

Onondaga County Save the Rain: Balancing a Gray & Green Long Term Control Plan

Onondaga County Department of
Water Environment Protection
Tom Rhoads, PE Commissioner
12/10/2015



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Joanne M. Mahoney

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Presentation Overview

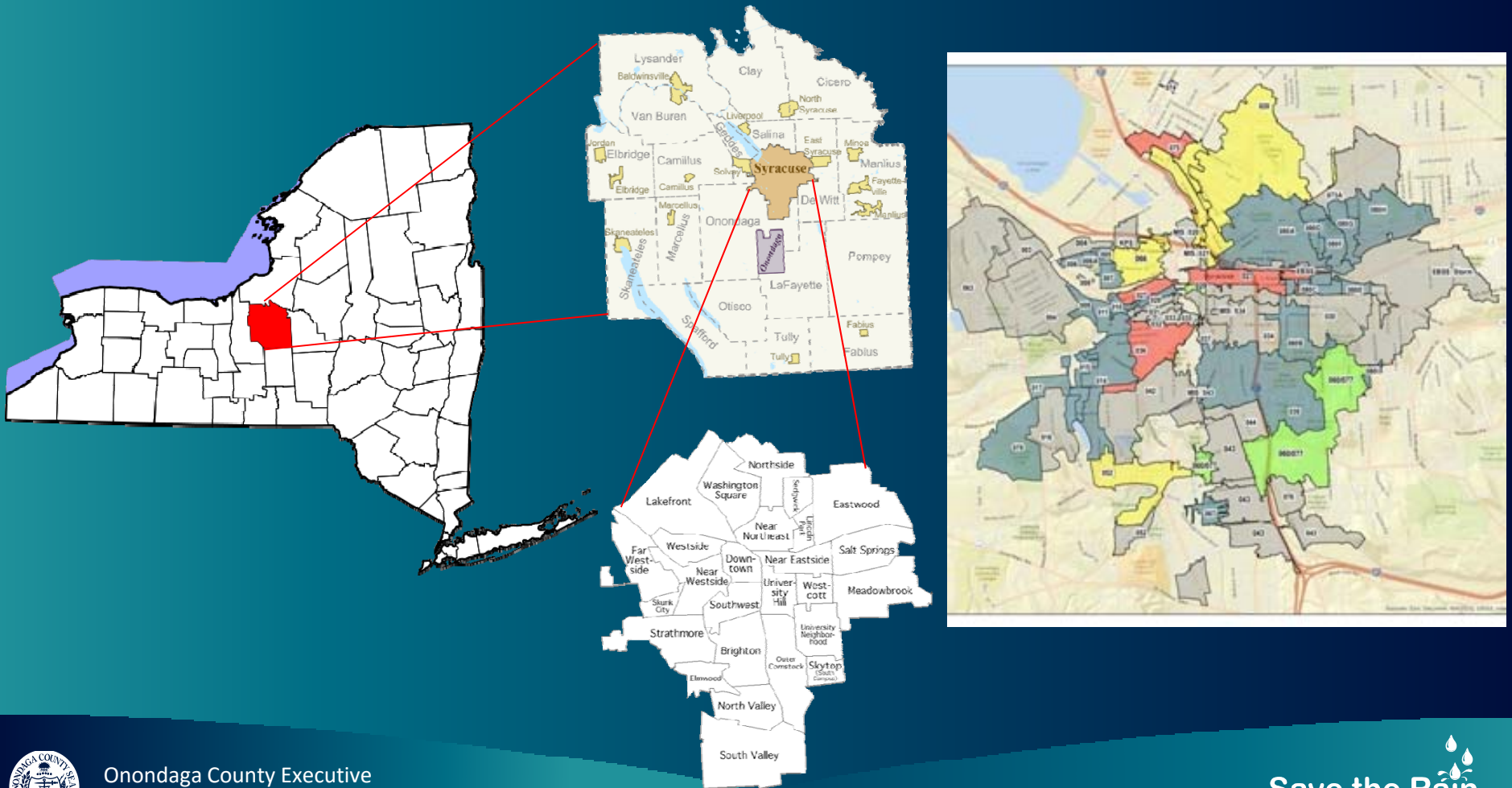
- Background Information & History
- Consent Judgment & Initial Projects
- Fourth Stipulation – Incorporating Green
- Build Your Brand – Save the Rain
- Balanced Program - Green and Gray Infrastructure
- Lessons Learned



