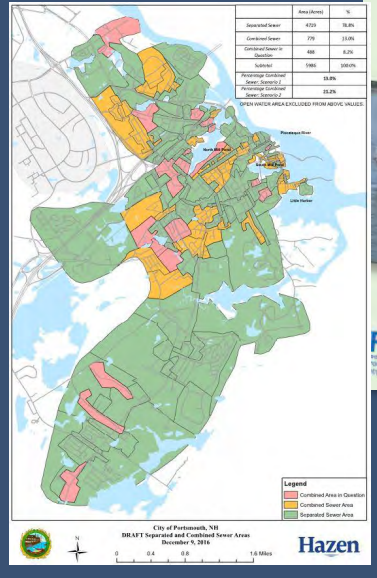
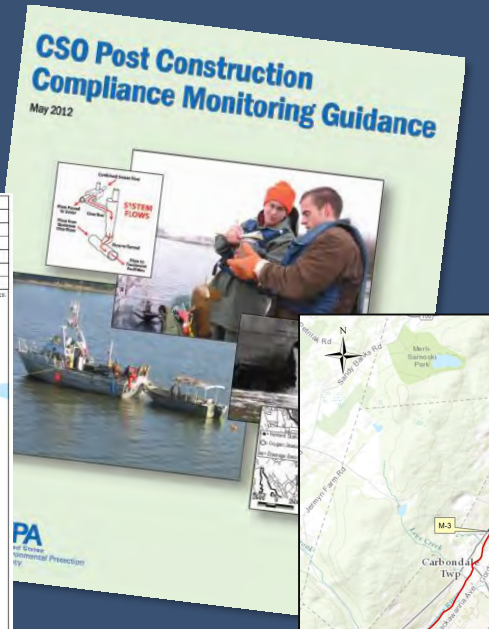
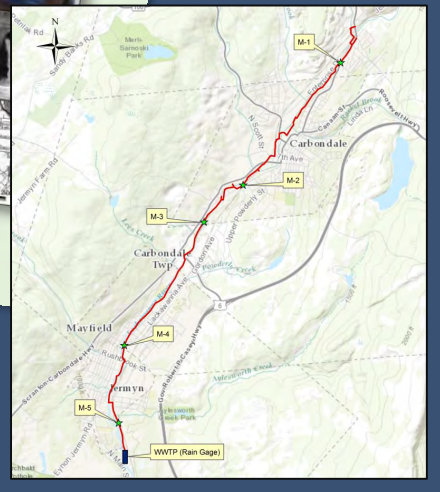
Hazen

Your CSO Long-Term Control Plan is Constructed… What Happens Next?



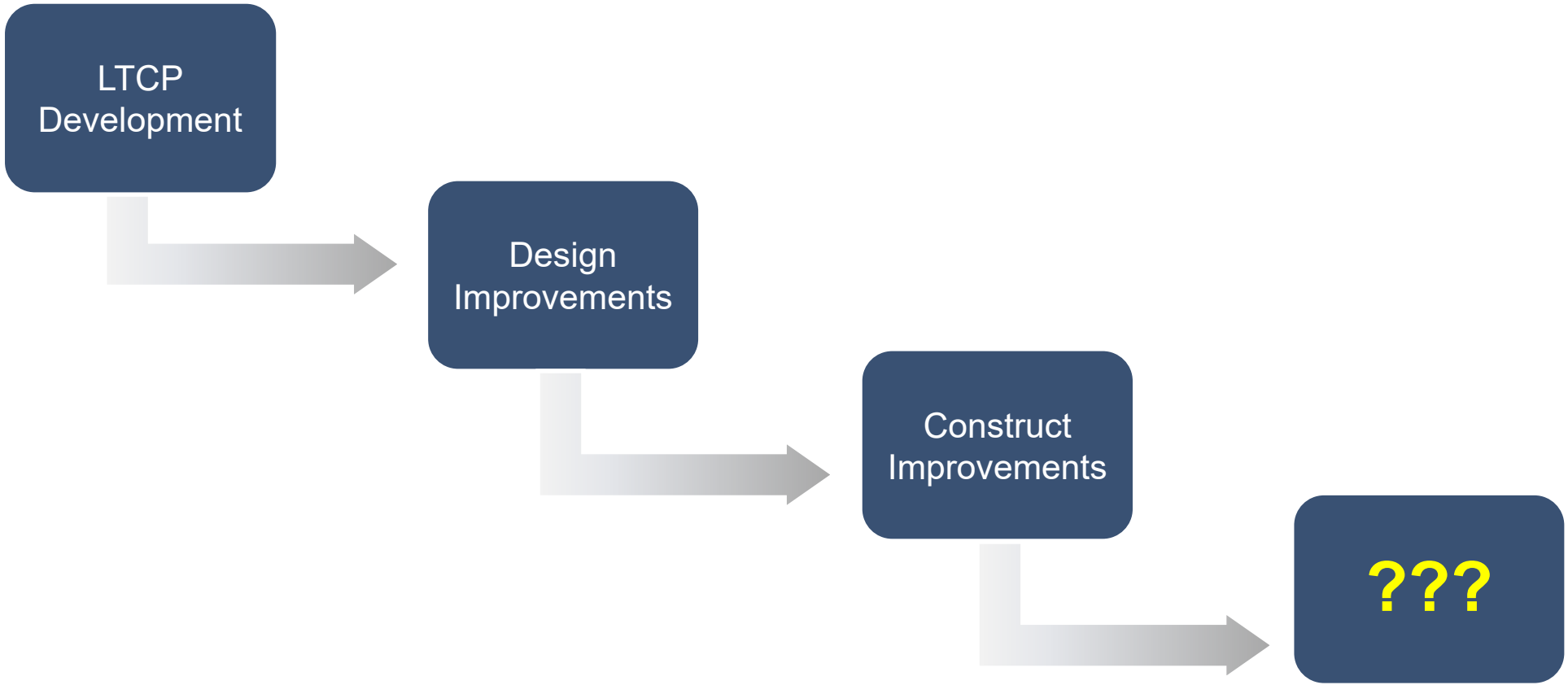




January 27, 2020
Charles Wilson, PE

NEW ENGLAND WATER ENVIRONMENT ASSOCIATION
NEWEA
WORKING FOR WATER QUALITY

Typical Workflow…



EPA Policy on PCMPs

- "…verify compliance with water quality standards…"
- "…ascertain effectiveness of CSO controls…"
- Not prescriptive
- Often in NPDES permits

