Green Infrastructure Solutions to Buffalo's Sewer Overflow Challenge

BUFFALO NIAGARA RIVERKEEPER®

With funding support from

The JOHN R. OISHEI Foundation

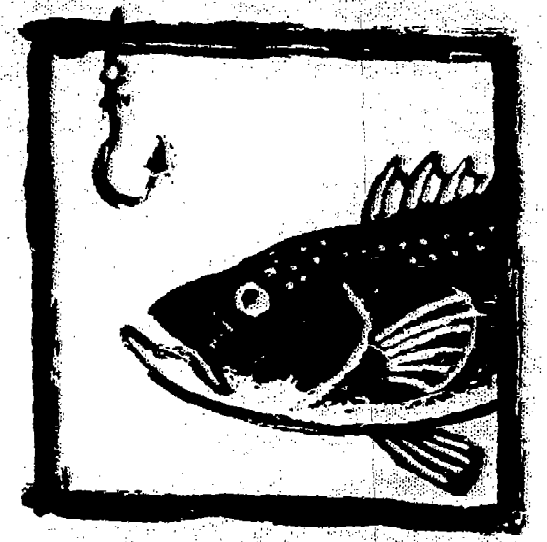
Community Foundation for Greater Buffalo

Role of Grassroots Organizations

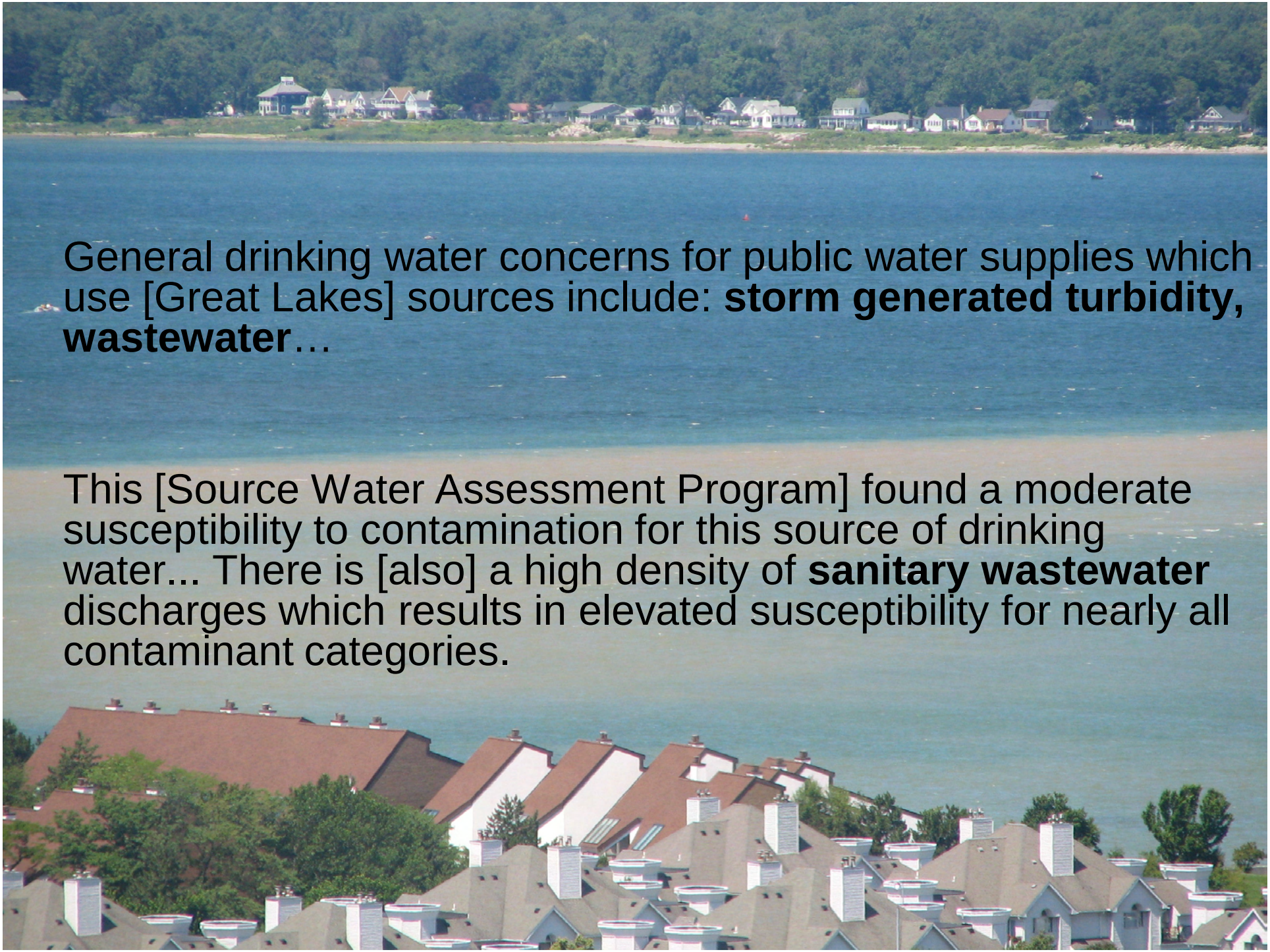
- **Local voice /Eye on the prize**
- Technical support (engineering, legal)
- Creativity (potential projects, partners, financing)
- Implementation assistance
- Diffusing tensions