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Onondaga County & City of Syracuse



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Metropolitan Information

- Onondaga County
 - Population: ~467,000 people
 - Land Area: 806 sq. mi. (2,088 sq. km)
 - Leadership: County Executive Joanne Mahoney; Onondaga County Legislature (17 members)
 - Operator Metro WWTP, SPDES permit holder, owns and operates trunk sewers & intercepting sewers
- City of Syracuse
 - Population: ~144,000 people
 - Land Area: 25.6 sq. mi (66.3 km²)
 - Leadership: Mayor Stephanie Miner; Syracuse Common Council (10 members)
 - Owns and maintains City sanitary collecting sewers; only combined sewers in the County system



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History

Onondaga Lake Facts

Watershed: 285 Square Miles

1 Mile Wide – 4.6 Miles Long

Average Depth: 35 feet

Max Depth: 63 feet

1940 – Swimming Banned

1970 – Fishing Banned

- 1988 – Atlantic States Legal Foundation files lawsuit against County
- 1998 – Amended Consent Judgment (ACJ)
- 2009 ACJ amended to authorize use of Green infrastructure



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ACJ Initial Projects

Original Consent Order planned to build four (4) Regional Treatment Facilities (RTFs) in neighborhoods and business districts



Initial Projects Opposed by Community Residents and Businesses



RTFs required large conveyance pipelines with significant community disruption, plus budget and schedule challenges



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Gray Infrastructure Program Summary 2009-2013

Gray Projects

- Harbor Brook Interceptor (ARRA)
- Midland RTF & Conveyances (CSO 044)
- Clinton Storage Facility
- Harbor Brook Storage Facility and Conveyances
- Erie Boulevard Storage System (EBSS) Gate Chamber #3 Improvement
- Sewer separation projects

Facilities Planning

- Floatable Controls via source control



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CSO Abatement Accomplishments 1998 - 2008

- Completed projects investing over \$350 million
- Completed 1 storage facility (Erie Blvd)
- Constructed 4 Floatables Control Facilities (HB, Franklin, Teall, Maltbie)
- Completed 2 Regional Treatment Facilities (Midland, Hiawatha)
- Separated and closed 12 CSO's
- Developed Initial Stormwater Management Model (SWMM)



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Gray Project Costs

(does not include cost for professional services)

- **Midland RTF and Conveyances** (5.5 MG Storage)

\$56,312,434 capital cost for RTF (2009 \$'s)

\$11,653,897 capital cost for Conveyances

\$1,809,802 Land Acquisition

120.1 MG CSO reduction (SWMM)
0.58 \$/gal

- **Clinton Storage Facility and Conveyances** (6.5 MG Storage)

\$18,552,508 capital cost for Conveyances

\$78,000,000 capital cost for storage facility

\$3,726,350 Land Acquisition

92.1 MG CSO reduction
1.09 \$/gal

- **HB Storage Facility and Conveyances** (4.9 MG Storage)

