

Wilmington
In the middle of it all

City of Wilmington, Delaware



Wilmington's LTCP Story: 1995-now

June 04, 2014



System Background

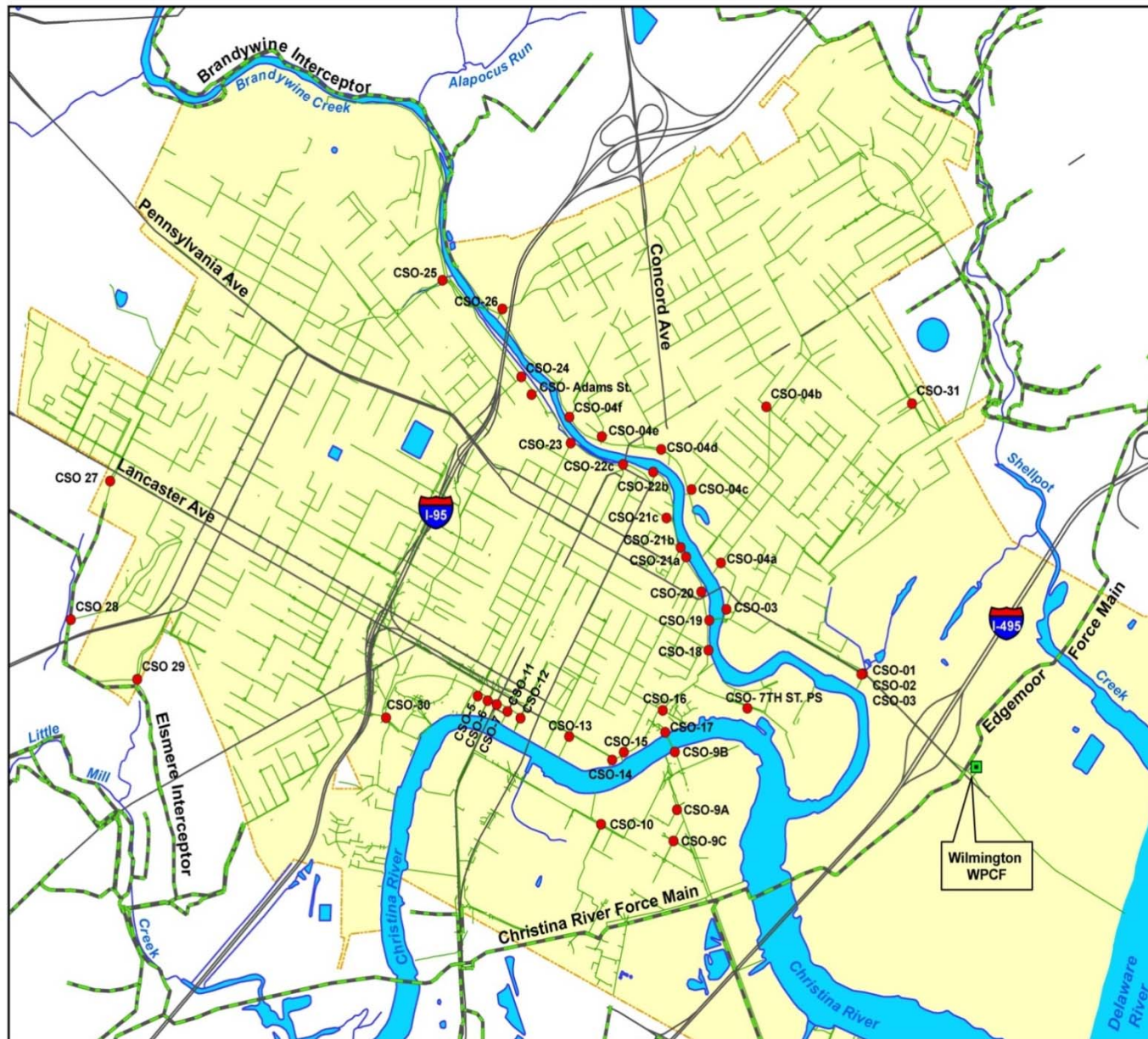


- Immediate City Area
≈ Population: 72,000
- Wilmington Area
≈ Population: 500,000





CITY OF WILMINGTON



Combined Sewer Overflow Locations within City Limits

Legend

- WPCF
- Combined Sewer Overflows
- Interceptors
- Major Roads
- Sewers (Diameter ≥ 12")
- Wilmington City Limits

Long Term Control Plan Evolution



- Three generations:
 - LTCP, ELTCP, FLTCP
- Partnership with DNREC
 - Review and Approval of Plans
 - SRF Funding
 - Mutual Understanding of Challenges
- Equitable Revenue Generation
 - Stormwater Utility Fee



Long Term Control Plan



- Early LTCP in 1990's
 - Response to EPA's 89/94 CSO Policies
 - \$30M WPCF upgrade
 - Series of key features:
 - New operation procedures
 - Source pollution control
 - CSO assessment / public education



Enhanced LTCP



- ELTCP developed in 2003, with new goals:
 - Achieve 85% average annual capture of CSO volume via a presumptive approach
 - Eliminate dry weather overflows
 - Eliminate CSOs upstream of the City's drinking water intake
 - Meet the load allocations for the Christina Basin TMDL and achieve water quality standards



Wilmington's Proven Track Record for Addressing CSOs



- Invested over \$27 million in capital costs to reduce and eliminate CSOs
- Estimated LTCP will achieve annual average capture of 92%
- Worked with CSO Task Force
- Constructed and operated the Canby Park Storage Facility
- Began Construction on Real Time Control System
- Eliminated a CSO above the drinking water intake at Rockford Road during the average year
- Eliminated dry weather overflows at CSO 4A/4B
- Actively participated in the Christina Basin TMDL development