SWIM

DRINK



FISH



General drinking water concerns for public water supplies which use [Great Lakes] sources include: **storm generated turbidity, wastewater**…

This [Source Water Assessment Program] found a moderate susceptibility to contamination for this source of drinking water... There is [also] a high density of **sanitary wastewater** discharges which results in elevated susceptibility for nearly all contaminant categories.


MAD RIVER CANOE


Decorative Lighting
Overlook Area
Proposed Naturalized Shoreline
Existing Grade
Proposed Shallow Water Zone
Remove Exisitng
13'
Reconstructed Riverwalk
Rip Rap
Wetland Plantings
Naturalized Waterfront Zone
Cross Section

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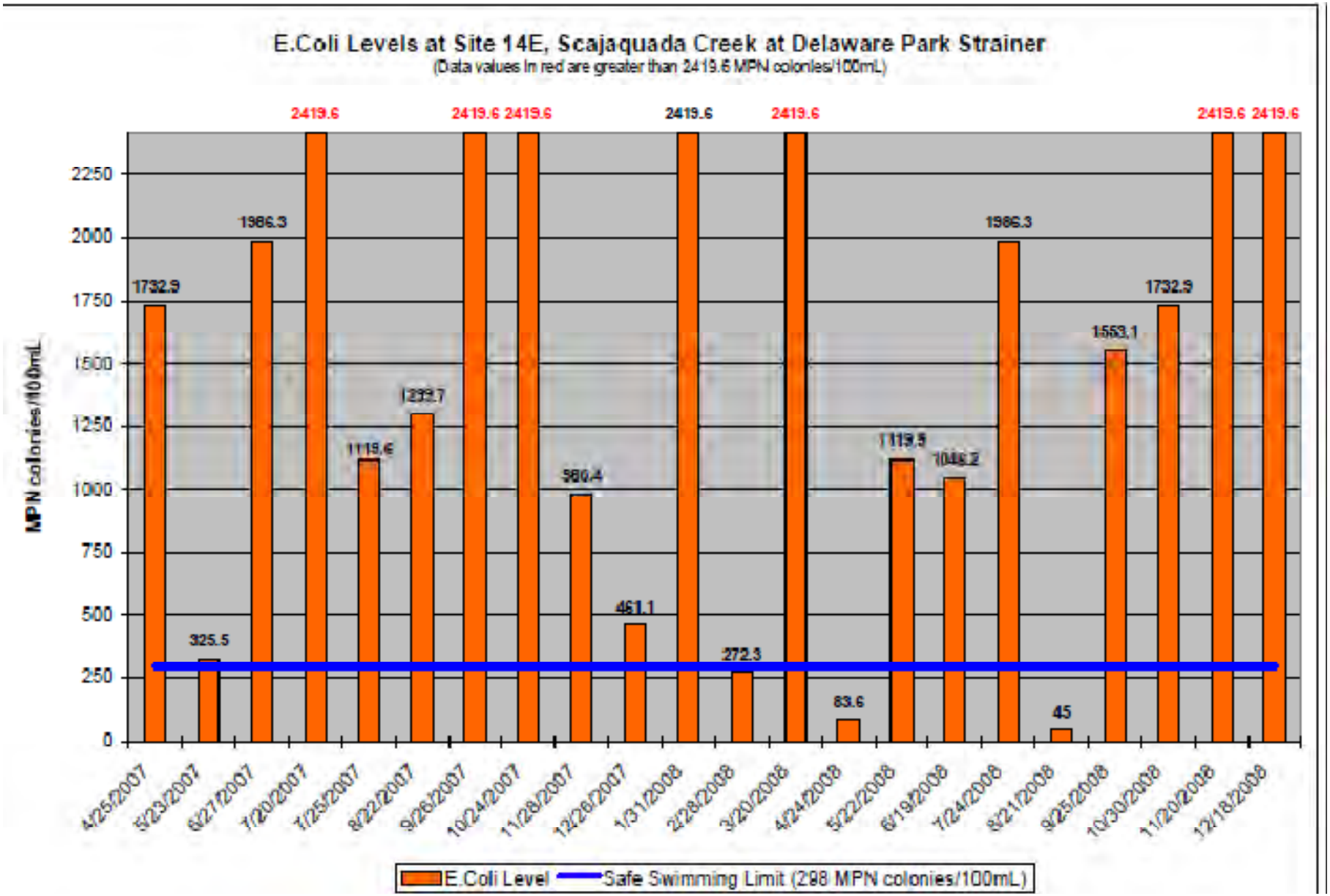
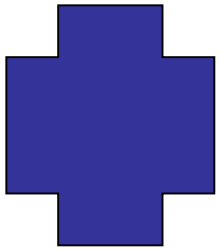
Early Technical Work