\$42,812,829 capital cost for
Storage and Conveyances

112.2 MG CSO reduction
0.38 \$/gal



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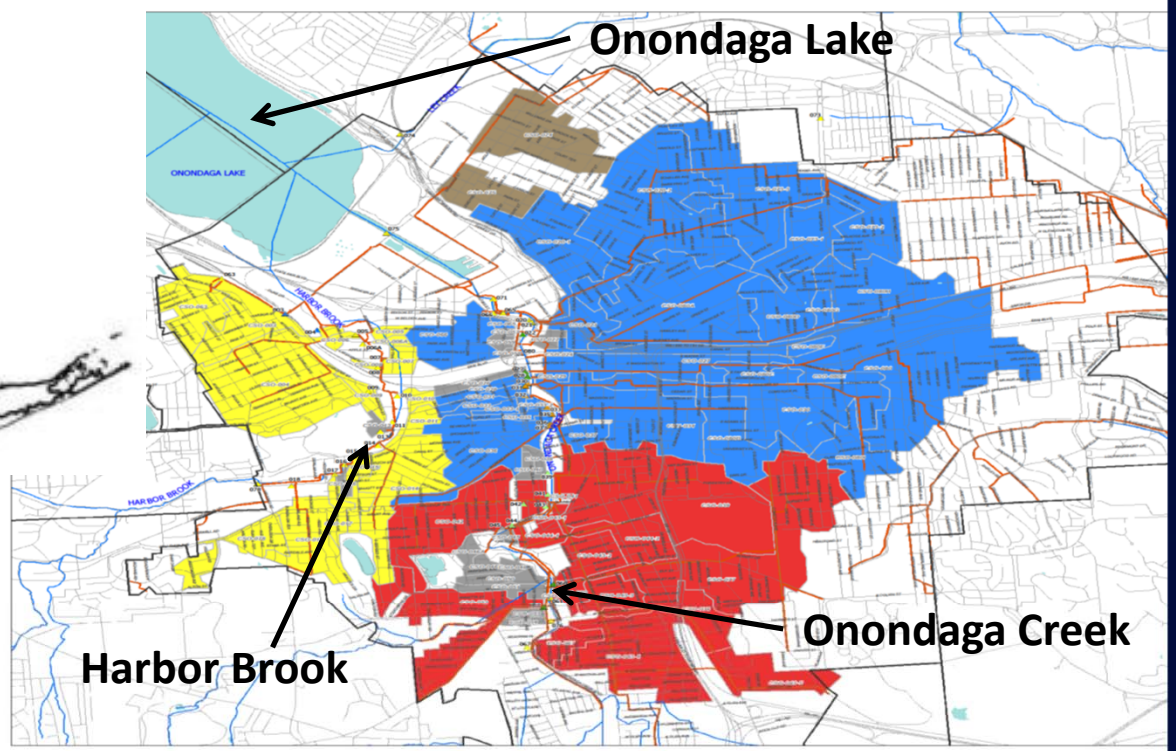
Fourth Stipulation to ACJ: America's First Green Infrastructure Consent Order

Onondaga County,
New York



City of Syracuse

- 7,660 acres
- 6.1 Billion Gallons Total Annual Combined Sewage Generated by the Metro Combined Sewer Service Area



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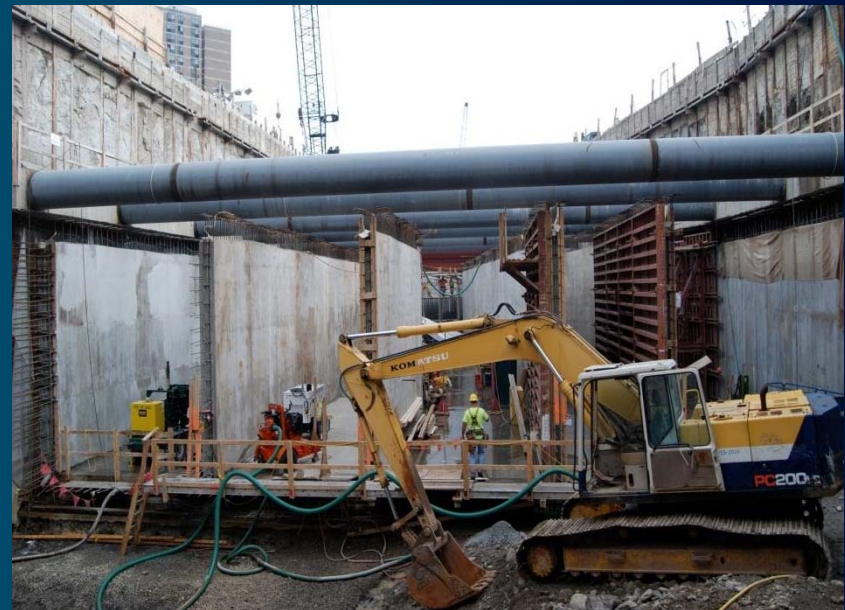
Fourth Stipulation to the ACJ (2009)