Wilmington's Proven Track Record for Addressing CSOs



- Conducted extensive public education, outreach, and awareness regarding CSOs
- Trapped and eliminated 2800 tons of debris plus street sweeping waste from entering the Christina Basin between 2003 and 2009.
- Implemented a stormwater utility based on impervious parcel land cover
- Supported green infrastructure pilot projects and source control projects to reduce runoff to the combined system
- Separated the combined sewer system where feasible in places like Wilmington Hospital



Major ELTCP Projects



- **Canby Park Storage Tank to protect Silverbrook Run**

2.7 MG (10,200 m³)



Start-up in 2004

Total Storage:

**4.76 MG
(18,000 m³)**

**Real Time Control
CSO-25**

Flow Regulation

**Real Time Control
Canby Park**

Storage

**Real Time Control
CSO-4a**

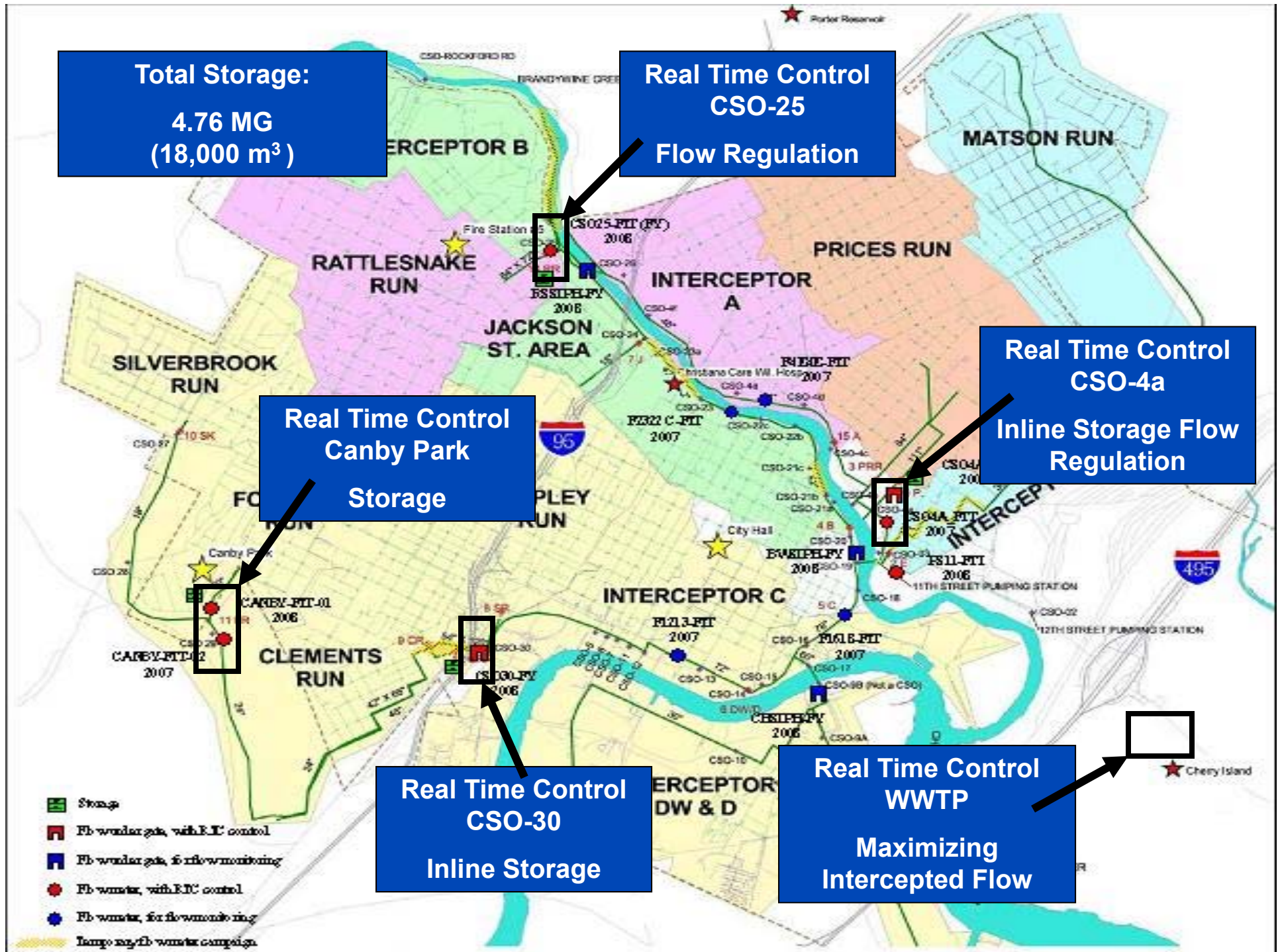
**Inline Storage Flow
Regulation**

**Real Time Control
CSO-30**

Inline Storage

**Real Time Control
WWTP**

**Maximizing
Intercepted Flow**



Major ELTCP Projects



Real Time Control

with siphon improvements

- Two RTC feasibility and preliminary design studies in 2004-2005
- Validate RTC benefits in the ELTCP framework for increasing CSO capture
- Significant savings: \$87M over initial LTCP