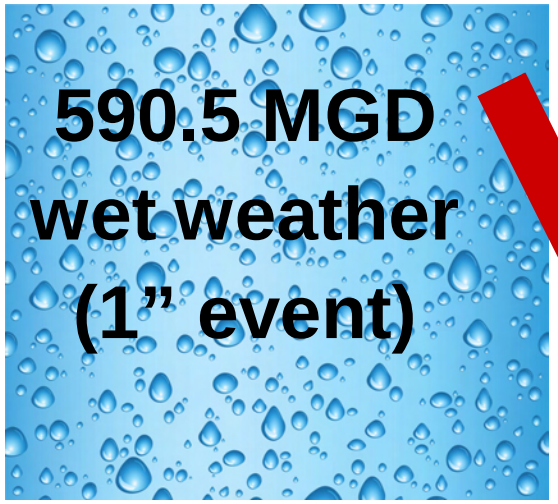
- Water Quality Sampling
- Definition of Stormwater Impacts
- Critique of traditional solutions
- Potential impacts of green infrastructure
- Legal agreement evolution


E.Coli Levels at Site 14E, Scajaquada Creek at Delaware Park Strainer
(Data values in red are greater than 2419.6 MPN colonies/100mL)
MPN colonies/100mL
0
250
500
750
1000
1250
1500
1750
2000
2250
2419.6
2419.6
2419.6
2419.6
2419.6
2419.6
2419.6
1986.3
1986.3
1732.9
1732.9
1553.1
1299.7
1119.6
1119.5
1046.2
980.4
461.1
325.5
272.3
83.6
45
4/25/2007
5/23/2007
6/27/2007
7/20/2007
7/25/2007
8/22/2007
9/26/2007
10/24/2007
11/28/2007
12/26/2007
1/31/2008
2/28/2008
3/20/2008
4/24/2008
5/22/2008
6/19/2008
7/24/2008
8/21/2008
9/25/2008
10/30/2008
11/20/2008
12/18/2008
E.Coli Level
Safe Swimming Limit (298 MPN colonies/100mL)

BSA Total Flow

150 MGD sanitary sewage = average dry flow





740.5 MGD
during wet weather
(1” event)

300 MGD
FULL

600 MGD
Partial

SEWAGE
TRTMNT

PLANT
CAPACITY

Major Problems with Sewer Separation

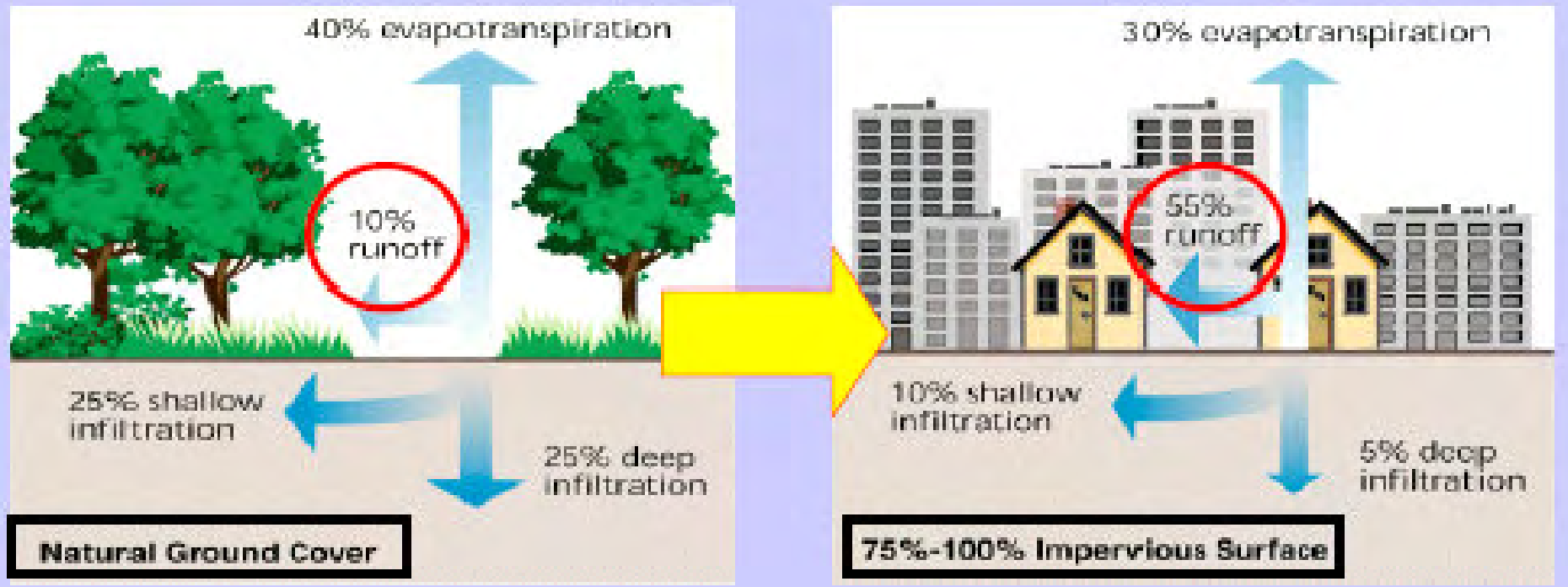
According to DEC's Priority Waterbodies List – BOTH sanitary waste and stormwater waste (urban runoff) are a source for pollution to BSA receiving water bodies