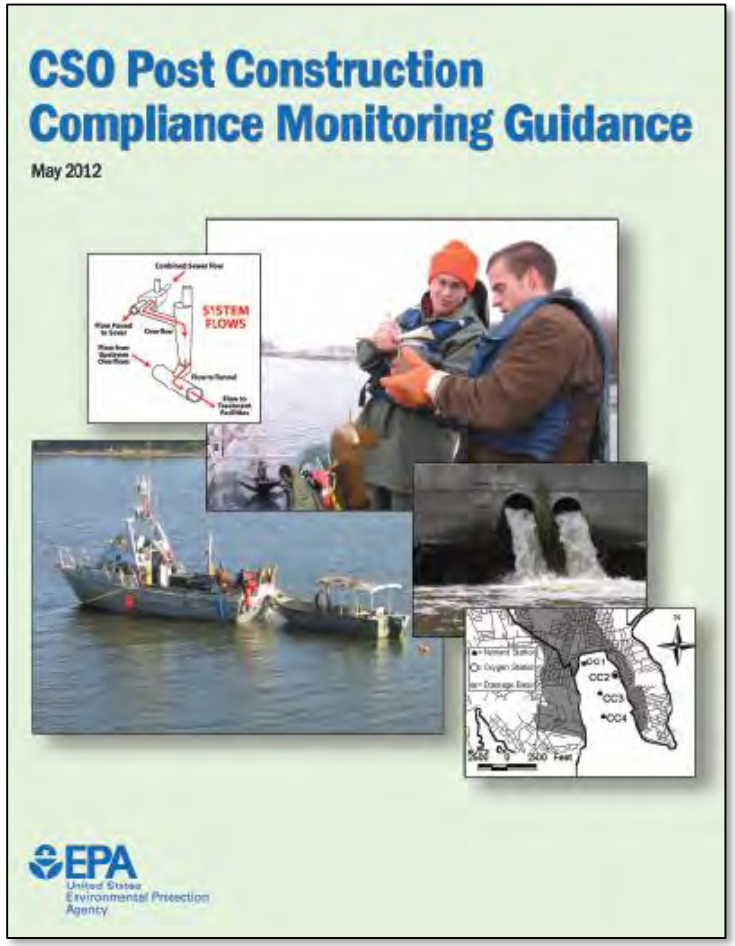
9. Post-Construction Compliance Monitoring Program

The selected CSO controls should include a post-construction water quality monitoring program adequate to verify compliance with water quality standards and protection of designated uses as well as to ascertain the effectiveness of CSO controls. This water quality compliance monitoring program should include a plan to be approved by the NPDES authority that details the monitoring protocols to be followed, including the necessary effluent and ambient monitoring and, where appropriate, other monitoring protocols such as biological assessments, whole effluent toxicity testing, and sediment sampling.

Source: Federal Register, EPA, 1994

EPA 2012 PCMP Guidance

- Variety of methods
  - Monitoring
  - Modeling
- Demonstration vs Presumption
- Annual average basis



Overall PCMP Approaches

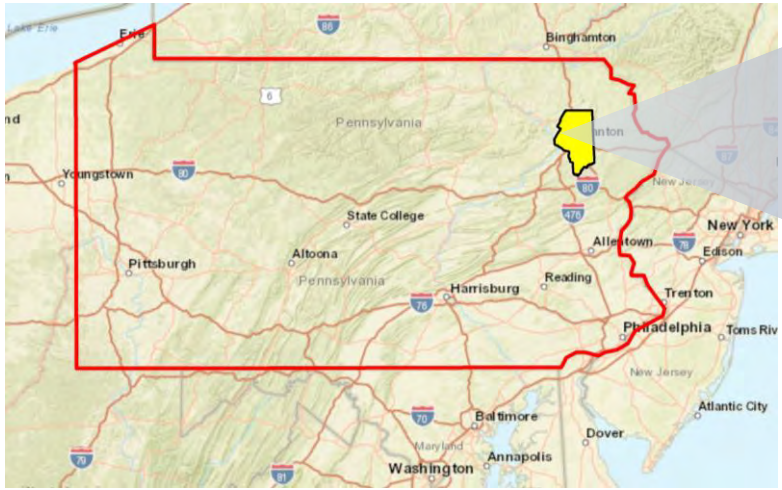
- Water quality monitoring
  - Can be expensive
  - Sampling may be difficult
- Sewer system modeling
  - Cost-effective
  - Calibrated sewer system model required

Case Studies

- Lackawanna County, PA
- Portsmouth, NH
- New York City, NY

Case Study – Lackawanna River Basin Sewer Authority

- 15 communities in Lackawanna County, PA
- Requirement to verify at least 85% capture of wet weather flow



3 WWTPs

71 miles of sewer

9 pump stations

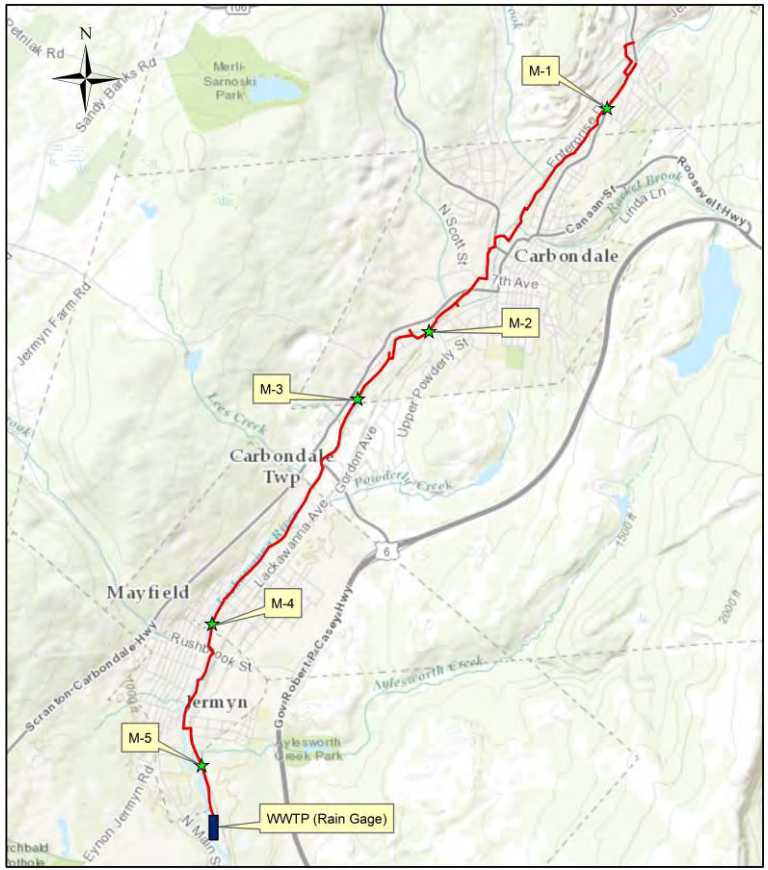
Case Study – Lackawanna River Basin Sewer Authority

Approach

1. Sewer system flow and rainfall monitoring
2. Hydraulic model development
3. Typical year continuous simulation
4. Calculation of wet weather capture

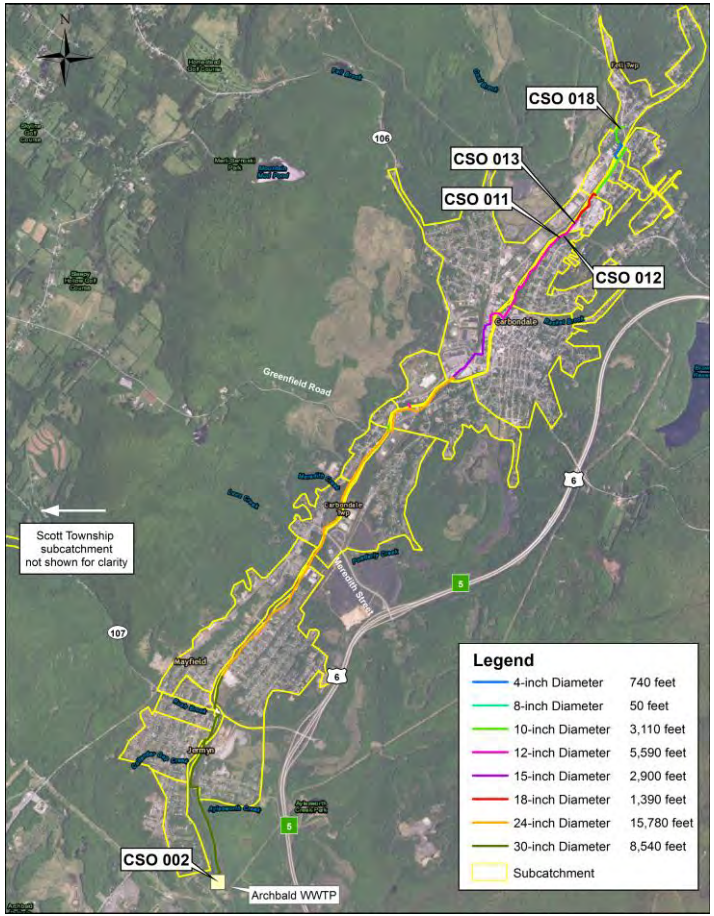
Flow/Rainfall Monitoring

- 5 flow meters
- 1 rain gauge
- 3 months
- 9/6/16 to 12/5/16



Model Development

- Hydraulics
  - Pipe Diameter
  - Pipe Invert
  - Manhole Rim
- Hydrology
  - Sewered Area
  - Dry weather flow
  - Runoff parameters