Summary of ELTCP Project Implementations



Key Project Name	Outfalls Affected	Design Cost	Construction Cost	Year Completed
RTC Phase I	4a, 4b, 27, 28, 29, 30, 31	\$5,939,000	\$1,200,000	2009
RTC Phase II			\$4,800,000	2011
Canby Park Storage	28, 29	~ \$2,000,000	\$6,000,000	2004
CSO 27 Diversion to Canby	27	\$710,000	\$1,420,000	2007
WWTP Headworks Upgrade	System wide	\$610,000	\$2,914,000	2011
CSO 4a/4b	4a, 4b	\$64,000	\$235,000	2004
Rockford Road Street Separation	Rockford outfall	\$1,725,000	\$615,280	2009
Rockford Road Home Separation	Rockford outfall		\$611,000	2010
Clean and Reconstruct Stormwater Inlets	All	\$150,000	\$998,000	2010
TOTAL		\$11,198,000	\$ 18,793,280	\$ 29,991,280

Current CSO Status - ELTCP Project Update



- **Real-Time Control (RTC) System**

- Phase I construction completed. Construction of Phase II expected to be completed in 2010 and operating in early 2011.

- **Canby Park CSO Storage Facility**

- Construction complete and in operation. Startup of facility in July 2004.
- Facility controls to be tied into RTC as part of RTC Phase II contract in 2011.



- **CSO 27 Diversion**

Construction complete November 2007.



Wilmington In the middle of it all

Current CSO Status – ELTCP Project Update



- CSOs 4a and 4b Improvements
 - Raised dam at 4a and reconfigured diversion structure at 26th & Pine completed February 2004. Dry weather overflows eliminated.
 - Final wet weather improvements with bending weirs to be completed as part of RTC Phase II contract in 2011.
- Rockford Road Sewer Separation
 - Construction completed.
- Rockford Road Downspout Disconnect Program
 - Currently under construction. 48 of 67 are to be completed. Plan for monitoring impacts under development.

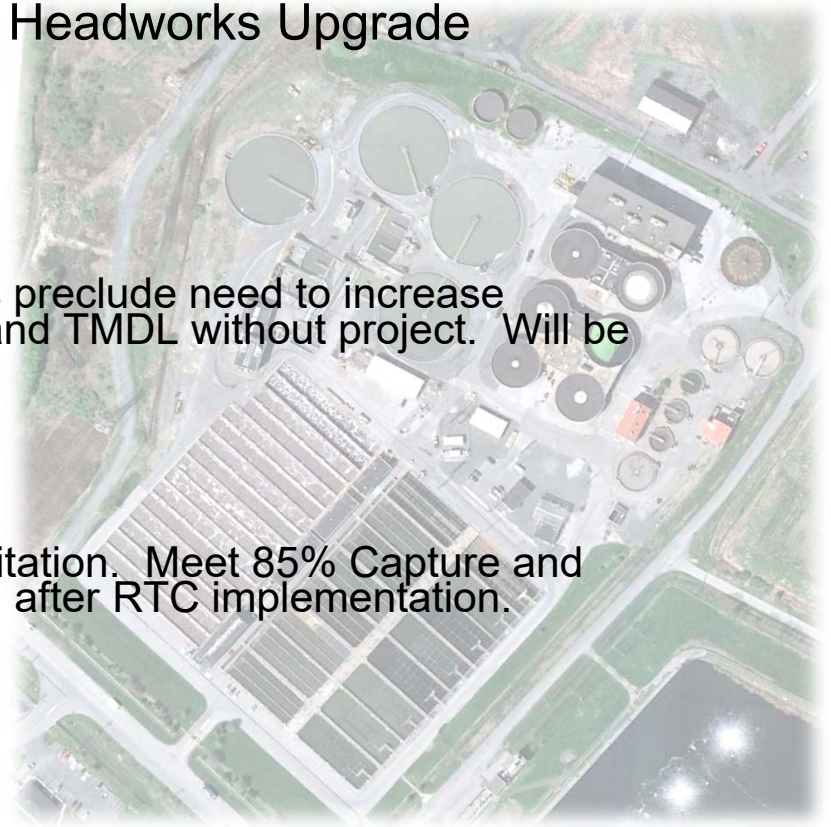


Wilmington In the middle of it all

Current CSO Status – ELTCP Project Update



- Waste Water Treatment Plant (WWTP) Headworks Upgrade
 - Construction to be completed in mid 2011.
- 11th Street Pumping Station Upgrade
 - Feasibility completed. Hydraulic limitations preclude need to increase capacity at this time. Meet 85% Capture and TMDL without project. Will be revisited after RTC implementation.
- Prices Run Diversion
 - Feasibility completed. Same hydraulic limitation. Meet 85% Capture and TMDL without project. Will be reevaluated after RTC implementation.
- Sewer GIS and Hydraulic Model
 - Continuous, ongoing effort

