PHILADELPHIA'S WET WEATHER MANAGEMENT PROGRAMS

COMBINED SEWER MANAGEMENT PROGRAM ANNUAL REPORT

National Pollutant Discharge Elimination System (NPDES) Permits
Nos. PA0026689, PA0026662, PA0026671

STORMWATER MANAGEMENT PROGRAM ANNUAL REPORT

National Pollutant Discharge Elimination System (NPDES) Permit
No. PA 0054712

Reporting Period July 1st 2012 to June 30th 2013

Submitted to:

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Water Quality Management

And

ENVIRONMENTAL PROTECTION AGENCY – REGION III
Water Protection Division

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List of Common Abbreviations

BFE	Base Flood Elevation
BLS	Bureau of Laboratory Services, Philadelphia Water Department
BMP	Best Management Practice
BCWSA	Bucks Country Water & Sewer Authority
CAC	Citizens Advisory Council
CCR	Comprehensive Characterization Report
CCTV	Closed Circuit Television
CIP	Capital Improvement Project
COA	Consent Order & Agreement
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DRBC	Delaware River Basin Commission
E&S	Erosion and Sedimentation
EWS	Early Warning System
FGM	Fluvial Geomorphology
FPC	Fairmount Park Commission
FWWIC	Fairmount Water Works Interpretive Center
GC,CW	Green City, Clean Waters
GIS	Geographic Information Systems
GSI	Green Stormwater Infrastructure
HHW	Household Hazardous Waste
HSI	Habitat Suitability Index
I/I	Inflow and Infiltration
ILF	In-Lieu Fee
IPM	Integrated Pest Management
IWMP	Integrated Watershed Management Plan
IWU	Industrial Waste Unit
L&I	Licenses and Inspections
LID	Low Impact Development
LTCPU	Long Term Control Plan Update
MS4	Municipal Separate Storm Sewer System
NMC	Nine Minimum Controls
NSCD	Natural Stream Channel Design
NPDES	National Pollution Discharge Elimination System
O&M	Operation and Maintenance
OOW	Office of Watersheds
PADEP	Pennsylvania Department of Environmental Protection
PCB	Polychlorinated Biphenyl
PCPC	Philadelphia City Planning Commission
PFD	Philadelphia Fire Department
PMP	Pollutant Minimization Plan
POTW	Publicly Owned Treatment Works

PPR	Philadelphia Department of Parks and Recreation
PWD	Philadelphia Water Department
RCP	River Conservation Plan
RFP	Request For Proposal
RTC	Real Time Control
SAN	Schuylkill Action Network
SAP	Sewer Assessment Program
SEPTA	Southeastern Pennsylvania Transportation Authority
SIU	Significant Industrial User
SFR	Storm Flood Relief
SMP	Stormwater Management Program
SOP	Standard Operating Procedure
SPILL	Sewage Pollution Incident & Location Log
SWDD	Southwest Drainage District
SWMM	Stormwater Management Model
SYTF	Scrap Yard Task Force
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
TTF	Tookany/Tacony-Frankford
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency, Region III
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey
WMR	Watershed Mitigation Registry
WPAC	Watershed Planning Advisory Committee
WPCP	Water Pollution Control Plant
WRT	Waterways Restoration Team

Compliance Checklist

The Compliance Checklist is attached in a separate document, outside the main report in the front left pocket of report binder for the Department's and EPA's convenience to review the annual report alongside NPDES permit requirements.

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Combined Sewer Management Program Annual Report

I Management and Control of CSOs

This report is submitted pursuant to meeting the requirements of NPDES Permits #'s PA0026662, PA0026671, and PA0026689; PART C, I. OTHER REQUIREMENTS, Combined Sewer Overflows (CSOs), III. IMPLEMENTATION OF THE LONG TERM CSO CONTROL PLAN, C. Watershed-Based Management, IV. Monitoring and Assessment. This section requires that the permittee submit an Annual CSO Status Report. The purpose of this report is to document the status and changes made to programs implemented by the Philadelphia Water Department (PWD), during the time period of July 1st, 2012 through June 30th, 2013, to manage and reduce the combined sewer overflows (CSOs) permitted to discharge to waters of the Commonwealth of Pennsylvania.

II Implementation of the Nine Minimum Controls

In the first phase of PWD's CSO strategy, and in accordance with its NPDES permits, the PWD submitted to the Department on September 27, 1995, "CSO Documentation: Implementation of Nine Minimum Controls". PWD submitted an Updated Nine Minimum Control Report to the Department on June 1, 2013 to supplement the 1995 report and describe current activities as a result of new technology or practices. The nine minimum controls (NMCs) are low-cost actions or measures that can reduce CSO discharges and their effect on receiving waters, do not require significant engineering studies or major construction, and can be implemented in a relatively short time frame.

II.A Proper Operation and Regular Maintenance Programs for the Sewer System and the CSOs (NMC 1)

II.A.1 Implement a Comprehensive Geographic Information System (GIS) of the City sewer system

In 2005, PWD completed a data converstion project that resulted in the creation of GIS coverages for all of the City's water, sewer, and high pressure fire infrastructure. In FY 2013, PWD continues to maintain this comprehensive GIS coverage of the City's sewer system. To ensure PWD's investment in GIS is as accurate and up to date as possible, edits and improvements are made to data on a daily basis. PWD utilizes the GIS coverages as the foundation for many of their operations including maintenance management, capital improvements, and hydraulic modeling. The development and progress of GIS coverage of the City's sewer system has been discussed in full detail in previous reports. For additional information on the implementation that was started in

2005, please refer to **SECTION II.A.1 IMPLEMENT A COMPREHENSIVE GIS OF THE CITY SEWER SYSTEM** on page 5 of the CSO-Stormwater FY 2008 Annual Report.

II.A.2 Implement a Comprehensive Sewer Assessment Program (SAP)

PWD finished development and initiated a sewer assessment program (SAP) by March of 2006. Additional information on the program's development progress and goals have been provided in previous reports; please refer to **SECTION II.A.2 IMPLEMENT A COMPREHENSIVE SEWER ASSESSMENT PROGRAM (SAP)** on page 6 of the CSO-Stormwater FY 2008 Annual Report.

PWD continues to implement a comprehensive SAP to provide for continued inspection and maintenance of the collection system using closed circuit television. The SAP is used to guide the capital improvement program to ensure that the existing sewer systems are adequately maintained, rehabilitated, and reconstructed. For the period of July 2012 – June 2013, the length of TV inspections averaged about 4.02 miles a month for a total of over 49 inspected miles, as shown in **TABLE II.A.2-1 MONTHLY TV INSPECTIONS**.

Table II.A.2-1 Monthly TV Inspections

Date	Miles Inspected
Jul-12	4.2
Aug-12	5.3
Sep-12	2.9
Oct-12	4.0
Nov-12	3.8
Dec-12	3.6
Jan-13	5.5
Feb-13	3.7
Mar-13	3.9
Apr-13	4.4
May-13	3.9
Jun-13	3.9
Average	**4.09**
Total	**49.1**

II.B Maximum Use of the Collection System for Storage (NMC 2)

II.B.1 Continue to Institutionalize a Comprehensive Monitoring and Modeling Program

II.B.1.1 Monitoring

PWD continues to maintain an extensive monitoring network throughout the combined sewer system including rain gages, pump stations and connections from adjacent outlying communities. Information on the monitoring network with the listing of the monitors, rain gages, and pumping stations can be found in **APPENDIX A - FLOW MONITORING**.

PWD submitted the Comprehensive Monitoring Plan to the Department on December 1, 2012 which describes the strategy for performing monitoring of natural and engineered systems associated with PWD's updated long term CSO control program (as referred to as the *Green City, Clean Waters* Program) and addresses the monitoring and assessment of surface waters, groundwater, rainfall, CSO discharges, sewer flows, and green infrastructure performance. For more information on the Comprehensive Monitoring Plan, please refer to page 33 in the **APPENDIX C – FY 2013 COA ANNUAL REPORT**.

II.B.1.2 Modeling

The U.S. EPA's Storm Water Management Model (SWMM) was used to develop the watershed-scale model for the PWD combined sewer system which used the RUNOFF and EXTRAN modules. Following model development, PWD converted all collection systems models to SWMM5. PWD has completed converting all collection system models to use EPA SWMM and will continue to update them as needed to ensure models can best depict existing sewer system conditions.

The model conversion process has been described in full detail in the previous reports, for more details please refer to **SECTION II.B.1.2 MODELING** on page 17 of the CSO-Stormwater FY 2012 Annual Report.

II.B.2 Continue to Operate and Maintain a Network of Permanent and Temporary Flow Monitoring Equipment

PWD continues to maintain a CSO Permanent Monitoring network and temporary monitoring programs to support planning for CSO control projects and to minimize dry weather overflows and tidal inflows.

II.B.2.1 Permanent Flow Monitoring Program

PWD uses a nework of permanent flow monitors that are connected to a newer data acquisition system (TELOG) which uses cellular-based telemetry and improved enterprise data management software. The implementation of this TELOG System initiated in FY 2008 has been decribed in detail in previous reports; please refer to page 18 of the CSO-Stormwater FY 2012 Annual Report for a decription of the implementation. As of FY 2013, the Collector System Monitoring Network is connected to 372 sites at various locations including CSO Regulators, Rain Gauges, Pump Stations, Interceptors, Chemical Feed Tanks and Hydraulic Control Points which collect over 720 individual level and / or flow measurements with over an eighty percent operational status. During FY 2013, PWD began to expand its rain gauge network to with the installation of 8 additional gauges to increase the accuracy and confidence of PWD's H&H model results. The listing of permanent flow monitors can be found in **APPENDIX A – FLOW MONITORING.**

II.B.2.2 Temporary Flow Monitoring Program

PWD maintains its temporary flow-monitoring program, initiated in July 1999, which consists of deploying portable flow meters throughout targeted Philadelphia sewershed areas to quantify wastewater flow through sanitary sewers and characterize the tributary sewersheds. During FY 2013, PWD monitored 133 sites for the purposes of model calibration, I/I identification and design support. The listing of all temporary flow monitors, their location, and the deployment projects can be found in **APPENDIX A – FLOW MONITORING: TABLE 6 - LISTING OF ALL TEMPORARY FLOW MONITORS DEPLOYED BY PROJECTS**. Additional details on the temporary flow-monitoring program have been discussed in the previous reports; please refer to **SECTION II.B.2.2 TEMPORARY FLOW MONITORING PROGRAM** on page 18 of the CSO-Stormwater FY 2012 Annual Report.

II.B.3 Continue to Evaluate the Collection System to Ensure Adequate Transport Capacity for Dry and Wet Weather Flow

II.B.3.1 Long Term Control Plan Update

System-wide hydrologic and hydraulic models have been developed in support of the Long Term CSO Control Plan Update (LTCPU). Model evaluations have been performed to evaluate the system performance benefits of various system improvement scenarios.

The evaluations of the system-wide models were completed in FY 2008. For additional information on this assessment, please refer to **SECTION II.B.3 LONG TERM CONTROL PLAN UPDATE** on page 20 of the CSO-Stormwater FY 2008 Annual Report.

II.B.3.2 PC-30 Extreme Wet Weather Overflow

PWD continues to monitor and conduct modeling analysis for PC-30 as needed. For addtional information on other efforts conducted for this site, please refer to **SECTION III.B.2.1.1 PC-30 Relief Sewer** on page 50.

II.B.3.3 Storm Flood Relief

Flooding is an on-going concern for PWD, as intense rain storms can result in riverine, street and surface flooding, basement backups, and property damage. PWD has initiated a comprehensive flooding and sewer overflow mitigation program to analyze and reduce property damage from flooding and basement backups. Aspects of this program include sewer system inspection and maintenance, property data collection, implementing individual property solutions when appropriate, and conducting sewer system hydraulic and hydrologic analysis to predict flooding-prone areas. These individual efforts have been discussed in detail in previous reports; please refer to **SECTION II.B.3.3 STORM FLOOD RELIEF** on pages 21-26 of the FY 2010 CSO-Stormwater Annual Report for more information.

Flood Relief Project Summary

PWD is still in the process of project planning and model refinement in pursuit of storm flood relief (SFR) capital solutions for 3 major sections of the city: South Philadelphia, Northern Liberties and Germantown. These sewer system projects will improve the conveyance of stormwater from intense rain events more efficiently, and ultimately reduce the potential for flooding. These complex projects are potentially costly and will take several years to design and construct. The hydraulic model indicates that these sewer system improvements can greatly reduce the frequency and severity of flooding events, but may not be able to handle all possible rain events. PWD will continue to refine the improvement solutions in order to optimize each project while minimizing disruption to the community during construction.

Throughout FY 2013, approximately 70 monitors were installed around the City to capture typical wastewater flow conditions. Many of these locations were chosen to ensure that the hydraulic models in targeted SFR planning areas reflect actual sewer system conditions, including peak or extreme conditions.

In addition, PWD continues the Basement Protection Program, which involves the installation of backwater valves in homes that request and are approved for them. During FY 2013, 13 applications were received, 6 repairs completed, and 5 applications are pending. To date, PWD has retrofitted 419 properties.

South Philadelphia

PWD completed two SFR projects in South Philadelphia, one on Porter St in 2010 and another on Snyder Ave in 2007. During FY 2013, the Moore Street project reached the final design stage and design was started on the Weccacoe Avenue and Snyder Avenue Phase 2 projects. Also during FY 2013, PWD began conducting a tunnel feasibility study to evaluate cost estimates, neighborhood impact and general feasibility of tunnels options. Once the study is complete, PWD will reevaluate the projects located in South Philadelphia to determine how best to prioritize these flooding improvement options. The following table (**TABLE II.B.3.3-1**) outlines a status of the current South Philadelphia SFR projects that are being evaluated.

Table II.B.3.3-1 South Philadelphia SFR Sewer Improvement Projects

Project Name	Location	Construction Estimate	Project Status
Snyder Avenue – Phase 1	Snyder Ave	$5.4 million Final	Construction Complete
Porter Street	Porter, 10th to Broad	$3.5 million Final	Construction Complete
Moore Street	Moore St. ROW, Christopher Columbus Blvd. to Delaware River	$5 million	Design 90% complete
Weccacoe Avenue	Weccacoe Avenue, Wolf Street and Oregon Avenue	$13 million	Design Started
Snyder Avenue – Phase 2	Snyder Ave from Front to 4th	$15 million	Design Started

Northern Liberties

PWD continues to move forward with the SFR sewer designs for Northern Liberties which also impact combined sewer neighborhoods in Fishtown, Port Richmond and Lower Kensington. Phase one (Delaware Ave and Laurel St) was completed in August of 2010. The contract for phases two (Canal St) and four (Canal & Laurel Sts. to Germantown Ave. & Wildey St.) were advertised in August of 2013. Significant progress was made on Phase three (Delaware Ave to River) in FY 2013 and it is in the final design stages. **TABLE II.B.3.3-1** demonstrates the status of the current Northern SFR projects that are being proposed.

Table II.B.3.3-2 Northern Liberties SFR Sewer Improvement Projects

Project Name	Location	Construction Estimate	Anticipated Construction Start	Project Status
Northern Liberties Phase 1	Delaware Avenue and Laurel Street	$3.31 million Final	April 2010	Construction Complete
Northern Liberties Phase 2	Canal Street Chamber	$6.5 million	Fall 2014	Design Complete
Northern Liberties Phase 3	Delaware Ave to River (Undertaken by SugarHouse)	$5.0 million	Fall 2013	Design 90% Complete
Northern Liberties Phase 4	Canal & Laurel Sts. to Germantown Ave. &Wildey St.	$9.0 million	Fall 2014	Design Complete
Northern Liberties Phase 5	Germantown Ave. from Wildey St. to Girard Ave.	$6.4 million	Spring 2015	Design 90% Complete
Northern Liberties Phase 6	Germantown Ave. & Thompson St. to Master & Randolph Sts.	$10.3 million	Spring 2015	Design 70% Complete

Germantown

PWD is modeling the East Germantown section of the City, which was impacted by flooding from intense rainstorms, such as Hurricane Irene (8/27/11) and Tropical Storm Lee (9/7/11). Preliminary trunk analysis and validation of PWD's H&H model was conducted by the U.S. Army Corps of Engineers (USACE). The model was expanded for greater accuracy and many preliminary solution options are currently under review and discussion. During FY 2013, PWD, in conjunction with the Streets Department, began initial planning efforts to install "Road May Flood" signage at intersections vulnerable to street flooding. Twenty-two (22) intersections have been identified for potential signage locations based on their flooding potential during five-year and ten-year storm events. The Streets Department is reviewing the locations for sign installation.

II.B.4 Fully Integrate the Real-Time Control Facility into the Operations of PWD

The construction of the Collector System Real Time Control (RTC) Center building was completed in the summer of 2003. The RTC Center became operational in September 2006. For full details on the development and features of this facility, please refer to **SECTION II.B.4 FULLY INTEGRATE THE REAL-TIME CONTROL FACILITY INTO THE OPERATIONS OF PWD** on page 22 of the CSO-Stormwater FY 2008 Annual Report.

Real Time Control Evaluation
Several projects were previously evaluated for Real Time Control; for additional information on these projects, please refer to **SECTION 2.1 EVALUATE REAL TIME CONTROL IN LTCP** on page 10 of the 1996 Annual CSO Status Report and **SECTION II.B.3.4 REAL TIME CONTROL EVALUATION** on page 26 of the CSO-Stormwater FY 2010 Annual Report.

II.B.5 Operate and Maintain In-Line Collection Storage System Projects Contained within the LTCP

II.B.5.1 Main Relief

The Main Relief Inflatable Dam storage project was completed in May of 2007. PWD continues to maintain and monitor this in-line collection system storage site. This project reduces the discharge of CSO into the Schuylkill River through utilization of the available in-system storage volume and also provides flood relief to combined sewer areas in all three of PWD's drainage districts (Northeast, Southeast and Southwest).

Following a major storm in October of 2011, the inflatable dam is no longer operating. A static 7.5 ft dam currently exists in its place as the volume control. With the current configuration, this relief system now achieves an overflow reduction of 33 MG.

The full extent of Main Relief has been discussed in previous reports. For more information on Main Relief Sewer Relief Project, please refer to **SECTION II.B.5.1 MAIN RELIEF** on page 26 of the CSO-Stormwater FY 2012 Annual Report.

II.B.5.2 Construction and Implementation of Tacony Creek Park (T-14)

The T-14 trunk sewer system conveys combined sewage from the largest combined sewershed in the PWD collection system. CSO outfall T-14, a 21′ by 24′ sewer, discharges into the Tacony Creek during periods of moderate to heavier rainfall. T-14 has a volume of approximately 10 million gallons and a control structure is needed in the sewer to use as much of this storage as possible. The installation of a crest gate helps to retain flow within the sewer. The gate reduces CSO discharges to the creek by utilizing the relief sewer for in-system storage. This control technology provides an additional margin of protection against dry weather overflows while maintaining flood protection for upstream communities. The crest gate retains the stored flow in the relief sewer and a new connector pipe drains the stored flow to an existing nearby interceptor.

Construction was completed on this project in July of 2011 and the site was placed in service in November of 2011 following acceptance testing. At present, the system is in manual operation, while some necessary changes are made to the PLC control and feedback loop of the gate control scheme. These modifications should be completed by conclusion of this year.

Additional information on T-14 relief sewer project has been discussed in previous reports; please refer to **SECTION III.B.1.5.1 CONSTRUCTION AND IMPLEMENTATION OF TACONY CREEK PARK (T-14)** on page 72 of the CSO-Stormwater FY 2012 Report.

III.B.5.3 Construction and Implementation of Rock Run Relief (R-15)

The Rock Run Relief Sewer provides flood relief to combined sewer areas upstream of regulator T-8 in the Northeast Drainage District (NEDD). An inflatable dam was constructed in the Rock Run Relief Sewer to allow for utilization of in-system storage to retain combined flows during a majority of wet weather events. The inflatable dam stores combined flows in the relief sewer until storm inflows have subsided and capacity exists in the Tacony Interceptor for conveyance of combined flows to the Northeast Water Pollution Control Plant (NEWPCP). This control technology also provides an additional margin of protection against dry weather overflows while maintaining flood protection for upstream areas.

Several alternative control logics for the inflatable dam operation and drain-down gate were investigated to develop a logic that minimized the risks of flooding, increased Rock Run Relief storage utilization, and eliminated adverse effects of the project at other CSO regulators on the Tacony Creek.

The system was placed into service in August 2010. PWD's Flow Control Unit is slowly incrementing the level controls to observe the operation of the automatic equipment under actual storm conditions. For the last year, PWD has increased the operating set point to 20.0 ft in the trunk sewer and the system has been operating as designed. PWD has continued to evaluate modifications to the upstream diversion structure to convey additional flows to this storage facility and maximize storage capabilities.

Additional information on Rock Run Relief has been discussed in previous reports; please refer to **SECTION III.B.1.4.2 CONSTRUCTION AND IMPLEMENTATIONI OF ROCK RUN RELIEF (R-15)** on page 72 of the CSO-Stormwater FY 2012 Annual Report.

II.C Review and Modification of Pretreatment Requirements to Assure CSO Impacts are Minimized (NMC 3)

II.C.1 Expand the Pretreatment Program to Include Significant Industrial Users (SIUs) Whose Facilities Contribute Runoff to the Combined Sewer System

The City of Philadelphia's Pretreatment Program regulates all significant industrial users (SIUs) that discharge into PWD's service area, which includes SIUs in both separate and combined sewer systems. The City continually reevaluates the Pretreatment Program to determine if improvements can be made. Through annual monitoring and inspection activities, PWD's Industrial Waste Unit (IWU) currently regulates 120 SIUs that discharge to the sanitary system. During FY 2013, only 111 SIU inspections were conducted, as the remainder of the 120 SIUs was inspected during the 2012 Calendar Year.

IWU updated its inspection form to include a stormwater management component in 2006. A copy of the Form can be found in **APPENDIX O** of the CSO-Stormwater FY 2009 Annual Report.

IWU also maintains a website to inform the public and industries of permitting regulations, requirements and other information that may benefit or impact industrial users. The IWU website is located at the following web address: http://www.phila.gov/water/IWU.html.

Additional information on this program expansion was reported in previous years; please refer to **SECTION II.C.1 EXPAND THE PRETREATMENT PROGRAM TO INCLUDE SIUs WHOSE FACILITIES CONTRIBUTE RUNOFF TO THE COMBINED SEWER SYSTEM** on page 27 of the CSO-Stormwater FY 2012 Annual Report.

II.C.2 Incorporate Guidance on BMPs for Industrial Stormwater Discharges into Stormwater Management Regulations Guidance

A Stormwater Management Guidance Manual was developed to assist developers in meeting the requirements of the Stormwater Regulations. The manual is revised when necessary to incorporate new information, such as updated forms or specific section details when stormwater management requirements change. The current version of the Stormwater Management Guidance Manual can be found at: http://www.pwdplanreview.org/StormwaterManual.aspx.

Additional information on the development and contents of this guidance manual has been provided in previous reports; please refer to **SECTION II.C.2 INCORPORATE GUIDANCE ON BMPS FOR INDUSTRIAL STORMWATER DISCHARGES INTO STORMWATER MANAGEMENT REGULATIONS GUIDANCE** on page 28 of the CSO-Stormwater FY 2012 Annual Report.

II.C.3 Continue to Serve as a Member of the Philadelphia Inter-governmental Scrap and Tire Yard Task Force

A Scrap Yard Task Force (SYTF) was created to address numerous complaints about the operation of scrap metal and auto salvage businesses, which may cause polluted runoff to enter the City's sewers, blight in City neighborhoods, and contribute to short dumping and other environmental hazards to area waterways.

The SYTF is in its fifth year of operation since it was reorganized in September of 2008. Inspections and meetings normally take place once a month in an effort to bring more scrap yards into compliance. A geodatabase was created to display the location of all scrap yard parcels in the city, along with other useful information including the address, owner, surface area, date of last inspection, and previous violations.

The SYTF inspections are conducted once a month and typically 4 facilities are inspected at a time. The inspections are weather permitting, as scrap yards are normally located outside. During FY 2013, the SYTF 48 scrap yard inspections. Violation notices of varying types from different agencies were issued to a majority of the sites. PWD continues to be a part of the SYTF and works to reduce the negative environmental impacts of scrap yards through continued inspections.

The SYTF has been fully discussed in previous years. For more information on this organization, please refer to **SECTION II.C.3 CONTINUE TO SERVE AS A MEMBER OF THE PHILADELPHIA INTER-GOVERNMENTAL SCRAP AND TIRE YARD TASK FORCE** on page 28 of the CSO-Stormwater FY 2012 Annual Report.

II.D Maximization of Flow to the Publicly Owned Treatment Works (POTW) for Treatment (NMC 4)

II.D.1 Continue to Analyze and Implement Non-Capital Intensive Steps to Maximize the Wet Weather Flow to the POTW

II.D.1.1 Modified Regulator Plan

The Modified Regulator Plan (MRP) was designed to deliver more flow to the WPCPs more frequently and enable greater pollutant removals. The projected flow increase associated with the MRP was completely implemented by the submission of the 1997 Annual Combined Sewer Overflow Status Report. For a full description of this plan, please refer to **SECTION II.D.1 MODIFIED REGULATOR PLAN** on page 27 of the CSO-Stormwater FY 2008 Annual Report. Additional plan implementation efforts were included in the Updated Nine Minimum Controls Report which can be found online by accessing the following link:
http://phillywatersheds.org/doc/Updated%20NMC%20Report.pdf

II.D.1.2 Maximization of Wet Weather Treatment in the LTCPU

Facility Concept Plans for each of the WPCPs were developed and submitted to PADEP and the US EPA on June 1, 2013. The Facility Concept Plans describe specific engineering and construction activities proposed to increase the maximum wet weather flow rates to or through the plants, thereby increasing the capture rate of combined sewage. Copies of these plans can be accessed at the bottom of the page of the following link:
http://phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan

II.D.2 Continue the Program which Requires Flow Reduction Plans in Agreements to Treat Wastewater Flows from Satellite Collection Systems where Violations of Contractual Limits are Observed

PWD provides wastewater service to some of its neighboring communities. Communities that exceed their contractual limits must develop flow reduction plans under PWD review. The following progress has been achieved with the following municipalities/counties during FY 2013.

Abington Township
A new contract has been drafted to replace the existing expired contract. The proposed new contract includes sections that specify exceedance charges for excessive flows and require a plan of action from the Township to eliminate the excessive flows within one year from the date that the Township receives notice of its violation. In addition, the proposed contract will require the Township to pay its proportionate share of PWD's

Long Term Control Plan Update (LTCPU) to reduce combined sewer overflows. PWD is proceeding with negotiations on the new contract.

Bucks County Water & Sewer Authority

Under the terms of a negotiated agreement with PWD in 2008, the Bucks County Water & Sewer Authority (BCWSA) installed meters at all connection points not previously monitored. In addition, BCWSA agreed to construct a 1.8 million gallon surge tank and pump station in early 2012 to address high peak flows to PWD's system. PWD requested technical drawings and flow data from BCWSA in order to evaluate the effectiveness of the tank. PWD continues to monitor the flow monitoring data along the city border to ensure contact exceedances do not occur.

Cheltenham Township

An amendment to Cheltenham's contract was recently drafted and sent to the Township for their review and approval. The amendment requires the Township to pay their proportionate share of the LTCPU and construct additional sewer capacity within the City.

Delaware County Regional Water Quality Control Authority (DELCORA)

A new 15-year contract with DELCORA was executed effective April 1, 2013. As part of the contract, DELCORA agreed to pay its proportionate share of the City's 25-year LTCPU to reduce combined sewer overflows. If DELCORA has excessive flows, they are required to develop a PWD-approved plan of action to eliminate them within a one year period. If DELCORA does not address continued exceedances of flow limits, the contract allows for PWD to terminate the agreement.

Springfield Township

PWD has begun the process of assessing the Township's flow characteristics to determine what flow reductions, if any, will be required by the Township. Once this assessment is complete, requred flow reductions will be incorporated into Springfield's proposed new contract, along with new penalties for flow exceedances, charges for any modifications to the PWD collector system required to accommodate flows from Springfield, and a commitment from the Township to pay its proportionate share of the LTCPU. Additionally, the proposed new contract has a provision requiring a plan of action from the Township to correct excessive flows within one year from receiving a notice of violation from the City. PWD is proceeding with neogotiations on the new contract.

The list of outlying community contracts can be found below in **TABLE II.D.2-1: LISTING OF WHOLESALE WASTEWATER CUSTOMER CONTRACTS AND CAPACITIES.**

Table II.D.2-1 Listing of Wholesale Wastewater Customer Contracts and Capacities

Customers	Average Annual Daily Flow Maximum (MGD)	Maximum Daily Flow (MGD)	Instantaneous Maximum Rate (Cubic ft./sec)	Maximum Annual BOD Loadings (000's lbs.)	Maximum Annual SS Loadings (000's lbs.)
Northeast Plant					
Abington	4.453		9.247		
Bensalem	6.133		11.740	5,340	3,734
Bucks	24.000	33.000	74.260	13,400	13,400
Cheltenham	13.380		20.750		
Lower Moreland	1.450	2.900	8.970	568	592
Lower Southampton	7.140	9.28	15.790	5,500	6,000
Southwest Plant					
DELCORA	50.000	75.000	155.000	21,771	19,487
Lower Merion	14.500		31.570	6,871	7,250
Springfield (Erdenheim)	3.200		4.600	1,050	1,200
Upper Darby	17.000		35.000	6,831	7,348
Southeast Plant					
Springfield (Wyndmoor)	1.000		1.930	155	200

II.D.3 Use Comprehensive Monitoring and Modeling Program to Identify Suburban Communities where Excessive Rainfall-dependant I/I Appear to be Occurring

The U.S. EPA's SWMM was used to develop the watershed-scale model for the PWD combined sewer system. Outlying communities are modeled as separate runoff sheds that load directly to the PWD sewer network. The sheds are calibrated to flow monitoring data collected at each respective connection. PWD has identified 129 connections from outlying communities. Presently, permanent flow monitors are installed at 110 connections and temporary monitors installed at 16 connections. 3 connections are unmonitored at this time. Through temporary deployments, average flow statistics were determined. **APPENDIX A – FLOW MONITORING: TABLE 2** contains the list of all known connections, their location and whether the connection is permanently monitored.

II.E Prohibition of CSOs during Dry Weather (NMC 5)

II.E.1 Optimize the Real-Time Control Facility to Identify and Respond to Blockages and (non-chronic) Dry Weather Discharges

Regular and reactive inspections and maintenance of CSO regulators are performed throughout the City to ensure that sediment accumulations and/or blockages are identified and corrected immediately to avoid dry weather overflows. PWD utilizes a remote monitoring network system daily to help identify locations showing abnormal flow patterns.

CSO Regulator Inspection & Maintenance Program

PWD maintains 175 combined sewer regulator chambers with regulator devices that control the diversion of wastewater flow to the interceptor system and 26 storm relief diversion chambers that allow excess flow during storm events to be diverted to storm relief sewers. These chambers discharge through 164 NPDES permitted point sources which make up the PWD's CSO outfalls. The maintenance of the chambers is critical to the performance of the system in that they control the frequency, duration and quantity of CSO discharges. Annual summaries of the comprehensive and preventative maintenance activities completed in the combined sewer system over the past year are detailed in **SECTION III.C.4.2 NPDES – ANNUAL CSO STATUS REPORT** on page 68 and any changes are discussed below.

PWD instituted a policy of next day follow-up inspection at sites that experience a DWO. PWD will conduct an evaluation of the effectiveness of twice-weekly inspections. During FY 2013, 5501 inspections were completed on 201 CSO regulator sites and storm relief diversion chambers. There were 14 dry weather discharges and a total of 292 blocks cleared to prevent a possible discharge from developing. Details of the inspections during the past fiscal year can be found beginning on page 2 of **APPENDIX B – FY13 FLOW CONTROL UNIT CSO PROGRAM MAINTENANCE.**

Tide Gate Inspection and Maintenance Program

Eighty-nine (89) tide gates are located at approximately half of the CSO regulator chambers in the City's system and prevent tidal inflow into the combined sewer system from the estuary receiving water body. Maintenance of the gates is critical to system performance because inflow from the receiving water body can adversely affect the combined sewer system and treatment facilities by reducing system capacities, potentially causing dry weather discharges. In FY 2013, CSO tide gate preventative maintenance was completed at 6 of the tidal-affected CSO regulator sites. Summaries of the tide gate inspection and maintenance completed during the past fiscal year are on page 17 of **APPENDIX B – FY13 FLOW CONTROL UNIT CSO PROGRAM MAINTENANCE**, which documents the locations of tide gate preventative maintenance performed in FY 2013.

Somerset Grit Chamber Cleaning

PWD regularly monitors the sediment accumulation in the grit trap at the origin of the Somerset Intercepting Sewer and in locations downstream to determine appropriate cleaning intervals for the grit trap and downstream interceptor. Driven by the monitoring program, the grit basin is cleaned periodically and debris quantities are tracked to further refine the frequency of cleaning necessary to maintain adequate capacity in the Somerset Intercepting Sewer. During FY 2013, an estimated 198 tons of grit were removed from the Somerset Grit Chamber. Summaries for Somerset Grit

Chamber cleaning activities are available on page 17 of **APPENDIX B – FY13 FLOW CONTROL UNIT CSO PROGRAM MAINTENANCE.**

Central Schuykill Pumping Station Grit Pocket Cleaning
PWD performs specialized maintenance activities at the Central Schuylkill Pump Station (CSPS). The siphon conveys the wastewater flow from the interceptors on the East side of the Schuylkill River to the West side. The siphon grit pockets are located on the downstream side of the siphon where sewers enter the wasterwater pump station. During FY 2013, the two grit pockets at the CSPS siphon were cleaned four times, and a total of 74 tons of settle grit were removed to ensure proper functionality of the site.

II.F Control of Solid and Floatable Materials in CSOs (NMC 6)

The ultimate goal of NMC 6 is, where feasible, to reduce or eliminate the discharge of floatables and coarse solids from combined sewer overflows to the receiving waters by relatively simple means. Various technologies can be used to control solids and floatables entering the receiving waters from CSOs, ranging from simple devices that remove material from the CSO flow stream to devices that remove floatables from the receiving water after they are discharged.

II.F.1 Control the Discharge of Solids and Floatables by Cleaning Inlets and Catch Basins

PWD is responsible for the inspection and cleaning of approximately 74,000 active stormwater inlets within the City. PWD has five highway crews, whose duties include cleaning high volume traffic areas; retrieving and installing inlet covers; replacing inlet covers that are missing; installing locking covers; unclogging choked inlet traps and outlet pipes so that inlets can take water; answering flood complaints; alleviating flooded streets and intersections when hydrants are opened, water mains break, or as a result of rain storms and other weather related problems.

For the period of July 2012– June 2013, 125,956 inlets were inspected, 96,612 inlets were cleaned. The average amount of debris removed from each cleaned inlet was 230lbs. The frequency of inlet inspections and cleaning have significantly increased since the implementation of Cityworks, an asset management system that generates automated work schedules based upon complaints and routine maintenance schedules. Additional statistics and information pertaining to Inlet Cleaning from FY 2013 can be found in **TABLE II.F.1-1.**

Table II.F.1-1: FY13 Inlet Cleaning Statistics

Total Inlets Inspected	125,956
Total Inlets Cleaned	96,612
Total Covers Replaced	366*
Total Covers Retrieved	6*
Total Covers Chained	5,625
Tons of Debris Removed	11,117
Avg. Lbs./ Inlet	230

* The number of inlet covers replaced and retrived has reduced significantly following PWD's improved ability to chain and lock covers.

II.F.2 Continue to Fund and Operate the Waterways Restoration Team (WRT)

PWD's Waterways Restoration Team (WRT) is a multi-crew force dedicated to performing stream cleanup work throughout the city including large trash and debris removal, and restoration of eroded streambanks and streambeds. The WRT works in partnership with Philadelphia Parks and Recreation (PPR) staff and various Friends of the Parks groups to maximize resources and build positive relationships with our communities. In FY 2013, WRT removed a total of 1416 tons of debris from the City's waterways, including 4 vehicles, 4756 tires and 27 shopping carts (**TABLE II.F.2-1**). Of the total debris removed, a majority of the weight can be attributed to large organic material (e.g. trees) that have fallen into the waterways and restricted flow, thus increasing the potential for bank erosion and/or damage to infrastructure.

Table II.F.2- 1 Summary of Waterways Restoration Team - Performance Measurements FY 2008-2013

Waste Removed	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Debris Removed (tons)	326	657	1438	750	741	1416
Cars Removed	80	15	12	11	14	4
Tires Removed	861	924	1062	1392	1256	4756
Shopping Carts Removed	72	268	102	89	50	27
Number of Clean-up Sites	178	375	335	459	434	467

II.F.3 Continue to Operate and Maintain a Floatables Skimming Vessel

Reduction in floatables improves both water quality and aesthetics of receiving streams. The use of a skimming vessel is a proactive control measure, capable of managing debris at various locations in open water before they reach static control methods. In addition, the boat is a visible control that increases public awareness and education of floatables impacts. PWD currently has two (2) skimming vessels; a large marine vessel, the R.E. Roy, and a smaller pontoon vessel.

II.F.3.1 Floatables Skimming Vessel – R.E. Roy

In 2006, the Water Department implemented a marine floatables strategy which consisted of marine vessel the R.E Roy to manage visible debris along the Delaware and tidal Schuylkill Rivers. The 39-foot marine vessel is operated approximately five days per week, at least 7 months out of the year. The vessel's main purpose is to perform general debris collection and removal on both these rivers, while also serving as a mechanism for public relations events. In FY 2013, the skimming vessel was operational during the majority of the year, shutting down field activities between December - March for winter maintenance. During the 149 days of operation in FY 2013, a total of 22.61 tons (275 cubic yards) of debris and floatables material were removed from the Delaware and Schuylkill Rivers (**FIGURE II.F.3.1-1** and **TABLE II.F.3.1-1**, respectively). The skimming vessel has been discussed in detail in previous reports; please refer to **SECTION II.F.3 FLOATABLES SKIMMING VESSEL – R.E. ROY** on page 37 of the CSO-Stormwater FY 2012 Annual Report for additional information on the skimming vessel.

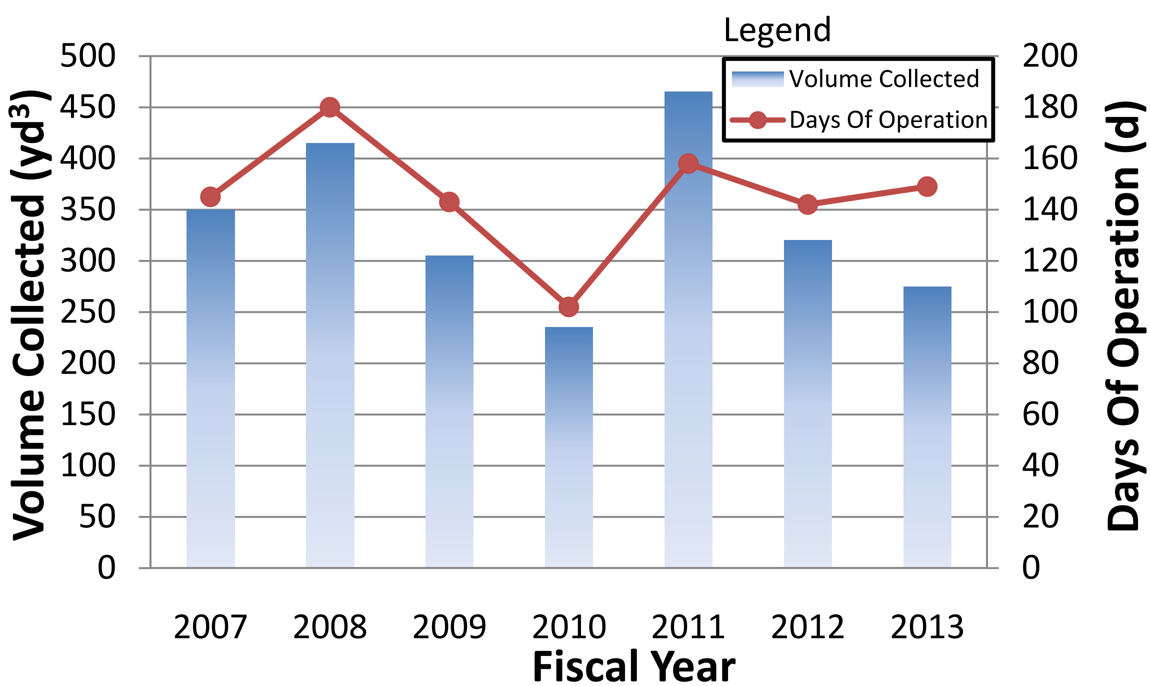

Figure II.F.3.1-1 : Debris removed and days of operation of the large skimming vessel (FY 2007-2013)

Table II.F.3.1-1 Debris Collected and Days of Operation by R.E. Roy Skimming Vessel

Date	Tons Removed*	Cubic Yards Collected	Days in Operation	Days on Schuylkill	Days on Delaware
July 2012	1.98	25	15	6	9
August 2012	0	35	23	14	9
September 2012	2.61	35	19	9.5	9.5
October 2012	9.17	35	20	14.5	5.5
November 2012	0	45	20	10	10
December 2012	1.75	5	1	1	0
January 2013	0	0	0	0	0
February 2013	0	0	0	0	0
March 2013	0	0	0	0	0
April 2013	0	10	10	6.5	3.5
May 2013	4.06	40	22	11.5	10.5
June 2013	3.04	45	19	12	7
FY 2013 TOTAL	**22.61**	**275**	**149**	**85**	**64**

*Skimming vessel crews do not always weigh debris collected at the end of each boat operation; therefore some month's "ton removed" totals may not be accurate.

II.F.3.2 Floatables Pontoon Vessel

PWD also operates and maintains a small skimming vessel, a pontoon vessel that is used on the non-tidal portion of Schuylkill River within Philadelphia to retrieve floating trash and debris from the waterways within the service area. The debris is hand netted from the water surface by employees standing on the vessel deck. The hand nets are emptied into ten 44-gallon debris containers on the deck and the containers are thn offloaded. The pontoon vessel can be utilized in the tight spaces found in marinas, among piers, and in near shore areas.

In FY 2013, the pontoon skimming vessel was operational from July – September 2012 and May – June 2013, removing a total of 4.1 cubic yards of recyclable material including bottles, plastic, paper, and 3.0 cubic yards of mixed trash. Due to exceptional flows experienced in the Schuylkill River during the operational period (i.e., spring/summer 2012 and 2013), a total of six deployments (approximately 36 captain's hours) occurred during the 2013 fiscal year. The pontoon vessel has been discussed in detail in previous reports; please refer to **SECTION II.F.3 FLOATABLES PONTOON VESSEL** on page 38 of the CSO-Stormwater FY 2012 Annual Report for additional information on the vessel.

II.F.4 Other Initiatives

II.F.4.1 Pilot Netting Facility

In October 2010, PWD requested from PADEP the removal of these nets due to PWD's belief that the nets are inefficient and resources could be better used elsewhere. Andy Sinclair of PADEP responded in April 2012 stating that PADEP has accepted the request for removal. Following receipt of this notice, PWD no longer conducts this pilot project, and as a result additional efforts are put towards maintaining other floatable control programs.

II.F.4.2 Repair, Rehabilitation, and Expansion of Outfall Debris Grills

Debris grills are maintained regularly at sites where the tide introduces large floating debris into the outfall conduit. This debris can become lodged in a tide gate, causing inflow to occur. Additionally, debris grills provide entry restriction and some degree of floatables control. During FY 2013, 16 debris grill inspections and cleanings were done. The list of the debris grill preventative maintenance activities is available on page 17 of **APPENDIX B – FY13 FLOW CONTROL UNIT CSO PROGRAM MAINTENANCE.**

II.G Pollution Prevention (NMC 7)

Most of the city ordinances related to NMC 7 are housekeeping practices that help to prohibit litter and debris from being deposited on the streets and within the watershed area. As pollutant parameters accumulate within the watershed, practices such as regular maintenance of catch basins can help to reduce the amount of pollutants entering the combined system and ultimately, the receiving water.

II.G.1 Continue to Develop and Share a Variety of Public Information Materials Concerning the CSO LTCP

The Public Outreach and Participation conducted in FY 2013 for the Green City, Clean Waters program which is the City's vision for addressing CSO reductions has been provided in **SECTION 7.0 - PUBLIC OUTREACH AND PARTICIPATION** starting on page 36 of **APPENDIX C – COA ANNUAL REPORT** and **SECTION II.G.3 CONTINUE TO PROVIDE ANNUAL INFORMATION TO CITY RESIDENTS ABOUT PROGRAMS VIA TRADITIONAL PWD PUBLICATIONS** on page 35 of this report.

II.G.2 Continue to Maintain Watershed Management and Source Water Protection Partnership Websites

II.G.2.1 Phillywatersheds.org

Phillywatersheds.org is an important PWD website which acts as a hub for all watershed-based programs and partnership information. The website provides information to the public on what issues are currently problematic for the City's watersheds, what PWD is doing to address these issues, and what residents of Philadelphia can do to help improve watershed health. It also includes educational tools, public meeting materials, maps and reports generated by PWD or partners. Daily activity on the site has increased compared to previous year, according to Google Analytics, from 106,066 visitors in FY 2012 to 136,614 visitors in FY 2013.

One exciting feature of the website is interactive mapping. Maps are available for green stormwater infrastructure projects, traditional infrastructure projects, waterways restoration projects, and community partnership projects. There are also maps for each of the seven major watersheds within Philadelphia. One of the main uses of the mapping system is the Combined Sewer Overflow Public Notification System, known as CSOcast. CSOcast shows CSO outfall overflow information retrieved from PWD's sewer monitoring network. More information on PWD's CSOcast is described in further detail in **SECTION II.H.2** of this report on page 42.

The website also features pages for various PWD initiatives. The page for the Rain Barrel Workshop, for example, allows citizens to register for PWD's rain barrel workshops and find out more information about rain barrels. It also contains a map showing the locations of the all the rain barrels given out through the workshop program. The page has been used successfully for numerous workshops and has received positive feedback from residents. For more information on PWD's Rain Barrel Program, please refer to page 41 of **APPENDIX C – FY 2013 COA ANNUNAL REPORT**.

A page was also launched in June of 2012 to share information about PWD's Rain Check Program. This page allows citizens the opportunity to sign up for free stormwater property assessments, learn about and choose suitable stormwater tools and then purchase the selected tool at a discounted rate. The site also features contact information for program staff, photographs of completed installations, and a FAQ section. For more information on PWD's Rain Check Program, please refer to page 40-41 of **APPENDIX C – FY 2013 COA ANNUNAL REPORT**.

The website also hosts a blog that is updated regularly with posts on a wide variety of topics including current programs and events, relevant partner initiatives, and programs that support GSI, the City's waterways, parks and the urban landscape. During FY 2013, there were 82 posts which were viewed at least 7,012 times. While there were fewer blog posts than the previous year, total readership remained roughly equal. Greater interest and awareness of the blog is confirmed by a nearly 20% increase in direct traffic.

Additionally, users are spending more time on the page as indicated by a lower bounce rate, or rate of people leaving the blog without exploring other pages within Phillywatersheds .org. This number does not represent the grand total of views as it does not reflect the number of views accessed from outside posts, such as Facebook, therefore it is assumed that the true number would be higher.

II.G.2.2 RiverCast

Philly RiverCast (http://www.phillyrivercast.org/) is the first operable web-based recreational warning system in the United States. Using near real-time flow, precipitation, and turbidity data, RiverCast translates the predicted bacteria levels in the Schuylkill River into one of three ratings, each of which corresponds to suggested guidelines for safe recreation. RiverCast guidelines offer tools for the public to make informed decisions about recreation, and thus help protect the public against illnesses caused by bacteria. Ultimately, RiverCast will help ensure continued safe recreational use of the Schuylkill River, while promoting public awareness of water quality concerns and indirectly engaging support for source water protection measures. Over 560,000 users have visited the Philly RiverCast website since it was first released in June 2005. This number includes over 70,000 visitors in FY 2013 year alone.

II.G.2.3 Schuylkill Action Network

The Schuylkill Action Network (SAN) Stormwater Workgroup was formed to identify a cost-effective approach to stormwater management through project prioritization and planning. The SAN website supports the SAN's Stormwater Workgroup by providing information about projects, events, publications, and a public component that conveys the SAN's message about protecting and improving the Schuylkill River to outside audiences. The workgroup is a partnership of representatives from PWD, PADEP, conservation districts, watershed organizations, municipalities, and others groups throughout the watershed. The SAN Stormwater Workgroup's ultimate goal is to maximize reduction and/or prevention of stormwater runoff pollution. In its 10 years of existence, the workgroup has served as an advisory committee for state and local governments, an ordinance review board for municipalities, and support group for large and small projects throughout the Schuylkill River Watershed. To date, the SAN has invested more than $21 million to complete over 200 projects to reduce stormwater pollution problems throughout the watershed. During the last year, SAN projects have addressed important pollution sources including agriculture, abandoned mine drainage and stormwater. Efforts from the last calendar year are documented in the following table (**TABLE II.G.2.3-1**):

Table II.G.2.3-1: 2013 Schuylkill Action Network Project Progress

Agriculture	Abandoned Mine Drainage (AMD)	Stormwater
• 300 feet of streambank fencing has been installed • 17,075 feet of streambank protected • 154 Conservation and Nutrient Management Plans completed on watershed farms • 2 manure storage facilities and barnyard retrofits completed • 5 Comprehensive Farm Management Plans completed	• $4.9 million secured or spent to address AMD issues in the watershed • 3 studies/models completed for AMD remediation and prevention • 32 acres of trees planted on abandoned mine lands • 2 projects completed to reduce water infiltration into mine pool (AMD Prevention) • 1 construction project initiated to build a treatment system for AMD	• Provided outreach to 20 municipalities with a large percentage of priority lands • 4 land transaction assistant projects completed, protecting 584 acres of priority watershed land and leveraging over $3.5 million in land value • Initiated a riparian buffer restoration initiative for a source water protection area in the watershed

In order to communicate to SAN stakeholders the accomplishments of the SAN Stormwater workgroup, as well as other workgroups in the partnership, the SAN routinely updates their website with input from PWD and the SAN Planning and Education and Outreach committees. The website, www.schuylkillwaters.org, includes an internal component that allows for improved communication among SAN workgroup members and facilitates on-the-ground work. The SAN website, together with Phillywatersheds.org, provides data and reports from the source water assessments for the Schuylkill River. For additional information on this committee, please refer to **SECTION II.G.2.3 SCHUYLKILL ACTION NETWORK** on page 41 of the CSO-Stormwater FY 2012 Annual Report.

II.G.2.4 Delaware Valley Early Warning System

The Delaware Valley Early Warning System (EWS) is an integrated monitoring, notification, and communication system designed to provide advanced warning of surface water contamination events in the Schuylkill Rover and Lower Delaware River Watersheds. The Delaware Valley EWS covers the entire length of the Schuylkill River as well as the Delaware River from the Delaware Water Gap to just below Wilmington, Delaware. The EWS monitoring network currently compiles water quality data stations throughout the watershed. Access to this data allows water suppliers to identify changes in water quality associated with both natural and accidental contamination events. PWD has been working with PADEP to meet the goal of dischargers adding EWS to their downstream notification list. Having dischargers contact the EWS directly will increase the number and geographic diversity of downstream notifications with just a single phone call. During FY 2013, EWS reported 15 unique events and over $300,000 was invested for improvements to the EWS web portal which includes the incorporation of a GIS mapping feature and tidal spill model analysis tool.

EWS has been discussed in further detail in previous reports; for additional information on this system please refer to **SECTION II.G.2.4 EARLY WARNING SYSTEM** on page 43 of the CSO-Stormwater FY 2012 Annual Report.

II.G.2.5 Other PWD Related Websites and Social Media

Stormwater Billing

PWD has a stormwater billing program website located at http://www.phila.gov/water/stormwater_billing.html that provides a map service showing the stormwater charges for every property in Philadelphia as well as helpful documents and forms regarding the stormwater fees. Customers are encouraged to visit this site if they have questions about their stormwater charges or would like more information concerning PWD's Appeals, Credits or CAP programs. This information can help property owners reduce the amount storm water entering the sewer system. For more information on the stormwater billing program please refer **SECTION III.C.1.3 – PARCEL-BASED STORMWATER BILLING** on page 56.

Development Review Program Website

PWD's Development Review Program has a website that provides guidance on the Philadelphia Stormwater Regulations, explains the plan review process, and allows developers to submit applications online. The site also provides access to the Stormwater Management Guidance Manual and updated news regarding stormwater. This site can be found at: http://www.pwdplanreview.org/. For more information on the activities conducted by Development Review Program please refer **SECTION F.5 – MONITOR AND CONTROL STORM WATER FROM CONSTRUCTION ACTIVITES** on page 102.

Water Quality Website

PWD's website located at http://www.phila.gov/water provides important information on current news, recent reports, important programs and other facts concerning water that are helpful to consumers.

Philadelphia Water Department on Social Media

Social Media has become an essential tool for disseminating departmental messaging about the pollution prevention and programs improving the City's water resources.

Facebook

PWD maintains two Facebook pages to keep residents informed on any news and events at or hosted by the Water Department. These pages can be accessed at: http://www.facebook.com/PhillyH2O and http://www.facebook.com/phillywatersheds.

PWD's Fairmount Water Works Interpretive Center (FWWIC) also maintains a Facebook page that extends the reach of departmental messaging. The page can be accessed at https://www.facebook.com/28309557520. Between these three Facebook Pages, the department reaches over 1500 fans.

Twitter

PWD and the FWWIC also have Twitter accounts providing helpful hints, resolving customer complaints and providing news concerning the department, education and water in general. The page can be found at: https://twitter.com/PhillyH2O and http://www.twitter.com/FWWIC and one can follow the accounts at @PhillyH2O and @FWWIC. The @PhillyH2O acount activity has increased substantially, averaging 55 tweets per month, up from 15 tweets per month in 2012. In addition, @PhillyH2O has 1333 followers, up from 207 in 2012. Including the @FWWIC followers, PWD has over 2700 followers.

Philadelphia Water Department Videos

PWD hosts videos on Vimeo and YouTube which provide information and news on its programs and vision for Philadelphia. The videos can be accessed at the following link:

- http://www.vimeo.com/phillywatersheds
- http://www.youtube.com/pwdepartment

Between the two platforms, the videos have been viewed over 2900 times between July 1, 2012 and June 30, 2013. This is up from 1581 views in FY 2012. These represent the number of full views of videos three to fifteen minutes in length.

II.G.3 Continue to Provide Annual Information to City Residents about Programs via Traditional PWD Publications

II.G.3.1 Billstuffers and Waterwheel Watershed Newsletters

PWD develops numerous publications for the public that are distributed throughout the City at advisory committee meetings, public meetings, and through billstuffers. The following components have been shared to the public during FY 2013:

Billstuffers

Rate Increase Billstuffer – January 2013

A billstuffer was distributed to explain the second phase of a three-phase change to water and wastewater service rates to customers for the period of January 2013 – June 30, 2013.

Rate Increase Billstuffer – June 2013

A billstuffer was distributed to explain about the second of a three-phase change to for water and wastewater service rates to customers for the period of July 1, 2013 to June 30, 2014.

Publications

2013 Water Quality Report (with 2012 Data) – June 2013

Annual consumer confidence report mandated by the federal Safe Drinking Water Act published and distributed each year to PWD wholesale and retail account customers, and other consumers of the City's water.

2012 Annual Financial Report – June 2013

Annual financial report distributed to bond rating agencies and other financial institutions. Report provides information on the Department's financial strength, water quality, water environment, asset management, water and wastewater treatment.

Media Advisories

March 13, 2013 – With Over 800 Votes – Winning Designs Unveiled at Rain Barrel Wrap Dedication Student Rain Barrel Designs to Highlight Stormwater Management

June 6, 2013 – Celebrating Clean Water During Philly Beer Week

June 12, 2013 – Philadelphia Homes Receive Downspout Planters to Be Featured in New Documentary, "Water Blues, Green Solutions" Helps Citizens Learn Ways to Manage Stormwater

Press releases

July 25, 2012 – Water Department to Hold an Additional Public Hearing on Proposed Rate Increase, New Water, Stormwater and Sewer Rates to Ensure Top-Quality Drinking Water

August 17, 2012 – Shawmont Avenue to be Closed between Eva and Minerva Streets due to a storm flood relief project

September 8, 2012 – Celebrating Pennsylvania's Coast at Penn's Landing

September 28, 2012 – Launch Party for Green Stormwater Infrastructure Projects Exhibition, Infill Philadelphia: Soak It Up Designed to Transform Urban Neighborhoods

October 5, 2012 – Special Art Tour with Environmental Artist Stacy Levy

October 10, 2012 – EPA to Provide $3 Million to Promote Green Solutions in Philadelphia, Funds to Support City's Green City, Clean Water Plan for Reducing Stormwater Runoff

November 15, 2012 – Deadline Approaching for National Design Competition Highlighting green Infrastructure $10,000 Top Prize for Innovative and Creative Designs for Philadelphia and Other Cities

February 15, 2013 – Infill Philadelphia: Soak It Up! Design Awards, Nine finalists compete for $10,000 top prize in national design competition showcasing innovative designs for green stormwater infrastructure

March 8, 2013 – Infill Philadelphia: Soak It Up! Design Awards, Three Winners to inspire innovation in green stormwater infrastructure

March 15, 2013 – Winter Moratorium for Water Shutoffs Draws to a Close for Philadelphia Water Department Customers

March 18, 2013 – Water Rates Maintain High Quality Drinking Water, Water Department and Water Revenue Bureau Encourage Companies with Delinquencies to Pay Their Fair Share

May 31, 2013 – Saucony Creek Brewing Company and Schuylkill Action Network Team up at the Tap! Celebrating Clean Water during Philly Beer Week!

June 12, 2013 – Philadelphia Homes Receive Downspout Planters to Be Featured in New Documentary "Water Blues, Green Solutions"

Community Letters
A letter was sent to over 2,000 customers in January 2013, alerting eligible non-residential customers about the application deadline for PWD's Customer Assistance Program.

A letter was sent to over 400 customers in June 2013 to notify them of a fire sprinkler service installed in their homes. The fire sprinkler service is equipped with a backflow prevention assembly that must undergo annual testing and maintenance by a City-certified backflow protection technician.

Community Meetings
A series of public hearings were held on the PWD proposal to increase water, sewer, stormwater, fire connection and miscellaneous charges on the following dates, times and locations:

1. Monday, July 9, 2012, 10:00 a.m. – 12 noon
   Philadelphia Senior Center, 509 S. Broad Street, Phila., PA 19147
2. Tuesday, July 10, 2012, 6:00 p.m. – 8:00 p.m.
   Roxborough Memorial Hospital, 5800 Ridge Avenue, Phila., PA 19128
3. Thursday, July 12, 2012, 6:00 p.m. – 8:00 p.m.
   Holy Family University, 9801 Frankford Avenue, Phila., PA 19114
4. Monday, July 16, 2012, 6:30 p.m. – 8:30 p.m.
   YMCA North Philadelphia, 1400 N. Broad Street, Phila., PA 19121
5. Tuesday, July 17, 2012, 6:30 p.m. – 8:30 p.m.
   White Rock Baptist Church, 5240 Chestnut Street, Phila., PA 19139
6. Tuesday, July 31, 2012, 6:00 p.m. – 8:00 p.m.
   The Philadelphia Protestant Home, 6500 Tabor Avenue, Phila., PA 19111

Advertisements
Paid advertisements were placed in the Philadelphia Inquirer, Philadelphia Daily News and the Montgomery County Times Chronicle on July 5, 2012 and the Bucks County Courier Times on July 6, 2012 to advertise the Public Meeting schedule for the Poquessing Act 167 Plan

Paid advertisements were placed in the Philadelphia Daily News, Philadelphia Inquirer, Philadelphia Tribune, Philadelphia Metro and Al Dia on July 6, 2012 to advertise the dates, times and locations of the rate increase public hearings.

Paid advertisements were placed in following newspapers on the dates listed below to advertise the dates, times and locations of the rate increase public hearings:

1. South Philadelphia Review, July 9, 2012
2. Roxborough Review, July 10, 2012
3. Northeast Times Weekly, July 12, 2012
4. Westside Weekly, July 17, 2012

II.G.3.2 Additional PWD and Partner Sponsored Events

PA Coast Day
PWD along with Partnership for the Delaware Estuary and PADEP Coastal Zone Management Program sponsored the 10th Annual Pennsylvania Coast Day on Sunday September 8, 2012. This year, 370 people participated in enough activities at the various organizations' booths to qualify for prizes in the Clean Water Challenge. During the 2012 event, 400 passes were distributed to attendees for a free ride on the Delaware RiverLink Ferry. In addition to the Coast Day activities, over 250 people visited the neighboring Independence Seaport Museum (significantly higher than usual attendance) and 302 adults and children took a free shuttle to FWWIC.

A 2013 Coast Day Event is currently scheduled for Saturday, September 7th, 2013. For more information on Coast Day visit: http://www.delawareestuary.org/coast-day

Philly FUN Fishing Fest
In celebration of the improving water quality, PWD and its partners, the Fish and Boat Commission and the Schuylkill River Development Corporation – have hosted the annual Philly FUN Fishing Fest on the banks of the Schuylkill River. The all-ages fishing festival is open to the public, no experience required. Prizes from various local sponsors are provided to the winners of various categories. Fishing instruction is provided by volunteers, while fishing rods are on loan and bait is donated. The event does not require a fishing license and it is free of charge. The Fishing Fest is an effective means to educate the public on the improving water quality and aquatic resources the City offers. This year, the event took place on Saturday, September 8, 2012, where approximately 97 individuals participated and approximately 225 fish were caught during the

tournament. For more information on the Philly Fun Fishing Fest, please visit: http://www.phillyriverinfo.org/fishingfest/.

Delaware Estuary Watershed Workshop for Teachers

In the 17th year of the Delaware Estuary Teacher Workshop program, two teacher workshops were held in July 2012 in coordination with the Partnership for the Delaware Estuary, Delaware National Estuarine Research Reserve and PWD. Thirty-one teachers attended the two workshops. Workshop activities typically involve a boat trip along the St. Jones River, visiting green infrastructure projects, performing chemical, physical and biological analysis in fresh and estuarine waters, discovering wetlands, dissecting oysters, participating in hands-on classroom and field experiences and much more. PWD hosted the teachers on tours of green infrastructure locations/projects, the Fairmount Fishway, FWWIC, the Belmont Water Treatment Plant, and Southeast Water Pollution Control Plant. This segment of the teacher workshop provided the participants with crucial information on non-point source pollution, the local waterways as a source of their drinking water, and the process undergone to return the water in an acceptable condition. This year PWD introduced teachers to the new Green Schools, Clean Waters curriculum. The workshop provided an opportunity for educators to receive free educational and classroom materials to teach students about the importance of watershed maintenance and pollution prevention. For more information on the teachers' workshop visit: http://www.delawareestuary.org/wetland-workshop.

Philadelphia Flower Show – PWD Exhibit

As in previous years, PWD designed an exhibit for the 2013 International Philadelphia Flower Show. Though the theme of the flower show changes annually, the PWD tries to incorporate elements such as green infrastructure techniques, water saving techniques and purifying techniques in every exhibit. This year's theme for the flower show was "Brilliant." The show took place from March 2nd-10th 2013. The PWD's display this year featured our Wastewater and Energy programs. The exhibit is intended to display the innovative methods that use wastewater to produce energy at our facilities. Wastewater picks up heat from sinks, dishwashers and industrial processes. The heat is then transported through the sewer lines to the wastewater treatment facilities. The live exhibit was seen by over 225,000 people and included stormwater pollution prevention messages and promotion of PWD's Green City, Clean Waters program.

II.G.4 Continue to Support the Fairmount Water Works Interpretive Center

The Fairmount Water Works Interpretive Center (FWWIC) is PWD's renowned education center, located on the banks of the Schuylkill River in Philadelphia. The Center tells the story of the Schuylkill River and its human connections throughout history. Innovative exhibits and interactive educational programs meld the history, technology and science, providing education on the many issues facing the regions' urban watersheds.

As detailed in **TABLE II.G.4-1,** during FY 2013, nearly 40,000 visitors attended the Interpretive Center which consisted of general visitors, school groups, community groups, and attendees for special exhibits, visiting authors and lecturers. An additional 4,000 adults and children were reached as part of the center's outreach efforts.

Table II.G.4-1 2012-2013 Fairmount Water Works Interpretive Center Visitors

2012-2013 Fiscal Year Fairmount Water Works Interpretative Center Visitors	
School Groups	550 classes, totaling 9,438 students
General Visitors	20,457
Fiscal Year 2013Total Visitors	**40,182**

PWD continues to encourage the efforts conducted by the FWWIC. More information has been provided in previous reports on the FWWIC programs; please refer to **SECTION II.G.4 EDUCATION PROGRAMS** on page 56 of the CSO-Stormwater FY 2012 Report.

II.H Public Notification to Ensure that the Public Receives Adequate Notification of CSO Occurrences and CSO Impacts (NMC 8)

PWD has developed and will continue to develop a series of informational brochures and other materials about its CSO discharges and the potential effects of these discharges on the receiving waters. In addition, PWD has enlisted watershed organizations and partnerships to assist in this endeavor to raise the level of citizen awareness about the function of CSO and stormwater outfalls through a variety of educational mediums.

II.H.1 Launch a Proactive Public Notification Program Using Numerous Media Sources

PWD is advancing a proactive public notification program that uses print, internet, outfall signage, and other media to distribute information on the locations of CSOs, information on hazards, and potential public actions.

<u>CSO Outfall Signage</u>

The CSO signage project was initiated to inform the public of the potential hazards of contact with the stream during combined sewer overflow events. The signs, placed at outfalls that are accessible by the public, let people know that during wet weather it is possible for polluted water to flow from the outfall and it would be hazardous to their health to contact the water during such events. They also request that PWD is informed of any overflows during dry weather and provide an emergency contact number. Additional information on outfall signage was provided in previous reports; please refer to **III.C.3.5 INTERPRETIVE SIGNAGE - CONTINUE TO IMPLEMENT INTERPRETIVE SIGNAGE** on page 125 of the CSO-Stormwater FY 2012 Annual Report

CSO Identification Signage

Signage was installed at each of Philadelphia's CSO outfalls, with the exception of 8 difficult to reach sites. The CSO outfalls now have identification signs displaying their outfall ID number. These signs are very useful and allow for accurate identification of outfalls when the public is reporting a problem. This alleviates communication problems between the public and PWD responders.

Additional information on this CSO identification signage was provided in previous reports; please refer to **III.C.3.5 INTERPRETIVE SIGNAGE - CONTINUE TO IMPLEMENT INTERPRETIVE SIGNAGE** on page 125 of the CSO-Stormwater FY 2012 Annual Report

II.H.2 Expand the Internet-Based Notification System (RiverCast) to the Tidal Section of the Lower Schuylkill River

In order to expand the web-based water quality forecasting system for the Schuylkill River, RiverCast, PWD developed another internet-based notification system called CSOcast in 2008, which reports on the overflow status of outfalls in every CSO shed. The purpose of this notification system is to alert the public of possible CSOs from Philadelphia's combined sewer system outfalls. When a combined sewer outfall is overflowing, and for up to a period of 24 hours following a rainfall event, conditions may be unsafe to recreate in the water body due to possible pollutant contamination. The CSOcast notification system can be accessed through: http://www.phillywatersheds.org/what_were_doing/documents_and_data/live_data/csocast.

The website is built using the Google Maps API which allows for the dynamic loading of geographically referenced data that can be viewed with a familiar and user-friendly interface. The map is available 24 hours a day and displays the most up-to-date data available (shown in **FIGURE II.H.2-1**). PWD is constantly updating and improving the notification system as well as the flow monitoring network in order to deliver the best information possible to the public. During FY 2013, CSOcast reported on the 164 CSO outfalls twice a day and the CSOcast webpage has been viewed 6,929 times in FY 2013 by 2,498 unique visitors.

For more information that has been provided in previous reports, please refer to **SECTION II.H.2 EXPAND THE INTERNET-BASED NOTIFICATION SYSTEM TO THE TIDAL SECTION OF THE LOWER SCHUYLKILL RIVER** on page 61 of the FY 2012 Annual Report.

II.I Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls (NMC 9)

II.I.1 Report on the Status and Effectiveness of Each of the NMCs in the Annual CSO Status Report

The CSO Annual Report, combined with the Stormwater Annual Report, will be submitted in September of each year, documenting the previous fiscal year activities.

III Implementation of the LTCP

III.A CSO LTCP Update - Report on the progress of the LTCP Update

The full Philadelphia Combined Sewer Overflow LTCPU report can be found at the following address: http://www.phillywatersheds.org/ltcpu.

An amended Consent Order & Agreement was signed by PWD and PADEP on June 1, 2011, amending the Green City, Clean Waters Program. For details on these amendments, please refer to **SECTION III.A CSO LTCUP UPDATE – REPORT ON THE PROGRESS OF THE LTCP UPDATE** on page 82 of the CSO-Stormwater FY 2011 Annual Report.

Please refer to **APPENDIX C – COA ANNUAL REPORT** for an update on implementation progress.

III.B Capital Improvement Projects

The Capital Improvement's phase of the PWD's CSO strategy is focused on technology-based capital improvements to the City's sewerage system that will further increase its ability to store and treat combined sewer flow, reduce inflow to the system, eliminate flooding due to system surcharging, decrease CSO volumes and improve receiving body water quality. PWD will continue to operate CSO capital improvement projects that were planned during the previous permit cycle to increase the capture and treatment of combined sewage. **TABLE III.B-1** provides a status update on the 17 capital projects selected by PWD in the 1997 LTCP to provide significant CSO load reduction.