- Agreed to by all parties (State, ASLF, County)
- Authorized use of Green infrastructure
- Approved Storage Facilities in place of RTFs
- Included time extension for Construction, and Metro phosphorus effluent limit
- Balanced program provides additional water quality and community benefits
 - Improve Quality of Life (civic infrastructure investments),
Promote Sustainability (beyond stormwater), Cost Benefit/Efficiency



Clinton CSO Storage Project

- Constructed on site & in lieu of planned Regional High Rate Treatment Facility
- Incorporated GI green roof, bioswales and captured stormwater for flushing storage tanks
- Saved \$15.7 million capital and \$230k per year O&M compared to Regional Treatment option



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Harbor Brook CSO Storage Project

- Located at site of planned RTF
- 4.9 MG underground storage, gravity in, pump out
- Grit and screenings removal, odor control, flushing with stormwater
- Construction \$42 million



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Storage compared to Regional High Rate Treatment Facilities

Storage

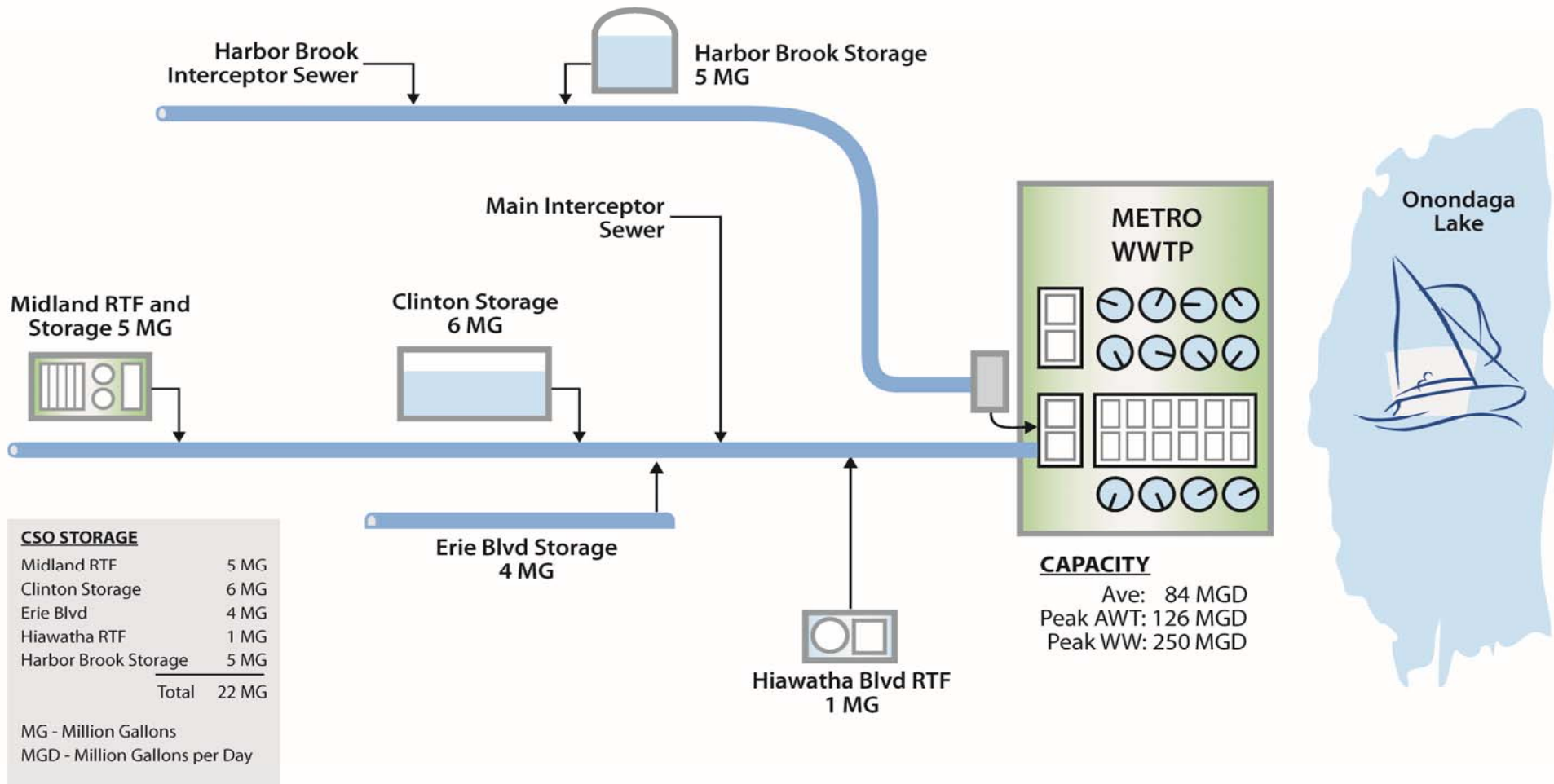
- Each gallon stored can receive full treatment (TSS,BOD, ammonia, phosphorus removal and UV)
- Low Chemical Usage
- Lower Energy Requirements
- Easier to operate and maintain
- Facilities can be mostly underground