Model Simulations

- Continuous “typical year” simulation
- Average annual CSO volume predicted
- Calculate fraction of flow generated in the system during wet weather that is conveyed to the WWTP

$$\%\ capture = 1 - \left[\frac{CSO}{RAINFALL\ RUNOFF + DRY\ WEATHER\ VOLUME}\right]$$

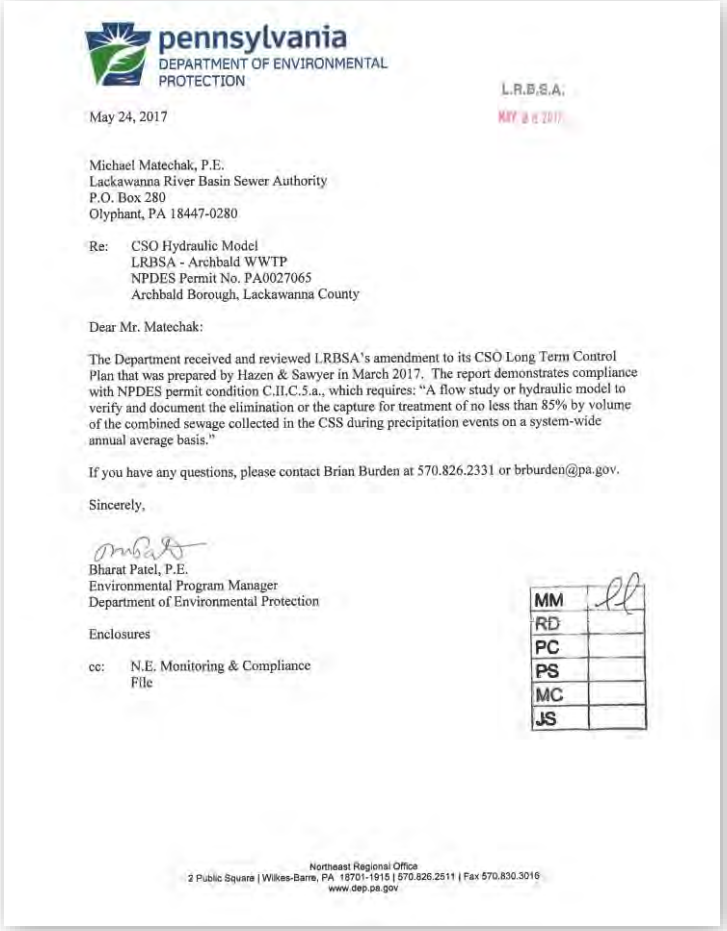
Results

Item	Value
Average Dry Weather Flow Rate for System	2.30 mgd
Annual Dry Weather Volume During Wet Weather	96.6 MG
Annual CSO Volume	2.5 MG
Rainfall Runoff	56.7 MG
Wet Weather Capture	98.4%

Sensitivity test: 26 MG CSO required to bring % capture down to 85%!

Results

- PADEP approval
- NPDES requirements for percent capture don't have to be burdensome
- Efficient tools can help speed things up
  - Data processing
  - Modeling
- Percent capture is relatively easy to assess



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

L.R.B.S.A.
MAY 8 2017

May 24, 2017

Michael Matechak, P.E.
Lackawanna River Basin Sewer Authority
P.O. Box 280
Olyphant, PA 18447-0280

Re: CSO Hydraulic Model
LRBSA - Archbald WWTP
NPDES Permit No. PA0027065
Archbald Borough, Lackawanna County

Dear Mr. Matechak:

The Department received and reviewed LRBSA's amendment to its CSO Long Term Control Plan that was prepared by Hazen & Sawyer in March 2017. The report demonstrates compliance with NPDES permit condition C.II.C.5.a., which requires: "A flow study or hydraulic model to verify and document the elimination or the capture for treatment of no less than 85% by volume of the combined sewage collected in the CSS during precipitation events on a system-wide annual average basis."

If you have any questions, please contact Brian Burden at 570.826.2331 or brburden@pa.gov.

Sincerely,

Bharat Patel, P.E.
Environmental Program Manager
Department of Environmental Protection

Enclosures

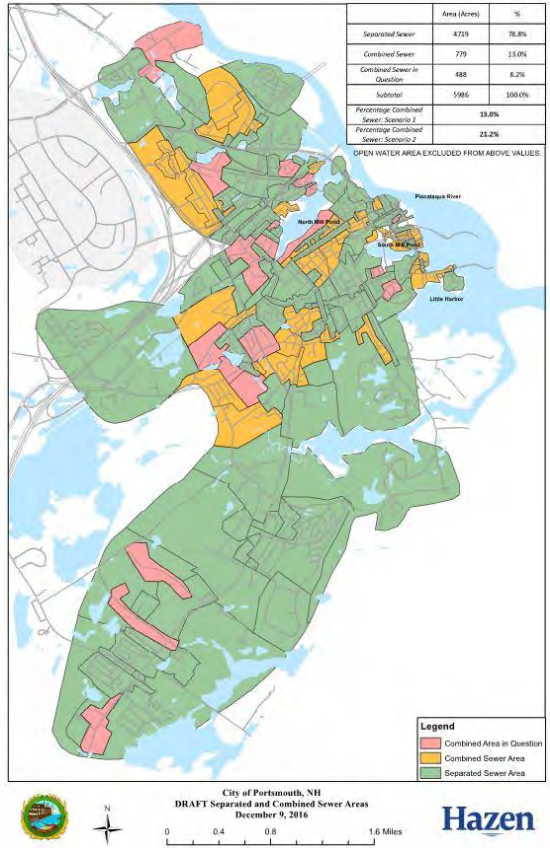
cc: N.E. Monitoring & Compliance
File

MM	
RD	
PC	
PS	
MC	
JS	

Northeast Regional Office
2 Public Square | Wilkes-Barre, PA 18701-1915 | 570.826.2511 | Fax 570.830.3016
www.dep.pa.gov