Sewer Separation directs more storm flow to local waterways than the combined sewer system – increasing nonpoint source pollution, erosion and flood potential

Weaknesses of Increasing Storage & Treatment capacity

- Inefficient on dry days
- Limited capacity on rainy days (10 year event target)
- Pollutes then cleans rain water
- Expensive to build
- No VISIBLE benefit
- No collateral environmental benefits

Continues to disrupt Great Lakes Groundwater Recharge & Climate Change Resilience



Images adapted from USEPA graphics

Potential Flow Reduction Aggressive Green Infrastructure Over 20 Years

- 60% residential downspout disconnect
- 70% reduction from commercial & industrial
- 60% green streets
- 90% schools/parks

45-50% FLOW REDUCTION During 95% of Wet weather Events (could be more)

BSA Total Flow

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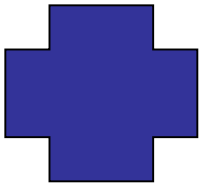
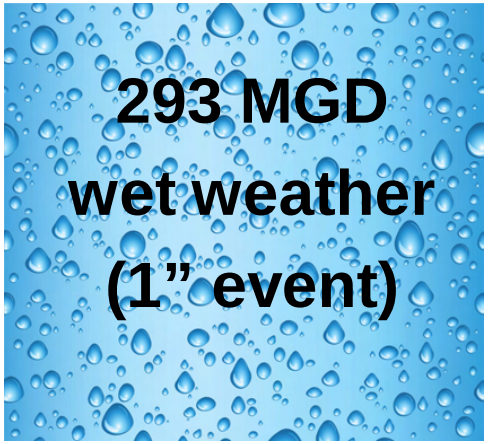
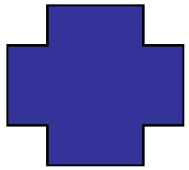