Table III.B-1: Summary of 1997 CSO LTCP Capital Projects

Project	Status
Real Time Control (RTC) Program	
RTC - Main Relief Sewer Storage (R-7 through R-12)	Complete
RTC - Tacony Creek Park Storage (T-14)	Complete
RTC - Rock Run Relief Sewer Storage (R-15)	Complete
Establish RTC Center	Complete
RTC & Flow Optimization (Southwest Main Gravity Interceptor, Cobbs Creek Cut-Off, and Lower Schuylkill West Side)	Complete
Targeted Infiltration/Inflow Reduction Programs	On-Going
Solids & Floatables Control Program	On-Going
85% CSO Capture Pennypack Watershed (P1 through P5)	Complete
Eliminate Outfalls: Dobson's Run Phase I	Complete
Eliminate Outfalls: Dobson's Run Phase II & III	Complete
Eliminate Main & Shurs Overflow (R-20)	Complete
Eliminate 32nd & Thompson Outfall (R-19)	Complete
Collection System Improvements	
Upgrade Frankford Siphon	Complete
Somerset Interceptor Sewer Conveyance Improvements	Complete
Cobbs Creek Low Level Conveyance Improvements	Complete
Cobbs Creek Low Level Control Project	Complete
Water Pollution Control Plant (WPCP) Wet Weather Treatment Maximization Program	Complete

III.B.1 On-going Capital Improvement Projects

III.B.1.1 Completion and Operation of the Real-time Control Center and Rehabilitate and Maintain the Monitoring Network

PWD has continued to maintain the RTC Center; no major changes have been made since the center was completed in 2003. For information pertaining to this topic, please refer to **SECTION II.B.4 - FULLY INTEGRATE THE REAL-TIME CONTROL FACILITY INTO THE OPERATIONS OF PWD** on page 18 of this report.

PWD continues to maintain and, when necessary, rehabilitate the monitoring network. For details on FY 2013 maintenance of monitoring network, please refer to **SECTION II.B.2 - CONTINUE TO OPERATE AND MAINTAIN A NETWORK OF PERMANENT AND TEMPORARY FLOW MONITORING EQUIPMENT** on page 14 of this report.

III.B.1.2 WPCP Wet Weather Treatment Maximization (NE)

PWD has evaluated and implemented options listed within the January 2000 Stress Testing Report. The plant stress-testing project allowed for a determination of existing and future optimum flows, loads, and operations of the various unit processes. Modifications were made to each of the three WPCPs through Capital Improvement

Projects (CIPs). This topic has been discussed in previous reports; for more information and additional details on the evaluation process and potential upgrade options, please refer to **SECTION III.B.1.2 WPCP WET WEATHER TREATMENT MAXIMIZATION (NE)** on page 66 of the CSO-Stormwater FY 2012 Annual Report.

III.B.1.2.1 Evaluate Stress Test Report Options in the LTCPU

PWD has completed an analysis of the Wet Weather Treatment Alternatives listed within the Stress Test Report for the three WPCPs in March of 2009. Several wet weather treatment technologies were evaluated, including Vortex Swirl Concentrators, Conventional Clarifiers, Chemically Enhanced Primary Treatment with Conventional Clarifiers, and Ballasted Flocculation. Section 8 option I-35 of the LTCPU document summarizes the wet weather expansion capacity at each of the WPCPs in more detail. These three reports conducted for each of the WPCPs were submitted as part of the LTCPU under the Supplemental Documentation Volumes 9 through 11, are available on-line at: http://www.phillywatersheds.org/ltcpu. Additional information has been provided in previous reports; please refer to **SECTION III.B.1.2.1 EVALUATE STRESS TEST REPORT OPTIONS IN THE LTCPU** on page 69 of the CSO-Stormwater FY 2012 Annual Report.

III.B.1.2.2 Implement Options 1, 2, and 4 from the Stress Test Report

Options 1, 2 and 4 have been completed as of January 2006, fulfilling all permit obligations on this portion of the project. For previously reported information, please refer to **SECTION III.B.1.3.2 IMPLEMENT OPTIONS 1, 2, AND 4 FROM THE STRESS TEST REPORT** on page 91 in the CSO-Stormwater FY 2010 Annual Report.

III.B.1.2.3 Plan, Design, and Construct Options 5 & 7 of the Stress Test Report to Increase the Secondary Plant Capacity to 435 MGD

Options 5 & 7 were completed and the modified conduits configurations are currently in service as of February and August 2012, respectively. Additional details on the implementation of these two options have been provided in previous reports; please refer to **SECTION III.B.1.2.3 PLAN, DESIGN, AND CONSTRUCT OPTIONS 2 & 6 FROM THE STRESS TEST REPORT** on page 70 in the CSO-Stormwater FY 2012 Annual Report.

III.B.1.2.4 Explore increasing the preliminary treatment, primary treatment, and final effluent disinfection treatment capacities in excess of the existing secondary treatment capacity at the NE WPCP

PWD has explored several options on increasing the preliminary treatment, primary treatment, and final effluent disinfection treatment capacities in excess of the existing secondary treatment capacity at the NE WPCP. These options were discussed in further detail, including design and construction performance standards within the NE WPCP Facility Concept Plan. This plan was submitted to the PADEP on June 1, 2013 and is currently awaiting approval. This plan is available on-line through the following website: http://phillywatersheds.org/doc/NE%20Facility%20Concept%20Plan%20-%20Final_FINAL.pdf

III.B.1.2.5 Initiate the Facility Planning and Design for the By-pass Conduit

On February 26, 2009, PWD submitted to the PADEP a letter documenting the evaluation of capturing an additional 100 MGD and greater of combined sewer wet weather flows at the Northeast plant plant by bypassing secondary processes when flows exceed secondary treatment capacity. The PADEP responded to this letter on April 1, 2009, approving the bypass of secondary treatment for 100 MGD of additional wet weather flow. The allowance of additional higher flows would be approved following a demonstration project for bypass flows in excess of 100 MGD. As described in the LTCPU, PWD committed to the expansion of the NE WPCP to include a 215 million gallon/day secondary treatment bypass. PWD has proceeded with a design and is prepared to build a bypass of the plant secondary processes for total plant flows that exceed 435 MGD.

III.B.1.2.6 Report to the DEP the Status of these Projects in the Annual Status Reports when Major Work Elements are Completed

The CSO Annual Report continues to include information in the WPCP wet weather treatment maximization at the NE WPCP.

III.B.1.3 85% Capture (NE) - 85% Flow Capture Technical Report

PWD submitted a technical memo documenting the 85% capture in the Pennypack Watershed in August 2008. For previously reported details, please refer to **SECTION III.B.1.3 85% CAPTURE (NE)** on page 71 of the CSO-Stormwater FY 2012 Annual Report.

III.B.1.4 In-Line System Storage Projects (NE)

Information on PWD's in-line system storage projects have been collectively reported on in **SECTION II.B.5 OPERATE AND MAINTAIN IN-LINE COLLECTION STORAGE SYSTEM PROJECTS CONTAINED WITHIN THE LTCP** of this report, starting on page 18.

III.B.1.5 Real Time Control (RTC) and Flow Optimization for the Southeast Drainage (SE)

Since no project with this name exists, this may actually be referring to content contained within **SECTION III.B.1.7: REAL TIME CONTROL (RTC) AND FLOW OPTIMIZATION FOR THE SOUTHWEST DRAINAGE (SW)** which is discussed on page 46 of this report.

III.B.1.6 WPCP Wet Weather Treatment Maximization (SW)

III.B.1.6.1 Implementation of the Southwest Plant Stress Test Report Option 1

The December 2001 SW WPCP Stress Test identified 7 potential upgrade options at the Southwest WPCP. PWD has evaluated the upgrade options to determine which improvements are necessary to meet PWD's operation commitment to treat wet weather flow of 490 MGD to achieve the CSO control goals stated in the LTCPU and its supplements. Option 1, to inspect and repair leaking weirs and concrete surfaces in the final sedimentation tanks at the Southwest Plant, was completed in April of 2002. Option 1 and other improvements were also discussed in further detail within the Facility Concept Plan for the Southwest Water Pollution Control Plant that was submitted to the PADEP on June 1, 2013 and is awaiting approval. This plan is available on-line through the following website: http://phillywatersheds.org/doc/SW%20Facility%20Concept%20Plan%20-%20Final_FINAL.pdf. Additional information on this permit commitment has been provided in previous annual reports; please refer to **SECTION III.B.1.6.1 IMPLEMENTATION OF THE SOUTHWEST PLANT STRESS TEST REPORT OPTION 1** on page 74 of the CSO-Stormwater FY 2012 Annual Report.

III.B.1.6.2 Analyze wet weather treatment capacity expansion as part of LTCPU

Please refer to **SECTION III.B.1.2.1 "EVALUATE STRESS TEST REPORT OPTIONS IN THE LTCPU"** on page 44 of this report for information on how wet weather treatment capacity expansion was analyzed as part of the LTCPU.

III.B.1.7 Real Time Control (RTC) and Flow Optimization for the Southwest Drainage (SW) - Implementation of Projects for Real Time Control (RTC) and Flow Optimization for the Southwest Drainage District

A number of inter-related projects in the Southwest Drainage District (SWDD) were determined to enhance the operation of the high-level and low-level collection systems and consequently maximize capture and treatment of wet-weather flows at the SWWPCP. As of April 2010, PWD has completed several modifications to the SWDD collection system in order to improve capacity and reduce the frequency and volume of CSO discharges.

These modifications include enlarging the DWO pipe and raising the diversion dam at the C17 regulator, modifying the operation of CSPS based on the level in the Cobbs Creek Lower Level (CCLL) interceptor, and regulating inflows from S27 to the Southwest Main Gravity interceptor using a DWO sluice gate under RTC. Additional modifications include installation of a side-overflow weir at the West Barrel at the 70^{th} & Dicks Triple Barrel, opening the East and Center Barrels for dry weather flow, decreasing overflows in the LSWS by enlarging the S45 DWO pipe, regulating inflows using a gate, evaluating the enlargement of the S38 DWO pipe and regulation of flows using a computer-controlled DWO gate.

More information on these projects was provided in previous reports; please refer to **SECTION III.B.1.8 REAL TIME CONTROL AND FLOW OPTIMIZATION FOR THE SOUTHWEST DRAINAGE** on page 74 of the CSO-Stormwater FY 2012 Annual Report.

III.B.1.8 RTC/Main Relief Sewer Storage (SW) - Construction and Implementation of Main Relief Sewer Storage and Real-time Control

Please refer to **SECTION II.B.5.1 "MAIN RELIEF"** on page 18 of the CSO portion of the Annual Report for information pertaining to this topic.

III.B.1.9 Eliminate CSO/Dobsons Run Project (SW) - Construction and Implementation of the Dobson's Run Project

Phase I (Stokely & Roberts – R22) of the Dobson's Run Reconstruction was completed in 1998. Phase II (Kelly Drive – S01T) of this project consisted of the sewer reach from Henry Ave. to Kelly Drive and eliminated branch sewer contributions of sanitary sewage from reaching temporary CSO S01T. Phase III eliminated all CSO discharge from occurring at S01T. Phases II & III were completed in February of 2011. Additional information on this project has been provided in previous reports; please refer to **SECTION III.B.1.10 ELIMINATE CSO/DOBSONS RUN PROJECT** on page 95 of the CSO-Stormwater FY 2011 Annual Report.

III.B.1.10 Eliminate CSO/Main and Shurs Off-Line Storage (SW) - Construction and Implementation of the Main and Shurs Off-line Storage Project

The Main Interceptor Sewer, which is located along the Schuylkill River adjacent to the Manayunk Canal in the northwest section of Philadelphia, conveys sewage from collection systems which serve the northwest section of the City. During extreme wet weather events, the Main Interceptor Sewer exceeds its capacity and overflows occur at relief point R20 into a storm sewer upstream of storm water outfall S-052-5. To abate the hydraulic overload conditions in the Main Interceptor Sewer, PWD finished constructing a three million gallon offline storage tank in May of 2013, which will capture and store excess flows, eliminating surcharges and preventing overflow conditions at relief point R20. The three million gallon concrete storage tank, head house building, and a performing arts center are being constructed on Venice Island, an artificial island between the Manayunk Canal and the Schuylkill River created when the Manayunk Canal was dug out. The storage tank will accommodate sanitary sewer/combined sewer overflow (SSO/CSO) that currently averages approximately 10 million gallons of untreated wastewater each year and will return it to PWD's Southwest WWTP.

On April 1, 2013, PADEP and PWD amended the COA for this site to extend milestone date of the construction of the storage tank and associated appurtenances to May 23, 2013 and extend the milestone date for the fully operational storage tank to November 23, 2013. Construction on the Storage Basin and Headhouse were completed in May of 2013 in accordance with the extension granted for the PADEP COA. The Storage Basin and Headhouse are currently undergoing functional system-wide testing, and are expected to be fully operational by November of 2013. The construction of the Performing Arts Center associated with this project is underway.

The COA issued for Main and Shurs also includes two sewer relining projects to be completed around R-20 to reduce inflow and infiltration. The lining projects at the Upper Schuylkill Intercepting Sewer and Wilde, Ridge, Dupont, and Silverwood Streets were completed.

PWD has continued implemention of the operational items included within the Corrective Action Plan (CAP) for Main and Shurs in order to obtain as much improvement to the system while the storage tank is being completed and put into operation. These operational items conducted in FY2013 include quarterly video inspections of sewer segments which resulted in 134 sewer segments being inspected. Of those sewer segments, 11 segments were recommended for repairs due to signs of significant I/I groundwater and/or infiltration.

Construction on the Storage Basin and Headhouse at Main and Shurs has been discussed in detail in the previous reports. Please refer to **SECTION III.B.1.11 ELIMINATE CSO/MAIN AND SHURS OFF-LINE STORAGE (SW) CONSTRUCTION AND IMPLEMENTATION OF THE MAIN AND SHURS OFF-LINE STORAGE PROJECT** on page 77 of the CSO-Stormwater FY 2012 Annual Report.

III.B.2 New Capital Improvement Projects to be Included in LTCPU

III.B.2.1 Asset and Capacity Management Program - Implement a Comprehensive Geographic Information System (GIS) of the City sewer system, Implement a Comprehensive Sewer Assessment Program (SAP), and Continue to Institutionalize a Comprehensive Monitoring and Modeling Program

PWD maintains a comprehensive asset and capacity management program. Please refer to the following sections for more information on our programs.

Please refer to **II.A.1 – "IMPLEMENT A COMPREHENSIVE GEOGRAPHIC INFORMATION SYSTEM (GIS) OF THE CITY SEWER SYSTEM"** on page 12 for more information on the City's GIS program.

Please refer to **SECTION II.A.2 "IMPLEMENT A COMPREHENSIVE SEWER ASSESSMENT PROGRAM (SAP)""** on page 13 for more information on SAP.

Please refer to **II.B.1 – "CONTINUE TO INSTITUTIONALIZE A COMPREHENSIVE MONITORING AND MODELING PROGRAM"** on page 14 for more information on Monitoring and Modeling.

III.B.2.1.1 Inflow/Infiltration (I/I) Controls

PWD continues to evaluate our sewer system for instances of inflow and infiltration. PWD's approaches to I/I Controls have been discussed in the previous annual reports. Please refer to **SECTION III.B.2.2 INFLOW/INFILTRATION CONTROLS** on page 81 in the CSO-Stormwater FY 2008 Annual Report.

Tide Inflow

This program was completed in 1999, and PWD continues to inspect and maintain all tide gates to ensure their correct performance. For additional details on this program, please refer to **SECTION 2.1.2 CORRECTIVE ACTIONS – TIDE INFLOW** on page 28 of the 2001 CSO Annual Status Report.

Sewer Assessment Program

The SAP is one of the tools used to identify and remediate areas of I/I as well as guide the capital improvement program to ensure that the existing sewer systems are adequately maintained, rehabilitated, and reconstructed. Please refer to **SECTION II.A.2 "IMPLEMENT A COMPREHENSIVE SEWER ASSESSMENT PROGRAM (SAP)"** on page 13 of this report for more information on this program.

Infrastructure Assessments

As of FY2008, infrastructure assessments have been completed for all watersheds within the City, and PWD continues to monitor and inspect for problem areas. For additional details on these assessments, please refer to **SECTION III.B.2.2 INFRASTRUCTURE ASSESSMENTS** on page 82 of the CSO-Stormwater FY 2008 Annual Report.

A reassessment of infrastructure along Wissahickon Creek was performed by PWD and Temple University during 2013. A more detailed infrastructure survey was required to support H&H modeling of Wissahickon Creek for the Wissahickon Act 167 Plan.

Interceptor Relining

Planning and design is underway for the relining of the entire length of interceptor within Philadelphia in the Cobbs Creek and Tookany/Tacony-Frankford Watersheds. Additional details on the progress of interceptor relining occurring in the Cobbs Creek and Tookany/Tacony-Frankford Watersheds are discussed in the **APPENDIX C – COA ANNUAL REPORT** on page 25.

PC-30 Parallel Relief Sewer

PWD constructed a parallel relief sewer to eliminate overflows at manhole PC-30 as per a Consent Order and Agreement (COA) issued by the DEP in September of 2007. The overflows at PC-30 were caused by a combination of various factors which influence the hydraulic carrying capacity of the Poquessing Creek Interceptor during wet weather events. These factors include excessive wet weather flows discharged to the interceptor above manhole PC-30 from the municipalities located in Bucks and Philadelphia Counties in addition to insufficient peak wet weather carrying capacity in the interceptor. To abate hydraulic overflow conditions in the Poquessing Interceptor, PWD proposed measures to reduce I/I in the interceptor during wet weather events. The parallel relief sewer constructed in State Road is approximately two miles in length and will capture and convey extraneous wet weather flows to the Upper Delaware low-level interceptor. The project and all stipulations of the COA regarding the parallel relief sewer were completed on 12/27/11. As of July 2013, the parallel relief sewer and all appurtenances have been operating as designed with no overflows occurring from the PC-30 manhole within COA design specification since the completion.

There were several sewer lining projects that were initiated from the COA for the PC-30 area. The sewer linings at Cottman Ave., which was a major source of I/I, were completed in April 2011 and will contribute to a significant reduction of I/I related overflows. Sewer linings at Colman Rd, Colman Place, Colman Terrace, and Basile Rd. have been completed. Sewer linings at London Road, Narcissus Road, Red Lion, Derry Terrace, Fairdale Road, Morning Glory, and Academy Roads started construction in March of 2013. Comly Rd along with several other streets around the PC-30 area are expected to start construction in 2014.

For addtional details on this project reported in previous reports, please refer to **SECTION III.B.2.1.1 PC-30 RELIEF SEWER** on page 80 of the CSO-Stormwater FY 2012 Report.

III.B.2.1.2 Sewer Separation

Sewer separation was studied and modeled as one of the options in the LTCPU and deemed cost prohibitive. No sewer separation projects have been identified or implemented during the reporting period.

III.B.2.1.3 New Storage Facilities

PWD is continuing to investigate opportunities to construct off-line CSO storage facilities to maximize existing sewer treatment capacity and increase the volume of CSO captured and treated. No new storage facility projects have been identified or implemented during the reporting period.

III.C Watershed-Based Management - Continue to Apply the Watershed Management Planning Process and Produce and Update to the Watershed Implementation Plans

The City of Philadelphia has embraced a comprehensive watershed characterization, planning, and management program committed to address a multitude of overlapping regulatory requirements including EPA's CSO Control Policy, Phase I and Phase II Stormwater Regulations, Storm Water Management PA Act 167, TMDL(s), PA Act 537 Sewage Facilities Planning and drinking water source protection programs.

Watershed Stakeholder Partnerships

Stakeholder support is critical to the success of implementing watershed-based planning initiatives. The Watershed Partnerships are designed to provide a forum for stakeholders to work together to develop strategies that embrace the dual focus of improving stream water quality and the quality of life within their communities.

During FY 2013, PWD and its designated watershed partnership facilitator, the Pennsylvania Environmental Council (PEC), initiated the Watershed Alliance of Southeastern PA to unite the watershed partnerships in the Philadelphia area. The goal of the Alliance is to offer workshops to all partnerships under the Alliance umbrella and convene individual partnerships only as needed.

Tookany/Tacony-Frankford Watershed Partnership

In 2000, the PWD launched the Tookany/Tacony-Frankford Watershed Partnership (TTF) as an effort to connect diverse stakeholders as neighbors and stewards of the watershed. In 2005, under PWD's leadership, the Partnership formally incorporated as an independent 501(c)(3) non-profit organization. In FY 2013, the TTF Watershed Partnership held 116 outreach events with approximately 5,332 participants in attendance. For previously reported information on this partnership, please refer to **SECTION III.C.1 TOOKANY/TACONY-FRANKFORD WATERSHED PARTNERSHIP** on page 86 of the CSO-Stormwater FY 2012 Report.

Darby – Cobbs Watershed Partnership

During the past fiscal year, the Partnership focused on public education and outreach, the formation of a Friends of Cobbs Creek group, collaboration with surrounding communities on regional stormwater management, and the promotion of stormwater BMPs. The Partnership organized a number of workshops and meetings during FY 2013, focused mainly on support of Friends of Cobbs Creek, the 58th Street Greenway, collaboration with the Darby Creek Valley Association and Eastern Delaware County Council, and public education and outreach. Activities included meetings, free family events, cleanup projects, and workshops on greening and regional stormwater management. These activities attracted many community members and municipal officials, with upwards of 300 attendees throughout FY 2013. For previously reported information on this partnership, please refer to **SECTION III.C1 DARBY-COBBS WATERSHED PARTNERSHIP** on page 87 of the CSO-Stormwater FY 2012 Report.

Pennypack Creek Watershed Partnership

PWD led an effort to develop a Rivers Conservation Plan for this watershed, which was completed in 2005. The Partnership has since organized activities to involve the community in improving the watershed. In FY 2013, these activities consisted of several public meetings focused on the finalization of the Pennypack Creek Watershed Act 167 Plan, which was approved on July 22, 2013.

Poquessing Creek Watershed Partnership

The Poquessing Creek Watershed Partnership holds a range of public education and outreach activities and events every year for local residents. In FY 2013, the Partnership focused on the finalization of the Poquessing Creek Act 167 Plan and a stream restoration project at Glen Foerd, a landmark located at the confluence of Poquessing Creek and the Delaware River. The Poquessing Act 167 has been submitted to PADEP and is awaiting approval. The Glen Foerd stream and bank restoration project took place in conjunction with other watershed partners and 18 volunteers. The project was awarded a $4,000 PECO Green Region Grant for shoreline restoration along Poquessing Creek.

Delaware Direct Watershed Partnership

During FY 2013, the Partnership was focused on implementation of the Green City, Clean Waters (GC,CW) Program, restoration of the Delaware Waterfront, and the incorporation and promotion of green infrastructure into the Spring Garden Master Plan Public meetings and restoration events were held to involve the community, with over 80 attendees throughout the year. With support of other partners, the Delaware Direct Watershed Partnership applied for two grants for restoration on private land. The grant applications were unsuccessful, and the partnership has shifted its focus to fundraising efforts in order to advance projects.

Wissahickon Creek Watershed Partnership

PWD continued to participate in the Wissahickon Partnership during FY 2013 in hopes that the Partnership will develop a watershed-wide restoration vision. The Partnership organized many activities during FY 2013, including various workshops, municipal meetins, and greening efforts. The main topics of focus were Act 167 Planning, TMDLs, MS4 Multi-Municipal Outreach, Audubon BirdTown, Ambler EAC and Rain Gardens, Mowing to Meadows, Ambler Area Flooding and Stormwater Study, and the Wissahickon Valley Watershed Association Committee. The workshops and meetings attracted many community members and municipal officials, with upwads of 350 attendees throughout FY 2013.

Schuylkill River Watershed Partnership (Philadelphia-Based Partnership)

During FY 2013, the Schuylkill River Watershed Partnership invited members to participate on the GC,CW Advisory committee, where both Delaware and Schuylkill partners were invited to serve as advisors. There were about 20 people in attendance in this meeting.

Implementation Planning - Development of Target Approach for Meeting Goals and Objectives

Through PWD's experience in working with stakeholder groups in goal prioritization and option evaluation, they have learned that stakeholder priorities can at times differ from those identified by the data driven problem identification process. PWD has developed an approach that is able to address what often emerges as a set of high priority stakeholder concerns while simultaneously addressing the scientifically defined priorities.

For areas within the combined sewered portion of the City, the culmination of the watershed management planning process often results in an Intergrated Watershed Management Plan (IWMP), or a watershed-specific planning document. **TABLE III.C.1-2** contains the current status of the various plans in each of Philadelphia's watersheds. Information on the each of the watersheds and the completed plans can be found at www.phillywatersheds.org/your_watershed.

The Cobbs Creek IWMP was completed in October 2004 and can be accessed online through the following website:
http://www.phillywatersheds.org/doc/Darby_Cobbs_WMP.pdf .

The Tookany/Tacony Creek IWMP was completed in May 2005 and can be accessed online through the following website:
http://www.phillywatersheds.org/doc/Tacony_Frankford_WMP.pdf .

The watersheds in the MS4 section of the City have undergone a slightly different process. In these watersheds (Pennypack, Poquessing, and Wissahickon), the stakeholder goals and objectives were established through the development of Rivers Conservation Plans and Act 167 Plans. PWD has decided to work with the watershed partners through these existing watershed-based planning efforts. Details on the Act 167 Plans can be found in **SECTION III.C.3.7 BASIN-SPECIFIC STORMWATER MANAGEMENT PLANS (ACT 167)** on page 67**.** PWD's goal is to have watershed-wide commitment to the IWMP planning process; the range of time for completing the IWMP once the Act 167 is in place is dependent on the interest and investment of our upstream communities in the planning process. If watershed-wide commitment cannot be garnered, PWD will independently move forward with development of an implementation commitment for the in-City portion of the watershed. Many of the management options selected in the TTF and Cobbs Creek IWMPs have been institutionalized a city-wide basis and continue to be implemented.

Table III.C.1-2 - Planning being completed in each watershed

Watershed	Preliminary Reconnaissance	Watershed Monitoring Program	River Conservation Plan	Watershed Management Plan	Implementation Commitment Status
Delaware River (tidal, non-tidal)	Monitoring Only		Completed in 2011	PWD continues to work with watershed partners on implementing specific projects.	Documented in the LTCPU and its supplements.
Cobbs-Darby Creeks	2003	2003	Darby RCP completed in 2005 by Darby Creek Valley Association	Completed 2004	1st 5-year Implementation Plan developed and committed to 2006-2011. Implementation plan has been incorporated into the Green City, Clean Waters program commitments.
Tacony-Frankford Creek	2000/2001	2004	Completed in 2004	Completed 2005	1st 5-year Implementation Plan developed and committed to 2006-2011. Implementation plan to be developed to align with Green City, Clean Waters program commitments.
Pennypack Creek	2002	2007-2008	Completed in 2005	Act 167 Stormwater Management Plan approved in July 2013	PWD is planning Stormwater Regulation changes to implement the Act 167 Plan.
Schuylkill River (tidal, non-tidal)	Monitoring Only		Completed in 2001 by the Academy of Natural Sciences, Natural Lands Trust, and the Conservation Fund	PWD continues to work with watershed partners on implementing specific projects.	Documented in the LTCPU and COA
Poquessing Creek	2001	2008-2009	Completed in 2007	Act 167 Stormwater Management Plan (currently in approval and adoption stage).	PWD is planning Stormwater Regulation changes to implement the Act 167 Plan.
Wissahickon Creek	2001	2005-2006	Completed in 2000 by FPC	Initiated in 2005, anticipated completion after the development of Act 167 plan and municipal TMDL commitments – (projected 2013-2014).	Wissahickon TMDL Implementation Plan was submitted in 2012 and awaits regulatory approval. Implementation plan depends on watershed partnership support for a watershed-wide initiative.

III.C.1 LAND: Wet-Weather Source Control

Watershed management fosters the coordinated implementation of programs to control sources of pollution, reduce polluted runoff, and promote managed growth in the City and surrounding areas, while protecting the region's drinking water supplies, fishing and other recreational activities, and preserving sensitive natural resources such as parks and streams.

PWD is committed to a balanced "land-water-infrastructure" approach to achieve its watershed management and CSO control goals. Where appropriate, this method includes infrastructure-based approaches, but focuses on implementation of a range of land-based stormwater management techniques and physical reconstruction of aquatic habitats where appropriate. The ultimate goal of PWD's approach is to regain the resources in and around streams that have been lost due to urbanization, both within the City of Philadelphia and in the surrounding counties, while achieving regulatory compliance objectives in a cost-effective manner. Central to all of these planning programs is a commitment to greening, sustainability, open space, waterfront revitalization, outdoor recreation, and quality of life.

The wet-weather source controls have been formalized in the LTCPU and its supplements, including the Consent Order and Agreement signed on June 1, 2011, which formally approved the *Green City, Clean Waters* program.

Detailed information on the Land-based wet-weather source controls can be found in **APPENDIX C – COA ANNUAL REPORT.**

III.C.1.1 Ordinance and Regulations Modifications - Continue to review and revise stormwater management regulations for development and redevelopment

PWD's Stormwater Management Regulations became effective in Philadelphia on January 1, 2006, which provided PWD with an opportunity to ensure development/ redevelopment that protects our water resources, reduces neighborhood flooding, and improves the quality of life in our communities. The Stormwater Management Regulation is triggered by projects which involve earth disturbance 15,000 square feet or greater. PWD is considering additional ways to improve and strengthen its stormwater programs during the LTCPU process. Additional incentives are being considered to further stimulate innovative stormwater designs as described in **APPENDIX C - COA ANNUAL REPORT** on page 22.

The complete stormwater regulations for the City of Philadelphia can be found at http://pwdplanreview.org/WICLibrary/StormwaterRegulations.pdf

Please refer to **SECTION F.5.B "POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT"** on page 105 for more information on the Stormwater Management Regulations.

III.C.1.2 Conduct workshops on LID

PWD staff in charge of Stormwater Regulation implementation holds weekly walk-in hours. The development community is invited to discuss general and technical details about their projects. Guidance is given by PWD staff on stormwater management implementation.

III.C.1.3 Implementation of Stormwater BMPs and LID - Continue to implement best management and LID demonstration

PWD continues to implement stormwater BMPs and LID, now referred to as Green Stormwater Infrastructure (GSI) through the Green City, Clean Waters program. Please refer to **APPENDIX C –COA ANNUAL REPORT** beginning on page 4 for a detailed description on the City's implementation of GSI during FY 2013.

III.C.1.4 Catch Basin Control Program - Continue to maintain the trapped inlets

PWD continues to maintain all City-owned inlets and catch basins to ensure they are clear and operating correctly. For a full description of the activities conducted by inlet cleaning programs during FY 2013, please refer to **SECTION II.F.1 "CONTROL THE DISCHARGE OF SOLIDS AND FLOATABLES BY CLEANING INLETS AND CATCH BASINS"** on page 26.

III.C.1.5 Impervious Cover Disconnection - Evaluate the feasibility of separating the stormwater runoff from large impervious land tracts for management and direct discharge

PWD is working to separate the stormwater runoff from large impervious land using many different approaches such as a parcel-based stormwater billing system, related incentives and plan review for new and redevelopment.

Parcel-based Stormwater Billing

Beginning July 1, 2010, PWD began a 4-year phase-in for parcel-based stormwater charges. Residential accounts pay a flat fee based on the average gross and impervious area of all residential properties in the city, and non-residential accounts pay a variable charge based on the property's specific gross area and impervious area. As of July 1, 2013, all accounts in the City have transitioned to the parcel-based method. To complement this new program, PWD offers a stormwater credits program where non-residential property owners may retrofit for stormwater management and receive a discount on their stormwater charges. Credits are available to owners who can disconnect their runoff from the City's sewer system and manage the stormwater on the property. **TABLE III.C.1.5-1** below provides information on the rates applicable to PWD's residential and non-residential customers through FY 2015.

Additional information on the transition to parcel-based stormwater billing has been provided in previous reports; please refer to **SECTION III.C.1.5 PARCEL-BASED STORMWATER BILLING** on page 105 of the CSO-Stormwater FY 2012 Annual Report.

Table III.C.1.5 – 1: Stormwater Billing Rates through Fiscal Year 2015

Fiscal Year	GA Charge / 500 sq.ft.	IA Charge / 500 sq.ft.	Residential Stormwater Charge	Residential Billing & Collection Charge	NonResidential Billing & Collection Charge
2013	$0.50	$4.00	$10.51	$1.59	$1.98
2014	$0.56	$4.50	$11.80	$1.65	$2.15
2015	$0.59	$4.75	$12.46	$1.69	$2.19

Stormwater Management Regulations

Under Philadelphia's Stormwater Regulations, development and redevelopment is helping to significantly reduce the amount of directly-connected impervious cover.

III.C.1.6 Reforestation - Work to implement reforestation demonstration projects to provide additional tree canopy

Green Stormwater Infrastructure Projects

Community greening and tree planting is a key component of green stormwater infrastructure and PWD's Green City, Clean Waters plan. PWD has been planting trees as part of the GSI projects. Please refer to **APPENDIX C –COA ANNUAL REPORT** on page 19 for information on trees planted as part of GSI projects implemented in the City.

Street Tree Planting

As part of supporting the City's GreenWorks goals, PWD has partnered with PPR to conduct street tree plantings. PPR contracted trees to be planted in the right-of-way in front of properties and on public lands. Between April 15 and June 15, 1,100 trees were planted through this contract.

TreePhilly Yard Tree Program

TreePhilly is a new greening initiative led by PPR, in partnership with Wells Fargo and the Fairmount Park Conservancy that directly engages all Philadelphians in improving their communities by planting and maintaining trees. PPR has partnered with the Pennsylvania Horticultural Society's (PHS) Tree Tenders Program to offer Philadelphia residents the chance to sign up for free yard trees for their private property (front, back, and side yards). In the fall of 2012 (October/November), TreePhilly distributed 2,000 trees, a second giveaway of yard trees in spring of 2013 (April) was just as successful distributing 2,500 trees.

Tree Vitalize and Pennsylvania Horticultural Society's Tree Plantings

PWD is an active partner and supporter of Tree Vitalize and PHS's other tree planting programs. Tree Vitalize was developed by the Pennsylvania Department of Conservation and Natural Resources to increase the tree canopy in the five-county

Philadelphia area. Tree Vitalize partners with numerous community groups throughout this area in order to plant trees in neighborhoods lacking sufficient tree canopy. During FY 2013, PHS tree planting events resulted in 6,218 trees planted in Philadelphia neighborhoods.

Table III.C.1.6 -1 Pennsylvania Horticultural Society's Tree Plantings Events

# of Trees Planted	Pennsylvania Horticultural Society's Tree Plantings Event
848	Philadelphia Tree Tenders Volunteer street tree plantings
85	Mill Creek Community businesses and schools
50	La Salle University Arbor Day Campus Student planting
1095	Spring 2012 Philadelphia Tree Vitalize Riparian Trees
4140	Fall 2013 Philadelphia Tree Vitalize Riparian Trees
3	Cozen O'Conner/Cristo Rey School yard trees
3	Einstein Health System Campus yard trees
6,218 Trees	**Total**

III.C.2 WATER: Ecosystem Restoration and Aesthetics

III.C.2.1 Waterways Restoration Team - Continue the assignment of a dedicated clean-up team to remove cars, shopping carts, and other debris, from CSO receiving waters

During FY 2013, the Waterways Restoration Team has continued their program which includes removal of cars, shopping carts, and other debris from receiving waters. Please refer to **SECTION II.F.2 "CONTINUE TO FUND AND OPERATE THE WATERWAYS RESTORATION TEAM (WRT)"** on page 27 for information pertaining to the Waterways Restoration Team's activities during FY 2013.

III.C.2.2 Waterways Restoration Team - Evaluate the capabilities of this crew in performing minor stream bank and bed repair around outfall pipes and to remove debris at these outfalls

During FY 2013, the Waterways Restoration Team continued their program, which includes conducting minor stream bank and bed repairs around outfalls and removing debris around them. Please refer to **SECTION II.F.2 "CONTINUE TO FUND AND OPERATE THE WATERWAYS RESTORATION TEAM (WRT)"** on page 27 for information pertaining to the Waterways Restoration Team's activities during FY 2013.

III.C.2.3 Stream Habitat Restoration - Propose and implement demonstration projects to address habitat degradation by engineering the stream channels to modern day flows and directly reconstructing the aquatic habitat

PWD is currently employing natural stream channel design (NSCD) and associated stormwater management BMPs as a means to improve the health of aquatic communities in receiving waters with degraded flow and habitat alterations due to stormwater runoff. Additional information on PWD's NSCD technique has been provided in previous reports; please refer to **SECTION III.C.2.3 COBBS CREEK STREAM RESTORATION** on page 136 of the CSO-Stormwater FY 2011 Annual Report.

Cobbs Creek Stream Restoration

During the previous reporting period, PWD awarded a contract for NSCD of reaches 6-8. The scope of services provided included the design of bank stabilization, wetland creation, full scale stream restoration, trailheads and gateways to Cobbs Creek Park as well as green stormwater infrastructure along Cobbs Creek Parkway. At that time, PWD expected that the project would be ready to bid for construction in FY 2013.

During FY 2013, the issue of property ownership and Right-of-Way added some complications to the design phase of this project. Reaches 6-8, which are bracketed by Market Street at the northern boundary and a SEPTA railroad bridge roughly 8,000 feet downstream, also encompass portions of Philadelphia and Delaware County. Within the planned limits of disturbance, more than 20 properties could be impacted, either temporarily or permanently. The planning and negotiation associated with this issue has significantly delayed the project's design phase. Presently, PWD has completed a base plan and 30% design plan for these reaches. Further design has been suspended, pending the results of PWD's efforts to acquire the requisite land rights that would enable the implementation of the recommended restoration plan. PWD will continue to work toward addressing the property issues within this section of the Cobbs Creek stream corridor, in hopes of developing and finalizing the stream corridor restoration plan.

In addition to Reaches 6-8 of Cobb Creek, PWD has made progress in developing stream corridor restoration plans for two additional reaches of Cobbs Creek. For reaches 1-3, which encompass Cobbs Creek from City Line Ave downstream to the Indian Creek confluence, PWD has completed a Basis of Design Report. The report was a coordinated effort between PWD, PPR, and the Cobbs Creek Golf Course. If implemented, the plan would implement the recommended stream restoration BMPs in conjunction with the Cobbs Creek Golf Course's plan to re-design and restore the Course to its previous configuration at the early part of the 20th century.

Downstream from Reaches 6-8, PWD has been working with the US Army Corps of Engineers (USACE) - Philadelphia District on plans to remove the Woodland Avenue Dam. Through this partnership, PWD and USACE have worked with PPR to produce a partial dam removal solution that meets the goals of this project while respecting the cultural and historical resources within the project area. During FY 2013, PWD/USACE completed 90% design plans and initiated the permitting process. PWD will continue to work with USACE, PPR, and other agencies to finalize these plans in the coming year. At the completion of the design phase, PWD will evaluate options to enter into a construction agreement with USACE that would enable PWD to implement the final dam removal plan. The implementation of this project is dependent upon the availability of appropriated federal funds. For additional information on this project reported in previous reports, please refer to **SECTION III.C.2.3 COBBS CREEK STREAM RESTORATION** on page 108 of the CSO-Stormwater FY 2012 Annual Report.

Manayunk Canal and FlatrockDam Improvement Project

The main objectives of the Manayunk Canal and Flatrock Dam Improvement Project are to ensure the safety and structural integrity of Flat Rock Dam and associated infrastructure while reintroducing flow into the Canal from the Schuylkill River. Reestablishment of flow through regulating control structures (e.g., sluice gates) and the development of a consistent maintenance program will potentially improve the water quality and health of biological communities.

Application for improvements to Flat Rock Dam Intake Channel Wall and Spillway was originally made by PWD, to the PADEP Division of Dam Safety in October 2003. In late 2003, PWD also applied to the USACE under CENAP-OP-R-200400214-39. Federdal funding limitations hindered significant progress of this project in previous years. During FY 2013, PWD requested USACE to re-activate permit application CENAP-OP-R-200400214-39, as significant modifications to the scope of work and overall project have occurred. As of June 30th 2013, design components for the Flatrock Dam portion of the project are at least 60% complete. These designs include the main spillway, sluiceway and west intake abutment/buttress wall. Designs for the Manayunk Canal Diversion Facility are also at least 60% complete, and encompass the intake structure, mechanical components, and flow diversion structure.

Tacony Creek Stream Restoration

PWD, in partnership with PPR, initiated plans to begin the design phase on multiple reaches of Tacony Creek in FY 2011. In FY 2012, PWD initiated a contract for design phase services for stream restoration, green stormwater management, and trail improvements in Reaches 4-5 of Tacony Creek. When completed, this project will accomplish almost 8,000 feet of stream corridor restoration.

During FY 2013, PWD completed 30% design plans and initiated the permitting process with PADEP and USACE. PWD plans to continue to finalize plans and specifications for this project and obtain the requisite permitting. For a full history on this project discussed in previous reports, please refer to **SECTION III.C.2.3 TACONY CREEK STREAM RESTORATION** on page 136 of the CSO-Stormwater FY 2011 Annual Report.

Indian Creek Stream Daylighting & CSO Storage Project

In FY 2013, PWD and USACE broke ground on this project and completed the majority of the stream daylighting portion of the project. PWD continues to work to complete the stream day-lighting and CSO Storage component, with riparian corridor plantings. For a full history on this project discussed in previous reports, please refer to **SECTION III.C.2.4 INDIAN CREEK STREAM DAYLIGHTING & CSO STORAGE PROJECT** on page 146 of the CSO-Stormwater FY 2010 Report.

Wissahickon TMDL Stream Restoration Projects

As part of PWD's Wissahickon Sediment TMDL Implementation Plan, PWD has proposed and implemented multiple stream restoration projects. These projects include:

- Carpenter's Woods (Construction Completed in 2009)
- Cathedral Run (Construction Completed in 2006)
- Cresheim Creek at St. Martins (Construction Completed in 2011)
- Hartwell Lane (Construction Completed in 2009)
- Rex Avenue (Construction Completed in 2010)
- Bells Mill Run (Construction Completed in 2012)
- Wises Mill Run (Construction Completed in 2012)
- Gorgas Run (Design Completed in 2012)

Because these projects were completed as part of PWD's Wissahickon Sediment TMDL Implementation Plan, a more detailed description of the Department's efforts has been provided in **SECTION D.II - WISSAHICKON SEDIMENT TMDL MONITORING PLAN IMPLEMENTATION** on page 74.

III.C.2.4 Wetland Enhancement and Construction - Propose and implement wetland enhancement and construction projects to remove pollutants, mitigate peak flow rates, reduce runoff volume, and provide considerable aesthetic, and wildlife benefits

PWD has designed and implemented three stormwater treatment wetlands facilities to remove pollutants and mitigate peak flows, while providing aesthetic and ecological benefits. These projects are:

- Saylor's Grove (Construction Completed in 2006)
- Wise's Mill (Construction Completed in 2012)
- Cathedral Run (Construction Completed in 2012)

In total, these three facilities receive and treat stormwater from more than 300 acres of the MS4 service area. Because these projects were completed as part of PWD's Wissahickon Sediment TMDL Implementation Plan, a more detailed description of the Department's efforts has been provided in **SECTION D.II - WISSAHICKON SEDIMENT TMDL MONITORING PLAN IMPLEMENTATION** on page 74.

Watershed Mitigation Registry

The Watershed Mitigation Registry (WMR) aims to provide environmental restoration and improvement projects to offset wetland and open water losses caused by development or redevelopment throughout the Philadelphia area. Environmental improvement projects could include restored or replacement wetlands, but also can include stream and riparian corridor restoration projects. PWD has drafted a Memorandum of Agreement in an effort to formalize PWD’s role in the statewide In-lieu Fee (ILF) program. This document is still under review by PADEP. PWD continued to work evaluate its projects internally to determine how it may benefit from PADEP's potential statewide ILF program in FY 2013.

This program was initiated in 2007, and is still awaiting approval from PADEP. For more information and a full history of this project discussed in previous reports, please refer to **SECTION III.C.2.4 WATERSHED MITIGATION REGISTRY** on page 142 of the CSO-Stormwater FY 2011 Annual Report.

III.C.2.5 Fish Passage Projects - Evaluate the benefits of projects that improve migratory fish passage in a manner consistent with the watershed management plans

Fish Passage on Cobbs Creek

In 2008, PWD began to investigate alternatives for reestablishing fish passage on Cobbs Creek. With assistance from USACE, a fish passage at the Woodland Dam is being developed as of August 2009. In March 2013, PWD provided the USACE with technical guidance and recommendations for physical and hydrologic conditions that will maximize the potential of successful upstream dispersal of two indicator species (blueback herring and alewife). The technical document was based on biological criteria of the aforementioned species which included three critical attributes; (1) minimum depth requirements, (2) maximum velocity conditions, and (3) upstream distance dispersal increments. These minimum habitat requirements were established in conjunction with actual hydrologic conditions during spring flow to determine if the preliminary design (i.e., 30% design submittal) represented the most effective solution to the current conditions. Based on this data, both USACE and PWD agreed to refine the design to include both habitat features and stream bank restoration practices that would maximize the efficacy of fish passage at this location and also provide system stability. It is the intention of both agencies to continue design work during the next fiscal year to develop a viable and cost-effective solution for fish passage in the lower Cobbs Creek.

Additional information on the history of this project has been reported on in previous years. Please refer to **SECTION III.C.2.5 FISH PASSAGE ON COBBS CREEK** on page 118 of the CSO-Stormwater FY 2012 Annual Report.

Fairmount Fish Ladder

The Fairmount Dam Fishway located on the western side of the Fairmount Dam, was completed in 1979. Effects of time and natural forces damaged the fish ladder and the degradations severely limited the ladder's efficiency at passing migratory fish species. PWD has partnered with the USACE – Philadelphia District to improve and revitalize the Fairmount Dam Fishway, pursuant to Section 1135 of the Water Resources Development Act of 1986. Several improvements have been made in 2009 and 2010 to increase fish passage efficiencyand resolve maintenance and operational issues. During the FY 2013, a total of 2,227 American shad passed through the Fairmount Fishway (**FIGURE III.C.2.5-2**). Relative abundance of American shad, measured as catch-per-unit-effort (fish/minute), was also lower than the FY 2012 (ie, calendar year 2011) record (**FIGURE III.C.2.5-2**). Although these metrics are lower than the previous year, it should not be construed as a deficiency of the fishway, but as an overall decrease in total shad numbers during the 2012 spring migration. More information on the history of the Fairmount Fish Ladder has been provided in previous reports. Please refer to **SECTION III.C.2.5 FAIRMOUNT FISH LADDER** on page 119 of the FY 2012 Annual Report.

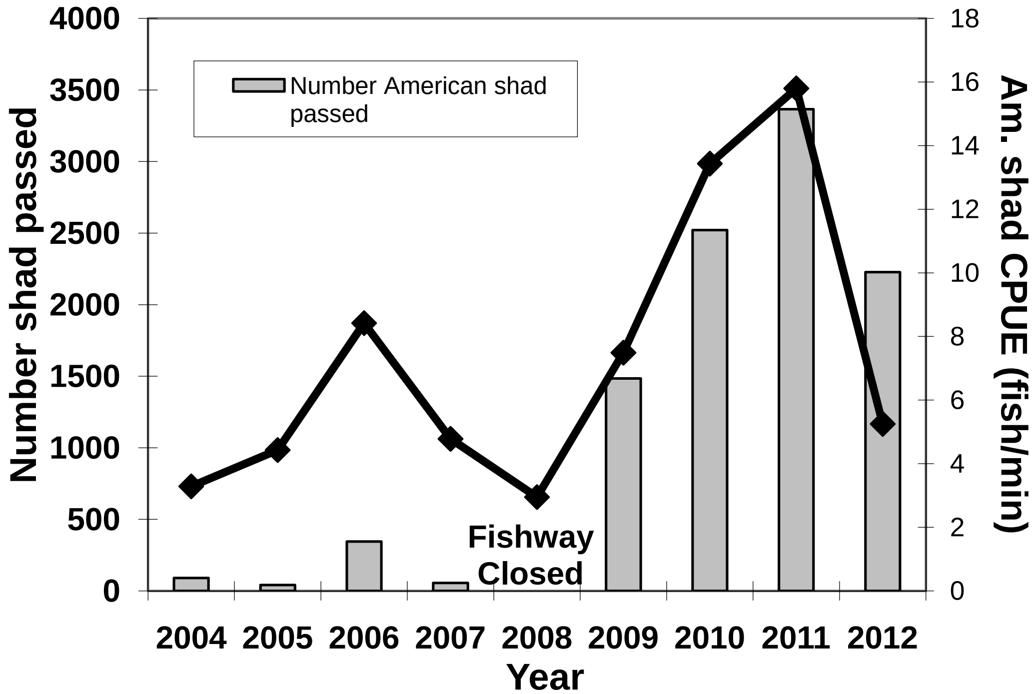

Figure III.C.2.5-1: Schuylkill River American shad passage and relative abundance at Fairmount Fishway 2004-2012

PWD Sanitary Line Natural Rock Ramp Fishway

A rock ramp fishway was constructed in Pennypack Creek in 2007 to raise the water surface elevation and provide fish passage at this site. PWD continued to conduct rapid, qualitative fish surveys in the tidal Pennypack Creek by boat and tote barge electrofishing in FY 2013. While a small number of anadromous and semi-migratory fish species have been collected, there is thus far no evidence of a spawning run of Hickory shad having been established in Pennypack Creek. However, in the spring of 2012, one adult American shad was found in Pennypack Creek above Rhawn Street, but below the Roosevelt Boulevard Dam. This finding was confirmed by state biologists and suggests that fish passage up to Roosevelt Boulevard is possible. PWD electrofishing surveys of the tidal Pennypack Creek have documented a spawning population of anadromous alewife and blueback herring. Both adult and juvenile striped bass have been collected in the tidal portion, but not above the rock ramp. The future of shad restoration in Pennypack Creek remains uncertain. No hickory shad fry were stocked in 2013. PWD will continue to monitor the fishway. Additional information on the history of this project has been provided in previous reports; please refer to **SECTION III.C.2.5 PWD SANITARY LINE NATURAL ROCK RAMP FISHWAY** on page 121 of the CSO-Stormwater FY 2012 Annual Report.

III.C.2.6 Riparian Buffer Creation and Enhancement - Continue programs for the restoration and protection of the natural lands that buffer each of the area waterways to reduce pollution, prevent erosion of the banks, provide wildlife food and cover, and shade the adjacent water, moderating temperatures for aquatic species

Environment, Stewardship & Education Division

PWD continues to support PPR, which undertakes a broad range of environmental restoration activities throughout the park system. Restoration activities have been ongoing since 2008. These efforts have been discussed in previous years; for more details and a full list of these activities, please refer to **SECTION III.C.2.6 ENVIRONMENT, STEWARDSHIP & EDUCATION DIVISION** on page 121 of the CSO-Stormwater FY 2012 Annual Report.

Riparian Buffer component of Stream Restorations

Riparian buffer enhancement will be evaluated in all stream restorations that are completed. Typically, riparian buffer enhancement activity includes invasive species management, live-stake planting, tree and shrub planting, and native seed mix application. Invasive species management usually begins one to two years prior to construction. Once the construction of the stream restoration project is complete, a landscaping plan is implemented which includes all of the applications mentioned above. Please refer to **SECTION III.C.2.3 STREAM HABITAT RESTORATION** on page 58 and **SECTION III.C.2.4 WETLAND ENHANCEMENT AND CONSTRUCTION** on page 61 in this report for more information on these topics.

III.C.3 Other Watershed Projects

III.C.3.1 River Conservation Plan - Continue to work in partnership with local partners to complete and implement River Conservation Plans (RCPs)

All River Conservation Plans (RCPs) are available for viewing at: **http://www.phillywatersheds.org/your_watershed** under each respective watershed's key documents.

Darby Creek RCP

This RCP was completed in 2005. For more information on the plan, please refer to **SECTION III.B.3.4.1 DARBY RCP** on page 121 of the CSO-Stormwater FY 2008 Annual Report.

Tacony-Frankford RCP

This RCP was completed in 2004. For more information on this plan, please refer to **SECTION F.2 TOOKANY/TACONY-FRANKFORD WATERSHED** on page 74 of the FY 2005 Stormwater Annual Report.

Pennypack RCP

This RCP was completed in 2005. For more information on this plan, please refer to **SECTION III.B.3.4.1 PENNYPACK RCP** on page 122 of the CSO-Stormwater FY 2008 Annual Report.

Poquessing RCP

This RCP was completed in 2007. For more information on this plan, please refer to **SECTION III.C.2.6 POQUESSING RCP** on page 155 of the CSO-Stormwater FY 2010 Report.

Delaware Direct RCP

This RCP was completed in 2011. For more information on this plan, please refer to **SECTION III.C.3.1 DELAWARE DIRECT RCP** on page 151 of the CSO-Stormwater FY 2011 Annual Report.

III.C.3.2 Watershed Information Center - Create a website to serve as a Watershed Information and Technology Center

The City maintains several websites that provide information on our watersheds and activities within them, please refer to **SECTION II.G.2 "CONTINUE TO MAINTAIN WATERSHED MANAGEMENT AND SOURCE WATER PROTECTION PARTNERSHIP WEBSITES"** on page 31 and **SECTION II.H.2 "EXPAND THE INTERNET-BASED NOTIFICATION SYSTEM (RIVER CAST) TO THE TIDAL SECTION OF THE LOWER SCHUYLKILL RIVER"** on page 41 for additional information on the websites.

III.C.3.3 Integrated Water Use Status Networks - Pilot a communication and water quality monitoring network that supports the identification and analysis of water quality events

PWD has two communication and water quality monitoring networks. RiverCast supports the identification and analysis of water quality events to support recreational water use status decisions (swimming, triathlons, rowing, etc.) and makes this information available in real time to the public. EWS is used to monitor water quality and notify water utilities about such events as hazardous substance spills or sudden changes in water quality.

Please refer to **SECTION II.G.2 "CONTINUE TO MAINTAIN WATERSHED MANAGEMENT AND SOURCE WATER PROTECTION PARTNERSHIP WEBSITES"** on page 31 for details about these communication and water quality monitoring systems.

III.C.3.4 Integrated Water Use Status Networks - Evaluate the technical and fiscal needs to expand the network into additional receiving waters where recreational uses are taking place.

In order to expand RiverCast, PWD developed another internet-based notification system called CSOcast, which reports on the overflow status of outfalls in every CSO shed.

Please refer to **SECTION II.H.2 "EXPAND THE INTERNET-BASED NOTIFICATION SYSTEM (RIVERCAST) TO THE TIDAL SECTION OF THE LOWER SCHUYLKILL RIVER"** on page 41 for information pertaining to this topic.

III.C.3.5 Interpretive Signage - Continue to implement interpretive signage

Green Stormwater Infrastructure and Restoration Locations Signage

PWD is developing an interpretive signage plan for green stormwater infrastructure projects implemented throughout the City as part of the Green City, Clean Waters program. In previous years, PWD installed signage at the Saylor Grove Stormwater Wetland, Columbus Square Park Rain Garden and Stormwater Planters, Bodine High School Stormwater Planters, and Womrath Park Rain Garden. PWD is committed to educating the public on the benefits of these projects and constantly evaluates better methods to convey information via signage. More details on these projects have been provided in previous reports; please refer to **SECTION III.C.3.5 GREEN STORMWATER INFRASTRUCTURE AND RESTORATION LOCATIONS SIGNAGE** on page 153 of the CSO-Stormwater FY 2011 Annual Report. Additional information on the Green City, Clean Waters Signage Program can be found within **APPENDIX C- COA ANNUAL REPORT** on page 37.

III.C.3.6 Interpretive Centers - Continue to support existing educational interpretive centers to educate citizens about their community and the water environment

PWD supports several existing educational centers including FWWIC and many public outreach efforts conducted by partners. Please refer to **SECTION II.G.3.2 – "ADDITIONAL PWD AND PARTNER SPONSORED EVENTS"** on page 38 and **SECTION II.G.4 "CONTINUE TO SUPPORT THE FAIRMOUNT WATER WORKS INTERPRETIVE CENTER"** on page 40 for more information on activities done in FY 2013 by the FWWIC and partner sponsored events.

III.C.3.7 Basin-Specific Stormwater Management Plans (ACT 167) - Continue to support the State Act 167 Storm water Management Planning process and integrate the results of these efforts into the watershed management plans and implementation plans

Act 167 provides for the regulation of land and water use for flood control and stormwater management purposes. It imposes duties, confers powers to the PADEP, municipalities and counties, and provides for enforcement and appropriations.

The City of Philadelphia signed a Phase 1 Agreement with PADEP in July, 2008 committing to the completion of a City-wide Act 167 planning process. This City-wide Act 167 will account for the City of Philadelphia Stormwater Regulations and will lay the groundwork for additional watershed-basin specific planning to follow. A Phase 2 agreement was conformed in April, 2009 which helped to outline a schedule for completing basin specific Act 167 plans for each of the watersheds that drain to the City, including (note: the Schuylkill and Delaware River drainage areas of the City will be covered by the county-wide implementation of the Act 167 program): Cobbs Creek, Darby Creek, Pennypack Creek, Poquessing Creek, Tacony/Frankford Creek, and Wissahickon Creek.

Darby-Cobbs Creek

An Act 167 Stormwater Management Plan was completed for the Darby-Cobbs Watershed in January 2005. The completed plan can be viewed at the Delaware County Planning Department's website at: www.co.delaware.pa.us/planning/watersheditems

Tookany/Tacony-Frankford Creek

The development of the Act 167 Plan for this watershed was jointly led by PWD and the Montgomery County Planning Commission. The plan was completed March 2008 and can be viewed at:
www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports.

Pennypack Creek

The Act 167 Stormwater Management Plan for this watershed was completed in June of 2011. A public hearing was held on June 14, 2011. The plan was adopted by the Bucks County Commissioners on June 20, 2012 followed by the Montgomery County Commissioners in July 19, 2012. PA DEP approved the Pennypack Act 167 Plan on July 22, 2013.The Pennypack Creek Act 167 plan is available for download at:
http://www.csc.temple.edu/research/Act167.htm

Poquessing Creek

In the fall of 2009, PWD initiated an Act 167 Stormwater Management Plan for this watershed. PWD is acting as municipal lead for plan development, and has partnered with the Bucks County Planning Commission in order to complete the plan. The stakeholder WPAC was convened in order to help guide the process, and a draft plan is now completed and available online at http://ntmeng.com/poquessing/.

A public hearing was held on July 10, 2012. The Montgomery County Commissioners adopted the plan on July 19, 2012 and Bucks County Commissioners adopted the plan on September 19, 2012. The plan was submitted to PADEP on December 26, 2013; final approval by PA DEP is pending.

Wissahickon Creek

In the fall of 2010, PWD initiated an Act 167 Stormwater Management Plan for this watershed. PWD is acting as municipal lead for plan development, and has partnered with the Montgomery County Planning Commission in order to complete the plan. A WPAC has been convened in order to help guide the process. The draft plan is under development, whereupon the review and approval process will be initiated after draft plan completion.

III.C.3.8 Sewage Facility Planning - Continue to review sewage facility planning modules and downstream sewage conveyance and treatment facilities to ensure that adequate capacity exists within these systems to accommodate flow

During FY 2013, PWD reviewed 612 "Sewage Facilities Planning Module Application Mailers" for projects requiring building permits within Philadelphia County. During the same period, PWD issued 62 sanitary sewer capacity certifications for projects in tributary municipalities. Additional information on sewage facility planning activities conducted by PWD has been discussed in the previous reports; please refer to **SECTION III.C.3.8 SEWAGE FACILITY PLANNING** on page 130 of the CSO-Stormwater FY 2012 Annual Report.

III.C.4 Monitoring and Assessment

III.C.4.1 NPDES – Quarterly Special Discharge Monitoring Report

PWD is committed to submitting the Quarterly Special Discharge Monitoring Report (DMR) documenting the Department's CSO discharges during the specified time periods. This report is due 45 days after the end of each quarter, thus a report is submitted 4 times a year by February 15, May 15, August 15, and November 15. PWD is working to switch to eDMRs. During FY 2013, PWD submitted four DMR within the 45 day timeframe, these reports also refered to as Quarterly Combined Sewer Overflow Status Reports.

III.C.4.2 NPDES - Annual CSO Status Report

Monitoring and characterization of CSO impacts from a combined wastewater collection and treatment system are necessary to document existing conditions and to identify water quality benefits achievable by CSO mitigation measures. The tables included in **APPENDIX D** and other information provided within this annual report represent the average annual CSO overflow statistics for period July 1 2012 – June 30 2013 as required in the NPDES Permit. Please refer to **TABLE 1 IN APPENDIX D – NPDES – FY 2013 CSO STATUS REPORT** on page 2 for a listing of all CSO permitted outfalls. The tables have been reorganized to present overflows by the specific receiving water into which the CSOs from a given interceptor system discharge. In order to be consistent, the column headings are presented in the same format found in the System Hydraulic Characterization (SHC) and NMC Documentation.

a. Annual summary of the frequency and volume of CSO discharges

Please refer to **TABLE 2 IN APPENDIX D – NPDES – FY 2013 CSO STATUS REPORT** on page 13 for the annual summary of the frequency and volume of CSO discharges during FY 2013.

b. Update of the CSO frequency and volume for a typical hydrologic year

Please refer to **TABLE 3 IN APPENDIX D – NPDES – FY 2013 CSO STATUS REPORT** on page 18 for an updated CSO frequency and volume for a typical hydrologic year.

c. Summary of the in-stream impacts and effectiveness of CSO controls and restoration projects.

Discharges resulting from combined sewer overflows can have negative biological and physical impacts on streams. CSOs tend to diminish water quality decreasing both the number and diversity of fish and macro invertebrate species. In addition, the excessively high flows resulting from CSOs tend to produce degrading, incised stream channels that do not readily access the floodplain.

As CSO controls and stream restoration projects are implemented, PWD expects improvement of existing biological and physical stream impairments. The extent of these improvements will be measured through regular monitoring to establish the overall effectiveness of these interventions.

d. An annual summary of the information provided in the Special Discharge Monitoring report including:

i. Rainfall data - total inches (to the nearest 0.01 inch) that fell each day and month for the period of the reports.

Please refer to **TABLES 4-15 IN APPENDIX D – NPDES – FY 2013 CSO STATUS REPORT** on pages 23-34 for daily and monthly rainfall totals for FY 2013.

ii. The total number of regulator inspections conducted during the period of the report.

Please refer to page 2 of **APPENDIX B – FY 2013 FLOW CONTROL UNIT CSO PROGRAM MAINTENANCE** for the total number of regulators inspected during the reporting period.

iii. A list of blockages (if any) corrected or other interceptor maintenance performed, including location, date and time corrected, and any discharges to the stream observed.

Please refer to page 3 of **APPENDIX B – FY 2013 FLOW CONTROL UNIT CSO PROGRAM MAINTENANCE** for a listing of blockages reported and corrected during the reporting period.

e. *Dry-weather overflows - for all dry weather overflows, indicate the location, date and time discovered, date and time corrected/ceased, and action(s) taken to prevent their re-occurrence.*

Please refer to page 16 of **APPENDIX B – FY 2013 FLOW CONTROL UNIT CSO PROGRAM MAINTENANCE** for a detailed listing of Dry-Weather overflows.

f. Wet-weather overflows - using calibrated models of the combined sewer system, provide a summary of the annual CSO frequency, volume, and percent capture of combined sewer flows.

This section heading is similar to Section a - *Annual summary of the frequency and volume of CSO discharges* above and will refer to the same table. Please refer to **TABLE 2 IN APPENDIX D – NPDES – FY 2013 CSO STATUS REPORT** on page 13 for the list of wet-weather overflows for the estimated average annual frequency and volume statistics for the past fiscal year.

g. Chronic or continuous discharges - Provide the status and corrective actions taken at all sites identified as being chronic or continuous discharges, including an estimate of flow and duration.

The only previously known chronic discharges were Main and Shurs and PC-30. For information on corrective actions, please refer to **SECTION III.B.1.10 'ELIMINATE CSO/MAIN AND SHURS OFF-LINE STORAGE (SW) - CONSTRUCTION AND IMPLEMENTATION OF THE MAIN AND SHURS OFF-LINE STORAGE PROJECT"** on page 47 and **SECTION III.B.2.1.1 "INFLOW/INFILTRATION (I/I) CONTROLS-PC-30 RELIEF SEWER"** on page 49. Please refer to **TABLE 17 IN APPENDIX D – NPDES – FY 2013 CSO STATUS REPORT** on page 36 for the list of discharges that occured at Main and Shurs and PC-30 during the fiscal year.

h. Documentation showing the continued implementation of the Nine Minimum Controls.

Please refer to **SECTION II IMPLEMENTATION OF THE NINE MINIMUM CONTROLS (NMCS)**' of this report on page 12**.**

i. Long Term Control Plan Implementation - The permittee shall submit information that describes the efforts to update and implement the CSO LTCP. The permittee shall continue to update implementation schedules as part of the Annual CSO status report."

Please refer to **SECTION III.A "CSO LTCP UPDATE - REPORT ON THE PROGRESS OF THE LTCP UPDATE"** on page 42 for information on the status of the LTCPU.

III.C.4.3 Rotating Basin Approach to Watershed Monitoring - Continue to implement a rotating basin approach to watershed monitoring in CSO receiving waters in order to characterize the impact of CSO discharges and other pollutant/pollution sources and the efficacy of CSO controls and watershed restoration practices.

The Rotating Basin Approach has been replaced with a "Comprehensive Watershed Monitoring Program", a 2010-2016 monitoring strategy developed by the PWD to comply with both the City's stormwater and CSO permit requirements and to assist with the Sourcewater Protection Program's objectives.

Please refer **SECTION F.2.STEP 1.B – PRELIMINARY PHYSICAL, CHEMICAL AND BIOLOGICAL QUALITY ASSESSMENT** on page 83 for information about Comprehensive Watershed Monitoring Program.

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STORMWATER MANAGEMENT PROGRAM ANNUAL REPORT

Part I Permit Conditions

Section A Applicability And Limitations On Coverage

The City will comply with the permit language on what are authorized and what are unauthorized stormwater discharges.

Section B Legal Authority

The City maintains adequate legal authority to enforce the Stormwater Management Program, in accordance with the National Pollutant Discharge Elimination System (NPDES) regulations 40 Code of Federal Regulations CFR122.26(D)(2)(i). Legal authority to operate and maintain the Stormwater Management Program includes various ordinances, regulations, and policies enforced by City departments. Philadelphia Code Section 13-603 was specifically enacted to ensure that the City had the proper authority necessary to implement the federal SW program. The actual language of this ordinance and other city ordinances can be found at http://www.phila.gov/philacode/. In addition, PWD has passed supplementary regulations to the city provision; they include Sections 500.0 to 500.6 which requires the abatement of cross connections and PWD Sections 600.14 & 600.15 which prohibits stormwater discharges. A copy of PWD's regulations can be obtained at the following website: http://www.phila.gov/water/pdfs/pwd_regulations.pdf

Futhermore, several ordinances have been implemented which are not directly related to the federal NPDES SW program, but support our goals and missions for the City. These include Philadelphia Code Section 14-1603.1 which requires stormwater management controls for new development and PWD regulation Section 600.0 to 600.13 which allows for Stormwater regulations for new development and redevelopement.

This Annual Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) and the US EPA, in accordance with requirements of the City of Philadelphia's NPDES Stormwater Management Permit No. PA 0054712. This Report is a compilation of the progress made on the Stormwater Management Program, during the reporting period from July 1, 2012 to June 30, 2013.

Section C Effluent Limitations

The City will comply with the permit language on effluent limitations and stormwater discharges covered under this permit.

Section D Sediment Total Maximum Daily Load (TMDL) for Wissahickon Creek

PWD has developed and implemented a program designed to achieve the goals of the sediment TMDL, which requires the City "to establish baseline data on the City's contribution of sediment loading and flow variations" and "evaluate and implement BMPs".

D.i. Conduct a Wissahickon Sediment TMDL Feasibility study and submit report

PWD initiated a feasibility study in October of 2005 in order to evaluate pollutant loads at MS4 outfalls and tributaries to the Wissahickon Creek (within Philadelphia) that cause an adverse impact to in-stream habitats as a result of transport of sediment and/or stream-bank erosion. The study also evaluates which outfalls and tributaries have the greatest potential for improvement through implementation of BMPs and/or other methods. Upon completion of the study, the City has designed and implemented a monitoring plan for Total Suspended Solids (TSS) and flow at selected MS4 outfalls, as well as at the confluence of selected tributaries to the Wissahickon Creek during various flow events (low flow, normal flow, and storm flow). The monitoring plan incorporates modeling results. A report documenting the findings of the feasibility study was submitted in September of 2009, a follow-up report on the monitoring effort was submitted in 2010. PWD has provided additional details on this study in previous reports; please refer to **SECTION D.i SUMMARY OF SEDIMENT AND STREAM RESTORATION FEASIBILITY STUDY** on page 201 of the CSO-Stormwater FY 2010 Annual Report.

D.ii. Wissahickon Sediment TMDL Monitoring plan implementation

<u>Wissahickon Sediment TMDL Monitoring plan implementation and outline submission</u>

PWD's commitment was initiated in 2005 through detailed monitoring and assessment of the Wissahickon Creek Watershed. The goal of PWD's implementation is to reduce the amount of sediment in the Wissahickon Creek using a multi-faceted approach. During the previous reporting year (2012), PWD completed the Sediment TMDL Implementation Plan. The implementation plan documents the commitment to sediment load reductions through various methods and was included as **APPENDIX F – WISSAHICKON CREEK SEDIMENT TMDL IMPLEMENTATION** to the CSO-Stormwater FY 2012 Annual Report. In addition to continuing inlet cleaning and stormwater regulatory enforcement programs, PWD developed and initiated the monitoring plan for stream restoration and stormwater treatment wetlands projects during FY 2013. The initial phase of this effort included baseline monitoring to measure the effectiveness of the stream restoration and stormwater treatment wetland facilities projects in meeting the targeted sediment reductions required by the US EPA's sediment TMDL for Wissahickon Creek. This effort includes H&H modeling and topographic survey baseline monitoring as a means to confirm sediment reduction estimates presented in PWD's Implementation Plan. These modeling and topographic survey efforts will be accompanied by photo and video-monitoring, as well as formal site inspections of the stormwater treatment wetland facilities.

Section E Pollutant Minimization Plan (PMP) for Polychlorinated Biphenyls (PCBs) in the City's Municipal Separate Storm Sewer System (MS4)

PWD has polychlorinated biphenyl (PCB) Pollutant Minimization Plans in effect under each of the three Water Pollution Control Plants individual NPDES permits which set forth more stringent plans than what is requested within PWD's MS4 NPDES Permit.