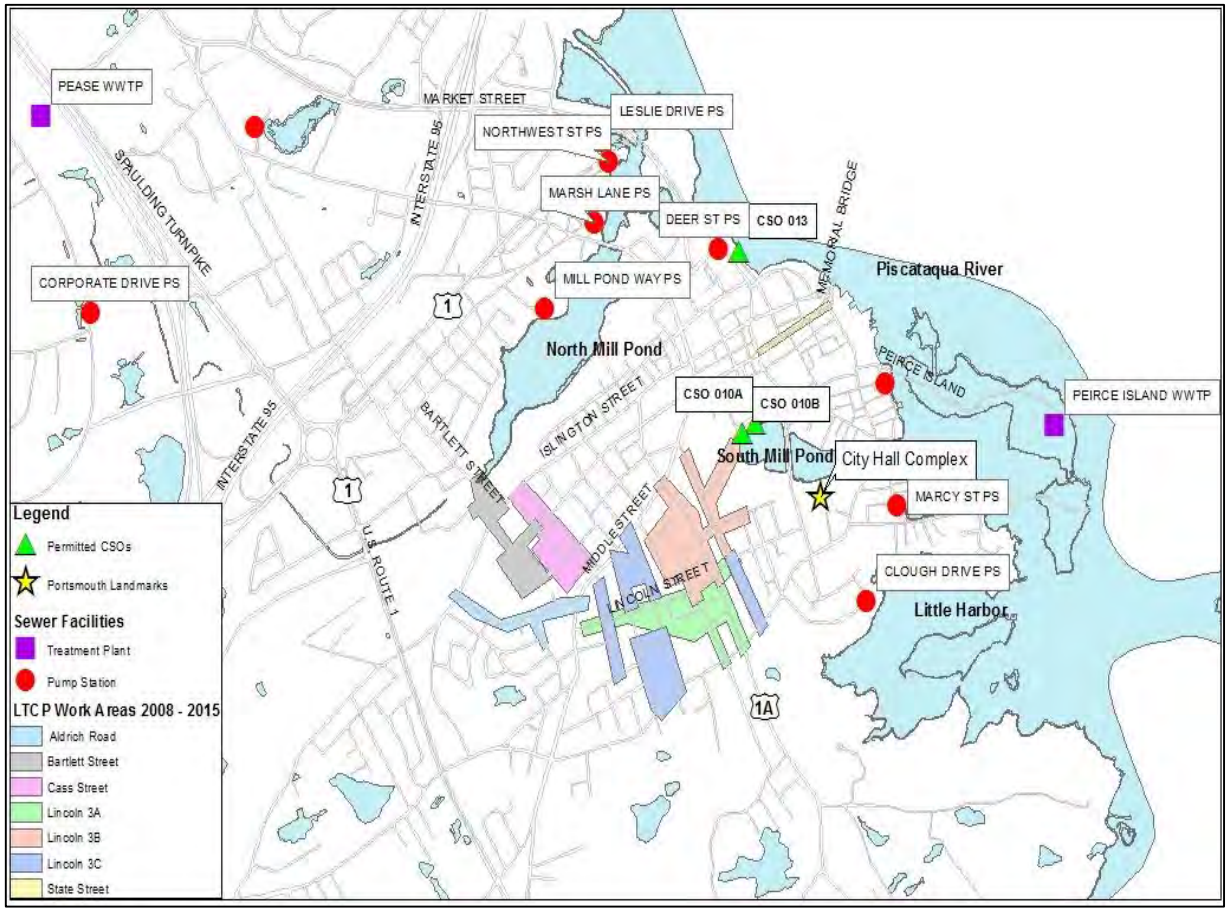
Case Study – City of Portsmouth, NH

- 120 miles of sewer
- 3 permitted CSOs
- $50 million in CSO abatement projects
- Consent decree requires PCMP to assess performance of LTCP/infrastructure upgrades

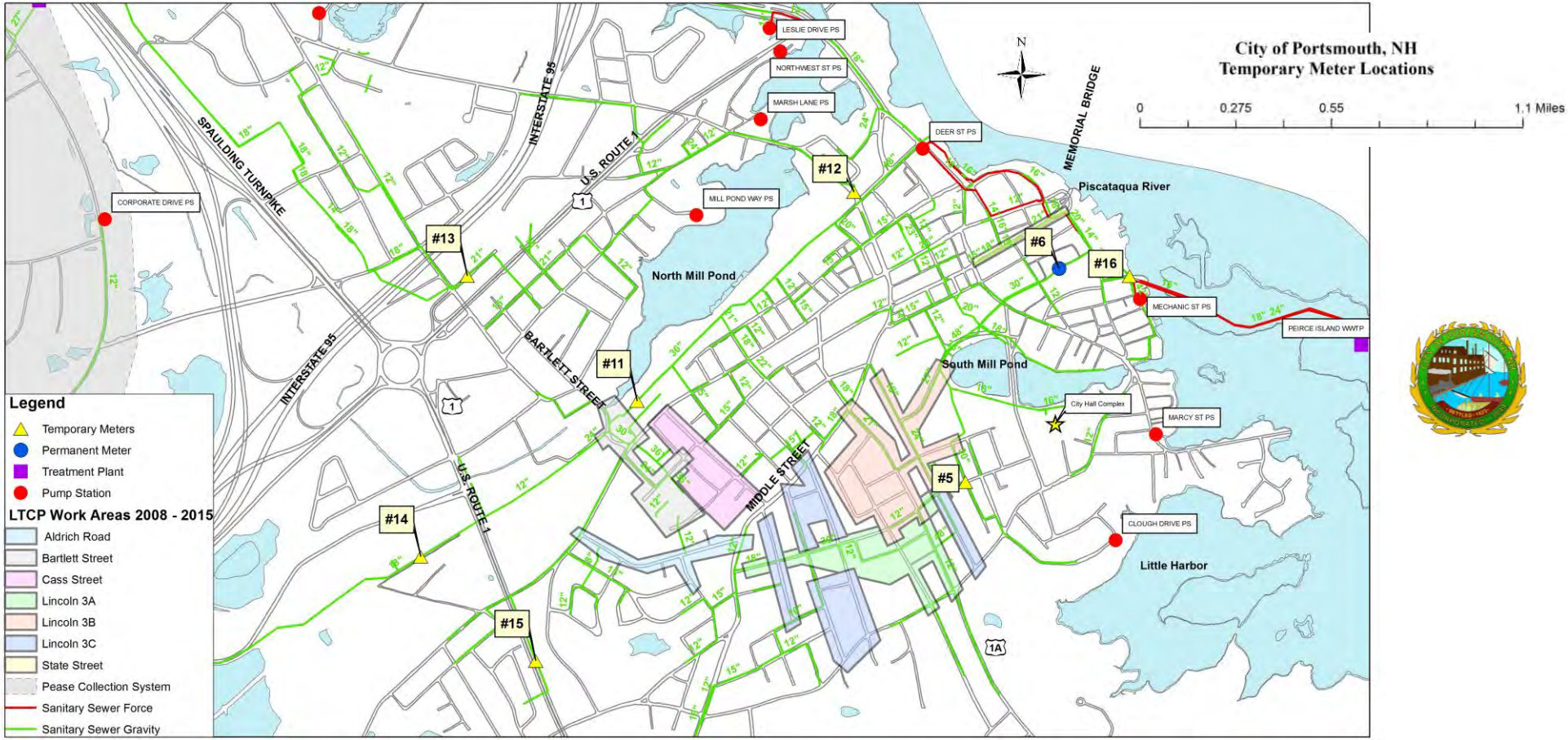


Approach

- Hydraulic modeling
- CSO discharge flow monitoring
- System flow monitoring



System Flow Monitoring



Modeling Approach

- Five-year annual average rainfall
- Baseline (no improvements)
- Post-construction (reflecting sewer separation)

