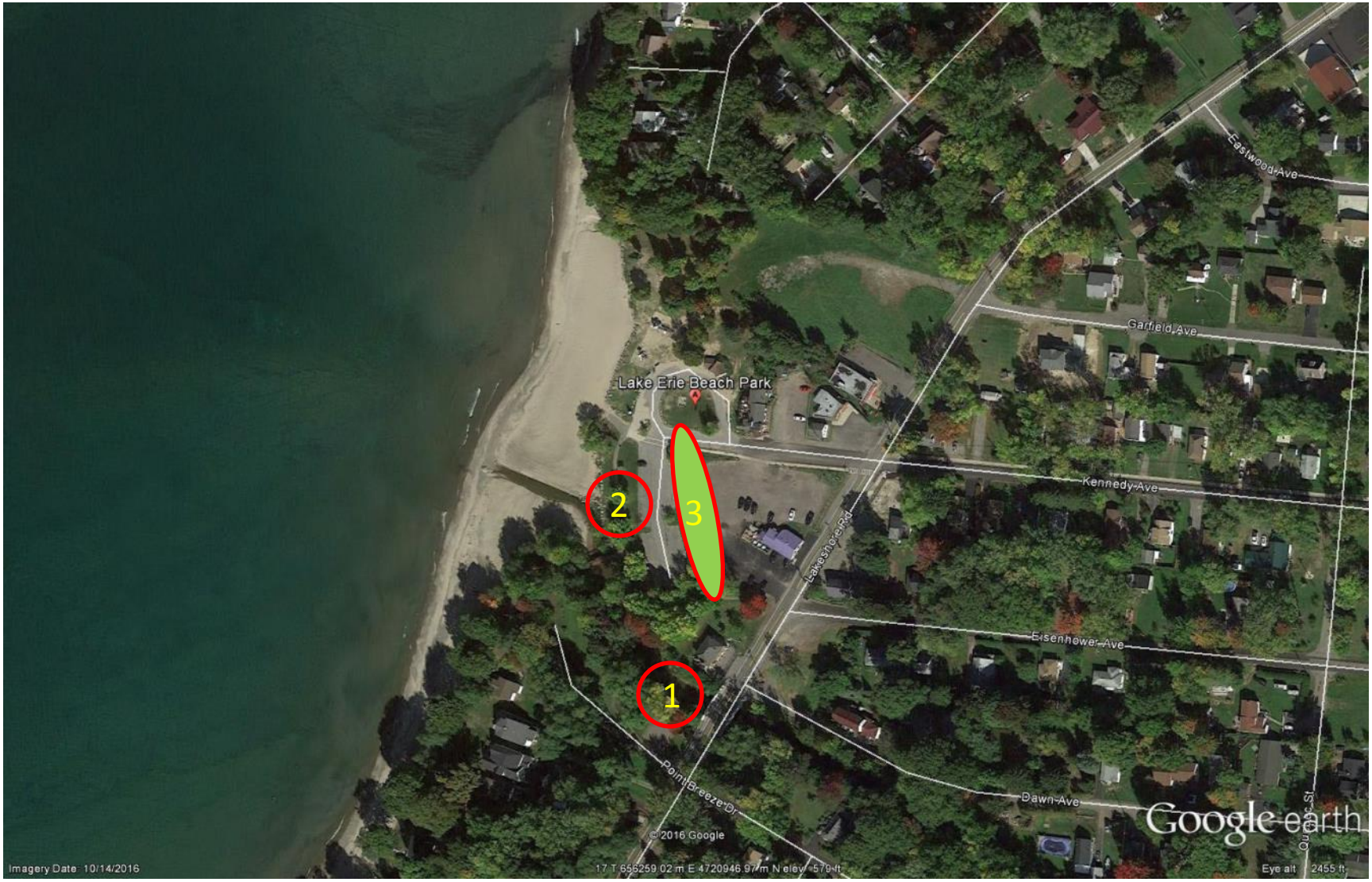
Site Evaluation & Design – Area 1: South Parking Lot

Pilot Projects: Lake Erie beach, Evans, NY

Site Evaluation & Design – Area 3: Main Parking Lot Swale



Pilot Projects: Lake Erie beach, Evans, NY

Site Evaluation & Design – Area 3: Main Parking Lot Swale

Pilot Projects: Lake Erie beach, Evans, NY

Site Evaluation & Design – Area 3: Main Parking Lot Swale

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Site Evaluation & Design – Area 3: Main Parking Lot Swale

Pilot Projects: Lake Erie beach, Evans, NY

Site Evaluation & Design – Summary

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  - 40-60% Nitrogen Removal
  - >75% Fecal Coliform Reduction

- Additional Benefits
  - Decreased Discharge Velocity & Volume
  - Increased Pervious Area
  - Aesthetic Improvement

Closing Comments

Image Source: Fairfax County, VA

Image Source: Soils.org

Closing Comments

Rain Gardens & Bioswales

Image Source: Sarah A. White, Nursery Extension Specialist, Clemson Extension Service

- Collect stormwater runoff from small areas
- Promote sediment removal through settling
- Infiltration of runoff, decreased discharge to streams/sewers
- Increase in infiltration through native plantings
- Convey stormwater runoff away from impervious surfaces
- Decrease flow velocities, erosion

Closing Comments

- Improves Water Quality
- Enhances Aesthetics
- Increases Biodiversity
- Opportunity to Educate the Public

Image Source: University of California, Santa Barbara

Q & A

Questions from the Audience

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