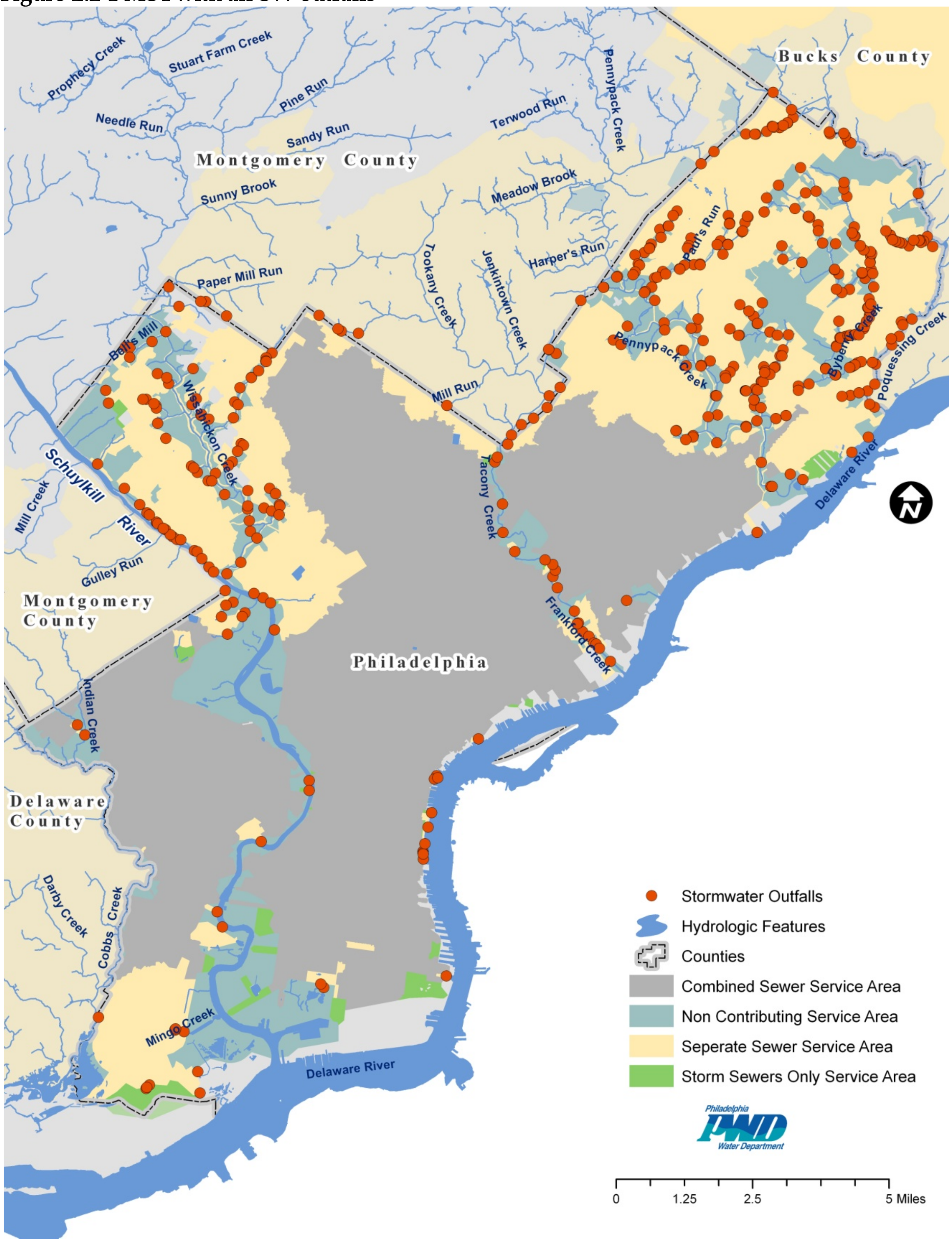
E.1 City PMP Contact Information:

Keith Houck, Manager
(215) 685 - 4910
Industrial Waste Unit
Aramark Tower, 4th Floor
1101 Market Street
Philadelphia, PA 19107

E.2 City of Philadelphia MS4 Service Area

The City's municipal sanitary separate sewer system (MS4) comprises about 40% of Philadelphia County and also accepts some water from surrounding communities. The MS4 includes the 434 permitted stormwater outfalls. A map of the MS4 service area referencing all outfalls is shown in **FIGURE E.2-1**.

Figure E.2-1 MS4 with all SW outfalls



E.3 / E.4 Investigation of Suspected Locations of PCB Releases/Containments

PWD has compiled a list of suspected current and historic locations of PCB material, equipment, processes, soil area, or facilities. During this permit cycle, PWD has attempted to visit all sites from the list of suspected PCB sources. The results of these investigations found that many of the sites no longer house PCB discharging devices, or the current owner has employed additional safety mechanisms to prevent any discharges. The details of these investigations and additional information on the PCB site selection process have been provided in previous reports; please refer to **SECTION E.3/E.4 - INVESTIGATION OF SUSPECTED LOCATION OF PCB RELEASES/CONTAINMENTS** on page 143 of the CSO-Stormwater FY 2012 Annual Report.

E.5 In- stream PCB sampling

PWD collected and analyzed twelve (12) in-stream samples for PCBs during the spring of 2009. No future sampling events are planned. PWD has submitted results from the sampling to the DRBC, at their request, for further analysis. Additional information regarding this In-stream Sampling has been provided in previous reports; please refer to **SECTION E.5 IN-STREAM PCB SAMPLING** on page 143 of the CSO-Stormwater FY 2012 Annual Report.

E.6 Develop Report on Control of PCB Discharges

PWD has created a protocol to investigate possible PCB sources within the City that may require control measures to reduce its discharge of PCBs. This process and the plan of action are described within the PCB PMP, located in **APPENDIX E** of the CSO-Stormwater FY 2009 Annual Report**.**

E.7 Work with DRBC to Create PMP Template

As of July 2013, PWD has not received any communication from the DRBC on creating a PMP Template.

E.8 Annually Document PCB PMP Compliance

PWD has completed its obligations to the PCB PMP in FY 2012. No additional work was conducted in FY 2013. Following the PCB source trackdown and inspection that was performed throughout the permit cycle, PWD discovered that of the 399 records on the original listing created in 2005, only 344 were legitimate sources; the 55 records removed were due to blanks, duplication, and non-locatable addresses. Of the 344 sites, only 74 are in use, 36 occur in the MS4 area and 35 have been retrofilled with a non-PCB material. Additional information on these investigations has provided in previous reports; please refer to **SECTION E.8 – ANNUALLY DOCUMENT PCB PMP COMPLIANCE** on page 146 of the CSO-Stormwater FY 2012 Annual Report.

Section F Stormwater Management Program

F.1. Source Identification

The following table presents a description of PWD's MS4 system, including; stormwater outfalls, lengths of sanitary sewer, and lengths of stormwater sewer within Philadelphia. These areas are depicted in **FIGURE F.1-1** on the following page.

Table F.1-1 Description of MS4 Infrastructure

Watershed	Drainage Area (Square Miles)	Miles of Pipe			MS4 Outfalls Count	
		Stormwater	Sanitary	Total MS4	PWD Owned	Other
Darby-Cobbs	-	1.02	0.81	1.82	3	-
Delaware Direct	3.15	79.81	52.68	132.49	18	122
Pennypack	11.67	234.93	234.03	468.96	130	14
Poquessing	8	154.71	156.52	311.23	141	19
Schuylkill	8.48	153.43	156.82	310.26	45	47
Tacony	2.47	54.46	59.02	113.48	34	1
Wissahickon	5.79	95.18	104.86	200.03	63	2
Total	**39.56**	**773.53**	**764.74**	**1538.27**	**434**	**205**

GIS Data Layers listed in **TABLE F.1-2** have been submitted within a geodatabase, **PWD_ANNUAL_REPORT_GIS_DATA_2013.MDB** which can be found on the **SUPPLEMENTAL CD.** The GIS Data Feature class filenames within the geodatabase are provided in **TABLE F.1-2.**

Table F.1-2 GIS Data Feature Classes within Geodatabase named - FY13_GISlayers.mdb

• All_PWD_Monitoring_FY13	• Philadelphia_Detention_Basins
• FY13_ES_Inspections	• Philadelphia_Impervious
• FY13_GSI_Projects	• Philadelphia_Major_Watersheds
• FY13_IWU_Pollution_Migration_Events	• Philadelphia_only_Major_Watersheds
• FY13_Known_Historical_PCB_Locations	• Philadelphia_Sewer_Sheds_2013
• FY13_PermittedDischargers	• PhiladelphiaBlocks2010
• FY13_Tech_Approvals	• Stormwatersheds_Pennypack_2013
• FY13_Sanitary_Infiltration_Events	• Stormwatersheds_Poquessing_2013
• Hydro_Line	• Stormwatersheds_Wissahickon_2013
• Hydro_Poly	• Stormwater_Outfalls_442
• Land_Use_PCPC_2013	• Wissahickon_Point_Source

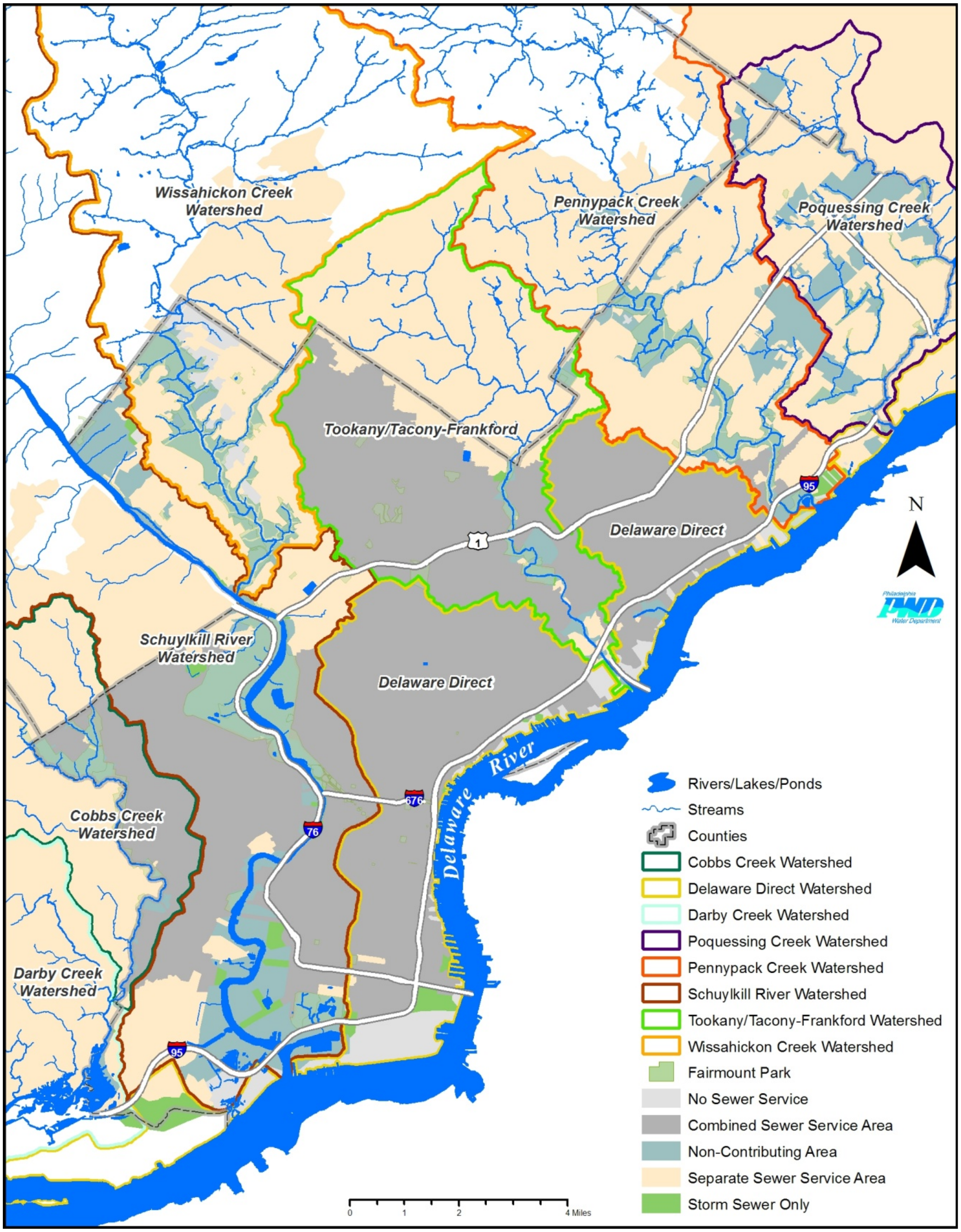


Figure F.1-1 Philadelphia Infrastructure System Areas

Descriptions of the GIS layers referenced in **TABLE F.1-2** are provided below:

All_PWD_Monitoring_2013
This layer presents the locations of PWD's chemical, fish, macroinvertebrate, and algae sampling sites. The contents of this feature class are discussed in **SECTION F.2.STEP.1.B** on page 83.

FY13_ES_Inspections
This layer presents the locations of erosion and sedimentation inspections carried out at construction sites within Philadelphia in FY 2013. The contents of this layer are discussed in **SECTION F.5 –STORMWATER FROM CONSTRUCTION ACTIVITIES** on page 102.

FY13_GSI_Projects
This layer presents the locations of existing and proposed green infrastructure projects sorted by their current status (completed, in construction, in design, ongoing) within Philadelphia County and the neighboring contributing areas.

FY13_IWU_Pollution_Migration_Events
This layer presents the locations of spills documented by PWD Industrial Waste Unit within Philadelphia in FY 2013. The contents of this layer are discussed in **SECTION F.7.A – POLLUTANT MIGRATION/INFILTRATION** on page 109.

FY13_Sanitary_Infiltration_Events
This layer presents the locations of Sewage Pollution Incidents documented by PWD within Philadelphia in FY 2013.The contents of this layer are discussed in **SECTION F.8.G.III – INVESTIGATE, REMEDIATE, AND REPORT SANITARY INFILTRATION** on page 115.

FY13_Tech_Approvals
This layer presents the locations of projects issued post construction stormwater management technical approvals by PWD in FY 2013. The contents of this layer are discussed in **SECTION F.5.B - POST CONSTRUCTION STORMWATER MANAGEMENT** on page 105.

Hydro_Line
This layer presents the boundaries of Philadelphia County and surrounding watershed hydrology in a polyline based feature class.

Hydro_Poly
This layer presents the boundaries of Philadelphia County and surrounding watershed hydrology in a polygon based feature class.

Land_Use_PCPC_2013
This layer presents Philadelphia land use as ascribed to individual parcel boundaries or units of land. Land use is the type of activity occurring on the land such as residential, commercial or industrial. Each unit of land is assigned to one of nine major classifications of land use (2-digit codes) and where possible more narrowly defined into one of 70 sub-classifications (3-digit codes).

PCB_Locations_Known_Historical
This layer presents the location of all known and historical PCB locations within Philadelphia. The contents of this layer are discussed in **SECTION E – POLLUTANT MINIMIZATION PLAN FOR PCBS** on page 75.

PermittedDischargers
This layer presents the location within Philadelphia of all permitted Discharger. The contents of this layer are discussed in **SECTION F.2.STEP 1.C** on page 90**.**

Philadelphia_Detention_Basins
This layer presents the location of all stormwater detention basins within Philadelphia County.

Philadelphia Impervious
This layer presents percent imperviousness and the amount of impervious area in Philadelphia County.

Philadelphia_Major_Watersheds
This layer presents the delineation of the Philadelphia County and surrounding counties' watershed boundaries including Darby-Cobbs, Delaware-Direct, Pennypack, Poquessing, Schuylkill, Tacony-Frankford, and Wissahickon watersheds.

Philadelphia_only_Major_Watersheds
This layer presents the delineation of the Philadelphia County's watershed boundaries including Darby-Cobbs, Delaware-Direct, Pennypack, Poquessing, Schuylkill, Tacony-Frankford, and Wissahickon watersheds.

Philadelphia Sewersheds_2013
This layer presents the boundaries of the MS4, combined sewer, un-sewered, non-contributing, and stormwater only areas within Philadelphia County and the neighboring contributing areas.

PhiladelphiaBlocks2010
This layer presents the results of the 2010 Census in Philadelphia County on a block level.

Stormwater_Outfall
This layer presents locations of all permitted stormwater outfalls within Philadelphia County and the neighboring contributing areas.

Wissahickon_Point_Sources
This layer presents permitted Point source locations within the Wissahickon Watershed.

GIS Stormwater Data Conversion Geodatabase Layers
The City has previously submitted additional GIS data layers that will not be included this year. These layers include outfalls, manholes, inlets, and various pipe as listed in **TABLE F.1-3**. The reason for their removal is the City's policy to not release these data layers to the general public due to concerns over redistribution and security. These data layers would be made available for viewing by the Department, should it be necessary.

Table F.1-3 GIS Data Feature Classes within Geodatabase named - StormwaterDataConversion.mdb

DataConv_GISAD_stBasin	DataConv_GISAD_stInletPipe
DataConv_GISAD_stBoring	DataConv_GISAD_stMeterChamber
DataConv_GISAD_stCasin	DataConv_GISAD_stOffsetAccess
DataConv_GISAD_stChamber	DataConv_GISAD_stOpenChannel
DataConv_GISAD_stCulvert	DataConv_GISAD_StormNetwork_Junctions
DataConv_GISAD_stDisconnectedInlet	DataConv_GISAD_stOutfall
DataConv_GISAD_stFitting	DataConv_GISAD_stPointFeature
DataConv_GISAD_stFlare	DataConv_GISAD_stPump
DataConv_GISAD_stForceMain	DataConv_GISAD_stRainGauges
DataConv_GISAD_stGravityMain	DataConv_GISAD_stStructure
DataConv_GISAD_stHostPipe	DataConv_GISAD_stTunnel
DataConv_GISAD_stManhole	DataConv_GISAD_stVentPipe
DataConv_GISAD_stManholeOther	DataConv_GISAD_stVirtualLink
DataConv_GISAD_stInlet	DataConv_GISAD_stVirtualNo

F.2. Discharge Management, Characterization, and Watershed-Based Assessment And Management Program

F.2.Step 1. Preliminary Reconnaissance: Permit Issuance Through End of Year 2

F.2.Step 1.a. Pennypack, Poquessing, Wissahickon WMP preliminary reconnaissance - Land use and resource mapping

PWD has conducted extensive mapping of information relevant to stormwater management planning. Previously discussed in **SECTION F.1 – SOURCE IDENTIFICATION** of this document on page 78, the GIS files include MS4 outfalls and contributing drainage areas, land use, population, monitoring locations, and other relevant layers. The maps and supporting GIS layers are included in the **SUPPLEMENTAL CD.**

F.2.Step 1.b. Pennypack, Poquessing, Wissahickon WMP preliminary reconnaissance - Preliminary physical, chemical, and biological quality assessment

Comprehensive Watershed Monitoring Program

Comprehensive assessment of our waterways is integral to planning for the long-term health and sustainability of our water systems. By measuring all factors that contribute to supporting fishable, swimmable, and drinkable water uses, appropriate management strategies can be developed for each watershed land area that Philadelphia shares.

PWD has carried out extensive sampling and monitoring programs to characterize conditions in seven local watersheds, both within the county boundaries and outside counties/municipalities. From 1999 to 2013, PWD has implemented a comprehensive watershed assessment strategy, integrating biological, chemical and physical assessments to provide both quantitative and qualitative information regarding the aquatic integrity of the Philadelphia regional watersheds. This information is published in Comprehensive Characterization Reports (CCRs) and used to plan improvements to watersheds in the Southeast Region of Pennsylvania.

Monitoring Timeline Strategy

Prior to the creation of PWD's Comprehensive Watershed Monitoring Program, baseline assessments were conducted in all of the Philadelphia regional watersheds to assess the degree, location and type of impairments occurring within each system. Baseline assessments, encompassing benthic, fish, habitat and discrete water quality monitoring, were routinely completed on a watershed within one year. With the addition of continuous and wet-weather water quality monitoring, periphyton assessments, and specialized physical assessment programs (*e.g.*, FGM assessments), CCRs were typically accomplished on a two-year timeline.

PWD conducted benthic macroinvertebrate, fish, and physical habitat monitoring activities in the Cobbs Creek Watershed in spring and summer 2012. This data will be processed and analyzed with results presented in an Integrated Watershed Management Plan indicator status update in 2013. Assessments targeting stations in Tookany-Tacony/Frankford Watershed were completed in spring of 2013 **(TABLE F.2.STEP 1.B-1)**.

As described in PWD's *Comprehensive Watershed Monitoring Program: Proposed Strategy 2010-2015*, the scale of watershed stressors is so expansive and the BMP program is still in its introductory phase that full implementation is limited but will increase once program is established. Therefore, PWD is focusing its monitoring efforts at maintaining a "sentinel" monitoring presence in each of the City's watersheds rather than dedicating monitoring efforts to individual watersheds. This regional monitoring approach has been greatly enhanced through a partnership with USGS. Continuous water quality data are collected from 11 USGS gaging stations, and quarterly baseflow water samples are analyzed for microbial and nutrient parameters of concern. PWD also continues to assess performance of stormwater BMP projects as they are constructed.

Table F.2.Step1.b-1 Overview of PWD Proposed Watershed Monitoring Activities 2010-2016

Watershed/Geographic Area	Activity	Period
PWD/USGS Gages	Continuous Water Quality Monitoring	2010-2015
PWD/USGS Gages	Quarterly Water Quality Grab Samples	2010-2015
Philadelphia Area Watersheds	Stormwater BMP Monitoring	2010-2015
Philadelphia Area Watersheds	Stream Restoration Project Monitoring	2010-2015
Cobbs Creek Watershed	Watershed-wide Comprehensive Assessment	2012-2013
Tookany-Tacony/Frankford Watershed	Watershed-wide Comprehensive Assessment	2013-2014
Wissahickon Creek Watershed	Tributary Assessment*	2014-2015
Wissahickon Creek Watershed	Watershed-wide Comprehensive Assessment	2015-2016

Monitoring Timeline 2010-2016

Allowing 10 years before re-assessment will potentially allow for a greater number of projects to be implemented. It allows PWD to focus monitoring efforts on evaluating the performance of stormwater BMPs and restoration projects, as well as the tidal Schuylkill and Delaware Rivers (which have not been assessed), as well as smaller wadeable streams. As described in the *Comprehensive Watershed Monitoring Program: Proposed Strategy 2010-2015*, PWD's current proposed strategy for watershed assessments also includes a less intense, but ongoing monitoring effort within each watershed, primarily through a partnership with the USGS. It should be noted that although the monitoring plan nominally covers 2010-2015, the assessment of the Wissahickon Creek Watershed spans 2015-2016 and is thus included here.

The proposed strategy for watershed assessments 2010-2016 includes resuming watershed-scale bioassessment activities at several stations within targeted watersheds. This program resumed in Cobbs Creek Watershed in 2012 and continued in the Tookany/Tacony-Frankford Watershed in 2013. (**TABLE F.2.STEP 1.B-2 PROPOSED WATERSHED MONITORING TIMELINE 2008-2016)**. These watershed scale re-assessment and subsequent indicator status update reports should complement the "adaptive management" approach favored by the IWMP implementation process, and allow for the locations and methods of assessment to be changed, depending upon the number of projects implemented and their spatial distribution within the watershed. It is hoped that these data will be useful as a long-term record of water quality changes in the region, more appropriate for assessing the goals of a City-wide distributed green infrastructure program than an approach which focuses on individual watersheds.

Table F.2.Step1.b-2 Proposed Watershed Monitoring Timeline 2010-2016

Watershed	Program Components	2010				2011				2012				2013				2014				2015				2016			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Cobbs	BMP Monitoring																												
	Quarterly WQ Grab sampling																												
	Continuous WQ Monitoring																												
	Annual WQ Summary																												
	Bioassessment																												
	Bioassessment Data Analysis																												
	IWMP Indicator Status Update																												
Tacony-Frankford	BMP Monitoring																												
	Quarterly WQ Grab sampling																												
	Continuous WQ Monitoring																												
	Annual WQ Summary																												
	Bioassessment																												
	Bioassessment Data Analysis																												
	IWMP Indicator Status Update																												
Wissahickon	BMP Monitoring																												
	Quarterly WQ Grab sampling																												
	Continuous WQ Monitoring																												
	Annual WQ Summary																												
	Tributary Assessment																												
	Tributary Data Analysis																												
	Bioassessment																												
	Bioassessment Data Analysis																												
	IWMP Indicator Status Update																												

Water Quality Sampling and Monitoring

Guiding Principles of Urban Water Chemistry Assessment

PWD's water quality assessment strategy has been designed to facilitate separate analyses of dry weather (i.e., baseflow) and wet weather water quality conditions. This program has evolved over time, as personnel and technological improvements have improved our abilities to collect more data from an increasing number of sampling locations in a more efficient manner. Automated sampling, in particular, has greatly increased the temporal resolution of stormwater sampling at multiple sampling locations for a single storm event.

In order to comply with the State-regulated stormwater permit obligations, PWD worked with USGS to record continuous water quality data at 10 gage stations in the Philadelphia region from July 2012 through November 2012 and March 2013 through June 2013. The sampling and monitoring sites are presented in **APPENDIX E - MONITORING LOCATIONS**. Four types of sampling were performed as discussed below. Parameters were chosen based on state water quality criteria, or because they are known or suspected to be important in urban watersheds.

Discrete Water Chemistry Assessment

In order to characterize conditions throughout the Philadelphia region and build a long-term record of water quality, PWD initiated a quarterly baseflow water quality sampling program at 10 USGS gage stations. Each USGS/PWD cooperative monitoring gage site was sampled once during the course of a few hours, to allow for travel time and sample processing/preservation. Samples are collected during dry weather and parameters were chosen based on the conclusions from baseline sampling, that indicated dry weather problems are primarily related to bacteria and nutrients. Results of samples collected to date are presented in **APPENDIX F- PWD QUARTERLY DRY WEATHER WATER QUALITY MONITORING PROGRAM.** Previous annual reports describe PWD's extensive surface water grab sampling efforts dating back to 2002.

Grab samples were also collected from seven locations in the Delaware Estuary and three locations in the tidal Schuylkill by boat July 2012-June 2013. Samples are collected at low tide to ensure that water samples adequately represent spatial variability in water quality that may be present. PWD plans to continue sampling the Delaware locations on a monthly basis in order to accumulate at least two years of data (approximately 24 samples). PWD is in the process of sampling the Schuylkill locations on a bi-monthly basis from April-November for at least two years. Results from quarterly dry weather grab sampling thus far are generally similar to data collected during the CCR data collection periods. For this reason, PWD will re-evaluate whether additional water quality sampling is needed to characterize water quality in targeted watersheds on a case-by-case basis.

Continuous Water Quality Assessment

In order to characterize conditions throughout the Philadelphia region and build a long-term record of water quality, PWD initiated a continuous water quality monitoring program at 10 USGS gage stations. Each USGS/PWD cooperative monitoring gage site records water quality data for dissolved oxygen, temperature, flow, pH, and specific conductance. Selected locations are also instrumented for turbidity, precipitation and photosynthetically active radiation (PAR). These data are made available to the public in near real-time on the internet at http://pa.water.usgs.gov/pwd/. FY 2013 monitoring results are presented in **APPENDIX G - PWD-USGS COOPERATIVE WATER QUALITY MONITORING PROGRAM ANNUAL SUMMARY.**

In addition to continuously monitoring water quality at USGS gaging stations, PWD continued deployments of *in situ* self-contained data logging continuous water quality monitoring sondes (YSI Inc. Models 6600, 6600 EDS, 600XLM) in the tidal Schuylkill River and Frankford Creek from April-November 2012. Tidal sondes were deployed again in April 2013, with the intention of collecting data through November 2013.

Long-term continuous monitoring for TMDL compliance and building a long-term water quality data record for the aforementioned watersheds will be accomplished in 2010-2015 through a partnership with the USGS. Results from City-wide continuous monitoring thus far are generally similar to data collected during the CCR data collection periods. For this reason, PWD will re-evaluate whether additional water quality sampling is needed to characterize water quality in targeted watersheds on a case-by-case basis. Continuous water quality instruments will also be utilized in evaluating the performance of certain stormwater BMPs and assessing conditions in tidal portions of the Schuylkill and Delaware Rivers as well as Frankford Creek.

Wet Weather Event Sampling

Automated samplers have eliminated the need for staff to manually collect samples, and have increased sampling efficiency. The primary use of automated samplers in the 2010-2016 period is the assessment of stormwater BMP performance. PWD is in the process of analyzing Saylor Grove wet weather water quality data collected from automated samplers from 2006-2011, and plans to complete a water quality update to the Saylor Grove Stormwater Treatment Wetland Operation, Maintenance, and Monitoring Report. Once this report is completed, PWD hopes to shift stormwater BMP water quality monitoring efforts to two new bioretention facilities (also located within the Wissahickon Creek Watershed) at Cathedral Road and Wises Mill Road.

Biological Monitoring

The biological monitoring protocols employed by PWD are based on methods developed by the US EPA (Barbour *et al*. 1999) and the PADEP. These procedures are as follows:

- Rapid Bioassessment Protocol III (Benthic Macroinvertebrate Sampling)
- Rapid Bioassessment Protocol V (Fish Sampling)
- Periphyton Assessment (Algae Monitoring)

Macroinvertebrate Assessments

As described in the PWD *Comprehensive Watershed Monitoring Program: Proposed Monitoring Strategy 2010-2015*, PWD's approach is intended to be a compromise, recognizing not only the benefits of collecting data from randomly selected sites but also the importance of maintaining a consistent monitoring effort at consistent locations over time. This plan is based on a similar monitoring program that USGS has implemented in Chester County (Reif 2002, Reif 2004). The plan reflects the manpower constraints of collecting and processing samples with the PADEP ICE protocol. It is hoped that this compromise approach will achieve some of the benefits of a randomized approach, while providing periodic re-evaluation of our watersheds required to inform the watershed planning process and comply with environmental mandates. Targeted watershed assessments resumed in Cobbs Creek Watershed in June 2012. (**TABLE F.2.STEP 1.B-3 PROPOSED BENTHIC INVERTEBRATE MONITORING TIMELINE 2010-2015**).

Table F.2.Step 1.b-3 Proposed Benthic Invertebrate Monitoring Timeline 2010-2015

Period	Monitoring Activity (number of samples*)
2010	Stream Restoration Monitoring (3)
2011	USGS gage samples (9); Randomly selected sites (16)
2012	Cobbs Creek (6**); USGS gage samples (9); Random (10)
2013	Tookany/Tacony Creek (10**) USGS gage samples (9); Random (6)
2014	Wissahickon Creek Tributaries*** (11) USGS gage samples (9); Random (5)
2015	Wissahickon Creek (12**)USGS gage samples (9); Random (4)

* Number of samples estimated, actual number of samples may vary
** Number of monitoring sites excludes 2 USGS gage sites in target watershed
*** See section 7 for more information on Wissahickon Creek tributary samples

During March 2012, PWD conducted Rapid Bioassessment Protocols (RBP III) at 25 (n=25) locations within Philadelphia area watersheds. Sampling was conducted at nine USGS gages in the PWD/USGS Cooperative Monitoring program, six sites in Cobbs Creek Watershed, and 10 randomly selected sites. These data are presented in **APPENDIX H – PWD WADEABLE STREAMS BENTHIC MACROINVERTEBRATE AND PHYSICAL HABITAT ASSESSMENTS.** Results of the Cobbs Creek assessments will be presented in a Cobbs Creek Watershed Integrated Watershed Management Plan Indicator Status Update in 2013. In spring 2013, PWD sampled nine USGS gages, 10 sites in Tookany/Tacony-Frankford Watershed, and six randomly chosen sites.

Fish Assessments

Targeted watershed assessments resumed in June and July 2012 when fish assessments were conducted at 4 sites within the Cobbs Creek Watershed. PWD also collected fish samples from 8 sites in the Tookany/Tacony-Frankford Watershed in summer 2013 (**TABLE F.2.STEP 1.B -4 PROPOSED FISH MONITORING TIMELINE 2010-2015)**. All surveys were conducted using electrofishing gear as described in EPA RBP V (Barbour, et al. 1999). Results of these fish assessments will be presented in a Cobbs Creek Watershed Integrated Watershed Management Plan Indicator Status Update in 2013.

Table F.2.Step 1.b-4 Proposed Fish Monitoring Timeline 2010-2015

Period	Monitoring Activity (number of samples*)
2012	Cobbs Creek Watershed Assessment (4)
2013	Tookany/Tacony Creek Watershed Assessment (8)
2015	Wissahickon Creek Watershed Assessment (10)

* Number of samples estimated, actual number of samples may vary

Algae Assessments
Algal biomass and nutrient ratio data may be used to provide information for the parameterization of water quality models. Beginning in 2011, PWD began collecting monthly phytoplankton samples from three monitoring locations on the Delaware River. Grab samples are taken at sites DR8190 (Commodore Barry Bridge), DR10016 (Ben Franklin Bridge), and DR 11011 (Baxter Water Treatment Plant Intake). Beginning in 2012, PWD began collecting phytoplankton samples from monitoring location SC470 (Navy Yard) on the Schuylkill River. Samples are delivered to the Patrick Center of the Academy of Natural Sciences of Philadelphia, phycology section, for taxonomic identification of diatoms and soft algae, as well as the determination of intracellular nutrient (C, N, P) concentrations.

Physical Monitoring

Physical Habitat Assessments
Habitat assessments are conducted along with benthic macroinvertebrate monitoring and thus the habitat assessment strategy is described under the heading **BIOLOGICAL MONITORING - MACROINVERTEBRATE ASSESSMENTS,** above. PWD assesses stream physical habitat condition using PADEP Instream Comprehensive Evaluation (ICE) protocols. During 2012, PWD conducted physical habitat assessments at 25 locations within Philadelphia area watersheds. Sampling was conducted at nine USGS gages in the PWD/USGS Cooperative Monitoring program, six sites in the targeted Cobbs Creek Watershed, and 10 randomly selected sites. These data are presented in **APPENDIX H – PWD WADEABLE STREAMS BENTHIC MACROINVERTEBRATE AND PHYSICAL HABITAT ASSESSMENTS.** Results of the Cobbs Creek assessments will additionally be presented in a Cobbs Creek Watershed Integrated Watershed Management Plan Indicator Status Update in 2013. In spring 2013, PWD sampled nine USGS gages, 10 sites in Tookany/Tacony-Frankford Watershed, and six randomly chosen sites.

Habitat Suitability Index (HSI)
In addition to habitat assessments, Habitat Suitability Index (HSI) models, developed by the U.S. Fish and Wildlife Service (USFWS), have been incorporated into the monitoring program. Based on empirical data and supported by years of research and comprehensive review of scientific literature, these models present numerical relationships between various habitat parameters and biological resources, particularly gamefish species and species of special environmental concern. To date, HSI have applied to Darby-Cobbs, Tookany/Tacony-Frankford, Wissahickon, and Pennypack Creek Watersheds. The Poquessing Creek Watershed CCR approach attempted to simplify the application of fish habitat suitability analysis to generalized guilds, as described below.

Physical Habitat Survey and Integrated Flow Modeling
PWD performed a very detailed physical survey of sites (n=6) where fish were collected in Poquessing Creek Watershed in 2008. PWD applied a depth-averaged finite element

flow model (River 2D) to assess habitat conditions under baseflow conditions for the Poquessing Creek Watershed CCR in 2010. Additional research is needed in order to parameterize physical habitat suitability models for various aquatic life groups of concern, but PWD is presently applying generalized "guild" characteristics which are intended to represent the habitat requirements of groups of similar species.

Fluvial Geomorphologic (FGM) / Infrastructure Analysis
Fluvial Geomorphologic (FGM) studies establish the physical attributes of the stream, identify areas of concern, and provide recommendations for rehabilitation of the stream corridors and floodplains. To date, FGM analysis has been conducted on the Darby-Cobbs, Tookany/Tacony-Frankford, Wissahickon, Pennypack, and Poquessing Creeks. Analysis was conducted in order to characterize channel morphology, disturbance, stability, and habitat parameters as well as to provide a template for hydrologic and hydraulic modeling and serve as a baseline for assessing channel bank and bed changes. Data provided from the FGM analyses will also serve to develop reach rankings within each watershed in order to prioritize restoration strategies. During FY 2013, PWD developed a draft of the Pennypack FGM Report. PWD is in the process of conducting another assessment of the Poquessing Creek Watershed.

This successional assessment was accomplished by resurveying cross-sections established during the initial study conducted in FY 2008 and conducting a Unified Stream Assessment Method reach characteristic assessment. During FY 2013, PWD developed a draft FGM report for the Poquessing Creek Watershed.

Summary of Monitoring Locations

Biological, physical and chemical monitoring locations are based on 3 criteria: 1) appropriate habitat heterogeneity; 2) access availability; and 3) proximity to USGS stream gaging stations and PADEP 305b monitoring sites. In general, the number of monitoring sites is proportional to the size of the drainage and the watershed's link magnitude (*i.e.*, number of 1st order streams). Maps of assessment sites by watershed and program (biological, chemical, or physical), which are also available as GIS data, are presented in **APPENDIX E – MONITORING LOCATIONS.**

F.2.Step 1.c. Pennypack, Poquessing, Wissahickon WMP preliminary reconnaissance - Inventory of Point and Non-Point sources

There are 139 NPDES permitted dischargers in Philadelphia, as shown in **APPENDIX I – NPDES PERMITTED DISCHARGERS**. This listing was downloaded from the EPA Integrated Compliance Information System- NPDES (ICIS-NPDES) as accessed through the Enforcement & Compliance History Online (ECHO) website (http://www.epa-echo.gov/echo/compliance_report_water_icp.html). Only 62 of these dischargers are located in MS4 areas, with the remaining dischargers located in the CSO areas or areas of direct drainage to a waterway.

PWD is also actively involved in developing estimates of non-point source pollutants.

The results of this analysis are described in the hydrologic models in **SECTION G ASSESSMENT OF CONTROLS** on page 120.

F.2.Step 1.d Pennypack, Poquessing, Wissahickon WMP preliminary reconnaissance - Preliminary problem assessment

CCRs were completed for the Wissahickon, Pennypack and the Poquessing Creek Watersheds. These reports include analysis of data collected over the monitoring period and present a characterization of problems within the watershed. The reports for each watershed are available to the public through the internet at the following address: http://www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports

F.2.Step 2. Watershed Plan Development: Permit issuance through end of year 4

The Act 167 Plans for the Pennypack and Poquessing Creek Watersheds were completed and submitted to the PADEP in December 2012. The Pennypack Creek Watershed Act 167 Plan was approved by the PADEP in July 2013. The Wissahickon Act 167 Plan is under development.

F.2.Step 3. Watershed Plan Implementation and Performance Monitoring: Permit issuance through expiration

F.2.Step 3.a. Pennypack, Poquessing, Wissahickon - Watershed Plan Implementation and Performance Monitoring - Dry Weather Water Quality and Aesthetics

F.2.Step 3.a.i. Operate the Defective Lateral Program

Over the last permit year, PWD has continued to successfully operate its Defective Lateral Program. A detailed discussion of this program is provided within this report in **SECTION F.3 - DETECTION, INVESTIGATION, AND ABATEMENT OF ILLICIT CONNECTIONS AND IMPROPER DISPOSAL** on page 97.

F.2.Step 3.a.ii. Debris removal from waterways impacted by storm water discharges

PWD continues to employ the WRT to remove debris and conduct small scale stream restoration projects within the City's waterways. Please refer the CSO portion of the Annual Report **SECTION II.F – CONTROL OF SOLID AND FLOATABLE MATERIALS** on page 26 for information about debris removal from waterways impacted by storm water discharges.

F.2.Step 3.a.iii. Lincoln Drive sewer relining

PWD completed the Lincoln Drive sewer relining in 2004. Additional information on this project was reported in previous reports; please refer to **SECTION F.2.3.a.iii LINCOLN DRIVE SEWER RELINING** on page 261 of the FY 2010 CSO-Stormwater Annual Report.

F.2.Step 3.a.iv. Stormwater outfall dry weather flow inspections

The City maintains a stormwater outfall monitoring system in compliance with the MS4 permit issued by the Department. All 434 of the City's permitted stormwater outfalls are routinely inspected such that all outfalls are inspected at least once per permit cycle. Those with dry weather discharges are sampled for fecal coliform and fluoride analysis. The results of these samples are reported on a quarterly basis and summarized in this annual report.

All the MS4 outfalls have been inspected at least once during the permit cycle as part the Permit Inspection Program. During FY 2013, only 2 outfalls were inspected and 2 were sampled due to observed dry-weather flow under the permit inspection program. In addition, 44 outfalls were inspected and 40 sampled due to observed dry-weather flow under the Priority Outfall quarterly sampling program during FY 2013. These samples are used to evaluate priorities for the Defective Lateral Detection and Abatement Program. A summary table (**TABLE F.2.Step 3.A.IV-1)** of the progress of the Defective Lateral Detection and Abatement Program from FY 2005 - FY 2013 as well as a synopsis of the work in the priority areas is provided below. The test results of these samples can be found in **APPENDIX J – FY 2013 DEFECTIVE LATERAL QUARTERLY REPORTS.**

Table F. 2.Step 3.a.iv-1: Stormwater Outfall Inspection Program

	Permit Inspection Program		**Priority Outfall Program**	
	Inspections:	**Samples:**	**Inspections:**	**Samples:**
FY 2005	73	69	83	74
FY 2006	97	56	90	81
FY 2007	46	33	46	31
FY 2008	56	30	30	30
FY 2009	8	8	56	56
FY 2010	237	121	44	44
FY 2011	79	39	43	43
FY 2012	24	20	44	40
Fy 2013	2	2	45	40
Total	598	358	437	399

F.2.Step 3.a.v. Defective Lateral Program priority outfalls sampling

Outfalls are prioritized for investigative work by the Defective Lateral and Abatement Program. In addition, outfalls identified as priority outfalls under the MS4 permit are sampled quarterly and summarized annually.

PWD also investigates all potential reports of an illicit discharge from the stormwater system.

T-088-01 (7th & Cheltenham Avenue)

As of June 30, 2013, 2,830 properties have had complete tests as defined by the MS4 permit in this priority outfall area. Of these properties, 132 (4.7%) have been found to have defective laterals and all have been abated.

The locations of dry weather diversion devices, the number of inspections, blockages, and discharges found in FY 2013 are listed below:

Table F.2.Step 3.a.v-1 Dry Weather Diversion Device Installation Locations

Location	ID#	Inspections	Blockages	Discharges
Plymouth Street, West of Pittville Ave.	CFD-01	40	8	0
Pittville Avenue, South of Plymouth St.	CFD-02	38	6	0
Elston Street, West of Bouvier Street	CFD-03	31	1	0
Ashley Street, West of Bouvier Street	CFD-04	29	2	0
Cheltenham Ave, East of N. 19 Street	CFD-05	36	2	0
Verbena Street, South of Cheltenham Ave.	CFD-06	26	1	0
IFO 600 W Cheltenham Ave.	CFD-07	41	11	1
IFO 6819 N 07th Street	CFD-08	39	9	0

Fecal coliform sampling at this outfall continues quarterly. Results for the outfall samples during FY 2013 are listed below:

Table F.2.Step 3.a.v-2 T-088-01 Quarterly Fecal Coliform Sampling

Date	Outfall (Fecal Colonies per 100 ml)
7/2/12	8000
10/1/12	570
1/8/13	18
4/3/13	236

W-060-01 (Monastery Avenue)

As of June 30, 2013, 611 properties have had complete tests as defined by the MS4 permit in this priority outfall area. Of these properties, 16 (2.6%) have been found to have defective laterals. All 16 have been abated.

Additionally, two (2) dry weather diversion devices were installed to intercept contaminated flow within the storm system and redirect the flow into the sanitary system. These devices are inspected regularly by the City's Collector System Flow Control Unit. The locations of these devices and the number of inspections, blockages, and discharges in FY 2013 are listed below:

Table F.2.Step 3.a.v-3 W-060-01 Inspections

Location	ID#	Inspections	Blockages	Discharges
Jannette Street, West of Monastery Ave.	MFD-01	23	1	0
Green Lane, North of Lawnton Street	MFD-02	22	0	0

Fecal coliform sampling at this outfall continues quarterly. Results for the outfall samples are listed below:

Table F.2.Step 3.a.v-4 W-060-01 Quarterly Fecal Coliform Sampling

Date	Outfall (Fecal Colonies per 100 ml)
7/2/12	19000
10/1/12	207
1/8/13	27
4/8/13	365

Monoshone Creek Outfalls

As of June 30, 2013, 2,744 properties have had complete tests as defined by the MS4 permit in this priority outfall area. Of these properties, 93 (3.4%) have been found to have defective laterals and all have been abated.

Significant reductions were achieved in fecal coliform concentrations and loadings in outfall W-068-04/05 as a result of defective lateral abatements, sewer relining, and the Saylor Grove Stormwater Wetland BMP. The entire Monoshone Creek Study and additional information on the area was provided in FY 2012, please refer to **SECTION F.2.STEP 3.A.V. DEFECTIVE LATERAL PROGRAM PRIORITY OUTFALL SAMPLING** on page 182 of the FY 2012 CSO-Stormwater Annual Report.

Fecal coliform sampling at these outfalls continues quarterly. A listing of the results for the W-068-05 outfall samples in FY 2013 are listed below:

Table F.2.Step 3.a.v-5 W-068-05 Quarterly Fecal Coliform Sampling

Date	Outfall (Fecal Colonies per 100 ml)
7/2/12	28000
10/23/12	122000
3/5/13	>2420
4/3/13	35

Manayunk Canal Outfalls

Of the 13 stormwater outfalls that discharge into the Manayunk Canal, the City is focusing on 7 that have recorded dry weather flow with some amount of fecal contamination. The results of FY 2013 fecal sampling at these are listed below:

Table F.2.Step 3.a.v-6 Manayunk Canal Outfall Fecal Sampling Results

Outfall	Outfall Fecal Colonies per 100 mL			
	9/25/12	12/4/12	3/18/13	6/20/13
S-058-01	145	9	105	325
S-059-01	4500	4300	2420	2420
S-059-02	6000	200000	2420	2420
S-059-03	2000	3400	2420	2420
S-059-04	3700	2600	1120	1414
S-059-05	2600	72	27	435
S-059-09	NF	NF	NF	NF

As of June 30, 2013, 2,478 properties have had complete tests as defined by the MS4 permit in the areas surrounding these 7 outfalls. Of these properties, 61 (2.5%) have been found to have defective laterals and all have been abated.

P-090-02 (Sandy Run)

PWD has previously installed a dry weather diversion device to intercept contaminated flow within the storm system and redirect the flow into the sanitary system. This device is inspected regularly by PWD and continues to function properly. During FY 2013, there were 45 inspections of this site, and 1 blockage and 1 discharge were reported in total.

Please refer to **SECTION F.3 - DETECTION, INVESTIGATION, AND ABATEMENT OF ILLICIT CONNECTIONS AND IMPROPER DISPOSAL** on page 97 for additional information on activities conducted for the Defective Lateral Program.

F.2.Step 3.a.vi. Priority Outfall Closure Testing

Investigation will continue within each particular outfall area (sewershed) until the priority outfall status may be closed. Closure of the defective laterals effort in a certain outfall area shall be as provided in the "Framework for Screening, Finding, and Abating Stormwater Pollution." During FY 2013, no outfalls were removed from the priority area designation; therefore no priority outfall closure testing was conducted.

Please reference **SECTION F.3 - DETECTION, INVESTIGATION, AND ABATEMENT OF ILLICIT CONNECTIONS AND IMPROPER DISPOSAL** on page 97 for a more detailed discussion of this subject.

F.2.Step 3.b. Healthy Living Resources

F.2.Step 3.b.i. Develop integrated storm water management plans

PWD develops integrated stormwater management plans for all of the City's watersheds. Please refer to the CSO portion of the Annual Report in **SECTION III.C.3.7 - BASIN-SPECIFIC STORMWATER MANAGEMENT PLANS (ACT 167)** on page 67 for a detailed discussion on the City's watersheds stormwater management plans.

F.2.Step 3.b.ii. Assess the benefits of implementing a Natural Stream Channel Design (NSCD) and effectiveness of the NSCD restoration approach

PWD has conducted several projects that have been designed with Natural Stream Channel Design concepts in mind. As each of PWD's NSCD projects are constructed, PWD realizes the importance of the extensive monitoring and O&M that accompanies such projects. Each project provides the opportunity to learn about what techniques do and do not work in their respective hydrologic and hydraulic regimes. In order to assess the effectiveness of these NSCD projects, PWD conducts post implementation monitoring at each site that includes the measurement of relevant biological, habitat, and physical parameters to be used in comparison to pre-construction conditions. Additional information on NSCD has been provided in previous reports; please refer to **SECTION E.3.3.2 MONITORING EFFECTIVENESS OF NSCD** on page 228 of the CSO-Stormwater FY 2008 Annual Report.

F.2.Step 3. c. Wet Weather Water Quality and Quantity

F.2.Step 3.c.i Implement various types of storm water BMP projects

Implement several BMP projects

PWD and its partners have implemented many BMP projects throughout the City including GSI, stream restoration, and wetland creation projects. For a complete listing of both completed and current GSI projects, please refer to the **APPENDIX C COA ANNUAL REPORT APPENDICES 2 AND 3**. For a description of activities conducted for PWD's stream restoration, and wetland creation projects, please refer to the **SECTIONS III.C.2.3 STREAM HABITAT RESTORATION AND III.C.2.4 WETLAND ENHANCEMENT AND CONSTRUCTION** starting on page 58.

Monitor three demonstration BMPs

PWD is currently monitoring multiple stormwater BMP project types such as stormwater tree trenches, stormwater planters, and porous pavement in order to develop monitoring protocols and assess the performance of individual BMPs. Monitoring protocols are documented in the Comprehensive Monitoring Plan which was submitted to PADEP by December 1, 2012. More information about the Comprehensive Monitoring Plan can be found in **APPENDIX C - COA ANNUAL REPORT SECTION 6.1** on page 33.

PWD is committed to ensuring stormwater BMPs owned and operated by the City are maintained. This commitment is often evaluated through monitoring of these sites. PWD has detailed activities conducted during FY 2013 for PWD's stream restoration, and wetland creation projects in a section above; please refer to the **SECTIONS III.C.2.3 STREAM HABITAT RESTORATION AND III.C.2.4 WETLAND ENHANCEMENT AND CONSTRUCTION** starting on page 58. Maintaintance activities during FY 2013 on PWD's GSI projects can be found in **APPENDIX C COA ANNUAL REPORT SECTION 3.1** on page 12.

F.3. DETECTION, INVESTIGATION, AND ABATEMENT OF ILLICIT CONNECTIONS AND IMPROPER DISPOSAL

F.3.a. Prevention of Illicit Discharges

F.3.a.i. Sewer and Lateral Inspections

The City requires plumbing permits for connections to the municipal sewer system. The permit affords the property owner an inspection of the plumbing work performed. Corrections of defective connections are confirmed to ensure that the ultimate discharge to the receiving waters does not contain sanitary waste. As part of PWD's Defective Lateral Program, 2,974 dye tests were completed in FY 2013. This number includes the 60 that resulted in abatements FY 2013. In addition, PWD reviewed 645 new sewer and storm connections during FY 2013. These numbers include connections that occur in the storm, sanitary and /or combined sewers. A single project or permit may also have one connection or multiple connections.

F.3.b. Investigation of Illicit Discharge Sources

F.3.b.i. Rank the MS4 outfalls according to their priority for corrective actions

PWD maintains a stormwater outfall monitoring system in compliance with the MS4 permit issued by the PADEP. All 434 of the City's permitted stormwater outfalls are routinely inspected such that all outfalls are inspected at least once per permit cycle. Those with dry weather discharges are sampled for fecal coliform and fluoride analysis. Outfalls are prioritized for investigative work by the Defective Lateral and Abatement Program. PWD is currently using the priority list generated 3/31/05. This priority list can be found in **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**. Outfalls identified as priority outfalls under the MS4 permit are sampled quarterly.

F.3.b.ii. Investigate dry weather flow to identify sewer lateral defects

During FY 2013, PWD staff performed 2,974 dye tests. Of these tests, 2,910 were unique connections and the remaining dye tests were revisits to certain connections. Of those connections, 60(2.1 %) were found defective and resulted in 65 abatements being completed. The total cost for the 65 abatements performed in FY 2013, both residential and commercial, was $517,598.50. Results of this fiscal year's program can be observed in **TABLE F.3.B.II-1**.

Table F.3.b.ii-1 Cross Connection Repair Program

Quarter	2012-3	2012-4	2013-1	2013-2	FY '13 Total or Average
Date Coverage	Jul12-Sep12	Oct12-Dec12	Jan13-Mar13	Apr13-Jun13	
Completed Tests *	887	675	680	668	2,910
Confirmed Connections	902	688	693	687	2,970
Cross Connection Identified	15	13	13	19	60
% of Defective Connections	1.7%	1.9%	1.9%	2.8%	2.1%
Abatements **	21	13	18	13	65
Average # of days to abate	17	28	19.7	23.8	22.1

*Completed Tests includes revisits of connections
**Cross connections abated may have been identified in the prior fiscal year

PWD also investigates all potential reports of an illicit discharge from the stormwater system through either the Industrial Waste Unit or the Sewer Maintenance Unit. During FY 2013, PWD investigated 14 reported sewage discharges. A listing of the reported sewage discharges from FY 2013 can be observed in **TABLE F.3.B.II-2**.

Table F.3.b.ii-2 FY2013 Reported Sewage Discharges

Location	Date	Outfall	Resolved Date	Resolution
9900 Sandy Road, Wooden Bridge Run	7/3/2012	P-105-13A	7/3/2012	Flushed 10" diameter sanitary sewer causing <1 gpm discharge into storm sewer.
5000 Ridge Avenue, Schuylkill River	8/14/2012	S-052-05	8/14/2012	Flushed 18" diameter sanitary sewer causing <1 gpm discharge to street.
8500 Algon Avenue, Pennypack Creek	8/17/2012	P-104-09	8/17/2012	Flushed 10" diameter sanitary sewer and removed debris causing <1 gpm discharge.
2700 Tolbut Street, Unnamed tributary of Pennypack Creek	8/20/2012	P-100-05	8/20/2012	Flushed 10" diameter sanitary sewer causing <1 gpm discharge.
Holme Avenue at Longford Street, Wooden Bridge Run	8/24/2012	P-100-14	8/24/2012	Flushed 10" diameter sanitary sewer causing <1 gpm discharge.
Baker Street between Mallory Street and Leverington Avenue, Manayunk Canal	9/28/2012	S-059-04	9/28/2012	Flushed 8" diameter sanitary sewer causing 4 gpm discharge, and bypass pump was set up.
Green and W. Duval Streets, Monoshone Creek	10/1/2012	W-068-05	10/1/2012	Flushed 12" diameter sanitary sewer causing 1 gpm discharge.
Wises Mill Road and Henry Ave., Wissahickon Creek	11/21/2012	W-076-13	11/21/2012	IWU investigated a discharge, but no active problem was found.
Philmont Ave and County Line Rd, Poquessing Creek	11/24/2012	Q-120-11	11/24/2012	Flushed 12" diameter sanitary sewer causing 5 gpm discharge.
2821 Shipley Rd, unnamed tributary of Pennypack Creek	2/7/2013	P-100-08	2/7/2013	Flushed 10" diameter sanitary sewer causing <1 gpm discharge.
Mitchell Street and Krams Avenue, Manayunk Canal	2/14/2013	S-059-04	2/14/2013	Flushed 8" diameter sanitary sewer causing W/C.
Deerpath Ln and Dimarco Dr, Poquessing Creek	4/16/2013	Q-107-02	4/16/2013	IWU investigated a discharge, but no choked sewer was identified.
2710 Welsh Rd, unnamed tributary of Pennypack Creek	4/26/2013	P-100-08	4/26/2013	Flushed 10" diameter sanitary sewer causing <1gpm discharge.
300 block of Krams Ave, Manayunk Canal	6/13/2013	S-059-04	6/13/2013	Flushed 8" diameter sanitary sewer causing W/C.

F.3.b.iii. Update the SOP for illicit connections detection and identification is updated as necessary

The Standard Operating Procedure/Methods (SOP) for illicit connection detection and identification required no updates during FY 2013.

F.3.c. Definitions used in this section

Definitions have been removed in this report; please refer to page 14 of **2005 NPDES MS4 PERMIT NO. PA0054712** for definitions provided within this section.

F.3.d. Abatements

F.3.d.i. Written notice about sewer lateral defects

49 Notices of Defect were issued to the property owners in FY 2013. In addition to these letters, other customer communications (follow-up letters, telephone or on-site conversations) may have been made in reference to the sewer lateral defects. Unfortunately, at this time the exact number of correspondence reveived via these other customer communications is unknown.

Abatements of Cross Connections

In the past nine reporting periods, PWD has abated 611 cross connections at a cost of $3,190,483.61. (**TABLE F.3.D.I -1**)

Table F.3.d.i-1 Summary of Abatement FY 2005-FY 2013

	# Cross Connections Abated		Total Cost of Abatements
	Residential	Commercial	
FY 2005	48	5	$169,955.00
FY 2006	66	3	$333,094.00
FY 2007	78	0	$388,844.00
FY 2008	45	8	$ 187,539.00
FY 2009	88	13	$395,249.00
FY 2010	42	5	$280,970.00
FY 2011	74	9	$527,984.50
FY2012	51	11	$389,249.61
FY 2013	59	6	$517,598.50
Total	551	60	$ 3,190,483.61

F.3.d.ii. Residential Properties Cross Connections abatement

Abatement of Residential Cross Connections

The City requires abatement of all residential defective connections upon discovery. During the FY 2013 reporting period, PWD funded abatement of 59 residential cross connections at a median average cost of $7,522.00, for a total cost of $492,497.50.

F.3.d.iii. Commercial and industrial properties Cross Connections abatement

Abatement of Commercial and Industrial Cross Connections

PWD requires prompt abatement of all commercial and industrial defective connections upon discovery, and maintains the legal authority to take administrative action to cease the pollution condition. During the FY 2013 reporting period, PWD funded abatement of 6 commercial cross connections at a median average cost of $4,429.00, for a total cost of $25,101.00.

F.3.d.iv. Residential Properties Cross Connections abatement schedule

When PWD goes out to a property to perform a dye test where a cross connection result is found, this information (location, date, and site description) is entered into an electronic database which later used to notify the property owner of defect. All defects are expected to be completed within 120 days of notice. During FY 2013, there were no properties that exceeded the 120 day requirement.

F.3.d.v. Cross Connections abatement confirmation testing

All abatements conducted during FY 2013 had confirmation testing showing abatement were installed properly.

F.3.e. Defective Connection Program Reporting

F.3.e.i. Illicit connection program quarterly report

Defective Lateral Quarterly Reports are submitted four times a year to Andrew Sinclair at PADEP as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers three-month periods staring in January, April, July, and October which are submitted no later than 45 days from the end of the reporting period. The Quarterly reports were submitted as required during FY 2013, and **APPENDIX J – FY 2013 DEFECTIVE LATERAL QUARTERLY REPORTS** contains all of these reports.

F.3.e.ii. Illicit connection program quarterly report contents

The report content within the illicit connection program quarterly reports have not changed in FY 2013. Please refer to **SECTION F.3.e.ii ILLICIT CONNECTION PROGRAM QUARTERLY REPORT CONTENTS** on page 275 of the CSO-Stormwater FY 2010 Annual Report to view the complete description of report contents.

F.4. Monitor and Control Pollutants from Industrial Sources

F.4.a. Applications/Permits

The City obtains NPDES permits/discharge information from industries if they contribute significant amounts stormwater into the City's sewer system. Industries that contribute stormwater directly into a waterway or discharge non-industrial waste into the system usually coordinate directly with the Department. A list of NPDES permits that involve stormwater associated with industrial activities in the City were obtained from the Department's website and are listed in **APPENDIX I – NPDES PERMITTED DISCHARGERS**.

F.4.b. Inspections

F.4.b.i. Industrial inspections

The Philadelphia Local Emergency Planning Committee (PLEPC) is the entity tasked with meeting the responsibilities of SARA Title III. Under PLEPC, the Fire Department representative is the individual that carries out the inspections. Philadelphia Fire Department (PFD) personnel inspect SARA facilities to ensure that information mentioned within their Tier II report is accurate, which includes a visual on-site inspection, verifying the facility has a PPC plan and reviewing any other information contained within the Tier II report. PFD personnel inspect approximately 100 facilities each year depending on staffing and the number of SARA Tier II reports that are submitted. As of July 2013, the PLEPC has received Tier II status reports from 425 facilities for the 2012 calendar reporting year.

F.4.b.ii. Update industrial waste inspection forms

The Industrial Waste Inspection Forms was updated in 2006, a copy of the forms can be found in provided in previous reports; please refer to **APPENDIX O** of the CSO-Stormwater FY 2009 Annual Report**.**

F.4.c. Monitoring/Enforcement

F.4.c.i. Industrial DMR submission

When necessary, the City shall request DMRs or additional sampling from the Department for surrounding industries to ensure compliance with NPDES effluent limitations.

F.4.c.ii. NPDES permits enforcement

Should PWD personnel observe a violation of NPDES permit terms and conditions, PWD will report the violation immediately and notify the interested and downstream parties, including PADEP. To date, PWD has never reported a NPDES violation conducted by another NPDES permit holder to PADEP.

F.5. MONITOR AND CONTROL STORMWATER FROM CONSTRUCTION ACTIVITIES

Stormwater runoff is a concern both during construction and after construction. The role of PWD in the plan review process has provided vastly improved oversight of site controls during earth disturbance activities and will assist in improving water quality. Additionally, post-construction stormwater management plan review now extends beyond peak rate control and encompasses water quality and water quantity technical requirements for more frequent storm events. Efforts continue to be focused on improving plan review for both Erosion & Sedimentation (E&S) as well as post-construction stormwater management. The following discussion documents the progress made so far in terms of stormwater runoff from construction activities including the collaboration between City Departments as well as between the City and State agencies.

During FY 2013, PWD performed numerous tasks in direct compliance with the NPDES Permit as well as tasks supporting continuance and improvement of a growing stormwater management program and watershed program. Some of the FY 2013 activities include the following:

- Continued coordination efforts with multiple City departments to help streamline review and ensure cost effective project designs.
- Worked with PADEP to better formalize coordination between the two agencies as well as document a communication strategy.
- Held applicant project meetings to discuss upcoming projects and active projects. Items discussed include project status, technical requirements and concerns, as well as key dates in the project timeline.
- Scheduled and held coordination meetings with local universities to discuss development projects planned for the campus as well as identify ways strengthen communication and streamline the review process.
- Continued to hold bi-monthly Development Services Committee meetings to gather feedback from the development community regarding the stormwater plan review program. In FY 2013, focus was placed on both process improvements as well as changes to policy and requirements. The goal is to implement changes to support transparency in requirements and streamline development in the City.

In addition to the above, similar tasks were performed as were reported in FY 2012. PWD continued to conduct reviews of stormwater management plans, hold weekly walk-ins review hour for applicants and maintain the website to allow online submittal of plans.

A summary of all plan review activities in FY 2013 is presented in **TABLE F.5-1**.

Table F.5-1 Summary of Plan Review Activities throughout FY 2013

	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	FY13 Total
Conceptual Review Stage													
Approvals	15	22	8	9	9	10	9	16	5	10	15	7	135
Rejections	40	47	18	21	28	28	34	31	25	40	36	20	368
Reviews	55	69	26	30	37	38	43	47	30	50	51	27	503
New Project Submittals	27	34	17	18	23	25	34	20	23	27	35	22	305
Average Review Time (days)	3.7	4.2	4.4	6.3	4.3	5.6	5.0	4.4	4.1	5.3	3.5	3.1	4.5
Post Construction Stormwater Management Plan Review Stage													
Administrative Screenings	7	15	12	11	6	9	9	14	17	10	13	22	145
Technical Approvals Issued	7	12	8	7	7	8	7	1	6	16	5	3	87
Rejections	32	35	20	27	19	20	18	26	35	36	21	28	317
Full Technical Reviews	59	70	42	59	39	40	40	39	62	78	40	52	620
New Project Submittals Received	36	22	11	13	8	6	10	11	15	9	11	8	160
Average Number of Reviews per Approval	4.4	4.9	4.8	5.0	4.3	3.4	4.7	3.0	4.5	3.8	4.2	3.7	4.3
Average Approval Time (days)	180	182	90	127	75	91	149	7	97	130	130	149	128
Acres of Earth Disturbance Approved	46.3	22.7	8.3	26.1	12.9	16.3	9.7	5.6	17.2	49.3	3.9	2.4	220.6
Acres of Green Roofs Approved	0	0.6	0.7	0.1	0.6	2.2	0.2	0	1.1	1.2	1.3	0	8.0
Acres of Porous Pavement Approved	3.1	0.9	0.2	0.2	0.5	2.7	1.5	0	5.8	2.5	0.3	1.0	18.5
Erosion and Sedimentation Inspections													
New Sites Inspected	3	6	6	9	9	5	6	2	5	8	7	6	72
Complaint Inspections	0	1	2	0	0	0	0	0	0	0	0	0	3
Total Inspections	49	21	15	18	21	24	13	17	22	28	18	18	264
Inspections at Project Sites with MS4 Sewers	6	7	5	5	7	5	5	4	9	7	3	8	71
Inspections at Project Sites with Combined Sewer	40	9	10	9	11	14	7	12	9	15	13	10	159
Stormwater Management Practice Inspections													
Total Inspections	210	201	157	219	158	228	301	309	245	246	223	197	2694
Inspections at Project Sites with MS4 Sewers	79	75	52	82	61	100	129	125	95	104	79	75	1056
Inspections at Project Sites with Combined Sewer	118	114	92	117	82	108	131	150	127	111	119	94	1363
DEP Reviews													
New Coordinated Reviews	3	10	10	7	3	8	8	4	5	3	4	8	73
Erosion and Sedimentation Plan Review													
Defer to DEP	0	1	0	0	0	1	0	2	0	0	1	2	7
Approved	4	11	9	2	6	6	6	0	4	7	6	3	64
Rejected	21	15	6	12	6	7	4	5	15	16	11	11	129
Not Applicable	13	9	12	13	10	10	13	12	9	16	10	9	136

F.5.a. Construction Site Runoff Control

PWD reviews E&S Plans for sites disturbing between 15,000 square feet and one acre of earth while following policies and practices as provided within the PADEP E&S Control Manual. As a result of plan review and coordination with the State, scheduled site inspections as well as timely responses to active construction site complaints have continued as part of the stormwater management program during FY 2013. The E&S process, including inspections, has been described in detail in previous reports; please refer to **SECTION F.5.A. CONSTRUCTION SITE RUNOFF CONTROL** in the CSO-Stormwater FY 2012 Annual Report on page 198.

Based upon the FY 2013 inspections, the major compliance issues continue to include improper use of silt fences, inadequate or lack of inlet protection, contractor not following the onsite E&S Plan and a complete absence of E&S controls. The sites visited cover all of Philadelphia including both separate storm sewer areas and combined sewer areas as depicted in **FIGURE F.5.A-1**.

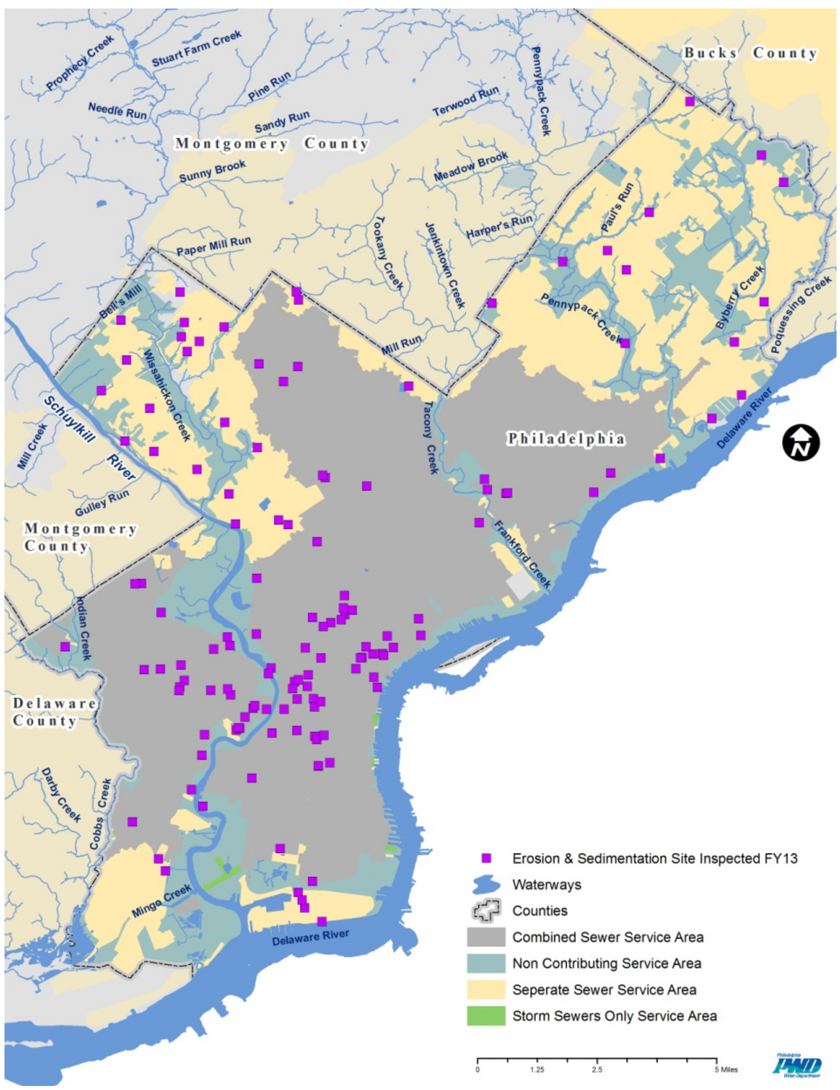


Figure F.5.a-1 Erosion and Sedimentation Site Inspections

F.5.b. Post-Construction Stormwater Management in New Development and Redevelopment

The adoption of the Philadelphia Stormwater Regulations on January 1, 2006 enabled Philadelphia to review plans for both new and redevelopment sites ensuring that water quality and quantity are part of the management plan. Details on the technical components of the Stormwater Regulations have been provided in previous years; please refer to **SECTION F.5.b POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT** on page 200 of the CSO-Stormwater FY 2012 Annual Report. The Philadelphia Stormwater Regulations are available online at http://www.phila.gov/water/pdfs/pwd_regulations.pdf.

Implementation of the Stormwater Regulations will continue to improve stormwater quality and quantity impacts as redevelopment and development continues across the City. PWD is tracking the stormwater management practices implemented by private development to address the regulations.