Year	Annual Rainfall (Inches)
1968	42.5
1988	44.9
1989	40.5
1990	47.8
1993	35.4

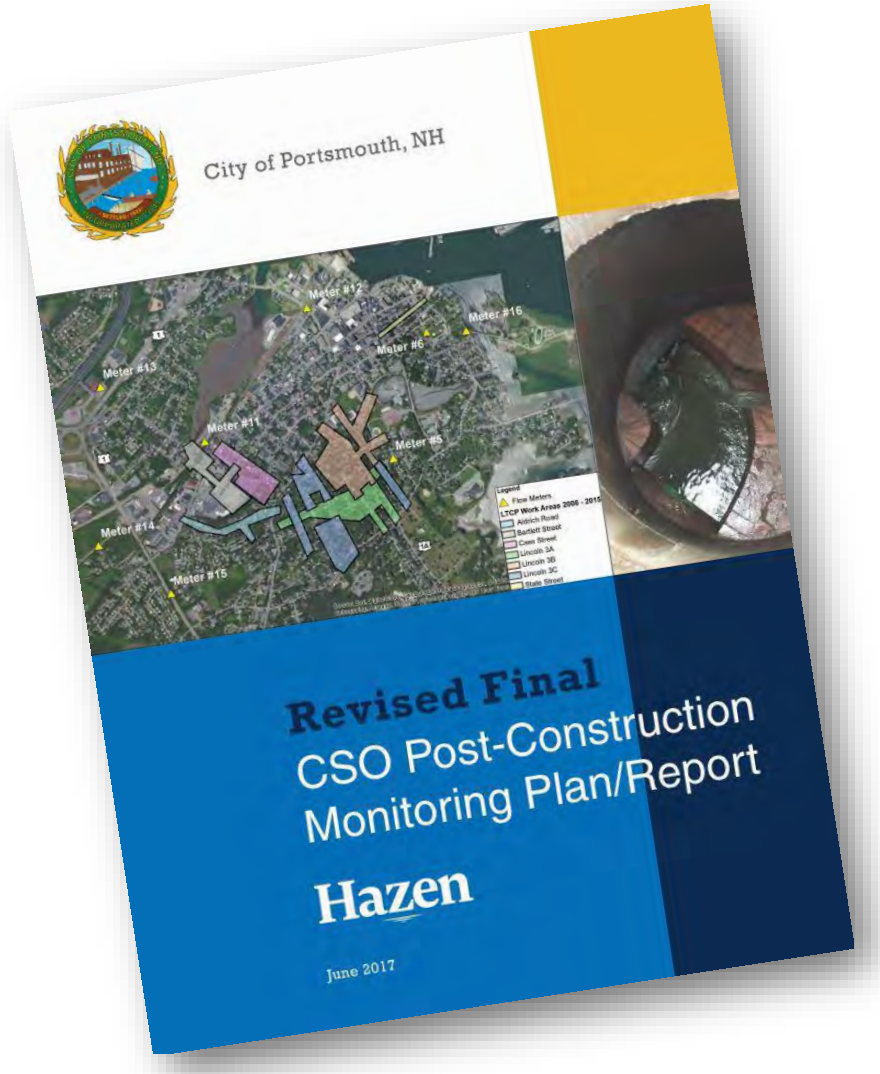
Results

- Large 5-year storm causes one discharge at CSO 013
- Model predictions indicate LTCP success

Post Separation CSO Performance		South Pond CSOs (10A/10B)	Deer St CSO (013)
Year	1968	0	0
	1988	4.03	0.53
	1989	0	0
	1990	1.64	0
	1993	0	0
Average		1.1	0.1
LTCP Target		2.1	0

Results

- PCMP/R submitted to EPA for review
- Comments addressed
- Approved!

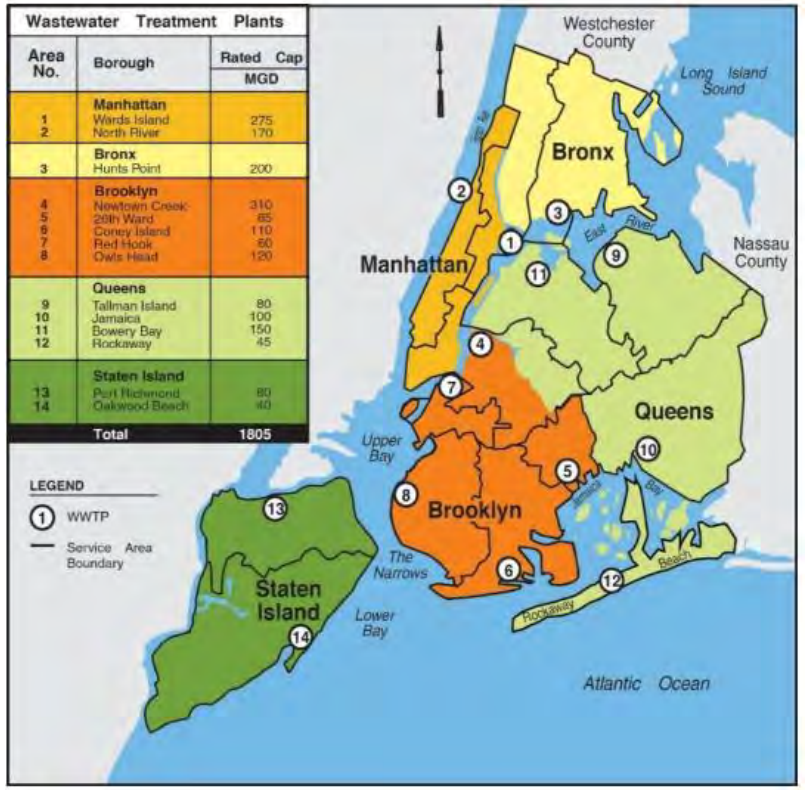


Case Study – New York City, NY

- Annual - focused on retention facilities
- Water quality monitoring
- Water quality modeling
- CSO Retention Tank monitoring (4 facilities)
- Collection system modeling

Case Study – New York, NY

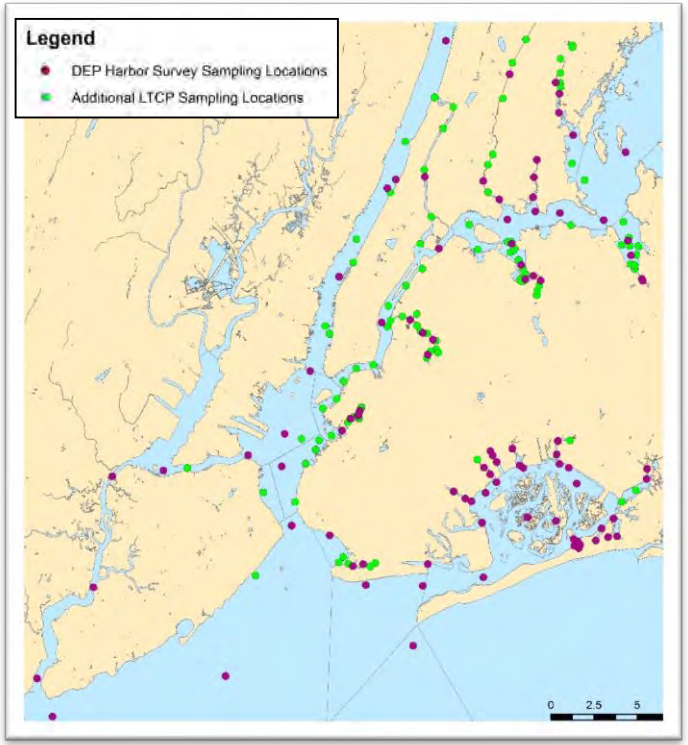
- 14 Wastewater Treatment Plants (WWTPs)
  - Range 40 mgd to 310 mgd
  - Total: 1.8 BGD total
- 6 Dewatering Facilities
- 4 CSO Treatment Facilities
- 96 Pump Stations
- 497 Regulators; 152 Miles of Intercepting Sewers
- 6 Laboratories
- 14 Inner Harbor Vessels
- 1 Biosolids Barge
- ~1,800 staff