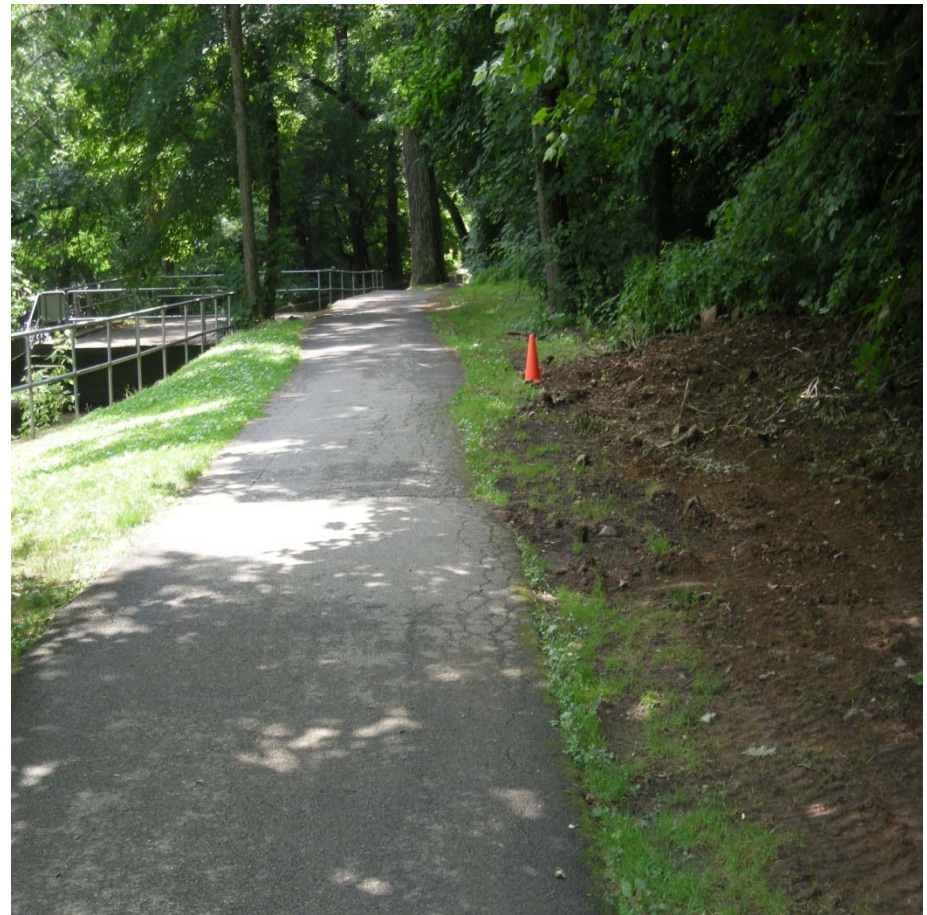


Wilmington In the middle of it all

Current CSO Status - ELTCP Project Update



- Kentmere and Union CSO
 - Completed regulator improvements to minimize overflows. Ongoing monitoring during wet weather. Phase I preliminary design completed to conduct partial separation of street drainage.
- Brandywine, Christina, and Rattlesnake Run Siphons
 - Part of RTC Phase II contract in 2011.
- Green Infrastructure
 - Preliminary analysis performed to determine effectiveness in CSO 23 area. Other areas to be analyzed.

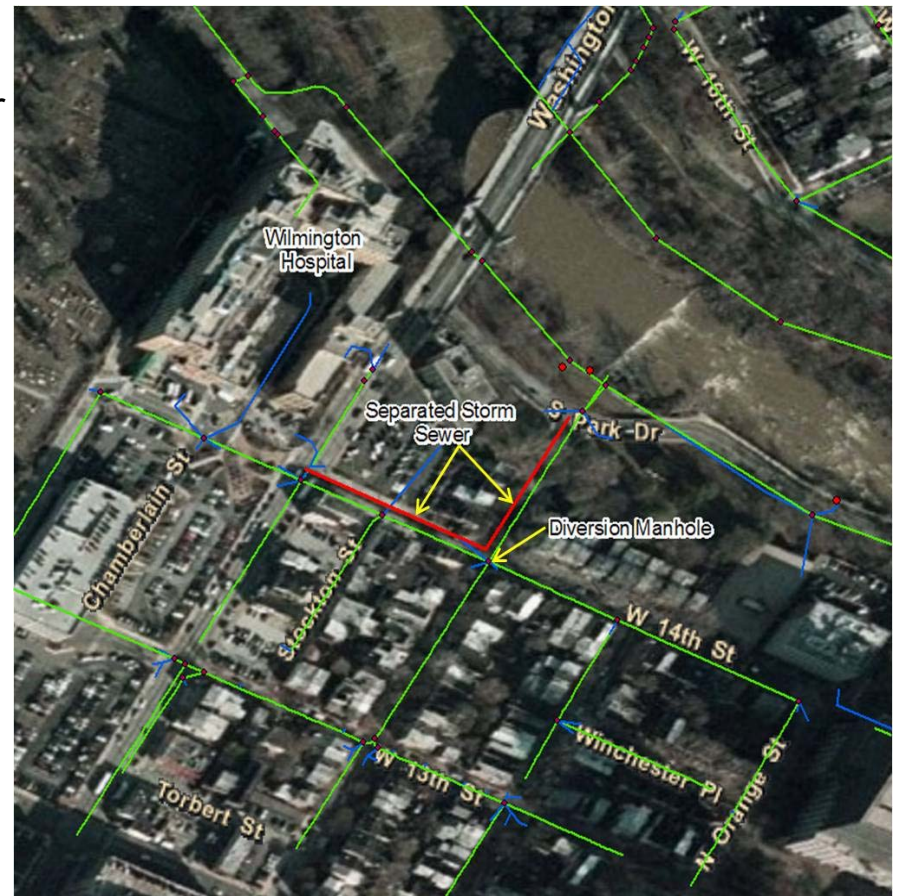


Wilmington In the middle of it all

Current CSO Status - ELTCP Project Update



- Hospital Storm Sewer Separation
 - Design complete. City will reimburse for work done by Hospital. Construction is underway.
- South Wilmington Wetland Park
 - Feasibility study completed.
- Sewer Inspection and Cleaning
 - Ongoing
- Rebuild and Clean storm inlets
 - Ongoing