F.5.c. Applications/Permits

During FY 2013, 305 unique projects were submitted to PWD for conceptual review through the program's website.

PWD approved 87 full technical plans during FY 2013. It should be noted that this number does not include plans re-submitted for review, some of them multiple times. The distribution of development projects that submitted post-construction stormwater management plans for review is presented in **FIGURE F.5.C-1, TABLE F.5.C-1 & 2.**

Since the beginning of FY 2013, there have been 73 coordinated permit applications submitted to PADEP that are undergoing a joint stormwater management review as shown in **TABLE F.5-1**.

Table F.5.c-1 Approved Stormwater Plan Location Summary by Contributing Area

Drainage Type	Number of Locations
Combined Sewer Area	43
Non-Contributing Area	17
Separate Sewer Area	27
Total	87

Table F.5.c-2 Approved Stormwater Plan Location Summary by Watershed

Drainage Watershed	Number of Locations
Delaware River	28
Poquessing Creek	4
Pennypack Creek	4
Schuylkill River	31
Tacony/Frankford Creek	8
Wissahickon Creek	11
Darby-Cobbs Creek	1
Total	87

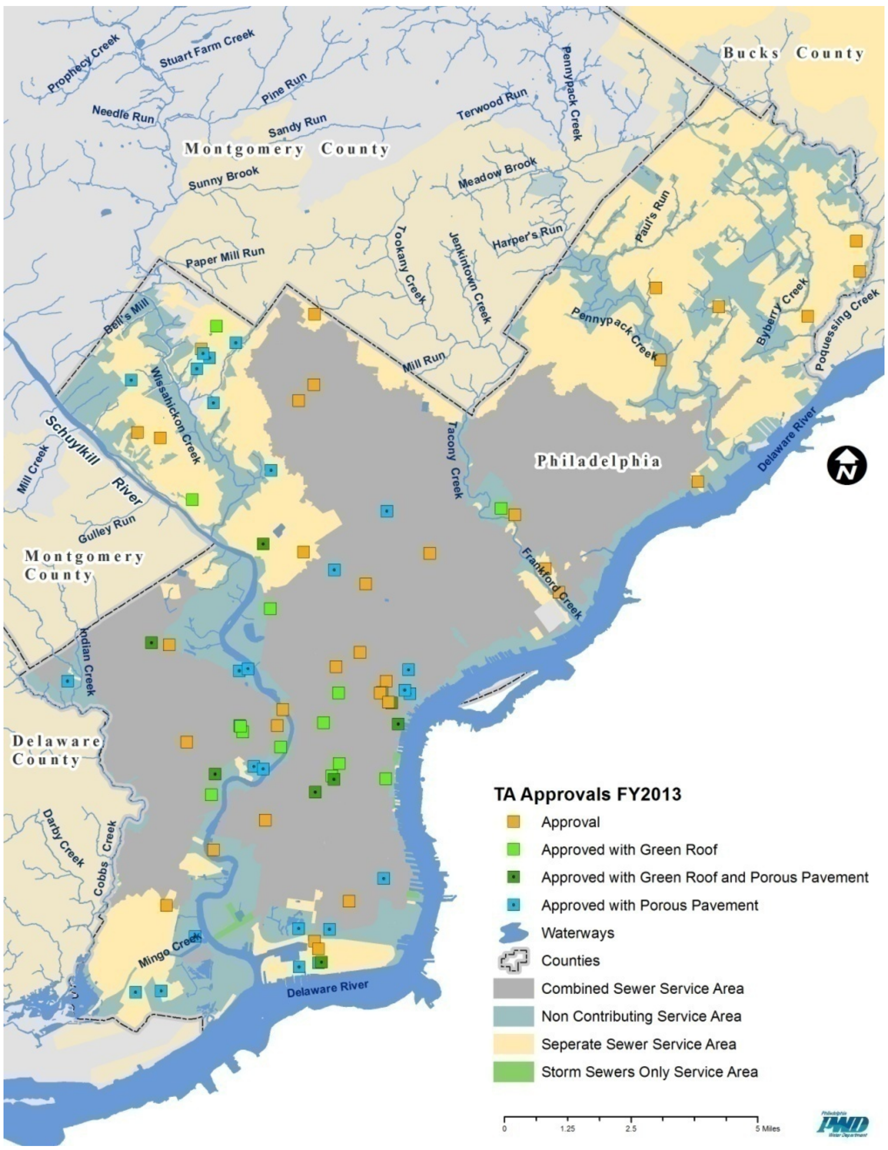


Figure F.5.c-1 Locations of Approved Post-Construction Stormwater Management Plans

F.5.d. Inspections

Inspectors conducted 256 site inspections. Many sites were visited multiple times to ensure compliance with appropriate E&S controls (**TABLE F.5.D-1**).

Table F.5.d-1 Erosion and Sedimentation Inspection Site Location Summary

Drainage Type	**Number of Locations**
Combined Sewer Area	159
Non-Contributing Area	28
Separate Sewer Area	71
Total Locations	258

F.5.e. Monitoring/Enforcement

In FY 2013, PWD issued only one (1) 7-Day Notice for E&S violations on one construction site. A total of three sites were issued Stop Work Orders for E&S violations.

F.5.f. NPDES Permit Requests

PWD continues to serve as the Conservation District for the City of Philadelphia for NPDES Construction Permitting Requirements and Chapter 102 Regulations relating to Erosion Control. PWD continues to receive notifications and coordinate reviews for permitting. For more information and full details on this process described in previous reports; please refer to **SECTION F.5.f NPDES PERMIT REQUESTS** on page 204 of the CSO-Stormwater FY 2012 Annual Report.

F.5.g. Storm Water BMP handbook and Construction Site BMP Sediment & Erosion Control Checklist

The Stormwater Management Guidance Manual was developed in 2006 to accompany the new Stormwater Regulations that went into effect the same year. The manual is intended to be a dynamic document allowing updates as needed with the most recent version available for electronic download at http://www.PWDPlanReview.org/StormwaterManual.aspx.

F.6. Watershed, Combined Sewer Overflow (CSO), and Source Water Protection Programs

PWD manages and operates three waste pollution control plants, three drinking water treatment plants, and miles of underground distribution and collection infrastructure. However, PWD is not just a provider of drinking water and wastewater treatment. PWD, through the Planning and Environmental Services Division (PESD), strives to reduce the amount of point and non-point discharges entering regional waterways and improve the environmental health of the region so that all waters are fishable and swimmable. The main programs within PESD, in addition to the Stormwater Management Program, that work together to improve regional ecological health, water quality, and sustainability are: EWS, SAN, CSO Management Program, Watershed Planning, Source Water Protection Program, and Wetlands Mitigation Registry. The Watershed Planning Program is presently explained in detail throughout **SECTION III.C.1** on page 55 of this report.

Source Water Protection Program

PWD's Source Water Protection Program embodies PWD's multi-barrier approach to ensuring the safety and quality of Philadelphia's drinking water, whose sources consist of the Schuylkill and Delaware Rivers. The Source Water Program staff work closely with PWD treatment plant managers and operators to anticipate and respond to emergencies and challenges to conventional treatment techniques. PWD continues to support the Source Water Protection Program, and has discussed it in full detail in the past. For more information on this program, please refer to **SECTION F.6 SOURCE WATER PROTECTION PROGRAM** on page 288 of the CSO-Stormwater FY 2010 Report.

Schuylkill Action Network

Please refer the CSO portion of the Annual Report **SECTION II.G.2.3 – SCHUYLKILL ACTION NETWORK** on page 32 for information about this topic.

Delaware Valley Early Warning System

Please refer the CSO portion of the Annual Report **SECTION II.G.2.4 – EARLY WARNING SYSTEM** on page 33 for information about this topic.

RiverCast

Please refer the CSO portion of the Annual Report **SECTION II.G.2.2 – RIVERCAST** on page 32 for information about RiverCast.

Combined Sewer Overflow Management Program

The Combined Sewer Overflow management program works to implement technically viable, cost-effective improvements and operational changes that mitigate the impacts of combined sewer overflows. Please refer to **SECTION I "MANAGEMENT AND CONTROL OF CSOs"** on page 12 in the CSO section of this document for additional information.

Watershed Mitigation Registry

Please refer to the CSO portion of the Annual Report **SECTION III. C.2.4 – WETLAND ENHANCEMENT AND CONSTRUCTION** on page 61 for information about the Watershed Mitigation Registry

F.7. MISCELLANEOUS PROGRAMS AND ACTIVITIES

F.7.a. Pollutant Migration/Infiltration to the MS4 System

PWD responds to all citizen complaints of liquid, solid, or gaseous pollutants within Philadelphia. A list of all pollutant migration events in FY 2013 is presented in **APPENDIX K: POLLUTANT MIGRATION/INFILTRATION TO THE MS4**.

F.7.b. Public Education and Awareness

F.7.b.i. Public Education Literature

The City takes an active role in providing information and education to the public and our community. Several events and programs are conducted each year in which the City provides numerous amounts of literature to the public. Please refer to the CSO portion of the Annual Report **SECTION II.G – POLLUTION PREVENTION** on page 30 for information about this topic.

F.7.c. Pesticides, Herbicides, and Fertilizer Controls

F.7.c.i. Integrated Pest Management protocol

The City does not use pesticides or conduct any practices that require the use of the Integrated Pest Management (IPM) protocol. The City is currently focusing on invasive plant management through the use of herbicide to remove invasive plants.

The Philadelphia Health Department uses larvicides, Bacillus Sphaericus (brand name Vectolex) and Methoprene (brand name Altosid), to prevent mosquito breeding and Spinosad (brand name Natular), a natural occurring bacteria in the soil, a new "green" larvicide**.** The larvicides are approved for use in the stormwater catch basins and are applied as such. The IPM protocol is followed when using the larvicides by inspecting the catch basins before treatments, using the least toxic or non-toxic product, and submitting a request for repairs when necessary. The IPM protocol is adhered to with the use of these larvicides as no oils or organo-phosphate products are used.

All associated Philadelphia Health Department staff are certified pest control applicators in accordance with PA Department of Agriculture. In order to maintain this certification, on-going training is required. The Philadelphia Health Department holds several on-site trainings per year for staff.

F.7.c.ii. Education materials to private pesticide users

The Philadelphia Health Department provides educational materials to organizations, companies and/or individuals upon request. Often private exterminators, especially companies that handle pest control work for City facilities, request this information since most buildings in the City contract out for pest control work through the individual Departments. Health Department Sanitarians (Inspectors) have this information available to provide to the public.

F.7.d. Snow Management Plan

The City faces winter storms that bring potentially dangerous accumulations of ice, sleet, freezing rain, and snow. Such events carry the potential to virtually paralyze the metropolitan area. In order to mitigate the impact of these storms, the Streets Department has prepared a Snow and Ice Removal Operations Plan which provides a detailed outline of the City's response to adverse winter weather conditions. The Streets Department's Snow and Ice Removal Operations Plan has not changed since FY 2012, and was provided in **APPENDIX O** of the CSO-Stormwater FY 2012 Annual Report.

F.7.e. Municipal/hazardous Waste, Storage, Treatment, and Processing Facilities

PWD conducted inspections of the facilities in 2010, and the inspection form used by PWD staff was altered to fit inspection protocol more appropriately. Following these inspections of the three City-owned Municipal Waste Facilities in 2010, PWD has satisfied the MS4 NPDES permit obligation; please refer to **SECTION F.7.e MUNICIPAL/HAZARDOUS WASTE, STORAGE, TREATMENT, AND PROCESSING FACILITIES** on page 212 of the CSO-Stormwater FY 2012 Annual Report for more information on these inspections.

F.8. BEST MANAGEMENT PRACTICES (BMPs)

The City will continue to conduct a program to evaluate the effectiveness of BMPs that are implemented.

F.8.a. Storm Sewer Discharge Ordinance

F.8.a.i. Submit storm sewer discharge ordinance

The Storm Sewer Discharge Ordinance was submitted during FY 2006. In support of the policy change, PWD has added documentation and notifications to a website (http://www.phila.gov/water/pdfs/pwd_regulations.pdf) in order to provide the development community a means of accessing the most recent stormwater management information. Additional information on activities to support the sewer discharge ordinance has been provided in previous reports; please refer to **SECTION F.8.a STORM SEWER DISCHARGE ORDINANCE** on page 297 of the CSO-Stormwater FY 2010 Annual Report for more information on this topic.

F.8.b. Commercial and Residential Source Controls

F.8.b.i. Mingo Creek Surge Basin

PWD is currently working with the Philadelphia International Airport (PHL), as part of the Green Airport Committee, to enhance the water quality of the stormwater discharges generated from the 28% of the Mingo Creek Surge Basin drainage area owned by PHL. The Basin was dewatered in August of 2012 to inspect the sediment levels. The basin sediment appears to have not changed since its last inspection in 2009; therefore no further accumulation has been occurring. For more information on this project, please refer to **SECTION F.8.b.i MINGO CREEK SURGE BASIN** on page 214 of the CSO-Stormwater FY 2012 Annual Report.

F.8.b.ii. Existing privately owned structural controls

Development projects that construct new stormwater structural controls to meet the Regulations are required to submit an O&M Agreement. Since the Regulations were enacted, over 315 projects have had O&M Agreements recorded as part of the deed.

PWD requires a pre-construction meeting prior to commencement of earth moving activities. In FY 2013, PWD conducted 93 pre-construction meetings for development projects. During the pre-construction meeting, both the E & S Control Plan and the PCSM Plan are discussed. Part of the inspection program growth during FY 2013 included conducting inspections of stormwater structural controls during construction. PWD technical plan review staff conducted site visits for 256 active projects during FY 2013. Technical plan review staff was on-site to verify construction according to the approved plan or to discuss necessary corrective actions for the project. During FY 2013, PWD assigned five full time inspectors to the task of inspecting the installation of stormwater management practices during the course of active construction for private development. As a result, PWD was able to increase its presence in the field by conducting over 2,500 inspections on over 350 sites.

PWD conducted an extensive inspection in 2009 of stormwater structural controls; please refer to **SECTION F.8.b.ii STORMWATER BASINS INSPECTION PROGRAM** on page 299 of the CSO-Stormwater FY 2010 Annual Report for more information on these inspections.

F.8.b.iii. Structural controls impact

The City maintains all city-owned structural controls, which presently consists of the Mingo Creek Surge Basin. Information about the Mingo Creek Surge Basin can be found in **SECTION F.8.B.I MINGO CREEK SURGE BASIN** on page 110 of this report.

F.8.c. Development plans review

PWD and the City Planning Commission provide review of drainage plans for new development. The drainage plans address both flood control and potential stormwater pollutants under the authority delegated 14-1603.1 of the Philadelphia Code and Charter. Please refer to **SECTION F.5 – MONITOR STORMWATER FROM CONTRUCTION ACTIVITIES** on page 102 for additional information. .

F.8.d. Operate and maintain public roadways
F.8.d.i. Deicing Practices and Salt Storage

The Streets Department has an established snow category system that defines the response to winter storms based on severity and accumulations. There are 5 snow categories, ranging from an event of sleet and freezing rain to an event of 12 inches of snow or more. Depending on the event, the response can include brine application, salting of roadways (with a mix of salt and anti-skid material), plowing, and snow-lifting operations that include storage of snow on city property or melting of snow at storm water inlet locations pre-arranged with the Water Department. The Streets Department's Snow and Ice Removal Operations Plan has not changed since FY 2012, and was provided in **APPENDIX O** of the CSO-Stormwater FY 2012 Annual Report. More information about this topic can be found in **SECTION F.7.d** on page 110 of this report.

F.8.d.ii. Street and Inlet Cleaning Practices

Require weekly cleaning of commercial, conduct annual cleaning of residential streets and inlets

During FY 2013, the Streets Department continued its street cleaning programs that target street debris and litter. With its fleet of mechanical sweepers, the Streets Department provides daily street cleaning in Center City and on major arteries and commercial corridors throughout the city. In FY 2013, a total of 51,146 miles were cleaned.

In addition, the Center City District (CCD) and University City District (UCD) conducts sidewalk cleaning. Heavily-trafficked commercial streets and areas receive daily sweeping with pans and brooms and mechanical cleaning. Other areas with a high density are cleaned at least twice weekly with machines (some areas are cleaned daily). Sidewalks also get a monthly power washing, except in winter, to remove accumulated stains, gum and grime. Through a variety of fee-for-service arrangements, CCD crews clean several adjacent commercial and residential areas and provide a 24-hour deployment to clean the three and a half mile long underground subway concourse and Center City's two regional rail stations. More information regarding the City's street maintenance programs has been provided in previous years; please refer to **SECTION F.8.d.ii STREET AND INLET CLEANING PRACTICES** on page 303 of the CSO-Stormwater FY 2010 Annual Report.

Public awareness of litter

The City promotes, develops, and implements litter reduction programs in an effort to increase public awareness of litter as a source of stormwater pollution. There are about 500 solar-powered, compaction litter receptacles in Center City, and another 400 in other commercial districts throughout the city. Several hundred standard wire baskets are also in place through the Philadelphia More Beautiful Committee Adopt-A-Basket program. The Philadelphia More Beautiful Committee organizes neighborhood cleaning events citywide. In the FY 2013 Clean Block season, 7,377 blocks were cleaned by 57,036 volunteers; 692 tons of trash were collected and removed. Also on April 13, 2013 the city held its six annual Philly Spring Cleaning day, a citywide anti-litter event partnering various city agencies and neighborhood community groups. More information on litter control has been provided in previous reports, please refer to **SECTION 7 - POLLUTION PREVENTION PROGRAMS** on page 7-1 of the Updated Nine Minimum Controls Report submitted to the PADEP on June 1, 2013 which is available on-line at http://phillywatersheds.org/doc/Updated%20NMC%20Report.pdf.

F.8.d.iii. Maintain all city-owned storm sewer inlets

PWD continues to maintain all city-owned storm sewer inlets. Please refer to the CSO portion of the Annual Report **SECTION II. F.1 – CONTROL OF DISCHARGE OF SOLIDS AND FLOATABLES BY CLEANING OF INLET AND CATCH BASINS** on page 26 for information on this program and activity conducted during FY 2013.

F.8.e. Animal Waste and Code Enforcement

F.8.e.i. Educational material regarding control of animal waste

The City of Philadelphia actively enforces code which covers the regulation of animal waste. The Philadelphia Code and Charter Chapter 10.100 – Animals and Chapter 10.700 – Refuse and Littering address the proper clean-up of pet waste and applicable fines and penalties. In addition, signs advertising said penalties are displayed city-wide in an effort to prevent residents from violating this statute. The City of Philadelphia also provides the text of this code online at http://municipalcodes.lexisnexis.com/codes/philadelphia/.

PWD provides additional information on pet waste to the public including how it affects stormwater and why to pick it up through its website located at the following site: http://www.phillywatersheds.org/whats_in_it_for_you/residents/pet-waste

Dog Waste Control Program

PWD launched an innovative approach to address dog waste in targeted neighborhoods in July of 2010. Through a pilot project in the Delaware Watershed, the Partnership for the Delaware Estuary found that many dog-owners are unaware of the connection of dog waste to water pollution. Over the past couple of years, thousands of "Bags on Board" and educational tip cards were produced and purchased for distribution at the FWWIC and various public events. The "Bags on Board" is a roll of 15 dog waste collection bags that conveniently clips onto a dog leash. Refills are available at most local pet shops.

PWD launched a "Spokesdog" competition to find two eco-friendly dogs and their caretakers to help educate their bark park buddies on keeping Philadelphia's waterways clean. In FY 2013 one dog was chosen from each of two source water protection neighborhoods, Fitler Square (31 contestants) and University City (21 contestants) to represent the city's efforts on dog waste control. Messages about the competition and runoff pollution caused by dog waste were featured in multiple articles in local newspapers, magazines and on television, reaching tens of thousands of Philadelphians. Also, PWD's website, which hosted the Spokesdog Competition information, registration and online voting, received close to 14,710 hits. More information can be found at the following website: http://www.phillywatersheds.org/spokesdog. The competition has been discussed fully in the past as well; please refer to **SECTION F.8.e.i EDUCATIONAL MATERIAL REGARDING CONTROL OF ANIMAL WASTE** on page 305 of the CSO-Stormwater FY 2010 Report.

F.8.f. Flood Management and Flood Control Devices

F.8.f.i. Structures built within the floodplain

All structures including building and other infrastructure such as piping and roads built within or close to the 100 Year Flood Plain area that require a Zoning Permit or a Building Permit or both should be reviewed to determine if Floodplain Regulations apply. The City's Licenses and Inspection (L&I) department will send all applicants with properties located in or close to the 100 Year Flood Plain to the Philadelphia City Planning Commission (PCPC) for review. If the property is determined to be within the Floodway or Floodway Fringe, structures built on the allowable property will be built at least one-foot above the Base Flood Elevation (BFE) or floodproofed such that plan complies to 14-1606 and any special Building Code requirements. In FY 2013, 13 applications were received by the Zoning Board of Adjustment for a Flood Plain Variance. Please note that application completion does not guarantee the structure will be built.

F.8.f.ii. Evaluate new and existing structural drainage controls

Our evaluation of structural drainage controls was discussed in further detail in **SECTION F.8.B.II** under "Existing Privately Owned Structural Controls" on page 110 of this report.

Work is being done on sections of the city that have chronic flooding to eliminate or reduce these occurrences; please refer to **SECTION II. B.3.3 – STORM FLOOD RELIEF** on page 16 for more information about the SFR projects and details on evaluating structural drainage controls.

F.8.f.iii. Streambank Restoration and Wetland Enhancement

Please refer to the CSO portion of the Annual Report **SECTION III. C.2.3 – STREAM HABITAT RESOTRATION** on page 58 for information pertaining to streambank restoration.

Please refer to the CSO portion of the Annual Report **SECTION III.C.2.4 – WETLAND ENHANCEMENT AND CONSTRUCTION** on page 61 for information pertaining to wetland enhancement.

F.8.g. Sanitary Infiltration Controls
F.8.g.i. Limit sanitary infiltration

As part of the Cross Connection Repair Program, PWD has conducted 1,246 abatements to correct cross connection in sewer laterals since 1994; 65 abatements were completed in FY 2013 alone. PWD also has in place ten (10) dry weather diversion devices which divert sanitary flow back into the sanitary sewer but still allow stormwater to pass through during wet weather events. We estimate that these abatements and dry weather diversion devices have prevented over 175 million gallons of contaminated flow from entering our waterways since the inception of the program and about 9.1 million gallons during FY 2013. Please refer to **SECTION F.3 – DETECTION, INVESTIGATION AND ABATEMENT OF ILLICIT DISCHARGES** on page 97 for more information on the Cross Connection Repair Program.

In addition as part of PWD's Sewer Maintenance Program, sewer relining are routinely conducted on both sanitary and storm sewers. Relining sewers helps to reinforce, seal and rehabilitate the existing sewers, specifically preventing inflow and infiltration (I/I) to allow the full pipe capacity to be reserved for sanitary and storm flow. Apart from those being done under consent orders, there are several sewer lining projects in the City that originate from sewer maintenance issues like street cave-ins, depressions, backups, as well as sewer assessment meetings.

As a part of PWD's commitment to improvement of water quality and aesthetics in dry weather, a large relining project began on the entire length of an interceptor within Philadelphia in the Tookany/Tacony-Frankford and Cobbs Creek Watersheds. Additionally, efforts are underway to coordinate sewer relining with Cheltenham Township for the entire sewershed to be relined. Please refer to **APPENDIX C – COA ANNUAL REPORT IN SECTION 3.3 INTERCEPTOR REHABILITATION PROGRAM** on page 25 for more information on the interceptor relining project.

A storage tank is under construction at relief sewer point R-20 located at Main Street and Shurs Lane (Main & Shurs) to capture and store excess flows. The consent order issued for Main and Shurs also includes sewer relinings to be done around regulator R-20 in an effort to reduce inflow and infiltration. Please refer to **CSO SECTION III.B.1.10– CONSTRUCTION AND IMPLEMENTATION OF THE MAIN AND SHURS OFF-LINE STORAGE PROJECT** on page 47 for more information on the Main and Shurs Off-line Storage Project and efforts to reduce inflow and infiltration at R-20.

PWD constructed a parallel relief sewer in December of 2011to eliminate overflows at manhole PC-30 as per a consent order issued by the DEP. The overflows at PC-30 are caused by a combination of various factors which influence the hydraulic carrying capacity of the Poquessing Creek Interceptor during wet weather events. There are also several sewer lining projects being done under the consent order for PC- 30 area in conjunction with the relief sewer being constructed. Please refer to **CSO SECTION III.B.2.1.1 – PC-30 RELIEF SEWER** on page 50 for more information on the PC-30 Relief Sewer.

F.8.g.ii. Inspection and remediation of on-lot septic/disposal systems

During the FY 2013, 1 complaint of malfunctioning On-Lot Sewage Disposal Systems was investigated and mitigated, 3 applications were received and issued for the installation of on-lot sewage disposal systems, and 481 portable toilet permits were issued. PWD continues to support the inspection and remediation of these systems. Additional information has been provided in previous reports; please refer to **SECTION F.8.g.ii INSPECTION AND REMEDIATION OF ON-LOT SEPTIC/DISPOSAL SYSTEMS** on page 307 of the CSO-Stormwater FY 2010 Annual Report.

F.8.g.iii. Investigate, remediate, and report sanitary infiltration

PWD responds to all citizen complaints of liquid, solid, or gaseous pollutants within Philadelphia. A database called the Sewage Pollution Incident & Location Log (SPILL), which reports information about unintentional sanitary discharges including the date reported, problem location, spill type, description, and abatement date, is maintained. Presented in **TABLE F.8.G.III-1** below is the information /output found on the SPILL database of reported sewage pollution incidents in FY 2013.

Table F.8.g.iii-1 FY 2013 Sanitary Infiltration Events

Report Date	Report Time	Problem Location	Spill Notes	Affected Outfall	Discharge (GPM)	Abatement Date	Abatement Time	Abatement
7/3/2012	9:00 AM	9946 Sandy Rd	Choked Sewer – Found small amount of sewage in the storm sewer. No discharge to outfall P105-13A	P-105-13A	0.008	7/3/2012	11:10 AM	Flushed open and removed large chunks of grease with vactor truck.
8/8/2012	12:50 PM	Outfall T-04 at Rising Sun Ave	Choked Sewer – Followed cloudy plume to discharge at outfall; fish kill at Roosevelt Blvd.	T-04	0.14	8/8/2012	5:30 PM	Sewer was flushed to un-choke.
8/14/2012	10:30 AM	Ridge Ave just past Ridge and Main St Split	Choked Sewer – Sanitary manhole was discharging. Upon arrival, sewage in manhole was up to street grade	S-052-05	0.033	8/14/2012	11:30 AM	Flusher broke through blockage to relieve the sewer.
8/17/2012	4:00 PM	8500 Algon Ave	Choked Sewer – Discharge at outfall; gray water in swale, no solids or debris	P-104-09	0.017	8/17/2012	7:00 PM	Removed debris (wood and rags) from manhole. Flushed and cleaned sewer
8/20/2012	1:20 PM	Winchester and Tolbut St.	Choked Sewer – Sewage in tributary to Pennypack Creek from outfall	P-100-05	0.05	8/20/2012	4:30 PM	Relieved choke sewer with flusher.
8/24/2012	8:20 AM	Holme Ave & Longford St	Choked Sewer – Sewage in stream; discharge at outfall	P-100-14	0.007	8/24/2012	10:40 AM	Flusher truck relieved choked sewer; added degreaser to system. Will request CCTV of sewer.
9/28/2012	11:40 AM	Baker and Leverington	Defective Sewer Pipe – Found sanitary sewer discharging into storm sewer at outfall	S-059-04	0.033	9/28/2012	1:40 PM	Set up bypass pumping until defect could be found. Sanitary sewer needed to be excavated
10/1/2012	3:40 PM	Duval and Greene	Choked Sewer – found choked sewer discharging into storm sewer during routine inspection	W-068-05	0.004	10/1/2012	7:40 PM	Relieved choked sewer; will have sewer CCTV'd.
11/24/2012	9:50 AM	13362 Philmont Ave	Choked Sewer – discharge visible at outfall	Q-120-11	0.049	11/24/2012	11:30 AM	Removed large amounts of grease, relieving choked sewer
2/14/2013	10:40 AM	4536 Mitchell St – Krams & Mitchell	Choked Sewer – there were bricks on the down-stream side of manhole	S-059-04	0.004	2/14/2013	3:00 PM	Flusher relieved the discharge – no discharge directly at outfall
6/13/2013	1:30 PM	300 block of Krams	Choked Sewer – Found 8" sanitary sewer choked between two manholes; affected 4 basements	S-059-04	0.004	6/13/2013	5:30 PM	Relieved choked sewer and basements cleaned by PWD C/S Unit; line will be CCTV'd.

F.8.h. Spill Prevention and Response

The City’s response plan to respond to and contain harmful spills that may discharge to the municipal separate storm sewer system is managed by the Philadelphia Local Emergency Planning Committee. PWD is represented on this committee. The plan for spill response in Philadelphia is the Citywide Hazmat Response Plan - Annex F to the City's Emergency Operations Plan, found in **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD.**

In order to protect PWD’s structures and treatment processes, PWD staff respond to oil and chemical spills and other incidents that have the potential to threaten the water supply or impact the sewer system, twenty-four hours per day, seven days per week. PWD responds to all incidents that can impact the sewer system. This includes both the sanitary sewer system and the storm sewer system. PWD supervises cleanup activities and assesses environmental impact. PWD inspectors also investigate various other types of complaints. Please refer to **SECTIONS F.7.A AND F.8.J** on pages 109 and 119, respectively, for information regarding the nature of spill prevention responses during FY 2013.

F.8.i. Public Reporting of Illicit Discharges, Improper Disposal

The City encourages public citizens to report the occurrence of illicit discharges that may impact the sewer system and water bodies. To facilitate the timely reporting of such events, PWD operates a Municipal Dispatcher 24 Hours/Day, 7 Days/Week to handle reports from the public. In addition, a customer service hotline (215 686-6300) is also operated that provides the ability to connect to the Dispatcher. This information is distributed in mailings, as well as online at http://www.phila.gov/water/contact_us.html.

Upon the reporting of such an incident, a PWD inspector is immediately dispatched to the site to investigate and determine the source of the discharge, as well as the extent of impact on the receiving water body. Each incident is logged into an electronic database that enables tracking of the details of each occurrence.

PWD received 23,010 requests during FY 2013. Currently PWD does not track phone calls specifically related to illicit discharges and improper disposals in the MS4 area, but instead tracks much broader topics including sewage backup, flooding, street cave-ins and water service disruptions. Any calls related to illicit discharges and improper disposals are forwarded to appropriate staff, and in FY 2013 PWD responded to 11 illicit discharges / improper disposals related events.

Philly 311
Philly311 was created to help eliminate the need to sort through the numerous phone numbers and hotlines available to contact the City government. A customer service specialist will connect the user to the information and services they may need either by calling 3-1-1, asking a question on the website or through Twitter @philly311. A Philly

311 mobile app is available for iPhone, Android, or Blackberry devices to report issues such as graffiti, potholes, litter and more. For more information on uses of Philly311, please visit: http://www.phila.gov/311/.

F.8.j. Used Oil and Toxic Material Disposal

The City continues to facilitate the proper disposal of used oil and other toxic materials. This program includes collections events, distribution of educational materials, the operation of a website, and a hotline accessible to the public.

The Streets Department conducts Household Hazardous Waste (HHW) Events several times throughout the city where people can properly dispose of used oil and other toxic materials. During FY 2013, the City of Philadelphia held 7 HHW Collection events, during which hazardous waste and computer material were collected and disposed of properly. These materials include oil, paint, and other toxic household substances. A summary of the collections over the last 9 fiscal years is provided below in **TABLE F.8.J-1**. More information on this program & other streets department programs including recycling and collection schedules are available to the public at http://www.philadelphiastreets.com/.

Table F.8.j-1 Household Hazardous Waste Collection Statistics (FY 2007 - 2013)

HHW Program Collection Summary		**# of Attendees**	**Quantity Accepted (lbs)**		
			HHW	**Computers**	**Total**
FY 2007 Total		3,358	240,198	59,660	299,858
FY 2008 Total		3,372	254,055	136,249	390,304
FY 2009 Total		3,711	250,903	237,270	488,173
FY 2010 Total		3,942	296,541	274,443	570,984
FY 2011 Total		3,803	256,337	338,181	594,518
FY 2012 Total		4,448	304,381	483,879	788,700
FY 2013 Total		4,852	287,003	571,995	858,998
FY 2013 Collection Event Details		**# of Attendees**	**Quantity Accepted (lbs)**		
Location	**Date**		**HHW**	**Computers**	**Total**
State Road and Ashburner	7/26/12	670	48,210	11,292	71,009
22nd & York	9/22/12	394	28,346	0	33,235
63rd Street	10/20/12	350	25,200	6,000	33,592
Delaware and Wheatsheaf	11/03/12	453	32,594	3,760	45,571
State Road and Ashburner	4/13/13	1,800	70,600	18,369	82,588
1st Highway Yard 4800 Parkside Ave	5/13/13	331	23,829	23,848	31,845
Domino And Umbria	6/13/13	855	58,224	8,726	58,478
Computers at Drop-off Sites	Year-wide			500,000	500,000
Total		**4,852**	**287,003**	**571,995**	**858,998**

F.8.k. Storm Water Inlet Labeling/Stenciling

Philadelphia community members received brochures inviting them to voluntarily participate in Storm Drain Marking to help educate the public about reducing stormwater runoff pollution. To date, over 400 volunteer groups have participated in this program marking an estimated total of over 11,000 storm drains. During FY 2013, over 165 stormwater inlet labels were distributed. PWD continues to support stormwater inlet labeling program and encourages communities to get involved each year. More information on this program has been provided in previous years; please refer to **SECTION F.8.k STORM WATER INLET LABELING/STENCILING** on page 312 of the CSO-Stormwater FY 2010 Annual Report.

Section G Assessment of Controls

Annually estimate pollutant loadings & reductions from stormwater management plan

The City of Philadelphia has implemented multiple BMPs, technologies, plan review methods, and watershed planning efforts in order to achieve the goals of the NPDES Permit. The goals of the permit aim to improve the quality of stormwater runoff, and to reduce the quantity and rate of stormwater reaching the MS4 system and receiving waters.

Each section of this Annual Report presents not only the projects and activities of the Stormwater Management Program, but also the effectiveness and success of the multiple BMPs, technologies, planning efforts, and miscellaneous programs in order to track the progress of the Stormwater Management Program.

PWD's approach to resolving impacts of stormwater discharges is one part of a carefully developed approach to meeting the challenges of watershed management in an urbanized setting. Pollutant loads for storm water outfalls in the Pennypack, Poquessing and Wissahickon Watersheds have been estimated using NetSTORM, results of these models are described in **STORMWATER LOADS ESTIMATES MEMOS** which were provided in previous reports; please refer to **APPENDIX K – Stormwater Load Estimates** from the CSO-Stormwater FY 2009 Annual Report.

Section H Fiscal Resources

H.1 Maintain adequate program funding

During FY 2013, the City provided fiscal resources needed to support operation and maintenance of the Stormwater Management Program as outlined in **TABLE H.1-1** below. The table presents fiscal year budgets for both the reporting year as well as the upcoming fiscal year.

Table H.1-1 Fiscal Resources

Program	FY 2013 Budget	FY 2014Budget
Office of Watersheds	$12.00Million	$12.50 Million
Collector Systems Support	$0.76 Million	$0.71 Million
Sewer Maintenance and Flow Control	$25.94 Million	$24.02 Million
Inlet Cleaning	$4.56 Million	$4.51 Million
Abatement of Nuisances	$8.38 Million	$8.66 Million
Sewer Reconstruction	$24.50 Million	$34.40 Million
Public Affairs and Education	$10.28 Million	$10.58 Million
Total	$86.37 Million	$95.38 Million

H.2 Annually submit fiscal analysis

The conditions of the NPDES permit are able to be achieved through appropriate budget planning supporting the projects and assessments critical to a successful program. Any funding changes will be included as part of subsequent annual reports.

APPENDIX A – FLOW MONITORING

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Table 1 - Summary of All Monitors

	# of Permanent Monitors	# of Temporary Monitors	# of Unknown Monitors
Combined Sewer Monitors	535	-	-
Outlying Community Monitors	110	16	3
Pumping Stations	82	-	-
Rain Gages	24	-	-
Monitors from Projects	-	117	-
Total	751	133	3

	# of Sites
Combined Sewer Monitors	288
Outlying Community Monitors	39
Pumping Stations	21
Rain Gages	24
Total	372

Table 2 - Listing of Monitored Outlying Community Connections

Site ID	Connection Type	Township	Measurement Name	Measurement Type
MA_1	STD	Abington	TEMPORARY	FLOW
MA_2	MTR	Abington	METERING CHAMBER FLOW	FLOW
MA_2	MTR	Abington	METERING CHAMBER LEVEL	LEVEL
MA_2	MTR	Abington	METERING CHAMBER VELOCITY	VELOCITY
MA_3	STD	Abington	TEMPORARY	FLOW
MA_4	STD	Abington	TEMPORARY	FLOW
MAx1	STD	Abington	TEMPORARY	FLOW
MB_1	MTR	Bucks Co.	METERING CHAMBER FLOW	FLOW
MBE_01	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_01	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_01	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_02	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_02	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_02	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_03	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_03	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_03	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_04	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_04	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_04	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_05	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_05	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_05	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_06	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_06	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_06	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_07	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_07	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_07	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_08	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_08	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_08	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_09	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_09	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_09	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_10	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_10	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL

Site ID	Connection Type	Township	Measurement Name	Measurement Type
MBE_10	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_11	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_11	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_11	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_12	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_12	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_12	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_13	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_13	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_13	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_14	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_14	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_14	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_15	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_15	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_15	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_16	MTR	Bensalem	METERING CHAMBER FLOW	FLOW
MBE_16	MTR	Bensalem	METERING CHAMBER LEVEL	LEVEL
MBE_16	MTR	Bensalem	METERING CHAMBER VELOCITY	VELOCITY
MBE_17	STD	Bensalem	TEMPORARY	FLOW
MC_1	MTR	Cheltenham	METERING CHAMBER FLOW	FLOW
MC_1	MTR	Cheltenham	METERING CHAMBER LEVEL	LEVEL
MC_1	MTR	Cheltenham	METERING CHAMBER VELOCITY	VELOCITY
MC_2	MTR	Cheltenham	METERING CHAMBER FLOW	FLOW
MC_2	MTR	Cheltenham	METERING CHAMBER LEVEL	LEVEL
MC_2	MTR	Cheltenham	METERING CHAMBER VELOCITY	VELOCITY
MC_3	MTR	Abington	METERING CHAMBER FLOW	FLOW
MC_3	MTR	Abington	METERING CHAMBER LEVEL	LEVEL
MC_3	MTR	Abington	METERING CHAMBER VELOCITY	VELOCITY
MCx_1	MTR	Cheltenham	METERING CHAMBER FLOW	FLOW
MCx_1	MTR	Cheltenham	METERING CHAMBER LEVEL	LEVEL
MCx_1	MTR	Cheltenham	METERING CHAMBER VELOCITY	VELOCITY
MCx_2	MTR	Cheltenham	METERING CHAMBER FLOW	FLOW
MCx_2	MTR	Cheltenham	METERING CHAMBER LEVEL	LEVEL
MCx_2	MTR	Cheltenham	METERING CHAMBER VELOCITY	VELOCITY
MD_1	MTR	Delaware Co.	METERING CHAMBER FLOW	FLOW
ML_1	MTR	Lower Merion	METERING CHAMBER FLOW	FLOW
ML_1	MTR	Lower Merion	METERING CHAMBER LEVEL	LEVEL

Site ID	Connection Type	Township	Measurement Name	Measurement Type
ML_1	MTR	Lower Merion	METERING CHAMBER VELOCITY	VELOCITY
ML_2	STD	Lower Merion	TEMPORARY	FLOW
ML_3	MTR	Lower Merion	METERING CHAMBER FLOW	FLOW
ML_3	MTR	Lower Merion	METERING CHAMBER LEVEL	LEVEL
ML_3	MTR	Lower Merion	METERING CHAMBER VELOCITY	VELOCITY
ML_4	MTR	Lower Merion	METERING CHAMBER FLOW	FLOW
ML_5	MTR	Lower Merion	METERING CHAMBER FLOW	FLOW
ML_5	MTR	Lower Merion	METERING CHAMBER LEVEL	LEVEL
ML_5	MTR	Lower Merion	METERING CHAMBER VELOCITY	VELOCITY
ML_6	MTR	Lower Merion	METERING CHAMBER FLOW	FLOW
ML_6	MTR	Lower Merion	METERING CHAMBER LEVEL	LEVEL
ML_6	MTR	Lower Merion	METERING CHAMBER VELOCITY	VELOCITY
ML_7	MTR	Lower Merion	METERING CHAMBER FLOW	FLOW
ML_7	MTR	Lower Merion	METERING CHAMBER LEVEL	LEVEL
ML_7	MTR	Lower Merion	METERING CHAMBER VELOCITY	VELOCITY
MLM_1	MTR	Lower Moreland	METERING CHAMBER FLOW	FLOW
MLM_1	MTR	Lower Moreland	METERING CHAMBER LEVEL	LEVEL
MLM_1	MTR	Lower Moreland	METERING CHAMBER VELOCITY	VELOCITY
MLM_2	MTR	Lower Moreland	METERING CHAMBER FLOW	FLOW
MLM_2	MTR	Lower Moreland	METERING CHAMBER LEVEL	LEVEL
MLM_2	MTR	Lower Moreland	METERING CHAMBER VELOCITY	VELOCITY
MLM_3	STD	Lower Moreland	TEMPORARY	FLOW
MLM_4	STD	Lower Moreland	TEMPORARY	FLOW
MLM_5	STD	Lower Moreland	TEMPORARY	FLOW
MLM_6	UNKNOWN	Lower Moreland	UNKNOWN	UNKNOWN
MLM_7	UNKNOWN	Lower Moreland	UNKNOWN	UNKNOWN
MPNBC_1	NO	PIDC - PNBC	METERING CHAMBER FLOW	FLOW
MS_1	STD	Springfield	TEMPORARY	FLOW
MS_2	MTR	Springfield	METERING CHAMBER FLOW	FLOW
MS_2	MTR	Springfield	METERING CHAMBER LEVEL	LEVEL
MS_2	MTR	Springfield	METERING CHAMBER VELOCITY	VELOCITY
MS_3	MTR	Springfield	METERING CHAMBER FLOW	FLOW
MS_3	MTR	Springfield	METERING CHAMBER LEVEL	LEVEL
MS_3	MTR	Springfield	METERING CHAMBER VELOCITY	VELOCITY
MS_4	STD	Springfield	TEMPORARY	FLOW
MS_5	STD	Springfield	TEMPORARY	FLOW
MS_6	MTR	Springfield	METERING CHAMBER FLOW	FLOW
MS_6	MTR	Springfield	METERING CHAMBER LEVEL	LEVEL

Site ID	Connection Type	Township	Measurement Name	Measurement Type
MS_6	MTR	Springfield	METERING CHAMBER VELOCITY	VELOCITY
MS_7	UNKNOWN	Springfield	UNKNOWN	UNKNOWN
MS_8	STD	Springfield	TEMPORARY	FLOW
MSH_1	MTR	Southampton	METERING CHAMBER FLOW	FLOW
MSH_1	MTR	Southampton	METERING CHAMBER LEVEL	LEVEL
MSH_1	MTR	Southampton	METERING CHAMBER VELOCITY	VELOCITY
MSH_2	STD	Southampton	TEMPORARY	FLOW
MSHX_1	STD	Southampton	TEMPORARY	FLOW
MSHX_2	STD	Southampton	TEMPORARY	FLOW
MUD_1	MTR	Upper Darby	METERING CHAMBER NEG FLOW N	FLOW
MUD_1	MTR	Upper Darby	METERING CHAMBER NEG FLOW S	FLOW
MUD_1	MTR	Upper Darby	METERING CHAMBER POS FLOW N	FLOW
MUD_1	MTR	Upper Darby	METERING CHAMBER POS FLOW S	FLOW
MUD_1O	MTR	Upper Darby	METERING CHAMBER FLOW	FLOW
MUD_1O	MTR	Upper Darby	METERING CHAMBER LEVEL	LEVEL
MUD_1O	MTR	Upper Darby	METERING CHAMBER VELOCITY	VELOCITY

*STD – temporary flow monitor

**MTR/NO – Permanent monitor

Table 3 - Listing of Combined Sewer Monitors

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C_01	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_01	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_02	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_02	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_04	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_04	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_04A	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_04A	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_05	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_05	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_06	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_06	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_07	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_07	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_09	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_09	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_10	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_10	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_11	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_11	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_12	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_12	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_13	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_13	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_14	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_14	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_15	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_15	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_16	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_16	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_17	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_17	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_18	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_18	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_19	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_19	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_20	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_20	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_21	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_21	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_22	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_22	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_23	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C_23	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_24	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_24	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_25	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_25	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_26	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_26	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_27	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_27	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_28A	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_28A	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_29	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_29	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_30	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_30	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_31	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_31	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_32	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_32	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_33	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_33	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_34	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_34	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_35	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_35	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_36	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_36	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_37	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_37	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
CSPS	Central Schuylkill	Schuylkill River	INTERCEPTOR LEVEL N	LEVEL
CSPS	Central Schuylkill	Schuylkill River	INTERCEPTOR LEVEL S	LEVEL
D_02	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_02	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_02	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_02	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_02	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_03	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_03	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_03	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_03	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_03	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_04	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_04	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_04	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D_04	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_04	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_05	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_05	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_05	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_05	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_05	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_06	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_06	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_06	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_07	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_07	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_07	Upper Delaware Low Level	Delaware River	SWO GATE POSITION 1	POSITION
D_07	Upper Delaware Low Level	Delaware River	SWO GATE POSITION 2	POSITION
D_07	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_07	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_08	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_08	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_09	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_09	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_09	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_09	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_09	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_11	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_11	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_11	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_11	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_11	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_12	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_12	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_13	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_13	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_15	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_15	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_15	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_15	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_15	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_17	Somerset	Delaware River	SWO LEVEL	LEVEL
D_17	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_18	Somerset	Delaware River	SWO LEVEL	LEVEL
D_18	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_19	Somerset	Delaware River	SWO LEVEL	LEVEL
D_19	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_20	Somerset	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D_20	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_21	Somerset	Delaware River	SWO LEVEL	LEVEL
D_21	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_22	Somerset	Delaware River	SWO LEVEL	LEVEL
D_22	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_23	Somerset	Delaware River	SWO LEVEL	LEVEL
D_23	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_24	Somerset	Delaware River	SWO LEVEL	LEVEL
D_24	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_25	Somerset	Delaware River	SWO LEVEL	LEVEL
D_25	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_37	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_37	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_38	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_38	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_39	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_39	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_40	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_40	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_41	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_41	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_42	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_42	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_43	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_43	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_44	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_44	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_45	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_45	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_46	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_46	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_47	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_47	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_48	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_48	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_49	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_49	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_50	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_50	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_51	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_51	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_51A	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_52	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_52	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D_53	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_53	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_54	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_54	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_58	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_58	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_61	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_61	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_62	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_62	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_63	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_63	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_64	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_64	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_65	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_65	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_66	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_66	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_67	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_67	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_68	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_68	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_69	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_69	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_70	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_70	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_71	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_71	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_72	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_72	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_73	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_73	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
F_03	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_03	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_04	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_04	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_05	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_05	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_06	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_06	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_07	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_07	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_08	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_08	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
F_09	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_09	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_10	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_10	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_11	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_11	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_12	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_12	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_13	Lower Frankford Creek	Frankford Creek	DWO LEVEL	LEVEL
F_13	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_13	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_14	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_14	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_21	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_21	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_23	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_23	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_24	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_24	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_25	Lower Frankford Creek	Frankford Creek	DWO GATE POSITION	POSITION
F_25	Lower Frankford Creek	Frankford Creek	SWO GATE POSITION 1	POSITION
F_25	Lower Frankford Creek	Frankford Creek	SWO GATE POSITION 2	POSITION
F_25	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_25	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
H_29		Schuylkill River	DWO LEVEL	LEVEL
H_29		Schuylkill River	SWO LEVEL	LEVEL
H_29		Schuylkill River	TRUNK LEVEL	LEVEL
H_35		Schuylkill River	BLOWER 1 RUN	EVENT
H_35		Schuylkill River	BLOWER 2 RUN	EVENT
H_35		Schuylkill River	DAM AIR PRESSURE	PSI
H_35		Schuylkill River	DWO GATE POSITION	POSITION
H_35		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
H_35		Schuylkill River	SWO GATE POSITION	POSITION
H_35		Schuylkill River	SWO LEVEL	LEVEL
H_35		Schuylkill River	TRUNK LEVEL	LEVEL
I_BYH09		Byberry Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC07	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC12	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC13	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC14	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC17	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC18	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC34	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLH18	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
I_CCLLC19	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC20	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC22	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC24	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC26	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLH01	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_COHOH16		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESH11	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESH15	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS09	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS14	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS17	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS26	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSSSH15	Central Schuylkill	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CVBH08		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_FHLH03	Frankford High Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_FHLTT08	Frankford High Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_FHLTT15	Frankford High Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_FLLH03	Frankford Low Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LDLLD43	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD45	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD47	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD53	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD62	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD69	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD70	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LFCH07	Lower Frankford Creek	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LFCH19	Lower Frankford Creek	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LFLLF08	Lower Frankford Low Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LFLLF10	Lower Frankford Low Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LSESH15	Lower Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSESS36	Lower Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSH01	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSS33	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSS38	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSS45	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_MRH21	Main Relief Sewer	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_OH12		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PASYH13		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PDRLH01		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PDRLH02		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PENRH02		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PH04	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PH05	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
I_PH06	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PH10	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PMPFH03		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PP02	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PP04	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PP05	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PQH09	Poquessing	Poquessing Creek	INTERCEPTOR LEVEL	LEVEL
I_PRH10		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SD19	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SD21	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SD25	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SH03	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SRH05		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGCH LH01	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGEH LH01	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGH17	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGH20	Southwest Main Gravity	Schuylkill River	C GATE POSITION	POSITION
I_SWMGH20	Southwest Main Gravity	Schuylkill River	E GATE POSITION	POSITION
I_SWMGH20	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGH20	Southwest Main Gravity	Schuylkill River	W GATE POSITION	POSITION
I_SWMGS28	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS34	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS43	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS47	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS50	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGWH LH01	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_UDLLD04	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLD08	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH03	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH04	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH07	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH14	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_WBH06		Wissahickon Creek	INTERCEPTOR LEVEL	LEVEL
I_WHLH08	Wissahickon High Level	Wissahickon Creek	INTERCEPTOR LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
I_WLLH11	Wissahickon Low Level	Wissahickon Creek	INTERCEPTOR LEVEL	LEVEL
P_01	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_01	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_02	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_02	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_03	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_03	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_04	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_04	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_05	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_05	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
R_01	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_01	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_01A	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_01A	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_02	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_02	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_03	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_03	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_04	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_04	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_05	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_05	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_06	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_06	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_07	Main Relief Sewer	Schuylkill River	SWO LEVEL	LEVEL
R_07	Main Relief Sewer	Schuylkill River	TRUNK LEVEL	LEVEL
R_08	Main Relief Sewer	Schuylkill River	SWO LEVEL	LEVEL
R_08	Main Relief Sewer	Schuylkill River	TRUNK LEVEL	LEVEL
R_09	Main Relief Sewer	Schuylkill River	SWO LEVEL	LEVEL
R_09	Main Relief Sewer	Schuylkill River	TRUNK LEVEL	LEVEL
R_10	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R_10	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R_11	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R_11	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R_11A	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R_11A	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R_12	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R_12	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R_13	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R_13	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R_13A	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R_13A	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
R_14	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R_14	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R_15	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
R_15	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
R_16	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R_16	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R_17	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R_17	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R_18	Frankford High Level	Tacony Creek	INTERCEPTOR LEVEL	LEVEL
R_18	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
R_19	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R_19	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R_20	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
R_20	Central Schuylkill East Side	Schuylkill River	STORMWATER LEVEL	LEVEL
R_24	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_24	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_25	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R_25	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_01	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_01	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_02	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_02	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_03	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_03	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_04	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_04	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_05	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_05	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_06	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_06	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_07	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_07	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_08	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_08	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_09	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_09	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_10	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_10	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_11	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_11	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_12	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_12	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_12A	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_12A	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S_13	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_13	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_14	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_14	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_15	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_15	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_16	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_16	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_17	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_17	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_18	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_18	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_19	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_19	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_20	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_20	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_21	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_21	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_22	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_22	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_23	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_23	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_24	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_24	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_25	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_25	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_26	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_26	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_27	Central Schuylkill East Side	Schuylkill River	DWO LEVEL	LEVEL
S_27	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_27	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_28	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_28	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_30	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S_30	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
S_31	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_31	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_32	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_32	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_33	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_33	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_34	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_34	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_35	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S_35	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_36	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_36	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_36A	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_36A	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_37	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_37	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_38	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_38	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_39	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_39	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_40	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_40	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_42	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_42	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_42A	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_42A	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_43	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_43	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_44	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_44	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_45	Lower Schuylkill West Side	Schuylkill River	DWO LEVEL	LEVEL
S_45	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_45	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_46	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_46	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_47	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_47	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_50	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S_50	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
S_51	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S_51	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
T_01	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_01	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_03	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_03	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_04	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_04	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_05	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_05	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_06	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_06	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_07	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_07	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
T_08	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_08	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_09	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_09	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_10	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_10	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_11	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_11	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_12	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_12	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_13	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_13	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_14	Frankford High Level	Tacony Creek	DWO GATE 1	POSITION
T_14	Frankford High Level	Tacony Creek	DWO GATE 2	POSITION
T_14	Frankford High Level	Tacony Creek	SWO CREST GATE	POSITION
T_14	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_14	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_15	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_15	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL

Table 4 - Listing of all Rain Gages (7/1/2012 - 6/30/2013)

Rain Gage	Location	Percent Working
RG_1	70th and Essington Ave	100%
RG_2	66th and Regent St	75%
RG_3	Fox Chase Rd. and Castor Ave	100%
RG_4	State Rd and Pennypack St	86%
RG_5	3rd and Mifflin St	98%
RG_6	Cardinal Ave and City Line Ave	100%
RG_7	G St. and E Annsbury St	100%
RG_8	N Water St. and E Clarkson Ave	99%
RG_9	54th and Lancaster Ave	99%
RG_10	Pine Rd and Susquehanna Rd	92%
RG_11	Rising Sun Ave and Lardner St	94%
RG_12	Pattison Ave and Columbus Blvd	98%
RG_13	Glendale Ave and Algon Ave	100%
RG_14	Delaware Ave and Lewis St	98%
RG_15	E Montgomery Ave and Thompson St	100%
RG_16	19th and Wood St	100%
RG_17	Saul St. and Benner St	96%
RG_18	Fox St. and Roosevelt Blvd	98%
RG_19	Chew Ave and Sharpnack St	98%
RG_20	Woodhaven Rd and Knights Rd	87%
RG_21	Shawmont Ave and Eva St	90%
RG_22	N 67th and Callowhill St	91%
RG_23	Penrose Ave and Mingo Ave	100%
RG_24	Lockart Rd and Lockart Ln	92%

Table 5 – Listing of All Pumping Stations

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_26VA	Storm Water	PUMP 1 RUN	EVENT	26th and Vare Ave
PS_26VA	Storm Water	PUMP 2 RUN	EVENT	27th and Vare Ave
PS_26VA	Storm Water	WET WELL LEVEL	LEVEL	28th and Vare Ave
PS_42ST	Waste Water	PUMP 1 RUN	EVENT	761 S 43rd St
PS_42ST	Waste Water	PUMP 2 RUN	EVENT	762 S 43rd St
PS_42ST	Waste Water	PUMP 3 RUN	EVENT	763 S 43rd St
PS_42ST	Waste Water	WET WELL LEVEL	LEVEL	764 S 43rd St
PS_BANK	Waste Water	PUMP 1 RUN	EVENT	15 S Bank St (Bank & Elbow Ln)
PS_BANK	Waste Water	PUMP 2 RUN	EVENT	16 S Bank St (Bank & Elbow Ln)
PS_BANK	Waste Water	WET WELL LEVEL	LEVEL	17 S Bank St (Bank & Elbow Ln)
PS_BELD	Waste Water	PUMP 1 RUN	EVENT	751 S Manatawna St (Belfry & Steeple)
PS_BELD	Waste Water	PUMP 2 RUN	EVENT	752 S Manatawna St (Belfry & Steeple)
PS_BELD	Waste Water	WET WELL LEVEL	LEVEL	753 S Manatawna St (Belfry & Steeple)
PS_BLVD	Storm Water	PUMP 1 RUN	EVENT	4251 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	PUMP 2 RUN	EVENT	4252 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	PUMP 3 RUN	EVENT	4253 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	PUMP 4 RUN	EVENT	4254 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	WET WELL LEVEL	LEVEL	4255 N Broad St (Broad & Roosevelt Blvd)
PS_CSPS	Waste Water	N GATE POSITION	POSITION	600 University Ave (34th St Bridge & University)

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_CSPS	Waste Water	N SIPHON LEVEL	LEVEL	601 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	N SIPHON LEVEL	LEVEL	602 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	N WET WELL LEVEL	LEVEL	603 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 1 RUN	EVENT	604 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 2 RUN	EVENT	605 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 3 RUN	EVENT	606 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 4 RUN	EVENT	607 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 5 RUN	EVENT	608 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 6 RUN	EVENT	609 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	S GATE POSITION	POSITION	610 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	S WET WELL LEVEL	LEVEL	611 University Ave (34th St Bridge & University)
PS_FORD	Waste Water	PUMP 1 RUN	EVENT	3800 Ford Rd (Across from West Park Hospital)
PS_FORD	Waste Water	PUMP 2 RUN	EVENT	3801 Ford Rd (Across from West Park Hospital)
PS_FORD	Waste Water	WET WELL LEVEL	LEVEL	3802 Ford Rd (Across from West Park Hospital)
PS_HOGI	Waste Water	PUMP 1 RUN	EVENT	3 Hog Island Rd (east of Airport control tower)
PS_HOGI	Waste Water	PUMP 2 RUN	EVENT	4 Hog Island Rd (east of Airport control tower)
PS_HOGI	Waste Water	WET WELL LEVEL	LEVEL	5 Hog Island Rd (east of Airport control tower)
PS_LIND	Waste Water	PUMP 1 RUN	EVENT	5200 Linden Ave (Linden & Milnor)
PS_LIND	Waste Water	PUMP 2 RUN	EVENT	5201 Linden Ave (Linden & Milnor)
PS_LIND	Waste Water	WET WELL LEVEL	LEVEL	5202 Linden Ave (Linden & Milnor)

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_LOCK	Waste Water	PUMP 1 RUN	EVENT	10778 Lockart Rd (Lockart St & Locart Ln)
PS_LOCK	Waste Water	PUMP 2 RUN	EVENT	10779 Lockart Rd (Lockart St & Locart Ln)
PS_LOCK	Waste Water	WET WELL LEVEL	LEVEL	10780 Lockart Rd (Lockart St & Locart Ln)
PS_MILN	Waste Water	PUMP 1 RUN	EVENT	9647 Milnor St (between Grant Ave & Eden St)
PS_MILN	Waste Water	PUMP 2 RUN	EVENT	9648 Milnor St (between Grant Ave & Eden St)
PS_MILN	Waste Water	PUMP 3 RUN	EVENT	9649 Milnor St (between Grant Ave & Eden St)
PS_MILN	Waste Water	WET WELL LEVEL	LEVEL	9650 Milnor St (between Grant Ave & Eden St)
PS_MING	Storm Water	BASIN LEVEL	LEVEL	7000 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 1 RUN	EVENT	7001 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 2 RUN	EVENT	7002 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 3 RUN	EVENT	7003 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 4 RUN	EVENT	7004 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 5 RUN	EVENT	7005 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 6 RUN	EVENT	7006 Penrose Ave (Schuylkill River under Platt Bridge)
PS_NEIL	Waste Water	PUMP 1 RUN	EVENT	4000 Neill Dr (Neill Dr & Falls Rd)
PS_NEIL	Waste Water	PUMP 1 RUN	EVENT	4001 Neill Dr (Neill Dr & Falls Rd)
PS_NEIL	Waste Water	PUMP 3 RUN	EVENT	4002 Neill Dr (Neill Dr & Falls Rd)
PS_NEIL	Waste Water	WET WELL LEVEL	LEVEL	4003 Neill Dr (Neill Dr & Falls Rd)
PS_P120	Waste Water	PUMP 1 RUN	EVENT	
PS_P120	Waste Water	PUMP 2 RUN	EVENT	
PS_P120	Waste Water	WET WELL LEVEL	LEVEL	
PS_P542	Waste Water	PUMP 1 RUN	EVENT	
PS_P542	Waste Water	PUMP 2 RUN	EVENT	

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_P542	Waste Water	WET WELL LEVEL	LEVEL	
PS_P603	Waste Water	PUMP 1 RUN	EVENT	2000 Langley Ave (PNBC)
PS_P603	Waste Water	PUMP 2 RUN	EVENT	2001 Langley Ave (PNBC)
PS_P603	Waste Water	WET WELL LEVEL	LEVEL	2002 Langley Ave (PNBC)
PS_P648	Waste Water	PUMP 1 RUN	EVENT	PNBC
PS_P648	Waste Water	PUMP 2 RUN	EVENT	PNBC
PS_P648	Waste Water	WET WELL LEVEL	LEVEL	PNBC
PS_P796	Waste Water	PUMP 1 RUN	EVENT	4801 S 13th St (PNBC)
PS_P796	Waste Water	PUMP 2 RUN	EVENT	4802 S 13th St (PNBC)
PS_P796	Waste Water	PUMP 3 RUN	EVENT	4803 S 13th St (PNBC)
PS_P796	Waste Water	WET WELL LEVEL	LEVEL	4804 S 13th St (PNBC)
PS_POLI	Waste Water	PUMP 1 RUN	EVENT	
PS_POLI	Waste Water	PUMP 2 RUN	EVENT	
PS_POLI	Waste Water	WET WELL LEVEL	LEVEL	
PS_RENN	Waste Water	PUMP 1 RUN	EVENT	11064 Rennard St (Philmont Shopping Center)
PS_RENN	Waste Water	PUMP 2 RUN	EVENT	11065 Rennard St (Philmont Shopping Center)
PS_RENN	Waste Water	WET WELL LEVEL	LEVEL	11066 Rennard St (Philmont Shopping Center)
PS_SPLA	Waste Water	PUMP 1 RUN	EVENT	9021 Buttonwood Pl (Spring Lane Meadows)
PS_SPLA	Waste Water	PUMP 2 RUN	EVENT	9022 Buttonwood Pl (Spring Lane Meadows)
PS_SPLA	Waste Water	WET WELL LEVEL	LEVEL	9023 Buttonwood Pl (Spring Lane Meadows)

Table 6 - Listing of all Temporary Flow Monitors Deployed by Projects

Site Name	Start	End	Maintained By	Project
C11-000110	10/20/2011	7/3/2012	CSL	CSO model calibration
P104-09-S0025	12/10/2010	7/3/2012	CSL	I/I
USE-0500	3/30/2012	7/3/2012	CSL	I/I
D66-001595	6/10/2011	7/5/2012	CSL	CSO model calibration
S50-001600	6/24/2011	7/5/2012	CSL	CSO model calibration
D39-009050	10/14/2011	8/2/2012	CSL	CSO model calibration
S42-000530	10/17/2011	8/2/2012	CSL	CSO model calibration
C17-000810	10/13/2011	12/3/2012	CSL	CSO model calibration
D62-000020	11/18/2011	12/3/2012	CSL	CSO model calibration
W068-05-S0047	11/30/2011	12/3/2012	CSL	I/I
S05-001085	10/21/2011	12/4/2012	CSL	CSO model calibration
T088-01-S0050	10/21/2011	12/4/2012	CSL	I/I
D05-001112	10/11/2011	12/5/2012	CSL	CSO model calibration
D65-DW0020	10/31/2011	12/5/2012	CSL	CSO model calibration
D67-DW015	10/28/2011	12/5/2012	CSL	CSO model calibration
F21-009745	10/13/2011	12/5/2012	CSL	CSO model calibration
P090-02-S0715	11/29/2011	12/5/2012	CSL	I/I
Q101-03-S0020	10/21/2011	12/5/2012	CSL	I/I
D61-000015	11/18/2011	12/6/2012	CSL	CSO model calibration
D63-000080	11/18/2011	12/6/2012	CSL	CSO model calibration
PR-0060	11/30/2011	12/6/2012	CSL	I/I
PR-0150	10/20/2011	12/6/2012	CSL	I/I
Q117-04-S0105	10/21/2011	12/6/2012	CSL	I/I
S45-000470	11/30/2011	12/6/2012	CSL	CSO model calibration
S50-002920	11/30/2011	12/7/2012	CSL	CSO model calibration
D05-000150	10/11/2011	12/11/2012	CSL	CSO model calibration
S42A-000795	10/14/2011	12/12/2012	CSL	CSO model calibration
P113-04-S0463	11/29/2011	1/7/2013	CSL	I/I
USE-0365	3/30/2012	1/8/2013	CSL	I/I
T08-000270	6/24/2011	1/16/2013	CSL	CSO model calibration
T08-000420	6/22/2011	1/16/2013	CSL	CSO model calibration
T14-000140	10/14/2011	1/16/2013	CSL	CSO model calibration
T14-001300	10/17/2011	1/16/2013	CSL	CSO model calibration
T14-013985	9/14/2011	1/16/2013	CSL	CSO model calibration

Site Name	Start	End	Maintained By	Project
T14-023480	5/26/2011	1/16/2013	CSL	CSO model calibration
T14-029300	6/15/2011	1/16/2013	CSL	CSO model calibration
T14-000490	2/1/2011	1/16/2013	CSL	Design
T14-014030	2/11/2011	1/16/2013	CSL	Design-SFR Germantown
Q114-12-S0010	1/27/2012	2/4/2013	CSL	I/I
D54-000150	1/30/2012	2/5/2013	CSL	CSO model calibration
T14-013795	1/27/2012	2/5/2013	CSL	CSO model calibration
C06-000010	2/27/2012	3/1/2013	CSL	CSO model calibration
C24-000010	2/27/2012	3/1/2013	CSL	CSO model calibration
D38-000690	2/28/2012	3/1/2013	CSL	CSO model calibration
D54-001970	2/28/2012	3/1/2013	CSL	CSO model calibration
T14-000330	1/30/2012	3/1/2013	CSL	CSO model calibration
W076-13-0035	2/27/2012	3/1/2013	CSL	I/I
D54-004077	3/29/2012	4/1/2013	CSL	CSO model calibration
T14-010220	4/27/2012	5/2/2013	CSL	CSO model calibration
W076-01-0015	3/29/2012	5/2/2013	CSL	I/I
S06-000045	6/5/2013	7/8/2013	CSL	CSO model calibration
F06-000025	5/29/2013	7/9/2013	CSL	CSO model calibration
W075-01-S0018	5/30/2013	7/10/2013	CSL	I/I
W095-01-S0020	6/5/2013	7/19/2013	CSL	I/I
BC-0055	12/1/2011	Present	CSL	I/I
BC-B0755	12/10/2012	Present	CSL	I/I
C07-000010	10/19/2012	Present	CSL	CSO model calibration
C17-000040	5/30/2013	Present	CSL	CSO model calibration
C17-000095	12/12/2012	Present	CSL	CSO model calibration
C17-003360	12/13/2011	Present	CSL	CSO model calibration
C17-006120	12/13/2012	Present	CSL	CSO model calibration
CV-0145	3/7/2013	Present	CSL	I/I
D25-004970	5/31/2013	Present	CSL	CSO model calibration
D25-017280	12/11/2012	Present	CSL	CSO model calibration
D39-007000	5/31/2013	Present	CSL	CSO model calibration
D39-012645	12/12/2012	Present	CSL	CSO model calibration
D47-000065	12/12/2012	Present	CSL	CSO model calibration
D63-000035	10/14/2011	Present	CSL	CSO model calibration
F03-000055	3/8/2013	Present	CSL	CSO model calibration

Site Name	Start	End	Maintained By	Project
F04-000015	3/8/2013	Present	CSL	CSO model calibration
F11-000040	3/8/2013	Present	CSL	CSO model calibration
F21-000145	12/12/2012	Present	CSL	CSO model calibration
F21-000255	12/11/2012	Present	CSL	CSO model calibration
F21-000375	12/11/2012	Present	CSL	CSO model calibration
IALL-B0355	12/12/2011	Present	CSL	I/I
M-0045	5/31/2013	Present	CSL	CSO model calibration
M005-07-0070	9/27/2012	Present	CSL	Eastwick Level Monitoring
M005-09-0140	9/27/2012	Present	CSL	Eastwick Level Monitoring
P083-03-S0050	10/11/2011	Present	CSL	I/I
P090-02-S0090	5/29/2013	Present	CSL	I/I
P090-02-S0590	12/10/2012	Present	CSL	I/I
P090-02-S0865	12/10/2012	Present	CSL	I/I
P099-01-S0025	5/29/2013	Present	CSL	I/I
PC-0010	1/30/2012	Present	CSL	I/I
PC-B1360	3/8/2013	Present	CSL	CSO model calibration
PP-0215	6/5/2013	Present	CSL	I/I
PP-B0790	3/13/2013	Present	CSL	I/I
PP-B1035	3/8/2013	Present	CSL	I/I
PR-B0405	12/10/2012	Present	CSL	I/I
Q109-07-S0025	12/10/2012	Present	CSL	I/I
Q110-17-S0015	5/30/2013	Present	CSL	I/I
S01-000045	5/30/2013	Present	CSL	CSO model calibration
S05-000012	3/18/2011	Present	CSL	CSO model calibration
S052-05-0015	8/24/2012	Present	CSL	
S059-01-S0010	12/11/2012	Present	CSL	I/I
S10-000030	12/13/2012	Present	CSL	CSO model calibration
S18-000010	5/31/2013	Present	CSL	CSO model calibration
S22-000025	5/30/2013	Present	CSL	CSO model calibration
S26-000010	5/30/2013	Present	CSL	CSO model calibration
S31-000010	5/30/2013	Present	CSL	CSO model calibration
S42A-001880	12/12/2012	Present	CSL	CSO model calibration
S43-000035	12/13/2012	Present	CSL	CSO model calibration
S45-001110	10/13/2011	Present	CSL	CSO model calibration
S50-003755	5/31/2013	Present	CSL	CSO model calibration

Site Name	Start	End	Maintained By	Project
S50-006935	12/17/2012	Present	CSL	CSO model calibration
S50-011535	5/30/2013	Present	CSL	CSO model calibration
T088-01-S0220	12/10/2012	Present	CSL	I/I
T11-000010	5/31/2013	Present	CSL	CSO model calibration
T14-013875	1/30/2012	Present	CSL	CSO model calibration
THL-B0705	12/10/2012	Present	CSL	I/I
UDLL-0270	10/4/2012	Present	CSL	I/I
USE-0660	7/12/2012	Present	CSL	CSO model calibration
W060-01-S0045	5/29/2013	Present	CSL	I/I
W067-01-S0060	5/31/2013	Present	CSL	I/I
WHL-0110	5/29/2013	Present	CSL	I/I
WLL-0100	5/29/2013	Present	CSL	I/I
WLL-0565	3/7/2013	Present	CSL	I/I

Table 7 - Listing of Outlying Community Contract Limits

Metered	Contract Limits					
Standardized	Instantaneous		Daily Max	Township Total		
Site ID	CFS	MGD	MGD	Inst. CFS	Inst. MGD	Daily Max MGD
MA1						
MA2						
MA3	0.185	0.12				
MA4	0.602	0.389				
MAx1	0.185	0.12				
Abington Total				9.247	5.976	4.453
MB1	74.26	54.989	37			
Bucks Total				74.26	54.989	37
MBE1						
MBE2						
MBE3						
MBE4						
MBE5			0.282			
MBE6			1.327			
MBE7			0.412			
MBE8						
MBE9						
MBE10						
MBE11						
MBE12						
MBE13						
MBE14						
MBE15						
MBE16						
Bensalem Total				11.74	7.588	6.133
MC1	2.75	1.777				
MC2	18	11.634				
MC3	0.48	0.31				
MCx1	8	5.171	Combined total for all the MCx#			
MCx2						
MCx3						
MCx4						
MCx5						
MCx6						

Metered	Contract Limits					
Standardized	Instantaneous		Daily Max	Township Total		
Site ID	CFS	MGD	MGD	Inst. CFS	Inst. MGD	Daily Max MGD
MCx7						
Cheltenham Total				20.75	13.411	13.380
MD1	155	100.179	50	155	10.179	50
ML1			5.474			
ML2			1.48			
ML3						
ML4			10.264			
ML5			1.848			
ML6			0.252			
ML7			0.84			
Lower Merion Total				31.57	20.404	14.5
MLM1						
MLM2		0.2	0.411			
MLM3						
MLM4						
MLM5						
MLM6						
MLM7						
Lower Moreland Total				8.97	5.797	1.45
MS1	4.6	2.973				
MS2						
MS3						
MS4		1.93	1.247			
MS5						
MS6						
MS7						
MS8						
Springfield Total				6.53	4.22	4.2
MSH1						38566
MSH2						
MSHX_1						
MSHX_2						
Southampton Total				15.79	10.205	7.14
MUD-N	35	22.621	17			

Metered	**Contract Limits**					
Standardized	**Instantaneous**		**Daily Max**	**Township Total**		
Site ID	**CFS**	**MGD**	**MGD**	**Inst. CFS**	**Inst. MGD**	**Daily Max MGD**
MUD-S	combined total for all Upper Darby Connections					
MUD-O						
MUD-1						
Upper Darby Total				35	22.621	17

PWD Collector System

Flow Control Unit

CSO Program Maintenance

2013

FLOW CONTROL UNIT

The Flow Control Unit's primary responsibilities are divided into four subgroups, Combined Sewer Overflow (CSO) Regulator Maintenance, Collector System Pumping Station Operation & Maintenance, Collector System Instrumentation and Collector System CCTV Technical Inspections. The Wastewater Pumping Group is located in the Torresdale Raw Water Pump Station maintenance shop at 5202 Pennypack St. The other three groups are located at the Fox Street maintenance facility. A brief description of each of the group's responsibilities and their 2013 fiscal year highlights follows.