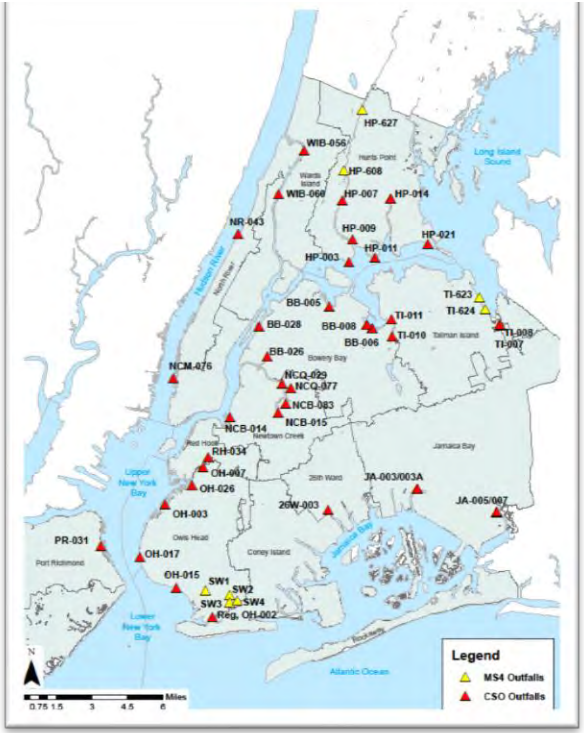
Sampling

- ✓ Fecal, *Entero* & Dissolved Oxygen Collected
- ✓ 3-5 wet weather events at each station
- ✓ 14 waterbodies sampled
- ✓ 80+ receiving water locations were sampled