Modeling Performance Results

- Achieves >85% Average Annual Capture by Volume and Meets National CSO Policy

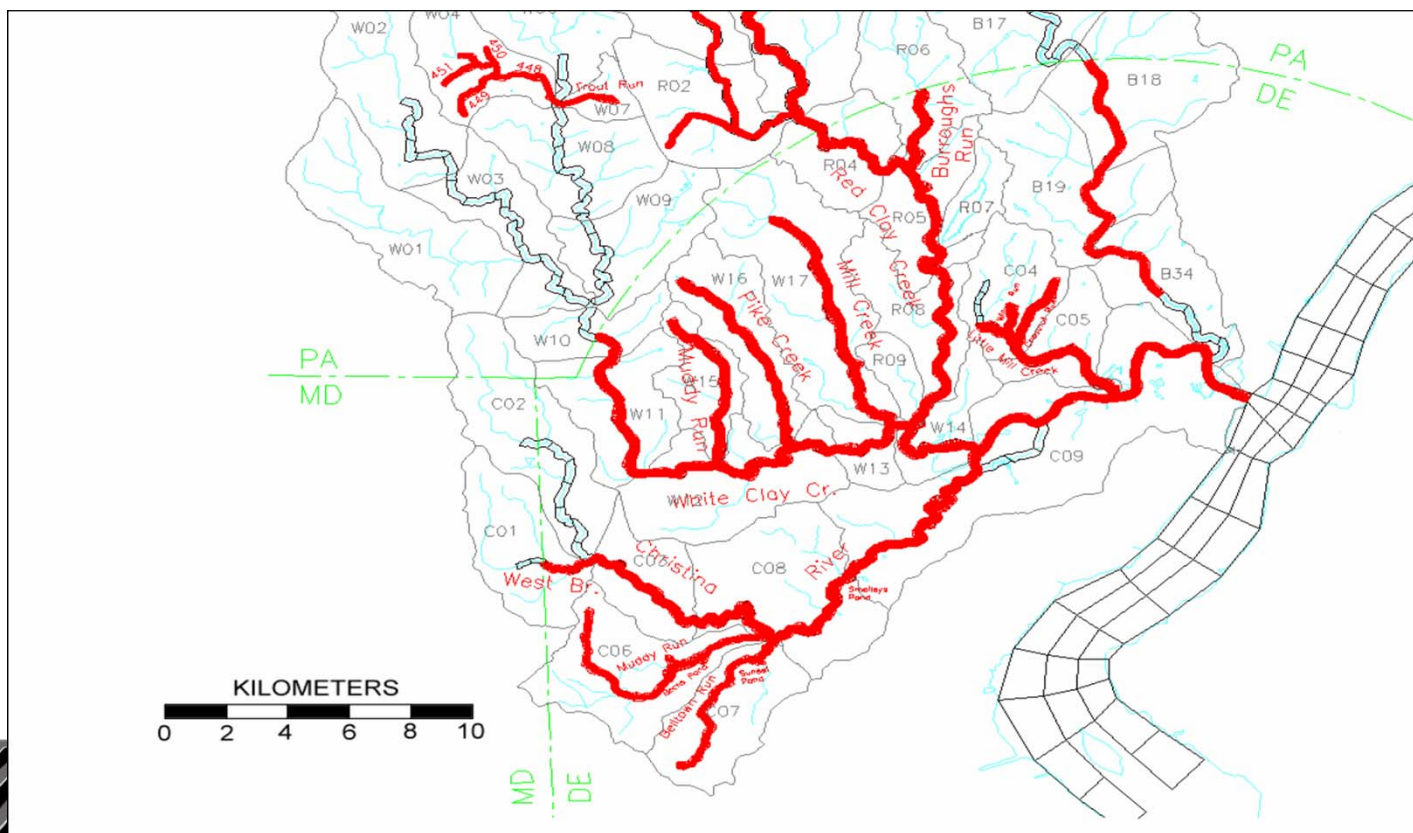
CSO System Performance Time period	Predicted Annual Overflows and % Capture	
	1983-85 (avg)	1994-98 (avg)
Wet Weather Volume MG/yr	3056	2656
Total Overflow Volume (sum) MG/yr	277	200
Capture Rate (sum)	90.9%	92.5%
Total Overflow Volume (global extrapolation) MG/yr	265	211
Capture Rate (global extrapolation)	91.3%	92.0%



Modeling Performance Results



- Wilmington achieves bacteria load reductions and meets WLAs of the Christina TMDL



Modeling Performance Results

- Wilmington Achieves Bacteria Load Reductions and Meets WLAs of the Christina TMDL

	CSO ID #	WLA (cfu/yr)	Predicted Annual Load (cfu/yr)	Additional CSO Volume Reduction Needed (MG)
Little Mill Creek (C05)	27, 28, 29	3.69E+13	5.11E+12	0
Christina River (C09)	5,6,7,9A,9C,10,11, 12,13,14,15,16,17,30	9.75E+13	9.25E+13	0
Brandywine Creek (B34)	3,4A-F,18,19,20,21A-C, 22B,22C,23,24,25,RR,K &U	2.55E+14	2.47E+14	0



Future CSO Priorities



- City will establish elements of a sustainable long term approach to CSO reduction via **green infrastructure (GI) and source controls**:
 - Stormwater utility billing structure
 - Reduce runoff from new and redevelopment
 - Examine a variety of pilot programs
 - Incorporate GI in future water and sewer replacement projects
- Continue to pursue and identify pollution sources upstream of the City's CSO areas.
- Continuation of compliance and performance of the Nine Minimum Controls to maintain CSO and TMDL objectives.



Wilmington's Future Approach to Addressing CSOs



- Adaptive Management Implementation
 - To create a system to monitor changes in the watershed.
 - To evaluate trends using monitoring data.
 - To modify the watershed management plan as necessary.