CSO REGULATOR MAINTENANCE GROUP

The combined sewer overflow chambers are serviced by 23 maintenance personnel who work out of the Fox Street Headquarters Facility. This group is responsible for the operations, maintenance, inspections and cleaning of 175 combined sewer-regulating chambers, 89 tide gate chambers, 26 storm relief chambers, various siphons and related wastewater control devices throughout the collection system.

Currently PWD maintains nine types of CSO regulators:

Brown & Brown (B&B) mechanical
Computer Controlled Sluice Gates
Computer Controlled B&B
Static Dams
Slot type regulators
Water Hydraulic Sluice Gates
Mechanical Sluice Gates
Side Overflow Weirs
Inflatable Rubber Dams

Mechanical or operational malfunctions of the regulators and tide gates causing a dry weather discharge are a violation of regulatory requirements. They can also have a major impact on the Wastewater Treatment Plant performance, stream water quality and recreational use of local waterways. Thus, the combined sewer regulator system is closely monitored and problems are corrected quickly. CSO chamber Inspections and clearing of any regulator blockages prior to causing a dry weather discharge are the primary responsibilities of this group and are key areas in assessing the groups overall performance.

The CSO Maintenance Group performed 5,501 inspections of the regulating chambers in FY2013. The work includes frequent visual inspections of the equipment and flow patterns to make sure everything is operating properly. The more comprehensive work such as cleaning and lubricating of the mechanical equipment is scheduled during periods between rain events. The group also utilizes the remote monitoring network system as their primary tool to help identify the locations that are showing abnormal flow patterns. By using the system in this manner, the crews are able to correct many partial blockages before they become a dry weather discharge.

In FY2013, the crews cleared 292 regulator blockages before they developed into a CSO dry weather discharge. There were 14 CSO dry weather discharges caused by all kinds of debris that needed corrective action to stop. This is an increase from FY2012 when there were 12 discharges for the year. Many of the discharges are a result of debris such as rags, sticks, stones and other debris that become lodged in the CSO regulator diversion or the dry weather outlet pipe during dry weather periods. These types of blockages are virtually unpredictable so frequent inspections and closely observing the monitoring trend data is essential to prevention. Following moderate to heavy rain events the CSO regulators can have grit, sticks, rags and other debris caught at various places in and around the regulator that could eventually result in a discharge. The CSO maintenance crews perform quick topside inspections of the CSO sites throughout the City for several days following these events to remove or clear away any of this storm debris. The work schedule will then revert to the more comprehensive maintenance such as cleaning, lubricating, adjusting equipment and performing minor repairs to the mechanical regulators.

WASTEWATER PUMPING STATION MAINTENANCE GROUP

The Wastewater Pumping Station Maintenance Group consisting of 24 maintenance personnel are located at the 5202 Pennypack St. Maintenance Shop. They are responsible for the operations and maintenance of 16 wastewater pumping stations, 3 stormwater pumping stations, 2 sodium hypochlorite dosing stations, 10 computer controlled CSO storage regulators and several online and offline wastewater storage facilities among other duties.

Many of the pumping stations provide for only one running pump and one reserve pump. This arrangement means that pump breakdowns must be responded to immediately and that overhauls need to be completed in a minimum amount of time. The main pump availability statistic compared to prior years is a good indicator of the Maintenance Group's performance in this area. On average, the main pumping units were in service 99.2% of the time in FY2013. The WWP Group completed 10 main wastewater pump overhauls and 4 overhauls on other large auxiliary units at the stations. These overhauls consist of repair and replacement of the worn pump and motor components to bring the equipment's performance up to new operating condition. In addition to the preventative maintenance program, the group is developing a predictive maintenance program that is beginning to pay dividends by pointing out equipment that is ready for servicing prior to failure.

In addition to the pumping station maintenance, the group maintains a variety of other equipment throughout the Collector System. They are responsible for the operations and maintenance of the two sodium hypochlorite dosing stations. They are located next to the QLRW pump station that injects hypo into the Upper Schuylkill East Interceptor and at the Totem Rd. pump station that injects hypo into the Bucks County force main. The group is responsible for maintaining adequate supply of the chemical, over 1,356,806 gallons in FY2013, for monitoring the downstream hydrogen sulfide levels and adjusting the dosage levels in addition to maintenance and repair of the equipment.

The group also fabricates and repairs bar screens, debris grills and other equipment for the Collector System and performs major maintenance of the CSO mechanical regulators such as installation of tide gates, overflow gates and servicing of the Brown & Brown regulators.

COLLECTOR SYSTEM INSTRUMENTATION MAINTENANCE GROUP

The fourteen Instrument and Electronic Technicians located at the Fox Street facility are primarily responsible for installing, calibrating and maintaining the electronic and instrumentation equipment in the Collector System monitoring and control network. They also repair, calibrate and certify the hazardous gas detection meters for the Department as well as install temporary flow and level monitors for various units in the Water Department.

One of the primary responsibilities of the CS Instrumentation Group is to maintain the network of level, flow meters and rain gauges up and running with a minimum of downtime while maintaining accurate reliable data. The network currently consists of 258 level and flow monitors in the NE SE and SW Drainage Districts, 35 gauges in the citywide rain gauge network, 56 Township flow metering stations and a number of additional monitors at various control sites. It is crucial that the remote site equipment is communicating and downloading data to the server so that the information is available for trend chart viewing and analysis for the users. The CSO maintenance group relies heavily on these charts to monitor the performance of all the CSO regulators while paying special attention to the sites that have had recent or a history of discharges. The monitoring data is used for a wide variety of other purposes such as calibrating the Collector System's hydraulic model, generating township sewage flows for billing and for various Planning and Engineering studies.

CCTV TECHNICAL INSPECTIONS GROUP

The Technical Inspections group consists of two Supervisors and fourteen Technicians who operate and maintain the seven closed circuit TV camera trucks. The seven CCTV trucks logged 48.9 miles of sewer inspections in FY2013.

The group has several primary functions which include inspections of sewers turned in for sewer complaints, special inspection requests from the Water/ Sewer Design group and the post construction inspection program which involves videoing the sewer at the completion of all sewer construction work. Another function of the group is to work with the Defective Connection Program group to identify the defective lateral connections.

Flow Control is currently experiencing a 29% vacancy rate of the authorized positions for the Unit. Due to the recent retirements of three secondary level Supervisors and two direct Supervisors in the last 2 years, the supervision in Flow Control is qualified but inexperienced. It is a testament to the skills and dedication of the many Flow Control workers who continue to work above expectations and willingly share their knowledge with their less experienced superiors in order to keep this critical infrastructure maintained and operational. The 27 vacant positions are expected to be filled soon.

92 Flow Control Positions	Filled	Vacant	Approved
Clerk III (Maint. Sched.)	1	0	1
Clerk Typist II	2	0	2
Electrician 1	1	0	1
Electronic Equipment Supervisor	2	0	2
Electronic Technician 1	0	1	1
Electronic Technician 2	21	5	26
Electronic Technician Grp. Ldr.	2	2	4
Ind. Process Mach. Mech. Grp. Ldr.	1	0	1
Industrial Electrician 1	1	1	2
Industrial Electrician 2	1	2	3
Industrial Electrician Group Leader 2	1	1	2
Industrial Process Mach. Mech.	5	2	7
Instrumentation Technician I	2	4	6
Interceptor Service Worker I	9	3	12
Interceptor Service Worker II	5	2	7
Interceptor Services Supervisor	1	1	2
Mach. & Equipment Mech.	5	1	6
Sewer Maintenance Inspector	1	0	1
Trades Helper (E)	1	0	1
Utility Maintenance Apprentice 1	1	0	1
Water Conveyance Sys. Asst. Supt. (A)	1	0	1
Water Conveyance Sys. Asst. Supt. (P)	1	2	3
Totals	65	27	92

PART 1				PHILADELPHIA WATER DEPARTMENT							Section 1	
DRY WEATHER STATUS				WASTE AND STORM WATER COLLECTION								
REPORT				FLOW CONTROL UNIT							April 2013 - June 2013	

COLLECTOR	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Totals
UPPER PENNYPACK - 5 UNITS													
INSPECTIONS	12	16	9	10	14	7	13	12	19	7	11	6	136
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	0	0	1	0	0	0	0	0	3	0	5
UPPER DELAWARE LOW LEVEL - 12 UNITS													
INSPECTIONS	29	29	32	38	18	25	28	40	32	41	32	29	373
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	5	2	6	3	0	0	4	5	4	3	2	3	37
LOWER FRANKFORD CREEK - 6 UNITS													
INSPECTIONS	10	15	13	14	10	19	11	18	19	12	18	12	171
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	2	1	3	0	2	0	0	3	0	1	0	13
LOWER FRANKFORD LOW LEVEL - 10 UNITS													
INSPECTIONS	23	26	15	26	17	15	21	25	25	23	27	21	264
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	0	0	0	0	1	5	1	4	0	0	11
FRANKFORD HIGH LEVEL - 14 UNITS													
INSPECTIONS	35	59	56	51	59	34	36	35	33	22	29	36	485
DISCHARGES	3	3	0	1	1	0	1	0	0	0	0	2	11
BLOCKS CLEARED	1	1	3	1	0	0	2	4	1	3	1	3	20
SOMERSET - 9 UNITS													
INSPECTIONS	17	29	20	22	28	21	26	21	26	28	25	16	279
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	0	0	0	0	1	0	1	2	0	1	6
LOWER DELAWARE LOW LEVEL - 33 UNITS													
INSPECTIONS	78	72	66	88	92	67	68	77	82	86	108	63	947
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	10	3	2	0	0	1	1	10	4	6	11	7	55
CENTRAL SCHUYLKILL EAST - 18 UNITS													
INSPECTIONS	44	65	47	61	51	29	52	53	42	44	55	65	608
DISCHARGES	1	0	0	0	0	0	0	0	0	0	1	0	2
BLOCKS CLEARED	5	6	2	3	4	3	7	2	3	7	3	8	53
LOWER SCHUYLKILL EAST - 9 UNITS													
INSPECTIONS	15	15	11	17	15	19	14	13	9	18	15	10	171
DISCHARGES	0	0	0	0	0	0	0	0	0	1	0	0	1
BLOCKS CLEARED	0	0	0	2	0	2	2	1	0	0	1	0	8
CENTRAL SCHUYLKILL WEST - 9 UNITS													
INSPECTIONS	19	18	22	24	17	29	23	16	31	19	23	18	259
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	1	3	0	3	3	2	2	3	1	2	4	24
SOUTHWEST MAIN GRAVITY - 10 UNITS													
INSPECTIONS	22	23	28	30	33	21	25	26	23	35	25	35	326
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	1	2	1	2	3	3	3	2	1	2	20
LOWER SCHUYLKILL WEST - 4 UNITS													
INSPECTIONS	8	8	12	7	6	7	9	4	4	12	11	6	94
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	2	0	1	2	0	0	0	1	1	1	8
COBBS CREEK HIGH LEVEL - 23 UNITS													
INSPECTIONS	31	57	41	66	61	54	71	71	63	78	40	43	676
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	2	2	1	0	6	7	0	0	0	3	22
COBBS CREEK LOW LEVEL - 13 UNITS													
INSPECTIONS	22	28	27	31	23	20	31	31	28	27	28	14	310
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	2	0	2	0	0	1	2	1	0	0	0	8
RELIEF SEWERS - 26 UNITS													
INSPECTIONS	30	51	36	43	33	25	26	38	30	37	27	26	402
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	0	0	0	0	0	0	0	2	0	0	2
TOTALS / MONTH for 201 REGULATOR UNITS													Totals
TOTAL INSPECTIONS	395	511	435	528	477	392	454	480	466	489	474	400	5501
TOTAL DISCHARGES	4	3	0	1	1	0	1	0	0	1	1	2	14
TOTAL BLOCKS CLEARED	25	17	22	18	11	15	30	41	24	31	26	32	292
AVER. # of INSP. / BC	16	30	20	29	43	26	15	12	19	16	18	13	21
DISC / 100 INSPECTIONS	1.0	0.6	0.0	0.2	0.2	0.0	0.2	0.0	0.0	0.2	0.2	0.5	0.3

CSO REGULATING CHAMBER MONTHLY INSPECTION

NEWPC & SEWPC PLANT REGULATORS

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
UPPER PENNYPACK 5 NEWPC UNITS															
P01	2	3	2	2	4	1	3	2	4	1	2	1	27	2.3	13.5
P02	2	3	2	2	2	1	3	2	5	1	2	1	26	2.2	14.0
P03	3	4	1	2	3	2	3	2	3	2	2	1	28	2.3	13.0
P04	3	4	3	3	3	2	2	4	4	2	3	2	35	2.9	10.4
P05	2	2	1	1	2	1	2	2	3	1	2	1	20	1.7	18.2
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS															
D02	3	3	3	7	3	3	2	3	3	5	3	2	40	3.3	9.1
D03	3	3	2	6	2	2	2	3	3	4	2	4	36	3.0	10.1
D04	3	3	3	3	3	3	3	3	4	4	3	3	38	3.2	9.6
D05	3	2	5	2	2	2	2	3	3	3	2	2	31	2.6	11.8
D06	2	2	2	2	1	2	2	3	3	3	2	2	26	2.2	14.0
D07	2	2	2	3	1	2	4	3	2	3	2	2	28	2.3	13.0
D08	2	2	2	3	1	2	3	3	2	3	2	2	27	2.3	13.5
D09	2	2	2	2	1	2	2	3	2	3	2	2	25	2.1	14.6
D11	2	2	2	2	1	2	2	2	4	3	2	2	26	2.2	14.0
D12	2	2	3	3	1	1	2	4	2	3	4	2	29	2.4	12.6
D13	2	2	2	2	1	2	2	2	2	3	3	2	25	2.1	14.6
D15	3	4	4	3	1	2	2	8	2	4	5	4	42	3.5	8.7
LOWER FRANKFORD CREEK 6 NEWPC UNITS															
F13	2	2	3	2	2	3	2	3	3	2	3	3	30	2.5	12.2
F14	4	5	4	3	2	4	2	3	4	2	3	3	39	3.3	9.4
F21	1	2	1	2	2	3	2	3	3	2	3	2	26	2.2	14.0
F23	1	2	2	3	1	3	2	3	3	2	3	1	26	2.2	14.0
F24	1	2	2	2	1	3	2	3	3	2	3	1	25	2.1	14.6
F25	1	2	1	2	2	3	1	3	3	2	3	2	25	2.1	14.6
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS															
F03	2	2	1	2	1	2	2	3	3	2	3	2	25	2.1	14.6
F04	2	2	1	2	1	2	2	3	3	2	3	2	25	2.1	14.6
F05	2	2	1	2	1	1	2	3	2	2	3	2	23	1.9	15.9
F06	3	3	2	3	3	2	2	3	3	2	3	2	31	2.6	11.8
F07	2	2	1	2	3	1	2	3	2	3	2	2	25	2.1	14.6
F08	2	2	1	2	1	1	2	3	2	2	3	2	23	1.9	15.9
F09	3	4	2	4	2	2	3	3	3	3	3	2	34	2.8	10.7
F10	2	3	3	2	2	1	2	1	2	2	2	2	24	2.0	15.2
F11	2	3	1	4	1	1	2	1	2	2	2	2	23	1.9	15.9
F12	3	3	2	3	2	2	2	2	3	3	3	3	31	2.6	11.8
FRANKFORD HIGH LEVEL 14 NEWPC UNITS															
T01	2	3	2	2	2	1	2	2	2	1	1	1	21	1.8	17.4
T03	3	3	2	3	2	3	2	2	3	3	2	2	30	2.5	12.2
T04	3	16	3	3	4	1	6	2	2	1	2	1	44	3.7	8.3
T05	1	3	2	2	2	1	2	2	2	1	1	1	20	1.7	18.2
T06	1	3	2	2	2	1	2	2	2	1	1	1	20	1.7	18.2
T07	1	3	2	2	2	1	2	2	2	1	1	1	20	1.7	18.2
T08	1	4	4	4	2	5	2	2	2	2	2	1	31	2.6	11.8
T09	2	3	2	2	2	1	2	1	2	2	2	1	22	1.8	16.6
T10	5	6	12	8	15	6	3	6	4	2	4	8	79	6.6	4.6
T11	11	7	14	11	16	7	3	3	4	3	4	9	92	7.7	4.0
T12	2	2	2	3	2	1	2	3	2	1	2	2	24	2.0	15.2
T13	1	2	5	3	4	3	4	4	2	2	3	3	36	3.0	10.1
T14	1	2	2	3	2	1	2	3	2	1	2	2	23	1.9	15.9
T15	1	2	2	3	2	2	2	1	2	1	2	3	23	1.9	15.9

11 TOTAL DISCHARGES FOR NE & SE DISTRICTS

0.9 AVERAGE DISCHARGES PER MONTH

13.1 AVER. DAYS BEFORE RETURNING TO SITE

3.6 AVER. INSPECTIONS PER DAY PER CREW

DTR = DAYS TO RETURN TO SITE

I/D/C = INSPECTIONS PER DAY PER CREW

I/D = INSPECTIONS PER DISCHARGE

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
SOMERSET LOW LEVEL 9 NEWPC UNITS															
D17	2	3	2	2	4	3	3	2	3	4	3	2	33	2.8	11.1
D18	2	3	1	3	3	3	5	3	3	3	3	3	35	2.9	10.4
D19	2	3	3	3	3	3	4	3	3	3	5	3	38	3.2	9.6
D20	2	3	3	3	3	2	4	3	3	3	3	2	34	2.8	10.7
D21	1	3	3	2	3	2	2	2	2	3	2	1	26	2.2	14.0
D22	2	3	1	2	3	2	2	2	3	3	2	1	26	2.2	14.0
D23	2	3	2	2	3	2	2	2	3	3	3	1	28	2.3	13.0
D24	2	3	1	2	3	2	2	2	3	3	2	1	26	2.2	14.0
D25	2	5	4	3	3	2	2	2	3	3	2	2	33	2.8	11.1
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS															
D37	5	2	2	3	5	4	5	3	7	3	2	2	43	3.6	8.5
D38	3	2	3	4	3	2	2	2	4	3	2	3	33	2.8	11.1
D39	3	2	3	5	5	3	2	2	4	3	2	1	35	2.9	10.4
D40	4	2	2	2	2	2	2	3	3	3	2	4	31	2.6	11.8
D41	2	2	3	4	3	2	3	2	3	3	4	1	32	2.7	11.4
D42	2	2	1	3	2	2	2	2	3	3	3	1	26	2.2	14.0
D43	2	2	1	2	2	2	2	2	2	3	3	1	24	2.0	15.2
D44	2	2	2	2	2	2	2	2	2	3	2	2	25	2.1	14.6
D45	2	2	3	3	2	3	2	3	2	2	4	2	30	2.5	12.2
D46	4	2	1	2	2	2	2	2	2	2	3	2	26	2.2	14.0
D47	2	2	1	2	2	1	2	2	2	3	4	2	25	2.1	14.6
D48	4	3	6	5	3	5	3	5	2	3	7	5	51	4.3	7.2
D49	2	2	2	2	2	1	2	2	2	3	3	2	25	2.1	14.6
D50	3	2	1	2	3	1	2	3	2	3	3	2	27	2.3	13.5
D51	2	2	1	2	2	1	2	2	2	2	3	3	24	2.0	15.2
D52	2	3	1	2	2	3	2	2	1	2	3	1	24	2.0	15.2
D53	3	2	1	3	2	1	2	2	2	3	3	2	26	2.2	14.0
D54	2	2	1	2	2	1	2	2	2	3	3	2	24	2.0	15.2
D58	3	3	2	2	4	2	2	3	4	3	4	2	34	2.8	10.7
D61	3	2	1	2	3	1	2	2	2	2	4	1	25	2.1	14.6
D62	3	2	1	1	3	1	2	2	2	2	3	1	23	1.9	15.9
D63	2	3	3	3	3	2	2	3	2	2	7	4	36	3.0	10.1
D64	2	3	1	2	3	1	1	2	2	2	3	2	24	2.0	15.2
D65	2	2	5	5	5	3	3	2	2	3	4	2	38	3.2	9.6
D66	2	1	2	3	2	1	3	2	2	2	4	2	26	2.2	14.0
D67	2	2	2	3	3	2	2	2	3	2	3	2	28	2.3	13.0
D68	2	2	5	3	4	1	1	5	2	3	4	1	33	2.8	11.1
D69	2	5	2	2	6	4	2	2	3	7	4	1	40	3.3	9.1
D70	1	3	1	5	4	4	4	3	3	2	3	3	36	3.0	10.1
D71	3	2	1	2	2	1	1	2	3	2	3	2	24	2.0	15.2
D72	1	2	3	2	2	4	1	2	3	2	3	1	26	2.2	14.0
D73	1	2	2	2	2	2	1	2	2	2	3	1	22	1.8	16.6
				1											
TOTAL	204	246	211	249	238	188	203	228	236	219	250	183	2655		
I /D/C	3.4	4.0	3.5	4.1	3.9	3.1	3.3	3.7	3.9	3.6	4.1	3.0			
UP	12	16	9	10	14	7	13	12	19	7	11	6	136	2.3	13.8
UDLL	29	29	32	38	18	25	28	40	32	41	32	29	373	2.6	12.1
LFC	10	15	13	14	10	19	11	18	19	12	18	12	171	2.4	13.1
LFLL	23	26	15	26	17	15	21	25	25	23	27	21	264	2.2	14.1
FHL	35	59	56	51	59	34	36	35	33	22	29	36	485	2.9	13.3
SLL	17	29	20	22	28	21	26	21	26	28	25	16	279	2.6	12.0
LDLL	78	72	66	88	92	67	68	77	82	86	108	63	946	2.5	12.9

CSO REGULATING CHAMBER DISCHARGE **NEWPC & SEWPC PLANT REGULATORS**

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
UPPER PENNYPACK 5 NEWPC UNITS													
P01													0
P02													0
P03													0
P04													0
P05													0
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS													
D02													0
D03													0
D04													0
D05													0
D06													0
D07													0
D08													0
D09													0
D11													0
D12													0
D13													0
D15													0
LOWER FRANKFORD CREEK 6 NEWPC UNITS													
F13													0
F14													0
F21													0
F23													0
F24													0
F25													0
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS													
F03													0
F04													0
F05													0
F06													0
F07													0
F08													0
F09													0
F10													0
F11													0
F12													0
FRANKFORD HIGH LEVEL 14 NEWPC UNITS													
T01													0
T03													0
T04		2											2
T05													0
T06													0
T07													0
T08													0
T09													0
T10	1				1							1	3
T11	2	1		1								1	5
T12													0
T13							1						1
T14													0
T15													0
													TOTAL
UP	0	0	0	0	0	0	0	0	0	0	0	0	0
UDLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LFC	0	0	0	0	0	0	0	0	0	0	0	0	0
LFLL	0	0	0	0	0	0	0	0	0	0	0	0	0
FHL	3	3	0	1	1	0	1	0	0	0	0	2	11
SLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LDLL	0	0	0	0	0	0	0	0	0	0	0	0	0

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
SOMERSET LOW LEVEL 9 NEWPC UNITS													
D17													0
D18													0
D19													0
D20													0
D21													0
D22													0
D23													0
D24													0
D25													0
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS													
D37													0
D38													0
D39													0
D40													0
D41													0
D42													0
D43													0
D44													0
D45													0
D46													0
D47													0
D48													0
D49													0
D50													0
D51													0
D52													0
D53													0
D54													0
D58													0
D61													0
D62													0
D63													0
D64													0
D65													0
D66													0
D67													0
D68													0
D69													0
D70													0
D71													0
D72													0
D73													0
D75													0
													TOTAL DISC
	3	3	0	1	1	0	1	0	0	0	0	2	11

	NO OF UNITS IN DISTRICT BLOCKED												**TOTAL**
UP	0	0	0	0	0	0	0	0	0	0	0	0	0
UDLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LFC	0	0	0	0	0	0	0	0	0	0	0	0	0
LFLL	0	0	0	0	0	0	0	0	0	0	0	0	0
FHL	2	2	0	1	1	0	1	0	0	0	0	2	9
SLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LDLL	0	0	0	0	0	0	0	0	0	0	0	0	0

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
UPPER PENNYPACK 5 NEWPC UNITS													
P01											1		1
P02											1		1
P03	1				1								2
P04											1		1
P05													0
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS													
D02			1	1					1		1		4
D03				1							1	1	3
D04	1		1						2			1	5
D05													0
D06								1	1				2
D07								1		1		1	3
D08	2	1	1	1			2						7
D09													0
D11		1	1										2
D12			1				1	1					3
D13										1			1
D15	2		1				1	2		1			7
LOWER FRANKFORD CREEK 6 NEWPC UNITS													
F13									1				1
F14	1	2	1	1		2			2				9
F21													0
F23				1									1
F24				1							1		2
F25													0
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS													
F03								1		1			2
F04								2					2
F05													0
F06													0
F07								2		1			3
F08													0
F09													0
F10							1						1
F11									1	1			2
F12										1			1
FRANKFORD HIGH LEVEL 14 NEWPC UNITS													
T01								1					1
T03													0
T04							1						1
T05													0
T06													0
T07										1			1
T08													0
T09	1												1
T10		1						2			1		4
T11			2	1								3	6
T12										1			1
T13			1				1	1	1				4
T14													0
T15										1			1

12.25 AVERAGE BLOCKAGES PER MONTH

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
SOMERSET LOW LEVEL 9 NEWPC UNITS													
D17													0
D18	1								1				2
D19										1		1	2
D20													0
D21							1						1
D22													0
D23										1			1
D24													0
D25													0
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS													
D37						1							1
D38		1											1
D39	1												1
D40								1	1	1		1	4
D41													0
D42								1	1	2	2		6
D43									1		2		3
D44								1	1			1	3
D45													0
D46													0
D47								1				1	2
D48	1	1	1					3		1	3	1	11
D49											1		1
D50													0
D51												1	1
D52													0
D53	1												1
D54													0
D58	1												1
D61								1			1		2
D62	1												1
D63								1				1	2
D64													0
D65												1	1
D66	1									1	1		3
D67							1				1		2
D68	1												1
D69	1												1
D70		1	1					1					3
D71	2												2
D72										1			1
D73													0
D75													0
													TOTAL
	19	8	12	7	1	3	9	24	14	18	18	14	147
UP	1	0	0	0	1	0	0	0	0	0	3	0	5
UDLL	5	2	6	3	0	0	4	5	4	3	2	3	37
LFC	1	2	1	3	0	2	0	0	3	0	1	0	13
LFLL	0	0	0	0	0	0	1	5	1	4	0	0	11
FHL	1	1	3	1	0	0	2	4	1	3	1	3	20
SLL	1	0	0	0	0	0	1	0	1	2	0	1	6
LDLL	10	3	2	0	0	1	1	10	4	6	11	7	55

CSO REGULATING CHAMBER MONTHLY INSPECTION

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
CENTRAL SCHUYLKILL EAST SIDE 18 SWWPC UNITS															
S05	5	6	7	5	3	2	4	3	2	2	6	5	50	4.2	7.3
S06	2	4	2	6	3	1	4	3	2	2	4	5	38	3.2	9.6
S07	2	4	2	7	4	1	4	3	2	2	3	5	39	3.3	9.4
S08	2	4	2	5	4	1	4	3	2	2	3	3	35	2.9	10.4
S09	2	5	3	3	3	1	2	3	2	2	2	4	32	2.7	11.4
S10	2	4	2	3	3	1	2	3	2	2	2	4	30	2.5	12.2
S12	3	4	2	4	4	2	5	4	3	3	3	4	41	3.4	8.9
S12A	3	4	3	4	4	2	5	4	3	3	3	4	42	3.5	8.7
S13	3	4	2	3	4	1	2	3	3	2	3	2	32	2.7	11.4
S15	2	3	2	3	2	2	3	3	3	2	3	3	31	2.6	11.8
S16	2	6	3	2	2	1	2	2	2	3	3	3	31	2.6	11.8
S17	2	3	2	2	2	1	2	2	2	3	2	2	25	2.1	14.6
S18	1	2	3	2	2	3	2	2	2	3	3	2	27	2.3	13.5
S19	3	3	3	2	2	2	4	3	3	3	2	4	34	2.8	10.7
S21	4	3	3	4	3	2	2	3	3	3	3	3	36	3.0	10.1
S23	2	2	2	2	2	1	2	2	2	2	3	5	27	2.3	13.5
S25	2	2	2	2	2	2	2	5	2	3	2	4	30	2.5	12.2
S26	2	2	2	2	2	3	1	2	2	2	5	3	28	2.3	13.0
LOWER SCHUYLKILL EAST SIDE 9 SWWPC UNITS															
S31	2	2	1	1	1	2	2	1	1	2	2	1	18	1.5	20.3
S35	2	2	1	1	2	2	1	1	1	2	2	1	18	1.5	20.3
S36	1	1	1	1	2	1	1	2	1	1		1	13	1.2	28.1
S36A	2	2	1	1	1	1	2	1	1	1	3	1	17	1.4	21.5
S37	1	1	1	1	1	1	1	1	1	1	1	1	12	1.0	30.4
S42	2	2	2	5	2	2	2	1	1	7	2	2	30	2.5	12.2
S42A	2	2	2	4	2	7	2	1	1	2	2	1	28	2.3	13.0
S44	2	1	1	1	1	1	1	1	1	1	1	1	13	1.1	28.1
S46	1	2	1	2	3	2	2	4	1	1	2	1	22	1.8	16.6
CENTRAL SCHUYLKILL WEST 9 SWWPC UNITS															
S01	2	2	2	2	1	1	2	2	3	2	2	2	23	1.9	15.9
S02	2	2	2	2	2	1	2	2	3	2	2	2	24	2.0	15.2
S03	2	2	3	2	1	2	2	2	3	2	2	1	24	2.0	15.2
S04	3	2	2	2	1	3	3	2	3	2	3	2	28	2.3	13.0
S11	2	2	1	2	1	2	2	1	2	2	1	1	19	1.6	19.2
S14	2	2	1	2	2	2	2	4	7	2	2	2	30	2.5	12.2
S20	2	2	1	3	5	14	6	1	4	1	1	2	42	3.5	8.7
S22	2	2	4	4	2	2	2	1	3	3	5	3	33	2.8	11.1
S24	2	2	6	5	2	2	2	1	3	3	5	3	36	3.0	10.1
SOUTHWEST MAIN GRAVITY 10 SWWPC UNITS															
S27	2	3	4	3	3	2	2	2	2	3	1	2	29	2.4	12.6
S28	2	2	3	2	3	1	2	2	2	3	1	2	25	2.1	14.6
S30	2	2	3	2	3	1	2	2	3	3	1	2	26	2.2	14.0
S34	2	2	2	3	4	2	4	3	2	3	4	3	34	2.8	10.7
S39	2	2	2	2	4	2	2	2	2	2	2	2	26	2.2	14.0
S40	2	2	1	1	5	2	3	2	2	2	2	1	25	2.1	14.6
S43	2	2	1	2	3	1	2	2	2	3	2	1	23	1.9	15.9
S47	2	2	1	2	2	1	2	1	2	3	2	1	21	1.8	17.4
S50	3	3	9	7	4	7	4	9	4	8	7	13	78	6.5	4.7
S51	3	3	2	6	2	2	2	1	2	5	3	8	39	3.3	9.4
LOWER SCHUYLKILL WEST SIDE 4 SWWPC UNITS															
S32	2	2	2	1	2	2	2	1	1	3	2	1	21	1.8	17.4
S33	2	2	6	3	2	2	2	1	1	3	2	2	28	2.3	13.0
S38	2	2	3	2	1	2	3	1	1	3	3	2	25	2.1	14.6
S45	2	2	1	1	1	1	2	1	1	3	4	1	20	1.7	18.2

3 TOTAL DISCHARGES IN SW DISTRICT

0.3 AVERAGE DISCHARGES PER MONTH

14.7 AVER. DAYS BEFORE RETURNING TO SITE

2.2 AVER. INSPECTIONS PER DAY PER CREW

DTR = DAYS TO RETURN TO SITE

I/D/C = INSPECTIONS PER DAY PER CREW

I/D = INSPECTIONS PER DISCHARGE

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
COBBS CREEK HIGH LEVEL 23 SWWPC UNITS															
C01	1	2	1	3	1	3	3	2	3	3	1	2	25	2.1	14.6
C02	1	2	1	3	5	3	3	2	3	3	1	2	29	2.4	12.6
C04	1	2	1	3	2	3	3	2	3	4	2	2	28	2.3	13.0
C04A	1	2	1	3	2	2	3	2	3	4	2	2	27	2.3	13.5
C05	1	2	1	4	3	2	3	2	2	3	1	2	26	2.2	14.0
C06	2	3	2	2	3	4	4	3	4	4	2	3	36	3.0	10.1
C07	2	4	2	3	4	2	4	3	3	3	2	3	35	2.9	10.4
C09	3	3	2	3	3	2	4	4	3	4	3	3	37	3.1	9.9
C10	1	2	2	2	3	2	3	3	2	5	2	2	29	2.4	12.6
C11	1	2	3	4	2	2	3	4	1	4	2	2	30	2.5	12.2
C12	1	2	2	2	2	2	3	3	1	3	1	1	23	1.9	15.9
C13	2	2	2	3	3	2	2	5	1	3	1	1	27	2.3	13.5
C14	2	2	2	3	4	2	3	4	1	3	3	1	30	2.5	12.2
C15	1	2	2	2	3	2	3	3	2	2	3	1	26	2.2	14.0
C16	2	2	2	2	3	2	3	4	2	2	3	1	28	2.3	13.0
C17	2	3	2	3	3	2	3	6	6	7	2	1	40	3.3	9.1
C31	1	3	2	3	2	2	3	4	3	3	1	2	29	2.4	12.6
C32	1	2	1	3	1	2	3	2	4	3	1	1	24	2.0	15.2
C33	1	3	2	3	2	2	3	3	3	3	1	2	28	2.3	13.0
C34	1	3	2	3	4	3	3	3	3	3	2	2	32	2.7	11.4
C35	1	3	2	3	2	3	3	2	3	3	1	2	28	2.3	13.0
C36	1	3	2	3	2	3	3	2	3	3	2	3	30	2.5	12.2
C37	1	3	2	3	2	2	3	3	4	3	1	2	29	2.4	12.6
COBBS CREEK LOW LEVEL 13 SWWPC UNITS															
C18	2	2	3	3	3	2	3	3	2	2	2	1	28	2.3	13.0
C19	2	2	2	2	3	2	3	4	2	2	2	1	27	2.3	13.5
C20	2	3	2	2	3	2	3	2	2	2	2	1	26	2.2	14.0
C21	2	2	2	2	2	3	3	2	2	2	2	1	25	2.1	14.6
C22	2	2	2	2	2	2	3	1	2	2	2	1	23	1.9	15.9
C23	2	2	2	4	2	1	2	2	2	2	2	1	24	2.0	15.2
C24	3	2	2	3	1	1	2	3	2	2	2	1	24	2.0	15.2
C25	2	3	3	3	2	2	2	4	3	3	4	2	33	2.8	11.1
C26	1	2	2	2	1	1	2	3	3	2	2	1	22	1.8	16.6
C27	1	2	2	2	1	1	2	3	2	2	2	1	21	1.8	17.4
C28A	1	2	2	2	1	1	2	2	2	2	2	1	20	1.7	18.2
C29	1	2	2	2	1	1	2	1	2	2	2	1	19	1.6	19.2
C30	1	2	1	2	1	1	2	1	2	2	2	1	18	1.5	20.3
TOTAL	161	214	188	236	206	179	225	214	200	233	197	191	2444		
I /D/C	1.8	2.3	2.1	2.6	2.3	2.0	2.5	2.3	2.2	2.6	2.2	2.1			
CSES	44	65	47	61	51	29	52	53	42	44	55	65	608	2.8	11.1
LSES	15	15	11	17	15	19	14	13	9	18	15	10	171	1.6	21.1
CSW	19	18	22	24	17	29	23	16	31	19	23	18	259	2.4	13.4
SWMG	22	23	28	30	33	21	25	26	23	35	25	35	326	2.7	12.8
LSW	8	8	12	7	6	7	9	4	4	12	11	6	94	2.0	15.8
CCHL	31	57	41	66	61	54	71	71	63	78	40	43	676	2.4	12.6
CCLL	22	28	27	31	23	20	31	31	28	27	28	14	310	2.0	15.7

CSO REGULATING CHAMBER DISCHARGE **SWWPC PLANT REGULATORS**

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
CENTRAL SCHUYLKILL EAST SIDE 18 SWWPC UNITS													
S05	1										1		2
S06													0
S07													0
S08													0
S09													0
S10													0
S12													0
S12A													0
S13													0
S15													0
S16													0
S17													0
S18													0
S19													0
S21													0
S23													0
S25													0
S26													0
LOWER SCHUYLKILL EAST SIDE 9 SWWPC UNITS													
S31													0
S35													0
S36													0
S36A													0
S37													0
S42										1			1
S42A													0
S44													0
S46													0
CENTRAL SCHUYLKILL WEST 9 SWWPC UNITS													
S01													0
S02													0
S03													0
S04													0
S11													0
S14													0
S20													0
S22													0
S24													0
SOUTHWEST MAIN GRAVITY 10 SWWPC UNITS													
S27													0
S28													0
S30													0
S34													0
S39													0
S40													0
S43													0
S47													0
S50													0
S51													0
LOWER SCHUYLKILL WEST SIDE 4 SWWPC UNITS													
S32													0
S33													0
S38													0
S45													0

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
COBBS CREEK HIGH LEVEL 23 SWWPC UNITS													
C01													0
C02													0
C04													0
C04A													0
C05													0
C06													0
C07													0
C09													0
C10													0
C11													0
C12													0
C13													0
C14													0
C15													0
C16													0
C17													0
C31													0
C32													0
C33													0
C34													0
C35													0
C36													0
C37													0
COBBS CREEK LOW LEVEL 13 SWWPC UNITS													
C18													0
C19													0
C20													0
C21													0
C22													0
C23													0
C24													0
C25													0
C26													0
C27													0
C28A													0
C29													0
C30													0
													TOTAL DISC
	1	0	0	0	0	0	0	0	0	1	1	0	3

	NO OF UNITS IN DISTRICT BLOCKED												TOTAL
CSE	1	0	0	0	0	0	0	0	0	0	1	0	2
LSE	0	0	0	0	0	0	0	0	0	1	0	0	1
CSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SWG	0	0	0	0	0	0	0	0	0	0	0	0	0
LSW	0	0	0	0	0	0	0	0	0	0	0	0	0
CCHL	0	0	0	0	0	0	0	0	0	0	0	0	0
CCLL	0	0	0	0	0	0	0	0	0	0	0	0	0

	NO OF DISCHARGES IN DISTRICT												TOTAL
CSE	1	0	0	0	0	0	0	0	0	0	1	0	2
LSE	0	0	0	0	0	0	0	0	0	1	0	0	1
CSW	0	0	0	0	0	0	0	0	0	0	0	0	0
SWG	0	0	0	0	0	0	0	0	0	0	0	0	0
LSW	0	0	0	0	0	0	0	0	0	0	0	0	0
CCHL	0	0	0	0	0	0	0	0	0	0	0	0	0
CCLL	0	0	0	0	0	0	0	0	0	0	0	0	0

CSO REGULATING CHAMBER MONTHLY BLOCKS CLEARED

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
CENTRAL SCHUYLKILL EAST SIDE 18 SWWPC UNITS													
S05		1	1							1			3
S06													0
S07				1			1				2	1	5
S08	1	1	1					2		1		1	7
S09		1			1								2
S10													0
S12							1			1			2
S12A							2						2
S13										1			1
S15									1			1	2
S16	1	2		1						1			5
S17													0
S18				1		1	1				1	1	5
S19					1							1	2
S21	1												1
S23	1						1		2			2	6
S25	1				1	1						1	4
S26		1			1	1	1			2			6
LOWER SCHUYLKILL EAST SIDE 9 SWWPC UNITS													
S31													0
S35													0
S36													0
S36A													0
S37													0
S42				2		1	1						4
S42A						1	1						2
S44													0
S46								1			1		2
CENTRAL SCHUYLKILL WEST 9 SWWPC UNITS													
S01												1	1
S02					1								1
S03			2			1			1				4
S04								1	1				2
S11													0
S14		1	1		1		1	1	1				6
S20					1								1
S22						1					1	2	4
S24						1	1			1	1	1	5
SOUTHWEST MAIN GRAVITY 10 SWWPC UNITS													
S27													0
S28										1			1
S30							1	1	2				4
S34			1			1	1						3
S39									1	1	1	1	4
S40							1						1
S43					1								1
S47						1		1				1	3
S50				1				1					2
S51				1									1
LOWER SCHUYLKILL WEST SIDE 4 SWWPC UNITS													
S32					1	1							2
S33			2							1		1	4
S38						1					1		2
S45													0

11.92 AVERAGE BLOCKAGES PER MONTH

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
COBBS CREEK HIGH LEVEL 23 SWWPC UNITS													
C01							1						1
C02					1								1
C04													0
C04A												1	1
C05												1	1
C06								1					1
C07												1	1
C09													0
C10													0
C11													0
C12													0
C13													0
C14	1												1
C15													0
C16								1					1
C17													0
C31							1						1
C32													0
C33				1				1					2
C34			1				1	1					3
C35							1	2					3
C36				1			1	1					3
C37			1				1						2
COBBS CREEK LOW LEVEL 13 SWWPC UNITS													
C18													0
C19							1						1
C20		1											1
C21													0
C22													0
C23													0
C24								1					1
C25													0
C26		1						1					2
C27				1									1
C28A													0
C29				1					1				2
C30													0
													TOTAL
	6	9	10	11	10	12	21	17	10	11	8	18	143
CSE	5	6	2	3	4	3	7	2	3	7	3	8	53
LSE	0	0	0	2	0	2	2	1	0	0	1	0	8
CSW	0	1	3	0	3	3	2	2	3	1	2	4	24
SWG	0	0	1	2	1	2	3	3	3	2	1	2	20
LSW	0	0	2	0	1	2	0	0	0	1	1	1	8
CCHL	1	0	2	2	1	0	6	7	0	0	0	3	22
CCLL	0	2	0	2	0	0	1	2	1	0	0	0	8

RELIEF SEWER MONTHLY INSPECTION

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
THOMAS RUN RELIEF SEWER													
R01	1	2	1	2	1	1	1	2	1	1	1	1	15
R02	1	2	1	2	1	1	1	2	1	1	1	1	15
R03	1	2	1	2	1	1	1	2	1	1	1	1	15
R04	1	2	1	2	1	1	1	2	1	1	1	1	15
R05	1	2	1	2	1	1	1	2	1	1	1	1	15
R06	1	2	1	2	1	1	1	2	1	1	1	1	15
MAIN RELIEF SEWER													
R07	1	3	2	2	1	1	1	2	4	2	1	1	21
R08	1	2	2	2	1	1	1	2	1	2	1	1	17
R09	1	2	2	2	1	1	1	2	1	2	2	1	18
R10	1	3	2	2	1	1	1	2	1	2	1	1	18
R11	1	3	1	2	1	1	1	2	1	2	1	1	17
R11A	1	3	1	2	1	1	1	2	1	2	1	1	17
R12	1	2	1	1	1	1	1	1	1	2	1	1	14
WAKLING RELIEF SEWER													
R13	2	2	2	1	1	1		1	1	2	1	1	15
R14	2	2	2	1	3	1	1	1	1	2	1	1	18
ROCK RUN STORM FLOOD RELIEF SEWER													
R15	2	2	2	2	1	1	1	1	1	2	1	1	17
OREGON AVE RELIEF SEWER													
R16	2	1	1	1	1	1	2	1	2	1	2	1	16
R17	2	1	1	1	2	1	2	1	2	1	2	2	18
FRANKFORD HIGH LEVEL RELIEF SEWER													
R18	1	1	2	2	2	1	1	1	1	2	1	1	16
32ND ST RELIEF SEWER													
R19	1	2	2	2	2	1	1	2	1	1	1	1	17
MAIN STREET RELIEF SEWER													
R20	1	2	2	2	2	1	1	1	1	1	1	1	16
SOMERSET SYSTEM DIVERSION CHAMBER													
R21													0
TEMPORARY REGULATOR CHAMBER													
R22													
R23	1	2	1	2	2	1	1	1	1	1	1	1	15
ARCH ST RELIEF SEWER													
R24	1	2	1	1	1	1	1	1	1	2	1	1	14
16TH & SNYDER													
R25	1	2	1	1	2	1	1	1	1	1	1	1	14
GRANT & STATE RD. RELIEF													
R26	1	2	2	2	1	1	1	1	1	1		1	14
TOTAL	30	51	36	43	33	25	26	38	30	37	27	26	402
AVER	1.1	1.9	1.3	1.6	1.2	0.9	1.0	1.4	1.1	1.4	1.0	1.0	1.2

RELIEF SEWER MONTHLY DISCHARGE

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
THOMAS RUN RELIEF SEWER													
R01													0
R02													0
R03													0
R04													0
R05													0
R06													0
MAIN RELIEF SEWER													
R07													0
R08													0
R09													0
R10													0
R11													0
R11A													0
R12													0
WAKLING RELIEF SEWER													
R13													0
R14													0
ROCK RUN STORM FLOOD RELIEF SEWER													
R15													0
OREGON AVE RELIEF SEWER													
R16													0
R17													0
FRANKFORD HIGH LEVEL RELIEF SEWER													
R18													0
32ND ST RELIEF SEWER													
R19													0
MAIN STREET RELIEF SEWER													
R20													0
SOMERSET SYSTEM DIVERSION CHAMBER													
R21													0
TEMPORARY REGULATOR CHAMBER													
R22													0
R23													0
ARCH ST RELIEF SEWER													
R24													0
16TH & SNYDER													
R25													0
GRANT & STATE RD. RELIEF													
R26													0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
UNITS	0	0	0	0	0	0	0	0	0	0	0	0	

RELIEF SEWER MONTHLY BLOCKS CLEARED

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
THOMAS RUN RELIEF SEWER													
R01													0
R02													0
R03													0
R04										1			1
R05													0
R06													0
MAIN RELIEF SEWER													
R07										1			1
R08													0
R09													0
R10													0
R11													0
R11A													0
R12													0
WAKLING RELIEF SEWER													
R13													0
R14													0
ROCK RUN STORM FLOOD RELIEF SEWER													
R15													0
OREGON AVE RELIEF SEWER													
R16													0
R17													0
FRANKFORD HIGH LEVEL RELIEF SEWER													
R18													0
32ND ST RELIEF SEWER													
R19													0
MAIN STREET RELIEF SEWER													
R20													0
SOMERSET SYSTEM DIVERSION CHAMBER													
R21													0
TEMPORARY REGULATOR CHAMBER													
R22													0
R23													0
ARCH ST RELIEF SEWER													
R24													0
16TH & SNYDER													
R25													0
GRANT & STATE RD. RELIEF													
R26													0
TOTAL	0	0	0	0	0	0	0	0	0	2	0	0	2
AVER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

MISCELLANEOUS SITE INSPECTIONS

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
P-090-02-PFD-01 SANDY RUN CREEK DIVERSION REGULATOR													
	4	5	3	3	2	5	3	2	2	4	6	6	45
T-088-01-CFD-01 PLYMOUTH ST. WEST OF PITTVILLE													
	2	5	2	2	2	4	5	3	2	4	5	4	40
T-088-01-CFD-02 PITTVILLE ST. SOUTH OF PLYMOUTH ST.													
	2	4	2	2	2	4	4	3	2	4	6	3	38
T-088-01-CFD-03 ELSTON ST. E. OF BOUVIER ST.													
	2	3	1	2	2	4	1	3	2	3	5	3	31
T-088-01-CFD-04 ASHLEY ST. W. OF BOUVIER ST.													
	1	3	1	2	2	4	1	2	2	3	5	3	29
T-088-01-CFD-05 CHELTENHAM AVE. E. OF 19TH ST.													
	2	3	2	2	2	3	1	2	2	3	4	2	28
T-088-01-CFD-06 VERBENA ST. S. OF CHELTENHAM AVE.													
	1	3	1	2	2	2	2	2	2	3	4	2	26
W-060-01-MFD-01 JANNETTE ST. WEST OF MONASTERY AVE.													
	2	3	2	2	2	2	2	2	2	2	2	2	25
W-060-01-MFD-02 GREEN LANE NORTH OF LAWNTON ST.													
	2	3	1	2	2	2	2	1	1	2	1	2	21
T-089-04-CFD-01 FRANKLIN & HASBROOK													
	5	6	2	8	7	9	9	4	5	6	7	10	78
T-088-01-CFD-07 CHELTENHAM E. OF 7 TH ST.													
	2	4	2	3	2	4	5	2	2	5	4	6	41
T-088-01-CFD-08 7 TH ST. S. OF CHELTENHAM													
	2	3	2	3	2	3	4	3	2	5	4	6	39
Totals	27	45	21	33	29	46	39	29	26	44	53	49	441

MISCELLANEOUS SITE DISCHARGES

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
P-090-02-PFD-01 SANDY RUN CREEK DIVERSION REGULATOR													
										1			1
T-088-01-CFD-01 PLYMOUTH ST. WEST OF PITTVILLE													
													0
T-088-01-CFD-02 PITTVILLE ST. SOUTH OF PLYMOUTH ST.													
													0
T-088-01-CFD-03 ELSTON ST. E. OF BOUVIER ST.													
													0
T-088-01-CFD-04 ASHLEY ST. W. OF BOUVIER ST.													
													0
T-088-01-CFD-05 CHELTENHAM AVE. E. OF 19TH ST.													
													0
T-088-01-CFD-06 VERBENA ST. S. OF CHELTENHAM AVE.													
													0
W-060-01-MFD-01 JANNETTE ST. WEST OF MONASTERY AVE.													
													0
W-060-01-MFD-02 GREEN LANE NORTH OF LAWNTON ST.													
													0
T-089-04-CFD-01 FRANKLIN & HASBROOK													
		1		2								3	6
T-088-01-CFD-07 CHELTENHAM E. OF 7 TH ST.													
							1						1
T-088-01-CFD-08 7 TH ST. S. OF CHELTENHAM													
													0
Totals	0	1	0	2	0	0	1	0	0	1	0	3	8

MISCELLANEOUS SITE BLOCKAGES CLEARED

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
P-090-02-PFD-01 SANDY RUN CREEK DIVERSION REGULATOR													
							1						1
T-088-01-CFD-01 PLYMOUTH ST. WEST OF PITTVILLE													
							1	1		2	1	1	6
T-088-01-CFD-02 PITTVILLE ST. SOUTH OF PLYMOUTH ST.													
	2	1					1			2			6
T-088-01-CFD-03 ELSTON ST. E. OF BOUVIER ST.													
										1			1
T-088-01-CFD-04 ASHLEY ST. W. OF BOUVIER ST.													
				1				1					2
T-088-01-CFD-05 CHELTENHAM AVE. E. OF 19TH ST.													
					1			1					2
T-088-01-CFD-06 VERBENA ST. S. OF CHELTENHAM AVE.													
	1												1
W-060-01-MFD-01 JANNETTE ST. WEST OF MONASTERY AVE.													
													0
W-060-01-MFD-02 GREEN LANE NORTH OF LAWNTON ST.													
													0
T-089-04-CFD-01 FRANKLIN & HASBROOK													
	1	1		1	1		2	1		1		1	9
T-088-01-CFD-07 CHELTENHAM E. OF 7 TH ST.													
	1	3	2	2			2					1	11
T-088-01-CFD-08 7 TH ST. S. OF CHELTENHAM													
	2	1		2	1			2				1	9
Totals	7	6	2	6	3	0	7	6	0	6	1	4	48

FY 2013 CSO Dry Weather Discharge Listing

Discharge Observed		Discharge Stopped		Last Inspection						
Date	Time	Date	Time	Date	Time	Site ID	Collector	Type Unit	Location	Comment
07/02/12	09:10 AM	07/02/12	09:50 AM	06/30/12	07:40 AM	S-05	CSES	B & B	24th St. 155 S of Park Towne Place	A LARGE ROCK WAS IN THE REGULATOR OPENING.
07/19/12	12:30 PM	07/19/12	12:10 PM	07/14/12	10:20 AM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	GRIT AND DEBRIS BLOCKING SLOT.
07/21/12	07:20 AM	07/21/12	09:30 AM	07/20/12	09:00 AM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	TRASH AND DEBRIS IN SLOT.
07/25/12	11:30 AM	07/25/12	02:40 PM	07/14/12	08:40 AM	T-10	FHL	SLOT	Roosevelt Blvd. E of Tacony Creek	DEBRIS AND TRASH IN DWO PIPE.
08/08/12	02:00 PM	08/08/12	03:40 PM	07/31/12	02:30 PM	T-04	FHL	SLOT	Rising Sun Ave. E of Tacony Creek	GREASE IN DWO PIPE.
08/16/12	09:30 AM	08/16/12	12:30 PM	08/13/12	09:40 AM	T-04	FHL	SLOT	Rising Sun Ave. E of Tacony Creek	DEBRIS IN DWO PIPE.
08/29/12	02:20 PM	08/29/12	03:20 PM	08/20/12	10:40 AM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	WAS BLOCK WITH DEBRIS IN DWO PIPE
10/22/12	01:40 PM	10/22/12	02:10 PM	10/12/12	10:00 AM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	LEAVES, STICKS, TRASH AND SODA CAN BLOCKING SLOT.
11/23/12	01:40 PM	11/23/12	03:20 PM	11/19/12	12:50 PM	T-10	FHL	SLOT	Roosevelt Blvd. E of Tacony Creek	DWO PIPE BLOCKED.
01/04/13	11:10 AM	01/04/13	12:20 PM	12/15/12	01:10 PM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	TREE LIMB AND DEBRIS BLOCKAGE IN DWO PIPE.
04/20/13	01:40 PM	04/20/13	04:00 PM	04/12/13	01:40 PM	S-42	LSES	B & B	Passyunk Ave. & 29th St.	SEVERAL TREE LIMBS, TREE STUMPS AND DEBRIS BLOCKING REGULATOR INLET AND SHUTTER GATE.
05/29/13	09:50 AM	05/29/13	10:40 AM	05/23/13	09:10 AM	S-05	CSES	B & B	24th St. 155 S of Park Towne Place	SHUTTER GATE STUCK IN CLOSED POSITION AND MOUTH OF DWO PIPE BLOCKED WITH STICKS AND DEBRIS.
06/22/13	09:30 AM	06/22/13	11:30 AM	06/17/13	08:30 AM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	DEBRIS AND GRIT IN DWO LINE.
06/22/13	01:10 PM	06/22/13	01:50 PM	06/08/13	09:40 AM	T-10	FHL	SLOT	Roosevelt Blvd. E of Tacony Creek	GRIT AND SAND DWO PIPE.

Dry Weather Discharges are continually tracked and analyzed to determine if new or modified maintenance procedures would help to prevent them from occurring. Although our established procedures have greatly reduced the number and duration of these discharges, the combined system picks up all manner of trash and debris that is unpredictable in its pattern of causing flow disruptions. Despite our best management practices of; having all inlets trapped and cleaned; preventative maintenance schedules for sewer flushing and cleaning or the regulators; CCTV inspection of DWO pipes; etc., it is virtually impossible to eliminate all blockages that could occur.

The City continues to aggressively control and minimize these dry weather overflows by utilizing the latest technology-based controls including our Collector System Remote Monitoring Network that currently includes over 320 sites with over 720 individual level and/or flow measurements. The CSO maintenance personnel are trained in the use of the system’s computer programs for analyzing the data and have developed a comprehensive understanding of individual CSO site’s distinct flow patterns. This familiarity allows them to quickly recognize abnormal conditions that may indicate accumulating debris so that they can respond before developing into a dry weather CSO blockage.

Collector System - Flow Control Unit - FY 2013 CSO Annual Report Miscellaneous Maintenance

SOMERSET GRIT CHAMBER CLEANINGS

DATE	TONS
4/22/2013	67
12/6/2012	92
7/16/2012	39

T-04 FLOATABLES PILOT PROJECT DEBRIS NET REPLACEMENTS

DATE	TOTAL WEIGHT
12/31/2012	
8/9/2012	125
7/25/2012	40

Discontinued 12/31/2012

CSO B&B REGULATOR MAINTENANCE

SITE	DATE
S-25	6/29/2013
S-23	6/29/2013
F-14	6/29/2013
D-66	6/29/2013
D-65	6/29/2013
D-63	6/29/2013
S-2	6/28/2013
S-1	6/28/2013
S-9	6/22/2013
S-18	6/22/2013
S-16	6/22/2013
S-7	6/1/2013
S-6	6/1/2013
S-5	6/1/2013
D-19	5/26/2013
D-18	5/26/2013
D-39	3/16/2013
D-38	3/16/2013
D-37	3/16/2013
D-72	12/28/2012
D-41	12/18/2012
S-20	12/4/2012
S-46	11/3/2012
S-33	11/3/2012
S-8	10/20/2012
S-7	10/20/2012
S-6	10/20/2012
D-41	10/15/2012
D-70	10/13/2012
D-18	10/13/2012
S-18	9/29/2012
S-16	9/29/2012
D-49	9/29/2012
D-44	9/29/2012
S-9	9/22/2012
S-50	9/7/2012
S-38	9/7/2012
F-14	9/7/2012
D-20	9/7/2012
D-19	9/7/2012

CSO TIDE GATE MAINTENANCE

SITE	DATE
S-50	6/1/2013
D-12	5/29/2013
D-37	12/29/2012
D-49	9/29/2012
D-44	9/29/2012
S-18	9/29/2012

CSO OUTFALL - DEBRIS GRILL MAINTENANCE

SITE	DATE
T-15	6/24/2013
PFD-01	6/14/2013
T-8	6/6/2013
T-15	5/16/2013
PFD-01	4/5/2013
T-15	3/26/2013
PFD-01	2/27/2013
T-15	2/22/2013
T-15	12/20/2012
PFD-01	12/10/2012
T-15	10/26/2012
T-8	10/23/2012
T-8	8/16/2012
PFD-01	8/1/2012
T-15	7/17/2012
T-8	7/13/2012

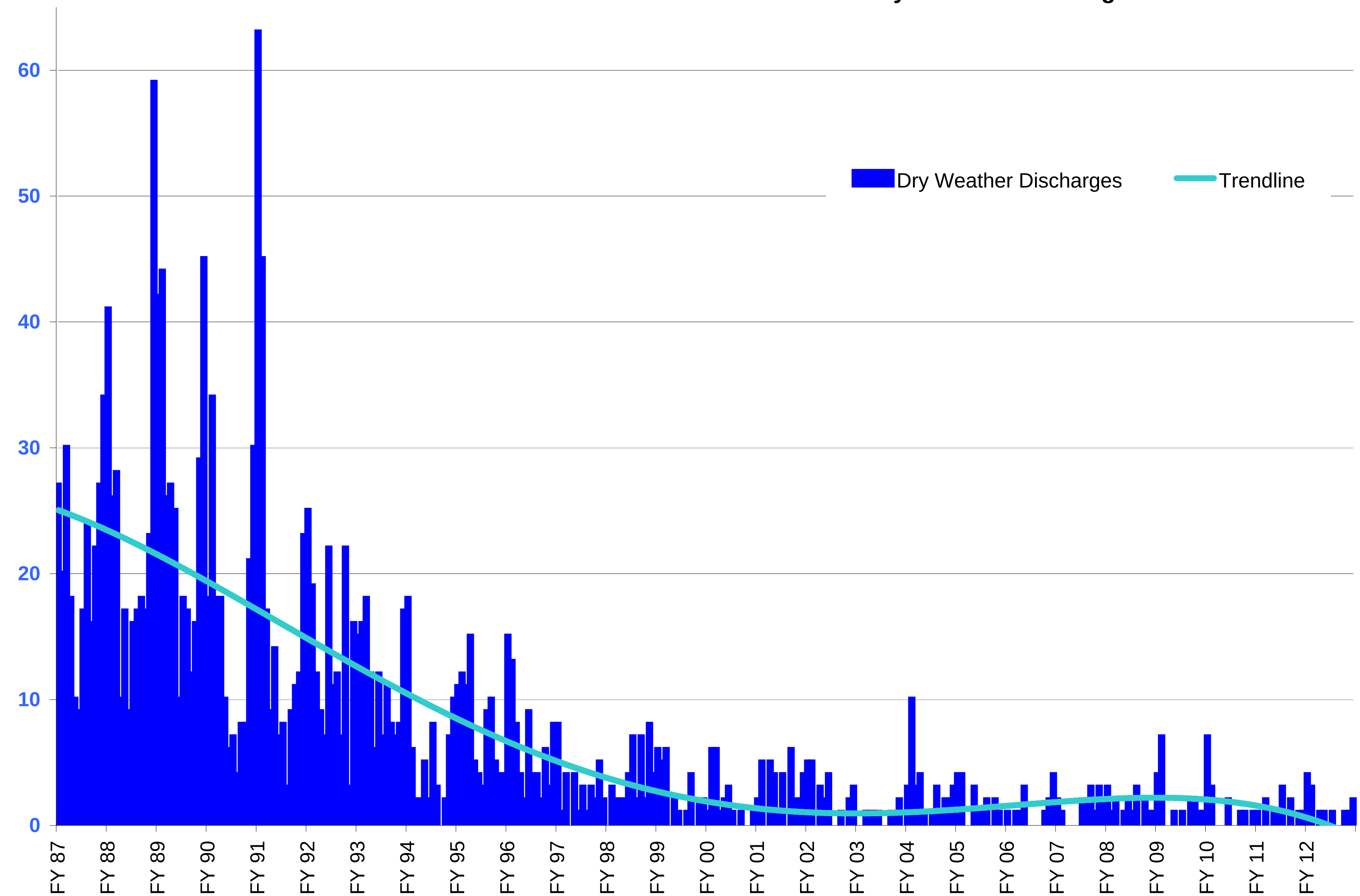
CSPS GRIT POCKET CLEANINGS

DATE	CU. YARDS
7/26/2013	26
6/26/2013	7
4/3/2013	16
7/27/2012	25

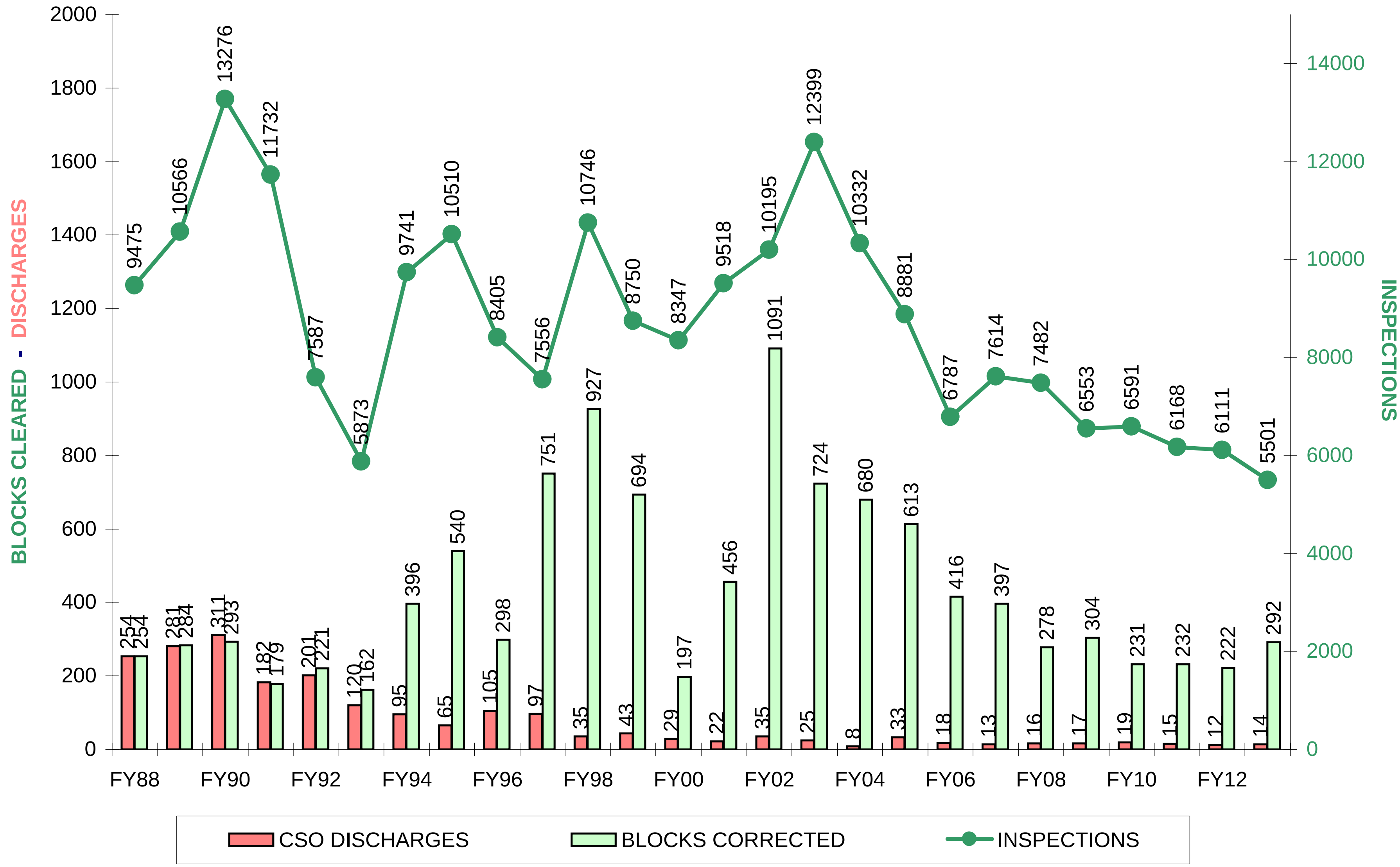
COMPUTER CONTROL CHAMBER PREVENTATIVE MAINTENANCE

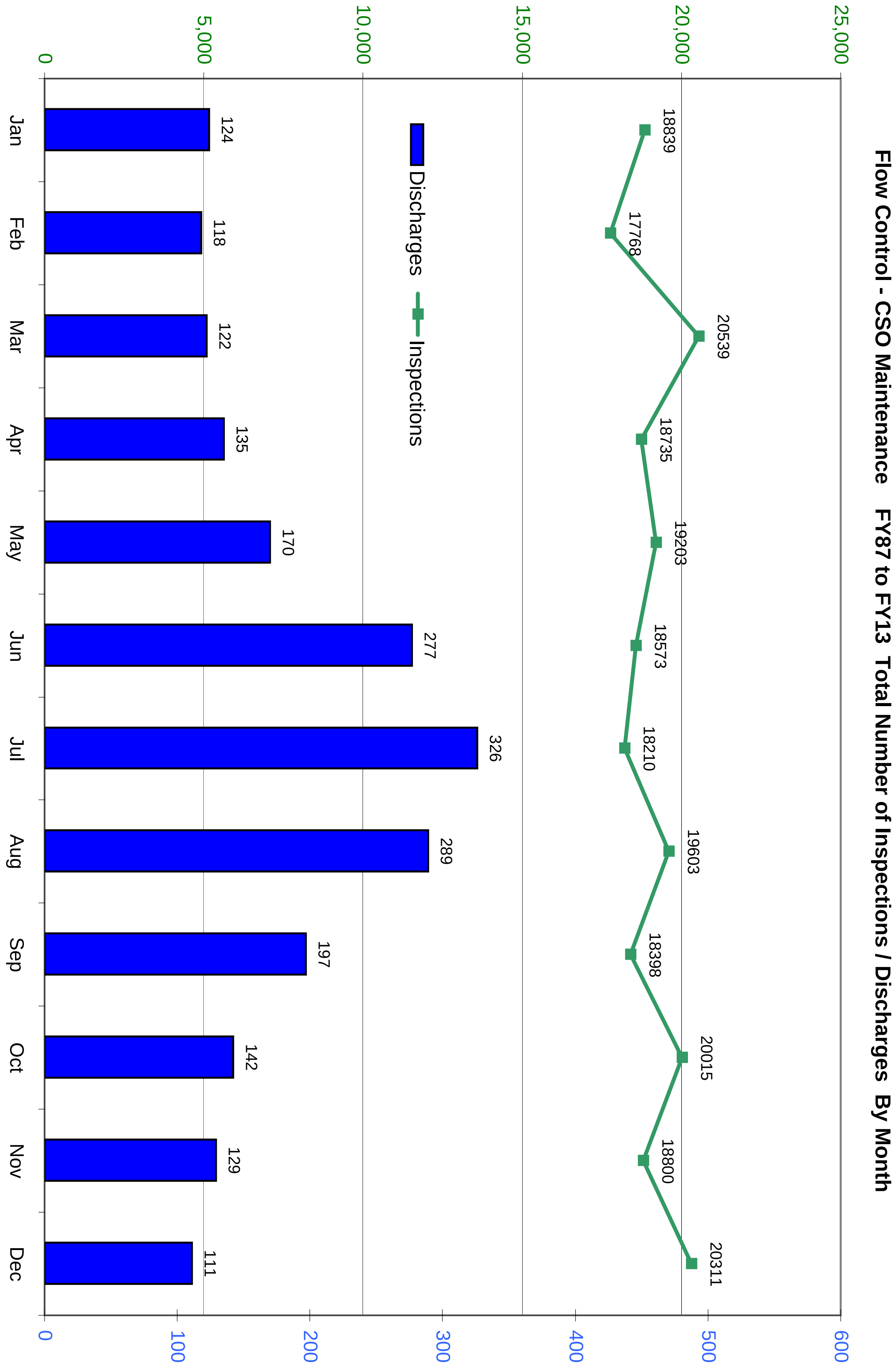
SITE	DATE
D-2	7/31/2013
D-3	7/31/2013
D-9	7/25/2013
Rock Run	7/24/2013
T-14	7/24/2013
Art Museum	7/12/2013
D-5	7/11/2013
D-7	7/10/2013
D-15	7/10/2013
D-11	7/9/2013
F-25	7/9/2013
Art Museum	6/28/2013
T-14	6/28/2013
Rock Run	6/27/2013
D-2	6/26/2013
D-9	6/26/2013
D-15	6/24/2013
D-3	6/21/2013
D-5	6/20/2013
D-7	6/20/2013
D-11	6/19/2013
Art Museum	5/30/2013
T-14	5/29/2013
F-25	5/24/2013
Rock Run	5/23/2013
D-15	5/20/2013
D-9	5/13/2013
D-11	5/13/2013
D-2	5/9/2013
D-5	5/8/2013
D-3	5/6/2013
D-7	5/6/2013
T-14	4/25/2013
Rock Run	4/22/2013
D-5	4/19/2013
D-7	4/18/2013
Art Museum	4/18/2013
D-3	4/17/2013
D-9	4/17/2013
D-11	4/17/2013
D-15	4/15/2013
F-25	4/15/2013
D-2	4/11/2013
Rock Run	3/25/2013
D-9	3/22/2013
D-3	3/8/2013
Art Museum	3/8/2013
D-7	3/7/2013
D-11	3/7/2013
F-25	3/7/2013
D-2	3/6/2013
D-5	3/4/2013
D-15	3/4/2013
D-3	1/28/2013
D-5	1/25/2013
D-11	1/25/2013
D-2	1/18/2013
D-7	1/16/2013
D-9	1/14/2013
D-15	1/14/2013
F-25	1/14/2013