Receiving Water Sampling Locations

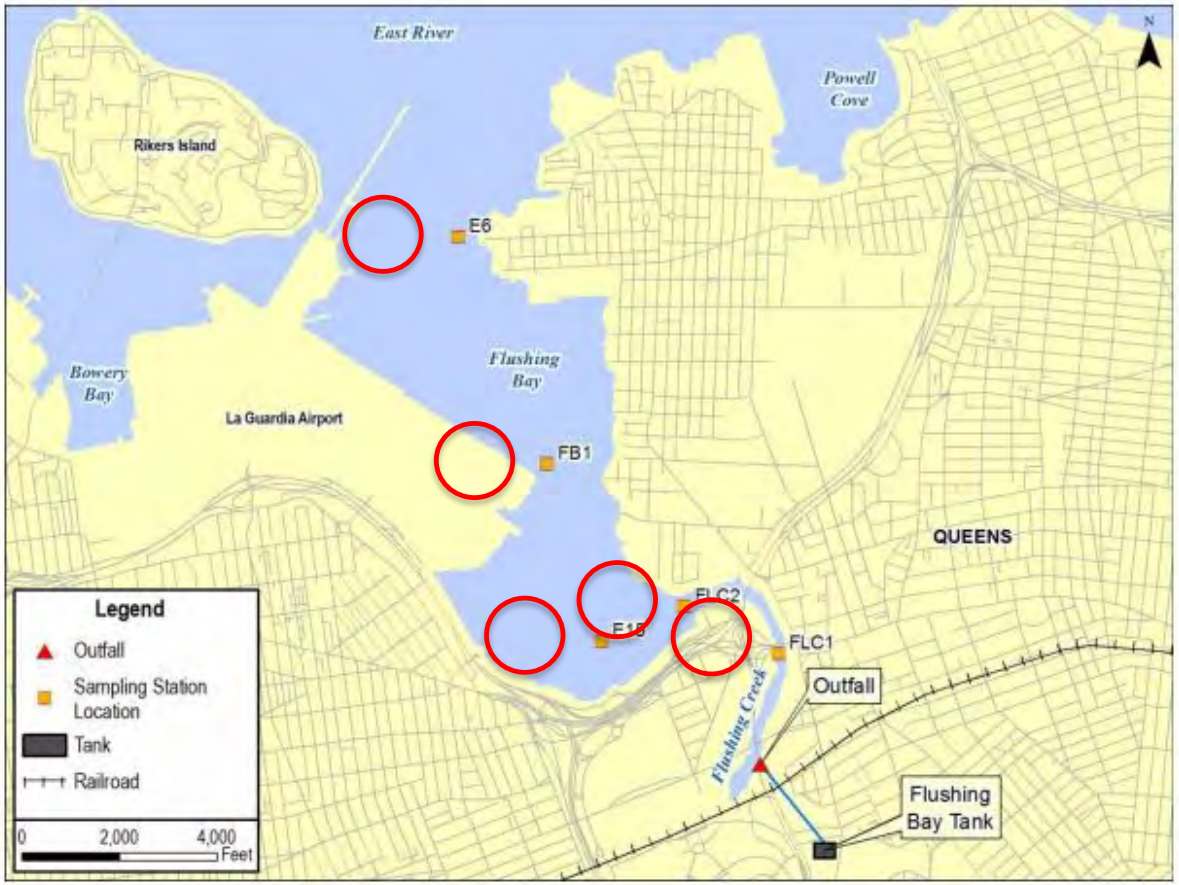


Landside Sampling and Flow Monitoring Locations

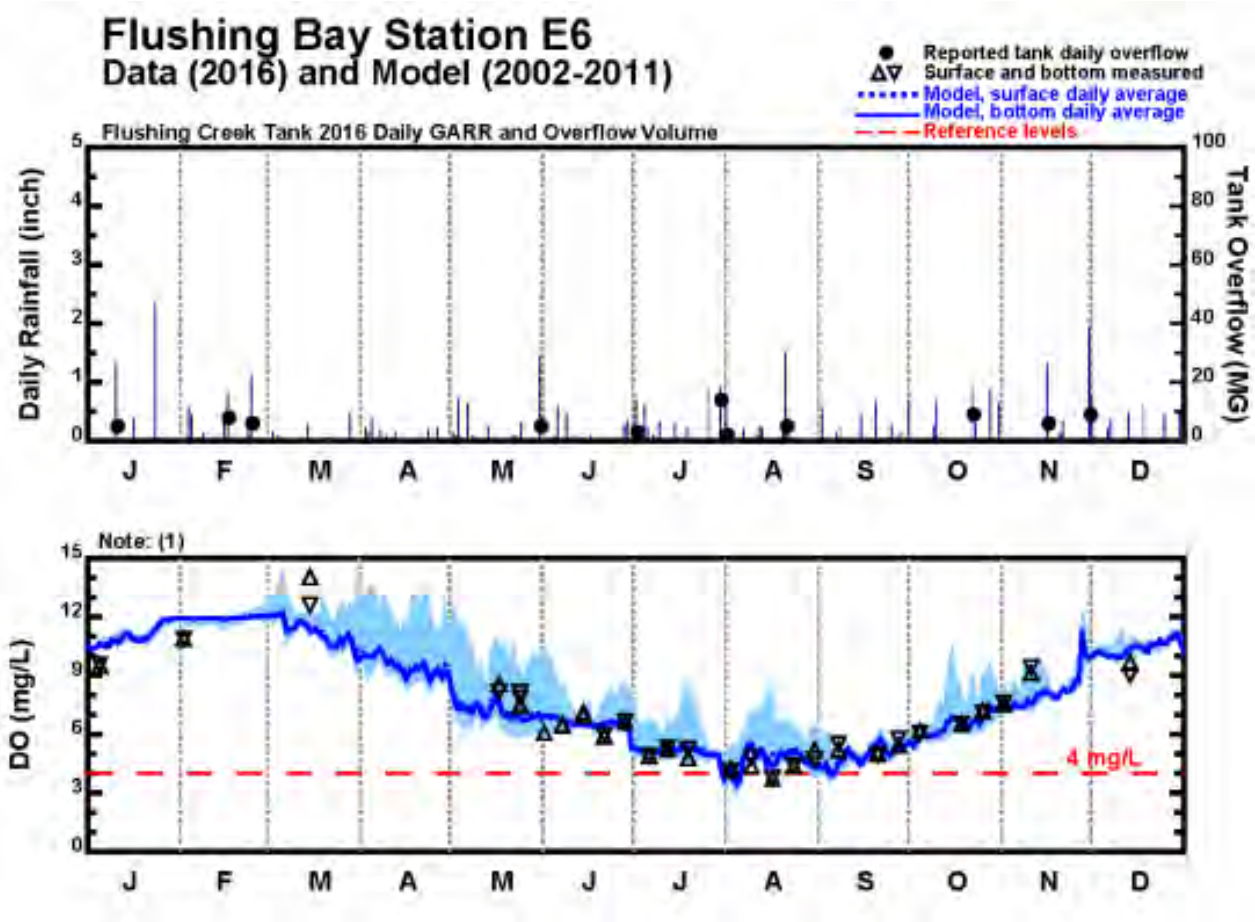


- ✓ Fecal, *Entero* & Dissolved Oxygen
- ✓ 3-5 wet weather events at each outfall
- ✓ 50+ landside locations sampled
- ✓ 3-6 months of flow monitoring