- Evaluation of Impacts of CSO Projects
 - Real Time Control Center
 - Updated XP-SWMM Model
 - Green Infrastructure Program



Final LTCP Objectives

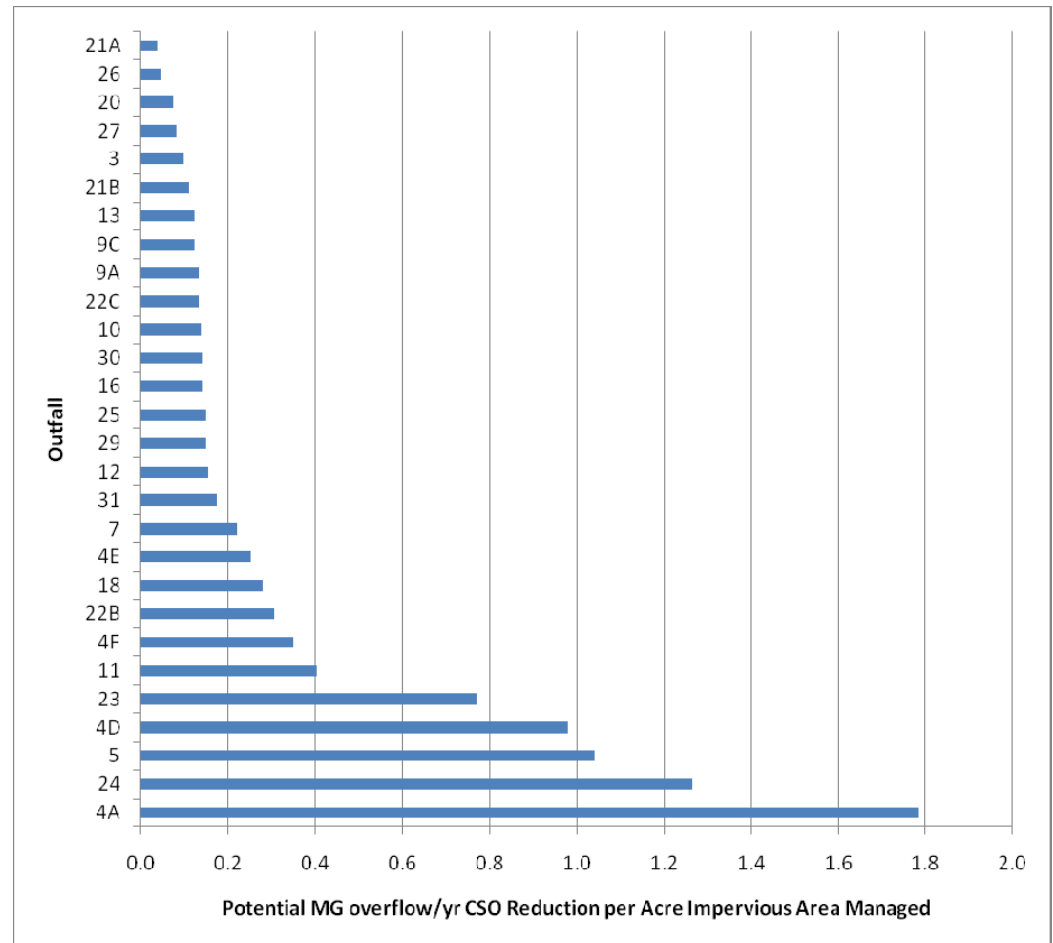


- Maintain compliance with CSOs and WLAs for the Christina Basin.
- Evaluate the performance and effects of key CSO projects. Reevaluate and reprioritize the CSO outfalls based on the measured and anticipated impacts.
- Develop and establish a source control and green infrastructure program to obtain cost-effective and sustainable additional long term CSO reductions.
- Continue to pursue and identify pollution sources upstream of the City's CSO areas.
- Continuation of compliance and performance of the Nine Minimum Controls



Future CSO Priorities

- Priority activities focus on evaluating performance of key CSO projects.
- Outfalls can be prioritized and improvements could include the potential effectiveness of impervious area reduction via source control such as green infrastructure.



Proposed Implementation Schedule



Key ELCTP Projects

Description/Title	Estimated Time for Completion (years)	Targeted Completion Year
Real Time Control System Construction completion	1	2012
Real Time Control System full operation	2	2013
Elimination of Rockford Road for average year	3	2014
11th St. Pumping Station re-evaluation study	2	2013
Prices Run Diversion re-evaluation study	2	2013

Proposed Implementation Schedule



New Priority CSO Projects

Description/Title	Estimated Time for Completion (years)	Targeted Completion Year
WWTP Headworks upgrade construction completion	1	2012
Plan for Kentmere & Union elimination for average year	1	2012
WWTP headworks upgrade full operation	2	2013
Kentmere & Union elimination for average year	5	2016



Proposed Implementation Schedule



Sewer Separation Projects

Description/Title	Estimated Time for Completion (years)	Targeted Completion Year
Complete sewer separation of Wilmington Hospital	4	2014
Identify new development projects or desired areas for potential sewer separation and develop a special area management plan	5	2016

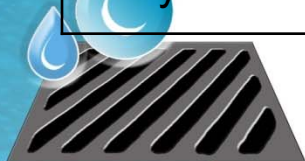


Proposed Implementation Schedule



Green Infrastructure Projects

Description/Title	Estimated Time for Completion (years)	Targeted Completion Year
Feasibility Study of Leveraging Stormwater Utility Credits To Incentivize Source Controls	1	2012
Feasibility Study of Stormwater Ordinance	3	2014
Plan for green infrastructure initiatives in public street projects	3	2014
Plan for green infrastructure initiatives in public building projects	3	2014
Plan for green infrastructure initiatives in private properties	3	2014
Study of code changes to support green infrastructure	4	2015