Flow Control - CSO Maintenance   FY87 to FY13 Dry Weather Discharges

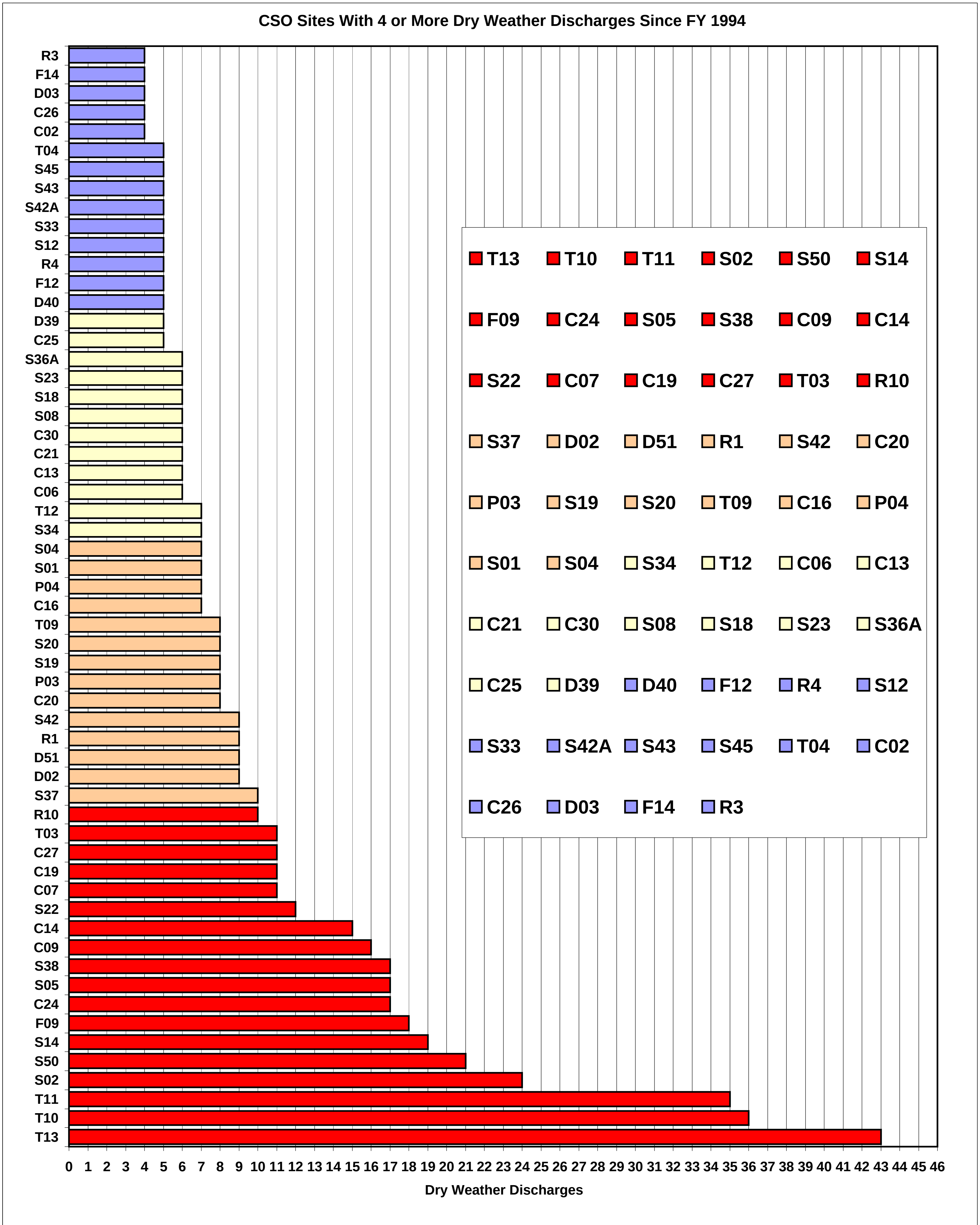


Flow Control - CSO Maintenance FY87 to FY13 Inspections / Discharges / Blocks





Flow Control - CSO Maintenance FY87 to FY13 Total Number of Inspections / Discharges By Month
Discharges
Inspections
0
5,000
10,000
15,000
20,000
25,000
0
100
200
300
400
500
600
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
124
118
122
135
170
277
326
289
197
142
129
111
18839
17768
20539
18735
19203
18573
18210
19603
18398
20015
18800
20311


CSO Sites With 4 or More Dry Weather Discharges Since FY 1994
R3
F14
D03
C26
C02
T04
S45
S43
S42A
S33
S12
R4
F12
D40
D39
C25
S36A
S23
S18
S08
C30
C21
C13
C06
T12
S34
S04
S01
P04
C16
T09
S20
S19
P03
C20
S42
R1
D51
D02
S37
R10
T03
C27
C19
C07
S22
C14
C09
S38
S05
C24
F09
S14
S50
S02
T11
T10
T13
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46
Dry Weather Discharges
T13 T10 T11 S02 S50 S14
F09 C24 S05 S38 C09 C14
S22 C07 C19 C27 T03 R10
S37 D02 D51 R1 S42 C20
P03 S19 S20 T09 C16 P04
S01 S04 S34 T12 C06 C13
C21 C30 S08 S18 S23 S36A
C25 D39 D40 F12 R4 S12
S33 S42A S43 S45 T04 C02
C26 D03 F14 R3

APPENDIX C

Green City, Clean Waters

FY2013 Annual Reporting for COA and WQBEL Obligations

Submitted to

The Commonwealth of Pennsylvania

Department of Environmental Protection

and The United States Environmental Protection Agency

By the Philadelphia Water Department

September 30, 2013

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Appendix 1: Completed Projects

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Appendix 4: Verified Private Development Green Stormwater Infrastructure Projects

Appendix 5: Green Stormwater Infrastructure Monitoring Status Report

Glossary of Acronyms

ADCP	Acoustic Doppler Current Profiler
ADA	Americans with Disabilities Act
AOCC	Administrative Order for Compliance on Consent
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CCLL	Cobbs Creek Low Level
City	City of Philadelphia
CMP	Comprehensive Monitoring Plan
COA	Consent Order and Agreement
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
DO	Dissolved Oxygen
DPP	Department of Public Property
ECA	Energy Coordinating Agency
FY	Fiscal Year
GA	Greened Acre
GIS	Geographic Information Systems
GSI	Green Stormwater Infrastructure
IAMP	Implementation and Adaptive Management Plan
L&I	Department of Licenses and Inspection
LTCP	Long Term Control Plan and its supplemental documents
LTCPU	Long Term Control Plan Update
MOU	Memorandum of Understanding
MOTU	Mayor's Office of Transportation and Utilities
MS4	Municipal Separate Storm Sewer System
NMCs	Nine Minimum Controls
NOAA	National Oceanic and Atmospheric Association
NPDES	National Pollutant Discharge Elimination System
PADEP	Pennsylvania Department of Environmental Protection
PCPC	Philadelphia City Planning Commission
PDE	Partnership for the Delaware Estuary
PEC	Pennsylvania Environmental Council
PennDOT	Pennsylvania Department of Transportation
PHA	Philadelphia Housing Authority
PIDC	Philadelphia Industrial Development Corporation
PPR	Philadelphia Parks and Recreation
RDA	Redevelopment Authority
RFI	Request for Information
RFP	Request for Proposal
RTC	Real Time Control
RTP	Rebuilding Together Philadelphia
SDP	School District of Philadelphia
SEPTA	Southeastern Pennsylvania Transportation Authority
SMIP	Stormwater Management Incentive Program
SMP	Stormwater Management Practice
SOD	Sediment Oxygen Demand
SRT	Simulated Runoff Testing
Streets Department	Philadelphia Streets Department
SRT	Simulated Runoff Testing

SSES	Sewer System Evaluation Survey
SWMM	Stormwater Management Model
TIGER	Transportation Investment Generating Economic Recovery
TPL	Trust for Public Land
TTF	Tookany/Tacony-Frankford Watershed
USEPA	United States Environmental Protection Agency
WASP	Water Quality Analysis Simulation Program
Water Department	Philadelphia Water Department
WPCP	Water Pollution Control Plant
WQBEL	Water Quality-Based Effluent Limit
ZCC	Zoning Code Commission

1.0 Introduction

The Consent Order and Agreement (COA) signed by the City of Philadelphia (City) and the Pennsylvania Department of Environmental Protection (PADEP), and the Administrative Order for Compliance on Consent (AOCC) with the United States Environmental Protection Agency (US EPA), formalized the regulatory approval of the *Green City, Clean Waters* program and amended the 2009 CSO Long Term Control Plan Update. As required by the COA, this Annual Report presents the City's *Green City, Clean Waters* implementation progress between July 1, 2012 and June 30, 2013.

1.1 Water Quality Based Effluent Limit (WQBEL) Performance Standards

The City's Combined Sewer Overflow (CSO) Long Term Control Plan Update (LTCPU) and its supplements are based on compliance with the National CSO Policy and to meet the water quality requirements of the Clean Water Act and the Pennsylvania Clean Streams Law. The City will construct and place into operation the controls described as the selected alternative in the LTCPU and its supplements to achieve the elimination of the mass of pollutants that would otherwise be removed by the capture of 85% by volume of the combined sewage collected in the Combined Sewer System (CSS) during precipitation events on a system-wide annual average basis.

Table 1-1 contains the Water Quality-Based Effluent Limits (WQBEL) implementation as defined in the COA.

1.2 First Five-Years of Deliverables to PADEP

The COA requires twelve deliverables due between December 1, 2011 and June 1, 2015 (**Table 1-2**). Seven deliverables were submitted to PADEP and the USEPA during the reporting period from July 1, 2012 to June 30, 2013:

> **The Comprehensive Monitoring Plan (CMP)** was submitted to the PADEP and USEPA prior to December 1, 2012. The CMP describes the plan for performing monitoring of natural and engineered systems associated with the *Green City, Clean Waters* program and addressed the monitoring and assessment of surface waters, groundwater, rainfall, CSO discharges, sewer flows, and green infrastructure performance.
>
> **The Facility Concept Plans for the Northeast, Southeast, and Southwest Water Pollution Control Plants** were submitted to the PADEP and USEPA prior to June 1, 2013. These plans describe the engineering and construction activities proposed to increase the maximum wet weather flow to or through each water pollution control plant, thereby increasing the capture rate of combined sewage.

Table 1-1: WQBEL Performance Standards

Metric	Units	Base line value	Cumulative amount as of Year 5 (2016)	Cumulative amount as of Year 10 (2021)	Cumulative amount as of Year 15 (2026)	Cumulative amount as of Year 20 (2031)	Cumulative amount as of Year 25 (2036)
NE / SW / SE WPCP upgrade: Design	percent complete	0	*note(1)	*note(1)	*note(1)	100%	100%
NE / SW / SE WPCP upgrade: Construction	percent complete	0	*note(1)	*note(1)	*note(1)	100%	100%
Miles of interceptor lined	Miles	0	2	6	14.5	14.5	14.5
Overflow Reduction Volume**(2)	million gallons per year	0	600	2,044	3,619	5,985	7,960
Equivalent Mass Capture (TSS)	Percent	62%	Report value	Report value	Report value	Report value	85%
Equivalent Mass Capture (BOD)	Percent	62%	Report value	Report value	Report value	Report value	85%
Equivalent Mass Capture (*Fecal Coliform*)	Percent	62%	Report value	Report value	Report value	Report value	85%
Total Greened Acres	GAs	0	744	2,148	3,812	6,424	9,564

*(1) Performance Standards for "percent complete" for the WPCP upgrade design and construction projects were not available at the time of the [date] Consent Order and Agreement. The City shall provide these targets to the Department along with the Facility Concept Plan for the WPCP. The Facility Concept Plan is due on a specific date in the Consent Order and Agreement. After the Department approves the Facility Concept Plan, the targets for "percent complete" will be entered into Table 1. The formal modification of Table 1 may be accomplished by the DEP by issuing a revised NPDES permit.

**(2) Overflow Reduction Volume means the difference between the volume of overflow in million gallons per year for the condition prevailing at the time of the report and the volume of overflow in million gallons per year for the baseline year. The baseline year is represented by Philadelphia's physical systems as they were configured on January 1, 2006. Both volumes will be determined from modeling, using climatic data representing the same "typical year" for Philadelphia as determined in the LTCPU development process, and a hydrologic/hydraulic model calibrated with flow data collected for verification of actual performance.

The Updated Documentation of the Implementation of the Nine Minimum Controls was submitted to the PADEP and USEPA prior to June 1, 2013. The report is an update to the 1995 "CSO Documentation: Implementation of Nine Minimum Controls" document and indicates how the City's activities are currently implemented while highlighting how these activities may have changed as a result of new technology, new practice, or other circumstances.

The Tributary Water Quality Model for Bacteria Report was submitted to the PADEP and USEPA prior to June 1, 2013. The report describes the methods and results of model simulation of bacteria concentrations in the nontidal reaches of Tookany/Tacony-Frankford Creek and Cobbs Creek affected by CSOs.

Table 1-2: COA Deliverables

Deliverable Name	Deliverable Date	Status
Implementation and Adaptive Management Plan	December 1, 2011	Submitted
Green Infrastructure Maintenance Manual Development Process Plan	June 1, 2012	Submitted
Comprehensive Monitoring Plan	December 1, 2012	Submitted
Facility Concept Plan for NE WPCP	June 1, 2013	Submitted
Facility Concept Plan for SE WPCP	June 1, 2013	Submitted
Facility Concept Plan for SW WPCP	June 1, 2013	Submitted
Updated Nine Minimum Controls Report	June 1, 2013	Submitted
Tributary Water Quality Model – Bacteria	June 1, 2013	Submitted
Tributary Water Quality Model - Dissolved Oxygen	June 1, 2014	In Development
Green Infrastructure Maintenance Manual - First Edition	June 1, 2014	In Development
Tidal Waters Water Quality Model - Bacteria	June 1, 2015	In Development
Tidal Waters Water Quality Model - Dissolved Oxygen	June 1, 2015	In Development

2.0 Implementation Tracking, Reporting, and Adaptive Management

2.1 Reporting Implementation Progress

Paragraph 3d of the COA requires the City to provide information regarding the implementation of CSO Controls, including the Nine Minimum Controls from the National CSO Policy, the Capital Projects from the 1997 Long Term Control Plan, and the CSO program elements discussed in the Approved LTCPU. Information regarding the implementation of the Nine Minimum Controls and the 1997 LTCP Capital Projects can be found in Sections II and III.B, respectively, of the Combined Sewer Management Program Annual Report.

2.2 *Green City, Clean Waters* Program Tracking System

The Water Department has a number of robust data tracking systems in place and under development which will be integrated through the creation of a *Green City, Clean Waters* Program Tracking System. The program tracking system will provide the means to simplify the compilation of information from these systems for information dissemination and regulatory reporting. During the reporting period, the Water Department has continued to update and develop existing and new components of the program tracking system to enhance the Water Department's ability to track data and report information.

During FY2013, significant progress was achieved in the development of the following program tracking system components:

- GreenIT - the Green Stormwater Infrastructure Implementation Tracking System
- PlanIT
- Stormwater Plan Review Database
- Significant updates to CAPIT - the Water Department's Capital Projects Tracking System
- Geographic Information System (GIS) Asset Tracking
- Maintenance Management Systems

These systems currently work together to track the implementation of *Green City*, *Clean* Waters and opportunities for further integration to streamline data compilation are under evaluation. A progress report for each of these data tracking systems follows in Sections 2.2.1-2.2.5.

2.2.1 GreenIT

The Water Department's tracking system for all public green stormwater infrastructure projects from the concept through construction phases, GreenIT (Version 1.0), is complete and is currently tracking designated compliance metrics. The user-friendly system utilizes both a web interface and desktop data entry application for use by both the Water Department in-house staff and external design contractors.

2.2.1.1 GreenIT System Description

The web interface starts at the Home Screen, which contains a navigation dashboard and table of up-to-date project statistics (**Figure 2-1**).

Figure 2-1: GreenIT's Home Screen

From the navigation dashboard, users can access the main functions of the GreenIT system. The main screens of GreenIT include:

- New Water/ Sewer Project
- Project Lookup
    - *Project Details & Green Data Estimates*
    - *Project Green Data Designed*
    - *Project Data Summary*
- Import Project Data
- Select Reports
- Export Data
- GreenIT User Manual

The *New Water/ Sewer Project* option allows a specific group of users to create new green stormwater infrastructure projects by selecting street segments and/or parcels from a map and entering required project information (project name, program, and contact person).

The *Project Lookup* screen allows the user to search for a particular project(s) via the Project ID or select parameters. The applicable project(s) are displayed on a map and listed below (**Figure 2-2**).

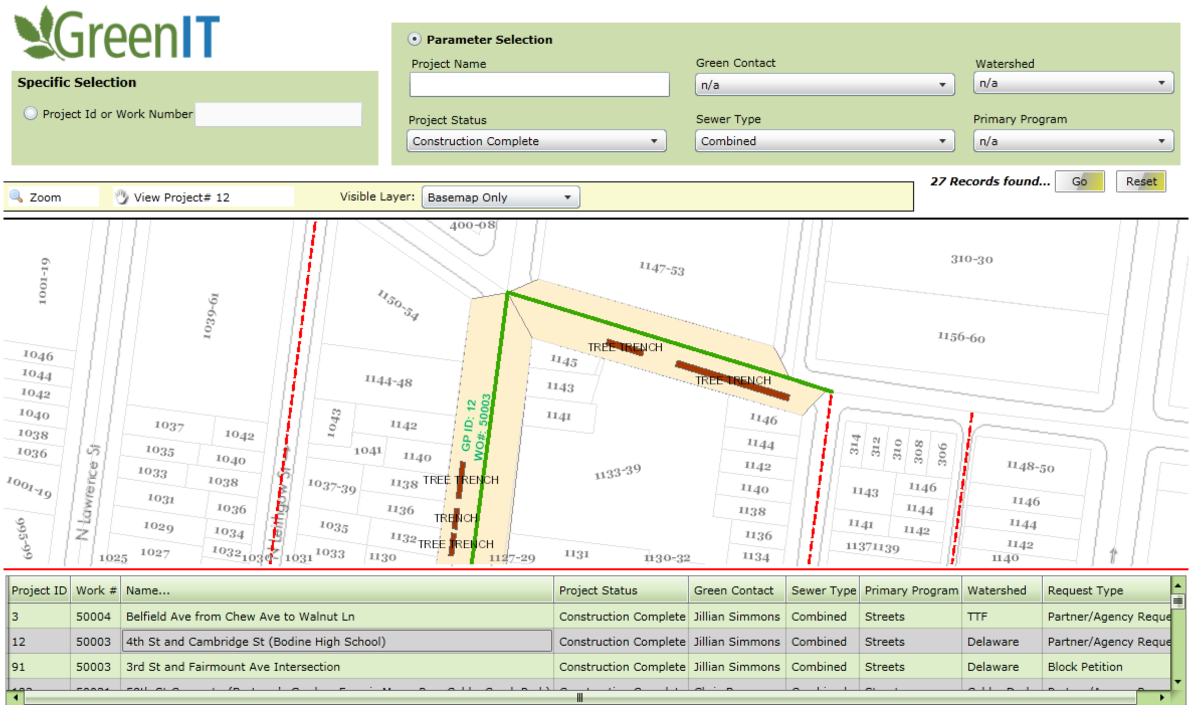


Figure 2-2: GreenIT's Project Lookup Screen

Project Details & Green Data Estimates

From the *Project Lookup* screen users can access the *Project Details and Green Data Estimates* screen, which displays project level details regarding location (pulled from GIS) and estimated system and stormwater management practice (SMP) data (e.g. estimated drainage area, planned Greened Acres, and the estimated number of SMPs by type). If a project has moved beyond the design phase, several of the project detail fields are filled using information pulled from the Water Department's Capital Projects (CAPIT) system, which is linked to GreenIT.

The *Project Green Data Designed* screen displays system level details, SMP details, infiltration test data and the number of non system trees. The data displayed on this screen is populated by importing information from a Smart Report created using GreenIT's Data Entry Application.

The *Project Data Summary* screen displays a project's system and SMP data summed at the project level based on the most recent status. If the project is in the planning or design stages, the screen uses the estimated data, however if a project has been constructed, the final "As Designed" values are displayed.

The *Import Project Data* screen allows the user to upload a Smart Report which updates a specified project's designed data metrics and other project details such as the project name, status, and design consultant.

This stand-alone application provides users (both internal and external) with an electronic form (the Smart Report) that, once complete, updates estimated system and SMP data with actual measurements.

A Smart Report is produced as a .pdf and .csv file for ease of transport to GreenIT. The import is done at the end of the design phase to capture the metrics "As Designed."

Training on the use of this application was provided for both the Water Department's in-house design team and external contractors.

2.2.1.2 Reporting Metrics

The *Reports* screen gives the user a list of predefined reports that can be generated in .pdf or .xlsx format. Available reports include:

- **Status Summary Report**: provides the number of projects and Greened Acres at each phase of development by program type and watershed.
- **Project Status Report:** provides project details for all projects currently in a specified status.
- **Watershed Summary Report:** provides the total number of each SMP type and total number of Greened Acres (planned or designed) within each watershed.
- **Green Stormwater Infrastructure Monthly Metric Report:** displays the Water Department's progress towards internal Greened Acre goals. Users also have the ability to access historical data using this reporting function.

Additionally, the information stored in the system is used to produce compliance reporting outputs for the completed and planned project tables in section 3 of this annual Report. The reporting format is illustrated in **Table 2-1**.

Table 2-1: Project Tracking Metrics and Reporting Format

Project Tracking Metrics										
Project Name	Status	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost	Partner(s)	Watershed

Project Name

For Water Department initiated and/or public property projects, the project name is typically of the associated school, park, playground, or streets.

Status

Current project status. Statuses include: In Concept/ Planning, In Design, In Projects Control (Under Contract Management), In Construction, and Construction Complete.

Storage Volume

The volume of runoff managed by the system. For infiltration systems, the entire depth of the system is counted. In detention/slow-release systems, only the depth above the orifice elevation is counted.

New trees

Total number of new trees planted in association with a system. This number also includes non-SMP trees, which are trees planted as part of a project but are not part of a stormwater management system.

Drainage Area

Area, in square footage, of impervious and/or pervious surface(s) flowing into a system(s) and SMP(s).

Greened Acres (GAs)

Greened Acres is a metric that accounts for the conversion of a highly impervious urban landscape through the implementation of projects that reduce storm water runoff. A Greened Acre is described as an acre of impervious cover connected (tributary) to a combined sewer that subsequently is reconfigured to utilize green stormwater infrastructure to manage all or a portion of the storm water runoff from that acre. Green stormwater infrastructure manages storm water using one or more of the source control processes of infiltration, evaporation, transpiration, decentralized storage, alternative stormwater routing, reuse, and others.

A Greened Acre is an expression of the volume of stormwater managed by green stormwater infrastructure, based on the design for the project, and is conditional on the proper operation and maintenance of the project. One Greened Acre is equivalent to 1 inch of managed stormwater from 1 acre of drainage area, or 27,158 gallons of managed stormwater. These volumes will be tracked as Greened Acres using the following equation:

Greened Acres = IC * Wd

Where:

IC is the impervious cover utilizing green stormwater infrastructure (acres). This quantity can include the area of the stormwater management feature itself, as well as the area that drains to it.

Wd is the depth of water over the impervious surface that can be physically managed in the facility (inches). Green stormwater infrastructure designs will be aimed at controlling at least 1 inch of runoff, and up to 1.5 inches of runoff, unless otherwise deemed feasible by engineering design.

Stormwater Management Practice (SMP) Type

Assets that make up a project's system(s). The SMP types were originally defined in Table 2-1 of the IAMP. Updated definitions are included in **Table 2-2**.

Program

The green program to which the project is assigned. Current programs include:

- Alleys/Driveways
- Campuses
- Facilities

- Industry and Business
- Open Space
- Parking
- Schools
- Stormwater Planning Districts
- Streets
- Vacant Land

Table 2-2: Updated SMP Definitions

SMP Type Definitions	
Field/Metric	**Definition/Purpose**
Stormwater Tree Trench	A stormwater tree trench is a subsurface infiltration/storage trench that is planted with trees. They are typically linear features that are constructed between the curb and the sidewalk. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Rain Garden	A rain garden is a shallow vegetated area designed to detain and release stormwater runoff and/or infiltrate where feasible. Rain gardens may also be referred to as bio-infiltration basins and bio-retention basins. They are typically integrated into landscape features (e.g. median strips) and are non-mowed areas.
Stormwater Planter	A stormwater planter is a structure filled with soil media and planted with vegetation or trees. It is designed to detain and release stormwater runoff and/or infiltrate where feasible. Planters can be designed below street grade or above grade and often contain curb edging as the structure surrounding the planter.
Stormwater Bump-out	A stormwater bump-out is a vegetated curb extension that intercepts gutter flow. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Infiltration/Storage Trench	An infiltration/storage trench is a subsurface structure designed to detain and release stormwater runoff and/or infiltrate where feasible.
Pervious Paving	Pervious paving is a hard permeable surface commonly composed of concrete, asphalt or pavers. II is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Stormwater Wetland	A stormwater wetland is a vegetated basin designed principally for pollutant removal. It typically holds runoff for periods longer than 72 hours and may include a permanent pool. Wetlands can also detain and release stormwater runoff.
Cistern/Rain Barrel	A cistern/rain barrel is a tank or storage receptacle that captures and stores runoff and can thereby reduce runoff volume. The stored water may be used to serve a variety of non-notable water needs (e.g. irrigation).
Green Roof	A green roof is a vegetated surface installed over a roof surface. Green roof are effective in reducing the volume and rates of stormwater runoff.
Swale	A swale is a channel designed to convey stormwater. It can be designed to attenuate and/or infiltrate runoff where feasible.
Stormwater Basin	A stormwater basin is a basin or depression that is vegetated with mowed grass. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.

Disconnection (impervious to pervious)	Disconnection is when runoff from an impervious area is directed to available adjacent pervious area.
Stormwater Tree	A stormwater tree is a tree that has stormwater runoff directed to its pit. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Non-SMP Tree	A non-SMP tree is a tree planted in a pervious area.

Construction Cost

Projects with a status of Construction Complete will have a finalized cost of construction provided. For historic projects, this cost is listed per Work Number, and is not available at the project level at this time.

Partner(s)

External entities involved in a project.

Watershed

The City of Philadelphia watershed where the project is located. Four of the City's seven watersheds fall at least partially within the combined sewer area. These watersheds are:

- Cobbs Creek Watershed
- Delaware Direct Watershed
- Tookany/Tacony-Frankford Creek Watershed
- Schuylkill River Watersheds

The *Export Data* screen gives the user the option to export all project data into Microsoft Excel to sort and filter as needed for data analysis or reporting needs not serviced by the available reports.

2.2.2 PlanIT

This new application allows the Water Department to compile and track information about all potential green stormwater infrastructure sites within Philadelphia in one centralized master list/registry. All potential sites will undergo initial evaluation and vetting before being recommended for conceptual design development in GreenIT. PlanIT has a simplified interface comprised of two main components:

- **Data Entry Forms** provide fields for recording desk top analysis information and coordination and policy details
- A **Map Viewer** allows new projects to be identified through a map interface and different project types to be viewed on one map. This will facilitate coordination between programs (streets, parks, schools, etc.)

The data collected in PlanIT will be used to prioritize projects and refine the framework for queuing projects.

2.2.3 Stormwater Plan Review Database

This database tracks private development projects' reviews and characteristics starting in 2006 and includes metrics related to project reviews for compliance with the Philadelphia Stormwater Regulations, and the status of those reviews. Recently, the database was enhanced to track record drawing reviews and store detailed As-built SMP data. Currently, work is being done to develop immediate needs for inspection tracking capabilities.

2.2.4 CAPIT

The Water Department's Capital Project Tracking System is slated to be upgraded to a more robust application to meet the Water Department's needs. Business requirements are being discussed and documented. Once developed, the new database will have all the capabilities of the current database, such as tracking basic project information through construction, but will be enhanced to meet additional requirements such as the ability to form project teams and track costs at the project level. A Request for Information has been published to seek potential developers for this database.

2.2.5 Geographic Information Systems (GIS)

GIS is used to track all Water Department assets, and significant work was conducted this reporting period to code all green stormwater infrastructure assets in GIS. This progress has led to the development of a separate GIS layer to display all green stormwater infrastructure projects that are tracked in GreenIT. Working groups met regularly throughout 2013 to modify existing GIS layers and develop a standard method for capturing green stormwater infrastructure in GIS.

2.2.6 Maintenance Management Systems

At present a database is used to record surface and subsurface maintenance schedules, data and programmatic information related to green stormwater infrastructure maintenance activities. The Water Department coordinates both internally and with other City agencies and partners so that notifications and activities are forwarded to the appropriate parties to ensure that inspection, monitoring, and maintenance processes are initiated, documented and tracked. This process is slated to be replaced by the inclusion of green stormwater infrastructure maintenance activities into the Water Department's Cityworks work order management system, which is linked to the City's GIS network and provides tools to track and manage work performed on the Water Department's assets such as fire hydrants, inlets, water mains, sewers, and green stormwater infrastructure. In FY2013 working groups met with developers to initiate the inclusion of green stormwater infrastructure maintenance in Cityworks.

3.0 Capital Projects

3.1 Green Stormwater Infrastructure

The COA requires 9,564 Greened Acres within the 25 year program horizon. Of that total, at least 744 Greened Acres will be achieved within the first five years.

The *Green City, Clean Waters* programmatic strategies for achieving these Greened Acres include:

1. Water Department-initiated green stormwater infrastructure projects,
2. Green stormwater infrastructure following "public works" projects, and
3. Private investment

The following three sub-sections describe the progress made during FY2013 for each of these strategies.

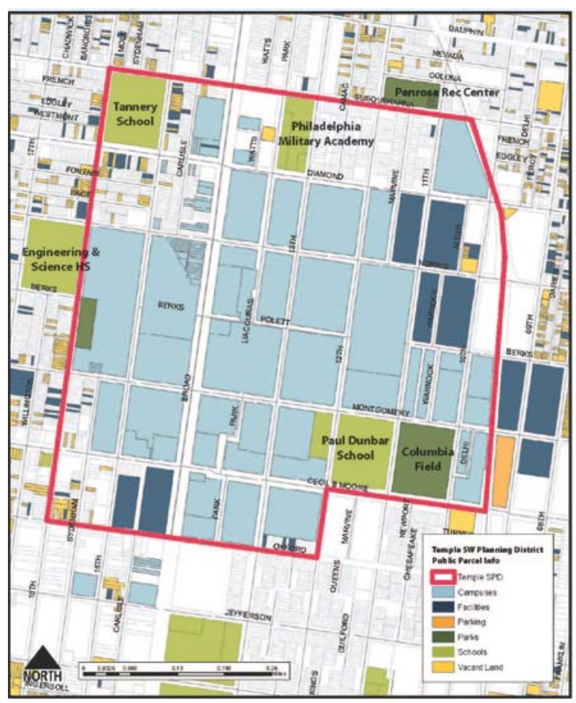
3.1.1 Water Department Initiated Green Stormwater Infrastructure

The Water Department initiates green stormwater infrastructure projects through several different mechanisms. Those that have achieved significant progress during the reporting period are documented in this section.

3.1.1.1 Stormwater Planning Districts (previously referred to as Stormwater Management Enhancement Districts or SMEDs)

Temple University

Temple University is a comprehensive public research university that has a total enrollment of over 36,000 full-time students. For over a century, Temple University has been an integral part of North Philadelphia's neighborhoods and the larger metropolitan area. Through its recent planning efforts, the university established a framework for campus development that prioritizes sustainability and calls for a cohesive urban landscape. This emphasis on transforming the physical character of the campus provided a significant opportunity to enhance stormwater management and environmental stewardship.



Watershed: Delaware

Total Acreage of Study Area: 240 (72% impervious)

Anticipated SIP Completion Date: June 2014

Status Update

Recently, the Water Department and Temple University entered into a partnership to form the Temple-Philadelphia Water Department Green Campus Initiative, with the goal of integrating sustainable stormwater management designs into the University's framework. The Water Department is working alongside Temple to analyze over 200 acres within and surrounding the main campus for green stormwater infrastructure implementation opportunities. Overall the goals of this partnership include:

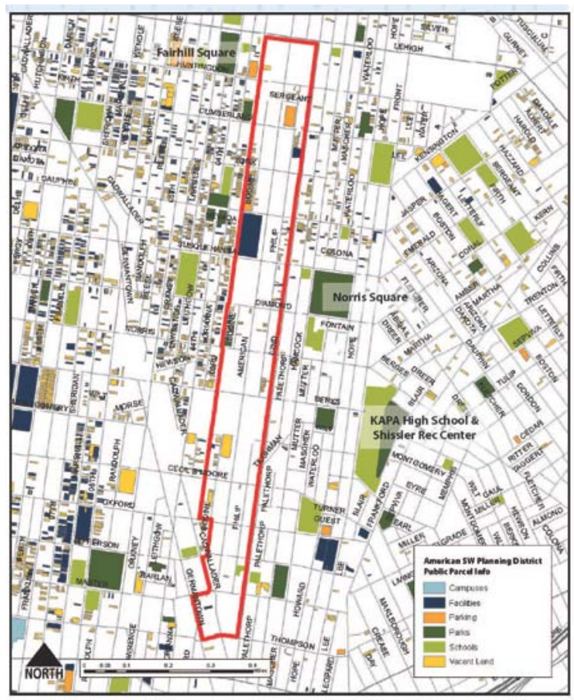
- Development of a comprehensive stormwater management plan that is well integrated with Temple's sustainability goals and strategic planning efforts
- Identification of demonstration projects that 1) further campus goals of connectivity and safety, and 2) highlight the holistic benefits of the City of Philadelphia's *Green City, Clean Waters* Plan
- Leveraging of the Water Department and Temple University resources in order to produce cost-effective and innovative stormwater management practices
- Piloting of green stormwater infrastructure technologies that promote Temple's commitment to sustainability and environmental research

The Water Department has begun work on a Temple University Stormwater Improvement Plan while Temple develops a new Landscape Architecture and Stormwater Master Plan. These efforts are highly collaborative and will result in a combined, focused approach to implementation. It is anticipated that the initial planning phase will be completed in the spring of 2014.

Examples of Potential Outreach and Coordination Partners:

> *Institutions, Government Agencies and City-Wide Organizations:* Temple University, Philadelphia Streets Department (Streets Department), Philadelphia City Planning Commission, Southeastern Pennsylvania Transportation Authority (SEPTA), Philadelphia Parks & Recreation, PennDOT, Philadelphia Housing Authority, Philadelphia Redevelopment Authority
>
> *Potential Community/Community Development Groups:* Asociación Puertorriqueños en Marcha, Beech Interplex Community Land Trust Corp., Norris Homes Tenants Association, Project HOME, Uptown Entertainment and Development, Village of Arts and Humanities, Yorktown Community Development Corp.

American Street



American Street is a historically industrial area that has recently begun the process of revitalization. Various nonprofits and community agencies have partnered to raise political awareness and attract grant funding toward neighborhood improvement projects, including vacant lot cleaning and maintenance. There has also been significant interest in redevelopment and re-zoning in the area. These factors, as well as the large impervious area and existing physical characteristics of the site, led to the selection of American St as a Stormwater Planning District.

Watershed: Delaware

Total Acreage of Study Area: 109 (67% impervious)

Anticipated Stormwater Improvement Plan Completion Date: February 2014

Status Update

The stormwater improvement plan for this area will identify opportunities to implement green stormwater infrastructure in the over widened right-of-way as well as on private property, and existing public lands. There is significant customer interest to reduce stormwater bills for private landowners in the area through green stormwater infrastructure implementation for credits. This area represents an excellent opportunity to implement green stormwater infrastructure to both enhance the surrounding neighborhoods and advance the goals of *Green City, Clean Waters*.

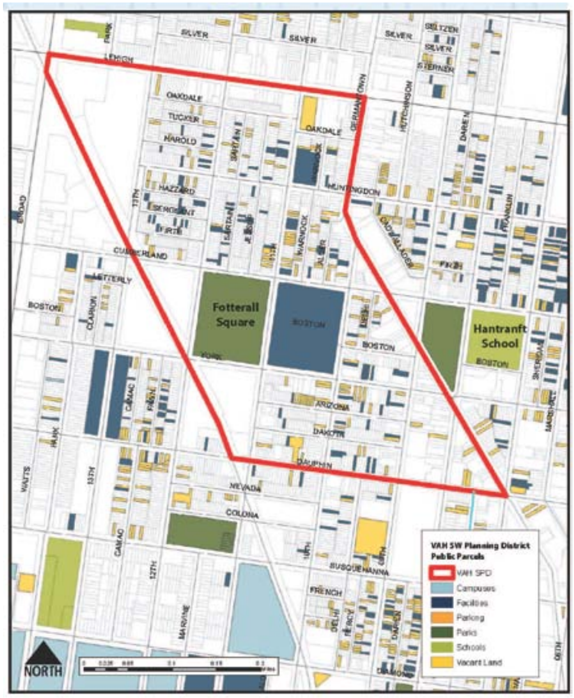
Examples of Potential Outreach and Coordination Partners include:

Government Agencies and City-Wide Organizations: Streets Department, Philadelphia Department of Commerce, Philadelphia City Planning Commission;

Business and Economic Development Entities: American Street Business Association, American Street Enterprise Zone; and

Community/Community Development Groups: Asociación Puertorriqueños en Marcha (APM), Norris Square Civic Associations, Women's Community Revitalization Project.

Village of Arts & Humanities



Over time, North Philadelphia has experienced significant population loss, and as a result has an abundance of vacant land. The Village of Arts and Humanities is a small neighborhood within North Philadelphia that has repurposed these underutilized areas, using art as a tool for revitalization. This neighborhood is defined by its vibrant colors, streetscaping and grassroots approach to social and economic development. Previously, the Village of Arts and Humanities has collaborated with Temple University on environmental research and has also shown interest working with the Water Department to incorporate stormwater management into the Village.

The purpose of this analysis is to identify whether effective methods for green stormwater infrastructure implementation are feasible and adaptable in neighborhood areas that are highly susceptible to change. The Water Department will work along with other city agencies that have plans for implementation in the area and try to leverage resources so that stormwater components can be added into other revitalization projects.

Watershed: Delaware

Total Acreage of Study Area: 84 (69% impervious)

Anticipated SIP Completion Date: March 2014

Status Update

The Department has just completed an existing conditions analysis for the study area and is gathering a preliminary list of green stormwater infrastructure opportunities for the area. Stakeholders will be engaged during the next phase of the process to identify areas for collaboration and leveraging of resources. The Water Department will be working with other city agencies working in the study area to make stormwater recommendations for upcoming projects, as well as identifying additional opportunities for implementation.

Examples of Potential Outreach and Coordination Partners include:

Government Agencies and City-Wide Organizations: Streets Department, Philadelphia City Planning Commission, SEPTA, Parks & Recreation, PennDOT, Philadelphia Housing Authority, Philadelphia Redevelopment Authority; and

Community/Community Development Groups: Village of Arts and Humanities.

Yorktown Ludlow

In 2010, the Yorktown Community Development Corporation, a community-based organization serving the Yorktown neighborhood, prepared a resident-driven neighborhood strategic plan in order to leverage and attract new investments. Within this plan, the residents cited aging infrastructure and stormwater managements as major concerns for the neighborhood. As a result, the community made recommendations for green stormwater infrastructure implementation along major corridors and has requested the help of the Water Department to complete these projects.

The Yorktown Ludlow neighborhood was chosen because of the unique opportunity for green stormwater infrastructure projects within public spaces. Many of the prioritized spaces in the public realm have the potential to be converted into green street corridors or plazas, as well as greened cul de sacs within private residential areas. The purpose of this analysis is to identify effective methods for green stormwater infrastructure implementation that are feasible and adaptable for various land use types.

Watershed: Delaware

Total Acreage of Study Area: 195 (68% impervious)

Anticipated SIP Completion Date: March 2014

Status Update

The Water Department has just completed an existing conditions analysis for the study area and is gathering a preliminary list of green stormwater infrastructure opportunities. Stakeholders will be engaged during the next phase of the process to identify areas for collaboration and leveraging of resources. Once opportunities are vetted internally and with stakeholders, the Water Department will begin prioritizing and queuing green stormwater infrastructure projects.

Examples of Potential Outreach and Coordination Partners include:

Government Agencies and City-Wide Organizations*:* Streets Department, Philadelphia City Planning Commission, SEPTA, Philadelphia Parks & Recreation, PennDOT, Philadelphia Housing Authority, Philadelphia Redevelopment Authority; and

Community/Community Development Groups: Asociación Puertorriqueños en Marcha, Yorktown Community Development Corp.

Stadium District

The Stadium District is a highly visible gateway positioned between the Navy Yard and numerous South Philadelphia neighborhoods. The core of this stormwater planning district is comprised of three large sports stadiums: Lincoln Financial Field, Citizens Bank Park, and the Wells Fargo Center. These facilities are surrounded by a large area of surface parking, some of which is City owned. This area was selected as a stormwater planning district for its large impervious area, the large number of parcels under City ownership, customer interest in stormwater bill credits, high visibility partnership opportunities, and significant stakeholder interest.

Watershed: Delaware

Total Acreage of Study Area: 622 acres (77% impervious)

Anticipated SIP Completion Date: February 2014

Total Contract Amount: $249,905

Status Update

Between November 2012 and April 2013, a first level existing conditions and sewer separation analysis was conducted for the area. This data and resulting report is being incorporated into the development of a Stormwater Improvement Plan. Through the stormwater planning district project, stormwater management alternatives will be developed for the Stadium District and evaluated based on cost and criteria that will help the Water Department meet environmental, economic, and community goals.

Examples of Potential Outreach and Coordination Partners include:

Government Agencies and City-Wide Organizations: Philadelphia City Planning Commission, Mayors Office of Sustainability, Philadelphia Industrial Development Corporation, Philadelphia Department of Commerce, Mayors Office of Transportation and Utilities, Streets Department, SEPTA, Philadelphia Parks and Recreation, Public Property, Philadelphia Parking Authority, Delaware Valley Regional Planning Commission, Pennsylvania Horticultural Society; and

Business and Economic Development Entities: Philadelphia Eagles, Philadelphia Phillies, Comcast Spectacor/Wells Fargo Center/XFINITY Live!, Novacare Complex, Sports Complex Special Services District; and

Community/Community Development Groups: Stadium Community Council, South Philadelphia Communities Civic Association, other South Philadelphia community groups as necessary.

3.1.1.2 PENNVEST Funded Projects

In 2009, the Water Department's entered into a $30M loan agreement with the Commonwealth's PENNVEST program, most of which was targeted for the design and construction of green stormwater infrastructure. As of July 2013, there are 47 projects with completed designs currently in contract management, and 38 green stormwater infrastructure projects and 3 Stream Restoration projects have been constructed with PENNVEST Funding (**Appendix 1**).

3.1.1.3 FY2013 Summary Statistics

As shown in **Table 3-1,** 62 Water Department-initiated and Public Works green stormwater infrastructure projects have been completed as part of the *Green City, Clean Waters* program, adding over 60 Greened Acres and 1033 new trees to the City. **Appendix 2** provides the Greened Acres and details associated with each of these projects located in the combined sewer area. Definitions of the metrics/headings are described in Section 2.2.1.2.

Over the next year, 269 green stormwater infrastructure projects are planned to be designed or constructed. Additional details on these projects can be found in **Appendix 3**.

Table 3-1: FY2013 Summary of Water Department-Initiated and Public Works Green Stormwater Infrastructure

Project Phase	In Planning	In Design	In Contract Development	In Construction	Completed
Number of Projects	43	96	16	52	62
Potential Number of Greened Acres*	45.9	159.3	23.1	54.2	60.7

*Potential number of Greened Acres is subject to change as projects go through the design process

3.1.2 Implementing Green Stormwater Infrastructure with Public Works Projects

During the first five years of implementation, the Water Department is committed to including green stormwater infrastructure elements in public works projects, including Streets Department-led work, the Water Department's water and sewer line replacement projects, and Philadelphia Parks and Recreation tree planting initiatives. Refer to Section 3.1.1.3 for summary statistics regarding this initiative.

3.1.2.1 Green Stormwater Infrastructure into Water and Sewer Projects

In this reporting period, the Water Department's internal processes for integrating green stormwater infrastructure with traditional water/sewer replacement projects were further developed. In the past year, Water Department initiated design work on 11 green/water/sewer projects, completed design work on 4 green water/sewer projects, started construction on 1 green/water/sewer project, and completed construction on 1 green/water/sewer project. As of June 30, 2013, a total of 31 green/water/sewer projects were in design (25 anticipated Greened Acres).

3.1.2.2 Green Streets Program Development

The Water Department advances development of the Philadelphia Green Streets Program through the continued integration of planning and partnerships with the Streets Department, SEPTA, the Mayor's Office of Transportation and Utilities, PennDOT and others, as well as through design and construction of collaborative projects. Details on Green Streets coordination efforts can be found in Section 4.2 of this report.

Green Streets Design Manual

The Green Streets Design Manual will serve as the guide for both public and private entities interested in developing green stormwater infrastructure designs within the right-of-way in Philadelphia. The manual addresses the technical and design requirements for green streets, appropriate project siting and sizing techniques, and the procedures that must be followed to obtain approval for construction.

Over the course of the past year, significant effort was put into taking the information from the collaboration with multiple agencies (Streets Department, PennDOT, Mayor's Office of Transportation and Utilities, Philadelphia Parks and Recreation, Philadelphia City Planning Commission and others) and formatting it into a draft manual. The draft Green Streets Design Manual has been undergoing final Water Department review and is scheduled for final partner review throughout 2013.

3.1.2.3 Tree Planting, Street Trees, and Piloting Stormwater Tree Pit Design

The Water Department continues to develop the stormwater tree pit pilot program in coordination with the Philadelphia Parks and Recreation tree planting contract and a separate coordination effort with PennDOT. Currently, there are five (5) versions of the stormwater tree pit that are in various stages of planning, design, and construction.

Seventeen (17) individual stormwater tree pits have been installed as part of a Water Department project located on Sepviva Street in North Philadelphia. The tree pits include curb grate inlets that introduce runoff directly into a gravel bed. The Water Department is currently working to establish appropriate maintenance requirements for the first phase of pilot stormwater tree pits, as well as provide design recommendations for future versions of the stormwater tree pits. Through the Philadelphia Parks and Recreation contract, the Water Department has developed four (4) additional versions of stormwater tree pits, three of which are currently being vetted by Philadelphia Parks and Recreation. Locations have been finalized and inter-agency contract mechanisms are under evaluation.

The fifth stormwater tree pit pilot is part of the PennDOT Interstate 95 & Richmond Street project. The Water Department collaborated with PennDOT to determine a final design for the twenty-six (26) pilot pits to be installed along Richmond St.

Each stormwater tree pit design will evaluate different technologies to inform hydraulic design, constructability, cost efficiency, and maintenance requirements. The Water Department will continue to work closely with Philadelphia Parks and Recreation and PennDOT in order to evolve the tree pit designs and determine the most efficient implementation method and inter-agency cost- sharing arrangement for stormwater tree pits.

3.1.3 Green Stormwater Infrastructure on Private Property

3.1.3.1 Philadelphia Stormwater Regulations

The City's Stormwater Regulations were revised in January of 2006, providing the foundation of the private sector's role in the *Green City, Clean Waters* program. Post Construction Stormwater Management Plans are reviewed for compliance with the stormwater regulations and the installations of SMPs are inspected during construction. During FY2013, the Water Department conducted 1,363 inspections during active construction in the combined sewer area.

Table 3-2 summarizes private development projects included in this year's Greened Acre total that were derived from constructed projects in the combined sewer area. A full list of verified private development projects can be found in **Appendix 4**.

Table 3-2: Summary of Verified Private Development Green Stormwater Infrastructure Projects

Watershed	Darby-Cobbs	Delaware	Pennypack	Tookany-Tacony/ Frankford	Schuylkill	Total
Private Development Greened Acres	8.3	54.3	1.1	30	52.4	146.1

The Water Department is undertaking a verification process for projects constructed between 2006 and 2011 to assess each project prior to counting Greened Acres toward compliance totals. In the past year, the Water Department continued and expanded its inspection verification initiative using contracted services, to gather as-built conditions from all approvals that have not otherwise been verified. Through technologies vetted in FY2012's pilot inspection efforts, the Water Department uses survey equipment, closed circuit TV, and standardized inspection checklists to verify the compliance of constructed projects. A focus of this effort will be on the creation of record drawings to document the constructed conditions of the project sites. The record drawings allow the Water Department to verify SMP installation and function. A map of verified private development green stormwater infrastructure projects and all planned and completed Water-Department-initiated and Public Works green stormwater infrastructure projects is featured below in **Figure 3-1**.

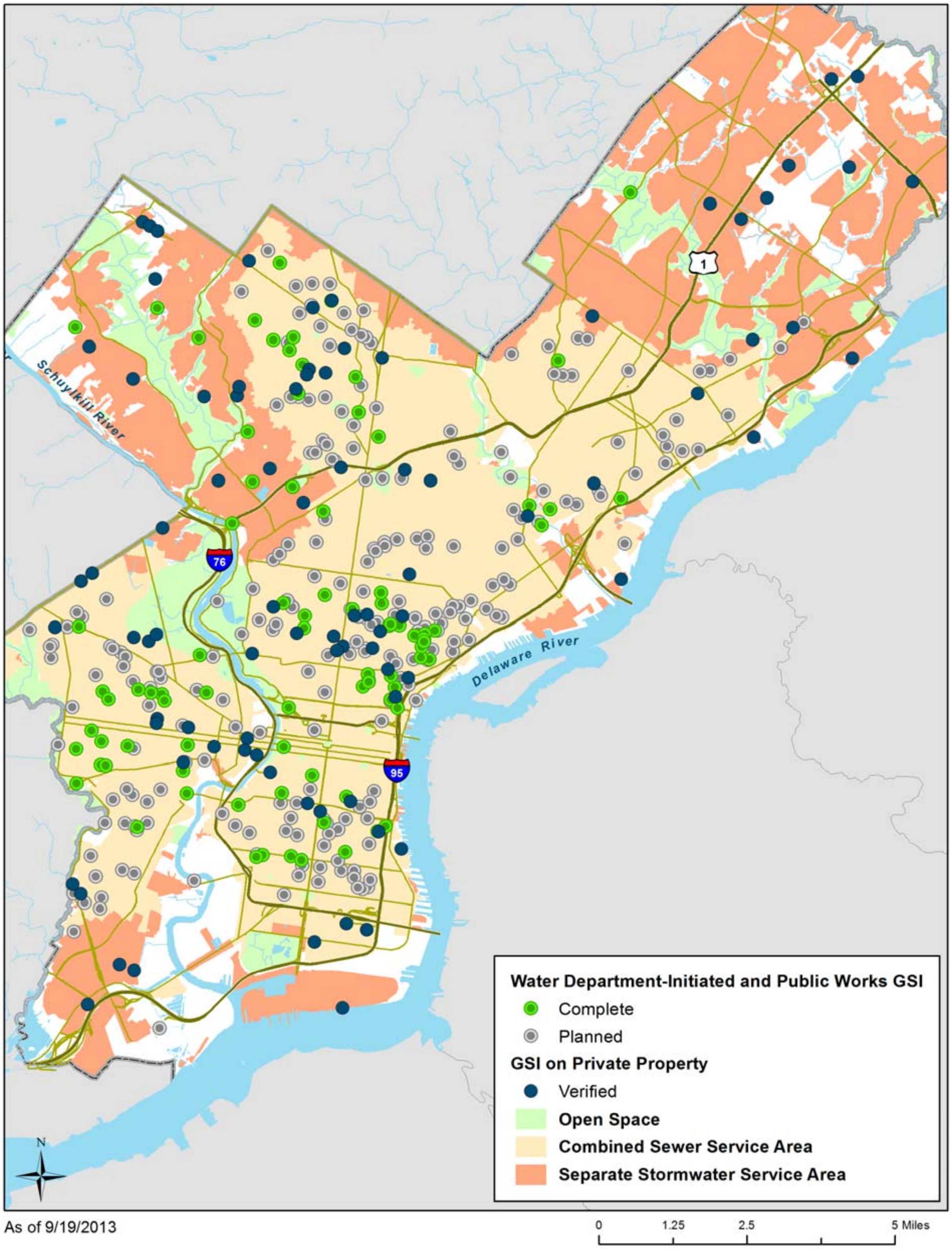


Figure 3-1: Green Stormwater Infrastructure Projects in Philadelphia County

3.1.3.2 Incentives for Private Development to Implement Green Stormwater Infrastructure

Stormwater Management Incentive Program

The Water Department offers incentives to private property owners to implement stormwater management best practices through a grant program administered by the Philadelphia Industrial Development Corporation. In January 2012, the Philadelphia Industrial Development Corporation and the Water Department launched the Stormwater Management Incentive Program (SMIP) to provide assistance to non-residential customers in achieving credits on their stormwater bills and to facilitate the implementation of Greened Acres on private property. **Table 3-3** is a summary table of a FY2013.

Table 3-3: FY2013 SMIP Awardees

Project	Grant Amount	Proposed GAs
Newman and Company	$370,000	6.08
Methodist Home	$81,000	1.01
School District of Philadelphia	$795,000	8.12
Greene Street Friends	$91,080	0.70
Cardone Industries	$3,361,441	52.02
Global Dye Works	$17,000	0.23
Settlement Music School	$140,000	1.88
Philabundance	$237,313	2.48
Community College of Philadelphia	$260,000	3.96
West Philly Coalition for Neighborhood Schools	$242,000	3.63
Wharton Street Lofts	$79,500	0.79
2303 Bainbridge LLC	$25,000	0.25
Friends of Chester Arthur	$232,000	2.28
Francisville Seniors	$31,250	0.32
Lindy Property Management	$165,000	1.67
Novick Brothers	$279,000	2.78
Total	**$6,406,584**	**88.2**

Business Improvement District Grant Program

In March 2012, the Philadelphia Industrial Development Corporation and the Water Department launched the Business Improvement District Grant Program. The program offers grant funding to Business Improvement Districts and similar entities to explore how they can collectively manage stormwater from multiple non-residential parcels. Use of funds is restricted to grants which support detailed green stormwater infrastructure feasibility studies to determine if collective stormwater management is feasible. Applicants must be Business Improvement Districts or similar entities. Five organizations have applied since the program launch. The Water Department has awarded three grants to the Aramingo Business Improvement District, Port Richmond Industrial Development Enterprise, and the South Street Headhouse District. Concept plans are in development for each area.

Stormwater Design Assistance

Since July 2009, the Water Department has offered site evaluation and concept planning services at no cost to customers interested in retrofitting properties for stormwater management. This assistance provides preliminary concept plans and helps the property owner understand the types of stormwater management practices suitable for their property. In fiscal year 2013, planning and design assistance was provided to 40 customers.

Green Project Review

The Water Department provides expedited turn around of project review for development projects if the project proposes to disconnect 95% or more of the post construction Directly Connected Impervious Area. In these cases, the Water Department guarantees a 5-day project review time, instead of the typical 15 calendar day review time. In fiscal year 2013, 29 projects qualified for a fast track Green Review.

Stormwater Credit

Non-residential property owners can obtain stormwater credits which reduce their monthly Stormwater Management Service charge. Stormwater credits can be earned as a result of the construction, operation, and maintenance of privately owned stormwater management practices that reduce a parcel's contribution of stormwater to the City's collection and conveyance systems. Retrofit and new development projects are eligible for credits on their stormwater bills. The Water Department approved 290 credit applications during the reporting period.

3.2 Waterfront Disconnection

The disconnection from the CSO system of runoff from the Delaware River waterfront areas is intended to occur incrementally throughout the duration of the COA. During the past fiscal year, the Water Department has increased the internal capacity for expanding planning efforts and monitoring progress of the areas of the waterfront being disconnected. An internal coordination process has been established among several Water Department divisions involved in waterfront sewer disconnection, therefore including separation as a goal in scheduled Water Department waterfront sewer projects. Additionally the Water Department has substantially increased communication with PennDOT at earlier stages in their planning process which will ensure that the amount disconnection for the Interstate 95 (I-95) area will be maximized over time. The Water Department is also evaluating opportunities to leverage waterfront disconnection in areas that PennDOT will not be performing construction.

PennDOT Projects

Coordination of this process to date has been focused on cost-share arrangements between PennDOT and the Water Department, and collaborative planning for the construction of new separate sewer pipes upsized to manage the stormwater needs of all future development between I-95 and the Delaware. Significant progress has been made in the past year on improving communications with PennDOT and finding mutually beneficial solutions for stormwater management.

Details are listed below for the five linear sections of the reconstruction project (GIR, AFC, BRI, BSR, and CPR).

AFC
This section is currently in preliminary design and the consultants have been requested to evaluate separate sewers as a part of their project.

BSR and BRI
The first phase of this section, BR0, is currently in final design. As a part of the design, all of the stormwater from the reconstructed portions of the highway and ramps is either being managed on-site or directly discharged to the Frankford Creek, removing the drainage area from the CSO system.

CPR: CP2
Six new outfalls are currently in construction and will accept stormwater runoff from the highway. They are oversized in order to accept the drainage areas in between the highway and the Delaware River as development occurs. Approximately 25 acres of highway are under construction and will be disconnected as part of the highway project. Additionally 16.4 acres of private property will be disconnected as a part of this project. Lastly, and additional 183.6 acres of private property should be separated as development occurs.

GIR: GR1
During the reporting period, GR1 has been under construction and primarily includes the relocation of Richmond Street. The drainage from the relocated street will be separated by connecting it downstream of the intercepting chambers at Dyott, Somerset and Cumberland Streets. Approximately 7.3 acres of roadway drainage is expected to be separated through GR1.

GIR: GR2
GR2 is also under construction and features a complete reconstruction of the mainline of the highway between Shackamaxon and Columbia. This elevated section is designed to manage the stormwater in order to comply with the Philadelphia Stormwater Regulations through green infrastructure practices in the areas along the highway.

GIR: GR3/4
GR3 and GR4 are in design concurrently, however they will be constructed in two separate phases. Several separate stormwater sewers are being evaluated for this section. Part of the infrastructure will be constructed as a portion of the GR3 project (with a temporary connection to the combined sewer), and the rest will be constructed as a part of the GR4 project. The sewers will then be connected below the regulating chamber, separating stormwater runoff from the area from the CSO system. The highway design includes stormwater management for the first inch of rainfall through compliance with Philadelphia's Stormwater Regulations. The Dyott Street portion of the project will also be constructed in two phases: GR3 will connect downstream of the regulator, and GR4 will construct a new outfall directly to the river.

Water Department Projects

The Water Department has two storm flood relief projects in the waterfront area that will contribute to the disconnection of certain areas. A description of these is also listed below.

Moore Street Storm Flood Relief

A flood relief project on Moore Street between Columbus Boulevard and the Delaware River is being designed to include the stormwater disconnection of the Pier 70 shopping center from the combined sewer system. This will potentially yield 61 acres of stormwater separation upon project completion, and will include provisions for an additional 46 acres of future separation between the shopping center and I-95.

Northern Liberties Storm Flood Relief

The design of a flood relief project in the Northern Liberties area includes the separation of stormwater through the construction of several new storm water sewers. A new 20" stormwater pipe from I-95 at Front Street to Delaware Avenue and a new 48" stormwater pipe from Delaware Ave to the river is planned to be constructed. These pipes will also collect stormwater from Laurel and Germantown Avenues. In addition, approximately 500 feet of the southbound lanes of Delaware Avenue south of Laurel Street will be separated when this construction is complete. Plans are being made for a future connection to a proposed separate system for Frankford and Delaware Avenues.

3.3 Interceptor Rehabilitation Program

The WQBEL Performance Standards requires 2 miles of interceptor lining by the end of year 5 (2016). As of July 2013, the Water Department is well ahead of that target with 6.2 miles completed, 5.6 miles in construction or in projects control, and 3.3 miles in design (**Table 3-4**).

Table 3-4: Interceptor Lining Status Update

Project Name	Design Status	Construction Status	Extents	Length (Miles)
60th and Cobbs Creek Parkway to 75th and Wheeler Sewer Lining	Design Complete	Construction Complete	60th and Cobbs Creek Parkway to 75th and Wheeler	2.2
Cobbs Creek Park to 63rd and Market Sewer Lining	Design Complete	Construction Complete	Cobbs Creek Park to 63rd and Market	0.5
40518 - Cobbs Creek Interceptor Phase 1 CIPP Lining	Design Complete	Construction Complete	63rd and Market to 62nd and Baltimore	1.6
40612 - Cobbs Creek Intercepting Sewer Lining Phase 2	Design Complete	In Projects Control	61st and Baltimore to 60th and Warrington	1
40613 - Cobbs Creek Interceptor Lining Phase 3	Design Complete	In Projects Control	City Avenue to D R/W in former 67th Street	1.7
40614 - Cobbs Creek Intercepting Sewer Lining Phase 4 (Indian Creek	Design Complete	In Projects Control	City Avenue to D R/W in former 67th Street	1.6

Project Name	Design Status	Construction Status	Extents	Length (Miles)
Branch)				
40615 - Tacony Creek Intercepting Sewer Lining Phase 1	Design Complete	Construction Complete	Chew & Rising Sun to I & Ramona	1.9
40616 - Tacony Creek Intercepting Sewer Lining Phase 2	Design Complete	Bid Awarded, Awaiting NTP soon	2nd St & 64th Ave to Chew & Rising Sun; DRW Mascher to Tacony Interceptor; Cheltenham Ave to Crescentville & Godfrey	1.3
40617 - Tacony Creek Intercepting Sewer Lining Phase 3	Design 30% Complete	-	I & Ramona to O & Erie	1
40618 - Upper Frankford LL Collector/Tacony Intercepting Sewer Lining Phase 4	Design 30% Complete	-	Castor & Wyoming to Frankford/Hunting Park	1.1
40619 - Upper Frankford Creek LL Collector/Tacony Intercepting Sewer Lining Phase 5	Design Started	-	Frankford/Hunting Park to Luzerne & Richmond	1.2

4.0 Streamlining

To achieve Performance Standards included in the WQBEL, the Water Department has developed partnerships with external agencies to coordinate and collaborate on stormwater management projects.

4.1 Tracking Federal and State Policy Developments

The Water Department conducts ongoing analyses and tracking of federal, state and local legislation and regulation that affect *Green City, Clean Waters* goals. This protocol requires a periodic review of policies, regulations, guidance, bills, and reports from a number of priority sources including governments, advocacy organizations, non-profits, and news sources. All legislative and regulatory developments that are relevant to the Water Department are reviewed and then imported into a policy tracking database.

4.2 Coordination with other City and Non-City Agencies to Achieve Policy Goals

The Water Department utilizes a pilot-based approach to coordination with partners in the implementation of the *Green City, Clean Waters* program. By embarking on singular partnership projects with unique characteristics, policy issues regarding project management responsibilities, project review workflows, cost shares, maintenance responsibilities, land access and project permanency can be negotiated and formally recorded. Often multiple pilot projects take place with each partner, since there are variables such as project lead, funding source, and external partner involvement which lead to a variety of project scenarios. As these pilots are accomplished, the Water Department documents and codifies the policies established as templates that can be applied to all future projects of the same type. The primary agency partnerships are described below.

4.2.1 Green Streets Program Development

The Water Department has advanced development of the Philadelphia Green Streets Program through the continued integration of planning and partnerships with the Streets Department, SEPTA, the Mayor's Office of Transportation and Utilities, PennDOT and others, as well as through the completion of both construction and design of several collaborative projects.

In the past year, the Water Department completed the design of several green stormwater infrastructure projects to be constructed in coordination with projects led by either the Water Department or partners. In addition, several of previously designed collaboration projects have started construction. Those projects in construction include the 58th Street Greenway, a federally funded streetscaping project that included several tree trenches and a rain garden in a traffic triangle, and the Passyunk Ave Corridor Improvements Project, which included three large rain gardens where the Streets Department proposed major intersection realignment. Green stormwater infrastructure was also installed as part of the Penn Street Trail project led by the Delaware River Waterfront Corporation. Stormwater bump-outs currently are under construction at several SEPTA bus stops and SEPTA included a stormwater tree trench in their recent upgrades to their station at 33rd and Dauphin Streets. The Water Department also worked with the Streets Department to complete green stormwater infrastructure designs to be included on two additional TIGER projects as well as another corridor improvements project. Continued coordination with PennDOT resulted in the approved design of stormwater tree pit that will be used in their reconstruction of Richmond Ave.

Policy and strategic planning improvements continue to make coordinating the design and construction of such projects more feasible. In addition to the Green Streets Design Manual, the Complete Streets Manual produced by the Mayor's Office of Transportation and Utilities and the SEPTA Bus Stop Design Guidelines were published over the past year and include references on integrating green stormwater infrastructure into projects in the public right-of-way. The Water Department has also developed a Streets Department/Water Department Green Stormwater Infrastructure Maintenance Memorandum of Understanding that is in the process of being reviewed by both agencies and has begun conversations to develop a similar agreement with PennDOT.

4.2.2 Schools

The Water Department is collaborating with the School District of Philadelphia to implement green stormwater infrastructure projects on School District property. The Water Department and the School District of Philadelphia have moved forward with a pilot-based approach to coordination, which has focused on three models of project implementation:

> **The Water Department Initiated Model** follows the Water Department's capital projects procedures where the Water Department manages design and construction. The George Nebinger School is the first test case for this coordination model.
>
> **The SDP Initiated Model** goes through the School District's capital improvements process and is funded via the SMIP Grant program. The School District of Philadelphia was awarded a first round SMIP Grant to build green stormwater infrastructure at five school sites.
>
> **The Third Party Model** employs interested non-profits to manage design and construction on behalf of the Water Department and the School District of Philadelphia. It allows the third party to leverage the Water Department's investment to fundraise for other schoolyard improvements. The Green2015 Partnership is an example of this model.