High Rate Treatment

- Can treat higher intensity events and back to back events but at much lower treatment levels
- High Chemical Usage
- High Energy Costs (large pumps, high demand charges, large electrical usage)
- Need to respond to events quickly; complex controls
- Facilities above ground and underground



Managing Storage and Treatment



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Build Your Brand – Save the Rain

- Lots of \$\$\$'s – *constantly communicate vision and values*
- U.S. Water Prize
- NYS Environmental Excellence Award
- APWA Environmental Project of the Year
- StormWater Solutions Magazine Top Stormwater Project (Rosamond Gifford Zoo)
- American Academy of Environmental Engineers Honor Award



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2013 US Water Prize Ceremony
Washington DC



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Balanced Program brings Benefits to Gray Infrastructure

- **GI removes Stormwater at source**
 - Avoids cost of conveyance, pumping and treating - \$2 per 1000 gallons avoided
 - Capacity in system and WWTP can be used to increase CSO capture and treatment with gray infrastructure
- **Expands and Improves Gray Infrastructure Options (storage)**
- **Green/Gray Projects focus on best of both**



Gray Infrastructure opportunities with balanced program

- CSO Storage becomes More Feasible When combined with Green
 - ✓ Storage sized to fit the Space Available and balanced with Green Infrastructure to capture design storm
 - ✓ Storage Volume can be managed
- Partial Sewer Separation can be combined with GI
- Smart use of existing infrastructure with Balanced Program
- Gray projects incorporate green components to enhance sustainability and community acceptance



Go Green

- Co-benefits of green
- Go all in – program approach
- Partnerships: road reconstruction, parks, libraries, schools, public parking, extra wide streets
- Recurring meetings
- Public brand
- Bundle with gray to extend PPU in SRF
- Private project funding