Proposed Implementation Schedule



Post-Construction Monitoring Projects

Description/Title	Estimated Time for Completion (years)	Targeted Completion Year
Upgrade of CSS Model	5	2016
Flow monitoring plan to support CSO model	5	2016
Modeling Plan to Verify CSO percent capture and Achievement of Christina TMDL loads	5	2016
Develop Final LTCP benchmark/baseline for CSO discharges & reprioritization of outfalls, as appropriate.	5	2016



Continuing challenges and things to consider



- Annual Report has been extremely helpful in monitoring progress.
 - No surprises to DNREC
 - We have not waited to implement plan
- Capture rate not meeting goals
 - 72% instead of 85%
 - 11th Street Pump Station Operations
 - Blockages and Sedimentation in Interceptors



Stormwater Permit Overview

- Separated Stormwater System (10%)
- MS4 Co-Permitee (2013)
 - NCC, Deldot
 - Wilmington, Newark
- Intend to Apply for Phase II Next Permit Cycle
- Develop Integrated Wet Weather Management Program



Overview

- Stormwater (SW) Program: FY 2006 to FY 2009
- SW Program FY 2010 and onwards...
 - Mission Statement
 - Key issues
- Discussion



Stormwater Fee Program

- Key Objectives
 - Recover cost of Combined Sewer Overflow (CSO) mitigation / stormwater management
 - Achieve cost recovery that is fair to everyone
 - Include parcels without water/sewer service
 - Establish a defensible basis for stormwater fee
 - Impervious area-based methodology



Stormwater Fee Program: Key Features

- User Fee not a Tax
 - Cost Accounting for Treatment, Sewer Maintenance and Stormwater Costs
 - Wastewater Treatment Costs Allocated to Stormwater
 - Rates designed to recover cost
- Revenue Neutral
 - Sanitary Sewer Fees Reduced
 - Water Billing Recovery Factor Reduced
 - 1.4 to 0.7



SW Program FY 2006 to FY 2009: Fee Methodology

- Non-residential stormwater classes
 - 12 classes with runoff factors
 - Direct Discharge Permit (DDP) holder class
 - Lowest runoff factor of 10%
 - Impervious area = Gross area X runoff factor
- Residential stormwater classes
 - 2 classes with four-tiered rate structure
 - Impervious area provided by New Castle County
- Condominium stormwater class
 - Impervious area estimated using GIS application



SW Program FY 2006 to FY 2009: Credit Program

- Stormwater credit program (non-residential and condominium parcels only)
 - Two types of credit for onsite SW management
 - **Quantity credit:** Maximum of 50% credit
 - **Quality credit:** Maximum of 10% credit
 - Total credit cannot exceed 60%
 - Parcel owners apply for credits through a formal application process
 - Public works performs technical review and site assessment



SW Program FY 2006 to FY 2009: Credits / Appeals

- Total of 141 Appeals/Credit requests received
- Total of 112 cases processed

TYPE	APPROVED AS REQUESTED	APPROVED WITH MODIFICATION	TOTAL APPROVED	TOTAL DENIED	TOTAL PENDING	TOTAL CASES
SW Appeals	31	21	52	13	25	90
SW Credits	20	0	20	27	4	51
TOTAL	51	21	72	40	29	141



SW Program Implementation: Legislative/Legal

- One Case Settled prior to trial (Port of Wilm)
- Army Corp of Engineers Property
 - Did not pay until update in Federal Legislation



FY 2010 and Onwards: **Mission Statement**

- Program continues to evolve
 - From CSO quantity management to integrated surface water quantity/quality management
 - Mission Statement reflects the evolving program
 - Full mission statement follows...



FY 2010 and Onwards: Mission Statement

The City of Wilmington is implementing an integrated stormwater management program that addresses the stormwater needs of the City while protecting its water resources. The major goal of this program is to reduce the amount of pollutants discharged into our rivers.

These pollutant discharges occur as a consequence of stormwater run-off, combined sewer overflows and wastewater treatment plant discharges.

The City is engaged in several management activities to mitigate the impact of these pollutant loads on rivers, including pre- and post-construction storm water management, watershed planning and protection, waste water treatment plant improvements, reduction of volume and frequency of combined sewer overflows, and surface water quality enhancement efforts through the promotion of storm water quality and quantity management utilizing best management practices.



Key Issues

- **Issue 1:** Stormwater program goals are expanding
 - Address CSO mitigation / Long Term Control Plan
 - Address flooding, sediment control, and drainage
 - Support surface water quality protection / Total Maximum Daily Loads (TMDLs)
- **Solution:** Clearly defined Mission Statement and comprehensive Stormwater Management Plan
- **Impact:**
 - Foster accurate perception of City's stormwater obligations
 - Eliminated User Class direct discharge of stormwater to surface water
 - Support user fee / credit program policies



Key Issues

- **Issue 1:** Existing Direct Discharge Permit (DDP) class with 10% runoff factor is not appropriate
 - Receive significant fee reduction without any onsite stormwater management
 - Impacts stormwater revenue generation
 - 28 parcels cause an annual revenue reduction of **\$972,784**
 - Impacts equitable cost recovery and shifts the burden to other customers
 - Potential risk of more appeals from other direct dischargers



FY 2010 and Onwards: Impact of Existing DDP Class

CUSTOMERS	COUNT OF PARCELS	EXISTING ANNUAL CHARGES (WITH DDP CLASS) ¹	POTENTIAL ANNUAL CHARGES (WITH CREDITS) ²	POTENTIAL ANNUAL CHARGES (NO CREDITS) ³
Total DDP Holder Parcels	28	\$126,468	\$1,026,028	\$1,099,253