The Water Department and the School District of Philadelphia have established regular meetings to improve communication and coordination efforts.

Additionally, the Water Department has awarded three SMIP Grants to school-related non-profits for schoolyard green stormwater infrastructure projects.

4.2.3 Green2015

Green2015 is an initiative to add 500 acres of new publicly accessible green space in the City by 2015. The Water Department has committed to the first two phases of the initiative, which are focused on making improvements to two pilot school playgrounds and four pilot recreational facilities. Phase one is nearing completion, and represents a collaborative effort between the Water Department, the Philadelphia Department of Parks and Recreation, the School District of Philadelphia and the Trust for Public Land. Green2015 provides the Water Department with the opportunity to establish precedents for working with the School District of Philadelphia and Philadelphia Parks and Recreation.

4.2.4 Parks and Recreation

Beyond Green2015, the Water Department and Philadelphia Parks and Recreation continue to work together to prioritize and address challenges to comprehensive green stormwater infrastructure implementation on park land. Emphasis is on the development of decision frameworks to facilitate site prioritization and selection, development of a collaborative public outreach process during project design and construction, and the establishment of agreements to clarify and confirm cost share and maintenance responsibilities, as well as to secure the longevity of green stormwater infrastructure assets on public land.

4.2.5 Vacant Lots

The Water Department expanded its pilot initiatives on vacant lands, via thorough analysis of the City's parcels of vacant land, and the development of partnerships with City agencies and authorities that own large quantities of vacant lands. The Water Department developed prioritization strategies to focus on lands that have high potential for stormwater management and low potential for development, as well as those that align geographically with other projects being constructed by city agencies or the Water Department, such as subsurface water and sewer projects. Specifically, the Water Department has developed relationships with Department of Public Property and Philadelphia Redevelopment Authority to acquire property rights for vacant lots on which it is planning to construct green stormwater infrastructure systems. The Water Department has also worked closely with Philadelphia Parks and Recreation on the development of new parks on vacant lands and is investigating the purchase of private lands via the sheriff's sale process. The Water Department is developing workflows for each of these different project scenarios, which include multiple levels of input and approval. The Water Department is also working with partner agencies to establish policies regarding long-term ownership, maintenance and replacement of green stormwater infrastructure projects located on vacant lots.

4.3 Stormwater Planning Districts Coordination

The Water Department has moved ahead with the Stormwater Planning District initiative (formerly known as Stormwater Management Enhancement Districts or SMEDS) by beginning work on five study areas (Districts). The Water Department identified the first five Districts based on size, form, complexity, and stakeholder interest. These areas are diverse in type; a large urban campus, a commercial corridor, a neighborhood with high rates of vacancy, a neighborhood with unique urban form, and a regional/national professional sports complex, and each presents a range of opportunities for managing stormwater as described in section 3.1.1.1.

The Water Department has contracted with consultant teams who are conducting detailed analysis of these areas. First, an existing conditions report is completed and stakeholder outreach is conducted, then a comprehensive stormwater improvement plan is developed for each district. These plans outline implementation options based on physical analysis and stakeholder input.

The Water Department engages stakeholders for each district comprised of government agencies, business and economic entities, and community/civic groups where appropriate. The strategies used to engage stakeholders are tailored to the specific area and the information gathered during this process is incorporated into the development of each stormwater improvement plan.

5.0 Operation and Maintenance

In order to ensure the function and sustainability of stormwater management infrastructure investments, the Water Department continues to develop Operation & Maintenance Agreements and protocols.

5.1 Maintenance of Public Facilities

The Water Department is committed to ensuring that constructed SMPs continue to operate as designed. During FY2013, the Water Department continued to further develop and structure a maintenance program that includes the routine maintenance of all Water Department green stormwater infrastructure assets.

The frequency of maintenance and the tasks performed at green stormwater infrastructure projects are dependent on the type of SMPs implemented at a given location. Green stormwater infrastructure projects with abundant vegetative components such as rain gardens, stormwater planters, basins, swales and stormwater bump-outs are regularly scheduled for maintenance throughout the growing season to ensure plant health and survival. Other SMP types with less vegetation, such as tree trenches, infiltration/storage trenches and porous pavements, require a more intermittent routine maintenance schedule. Routine maintenance of all subsurface components associated with constructed SMPs (i.e. pipes and inlets) is performed at a minimum of once per year until further maintenance data is collected and standard operating procedures (SOPs) are refined. Table 5-1 provides a list of SMP types and the total number currently maintained by the Water Department.

Table 5-1: Water Department SMP Types Currently Maintained

SMP Type	Total maintained by PWD
Stormwater Tree Trench	46
Stormwater Planter	15
Stormwater Bump-out	6
Rain Garden	11
Stormwater Basin	3
Infiltration/Storage Trench	17
Pervious Pavement	8
Swale	4

Routine surface maintenance tasks include activities such as plant care (e.g., pruning, watering, vegetation control, replanting, etc), cleaning (e.g., trash/ sediment/ organic debris removal), structural upkeep and repairs (e.g., winterizing, string trimming, repairing no- mow edges, etc.). Pervious pavement SMPs receive maintenance that consists of vacuuming for the removal of fines and other debris. Routine subsurface maintenance activities include tasks such as jetting or vacuuming of distribution and underdrain pipe elements, cleaning of inlet and control structures, and debris removal along the curb.

Average maintenance cycles and tasks by SMP type have been developed through observation of field data over many maintenance seasons to maintain safe and effective SMPs. The frequency of maintenance and the activities performed are subject to change based on various factors that are evaluated as sites begin to mature and further experience is gained. Changes in frequency can include an increase in maintenance events in order to address various needs (i.e. public events, follow-up maintenance actions). In addition, frequency of maintenance may decrease as vegetated practices mature, volunteer programs are established, and the Water Department further refines maintenance SOPs.

5.2 Maintenance of Private Facilities

The Stormwater Plan Review program continues to utilize two effective tools to ensure the on-going maintenance of private facilities by executing Operation & Maintenance Agreements and conducting post-construction maintenance inspections.

An Operation & Maintenance Agreement is notarized and recorded to the property land deed prior the issuance of a Post-Construction Stormwater Management Plan Approval by the Water Department. These agreements outline the SMP on the private site and outline suggested maintenance protocol. The agreements also include language granting the Water Department the right to inspect and even perform maintenance on behalf of the property owner. Opportunities to streamline and enhance the agreement process were evaluated in the past year, and potential improvements will be vetted in the coming year.

Post-construction maintenance inspections continued through the reporting period. The Water Department is currently piloting more efficient ways to inspect private sites. During FY2013, the pilot expanded to include inspections with closed circuit TV, professional survey equipment, and enhanced inspection practices intended to better document and evaluate the condition and performance of private sites.

5.3 Green Stormwater Infrastructure Maintenance Manual

The Water Department received approval of the Green Infrastructure Maintenance Manual Development Process Plan from the PADEP on November 15, 2012. During FY2013, the Water Department worked toward documenting the structure and content of maintenance SOPs. Development of the Green Infrastructure Maintenance Manual, a compilation of these SOPs, is on target to be completed by the June 1, 2014 deadline.

The Water Department is committed to gathering information from actively maintained Water Department green stormwater infrastructure projects to develop and refine maintenance protocols for various SMP types implemented as part of the *Green City, Clean Waters* program. The goal is to identify the most effective and sustainable practices to ensure the operation and maintenance of Water Department assets. Maintenance records are tracked and compiled through the current maintenance contract which will ultimately provide valuable data to inform the Water Department about the condition and needs of green stormwater infrastructure projects.

6.0 Data Collection and Analysis

6.1 Comprehensive Monitoring Plan

Proposed methodologies for the *Green City, Clean Waters* monitoring program were outlined in both the draft Comprehensive Monitoring Plan (CMP) submitted December 1, 2012 and in a comment response sent to PADEP and the USEPA on July 31, 2013. A revised CMP will be submitted at a future date (yet to be negotiated), and will include further documentation of proposed methodologies. Upon CMP approval, any updates t0 the development and refinement of approved methodologies will be included in future COA Annual Reports. Sections 6.2-6.5 include a status update including FY2013 activities, programs, and projects related to the Water Department's development of a comprehensive monitoring program.

6.2 Develop Dissolved Oxygen (DO) models and Bacteria Models of the Tacony-Frankford and Cobbs Creeks

The Water Department is developing DO and bacteria water quality models for the two non-tidal CSO receiving water bodies within the City boundary, the Tacony-Frankford Creek and the Cobbs Creek. The Tributary Water Quality Model for Bacteria was submitted to PADEP for review and approval on June 1, 2013. Development of the DO model continues, and as of July 2013 are on target for the June 1, 2014 COA deliverable date. Selection of a segmentation design that represents each stream in WASP is nearly complete. Segmentation design factors include the locations of outfalls, monitoring points, and stream features such as riffles, runs and pools. Selection of water quality model validation periods is complete and incorporates continuous DO, temperature, and light (i.e, photosynthetically active radiation) data collected at the USGS gages in the basins. Sensitivity analyses are underway to better define the relative effects of the numerous WASP input variables. A base flow analysis of each watershed that appropriately distributes freshwater inputs in the two models has been completed, however it may be modified in the future.

6.3 Hydrodynamic and Water Quality Model for the Tidal Delaware and Schuylkill Rivers

The Water Department is developing hydrodynamic and water quality models for the tidal Schuylkill River and tidal Delaware River. In the case of the latter, the domain of the model spans 73 river miles from Trenton NJ to Delaware City DE to fully represent the extent within and beyond the influence of the City's CSO discharges. Data acquisition for the contemporary period is still underway with a major effort to collect current data using Acoustic Doppler Current Profiler technology and a Sediment Oxygen Demand monitoring program conducted by the Woods Hole Group, the Academy of Natural Sciences, the University of Delaware, and Chesapeake Biogeochemical Associates. Water quality data from other agencies, Discharge

Monitoring Records and data on other NPDES discharges continue to be compiled into a comprehensive database for model input and calibration. In addition, a water quality survey will be conducted in the model measuring nutrient and Biological Oxygen Demand parameters and nitrification rates at different locations to further calibrate the model.

Bathymetry survey of tributary confluence areas for modeled tidal stream segments is complete. Initial sensitivity analysis simulations for bottom roughness (i.e., friction) continue. As of July 2013 developments on the Hydrodynamic and Water Quality model are on target for the June 1, 2015 COA deliverable date.

6.4 Sewer System Evaluation Survey (SSES)

The Sewer System Evaluation Survey (SSES) analytical study phase continues, including sanitary sewer flow meter data evaluation and wet and dry weather flow evaluation using the USEPA SSOAP software tools. Drainage area delineations were updated based on current collection system plans and GIS coverages. The SSES is on track for submittal by June 1, 2014, and the Outlying Communities Report will follow by June 1, 2015.

6.5 Green Stormwater Infrastructure Monitoring

Monitoring and testing green stormwater infrastructure is essential to determine its effectiveness in managing stormwater and reducing combined sewer overflows.

The Water Department uses post-construction monitoring and post-construction testing at the SMP and system levels to evaluate the performance of stormwater management practices and to provide information for improvements to design and maintenance. Since November 2012 the Water Department has monitored 27 stormwater management sites. As requested by the PADEP and USEPA through the CMP comment/comment response negotiations, a Green Stormwater Infrastructure Monitoring Status Report is included in **Appendix 5**.

Green Stormwater Infrastructure Pilot Program

The Water Department has selected 128 sites to be included in the green stormwater infrastructure pilot program. Information on the selected sites and their associated variables can be found in the Green Stormwater Infrastructure Monitoring Status Report in **Appendix 5**.

Implementation Challenges

The initial challenges of developing a monitoring program have included the need to develop a comprehensive monitoring program to best utilize resources, select sites, inform the *Green City, Clean Waters* adaptive management program, and fulfill compliance obligations. Other challenges include lack of proper equipment and applicable monitoring protocols for the sites being implemented in Philadelphia.

The Water Department is in the process of developing internal protocols to ensure proper design and installation of observation wells to protect monitoring equipment and allow full functionality. In addition, through piloting the Water Department is identifying equipment and location needs for select methodologies. Finally, a database is being developed to track field activities and available resources.

7.0 Public Outreach and Participation

The Water Department continues to strive to develop the best methods and preferred tools for engaging a broad range of stakeholders. In FY2013, the Water Department engaged 62,638 residents through a variety of public outreach and participation initiatives. The following includes updates on current programs and projects.

7.1 Green Stormwater Infrastructure Notification & Outreach Process for Green Programs

Public outreach that helps increase public acceptance and buy-in of green stormwater infrastructure should occur over the course of a project, from site identification to design and from construction to post- construction. The Water Department's multi-layer notification process will evolve as new areas are greened. Tasks vary per green program, but they may include outreach to property owners and site users; meetings with partners and presentations at community meetings and events; solicitation of design feedback (at times); coordination of public education and resources (i.e., environmental education curriculum in classroom or during after care at recreation center); event planning for ribbon-cuttings (for select sites); partnership development with users of the site, civics and other partners; coordination for adoption opportunities and more.

These initiatives specifically support the following Water Department programs and projects:

- Green Streets
- Green Parks
- Green Vacant Lands
- Green Parking
- Green Schools
- Green Campus
- Green Public Facilities
- Green Industry, Business, Commerce and Institutions
- Stormwater Management Enhancement Districts
- *Community Input Form*
- 21st Century Pennsylvania Horticultural Society contract
- Green 2015

7.2 Public Education and Outreach Programs

Green City, Clean Waters Partners Master List

The *Green City, Clean Waters* Partners Master List is a distribution list of email addresses that gets updated after collecting contact information at public events and meetings hosted by the Water Department. As of July, 2013, there are approximately 5,814 active live entries on the list. This number reflects the number of individuals confirmed through the email management system as participants with accurate contact information and those specifically interested in receiving email updates, e-newsletters, regarding *Green City, Clean Waters* and/or other Water Department special initiatives and events.

Green City, Clean Waters Signage

The Water Department is currently developing interpretive signage and plans to install the signage at select green stormwater infrastructure locations. A variety of test sign types have been fabricated. Public feedback was collected in the Spring of 2013 at various public sites for a two week period. The feedback informed the final text and design of the signage. Currently, the final designs for an overview sign and various green tools are in the final stage of development.

Online Community Input Form

The Water Department continues to encourage the public to submit locations for consideration through the Community Input Form, an on-line tool that accepts community input on the identification of potential green stormwater infrastructure projects at schools, recreation centers, parks, public spaces, parking lots, vacant lots and on streets. The Water Department is also accepting neighborhood-wide submissions for potential green stormwater infrastructure opportunities. Submissions of input do not guarantee that a project will be selected for implementation, however, each submission is reviewed and submitters are notified of the results of the review of their project within a six week period. The community input form may be accessed at www.philllywatersheds.org/CIF.

Stormwater Art

The Water Department works with local artists on various artistic mediums that can help interpret *Green City, Clean Waters* through art in an effort to raise awareness about green stormwater infrastructure. Example projects include yarn bombing (temporary knitted yarn art) of stormwater tree trenches; rain barrel wrap designs created by local students; Soak It Up design workshops with artist, Stacy Levy; signature art projects at gateways and/or model sites; inlet art; calendar art contests, etc.

Furthermore, the Water Department is interested in branding green stormwater infrastructure or nearby items (such as street furniture) with a symbol that is an identifiable feature to unify and distinguish all green stormwater infrastructure projects throughout the City. The branding initiative is also intended for the public to better recognize the Water Department's green investments.

In FY2013, the Water Department and Mural Arts worked on a rain barrel wrap project that involved the creation of 11 designs by 30 students from two schools. The final designs were displayed on-line and the top three designs that were voted on by the public were fabricated and wrapped on 40 rain barrel wraps.

The Water Department and Mural Arts also worked with Stacy Levy on a signature art project that involves a beautiful art piece on the street in Queen Village to raise awareness of the urban water cycle. The art demonstrates water flowing into the inlets and connect to the Delaware River. The goal is to replicate similar art pieces that would serve as temporary art in front of signature green stormwater infrastructure sites in the future. The temporary art will serve as branding for *Green City, Clean Waters* sites.

Infill: Soak It Up

This 18-month partnership between the Water Department, the Community Design Collaborative and the USEPA focused on accelerating the adoption, adaptation and implementation of green stormwater management in Philadelphia. The initiative involved a series of design centered programs including exhibitions, workshops, and charrettes. The culmination was a national green stormwater infrastructure design competition that awarded the three winning teams with cash prizes. The designs responded to typical and complex stormwater management problems in an innovative and cost-effective manner. There were a total of 28 submissions for the competition, which represented the work of 101 firms and 315 professionals. Nine finalists competed for cash prizes in the amount of $10,000. One winner was chosen in each of the three design challenge categories (industrial, commercial, and residential).

Soak It Up Adoption

Soak It Up Adoption is a pilot program designed to support civic organizations interested in helping to monitor and care for Water Department green stormwater infrastructure in their neighborhoods. The program is funded by the Water Department and administered by the Pennsylvania Environmental Council in partnership with the Philadelphia Industrial Development Corporation. Civic associations and other interested non-profit community organizations can apply for small grants to become adoptees. Pilot phase grant recipients will be asked to participate in introductory training, monitor green stormwater infrastructure, collect trash and provide feedback about the site and their experience for one year. The Soak It Up adoption grant pilot program aims to go above and beyond the Water Department's routine maintenance program by engaging civic organizations in helping to ensure that their communities know about and care for green stormwater infrastructure, keeping the sites litter free and attractive. In spring 2013, nine organizations were accepted to participate in the program, which involves a small grant award to facilitate implementation in each designated neighborhood.

Philadelphia Watershed and Green Infrastructure Tours

The Water Department and its partners offer tours several times a year to explore the natural history of a watershed to better understand the buried streams beneath us, or to visit model green stormwater infrastructure projects throughout the City and beyond. By recognizing and showcasing green stormwater infrastructure projects, the Water Department hopes to inspire others to replicate similar stormwater management projects. An online green tour alternative is underway. Features, such as podcasts and interactive mapping tools are also being explored for the online tour. During the reporting period, the Water Department led five Green Infrastructure tours catered to diverse audiences, including municipal managers, scientists, program directors, foresters, environment and sustainability institutes, and local schools.

Green City, Clean Waters Art Contest

The Partnership for the Delaware Estuary and the Water Department sponsored an art contest for Philadelphia public, private and home-schooled students, grades K-12. The theme was originally "Protect Philadelphia's Hidden Streams," but was changed to "Green City, Clean Waters." The contest initially was intended to help educate schoolchildren about stormwater runoff pollution, polluting Philadelphia's hidden, underground streams, the Schuylkill and Delaware Rivers, and the Delaware Bay. The contest still strives to educate schoolchildren about stormwater runoff pollution, but also provides City residents with information on how to protect waterways and about the Water Department's new initiatives. Students are asked to create an original piece of artwork that shows how Philadelphians can help prevent stormwater runoff pollution. Alternatively, participants can create an original 30-second video showcasing what pet waste does to our water and how pet owners can help by picking up after their pets. Winning artwork is used to promote pollution prevention messages on SEPTA buses and in a calendar. Along with the drawings, the calendar contains monthly tips to help prevent water pollution. Winning videos are posted on the Partnership for the Delaware Estuary YouTube channel, and can be accessed at: http://www.youtube.com/user/DEESTUARY

7.3 Green Homes Initiatives

Green Homes Technical Evaluation and Improvement

The Water Department is piloting, monitoring and evaluating residential green tools and tracking technology improvements for these tools.

Downspout Planter Technology Improvements

The Water Department works with Shift Design on fabricating a stormwater downspout planter starter kit, a stormwater downspout planter that could be prefabricated and modular, that maximizes the stormwater storage capacity and controls the drain down. The goal was to create a downspout planter that is aesthetically appealing to homeowners and has a “do-it-yourself” assembly style. A prototype has been designed and fabricated. Currently 10 prototypes are being tested at Water Department facilities and the homes of Rain Check participants.

Philadelphia Water Department Facility Residential Pilot Projects

Installation, inspection, maintenance, and evaluation of downspout planters and other pilot residential tools are conducted at Water Department facilities. This project also provides an opportunity to strengthen communication between Water Department employees.

Pilot stormwater tools are located at the following Water Department facilities:

- Belmont – Lumber downspout planters and Aqualock ground level bioswales
- Queen Lane –ShiftDesign prototype downspout planter (pending assessment of site)
- Fox Street – Lumber downspout planters

Rebuilding Together Philadelphia Downspout Planters

The Water Department has worked with Rebuilding Together Philadelphia since 2010 to conduct block builds in neighborhoods in the combined sewer area. These block builds involve completing critical home repairs, adding energy efficient upgrades, and home modifications for multiple homeowners at a time. Exterior work, such as tree planting, sidewalk remediation and block cleanups, is also completed throughout the participating blocks to tie the residential projects together and to further galvanize the community to continue improvements. Rebuilding Together Philadelphia offers downspout planters and the installation of the planters free of charge during block builds.

In FY2013, there were 31 downspout planters built and installed through block builds by Rebuilding Together Philadelphia, including 11 in the Mantua neighborhood, 3 in the Nicetown neighborhood, and 17 in the Belmont neighborhood.

Rain Check Pilot Program

In June 2012, the Water Department launched Rain Check, a pilot program designed to incentivize homeowners to install landscape improvements that manage stormwater. The Department started Rain Check with three broad objectives: first, to educate Philadelphia homeowners about the importance of stormwater management and the value of implementing the *Green City, Clean Waters* plan; second, to evaluate the use of incentives to motivate residential customers to manage stormwater on their properties; and third, to determine the feasibility of managing large amounts of stormwater runoff through residential green infrastructure. The Water Department will evaluate the effectiveness of using these public outreach efforts to achieve Greened Acres and meet our COA commitments.

To meet these objectives, the Water Department structured a pilot program for approximately 250 participants in which the Water Department provides free stormwater property assessments and shares the cost of implementing one of five stormwater management practices on a participant's property. The five stormwater tools available are downspout planters, rain gardens, pavement removal, porous paving and yard trees. The Water Department works through a non-profit partner, the Energy Coordinating Agency, to help provide job training for stormwater assessments and green tool installations as well as coordinate scheduling logistics with the participants.

Table 7-1 provides metrics that the Water Department has used to track the progress of the Rain Check program through the first year of the pilot program. These numbers are useful in tracking the installation of stormwater tools. To help measure Rain Check's impact on participants' understanding of stormwater management, the Water Department has developed before and after surveys that ask people to define terms such as watershed and rate their change in understanding before and after participation in the program. Data from the FY2013 surveys are not yet available.

Table 7-1: Rain Check Program Metrics

Participation	
Total Sign-ups	247
Total Properties Assessed	208
Participation Ended	118
No tool wanted	22
No tool feasible	20
High cost	17
Non-responsive	36
Other	23
Total Participants	90
Stormwater Tool Installations	
Downspout Planters	34
Rain Gardens	7
Yard Trees	7
Porous Paving	6
Depaving	1
In Process	36
Total Stormwater Tool Installations	60
Stormwater Tool Installation In Process	36

Definition of Metrics

Total Sign-ups:

This represents the total number of people who signed up for the program. After signing up for the program, some people decided not to participate or didn't respond to our calls. This explains the difference between the total sign-ups and the number of properties assessed.

Properties Assessed:

This is the number of properties for which the Water Department provided a free stormwater property assessment. The assessment process is valuable to the Water Department even if a participant doesn't install a stormwater tool. Through the assessment process, the Department identifies if any stormwater tools are feasible on a property and if so, what tools might work. The Water Department uses this as an opportunity to educate people about stormwater management and *Green City, Clean Waters*, and to gather data on the square footage of impervious area, the feasibility of managing water on the property and the conditions of the drains, gutters, risers, downspouts, etc.

Participation Ended:

People stopped participating in the Rain Check program for a variety of reasons. On some properties no tool was physically feasible. On other properties people weren't interested in installing the tools that were feasible. For others the cost was too high, or much higher than they originally expected. There were also several participants that became non-responsive following the property assessment and an installation could not be coordinated.

Total Participants:
Following the initial property assessment, this number represents the residents that decided to continue their participation in the Rain Check program through stormwater tool installation/coordination.

Stormwater Tools Installed:
The Water Department installed 54 stormwater tools at the conclusion of FY2013. For some participants who signed up in FY2013, the installation of their tools is still in progress. Downspout planters were by far the most popular tool for two reasons: a) they are physically feasible on most properties and b) they were less expensive than most other tools. Please note the sum of the different tools is greater than the total stormwater tools because yard trees were planted on a participant's home in addition to the installation of a different stormwater tool.

Stormwater Tool Installation In-Process:
This describes participants which have had a property assessment and indicated some interested in having a stormwater tool installed, yet installation has not yet been completed. Some of these people will move through with installations, while others may be non-responsive.

More information on the program can be found at the following site: http://www.phillywatersheds.org/whats_in_it_for_you/residents/raincheck.

Rain Barrel Program
The Water Department implemented a Rain Barrel program to educate the public about stormwater and it contributes to the occurrences of CSOs. Rain barrels create de-centralized storage which helps create more capacity in the sewer system and also gives the property owner access to this water for their own use such as plant watering and car washing. Since the start of this program, approximately 3,800 rain barrels have been distributed and installed throughout Philadelphia by the Water Department or the program partner, the Energy Coordinating Agency. Rain barrels are offered free of charge to residents who participate in Water Department-sponsored rain barrel workshops, where they have the opportunity to learn about the benefits of managing stormwater runoff and techniques for rain barrel usage. To ensure proper installation, the rain barrels are installed by the Energy Coordinating Agency or their partners. Over the past year, approximately 1,050 rain barrels were distributed and installed throughout Philadelphia by the Energy Coordinating Agency on behalf of the Water Department. More information on the Water Department's Rain Barrel program and upcoming workshops can be found at the following website: http://www.phillywatersheds.org/rainbarrel.

Appendix 1

PENNVEST Projects

Work Order #	Project Name	Type	Watershed (s)	Status	Cost*	Drainage Area (SF)	SMP Types
50038	Donald Finnegan Playground Wilson Park E.H. Vare Middle School Stephen Girard School Southwark School Julian Abele Park	GSI	Schuylkill	Construction Complete	$1,284,000	165,702	Tree Trenches
50010	Barry Playground	GSI	Schuylkill	Contract Management	$944,958	110,381	Tree Trenches
50040	Yorktown	GSI	Delaware	On Hold in Design	$1,125,036	78,234	Planters, Infiltration Trenches
50034	Thompson St and Columbia St Trenton Ave and Norris St.	GSI	Delaware	Contract Management	$580,875	65,863	Tree Trenches, Infiltration Trench, Bumpout, Rain Garden
50036	29th and Chalmers Playground William Cramp School Barton School 27th St from Indiana to Toronto	GSI	Delaware/ Schuylkill	Contract Management	$630,605	111,775	Tree Trenches, Bumpout
50019	Anna B. Day School Francis Scott Key School Epiphany of Our Lord School Dickinson Square	GSI	Delaware	Contract Management	$963,139	129,286	Tree Trenches, Infiltration Trenches, Bumpout
50042	Bridesburg Recreation Center Dorsey Playground Roosevelt Playground Magnolia Cemetery Carmella Playground	GSI	Delaware	Contract Management	$1,786,000	243,065	Tree Trenches, Infiltration Trenches, Planters, Rain Garden
50025	A.S. Jenks School Smith Elementary St Thomas Aquinas School Sacks Playground	GSI	Delaware	Contract Management	$1,128,504	136,169	Tree Trenches
50007	Blue Bell Inn Triangle	GSI	Darby-Cobbs	Contract Management	$270,000	25,918	Rain Garden
50041	Longstreth School Little Sisters of the Poor McCreesh Playground Springfield Ave & Cobbs Creek Island	GSI	Darby-Cobbs/ Schuylkill	Contract Management	$1,212,000	207,912	Tree Trenches, Infiltration Trenches, Planters, Rain Gardens
50039	Temple Engineering & Architecture Building William Gray Youth Center Dick Elementary School 12th & Diamond	GSI	Delaware	Contract Management	$883,110	128,633	Tree Trenches
50029	Simons Recreation Center Pleasant Playground Morris Leeds Middle School	GSI	TTF	Construction Complete	$1,502,632	307,316	Tree Trenches
50037	Cassidy Elementary School Overbrook Elementary School Old Cathedral Elementary Belmont School James Rhoads School	GSI	Schuylkill/ Darby-Cobbs	Contract Management	$1,550,000	273,295	Tree Trenches

Work Order #	Project Name	Type	Watershed (s)	Status	Cost*	Drainage Area (SF)	SMP Types
	Sister Clara Muhammad School Mastery Charter School Muhammed Square						
50028	MLK Recreation Center Towey Recreation Center Philadelphia Military Academy Fredrick Douglass Elementary	GSI	Delaware	Construction Complete	$611,200	115,216	Tree Trenches
50026	Daroff School Sayre High School Andrew Hamilton School Shepard Recreation Center	GSI	Darby-Cobbs	Construction Complete	$1,636,000	252,604	Tree Trenches, Infiltration Trench, Planters, Bumpouts
50046	Womrath Park	GSI	TTF	Construction Complete	$522,000	46,087	Infiltration Trench, Swale, Rain Garden
50027	Bryant Elementary School William Harity School Samuel B. Huey Elementary Christy Recreation Center Baltimore Ave Island	GSI	Darby-Cobbs	Construction Complete	$985,200	168,969	Tree Trenches
50043	Harpers Hollow Park Wakefield Park	GSI	TTF	Construction Complete	$474,000	63,249	Stormwater Basin, Rain Gardens
50020	Welsh School Wakisha Charter School Diamond St from 25th to Stillman Poplar St from 8th to Franklin St Dendy Recreation Center	GSI	Delaware	Contract Management	$817,970	96,703	Tree Trenches, Infiltration Trench, Rain Garden
50001	Chew Playground Passyunk Ave- Dickinson to Reed St. 12 St to Reed St 12 St from Dickinson to Tasker St 10th St from Wilder to Reed St	GSI	Delaware	Contract Management	$878,015	107,027	Tree Trenches, Infiltration Trench, Planters, Bumpouts, Rain Garden
50003	Bodine High School 4th St from Poplar to Wildey St 3rd St and Fairmount Ave Intersec. Fairmount Ave - N 3rd to N 4th St	GSI	Delaware	Construction Complete	$407,903	49,136	Tree Trenches, Infiltration Trench, Planters, Bumpout
50004	Belfield and Chew	GSI	TTF	Construction Complete	$285,000	68,476	Tree Trenches
50002	Blair St from Hewson to Palmer Hewson St – Blair St to Trenton Ave Montgomery – Frankford to Blair St	GSI	Delaware	Closed	$173,494	34,108	Tree Trench, Infiltration Trenches
50009	Queen Lane from Henry St to Fox St. Bureau of Laboratory Sciences	GSI	TTF/ Schuylkill	Closed	$703,733	95,919	Tree Trenches, Infiltration Trench, Planters, Bumpouts
50005	Hartranft School Palmer St – Frankford Ave to Blair St 16th St betw. Passyunk Ave & Jackson St.	GSI	Delaware/ Schuylkill	Closed	$402,396	68,520	Tree Trenches, Infiltration Trench

*Projects are grouped for bidding purposes therefore project construction costs are based on groups of projects.

Appendix 2

Completed Projects

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
West Mill Creek Farm Swales	5/1/2006	360	4	13942	0.1	Rain Garden, Swale	Streets	$57,850	Pennsylvania Horticulture Society, Pennsylvania Department of Environmental Protection, Philadelphia Water Department	Schuylkill
Mill Creek Playground Basketball Court	6/2/2006	1870	0	9350	0.52	Pervious Paving	Open Space	$375,925	Pennsylvania Department of Environmental Protection, Philadelphia Department of Recreation, Councilwoman Blackwell	Schuylkill
Ogden St and Ramsey St (West Mill Creek Recreation Center)	7/1/2006	755	5	17345	0.21	Stormwater Tree Trench, Pervious Paving	Streets	Partner-project, no capital investment by the PWD	Pennsylvania Horticulture Society, Pennsylvania Department of Environmental Protection, Philadelphia Department of Recreation	Schuylkill
47th & Grays Ferry	4/1/2007	1260	7	19200	0.35	Rain Garden	Vacant Land	$15,614	Pennsylvania Department of Environmental Protection, Pennsylvania Horticulture Society, University City Green	Schuylkill
Cliveden Park	9/1/2007	4378	0	52355	1.21	Stormwater Basin	Open Space	$175,000	Pennsylvania Horticulture Society, Pennsylvania Department of Environmental Protection, Philadelphia Department of Recreation	TTF

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
Clark Park Basketball Court	11/1/2007	3080	0	32517	0.85	Infiltration/Storage Trench	Open Space	Cost not available	Pennsylvania Department of Environmental Protection, Philadelphia Department of Recreation, Pennsylvania Department of Conservation & Natural Resources	Schuylkill
McMahon St (Waterview Recreation Center)	7/1/2008	2021	8	13368	0.56	Stormwater Tree Trench, Stormwater Planter, Pervious Paving	Streets	$49,500	Pennsylvania Horticulture Society, Philadelphia Department of Recreation	TTF
Liberty Lands	6/1/2009	849	24	8000	0.23	Rain Garden	Open Space	Partner-project, no capital investment by the PWD	Pennsylvania Horticulture Society, Pennsylvania Department of Environmental Protection, Northern Liberties Neighborhood Association	Delaware
Columbus Square	1/1/2010	730	0	7854	0.2	Stormwater Planter, Infiltration/Storage Trench, Pervious Paving	Streets	$175,000	Department of Public Property, Department of Recreation, Friends of Columbus Square	Delaware
Sepviva St from Susquehanna Ave to Dauphin St	1/27/2010	962	13	27425	0.27	Infiltration/Storage Trench	Streets	$1,149,000**		Delaware

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
Lancaster Ave from N 58th St to N 63rd St	11/1/2010	11282	219	76689	3.11	Stormwater Tree Trench, Stormwater Bumpout, Swale	Streets	Partner-project, no capital investment by the PWD	Philadelphia Department of Commerce, Philadelphia Industrial Development Corporation, Environmental Protection Agency	Schuylkill
7th St, 8th St, and Cumberland St (Hartranft School)	11/10/2010	3460	6	44524	0.95	Stormwater Tree Trench, Infiltration/Storage Trench	Streets	$412,000	Pennsylvania Horticulture Society	Delaware
Palmer St from Frankford Ave to Blair St (Shissler Playground)	11/10/2010	1250	5	9250	0.34	Stormwater Tree Trench	Streets		Pennsylvania Horticulture Society, New Kensington Community Development Corporation	Delaware
16th St between Passyunk Ave and Jackson St	11/10/2010	571	8	14735	0.16	Stormwater Tree Trench	Streets			Schuylkill
Shissler Playground	12/6/2010	3384	9	17600	0.93	Stormwater Tree Trench	Open Space	$50,000	Department of Recreation, Pennsylvania Horticulture Society, New Kensington Community Development Corporation	Delaware
Bureau of Laboratory Services	5/14/2011	1290	6	13408	0.36	Stormwater Tree Trench, Stormwater Planter, Infiltration/ Storage Trench	Streets	$675,425**		TTF

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
Benjamin Franklin Parkway from 21st St to 23rd St	6/1/2011	3561	0	29605	0.98	Infiltration/Storage Trench	Streets	Partner-project, no capital investment by the PWD	Fairmount Park Commission	Schuylkill
Rockland St	6/22/2011	5542	41	178850	1.53	Infiltration/Storage Trench	Streets	$3,221,333**		TTF
Percy St from Catharine St to Christian St	7/18/2011	657	0	4740	0.18	Pervious Paving	Streets	$936,000**		Delaware
Blair St (Shissler Playground)	11/4/2011		5		0	Other	Streets	$197,000	Pennsylvania Horticulture Society, New Kensington Community Development Corporation, Department of Recreation	Delaware
Hewson St from Blair St to Trenton Ave (Shissler Playground)	11/4/2011		0		0	Other	Streets			
Montgomery Ave, Shissler Playground	11/4/2011	1572	9	34090	0.43	Stormwater Tree Trench, Infiltration/Storage Trench	Streets			
Reese St	11/5/2011	454	4	4829	0.13	Stormwater Tree Trench	Streets	Partner-project, no capital investment by the PWD	Pennsylvania Horticulture Society	Delaware
Earl St (Hetzell Playground)	11/5/2011	593	4	6930	0.16	Stomwater Tree Trench	Streets			
8th St	11/5/2011	817	4	9361	0.23	Stomwater Tree Trench	Streets			
Front St	11/5/2011	818	6	9476	0.23	Stomwater Tree Trench	Streets			
9th St	11/5/2011	806	4	9422	0.22	Stomwater Tree Trench	Streets			
Diamond St	11/5/2011	1075	4	12538	0.3	Stomwater Tree Trench	Streets			

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
Madison Memorial Park	12/16/2011	401	13	7015	0.11	Infiltration/Storage Trench	Open Space	Partner-project, no capital investment by the PWD	Digsau, City Play, Northern Liberties Neighborhood Association	Delaware
Eadom Parking Lot	5/2/2012	47455	20	85827	13.07	Rain Garden	Parking	All done in house by PWD Crews, No bid costs	Department of Public Property	Delaware
Herron Playground Basketball Court	10/2/2012	5927	0	14480	1.63	Infiltration/Storage Trench, Pervious Paving	Open Space	$50,000	Philadelphia Department of Recreation, Philadelphia Capital Program Office	Delaware
21st St from Venango to Pacific	12/6/2012	1397	6	15237	0.38	Stomwater Tree Trench	Streets	Partner-project, no capital investment by the PWD	Philadelphia Industrial Development Corporation	Delaware
Harper"s Hollow Park	1/14/2013	2915	0	24542	0.8	Stormwater Basin	Open Space	$474,000		TTF
Wakefield Park	1/14/2013	4447	55	38710	1.23	Rain Garden	Open Space			TTF
Belfield Ave from Chew Ave to Walnut Ln	2/4/2013	5573	24	68465	1.54	Stormwater Tree Trench	Streets	$285,000	Tookany/Tacony-Frankford Watershed Partnership	TTF
Norris St, Van Pelt St, and Berks St (Frederick Douglass Elementary School)	2/14/2013	4442	34	32100	1.22	Stormwater Tree Trench	Streets	$611,200		Delaware
Philadelphia Military Academy	2/14/2013	2113.7	25	20275	0.58	Stormwater Tree Trench	Streets			Delaware

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
22nd St, Cecil B Moore Ave (Martin Luther King Recreation Center)	2/14/2013	6247.5	10	42040	1.72	Stormwater Tree Trench	Streets			Delaware
Berks, Mascher (Towey Recreation Center)	2/14/2013	3721.6	8	20800	1.03	Stormwater Tree Trench	Streets		Pennsylvania Horticulture Society, Fairmount Park Commission	Delaware
Womrath Park	2/14/2013	7491	7	46080	2.06	Rain Garden, Infiltration/ Storage Trench, Swale	Open Space	$522,000	Philadelphia Department of Parks & Recreation, Tookany/Tacony-Frankford Watershed Partnership, Frankford Civic Association	TTF
Belgrade St and Marlborough St	3/5/2013	1263	1	14700	0.35	Stormwater Tree Trench	Streets	$2,114,000**		Delaware
Baltimore Ave Island from S 60th St to Wharton St	5/3/2013	3067	4	22684	0.84	Stormwater Tree Trench	Streets		Pennsylvania Environmental Council	Cobbs-Darby
52nd St, 53rd St, Pine St, and Osage St (Samuel B. Huey Elementary School)	5/3/2013	4163	15	35044	1.15	Stormwater Tree Trench	Streets		Pennsylvania Environmental Council	Cobbs-Darby
Christian St, Webster St, 56th St (Christy Recreation Center)	5/3/2013	5262	19	43093	1.45	Stormwater Tree Trench	Streets	$985,200	Pennsylvania Environmental Council, Department of Recreation	Cobbs-Darby
William Harrity School	5/3/2013	2479	9	19554	0.68	Stormwater Tree Trench	Streets			Cobbs-Darby
60th St, 61st St, Cedar Ave, and Hazel Ave (Bryant Elementary School)	5/3/2013	4403	16	48607	1.21	Stormwater Tree Trench	Streets		Pennsylvania Environmental Council	Cobbs-Darby
Woolston Ave, Walnut Ln, Rodney St (Simons Recreation Center)	5/22/2013	6918	43	61647	1.91	Stormwater Tree Trench	Streets		Department of Recreation	TTF

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
Chew Ave, Slocum St (Pleasant Playground)	5/22/2013	2302	8	15940	0.63	Stormwater Tree Trench	Streets	$1,502,632	Department of Public Property	TTF
Morris Leeds Middle School	5/22/2013	25522	83	216748	7.03	Stormwater Tree Trench	Streets			TTF
22nd, Carpenter, Montrose (Julian Abele Park)	5/22/2013	2458	9	22487	0.68	Stormwater Tree Trench	Streets	$1,284,000	Department of Public Property	Schuylkill
Oakford, 30th (Donald Finnegan Playground)	5/22/2013	3352	24	29513	0.92	Stormwater Tree Trench	Streets			Schuylkill
24th St and Wolf St (Smith Playground)	5/22/2013	7476	19	55510	2.06	Stormwater Tree Trench	Streets			Schuylkill
23rd St, 24th St, and Jackson (E.H. Vare Middle School)	5/22/2013	3952	20	32228	1.09	Stormwater Tree Trench	Streets			Schuylkill
Stephen Girard School	5/22/2013	1377	6	9315	0.38	Stormwater Tree Trench	Streets			Schuylkill
Southwark School	5/22/2013	1869	4	16658	0.51	Stormwater Tree Trench	Streets			Delaware
58th St, 59th St, and Walnut St (Sayre High School)	5/24/2013	6453	42	64720	1.78	Stormwater Tree Trench, Infiltration/Storage Trench	Streets	$1,636,000	Pennsylvania Environmental Council	Cobbs-Darby
Haverford Ave, 57th St and Vine St (Shepard Recreation Center)	5/24/2013	7417	27	64162	2.04	Stormwater Tree Trench, Stormwater Planter, Stormwater Bumpout	Streets			
Pine St, Frazier St, and 57th St (Andrew Hamilton School)	5/24/2013	3894	14	44332	1.07	Stormwater Tree Trench	Streets			

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acres (acre-inch)	SMP Type	Program	Construction Cost*	Partner (s)	Watershed
56th St, 57th St, Race St, and Vine St (Daroff School)	5/24/2013	8244	43	79396	2.27	Stormwater Tree Trench, Stormwater Planter, Stormwater Bumpout, Pervious Paving	Streets			
58th St Connector(Bartram's Garden, Francis Myers Rec, Cobbs Creek Park)	6/3/2013	4825	12	46000	1.33	Stormwater Tree Trench, Rain Garden	Streets	$200,000		Cobbs-Darby
4th St and Cambridge St (Bodine High School)	6/4/2013	2541	11	33496	0.7	Stormwater Tree Trench, Stormwater Planter, Infiltration/ Storage Trench	Streets	$407,903	City Play, Mural Arts Program, Northern Liberties Neighborhood Association	Delaware
3rd St and Fairmount Ave Intersection	6/4/2013	1306.8	7	15630	0.36	Stormwater Tree Trench, Stormwater Bumpout	Streets		Northern Liberties Neighborhood Association	Delaware

*Projects are grouped for bidding purposes therefore project construction costs are based on groups of projects.
** GSI projects were added to water/sewer projects and there is no current mechanism to separate out the total cost of the GSI component of the project.

Appendix 3

Planned Projects

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
43rd St (Clark Park)	Schuylkill	Streets	In Planning	Not Yet Known	Friends of Clark Park, University City District, University City Green	TBD	2017	TBD
Morris Park	Cobbs-Darby	Open Space	In Planning	Not Yet Known		TBD	2017	TBD
Vacant Lot on Chelten Ave	TTF	Open Space	In Planning	Not Yet Known	Philadelphia Planning Commission, Southeastern Transportation Authority	TBD	2017	TBD
Frankford from Placid to Ellie	Pennypack	Streets	In Planning	Not Yet Known	Philadelphia Planning Commission	TBD	2017	TBD
St. Dominic School	Pennypack	Streets	In Planning	Not Yet Known	Philadelphia Planning Commission	TBD	2017	
Ross Park	Delaware	Open Space	In Planning	Not Yet Known	Department of Public Property, Councilwoman Sanchez, Philadelphia Department of Parks & Recreation	TBD	2017	TBD
12th and Cambria Recreation Center	Delaware	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Black Coyle and McBride Playground	Delaware	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Wissinoming Park	Delaware	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Rockland Garden	TTF	Streets	In Planning	Not Yet Known		TBD	2017	TBD

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Feltonville Recreation Center	TTF	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Morris Estate Playground	TTF	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
33rd and Cecil B Moore Ave	Schuylkill	Open Space	In Planning	Not Yet Known	Southeastern Transportation Authority, Department of Recreation	TBD	2017	TBD
Carroll Park	Schuylkill	Open Space	In Planning	Not Yet Known		TBD	2017	TBD
Clearview Park	Schuylkill	Open Space	In Planning	Not Yet Known		TBD	2017	TBD
Lawncrest Recreation Center	TTF	Open Space	In Planning	Not Yet Known		TBD	2017	TBD
Tarken Playground	TTF	Open Space	In Planning	Not Yet Known		TBD	2017	TBD
Stinger Square	Schuylkill	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Vernon Park	TTF	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Fotterall Square	Delaware	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Baynton St and Armat St	TTF	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Penn St and Belfield Ave	TTF	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Belfield Ave and Armstrong St	TTF	Streets	In Planning	Not Yet Known		TBD	2017	TBD
West Mill Creek Playground Tennis Courts	Schuylkill	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
37th & Mt Vernon Playground	Schuylkill	Open Space	In Planning	Not Yet Known		TBD	2017	TBD
Lanier Playground	Schuylkill	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Conestoga Community Playground	Schuylkill	Open Space	In Planning	Not Yet Known	Philadelphia Department of Parks & Recreation	TBD	2017	TBD
Kingsessing Recreation Center	Schuylkill	Open Space	In Planning	Not Yet Known		TBD	2017	TBD
Germantown Ave from Glenwood Ave to Sedgley Ave, Glenwood Ave from 10th St to Germantown Ave	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Glenwood Ave from 6th St to Fairhill St	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Glenwood Triangle	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Allegheny Ave from Glenwood Ave to Sedgley Ave	TTF	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Armat St and Heiskell St	TTF	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Berges St and Martha St	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Palmer Cemetery	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Almond St - York to Boston	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Moyer St and Norris St	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Amber St, Lehigh Ave, Collins St	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Lehigh Ave - Martha to Trenton	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
St. Anne Rectory	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Thompson St and Huntingdon St	Delaware	Streets	In Planning	Not Yet Known		TBD	2017	TBD
43rd St, 45th St, Powelton Ave	Schuylkill	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Brandywine St, Melon St, Synedum St	Delaware, Schuylkill	Streets	In Planning	Not Yet Known		TBD	2017	TBD
Weccacoe Playground	Delaware	Open Space	In Design	Rain Garden	Department of Recreation	TBD	2016	TBD
John F Kennedy Blvd from 30th St to 32nd St	Schuylkill	Streets	In Design	Stormwater Tree Trench	Drexel University, University of Pennsylvania, University City District	TBD	2016	TBD
Tacony Creek Reaches 4/5	TTF	Open Space	In Design	Rain Garden	Philadelphia Department of Parks & Recreation, Tookany/Tacony-Frankford Watershed Partnership	TBD	2016	TBD
Atlantic, Tioga (Kenderton Field)	Delaware	Streets	In Design	Stormwater Tree Trench	Pennsylvania Horticulture Society, Fairmount Park Commission	TBD	2016	TBD
Sedgley Ave, 22nd St (Cecil B Moore Recreation Center)	Delaware	Streets	In Design	Stormwater Tree Trench, Stormwater Bumpout	Pennsylvania Horticulture Society, Fairmount Park Commission	TBD	2016	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
16th St, Sydenham St, and Cumberland St (HM Stanton School)	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Germantown Ave Storm Flood Relief	Delaware	Streets	In Design	Stormwater Tree Trench, Other		TBD	2016	TBD
Hunting Park from Old York Rd to Roosevelt Blvd	TTF	Streets	In Design	Infiltration/Storage Trench		TBD	2016	TBD
Marshall St from Hunting Park Ave to Cayuga St	TTF	Streets	In Design	Stormwater Tree Trench, Pervious Paving		TBD	2016	
Ingersoll Commons	Delaware	Open Space	In Design	Rain Garden	Community Ventures, Department of Public Property, Philadelphia Department of Parks & Recreation	TBD	2016	TBD
Drexel College of Media Arts & Design	Schuylkill	Streets	In Design	Stormwater Tree Trench	Drexel University	TBD	2016	
40th and Baltimore	Schuylkill	Streets	In Design	Stormwater Tree Trench	Southeastern Transportation Authority, University City District	TBD	2016	TBD
Woodcrest, Graham, Malvern, 59th (Beeber Middle School)	Schuylkill	Streets	In Design	Stormwater Tree Trench		TBD	2016	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Pine, Larchwood, 51st (Malcolm X Park)	Schuylkill	Streets	In Design	Stormwater Tree Trench	Philadelphia Planning Commission, Philadelphia Department of Parks & Recreation	TBD	2016	
Upland Way	Schuylkill	Streets	In Design	Stormwater Tree Trench, Stormwater Bumpout, Swale	American Cities Foundation	TBD	2016	
29th & Cambria PWD Facility Employee Parking Lot	Delaware	Streets	In Design	Stormwater Tree Trench, Infiltration/Storage Trench, Stormwater Planter		TBD	2016	TBD
Mole St from Fitzwater to Catharine St and Webster St from 16th to 17th	Delaware	Streets	In Design	Pervious Paving		TBD	2016	TBD
Windrim Ave from Wayne Ave to Germantown Ave	TTF	Streets	In Design	Stormwater Bumpout, Infiltration/Storage Trench	Philadelphia Planning Commission, Southeastern Transportation Authority, Nicetown Community Development Corporation	TBD	2016	TBD
Wayne Ave and Abbottsford Ave	TTF	Streets	In Design	Infiltration/Storage Trench		TBD	2016	
Ruscomb, 17th, Ogontz (Logan School)	TTF	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Marcer, Indiana, Ann, Almond (Powers Park)	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Thompson, Elkhart, Edgemont, Indiana (Stokley Playground)	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Westmoreland and Tulip	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Old York Rd (Skevchenko Park)	TTF	Streets	In Design	Stormwater Bumpout, Infiltration/Storage Trench	Department of Public Property	TBD	2016	
Park Ave	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Taggert School	Delaware	Streets	In Design	Stormwater Tree Trench	Community Design Collaborative	TBD	2016	
Wolf St (Sharswood School and Our Lady of Carmel School)	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
St. Monica Manor	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Benjamin Franklin Pkwy from 16th St to 19th St	Schuylkill	Streets	In Design	Infiltration/Storage Trench	Philadelphia Department of Parks & Recreation, Department of Public Property	TBD	2016	TBD
Clearview and Washington	TTF	Vacant Land	In Design	Rain Garden, Stormwater Bumpout, Infiltration/Storage Trench	Tookany/Tacony-Frankford Watershed Partnership	TBD	2016	TBD
Morris Estates	TTF	Open Space	In Design	Stormwater Tree Trench, Rain Garden	Philadelphia Department of Parks & Recreation	TBD	2016	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Adams Ave from Ruan to Factory	TTF	Streets	In Design	Stormwater Tree Trench, Stormwater Bumpout, Infiltration/Storage Trench		TBD	2016	TBD
Federal St, Wharton St, Columbus Square	Delaware	Streets	In Design	Stormwater Tree Trench, Rain Garden, Infiltration/Storage Trench	Philadelphia Department of Parks & Recreation	TBD	2016	TBD
Haverford Triangle	Schuylkill	Vacant Land	In Design	Rain Garden, Swale, Infiltration/Storage Trench		TBD	2016	TBD
Baker Playground	Schuylkill	Open Space	In Design	Rain Garden, Infiltration/Storage Trench	Philadelphia Department of Parks & Recreation	TBD	2016	
Heston Lot	Schuylkill	Open Space	In Design	Rain Garden	Department of Public Property	TBD	2016	
Sedgwick Station	TTF	Streets	In Design	Stormwater Bumpout	Southeastern Transportation Authority	TBD	2016	TBD
Chelten Hills Cemetery	TTF	Streets	In Design	Stormwater Tree Trench, Stormwater Bumpout, Infiltration/Storage Trench, Swale		TBD	2016	
E Hortter St, Lowber Ave, E Upsal St, Mansfield Ave (Finley Playground)	TTF	Streets	In Design	Stormwater Tree Trench, Stormwater Bumpout		TBD	2016	
Ivy Hills Cemetery	Wissahickon	Streets	In Design	Swale		TBD	2016	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Thouron Ave, Mohican St, Rugby St, W Washington Ln (Pennypacker School)	TTF	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Paseo Verde - 9th St from Berks to Norris	Delaware	Streets	In Design	Stormwater Tree Trench	APM	TBD	2016	TBD
Ridgewood - 55th to 54th	Cobbs-Darby	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Warrington - 54th to 55th	Cobbs-Darby	Streets	In Design	Stormwater Bumpout		TBD	2016	
Marston St, Eyre St, and Taney St	Schuylkill	Streets	In Design	Pervious Paving		TBD	2016	TBD
Panati Playground	Delaware	Open Space	In Design	Rain Garden, Infiltration/Storage Trench	Department of Public Property	TBD	2016	TBD
20th, Limekiln, Ridley, and 65th (Kinsey School)	TTF	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
65th, 18th, Chelten, Ogontz (Mt. Airy School of God in Christ)	TTF	Streets	In Design	Stormwater Tree Trench, Stormwater Bumpout		TBD	2016	
National Cemetery	TTF	Streets	In Design	Swale		TBD	2016	
19th, Haines (Rowen William School)	TTF	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Wagner Louis Middle School	TTF	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Guerin Recreation Center	Schuylkill	Open Space	In Design	Stormwater Tree Trench, Rain Garden, Pervious Paving	Philadelphia Department of Parks & Recreation	TBD	2016	TBD

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Smith Playground	Schuylkill	Open Space	In Design	Stormwater Tree Trench, Rain Garden	Philadelphia Department of Parks & Recreation	TBD	2016	
Harrowgate Park	Delaware	Open Space	In Design	Rain Garden	Philadelphia Department of Parks & Recreation, Southeastern Transportation Authority	TBD	2016	TBD
Ferko Playground	TTF	Open Space	In Design	Stormwater Bumpout, Rain Garden, Infiltration/Storage Trench	Philadelphia Department of Parks & Recreation	TBD	2016	
Hunting Park	TTF	Open Space	In Design	Stormwater Tree Trench, Rain Garden, Infiltration/Storage Trench, Swale	Philadelphia Department of Parks & Recreation	TBD	2016	TBD
Cloud St from Church St to Waln St	TTF	Streets	In Design	Pervious Paving		TBD	2016	TBD
Kinsey from Tackawanna St to Torresdale St	TTF	Streets	In Design	Other		TBD	2016	
Cobbs Creek Park Reaches 6-8	Cobbs-Darby	Open Space	In Design	Stormwater Tree Trench, Rain Garden, Swale	Philadelphia Department of Parks & Recreation	TBD	2016	TBD
Luzerne, Dungan, L, Lycoming (Francis Hopkinson Little School House)	TTF	Streets	In Design	Stormwater Tree Trench, Stormwater Planter, Infiltration/Storage Trench		TBD	2016	TBD

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Erie Shopping Center	TTF	Streets	In Design	Stormwater Tree Trench, Stormwater Planter, Infiltration/Storage Trench		TBD	2016	
Glenwood from Pacific to Castor	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Mariana Bracetti Academy Charter School	TTF	Streets	In Design	Stormwater Tree Trench, Stormwater Planter, Infiltration/Storage Trench		TBD	2016	
Summerdale, Longshore, Tyson (J. Hampton Moore School)	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Pennway, Longshore, Algon, Knorr	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Strawberry Mansion	Schuylkill	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Galloway, Howard, & Hancock	Delaware	Streets	In Design	Stormwater Tree Trench, Pervious Paving		TBD	2016	TBD
Woodland Ave (Tiger III)	Schuylkill	Streets	In Design	Stormwater Tree Trench	Philadelphia Streets Department	TBD	2016	TBD
Bustleton Ave (Tiger III)	Delaware	Streets	In Design	Stormwater Tree Trench	Philadelphia Streets Department	TBD	2016	TBD
Collazo Park	Delaware	Open Space	In Design	Stormwater Tree Trench, Rain Garden, Pervious Paving	Trust for Public Land, Philadelphia School District, Philadelphia Department of Parks & Recreation	TBD	2016	TBD

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Gathers Recreation Center	Delaware	Open Space	In Design	Stormwater Tree Trench	Trust for Public Land, Philadelphia Department of Parks & Recreation	TBD	2016	TBD
William Dick Elementary	Delaware	Schools	In Design	Stormwater Tree Trench, Rain Garden, Infiltration/Storage Trench	Trust for Public Land, Philadelphia School District, Philadelphia Department of Parks & Recreation	TBD	2016	TBD
Germantown Ave SFR - Phase 5	Delaware	Streets	In Design	Stormwater Tree Trench, Infiltration/Storage Trench		TBD	2016	TBD
Moss Playground	Delaware	Open Space	In Design	Stormwater Tree Trench, Rain Garden, Infiltration/Storage Trench		TBD	2016	TBD
Carmella Playground	Delaware	Open Space	In Design	Rain Garden, Infiltration/Storage Trench		TBD	2016	
Collins, Tulip, and Agate	Delaware	Streets	In Design	Stormwater Tree Trench, Other		TBD	2016	TBD
59th, Vodges	Cobbs-Darby	Streets	In Design	Stormwater Tree Trench, Pervious Paving		TBD	2016	TBD
Camac St, Iseminger St, Juniper St, McClellan St, Pierce St, Watkins St	Delaware	Streets	In Design	Pervious Paving		TBD	2016	TBD
9th St, Hoffman St, Mifflin St, Percy St, Pierce St	Delaware	Streets	In Design	Stormwater Tree Trench, Pervious Paving		TBD	2016	$1,234,750

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Callowhill Stormwater Trees	Delaware	Streets	In Design	Other	Philadelphia Streets Department	TBD	2016	$76,658
Hirst, Ludlow, Robinson	Cobbs-Darby	Streets	In Design	Stormwater Tree Trench, Pervious Paving		TBD	2016	$1,198,180
Clifford from 31st to Montgomery	Schuylkill	Streets	In Design	Pervious Paving		TBD	2016	$996,000
52nd, 53rd, Gainor, and Diamond	Schuylkill	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Philadelphia Protestant House	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Har Nebo Cemetery - Algon and Oxford Intersection	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Carnell School - Langdon	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Rowland Ave - Ryan to Vista	Delaware	Streets	In Design	Infiltration/Storage Trench		TBD	2016	
Crispin St - Ryan to Lansing	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Crispin St - Hartel to Rhawn	Pennypack	Streets	In Design	Stormwater Tree Trench		TBD	2016	
Gaul, Weikel, Witte	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Mole, Bancroft	Schuylkill	Streets	In Design	Pervious Paving		TBD	2016	TBD
Cleveland, Gratz, Greene, Roberts	TTF	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Fairmount, Corinthian, 20th, Ridge	Delaware	Streets	In Design	Stormwater Tree Trench, Infiltration/Storage Trench		TBD	2016	TBD

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Ralph Brooks Park	Schuylkill	Open Space	In Design	Infiltration/Storage Trench	Urban Roots, Philadelphia Department of Parks & Recreation, Councilman Johnson	TBD	2016	TBD
Ellsworth, 22nd, 20th, 18th	Delaware	Streets	In Design	Stormwater Tree Trench		TBD	2016	TBD
Germantown Ave Storm Flood Relief	Delaware	Streets	Contract Management	Stormwater Tree Trench, Infiltration/Storage Trench		0.66	2015	TBD
Kemble Park	TTF	Open Space	Contract Management	Infiltration/Storage Trench, Rain Garden, Swale	Philadelphia Department of Parks & Recreation	3.23	2015	TBD
Wister Woods Park	TTF	Open Space	Contract Management	Rain Garden	Philadelphia Department of Parks & Recreation	6.18	2015	
Dauphin from Frankford to Tulip	Delaware	Streets	Contract Management	Stormwater Tree Trench, Infiltration/Storage Trench, Pervious Paving		0.7	2015	TBD
Ontario St from A St to 6th St	Delaware	Streets	Contract Management	Stormwater Tree Trench		1.03	2015	TBD
Hope St from Master to Jefferson	Delaware	Streets	Contract Management	Pervious Paving		0.21	2015	TBD
Hope St from Berks to Norris	Delaware	Streets	Contract Management	Pervious Paving		0.24	2015	
73rd and Grays	Cobbs-Darby	Streets	Contract Management	Stormwater Tree Trench		1.69	2015	TBD
72nd, Buist, 71st, Dicks (Elmwood Park)	Schuylkill	Streets	Contract Management	Stormwater Tree Trench, Rain Garden		2.01	2015	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Buist Ave, 70th, Elmwood, Holbrook (Patterson School)	Schuylkill	Streets	Contract Management	Stormwater Tree Trench		1.08	2015	
Elmwood, 64th, Grays, 65th (Connell Park)	Schuylkill	Streets	Contract Management	Stormwater Tree Trench		1.15	2015	
Buist, 63rd, Chelwynde, 64th (Mother Mary of Peace School)	Schuylkill	Streets	Contract Management	Stormwater Tree Trench		1.1	2015	
St. James Episcopal Church of Kingesessing	Cobbs-Darby	Streets	Contract Management	Stormwater Tree Trench		2.18	2015	
Stenton Avenue and Washington Lane, NE Intersection	TTF	Streets	Contract Management	Rain Garden	Philadelphia Streets Department, Ogontz Avenue Revitalization Corporation, Mayors Office of Transportation & Utilities	0.71	2015	TBD
56th from Greenway to Paschall	Schuylkill	Streets	Contract Management	Stormwater Tree Trench		0.5	2016	TBD
Benson Park	Delaware	Open Space	Contract Management	Stormwater Planter	Department of Public Property	0.38	2016	TBD
Welsh School	Delaware	Streets	In Construction	Rain Garden, Infiltration/Storage Trench	Pennsylvania Horticulture Society	0.57	2014	$818,000
Wakisha Charter School	Delaware	Streets	In Construction	Stormwater Tree Trench	Department of Recreation	0.8	2014	
Diamond St from 25th St to Stillman St	Delaware	Streets	In Construction	Stormwater Tree Trench	Pennsylvania Horticulture Society	0.26	2014	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Poplar St from 8th St to Franklin St	Delaware	Streets	In Construction	Stormwater Tree Trench	Pennsylvania Horticulture Society	0.2	2014	
10th St and Jefferson St (Dendy Recreation Center)	Delaware	Streets	In Construction	Stormwater Tree Trench	Department of Recreation	0.62	2014	
Passyunk Ave	Schuylkill	Streets	In Construction	Stormwater Bumpout	Philadelphia Streets Department	1.49	2014	Partner-project, no capital investment by PWD
Thompson St and Columbia Ave	Delaware	Streets	In Construction	Stormwater Tree Trench, Stormwater Bumpout	Pennsylvania Horticulture Society, New Kensington Community Development Corporation	0.97	2014	$581,000
Trenton Ave and Norris St	Delaware	Streets	In Construction	Stormwater Tree Trench, Infiltration/Storage Trench, Rain Garden	Pennsylvania Horticulture Society, New Kensington Community Development Corporation	0.73	2014	
12th St and Reed St (Columbus Square)	Delaware	Streets	In Construction	Rain Garden	Department of Recreation, Passyunk Square Civic Association	0.56	2014	$878,015.00
12th St from Dickinson St to Tasker St	Delaware	Streets	In Construction	Stormwater Tree Trench, Stormwater Planter	Passyunk Square Civic Association	0.67	2014	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
10th St from Wilder St to Reed St	Delaware	Streets	In Construction	Stormwater Tree Trench	Passyunk Square Civic Association, South Philadelphia Older Adult Center, Department of Recreation	0.3	2014	
18th St, 19th St, Ellsworth St, and Washington Ave (Chew Playground)	Delaware	Streets	In Construction	Stormwater Tree Trench	Department of Recreation	1.3	2014	
Passyunk Ave from Dickinson St To Reed St	Delaware	Streets	In Construction	Stormwater Planter, Infiltration/Storage Trench	Passyunk Square Civic Association, South Philadelphia Older Adult Center, Department of Recreation	0.4	2014	
Moyamensing Ave and Morris St (Dickinson Square)	Delaware	Streets	In Construction	Stormwater Tree Trench, Stormwater Bumpout, Infiltration/Storage Trench	Southeastern Transportation Authority, Friends of Dickinson Park, Department of Recreation	0.89	2014	$963,000
8th St, Wolf St, and Mildred St (Francis Scott Key School)	Delaware	Streets	In Construction	Stormwater Tree Trench, Infiltration/Storage Trench	Lower Moyamensing Civic Association	0.77	2014	
Jackson St, Tree St, 13th St (Epiphany of Our Lord School)	Delaware	Streets	In Construction	Infiltration/Storage Trench	Lower Moyamensing Civic Association	0.14	2014	
Duval St, Crittenden St, and Johnson St (Anna B. Day School)	TTF	Streets	In Construction	Stormwater Tree Trench	Tookany/Tacony-Frankford Watershed Partnership	2.51	2014	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
18th St, 19th St, and Bigler St (Barry Playground)	Schuylkill	Streets	In Construction	Stormwater Tree Trench	Department of Recreation	2.81	2014	$945,000
Blue Bell Inn Triangle	Cobbs-Darby	Open Space	In Construction	Rain Garden	Fairmount Park Commission, Pennsylvania Horticulture Society	0.6	2014	$270,000
Chalmers (29th and Chalmers Playground)	Delaware	Streets	In Construction	Stormwater Tree Trench, Stormwater Bumpout	Philadelphia Department of Parks & Recreation	0.63	2014	$631,000
William Cramp School	Delaware	Streets	In Construction	Stormwater Tree Trench		0.98	2014	
Rosehill St (Barton School)	TTF	Streets	In Construction	Stormwater Tree Trench		1.21	2014	
27th St from Indiana to Toronto	Delaware	Streets	In Construction	Stormwater Tree Trench	Philadelphia Department of Parks & Recreation	0.29	2014	
Little Sisters of the Poor	Schuylkill	Streets	In Construction	Stormwater Tree Trench	Snyderville Community Development Corporation	2.44	2014	$1,212,000
57th St and Pentridge St (Longstreth School)	Cobbs-Darby	Streets	In Construction	Stormwater Tree Trench, Stormwater Planter	Snyderville Community Development Corporation	0.99	2014	
McCreesh Playground / Catharine Elementary School	Cobbs-Darby	Streets	In Construction	Stormwater Tree Trench, Infiltration/Storage Trench	Snyderville Community Development Corporation	1.5	2014	
Springfield Ave and Cobbs Creek Island	Cobbs-Darby	Streets	In Construction	Rain Garden, Infiltration/Storage Trench	Snyderville Community Development Corporation	0.94	2014	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
13th St, Porter St, and Moyamensing Ave (A.S. Jenks School)	Delaware	Streets	In Construction	Stormwater Tree Trench	Lower Moyamensing Civic Association	0.67	2014	$1,129,000
4th St, 5th St, Federal St, and Washington Ave (Sacks Playground)	Delaware	Streets	In Construction	Stormwater Tree Trench		1.64	2014	
Smith Elementary School	Schuylkill	Streets	In Construction	Stormwater Tree Trench		0.73	2014	
St Thomas Aquinas School	Schuylkill	Streets	In Construction	Stormwater Tree Trench		1.19	2014	
Franklin St from Diamond St to Norris St	Delaware	Streets	In Construction	Stormwater Tree Trench, Infiltration/Storage Trench		1.64	2014	$1,911,000**
Preston St, 41st St, Brown St, and Aspen St (Belmont School)	Schuylkill	Streets	In Construction	Stormwater Tree Trench		1.33	2014	$1,550,000
49th St, Parrish St, and Ogden St (James Rhoads School)	Schuylkill	Streets	In Construction	Stormwater Tree Trench		0.74	2014	
Sister Clara Muhammad School	Schuylkill	Streets	In Construction	Stormwater Tree Trench		0.71	2014	
47th St, 48th St, Wyalusing Ave (Muhammed Square)	Schuylkill	Streets	In Construction	Stormwater Tree Trench		1.41	2014	
53rd St and Peach St (Mastery Charter School)	Schuylkill	Streets	In Construction	Stormwater Tree Trench		0.68	2014	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Kenmore Rd, Haddington St, and Atwood Rd (Cassidy Elementary School)	Cobbs-Darby	Streets	In Construction	Stormwater Tree Trench		1.21	2014	
62nd St and Lebanon (Overbrook Elementary)	Schuylkill	Streets	In Construction	Stormwater Tree Trench		0.67	2014	
Old Cathedral Cemetary	Schuylkill	Streets	In Construction	Stormwater Tree Trench		0.59	2014	
William Gray Youth Center	Delaware	Streets	In Construction	Stormwater Tree Trench		0.93	2014	$883,000
Parking Lot - 12th St, Marvine St, and Diamond St	Delaware	Streets	In Construction	Stormwater Tree Trench		1.75	2014	
24th St and Diamond St (Dick Elementary School)	Delaware	Streets	In Construction	Stormwater Tree Trench		1.2	2014	
Alder St from Norris St to Diamond St	Delaware	Streets	In Construction	Stormwater Tree Trench	Philadelphia Housing Authority	0.42	2014	
Bridesburg Recreation Center/Bridesburg School	Delaware	Streets	In Construction	Stormwater Tree Trench, Rain Garden, Infiltration/Storage Trench	Tacony Civic Association, Philadelphia Department of Parks & Recreation	1.92	2014	$1,786,000
White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School	Delaware	Streets	In Construction	Stormwater Tree Trench	Tacony Civic Association	2.68	2014	

Project Name	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre Estimate (acre-inches)	Completion Date Estimate	Estimated Construction Cost*
Hegerman St, Magee Ave, and Hellerman St (Dorsey Playground)	Delaware	Streets	In Construction	Stormwater Tree Trench	Tacony Civic Association	1.02	2014	
Hellerman St, Cottage St, and Levick St (Roosevelt Playground)	Delaware	Streets	In Construction	Stormwater Tree Trench, Stormwater Planter, Infiltration/Storage Trench	Tacony Civic Association, Roosevelt Playground Park Advisory Council	1.68	2014	
Magnolia Cemetary	Delaware	Streets	In Construction	Stormwater Tree Trench	Tacony Civic Association	0.48	2014	
Philadelphia Zoo	Schuylkill	Streets	In Construction	Stormwater Planter, Rain Garden, Infiltration/Storage Trench	Philadelphia Zoo, Philadelphia Department of Parks & Recreation	1.53	2014	Partner-project, no capital investment by PWD
George W. Nebinger School	Delaware	Schools	In Construction	Rain Garden, Infiltration/Storage Trench, Swale	Environmental Protection Agency	1.85	2014	$280,000
33rd & Dauphin SEPTA Bus Stop Loop	Schuylkill	Streets	In Construction	Stormwater Tree Trench	Southeastern Transportation Authority	1	2014	Partner-Project, no capital investment by PWD

*Projects are grouped for bidding purposes therefore project construction costs are based on groups of projects.