Going green at the Zoo; and less extreme works too



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Multiple Green Co-Benefits

- CSO Reductions
- Water Quality Improvements
- Regulatory Compliance
- Sewer Infrastructure Rehabilitation
- Civic Infrastructure Rehabilitation
- Community Interest and Support
- Voluntary Community Infrastructure Contributions (Rain Barrels, Rain Gardens, Tree Planting)
- Integrated planning process consistent with EPA vision
- Saves Money



Harbor Brook CSO Treatment Wetland



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Why a Balanced Approach is Better

- **Saving over \$20M in capital cost** and reducing life cycle costs; **improved community assets** (sewers, roads, parking lots, roofing systems, vacant lots, parks, schools, and more)
- Revised program moved Green Infrastructure to **front of program**, implements a **smarter gray program**, extended compliance schedule by 5 years
- Environmental Benefit to lake and tributaries is **visible to Community**; able to appreciate why their utility rates have increased
- Green Infrastructure is at a neighborhood scale, building sense of community
- Integrated planning process consistent with EPA policy goals



Red Tailed Hawk at
Harbor Brook
CSO Treatment Wetland



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Lessons Learned:

Start Your LTCP with a Knowledge Base

- Data – flow, overflow, and rainfall
- Sewer system info - physical survey of outfall weirs and regulators
- SWMM – before, during and after
 - % capture, volume, & frequency
 - System optimization
- Municipal data – road reconstruction schedules, utility data, soils info, geotech background, % impervious, vacant lots, contaminated soils, etc.
- Preconstruction WQ - monitoring
- Communications - Municipal and neighborhood contacts
 - Develop recurring meetings
 - Build brand; transparent & responsive



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Lessons Learned:

Long Term Control Plan

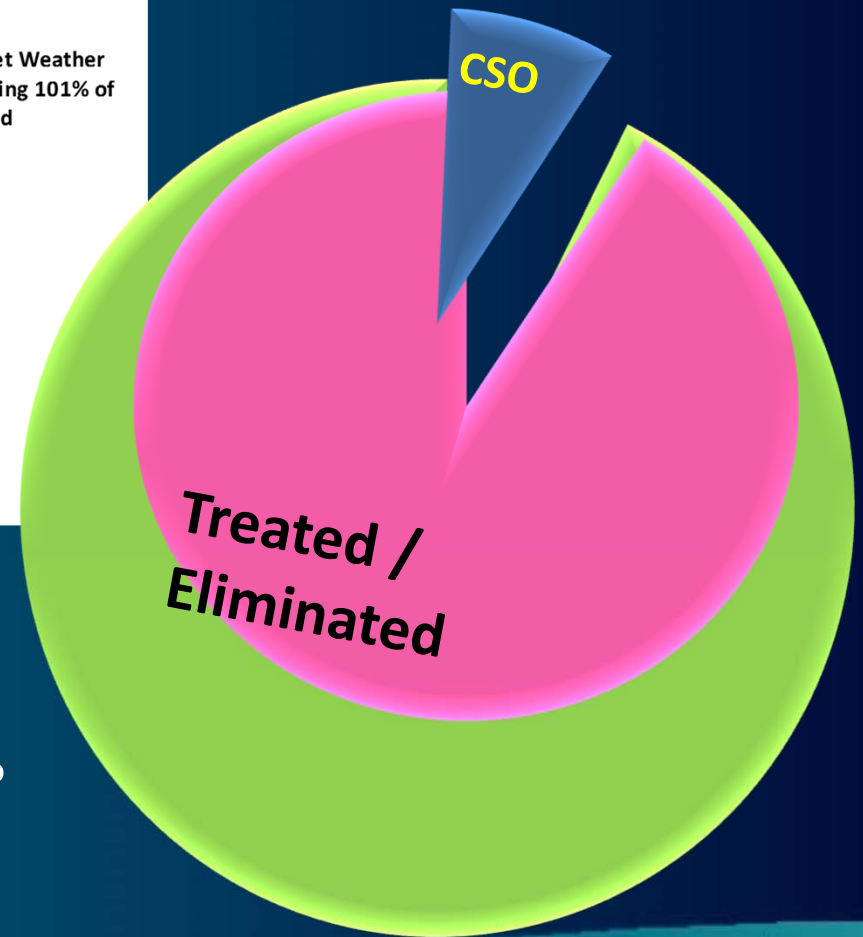
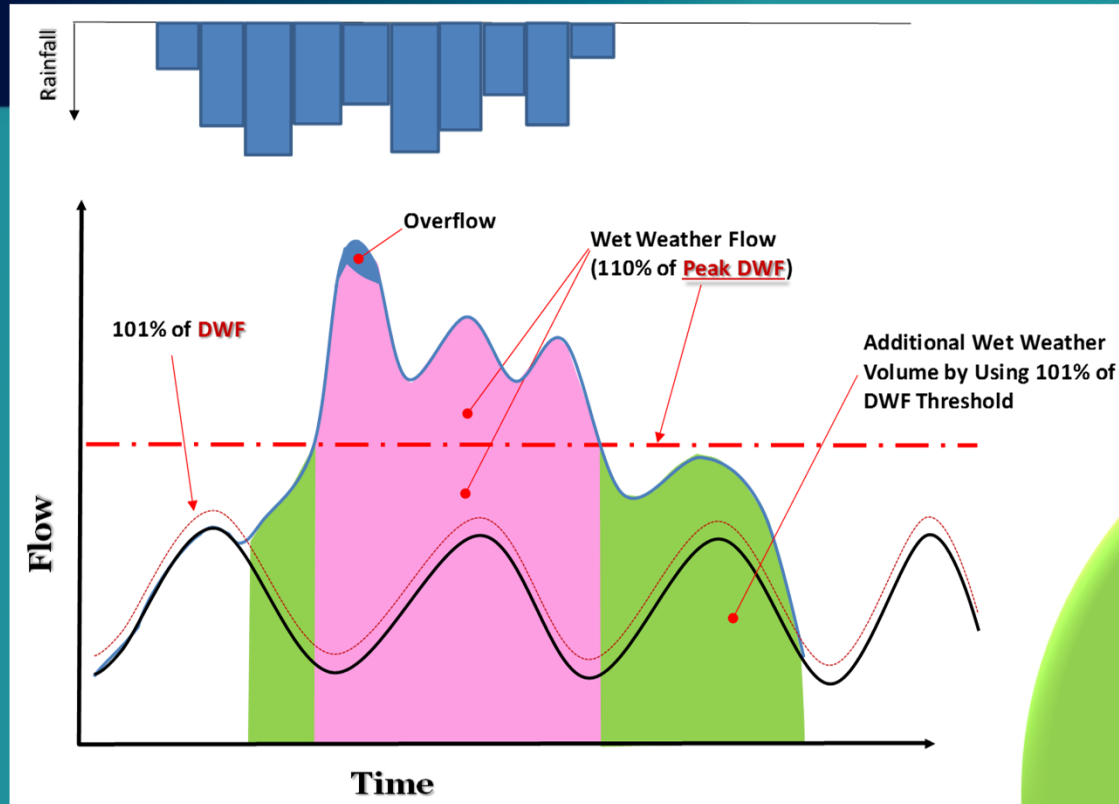
- Clear baseline & expectations
 - Base year rainfall
 - Capture definitions
 - Project completion
- Flexibility – we all want to get smarter and in 20 years it happens! Prepare for it.
- Stakeholders and understandings change
- Schedule float (approvals, municipal coordination, public interaction, & unanticipated challenges)
- Manage Other Assets & CSOs



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Annual Capture Methodology



Expectations and Definitions:

How do we agree on what percent capture means?

How do we agree on base year precipitation?