¹ DDP Holder Classification with 10% Runoff Factor

² 10% Credit for Individual NPDES; 5% Credit for General NPDES

³ No NPDES Credit and no DDP Holder Classification

ANNUAL REVENUE IMPACT (WITH DDP) = \$972,784
ANNUAL REVENUE IMPACT (WITH NPDES CREDITS) = \$73,225



FY 2010 and Onwards: Potential Solution – Existing DDP Class

- Eliminate the DDP holder stormwater class
- Create a new “National Pollutant Discharge Elimination System (NPDES) Credit”
 - 10% credit for Individual NPDES Permit (4 Parcels)
 - 5% credit for General NPDES Permit (24 Parcels)
 - Execute changes to the ordinance and stormwater manual
 - Conduct extensive customer education / notification / meetings



Key Issues

- **Issue 2:** Stormwater exemption for “City Owned” properties
 - Impacts equitable cost recovery
 - Potential violation of State statutes
 - Impacts perception of City’s stormwater stewardship
- **Solution:** Eliminate stormwater Exemption
 - Bill all parcels within the City limits
- **Impact**
 - Overall reduction in stormwater Unit Cost (\$/ESU)



FY 2010 and Onwards: **SW Rate Impact**

- ESU Rate impact of eliminating DDP class

ITEM		FY2007	FY2008	FY2009	FY2010
1	Annual Stormwater Revenues ¹	\$5,059,000	\$5,691,375	\$5,691,375	\$5,885,650
2	Impervious Area (sq. ft.) ²	122,581,407	122,581,407	122,581,407	125,406,745
3	ESUs Calculated ³	155,363	155,363	155,363	158,944
4	Quarterly ESU Rate ⁴	\$8.141	\$9.159	\$9.159	\$9.257

¹ In FY 2008 revenue increase of 12.5%; In FY 2010, revenues adjusted by \$73,225 to reflect loss due to potential NPDES credits

² FY 2010 Impervious Area increase reflects the revised DDP class impervious area

³ FY 2010 ESUs increase reflects the revised DDP class ESUs

⁴ Line Item 1 ÷ Line Item 3 ÷ 4



ESU = Equivalent Stormwater Unit

FY 2010 and Onwards: **SW Rate Impact**

- Residential rate impact of eliminating DDP class

TIER	ESU RATIO	IMPERVIOUS AREA (SQ. FT.)	FY2007	FY2008	FY2009	FY2010
1	1.00	0 to 799	\$8.14	\$9.16	\$9.16	\$9.26
2	1.45	800 to 1,299	\$11.80	\$13.28	\$13.28	\$13.42
3	2.48	1,300 to 2,399	\$20.19	\$22.71	\$22.71	\$22.96
4	4.40	2,400 and over	\$35.82	\$40.30	\$40.30	\$40.73



FY 2010 and Onwards: **SW Rate Impact**

- ESU Rate impact of eliminating DDP class and SW Exemption

ITEM		FY2007	FY2008	FY2009	FY2010
1	Annual Stormwater Revenues ¹	\$5,059,000	\$5,691,375	\$5,691,375	\$5,885,650
2	Impervious Area (sq. ft.) ²	122,581,407	122,581,407	122,581,407	138,918,664
3	ESUs Calculated ³	155,363	155,363	155,363	176,069
4	Quarterly ESU Rate ⁴	\$8.141	\$9.159	\$9.159	\$8.357

¹ In FY 2008 revenue increase of 12.5%; In FY 2010, revenues adjusted by \$73,225 to reflect loss due to potential NPDES credits

² FY 2010 Impervious Area increase reflects the revised DDP class & SW Exempt impervious area

³ FY 2010 ESUs increase reflects the revised DDP class ESUs & SW Exempt

⁴ Line Item 1 ÷ Line Item 3 ÷ 4



FY 2010 and Onwards: **SW Rate Impact**

- Residential rate impact of eliminating DDP class and SW Exemption

TIER	ESU RATIO	IMPERVIOUS AREA (SQ. FT.)	FY2007	FY2008	FY2009	FY2010
1	1.00	0 to 799	\$8.14	\$9.16	\$9.16	\$8.36
2	1.45	800 to 1,299	\$11.80	\$13.28	\$13.28	\$12.12
3	2.48	1,300 to 2,399	\$20.19	\$22.71	\$22.71	\$20.73
4	4.40	2,400 and over	\$35.82	\$40.30	\$40.30	\$36.77



Discussion

- Elimination of the DDP stormwater class and the City Owned parcel stormwater exemption
- Required ordinances, manuals, and customer notification



Wilmington
In the middle of it all



Discussion



Potential Solutions

- Develop a Stormwater Management Plan
(Issues 1 & 2)
 - Includes a well-defined Mission/Vision Statement
 - Defines level of service
 - Identifies program components
 - Defines stormwater policies
 - Establishes program's capital / operational costs
 - Defines funding sources / cost recovery
- Clearly state program purpose / objectives in the Ordinance



Stormwater NPDES Credits Survey

- Short survey of 14 stormwater utilities
 - 10 are MS4 permittees
 - 4 have stated Mission/Vision statements
 - NPDES credits varied
 - 11 utilities offered 35% or less credits for NPDES permit holders
 - 7 offered 10% or less NPDES credits



Thank You!



Bryan P. Lennon
Assistant Water Division Director
bplennon@wilmingtonde.gov
(302) 576-3075

City of Wilmington
Department of Public Works
800 French Street
Wilmington, DE 19801-3537