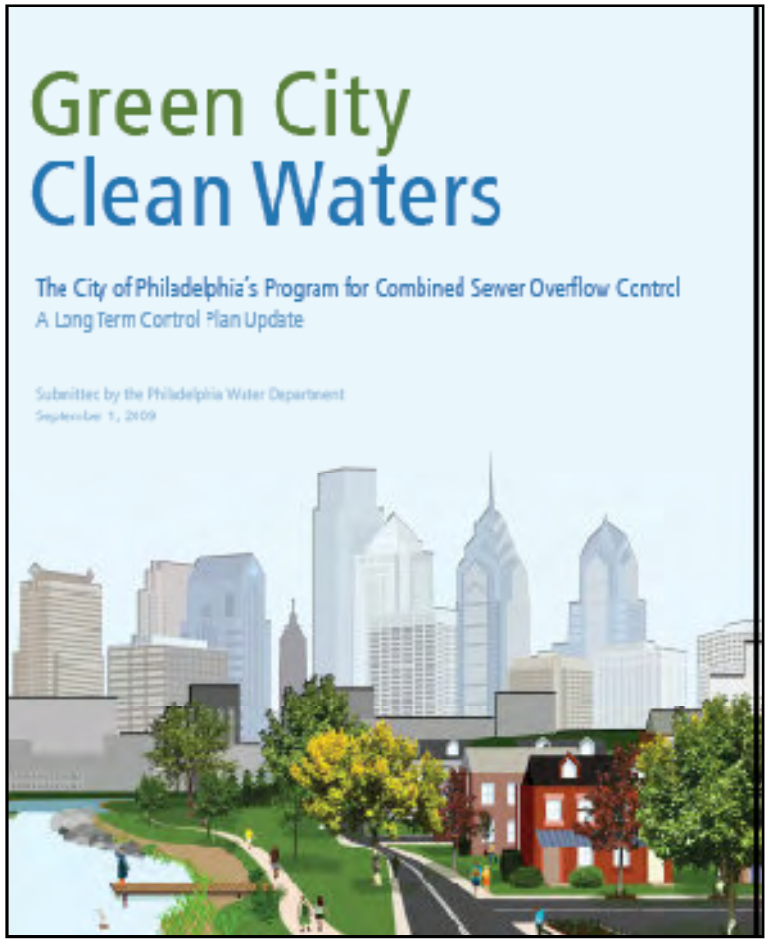


157 MGD sanitary sewage capacity **for sale to suburbs**

600 MGD
during wet weather
(1” event)

Four Major Models for Green Infrastructure for CSO LTCP Consent Decrees

- Philadelphia
- Syracuse
- Kansas City
- Cleveland



Common GI Legal Features

- Base system model that accurately connects land use, perviousness, precipitation and stormwater runoff with (complex) below ground system dynamics
- Performance criteria (95%+ wastewater capture)
- Code (stormwater regs and zoning) change to require infiltration for new and redevelopment
- List of preliminary green infrastructure retrofit projects, evaluation
- Mechanism for adaptive management
- Commitment to watershed based approaches to regional water quality improvements

Two Approaches

Commit to Grey	Commit to Grey
+ Pilot Green	+ Hard Commit to Green (MG managed)
+ Mechanism to Swap Green for Grey	+ Mechanism to Swap Green for Grey
(Syracuse/Kansas City)	(Cleveland)

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Financing

- Buffalo Sewer Authority sources
  - unrestricted, undesignated fund resources of $4+ million
  - five year capital plan funding currently estimated at $45 million over five years (ex SPP 240 project)
  - transfers to the City of Buffalo general fund of $2.9 + million per year – work with Mayor on Green Streets/Vacant Land Management?
  - rate restructuring to cover stormwater & improve equity
  - rate increases – Off set by recent property tax reduction?
  - contract renegotions with suburban customers

Financing Con’t

- City of Buffalo collaboration sources
  - Office of Strategic Planning
    - Zoning Code Changes
    - Brownfield Opportunity Area
  - department of public works funding for green streets
  - department of inspections funding for demolitions and vacant land management
  - Buffalo Municipal Housing Authority funding for stormwater management

Financing Con’t

State/Federal Funding Collaborations

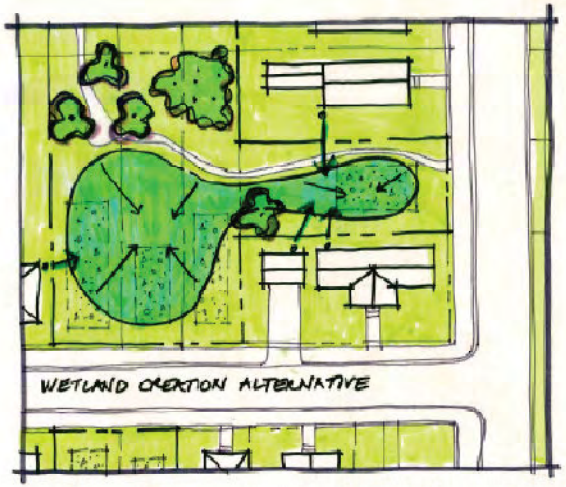
- HUD
- DOT
- Empire State Development including Erie Canal Harbor
- Dormitory Fund
- NYS DEC
- NYS Department of State Coastal Resources
- NYS Office of Parks, Historic Preservation