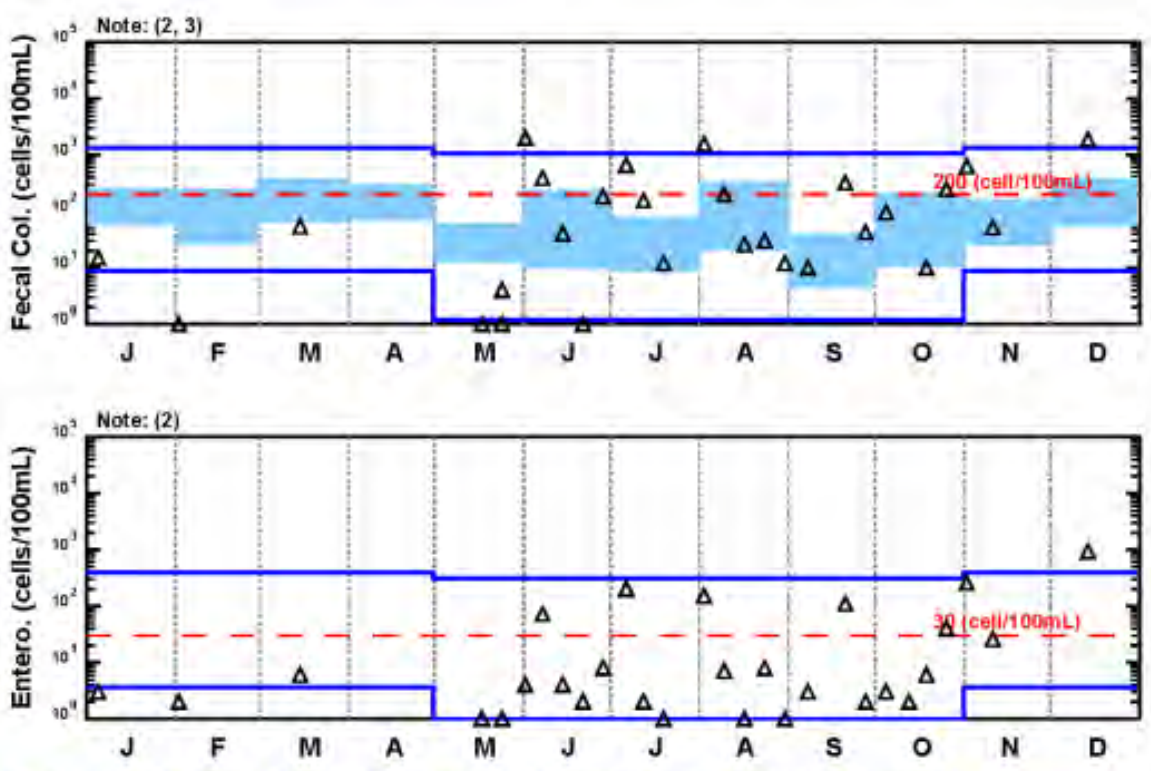
Water Quality Sampling – Flushing Tank



Water Quality Results

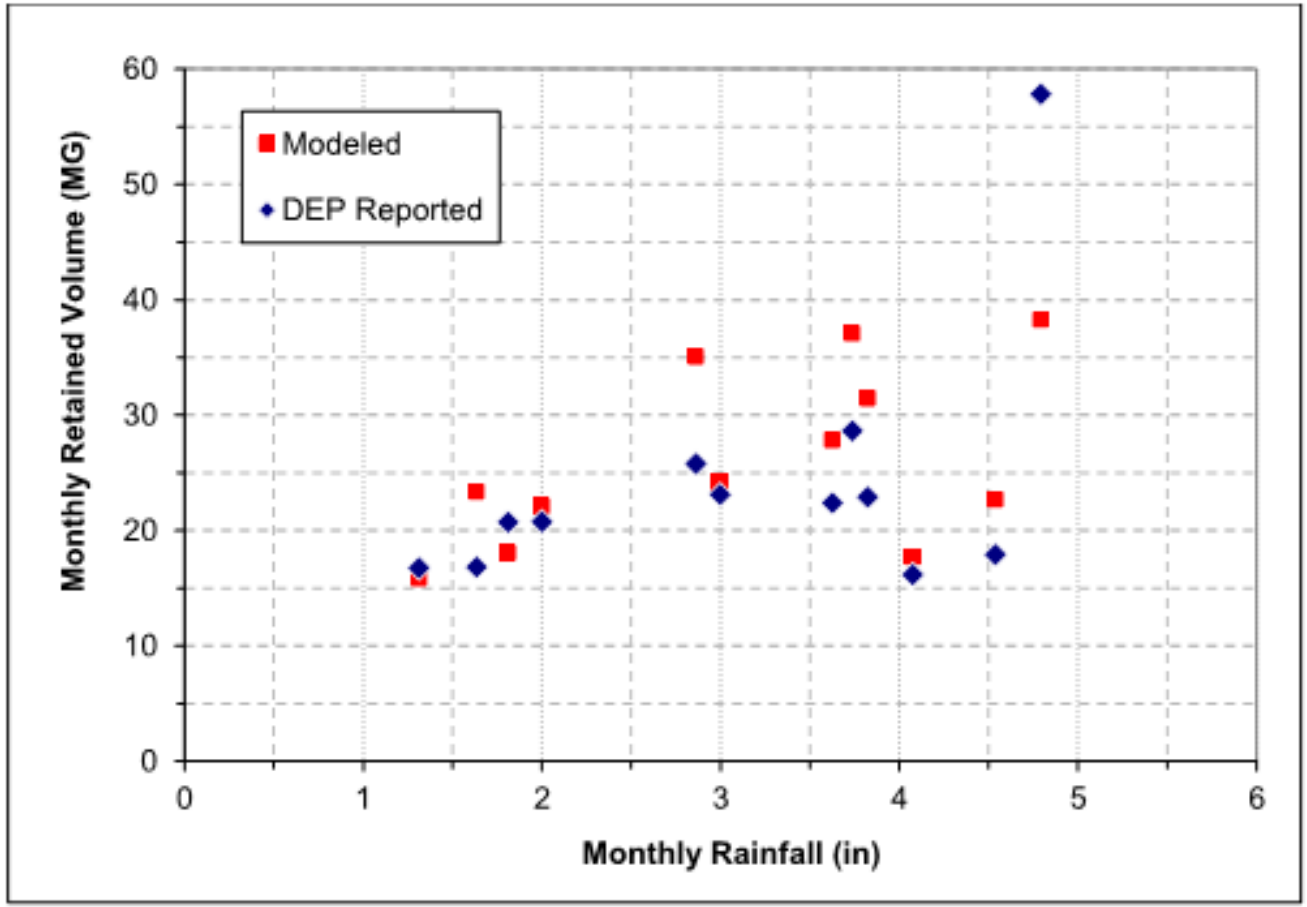


Water Quality Results

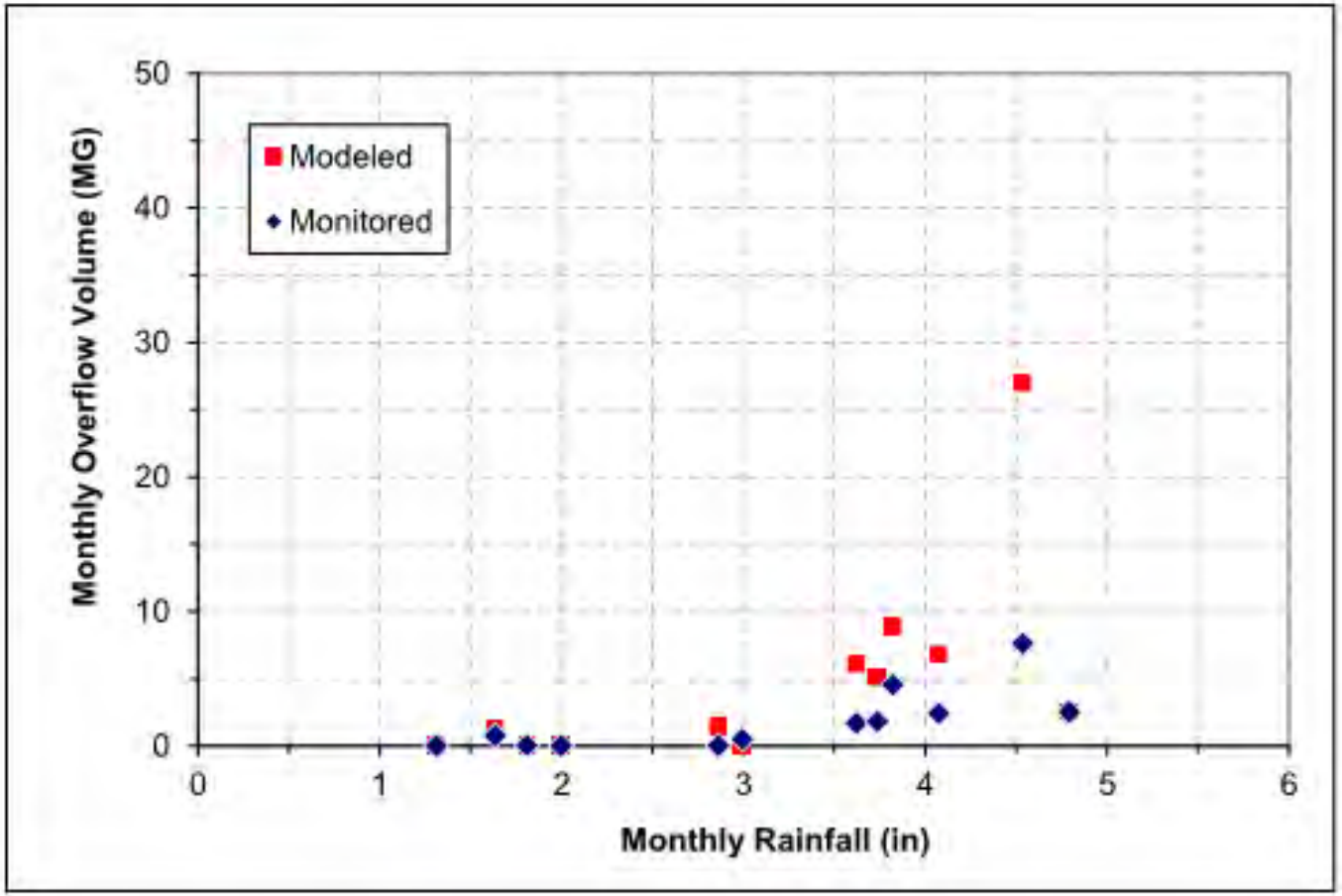


Notes: (1) Modeled range (shaded) of 2008 surface daily maximum and bottom daily minimum DO
(2) Modeled 90th/10th percentile results (lines) in surface layer for recreational and non-recreational periods
(3) Modeled range (shaded) of monthly geometric mean for ten-year periods

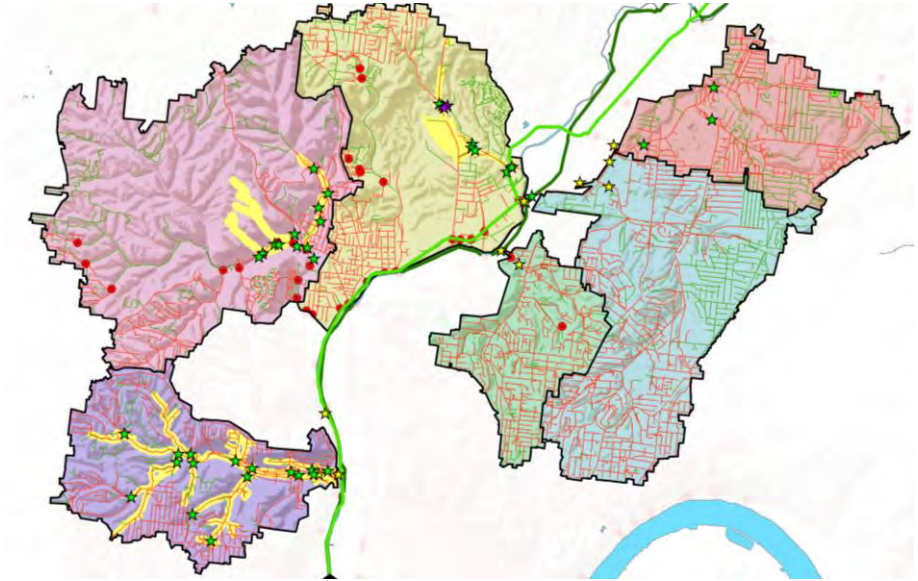
Collection System Results



Collection System Results



Other Ongoing/Pending PCMPs



Cincinatti, OH

60 flow meters; 12 months; pre/post calibrated model

Nashua, NH

Direct receiving water quality sampling (4 locations)

Conclusions

- PCMPs are not “one size fits all”
- Modeling approaches can be effective
- Don’t overcommit on receiving water monitoring