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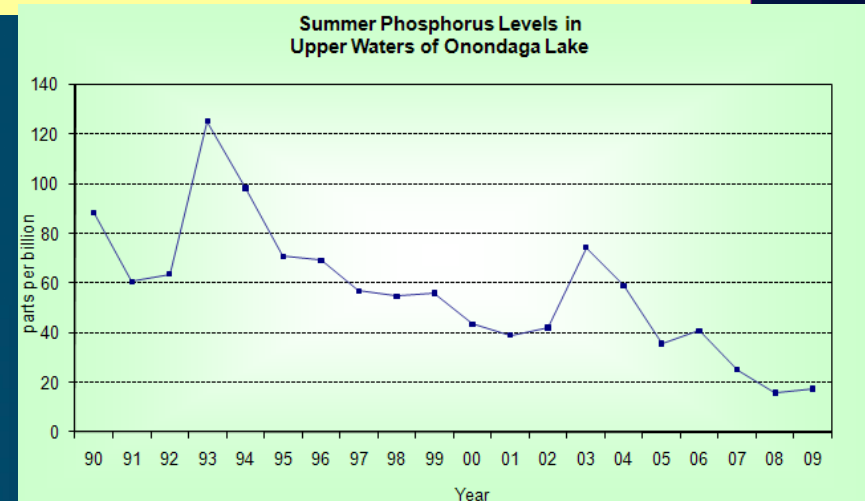
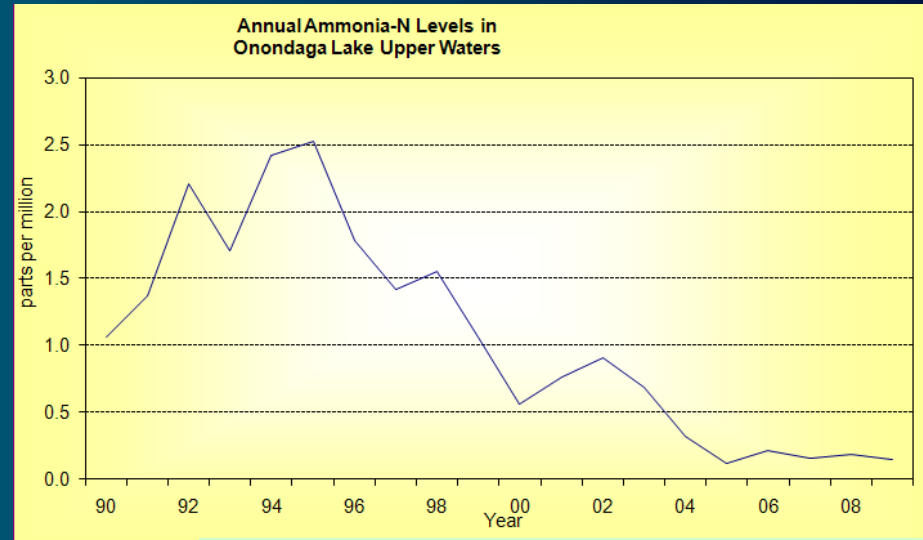
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Build a Control Plan That Considers System as well as CSO Abatement



Ammonia decreased from 8,000 pounds per day (ppd) to less than 50 ppd

Phosphorus decreased from 300 ppd to 50 ppd



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Lessons

Learned: Green

- Forebays! for green (and gray)
- Green requires a champion
- Porous asphalt great, porous concrete not as great
- Neighborhood approach and partnership = huge opportunity
- Bundle green and gray to extend Period of Probable Usefulness (PPU) for SRF
- Program management enables flexibility and creates unanticipated wins
- Green maintenance isn't all about more, but it is different



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More Lessons Learned

- PCCM also means Pre-Construction Monitoring
- Don't let floatables wag the dog
- Neighborhood approach and partnership = huge opportunity
- Become fluent in SWMM (base year, definition of capture, LID modeling, model calibration, etc)
- CSO stuff is very expensive, system asset management planning is critical, become fluent in Financial Capability Analysis (FCA)



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Questions? Additional information

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