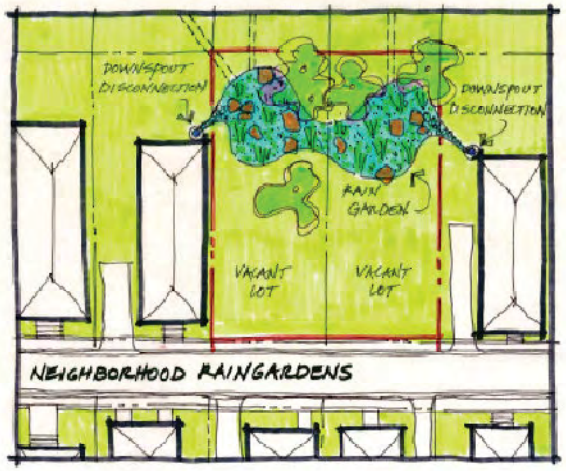
Downspout Disconnect

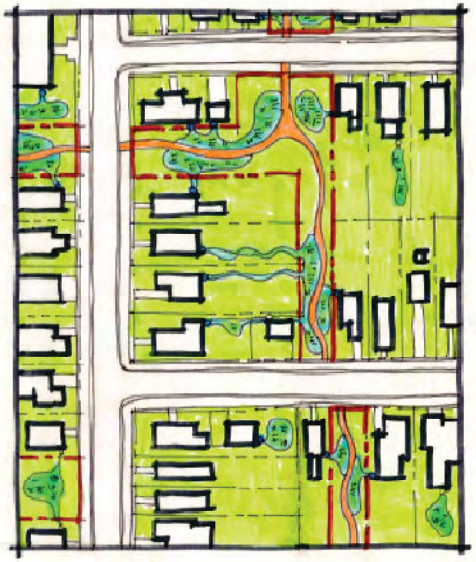
First Ward
Hamlin Park
Elmwood Village

Green Street Pilot: SPP 240/CSO 60

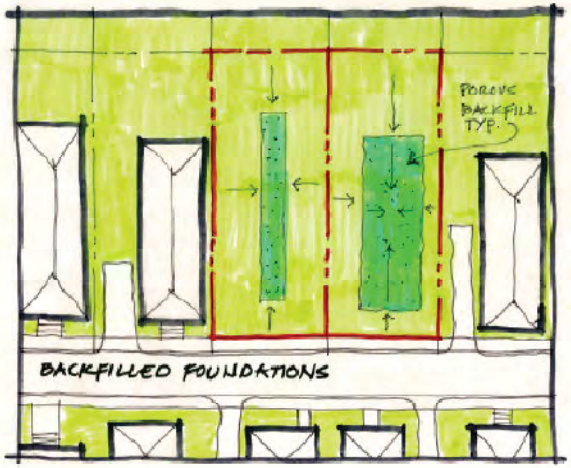
Vacant Land Management







URBAN TRAILS AND RAIN GARDENS UTILIZING CONTIGUOUS VACANT LAND PARCELS · DOWNSPOUT DISCONNECTIONS FEED RAINGARDENS



Source: Buffalo Niagara RIVERKEEPER

South Buffalo BOA – GLRI Award

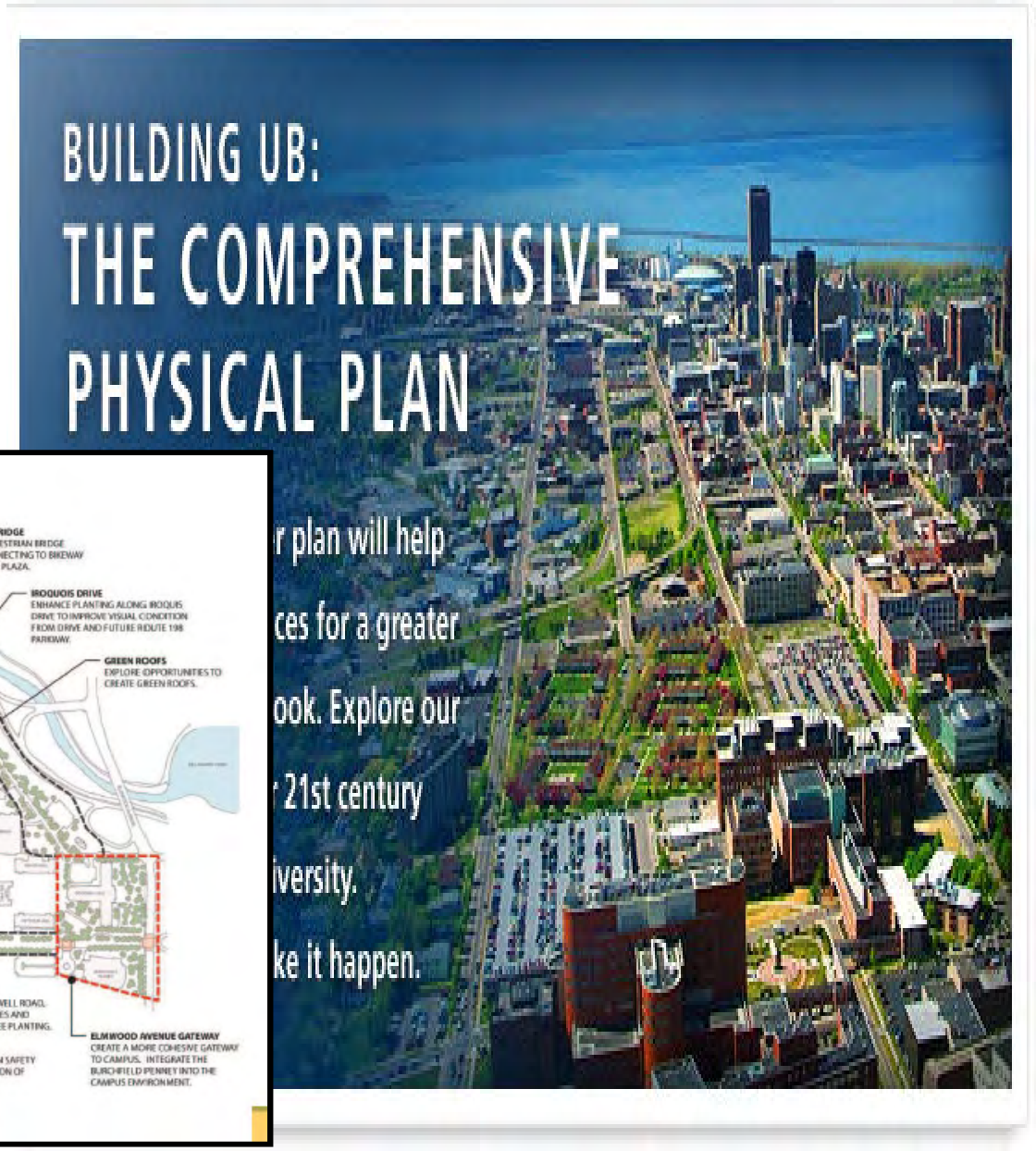

An Aerial of the Current Condition

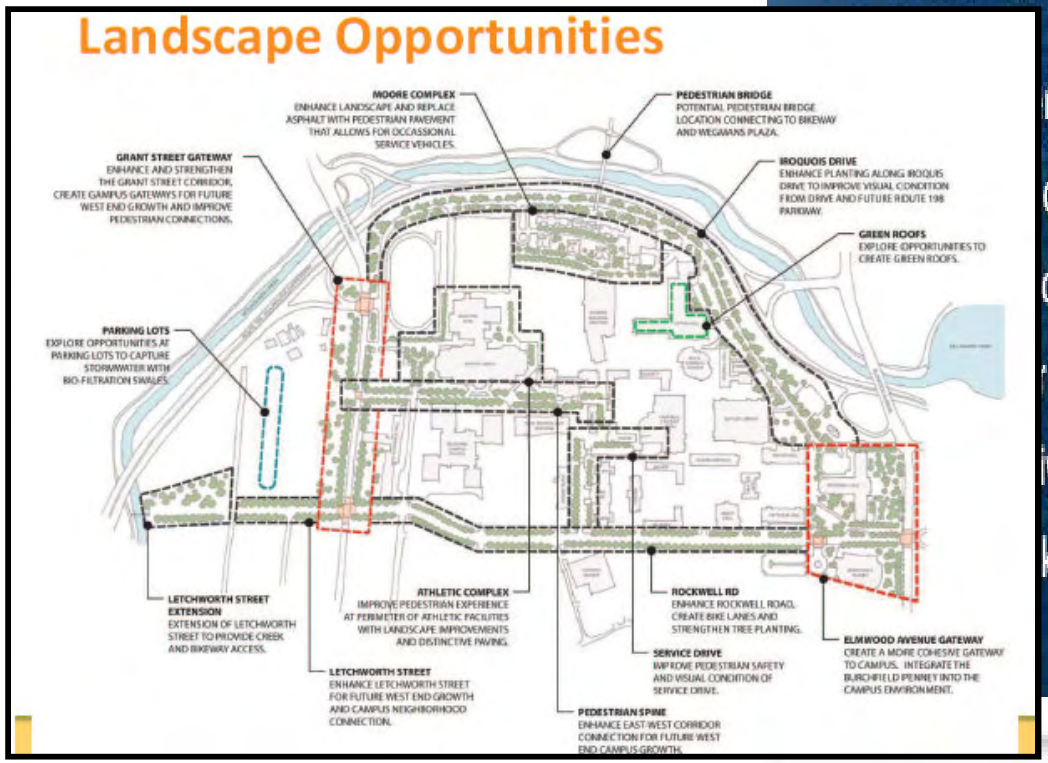

A Rendering of the Master Plan


Looking East Over the Riverbend Peninsula


Looking North Across the Golf Course and up Hopkins Street

