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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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
• Nine-element Watershed Management Plan for the Niagara River/Lake Erie Watershed

• Currently in Phase 3:
  o to assess completed water quality sampling by USGS and LEWPA
  o develop pollutant reduction goals
  o conduct stream assessments
  o determine implementation projects to achieve pollutant reduction targets.

• This will help direct water quality project implementation funds
Example implementation projects include:

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

<table>
<thead>
<tr>
<th>24.5 acres of land-based invasive species management</th>
<th>6,414 tons of sediment prevented from reaching waterways</th>
<th>14 watershed signs installed</th>
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</thead>
<tbody>
<tr>
<td>85.5 acres of stormwater treated annually</td>
<td>6,422 pounds of phosphorus prevented from reaching waterways</td>
<td>3,565 people educated</td>
</tr>
<tr>
<td>501 boats inspected for aquatic invasive species</td>
<td>47.4 acres hydroteed</td>
<td>6 feasibility studies completed</td>
</tr>
<tr>
<td>5,121 feet of stream bank and road bank stabilized</td>
<td>2,300 feet of streamside vegetated buffers planted</td>
<td>12,836 pounds of nitrogen prevented from reaching waterways</td>
</tr>
</tbody>
</table>
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

- 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

Image Source: The Nature Conservancy
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
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
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
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 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
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 – Summary

• Primary Benefits
  ➢ 25-50% TSS Removal
  ➢ 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

• 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

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