SUNY Campuses



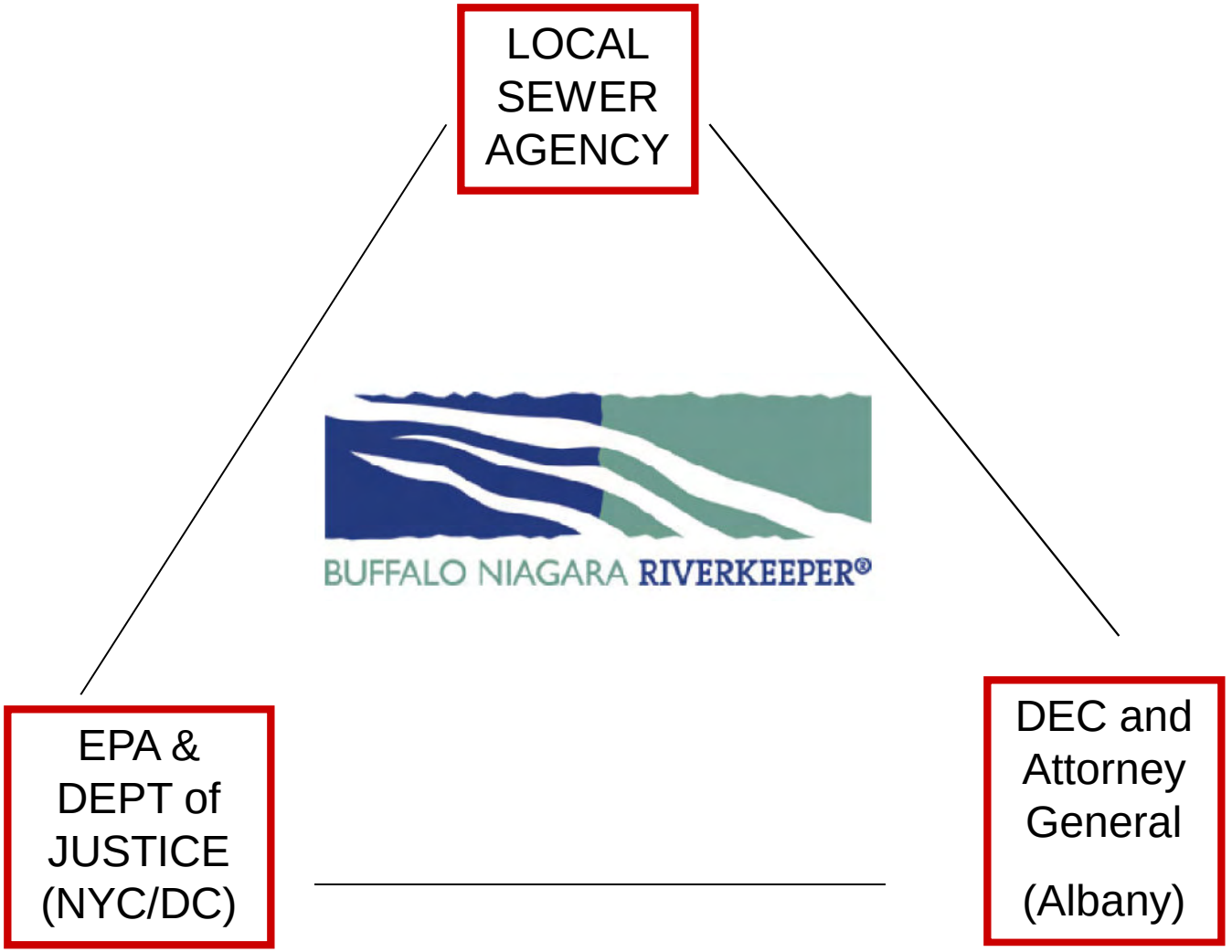


Campus: Buffalo Municipal Housing Authority

Empire State Development: Canalside

Peace Bridge Authority: Plaza

Diffusing Tension



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Examples of green infrastructure in Buffalo

Nichols School

This Rain Garden collects water from roofs and the sidewalks.

The porous parking lot helps to divert rain water from the sewer.

Green Roofs provide extra green space

HSBC Rain Garden

Native plants were used in this rain garden to project the beauty and show the importance of having green space within the city.

City of Niagara Falls Rain Garden

Rain gardens line the side of walkways in Niagara Falls, providing native plants while soaking up rainfall that would otherwise overwhelm the sewer system.

Parking Lot on Lafayette

This landscape consists of Bio Retention Cells. These cells collect stormwater runoff and purify it by 95% or more. All plants are native and were selected because they can withstand a wide variety of conditions.

Dulski Center/
Lovejoy Community Rain Garden

The T.J. Dulski Center in the Lovejoy neighborhood is another example of the low impact developments that have been implemented throughout the city.

Fox Tire

Located at 1035 William Street, this green roof combined with the disconnection of all downspouts makes Fox Tire green as can be!

BN Medical Campus