** GSI projects are added to water/sewer projects and there is no mechanism in place to separate out the total cost of the GSI component of the project.

Appendix 4

Verified Private Development GSI Projects

Project ID	Zip Code	Watershed	Management Practices	Storage Volume (cf)	Impervious Area Managed (sf)	GA
2010-BROA-1347-01	19141	TTF	Subsurface infiltrating basin	2,808	27,695	0.77
2007-WASH-642-01	19146	Delaware	Subsurface infiltrating basin	3,573	33,550	0.98
2008-DREX-788-01	19104	Schuylkill	Subsurface infiltrating basin, bio-infiltration systems, and porous pavement	7,566	34,471	2.08
2006-PROG-400-01	19122	Delaware	Subsurface infiltrating basins	12,288	123,274	3.39
2010-ESPE-1288-01	19140	TTF	Subsurface infiltrating basin	3,112	35,668	0.86
2009-PASC-1226-01	19142	Darby-Cobbs	Subsurface infiltrating basins	12,982	88,571	3.58
2006-0076-01	19144	TTF	Subsurface infiltrating and subsurface detention basins	7,739	34,046	2.13
2009-THEM-1167-01	19121	Delaware	Green roof and porous pavement	2,164	830	0.60
2007-1615-544-01	19121	Schuylkill	Subsurface infiltrating basin and porous pavement	2,150	19,714	0.59
2009-FRAN-1130-01	19137	Delaware	Subsurface infiltrating basins	10,224	113,759	2.82
2010-PASC-1238-01	19142	Darby-Cobbs	Subsurface Infiltration, Porous Pavement	7884	47687	2.17
2009-PASC-1226-01	19142	Darby-Cobbs	Subsurface Infiltration	9419	87459	2.59
2009-7149-1186-01	19135	Delaware	Subsurface Infiltration	1332	15930	0.37
2010-411W-1300-01	19122	Delaware	Bio-retention, Subsurface Detention	1053	16771	0.29
2011-CHRI-1545-01	19147	Delaware	Subsurface Infiltration, Porous Pavement, Green Roof	2927	23684	0.81
2009-2007-1090-01	19148	Delaware	Subsurface Infiltration, Subsurface Detention	64320	627374	17.72
2009-TEMP-1077-01	19122	Delaware	Bio-retention, Subsurface Detention, Porous Pavement	2015	19523	0.56
2007-WASH-642-01	19146	Delaware	Subsurface Infiltration	3592	42100	0.99
2010-PSDC-1234-01	19147	Delaware	Subsurface Infiltration	2879	31363	0.79
2009-CONG-1210-01	19133	Delaware	Subsurface Infiltration, Porous Pavement	10175	61046	2.80
2010-AGIL-1461-01	19121	Delaware	Subsurface Infiltration	4915	50612	1.35
2006-LE22-460-01	19123	Delaware	Subsurface Infiltration, Porous Pavement	2452	20788	0.68
2007-HERR-690-01	19147	Delaware	Porous Pavement	3285	19712	0.90

Project ID	Zip Code	Watershed	Management Practices	Storage Volume (cf)	Impervious Area Managed (sf)	GA
2008-SHER-926-01	19122	Delaware	Porous Pavement, Green Roof	1056	8518	0.29
2009-THEM-1167-01	19121	Delaware	Porous Pavement, Green Roof	1446	16461	0.40
2010-ARCH-1393-01	19122	Delaware	Green Roof	744	14007	0.20
2011-NEWN-1620-01	19123	Delaware	Subsurface Infiltration, Porous Pavement, Green Roof	3182	22924	0.88
2011-DIAM-1617-01	19140	Delaware	Subsurface Detention, Green Roof	1604	32065	0.44
2006-CCPO-276-01	19122	Delaware	Surface Infiltration	11597	99752	3.19
2010-PHIL-1362-01	19148	Delaware	Bio-retention, Surface Detention	7894	97712	2.17
2006-PROG-400-01	19122	Delaware	Subsurface Infiltration	13238	120225	3.65
2009-PARK-1197-01	19104	Schuylkill	Bio-infiltration	2905	26444	0.80
2008-DREX-788-01	19104	Schuylkill	Bio-infiltration, Subsurface Infiltration, Porous Pavement	6640	40391	1.83
2010-GEST-1346-01	19131	Schuylkill	Subsurface Infiltration, Subsurface Detention	4316	43136	1.19
2008-NORT-1012-01	19104	Schuylkill	Subsurface Infiltration	5193	33931	1.43
2007-1615-544-01	19121	Schuylkill	Subsurface Infiltration, Porous Pavement	1992	21605	0.55
2011-PROP-1662-01	19130	Schuylkill	Surface Infiltration, Subsurface Infiltration	13358	80150	3.68
2005-0099-01	19131	Schuylkill	Surface Detention	101115	867167	27.86
2011-4240-1543-01	19104	Schuylkill	Subsurface Infiltration	2693	24350	0.74
2011-LOCU-1503-01	19104	Schuylkill	Disconnections	726	29023	0.20
2010-STJO-1239-01	19131	Schuylkill	Subsurface Infiltration, Bio-infiltration	4123	30200	1.14
2010-UNIV-1385-01	19104	Schuylkill	Bio-retention, Subsurface Detention	4853	32455	1.34
2009-PENN-1019-01	19104	Schuylkill	Bio-retention, Subsurface Detention	21408	415793	5.90
2010-EARL-1460-01	19146	Schuylkill	Subsurface Infiltration	1448	16401	0.40
2006-OVER-462-01	19151	Schuylkill	Subsurface Infiltration	6440	38638	1.77
2011-CCTD-1535-01	19139	Schuylkill	Subsurface Infiltration	3379	39755	0.93
2010-8828-1321-01	19136	Pennypack	Subsurface Infiltration	3856	44823	1.06
2010-BROA-1347-01	19141	TTF	Subsurface Infiltration	2805	32504	0.77
2011-BOTT-1646-01	19124	TTF	Bio-retention, Subsurface Detention	10553	64940	2.91
2007-SIMO-496-01	19138	TTF	Bio-infiltration, Porous Pavement	1079	12527	0.30
2006-TEMP-197-01	19138	TTF	Subsurface Detention, Porous Pavement	817	54013	0.23

Project ID	Zip Code	Watershed	Management Practices	Storage Volume (cf)	Impervious Area Managed (sf)	GA
2011-PROP-1483-01	19144	TTF	Surface Infiltration, Subsurface Infiltration, Porous Pavement	5638	33832	1.55
2009-PRES-1037-01	19150	TTF	Bio-infiltration, Subsurface Infiltration, Porous Pavement	6530	39183	1.80
2007-LASA-593-01	19144	TTF	Subsurface Infiltration, Porous Pavement	41326	302893	11.38
2011-3343-1653-01	19144	TTF	Subsurface Infiltration, Porous Pavement	2526	16614	0.70
2009-WOLC-1169-01	19138	TTF	Bio-infiltration, Subsurface Detention	3534	76669	0.97
2007-GAMB-701-01	19124	TTF	Bio-infiltration, Porous Pavement	5622	33726	1.55
2011-DOLL-1636-01	19144	TTF	Subsurface Infiltration	1923	23150	0.53
2010-PNKW-1360-01	19140	TTF	Subsurface Infiltration, Porous Pavement	8208	92253	2.26
2010-ESPE-1288-01	19140	TTF	Subsurface Infiltration	3128.5	35356	0.86
2009-NICE-1136-01	19140	TTF	Bio-retention, Subsurface Detention	1496	23859	0.41
2009-WALM-1045-01	19148	Delaware	Bio-retention, Direct Discharge	28988	173929	7.99
Verified Private Development GSI GA Total						146.07

Appendix 5

GSI Monitoring Status Report

GSI Monitoring Status Report

1.0 Introduction

During the reporting period of July 1, 2012 to June 30, 2013, the Philadelphia Water Department's *Green City, Clean Waters* program addressed stormwater runoff reductions in urbanized areas using a combination of traditional infrastructure and green stormwater infrastructure (GSI). GSI projects vary in size, complexity, and the degree to which the project is connected to the existing drainage system, but in general the objective is to evapotranspire, infiltrate, reuse, or detain stormwater rather than convey it directly to the sewer system. Monitoring and testing GSI is therefore essential to determine the effectiveness of tree trenches, porous pavement, and other GSI projects in managing stormwater and reducing combined sewer overflows.

The focus of the monitoring program during the proof of concept phase of the *Green City, Clean Waters* program is post-construction performance monitoring and testing using various methods (*e.g.*: continuous water level monitoring, simulated runoff tests, etc.). The primary goal of GSI monitoring and testing is to measure the performance of the system in reducing stormwater runoff. Secondary goals include providing information for improvements to GSI design and maintenance and developing appropriate monitoring methods for the variety of GSI projects installed city-wide.

Project characteristics such as contributing drainage area, storage volume, inlet capture efficiency, and (when present) slow release discharge parameters can be observed and a more complete view of a system's functionality can be determined. The comprehensive understanding of GSI through monitoring and testing allows the Water Department to make informed decisions for current and future projects regarding the GSI design standards, type and frequency of maintenance activities, and program optimization. However, the need for clearly defined monitoring objectives cannot be understated. Individual GSI monitoring activities must be planned and carried out knowing the research questions to be answered, parameters to be estimated, hypotheses to be tested, monitoring constraints, reporting deadlines and available resources.

From November 2012 to June 30, 2013, the Water Department monitored 27 stormwater management sites using methods described in the draft Comprehensive Monitoring Plan, submitted December 1, 2012.

Table 1-1: Summary of Monitored SMP Types

SMP Type	Monitored Sites	Program Sites
Stormwater Tree Trench	20	198
Stormwater Planter		29
Stormwater Bump-out		18
Rain Garden		36
Stormwater Basin		3
Infiltration/Storage Trench	2	20
Pervious Paving	3	11
Swale		6
Stormwater Wetland		
Other	2	2

2.0 Data Tracking

During the reporting period, much consideration was given to how best to track the information gathered from GSI monitoring activities. A relational database was created using Microsoft Access to store data collected from the monitoring methods currently being implemented. Data is collected at the task level and can be used in data analysis via queries to determine deployment and site characteristics. This database is also linked to the GreenIT tracking system, and therefore contains the individual SMP information for monitored GSI projects.

3.0 Protocol Development

Proposed methodologies for performance monitoring were outlined in both the draft Comprehensive Monitoring Plan (CMP) submitted December 1, 2012 and in a comment response sent to PADEP and the EPA on July 31, 2013. They will be further discussed in a revised CMP submitted by a yet-to-be- determined date. Upon CMP approval, information on the development and refining of approved methodologies will be included in future COA Annual Reports.

Continuous Hydrologic and Hydraulic Monitoring

To date, 29 water level sensors have been deployed at 27 sites. Barometric sensors also were deployed in various geographic locations within the city. A one kilometer radius is the maximum distance used between and observation well and a barometric sensor.

Table 3-1: Deployment Averages of Continuous Sensors

Sensor Type	Number Currently Deployed	Average Number of Days Deployed
Barometric Pressure Sensor	7	211
Water Level Sensor	27	187

To implement the continuous hydrologic and hydraulic monitoring, several new pieces of equipment were acquired. Forty new HOBO U20 Water Level Data Loggers (model U20-001-04) were acquired. Deployment of the new equipment is in progress.

In addition, a field computer designed for rugged use has been deployed with software and interface devices to perform data collection, preliminary viewing of data, and field analysis of data. Data analysis is in progress for sites with deployed sensors and is expected to be more developed following the collection of a year's worth of data.

Simulated Runoff Testing

The Water Department acquired a W-1250 Sensus Water Meter Tester to measure flow to an SMP during the application of a Simulated Runoff Testing. This water meter is capable of estimating flows from 0.04 CFM to 167 CFM. To date, three Simulated Runoff Tests were performed at three different sites and analyses of the results are in progress.

Pervious Paving Infiltration Testing

Development of this procedure was completed in FY 2013 and refinement of the methods is ongoing. The full text of this procedure will be included in the revision of the Comprehensive Monitoring Plan. A two foot section of 12" Schedule 60 PVC pipe was acquired to function as infiltration rings. This pipe section was cut into two 10" sections creating two infiltration rings, to allow for performance of multiple tests. Modifications were made to the test method to compensate for the different infiltration ring diameters. To date, three SMPs have been selected for surface infiltration rate testing. Twelve different surface infiltration rate tests of porous surfaces have been performed. Data analysis is in progress for these sites, but full analyses will not be completed until an entire year of data has been acquired.

Soil Surface Infiltration Rate Testing

The Water Department currently has one double ring infiltrometer and two single ring infiltrometers that are used in the implementation of the Soil Surface Infiltration Rate Testing. Continuous refinements in the Soil Surface Infiltration Rate Testing protocol is always ongoing. ASTM Standards (ASTM Committee D18, ASTM D3385-09 Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer, 2009, and ASTM Committee D18, ASTM D-5093-02, Standard Test Method for Field Measurement of Infiltration Rate Using Double-Ring Infiltrometer with Sealed-Inner Ring, 2008) are currently under review as the basis for future improvements to be incorporated in the Soil Surface Infiltration Rate Testing Standard Operating Procedure.

Lateral Groundwater Mounding

The Water Department is researching techniques to install groundwater monitoring wells in proximity to SMP(s) through internal mechanisms and through external contracts. Twelve potential sites have been identified and are being investigated. This process is ongoing and more a substantive update will be provided when progress advances beyond the planning and explorative phase.

Sewer System Monitoring

Sewer system monitoring per the methods outlined in the draft Comprehensive Monitoring Plan will be reported on upon the final approval of the Plan.

Meteorological Monitoring

Meteorological monitoring per the methods outlined in the draft Comprehensive Monitoring Plan is on-going and will be reported on upon the final approval of the Plan.

Groundwater Level Monitoring

The Water Department is investigating sources and the means to install groundwater level monitoring wells through internal mechanisms and through external contracts. Nine potential sites have been identified and are under investigation. This process is ongoing and more a substantive update will be provided in the next annual report.

4.0 Site Selection

Initial site selection for the GSI monitoring program was based largely upon the types of SMPs that were available and the feasibility of site monitoring at a project location given the limited amount of constructed GSI projects at the time. To test the feasibility and measure the effectiveness of GSI under the full range of potential conditions during this early stage of GSI implementation, a pilot program was designed to ensure that a wide range of materials and implementation conditions were represented in sites selected for the monitoring program. Through the creation of the pilot program, additional sites have been selected for either current or future monitoring efforts based upon an extensive list of project characteristics and site variables. Constructed sites currently are undergoing evaluation for monitoring feasibility and are subject to change/be replaced by another site if it is determined that monitoring activities are not practical at the selected site. Pilot Program sites and their variables are documented in the following section.

5.0 Pilot Projects List

This section includes the entire list of selected pilot projects as of August 26, 2013. The information for each project includes the project name, construction status, types of GSI systems, and applied pilot program variables.

Pilot program variables are organized by groups and sub-groups. The structure of the pilot program variables list is as follows:

Green Cell – Bold Letters	Pilot variable primary group
Grey Cell – Bold Letters	Pilot variable sub-group
No shading, indented, standard font letters	Pilot variable within sub-group
No shading, no indent, bold letters	Pilot variable within primary group, but not within any sub-group

The entire list of pilot program variables, with the number of currently identified projects for each variable, is shown in Table 5-1. The list of pilot projects and identified pilot variables is not static, and can change over time as new information becomes available.

Table 5-1: List of pilot program variables, with number of identified pilot projects and definitions.

Pilot Locations	
School yards/ schools	GSI is implemented in a school yard or school playground. PWD collaborates with the school for GSI implementation.
Recreation Centers	GSI is implemented on a recreation center site.
"Open Space" park sites	
Mowable	A surface system in an open space park site that is not planted with shrubs and herbaceous species, but rather with mowable grass.
Non-mowable	A surface system in an open space park site that is planted with herbaceous species, shrubs, and occasionally trees.
Surface	A system in an open space park site that manages stormwater on the surface before infiltrating.
Subsurface	A subsurface system within an open space park site. There is no surface storage.
Traffic Triangles	GSI is implemented in the triangular space between the intersection of three streets.
Gateways	GSI is located in a highly visible area that is a frequently used route into a particular neighborhood.
Alleys	
Public	A narrow residential street, wide enough for one car.
Private	Alleys between homes to access parking behind houses, or alleys between homes with no vehicle access.
With Rooftop Disconnect	GSI is implemented in an alley, and external downspouts are disconnected from the sewer and routed to the GSI system to manage roof runoff.

Without Rooftop Disconnect	GSI is implemented in an alley with no external downspout disconnection.
Centralized Facility	A large GSI system that captures runoff from several streets or properties to manage a large drainage area.
Stormwater + Art Site	Stormwater-relevant art is incorporated with GSI implementation. This can include outreach with local artists or art groups to increase aesthetics and awareness of GSI.
Spray Grounds	PWD works with Public Parks and Recreation to implement GSI during a park rehabilitation that will include a spray ground.
Athletic Fields	GSI is installed within an athletic field.
Vacant Underground Facilities	Vacant land is acquired with unused underground facilities that can be retrofitted to manage stormwater.
Medians	GSI is implemented in the median of a wide roadway to capture runoff from both sides of the street.
Commercial Corridors	GSI is implemented in the public right of way in an area with high commercial activity, such as shops, restaurants, and other businesses.
Bridge Runoff	Runoff from a bridge is routed to a GSI system.
Streets	
Bumpouts	GSI includes a bumpout system in the public right of way that manages street and sidewalk runoff.
Crosswalks	GSI is located at a crosswalk to managed impervious area from the upstream street.
Tree Trenches	GSI includes a tree trench in the public right of way that manages street and sidewalk runoff.
Planters	GSI includes a stormwater planter in the public right of way that manages street and sidewalk runoff.
Porous	Permeable pavement is implemented in a street to manage runoff.
Rain Garden	GSI includes a rain garden in the public right of way that manages street and sidewalk runoff.
Infiltration/Storage Trench	GSI includes an infiltration/storage trench without tree pits in the public right of way that manages street and sidewalk runoff.
Sidewalk Swale	GSI includes a swale in the sidewalk that manages street and sidewalk runoff.
Various Ownership Types	
Public Right-of-way	GSI is implemented in the public right of way, managing street and sidewalk runoff.
Public Parcels	GSI is implemented in a public parcel, such as a park, government building, school, etc.
Private	GSI is implemented on private property with assistance from PWD.
Parking Lots	
Surface Systems	A surface system, such as a rain garden, is implemented in a parking lot.
Subsurface Systems	A subsurface system, such as a subsurface infiltration basin, is implemented in a parking lot.
Vacant Lands/ Land Acquisition	Vacant land is acquired by PWD, which is then used for stormwater management with GSI.

Commercial	GSI is implemented on a commercial site, such as a shopping center.
Physical Settings	
Piedmont Province	The site is located in the Piedmont Physiographic Province.
Coastal Plain Province	The site is located in the Coastal Plain Physiographic Province.
Soil Infiltration Capacity	
High tested infiltration rate (>5 in/hr)	The field estimated infiltration rate at the location of the SMP is greater than 5 in/hr.
Low tested infiltration rate (<0.5 in/hr)	The field estimated infiltration rate at the location of the SMP is less than 0.5 in/hr, but the system is designed for infiltration with no slow-release orifice.
Slope Conditions	
Steep (>3%)	The drainage area to the system is steep, with a slope greater than 3%.
Flat (<1.5%)	The drainage area to the system is relatively flat, with a slope less than 1.5%.
Pilot Systems	
Curbless Street	The system includes a curbless street and runoff is captured by overland surface flow.
Stormwater Tree Pit Designs	Stormwater is managed by single stormwater tree pits.
Rain Gardens	
With Stone	The system is a rain garden with a stone storage layer beneath the bioretention soil media.
Without Stone	The system is a rain garden without a stone storage layer beneath the bioretention soil media. A stone trench can be included adjacent to the rain garden to manage overflow.
With Sumped Inlet Pretreatment	The system includes a rain garden where runoff enters via a sumped inlet.
With Swale Pretreatment	The system includes a rain garden where runoff enters via a vegetated swale.
With Forebay Pretreatment	The system includes a rain garden with a forebay to settle out solids and other debris before runoff enters the basin.
Without Pretreatment	The system includes a rain garden with no pretreatment.
Planters	
With Stone	The system includes a planter or planters with a stone storage layer beneath the bioretention soil media.
Without Stone	The system includes a planter or planters without a stone storage layer beneath the bioretention soil media. A stone trench can be included adjacent to the planter to manage overflow.
With Sumped Inlet Pretreatment	The system includes a planter where runoff enters via a sumped inlet.
Without Pretreatment	The system includes a planter or planters with no pretreatment.
Sidewalk Swales	The system includes a vegetated swale in the sidewalk that manages street and sidewalk runoff.

Pipeless Trenches	The system is a subsurface gravel trench without perforated distribution pipes.
New Inlets	
Tree Pit Inlets	Runoff enters the system via below-grade stormwater tree pits, where it will then percolate through the soil of the tree pits into the gravel trench.
Permapave Inlets	Runoff enters the system via an at-grade permeable pavement inlet grate.
Dual Trap Inlets	A single structure that acts as both the inlet and outlet of the system, separated by a weir wall.
Trench Drains	Runoff enters the system via a shallow trench drain, either by curb cuts leading to trench drains or through a surface level grate over the trench drain.
Blue Roof	Detention storage is provided on the roof of a building, but with no vegetation.
Roof Leader Treatments	
Disconnection Options	Roof runoff is managed by disconnecting roof downspouts through a variety of methods, including both external and internal downspouts.
Leader to planter	Roof runoff is managed by disconnecting a roof downspout and leading it to a stormwater planter.
Leader to rain garden	Roof runoff is managed by disconnecting a roof downspout and leading it to a rain garden.
Leader to tree pit	Roof runoff is managed by disconnecting a roof downspout and leading it to a tree pit.
Leader to tree trench	Roof runoff is managed by disconnecting a roof downspout and leading it to a tree trench.
Pumped Systems	The system includes a detention structure where outflow to the combined sewer is controlled by a pump system.
Reuse Systems	Runoff is captured in a detention system to be reused by building or site operations such as providing water for toilets or irrigation.
Injection Wells	The system is a deep vertical injection well, utilizing both vertical and lateral infiltration from the system.
Regrading Street Crown/ Median Treatments	The entire street is re-graded so that all runoff drains to one side of the street or to the median of a multi-lane street, where it is then managed with GSI.
Loading Ratio	
High Loading Ratio (>15)	The loading ration of impervious drainage area to system footprint is greater than 15.
Mid-Range Loading Ratio (10-15)	The loading ration of impervious drainage area to system footprint is between 10 and 15.
Low Loading Ratio (<10)	The loading ration of impervious drainage area to system footprint is less than 10.
Bumpouts	A curbed and vegetated system that extends into the street and captures runoff directly from the gutter.
Pilot Materials	
Porous Materials	
Porous Pavers	Newly paved area consists of permeable interlocking concrete pavers with a stone storage layer to capture and infiltrate runoff.

Asphalt	Newly paved area consists of permeable asphalt with a stone storage layer to capture and infiltrate runoff.
Concrete	Newly paved area consists of permeable concrete with a stone storage layer to capture and infiltrate runoff.
Play Surface	Newly paved area consists of a permeable rubber play surface with a stone storage layer to capture and infiltrate runoff.
Other	Newly paved area consists of alternative permeable pavement technologies with a stone storage layer to capture and infiltrate runoff.
Storage Types	
Stone	The system includes subsurface storage in gravel.
Arched Systems	The system includes subsurface storage with arched storage systems, such as the StormTech chambers or approved equal.
Structural Vaults	The system includes subsurface storage in a concrete vault.
Crate Systems	The system includes subsurface storage with plastic storage crates such as the Atlantic D-Raintank crates or approved equal.
Silva Cell	The system includes subsurface storage in Silva Cells or approved equal.
Pre-treatment Technologies	
Hydrodynamic Separator	The system includes a hydrodynamic separator for pretreatment with a swirl concentrator and flow controls.
Forebays	The system includes a forebay as pretreatment for solids removal.
Sumped Inlet Systems With Filter	The system includes a green inlet or inlets with a sump, trap, and filter bag.
Sumped Inlet Systems Without Filter	The system includes an inlet or inlets with a sump and trap, but with no filter bag.
Swales	The system includes a vegetated swale as pretreatment for solids and pollutant removal.
Soil Types	
Structural Soils	Tree pits use structural soil, which is planting soil that can be compacted to pavement design and installation requirements while permitting plant growth. Soil is amended with crushed stone to increase structural strength.
Native Soils	The soil media in the vegetated system uses native soils.
Amended Native Soils	The soil media in the vegetated system uses native soils amended with materials to help promote plant health and treatment capacity.
Engineered Imported Soils	The soil media in the vegetated system uses engineered imported bioretention soils.
Modular Planters	Modular precast planter systems designed to have simpler installation and lower cost than cast-in-place planters.
Fencing	The surface portion of the system has fencing around the perimeter of the footprint.
Policy/Partnerships	
LEED/ Sustainable Sites Initiative	GSI is implemented either adjacent to a development seeking LEED certification, or as part of the LEED certification requirements.
Public Agency	GSI is implemented in partnership with at least one other public agency.

Non-Government Organizations	GSI is implemented in partnership with at least one non-government organization.
Civic Groups	GSI is implemented in partnership with at least one civic group.
Center City District, University City District	GSI is implemented within Center City District or University City District.
Other Policy/ Partnership	GSI is implemented in a partnership that does not fit the other policy/partnership variables.
Implementation Strategies	
Complete Street Concepts	GSI is implemented in coordination with other improvement projects to enhance pedestrian friendliness and safety, multi-modal transportation, and overall greening of the street.
Storm Flood Relief	GSI is implemented as part of a storm flood relief project, or as the storm flood relief project.
Standard Detail Roll-Out	GSI is implemented using standard details instead of individual site designs.
Physical networks	GSI includes multiple systems that are hydrologically connected, in that when one overflows, bypass runoff is captured by the next downstream system. The physical network collectively manages at least 1 inch of runoff from the total drainage area.
SMEDs	A Stormwater Implementation Plan (SIP) is developed through an area-wide study that considers existing planning initiatives and outside agencies' goals for the area.
Following Public Works	GSI is implemented in coordination with other public works projects.
Green Campuses	GSI is implemented on a campus, as part of a larger scale plan.
Community Acceptance	
Educational Signage	GSI is implemented with educational signage with information on the purpose and function of the system.
Subsurface Conditions	
Groundwater Mounding	An infiltrating GSI system includes piezometer wells for groundwater level monitoring to determine if any significant groundwater mounding occurs or has an impact on adjacent buildings.
Soil Stability (i.e. subsidence)	Soil stability issues are observed due to the GSI system.
Health and Safety	
Pedestrian Impacts	The GSI system influences pedestrian safety and/or friendliness of a street.
Bicyclist Impacts	The GSI system influences bicycle safety and/or friendliness of a street.
Driver Impacts	The GSI system influences driver safety and/or friendliness of a street, including traffic calming effects.
Vectors	The GSI system leads to problems with animals or insects that could potentially pose a risk to human health.
SMP Performance Monitoring	
SMP Type	
Bioinfiltration	SMP performance monitoring takes place in a bioinfiltration basin.

Bioretention	SMP performance monitoring takes place in a bioretention basin.
Bumpout	SMP performance monitoring takes place in a bumpout.
Bumpout and tree trench/infiltration trench	SMP performance monitoring takes place in a bumpout and tree trench system.
Infiltration/storage trench	SMP performance monitoring takes place in an infiltration/storage trench.
Injection well	SMP performance monitoring takes place in an injection well.
Planter	SMP performance monitoring takes place in a stormwater planter.
Planter trench	SMP performance monitoring takes place in a planter trench.
Porous pavement	SMP performance monitoring takes place in a porous pavement system.
Sidewalk swale	SMP performance monitoring takes place in a sidewalk swale.
Tree trench	SMP performance monitoring takes place in a tree trench.
Maintenance	
High Frequency Maintenance	
Surface Systems	A surface system is maintained more frequently than what is typical.
Subsurface Systems	A subsurface system is maintained more frequently than what is typical.
Low Frequency Maintenance	
Surface Systems	A surface system is maintained less frequently than what is typical.
Subsurface Systems	A subsurface system is maintained less frequently than what is typical.
Inspection/Monitoring-Driven Maintenance	
Surface Systems	A surface system is only maintained after inspections or monitoring shows that it is needed.
Subsurface Systems	A subsurface system is only maintained after inspections or monitoring shows that it is needed.
Vegetated Systems	
Post-construction plant irrigation	The vegetated system is irrigated after construction until the plants are established.
No post-construction plant irrigation	The vegetated system is not irrigated after construction.
High frequency weeding	Weeding and pruning is done more frequently than what is typical.
Annual weeding	Weeding and pruning takes place once per year.
No weeding	Weeding and pruning does not take place.

Greenfield Elementary School

Status: Complete
System Types: Bioinfiltration (1), permeable pavement (2)
Number of Applied Pilot Variables: 10

Applied Pilot Variables

Pilot Locations
School yards/ schools
Various Ownership Types
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
Without Stone
Without Pretreatment
Loading Ratio
Low Loading Ratio (<10)
Pilot Materials
Porous Materials
Porous Pavers
Playsurface
Storage Types
Stone
Soil Types
Engineered Imported Soils

40224 – Percy St from Catharine St to Christian St

Status: Complete

System Types: Permeable pavement (1)

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Streets
Porous
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Loading Ratio
Low Loading Ratio (<10)
Pilot Materials
Porous Materials
Asphalt
Storage Types
Stone
Implementation Strategies
Following Public-Works
SMP Performance Monitoring
SMP Type
Porous pavement

40330 – Sepviva St from Susquehanna Ave to Dauphin St

Status: Complete

System Types: Infiltration trench (1), stormwater tree pits (17)

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Streets
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Stormwater Tree Pit Designs
New Inlets
Dual Trap Inlets
Loading Ratio
High Loading Ratio (>15)
Pilot Materials
Storage Types
Stone
Implementation Strategies
Following Public-Works

40659 – Waterview Recreation Center – McMahon St from Price St to Haines St

Status: Complete
System Types: Tree trench (2), permeable pavement (1), planter (1)
Number of Applied Pilot Variables: 17

Applied Pilot Variables

Pilot Locations
Recreation Centers
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Planters
With Stone
Without Pretreatment
Roof Leader Treatments
Disconnection Options
Leader to planter
Loading Ratio
Mid Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Porous Materials
Concrete
Storage Types
Stone
Soil Types
Native Soils
Policy/Partnerships
Public Agency
Non-Government Organizations
Civic Groups
SMP Performance Monitoring
SMP Type
Porous pavement

50004 – Belfield Ave from Chew Ave to Walnut Ln

Status: Complete

System Types: Tree trench (6)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Crate Systems
Pre-treatment Technologies
Sumped Inlet Systems With Filter
SMP Performance Monitoring
SMP Type
Tree trench

50006 – Columbus Square Stormwater Planters

Status: Complete

System Types: Planter (2), planter trench (1)

Number of Applied Pilot Variables: 13

Applied Pilot Variables

Pilot Locations
Streets
Planters
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Planters
With Stone
With Sumped Inlet Pretreatment
Loading Ratio
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Civic Groups
Community Acceptance
Educational Signage
SMP Performance Monitoring
SMP Type
Planter trench

50009 - Queen Lane

Status: Complete

System Types: Bumpout (6)

Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
With Stone
Without Pretreatment
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Bumpouts
Pilot Materials
Storage Types
Stone
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Implementation Strategies
Physical networks
Community Acceptance
Health and Safety
Driver Impacts

50009 – Bureau of Laboratory Services

Status: Complete

System Types: Planter (7), infiltration trench (1), tree trench (2)

Number of Applied Pilot Variables: 15

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Planters
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Slope Conditions
Steep (>3%)
Pilot Systems
Planters
With Stone
Without Pretreatment
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Soil Types
Engineered Imported Soils
Implementation Strategies
Physical networks
SMP Performance Monitoring
SMP Type
Infiltration/storage trench
Planter

50011 - Liberty Lands

Status: Complete
System Types: Bioretention (1)
Number of Applied Pilot Variables: 15

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Non-mowable
Surface
Various Ownership Types
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
With Stone
With Sumped Inlet Pretreatment
With Swale Pretreatment
Loading Ratio
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Swales
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Civic Groups
Other Policy/ Partnership

50014 - 47th & Grays Ferry Rain Garden

Status: Complete
System Types: Bioinfiltration (2)
Number of Applied Pilot Variables: 11

Applied Pilot Variables

Pilot Locations
Traffic Triangles
Streets
Rain Garden
Various Ownership Types
Public Parcels
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
Without Stone
Without Pretreatment
Loading Ratio
High Loading Ratio (>15)
Pilot Materials
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Other Policy/ Partnership
Community Acceptance
Subsurface Conditions
Soil Stability (i.e. subsidence)

50022 - Madison Memorial Park

Status: Complete

System Types: Subsurface detention basin (1)

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
Streets
Infiltration/Storage Trench
Various Ownership Types
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Pilot Materials
Storage Types
Stone
Policy/Partnerships
Public Agency
Civic Groups

50023 - Herron Playground Porous Basketball Court

Status: Complete

System Types: Infiltration trench (1), porous asphalt (1)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Subsurface
Various Ownership Types
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Porous Materials
Asphalt
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Policy/Partnerships
Public Agency
SMP Performance Monitoring
SMP Type
Porous pavement

50024 - Shissler Playground

Status: Complete

System Types: Infiltration trench (1), tree trench (3)

Number of Applied Pilot Variables: 18

Applied Pilot Variables

Pilot Locations
Recreation Centers
"Open Space" park sites
Subsurface
Athletic Fields
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
New Inlets
Trench Drains
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Policy/Partnerships
Non-Government Organizations
Civic Groups
Community Acceptance
Subsurface Conditions
Groundwater Mounding
SMP Performance Monitoring
SMP Type
Infiltration/storage trench
Tree trench

50026 - Daroff School – 56th St, 57th St, Race St, and Vine St

Status: Complete

System Types: Tree trench (3), Bumpout/tree trench (1)

Number of Applied Pilot Variables: 19

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Tree Trenches
Planters
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Planters
With Stone
New Inlets
Trench Drains
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Bumpouts
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Community Acceptance
Health and Safety
Pedestrian Impacts
Bicyclist Impacts
Driver Impacts
SMP Performance Monitoring
SMP Type
Bumpout and tree trench/infiltration trench

50026 - Shepard Recreation Center - 57th St and Vine St

Status: Complete

System Types: Bumpout/tree trench (1), tree trench (2)

Number of Applied Pilot Variables: 16

Applied Pilot Variables

Pilot Locations
Recreation Centers
Streets
Bumpouts
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Bumpouts
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Community Acceptance
Health and Safety
Pedestrian Impacts
Bicyclist Impacts
Driver Impacts
SMP Performance Monitoring
SMP Type
Bumpout and tree trench/infiltration trench

50027 - Baltimore Ave Island from S 60th St to Wharton St

Status: Complete

System Types: Tree trench (1)

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Traffic Triangles
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Non-Government Organizations

50027 - Bryant Elementary School - 60th St, 61st St, Cedar Ave, and Hazel Ave

Status: Complete

System Types: Tree trench (2)

Number of Applied Pilot Variables: 10

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
New Inlets
Dual Trap Inlets
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Sumped Inlet Systems Without Filter
Policy/Partnerships
Non-Government Organizations

50027 - William Harrity School - Webster St and Frazier St

Status: Complete

System Types: Tree trench (5)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
Recreation Centers
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Non-Government Organizations

50027 - Christy Recreation Center - Christian St, Webster St, and 56th St

Status: Complete

System Types: Tree trench (5)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
Recreation Centers
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Non-Government Organizations

50029 - Morris Leeds Middle School - Mt. Pleasant Ave, Sedgwick St, Gorgas Ln, Rodney St, Lowber Ave, and Woolston Ave

Status: Complete

System Types: Tree trench (14)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Crate Systems
Pre-treatment Technologies
Sumped Inlet Systems With Filter

50029 - Simons Recreation Center - Woolston Ave, Walnut Ln, and Rodney St

Status: Complete

System Types: Tree trench (5)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Crate Systems
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Public Agency

50032 - PHS PennVest Tree Trenches

Status: Complete

System Types: Tree trench (6)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Soil Types
Structural Soils
Policy/Partnerships
Non-Government Organizations
Community Acceptance
Subsurface Conditions
Groundwater Mounding
SMP Performance Monitoring
SMP Type
Tree trench

50033 - Lancaster Ave from N 58th St to N 63rd St

Status: Complete

System Types: Tree trench (1), bumpout (1), bioinfiltration (1), sidewalk swale (1)

Number of Applied Pilot Variables: 12

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Tree Trenches
Rain Garden
Sidewalk Swale
Various Ownership Types
Public Right-of-way
Pilot Systems
Rain Gardens
With Stone
Sidewalk Swales
Bumpouts
Policy/Partnerships
Public Agency
Non-Government Organizations
Other Policy/ Partnership
Implementation Strategies
Complete Street Concepts

50043 - Harper's Hollow Park

Status: Complete

System Types: Bioinfiltration (1)

Number of Applied Pilot Variables: 12

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Mowable
Surface
Streets
Rain Garden
Various Ownership Types
Public Parcels
Physical Settings
Piedmont Province
Soil Infiltration Capacity
High tested infiltration rate (>5 in/hr)
Slope Conditions
Steep (>3%)
Pilot Systems
Rain Gardens
Without Stone
With Sumped Inlet Pretreatment
Loading Ratio
Low Loading Ratio (<10)
Pilot Materials
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils

50043 - Wakefield Park

Status: Complete

System Types: Bioinfiltration (2)

Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Non-mowable
Surface
Streets
Rain Garden
Various Ownership Types
Public Parcels
Physical Settings
Piedmont Province
Soil Infiltration Capacity
High tested infiltration rate (>5 in/hr)
Slope Conditions
Steep (>3%)
Pilot Systems
Rain Gardens
Without Stone
With Sumped Inlet Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Community Acceptance
Subsurface Conditions
Groundwater Mounding

50046 - Womrath Park

Status: Complete

System Types: Bioretention (1)

Number of Applied Pilot Variables: 19

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Non-mowable
Surface
Streets
Rain Garden
Various Ownership Types
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
With Stone
With Sumped Inlet Pretreatment
With Swale Pretreatment
With Forebay Pretreatment
Loading Ratio
High Loading Ratio (>15)
Pilot Materials
Storage Types
Crate Systems
Pre-treatment Technologies
Forebays
Sumped Inlet Systems With Filter
Swales
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Civic Groups
Community Acceptance
Educational Signage
SMP Performance Monitoring
SMP Type
Bioretention

50063 - Eadom Parking Lot - 5312-50 Eadom St

Status: Complete

System Types: Bioinfiltration (6)

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Parking Lots
Surface Systems
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
With Stone
Without Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Policy/Partnerships
Public Agency

50001 - 10th St from Wilder St to Reed St

Status: Design Complete – In Construction
System Types: Infiltration trench (2)
Number of Applied Pilot Variables: 11

Applied Pilot Variables

Pilot Locations
Streets
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Policy/Partnerships
Public Agency
Civic Groups
Other Policy/ Partnership
Community Acceptance
Subsurface Conditions
Groundwater Mounding

50001 - Passyunk Ave from Dickinson St To Reed St

Status: Design Complete – In Construction

System Types: Infiltration trench (2)

Number of Applied Pilot Variables: 11

Applied Pilot Variables

Pilot Locations
Streets
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Policy/Partnerships
Public Agency
Civic Groups
Other Policy/ Partnership
Community Acceptance
Subsurface Conditions
Groundwater Mounding

50001 - Chew Playground - 18th St, 19th St, Ellsworth St, and Washington Ave

Status: Design Complete – In Construction

System Types: Bumpout/Tree trench (2), tree trench (2)

Number of Applied Pilot Variables: 13

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Bumpouts
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
SMP Performance Monitoring
SMP Type
Bumpout and tree trench/infiltration trench

50001 - 12th St and Reed St (Columbus Square)

Status: Design Complete – In Construction

System Types: Bioretention (1)

Number of Applied Pilot Variables: 13

Applied Pilot Variables

Pilot Locations
Streets
Rain Garden
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
With Stone
With Sumped Inlet Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Civic Groups
Community Acceptance
Health and Safety
Pedestrian Impacts
SMP Performance Monitoring
SMP Type
Bioretention

50003 - Bodine High School - 4th St and Cambridge St

Status: Design Complete – In Construction

System Types: Planter trench (1), planter box (1), tree trench (3)

Number of Applied Pilot Variables: 20

Applied Pilot Variables

Pilot Locations
Stormwater + Art Site
Streets
Tree Trenches
Planters
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Planters
With Stone
Without Pretreatment
New Inlets
Dual Trap Inlets
Loading Ratio
High Loading Ratio (>15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Crate Systems
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Civic Groups
Implementation Strategies
Physical networks
SMP Performance Monitoring
SMP Type
Planter trench
Tree trench

50003 - 3rd St and Fairmount Ave Intersection

Status: Design Complete – In Construction

System Types: Bumpout/Tree trench (1)

Number of Applied Pilot Variables: 12

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Bumpouts
Pilot Materials
Storage Types
Stone
Soil Types
Engineered Imported Soils
Policy/Partnerships
Civic Groups
Community Acceptance
Health and Safety
Pedestrian Impacts
Bicyclist Impacts
Driver Impacts

50007 - Blue Bell Inn Triangle

Status: Design Complete – In Construction

System Types: Bioinfiltration (1)

Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Mowable
Surface
Traffic Triangles
Various Ownership Types
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
Without Stone
With Sumped Inlet Pretreatment
With Swale Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Pre-treatment Technologies
Sumped Inlet Systems Without Filter
Swales
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Non-Government Organizations

50010 - Barry Playground - 18th St, 19th St, and Bigler St

Status: Design Complete – In Construction

System Types: Tree trench (2), infiltration/storage trench (2), infiltration trench (1)

Number of Applied Pilot Variables: 19

Applied Pilot Variables

Pilot Locations
Recreation Centers
"Open Space" park sites
Subsurface
Streets
Tree Trenches
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Public Parcels
Physical Settings
Coastal Plain Province
Pilot Systems
New Inlets
Permapave Inlets
Dual Trap Inlets
Roof Leader Treatments
Disconnection Options
Leader to tree trench
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
LEED/ Sustainable Sites Initiative
Public Agency
Community Acceptance
Subsurface Conditions
Groundwater Mounding

50019 - Anna B. Day School - Duval St, Crittenden St, and Johnson S

Status: Design Complete – In Construction

System Types: Tree trench (4)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Non-Government Organizations
Community Acceptance
Subsurface Conditions
Groundwater Mounding

50019 - Dickinson Square - Moyamensing Ave and Morris St

Status: Design Complete – In Construction

System Types: Bumpout/trench (1), tree trench (1)

Number of Applied Pilot Variables: 21

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Tree Trenches
Planters
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Planters
Without Stone
Without Pretreatment
New Inlets
Trench Drains
Loading Ratio
Mid-Range Loading Ratio (10-15)
Bumpouts
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Fencing
Policy/Partnerships
Public Agency
Civic Groups
Community Acceptance
Health and Safety
Pedestrian Impacts
Bicyclist Impacts
Driver Impacts
SMP Performance Monitoring
SMP Type
Planter trench

50020 - Welsh School - 4th St and Dakota St

Status: Design Complete – In Construction
System Types: Bioretention (1), tree trench (1)
Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
School yards/ schools
Streets
Tree Trenches
Rain Garden
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Rain Gardens
With Stone
Without Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
SMP Performance Monitoring
SMP Type
Bioretention

50025 - St Thomas Aquinas School - 17th St, 18th St, Morris St, and Fernon St

Status: Design Complete – In Construction

System Types: Tree trench (3)

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Soil Infiltration Capacity
High tested infiltration rate (>5 in/hr)
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Community Acceptance
Subsurface Conditions
Groundwater Mounding

50025 - Smith Elementary School - 19th St, Garnet St, Reed St, and Wharton St

Status: Design Complete – In Construction

System Types: Tree trench (1)

Number of Applied Pilot Variables: 6

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Community Acceptance
Subsurface Conditions
Groundwater Mounding

50034 - Thompson St and Columbia Ave

Status: Design Complete – In Construction

System Types: Bumpout /tree trench (1), Bumpout /infiltration trench (1)

Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Tree Trenches
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Loading Ratio
High Loading Ratio (>15)
Bumpouts
Pilot Materials
Storage Types
Stone
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Civic Groups
Community Acceptance
Health and Safety
Pedestrian Impacts
Driver Impacts
SMP Performance Monitoring
SMP Type
Bumpout and tree trench/infiltration trench

50034 - Trenton Ave and Norris St

Status: Design Complete – In Construction

System Types: Infiltration trench (2), bioinfiltration (1)

Number of Applied Pilot Variables: 17

Applied Pilot Variables

Pilot Locations
Streets
Rain Garden
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Soil Infiltration Capacity
Low tested infiltration rate (<0.5 in/hr)
Pilot Systems
Rain Gardens
Without Stone
Without Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Non-Government Organizations
Civic Groups
Community Acceptance
Health and Safety
Pedestrian Impacts
SMP Performance Monitoring
SMP Type
Bioinfiltration
Infiltration/storage trench

50041 - Springfield Ave and Cobbs Creek Island

Status: Design Complete – In Construction

System Types: Bioinfiltration (1)

Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
Traffic Triangles
Streets
Rain Garden
Various Ownership Types
Public Parcels
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
With Stone
With Sumped Inlet Pretreatment
Without Pretreatment
New Inlets
Trench Drains
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Civic Groups
SMP Performance Monitoring
SMP Type
Bioinfiltration

50041 - Longstreth School - 57th St and Pentridge St

Status: Design Complete – In Construction
System Types: Planter tree trench (1)
Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Planters
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Planters
With Stone
Without Pretreatment
New Inlets
Trench Drains
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Fencing
Policy/Partnerships
Civic Groups
SMP Performance Monitoring
SMP Type
Planter trench

50042 - Bridesburg Recreation Center and Bridesburg School - Richmond St, Jenks St, and Buckius St

Status: Design Complete – In Construction

System Types: Bioinfiltration (1), infiltration trench (1), tree trench (1)

Number of Applied Pilot Variables: 18

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Rain Garden
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
With Stone
With Sumped Inlet Pretreatment
Without Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Civic Groups
Community Acceptance
Subsurface Conditions
Groundwater Mounding
Health and Safety
Pedestrian Impacts
SMP Performance Monitoring
SMP Type
Bioinfiltration

50042 - Roosevelt Playground - Hellerman St, Cottage St, and Levick St

Status: Design Complete – In Construction

System Types: Tree trench (3), planter trench (1)

Number of Applied Pilot Variables: 14

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Planters
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Planters
With Stone
Without Pretreatment
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Civic Groups

50044 - Kemble Park

Status: Design Complete - In Projects Control

System Types: Bioinfiltration (1), infiltration trench (3)

Number of Applied Pilot Variables: 16

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Non-mowable
Surface
Subsurface
Alleys
Centralized Facility
Streets
Rain Garden
Infiltration/Storage Trench
Various Ownership Types
Public Parcels
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
Without Stone
With Sumped Inlet Pretreatment
With Swale Pretreatment
Pilot Materials
Storage Types
Crate Systems
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Swales
Policy/Partnerships
Public Agency
Community Acceptance
Health and Safety
Vectors

50044 - Wister Woods Park

Status: Design Complete - In Projects Control

System Types: Bioinfiltration (4)

Number of Applied Pilot Variables: 12

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Non-mowable
Surface
Streets
Rain Garden
Various Ownership Types
Public Parcels
Physical Settings
Piedmont Province
Soil Infiltration Capacity
High tested infiltration rate (>5 in/hr)
Slope Conditions
Steep (>3%)
Pilot Systems
Rain Gardens
Without Stone
With Sumped Inlet Pretreatment
Pilot Materials
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Public Agency
Community Acceptance
Health and Safety
Vectors

50047 - Philadelphia Zoo - Girard from 39th to 34th

Status: Design Complete - In Construction

System Types: Bioinfiltration (5), bioinfiltration /infiltration trench (2), infiltration trench (2), planter trench /infiltration trench (1)

Number of Applied Pilot Variables: 18

Applied Pilot Variables

Pilot Locations
Streets
Planters
Rain Garden
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Soil Infiltration Capacity
High tested infiltration rate (>5 in/hr)
Pilot Systems
Rain Gardens
Without Stone
Without Pretreatment
Planters
With Stone
Without Pretreatment
New Inlets
Trench Drains
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Public Agency
Other Policy/ Partnership
Implementation Strategies
Following Public-Works

50052 - Pleasant Playground - Chew Ave from Pleasant St to Slocum St and Slocum St from Chew Ave to dead end

Status: Design Complete

System Types: Tree trench (2)

Number of Applied Pilot Variables: 10

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Soil Infiltration Capacity
High tested infiltration rate (>5 in/hr)
Pilot Systems
Loading Ratio
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Silva Cell
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency

50056 - George W. Nebinger School-Carpenter St between S 6th St and E Passyunk Ave

Status: Design Complete - In Construction

System Types: Subsurface detention basin (1), bioinfiltration basin (1)

Number of Applied Pilot Variables: 17

Applied Pilot Variables

Pilot Locations
School yards/ schools
Streets
Rain Garden
Infiltration/Storage Trench
Various Ownership Types
Public Parcels
Parking Lots
Subsurface Systems
Physical Settings
Coastal Plain Province
Soil Infiltration Capacity
High tested infiltration rate (>5 in/hr)
Pilot Systems
Rain Gardens
With Stone
With Swale Pretreatment
New Inlets
Trench Drains
Loading Ratio
Mid-Range Loading Ratio (10-15)
Pilot Materials
Porous Materials
Playsurface
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Swales
Soil Types
Engineered Imported Soils
Policy/Partnerships
Other Policy/ Partnership

50069 - Callowhill St from 2nd to 7th

Status: Design Complete

System Types: Stormwater tree pit (10)

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Systems
Stormwater Tree Pit Designs
Policy/Partnerships
Public Agency

73068 - Southwest Treatment Plant Parking Lot

Status: Design Complete - In Projects Control

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
Various Ownership Types
Public Parcels
Parking Lots
Surface Systems
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
Without Stone
Without Pretreatment
Pilot Materials
Porous Materials
Porous Pavers
Concrete

40794 - Tacony Creek Reaches 4/5

Status: Active

System Types: Bioretention (8)

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Surface
Centralized Facility
Various Ownership Types
Public Parcels
Pilot Systems
Rain Gardens
Without Stone
With Forebay Pretreatment
Pilot Materials
Pre-treatment Technologies
Forebays
Soil Types
Amended Native Soils
Policy/Partnerships
Public Agency
Non-Government Organizations

50021 - John F Kennedy Blvd from 30th St to 32nd St

Status: Active

System Types: Tree trench (6)

Number of Applied Pilot Variables: 10

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Loading Ratio
Mid-Range Loading Ratio (10-15)
Low Loading Ratio (<10)
Pilot Materials
Storage Types
Stone
Pre-treatment Technologies
Sumped Inlet Systems With Filter
Policy/Partnerships
Center City District, University City District
Other Policy/ Partnership
Implementation Strategies
Complete Street Concepts

50045 - Benjamin Franklin Pkwy from 16th St to 19th St

Status: Active

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
Streets
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Pilot Materials
Storage Types
Stone
Policy/Partnerships
Public Agency
Implementation Strategies
Complete Street Concepts

50048 - Mt. Airy School of God in Christ - 65th, 18th, Chelten, Ogontz

Status: Active

Number of Applied Pilot Variables: 11

Applied Pilot Variables

Pilot Locations	
Streets	
	Bumpouts
	Tree Trenches
Various Ownership Types	
	Public Right-of-way
Pilot Systems	
Rain Gardens	
	With Stone
	Without Pretreatment
Bumpouts	
Pilot Materials	
Storage Types	
	Stone
Soil Types	
	Engineered Imported Soils
Implementation Strategies	
Physical networks	
Community Acceptance	
Health and Safety	
	Bicyclist Impacts
	Driver Impacts

50048 - National Cemetery - Andrews, Rodney, Haines, Limekiln

Status: Active

System Types: Sidewalk swale (3)

Number of Applied Pilot Variables: 6

Applied Pilot Variables

Pilot Locations
Streets
Sidewalk Swale
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Sidewalk Swales
Pilot Materials
Storage Types
Stone
Community Acceptance
Health and Safety
Pedestrian Impacts

50052 - Sedgwick Station - Sprague and Durham

Status: Active

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Systems
Pipeless Trenches
Policy/Partnerships
Public Agency

50052 - Chelten Hills Cemetery - Lowber, Upsal, Woolston, Washington

Status: Active

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Pipeless Trenches

50052 - Finley Playground - E Hortter St, Lowber Ave, E Upsal St, Mansfield Ave

Status: Active

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Pipeless Trenches

50052 - Ivy Hills Cemetery - Easton Rd, Thouron Ave, Roumfort Rd, Lynnewood Rd, Mansfield Ave, Ivy Hill Rd

Status: Active

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Pipeless Trenches

50052 - Pennypacker School -Thouron Ave, Mohican St, Rugby St, W Washington Ln

Status: Active

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Physical Settings
Piedmont Province
Pilot Systems
Pipeless Trenches

50053 - Windrim Ave from Wayne Ave to Germantown Ave

Status: Active

System Types: Bumpout (1)

Number of Applied Pilot Variables: 6

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Systems
Bumpouts
Policy/Partnerships
Public Agency
Non-Government Organizations

50053 - Skevchenko Park - Old York, Somerville, Fisher

Status: Active

Number of Applied Pilot Variables: 6

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Various Ownership Types
Public Right-of-way
Pilot Systems
Rain Gardens
With Stone
Without Pretreatment
Policy/Partnerships
Public Agency
Implementation Strategies
Physical networks

50055 - Drexel College of Media Arts & Design

Status: Active

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Pilot Systems
Pipeless Trenches
Policy/Partnerships
Center City District, University City District
Other Policy/ Partnership

50055 - 40th Street Portal - 40th St and Baltimore Ave

Status: Active

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Pilot Systems
Pipeless Trenches
Policy/Partnerships
Public Agency
Center City District, University City District

50055 - Beeber Middle School - Woodcrest, Graham, Malvern, 59th

Status: Active

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Pilot Systems
Pipeless Trenches

50055 - Malcolm X Park - Pine, Larchwood, 51st

Status: Active

Number of Applied Pilot Variables: 4

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Various Ownership Types
Public Right-of-way
Pilot Systems
Pipeless Trenches
Policy/Partnerships
Public Agency

50055 - Upland Way - Redfield to 59th

Status: Active

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
Streets
Bumpouts
Infiltration/Storage Trench
Sidewalk Swale
Pilot Systems
Sidewalk Swales
Pipeless Trenches
Bumpouts
Policy/Partnerships
Non-Government Organizations

50059 - Ferko Playground - I St, Cayuga St, L St

Status: Active

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Surface
Subsurface
Centralized Facility
Athletic Fields
Physical Settings
Coastal Plain Province
Pilot Systems
Roof Leader Treatments
Disconnection Options
Leader to rain garden
Pilot Materials
Soil Types
Amended Native Soils
Policy/Partnerships
Public Agency

50059 - Harrowgate Park - Kensington, Tioga, Jasper, Schiller

Status: Active

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Mowable
Surface
Bridge Runoff
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
Without Stone
With Forebay Pretreatment
Pilot Materials
Pre-treatment Technologies
Forebays
Policy/Partnerships
Public Agency

50060 - Hunting Park - Old York Rd, 9th St, Cayuga St, Hunting Park Ave

Status: Active

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Mowable
Surface
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
With Swale Pretreatment
New Inlets
Trench Drains
Pilot Materials
Pre-treatment Technologies
Swales
Policy/Partnerships
Public Agency

50061 - Bustleton Ave from Magee to St Vincent

Status: Active

Number of Applied Pilot Variables: 4

Applied Pilot Variables

Pilot Locations
Streets
Infiltration/Storage Trench
Pilot Materials
Storage Types
Stone
Policy/Partnerships
Public Agency
Implementation Strategies
Standard Detail Roll-Out

50062 - Woodland Ave from 43rd to 72nd

Status: Active

Number of Applied Pilot Variables: 4

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Pilot Materials
Storage Types
Stone
Policy/Partnerships
Public Agency
Implementation Strategies
Standard Detail Roll-Out

50065 - Panati Playground, 2119-29 Clearfield St

Status: Active

Number of Applied Pilot Variables: 10

Applied Pilot Variables

Pilot Locations
Recreation Centers
Spraygrounds
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
Without Stone
New Inlets
Trench Drains
Roof Leader Treatments
Disconnection Options
Leader to tree trench
Pilot Materials
Storage Types
Crate Systems
Soil Types
Amended Native Soils
Policy/Partnerships
Public Agency

50068 - Ingersoll Commons - Smedley, Seybert, 16th

Status: Active

System Types: Rain garden (1)

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Centralized Facility
Vacant Lands/ Land Acquisition
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
With Stone
New Inlets
Trench Drains
Pilot Materials
Porous Materials
Porous Pavers
Policy/Partnerships
Public Agency
Non-Government Organizations

50070 - Benson Park- Jefferson, 4th, Harlan, and Lawrence

Status: Active

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
Streets
Planters
Physical Settings
Piedmont Province
Pilot Systems
Planters
With Sumped Inlet Pretreatment
New Inlets
Trench Drains
Pilot Materials
Porous Materials
Porous Pavers
Policy/Partnerships
Public Agency
Community Acceptance
Health and Safety
Pedestrian Impacts

50071 - Collazo Park - Westmoreland and Howard

Status: Active

Number of Applied Pilot Variables: 11

Applied Pilot Variables

Pilot Locations
Recreation Centers
Various Ownership Types
Public Parcels
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
Without Stone
Without Pretreatment
New Inlets
Dual Trap Inlets
Trench Drains
Pilot Materials
Porous Materials
Asphalt
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Non-Government Organizations

50074 - Gathers Recreation Center - Diamond, Glenwood

Status: Active

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Recreation Centers
Spraygrounds
Various Ownership Types
Public Parcels
Pilot Systems
New Inlets
Dual Trap Inlets
Pilot Materials
Storage Types
Stone
Policy/Partnerships
Public Agency
Non-Government Organizations
SMP Performance Monitoring
SMP Type
Tree trench

50075 - William Dick Elementary - 24th, Diamond, 25th St

Status: Active

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
School yards/ schools
Athletic Fields
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
Without Stone
Pilot Materials
Porous Materials
Porous Pavers
Soil Types
Engineered Imported Soils
Policy/Partnerships
Public Agency
Non-Government Organizations

50077 - 49th St, 50th St, and Haverford St

Status: Active

System Types: Swale (1), rain garden (1)

Number of Applied Pilot Variables: 6

Applied Pilot Variables

Pilot Locations
Traffic Triangles
Streets
Sidewalk Swale
Vacant Lands/ Land Acquisition
Physical Settings
Coastal Plain Province
Pilot Systems
Rain Gardens
Without Stone
Sidewalk Swales

50077 - Heston Lot - Hunter St, 55th St

Status: Active

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Non-mowable
Surface
Vacant Lands/ Land Acquisition
Pilot Systems
Rain Gardens
Without Stone
Policy/Partnerships
Public Agency

50078 - Clearview and Washington

Status: Active

Number of Applied Pilot Variables: 9

Applied Pilot Variables

Pilot Locations
"Open Space" park sites
Non-mowable
Surface
Vacant Lands/ Land Acquisition
Physical Settings
Piedmont Province
Pilot Systems
Rain Gardens
With Stone
With Sumped Inlet Pretreatment
New Inlets
Trench Drains
Policy/Partnerships
Civic Groups
Implementation Strategies
Following Public-Works

50084 - Carmella Playground

Status: Active

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
Recreation Centers
Streets
Sidewalk Swale
Various Ownership Types
Public Parcels
Pilot Systems
Sidewalk Swales
Roof Leader Treatments
Disconnection Options
Leader to planter
Pilot Materials
Storage Types
Arched Systems

50084 - Moss Playground

Status: Active

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
Recreation Centers
Centralized Facility
Athletic Fields
Streets
Rain Garden
Infiltration/Storage Trench
Various Ownership Types
Public Parcels
Physical Settings
Slope Conditions
Flat (<1.5%)

50086 - East Fairmount Park - Kelly Drive

Status: Active

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Streets
Sidewalk Swale
Pilot Systems
Sidewalk Swales
Policy/Partnerships
Public Agency

50089 - Erie Shopping Center - Castor, Erie, M

Status: Active

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Streets
Planters
Planters
Without Stone
Permapave Inlets

50089 - Francis Hopkinson Little School House - Luzerne, Dungan, L, Lycoming

Status: Active

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Streets
Planters
Infiltration/Storage Trench
Pilot Systems
Planters
With Sumped Inlet Pretreatment

50089 - Glenwood from Pacific to Castor

Status: Active

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
New Inlets
Permapave Inlets

50089 - Mariana Bracetti Academy Charter School - Torresdale, Hunting Park, Jasper

Status: Active

Number of Applied Pilot Variables: 4

Applied Pilot Variables

Pilot Locations
Streets
Planters
Infiltration/Storage Trench
Pilot Systems
Planters
Without Stone
With Sumped Inlet Pretreatment

50090 - Philadelphia Protestant House - Levick, Martins Mill, Magee

Status: Active

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Physical Settings
Slope Conditions
Flat (<1.5%)
Pilot Systems
New Inlets
Permapave Inlets

40669 - Hope Street from Master to Jefferson

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
Streets
Porous
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Materials
Porous Materials
Asphalt
Implementation Strategies
Following Public-Works

40669 - Hope St from Berks to Norris

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
Streets
Porous
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Materials
Porous Materials
Asphalt
Implementation Strategies
Following Public-Works

40695 - Hunting Park from Old York Rd to Roosevelt Blvd

Status: Active - Water/Sewer

System Types: Vegetated Median (1)

Number of Applied Pilot Variables: 8

Applied Pilot Variables

Pilot Locations
Medians
Streets
Porous
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Materials
Porous Materials
Asphalt
Concrete
Storage Types
Stone
Implementation Strategies
Following Public-Works

40713 - Mole St from Fitzwater to Catharine and Webster St from 16th to 17th

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
Streets
Porous
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Materials
Porous Materials
Asphalt
Implementation Strategies
Following Public-Works

40735 - Germantown Ave SFR - Phase 5 - Wildey to Girard

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Implementation Strategies
Storm Flood Relief
Following Public-Works

40736 - Germantown Ave SFR - Phase 6 - 3rd St, Germantown Ave, and Master St

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Implementation Strategies
Storm Flood Relief
Following Public-Works

40747 - Marston, Eyre, Taney

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 5

Applied Pilot Variables

Pilot Locations
Streets
Porous
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Materials
Porous Materials
Asphalt
Implementation Strategies
Following Public-Works

40773 - Galloway, Howard, & Hancock

Status: Active - Water/Sewer

System Types: Porous Crosswalk (1)

Number of Applied Pilot Variables: 4

Applied Pilot Variables

Pilot Locations	
Streets	
	Crosswalks
Various Ownership Types	
	Public Right-of-way
Physical Settings	
Coastal Plain Province	
Implementation Strategies	
Following Public-Works	

40774 - Clifford from 31st to Montgomery

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 7

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Porous
Infiltration/Storage Trench
Various Ownership Types
Public Right-of-way
Physical Settings
Piedmont Province
Pilot Materials
Porous Materials
Asphalt
Implementation Strategies
Following Public-Works

40775 - Kinsey from Tackawanna St to Torresdale St

Status: Active - Water/Sewer

System Types: Injection well (1)

Number of Applied Pilot Variables: 4

Applied Pilot Variables

Pilot Locations
Various Ownership Types
Public Right-of-way
Physical Settings
Coastal Plain Province
Pilot Systems
Injection Wells
Implementation Strategies
Following Public-Works

40785 - Collins from Westmoreland to Allegheny, Tulip from Allegheny to Ann, Agate from Clearfield to Allegheny

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Streets
Tree Trenches
Pilot Systems
Injection Wells
Implementation Strategies
Following Public-Works

40819 - Camac St, Iseminger St, Juniper St, McClellan St, Pierce St, Watkins St

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Streets
Porous
Various Ownership Types
Public Right-of-way
Implementation Strategies
Following Public-Works

40827 - Mole, Bancroft

Status: Active - Water/Sewer

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Streets
Porous
Various Ownership Types
Public Right-of-way
Implementation Strategies
Following Public-Works

9378 - American Legion Playground

Status: In Queue

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Locations
Centralized Facility
Physical Settings
Slope Conditions
Flat (<1.5%)

Black Coyle & McBride - Huntington, Trenton, Hazzard, Collins

Status: In Queue

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Parking Lots
Subsurface Systems
Physical Settings
Coastal Plain Province
Policy/Partnerships
Public Agency

Burke Playground - Jackson St

Status: In Queue

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Stormwater Tree Pit Designs

Chelten Ave Vacant Lot between Germantown and Baynton

Status: In Queue

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Locations
Vacant Lands/ Land Acquisition
Policy/Partnerships
Public Agency

Francis Myers Recreation Center

Status: In Queue

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Systems
Roof Leader Treatments
Disconnection Options
Leader to tree pit

Hackett School

Status: In Queue

Number of Applied Pilot Variables: 3

Applied Pilot Variables

Pilot Locations
Various Ownership Types
Public Parcels
Parking Lots
Subsurface Systems
Pilot Materials
Storage Types
Structural Vaults

Kingsessing Recreation Center

Status: In Queue

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Systems
Roof Leader Treatments
Disconnection Options
Leader to rain garden

Mastery Charter School - W Berks St

Status: In Queue

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Stormwater Tree Pit Designs

McKinley School

Status: In Queue

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Systems
Roof Leader Treatments
Disconnection Options
Leader to rain garden

Shissler Recreation Center

Status: In Queue

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Stormwater Tree Pit Designs

Thouron & Cliveden Alley

Status: In Queue

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Locations
Alleys
Public
With Rooftop Disconnect

Christian St from 6th St to E Passyunk Ave

Status: Pending

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Stormwater Tree Pit Designs

E Passyunk Ave from Federal St to Kimball St

Status: Pending

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Stormwater Tree Pit Designs

American St. from Thompson St. to Lehigh Ave.

Status: Potential

Number of Applied Pilot Variables: 4

Applied Pilot Variables

Pilot Locations
Medians
Physical Settings
Coastal Plain Province
Implementation Strategies
Complete Street Concepts
SMEDs

Richmond St (I-95)

Status: Potential

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Systems
Stormwater Tree Pit Designs

Stadium Area SMED

Status: Potential

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Physical Settings
Coastal Plain Province
Implementation Strategies
SMEDs

Temple University SMED

Status: Potential

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Implementation Strategies
SMEDs
Green Campuses

Village of Arts and Humanities SMED

Status: Potential

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Implementation Strategies
SMEDs

Yorktown SMED

Status: Potential

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Implementation Strategies
SMEDs

ACE/Dougherty Company

Status: Stormwater Management Incentives Program Grant

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Locations
Commercial

Methodist Home for Children Resources

Status: Stormwater Management Incentives Program Grant

Number of Applied Pilot Variables: 1

Applied Pilot Variables

Pilot Locations
Commercial

Newman & Company, Inc.

Status: Stormwater Management Incentives Program Grant

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Locations
Various Ownership Types
Private
Commercial

Pennypack Woods HOA

Status: Stormwater Management Incentives Program Grant
Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Locations
Various Ownership Types
Private
Commercial

Thomas Scattergood Behavioral Health Foundation

Status: Stormwater Management Incentives Program Grant

Number of Applied Pilot Variables: 2

Applied Pilot Variables

Pilot Locations
Various Ownership Types
Private
Commercial

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Table 1 - Listing of all CSO permitted outfalls

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
NPDES Permit #0026689 - Northeast						
2	39d 58m 50s	75d 4m 58s	Castor Ave. and Balfour St.	Delaware River	Somerset	D_17
3	39d 58m 45s	75d 5m 6s	Venango St. NW of Casper St.	Delaware River	Somerset	D_18
4	39d 58m 41s	75d 5m 15s	Tioga St. NW of Casper St.	Delaware River	Somerset	D_19
5	39d 58m 43s	75d 5m 28s	Ontario St. NW of Casper St.	Delaware River	Somerset	D_20
6	39d 58m 44s	75d 5m 41s	Westmoreland St. NW of Balfour St.	Delaware River	Somerset	D_21
7	39d 58m 42s	75d 5m 53s	Allegheny Ave. SE of Bath St.	Delaware River	Somerset	D_22
8	39d 58m 38s	75d 6m 12s	Indiana Ave. SE of Allen St.	Delaware River	Somerset	D_23
10	39d 58m 38s	75d 6m 28s	Cambria St. E of Melvale St.	Delaware River	Somerset	D_25
11	40d 1m 18s	75d 1m 44s	Cottman St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_02
12	40d 1m 14s	75d 2m 0s	Princeton Ave SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_03
13	40d 1m 8s	75d 2m 13s	Disston St. SE of Wissinoming St.	Delaware River	Upper Delaware Low Level	D_04
14	40d 0m 58s	75d 2m 34s	Magee St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_05
15	40d 0m 53s	75d 2m 46s	Levick St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_06
16	40d 0m 44s	75d 3m 5s	Lardner St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_07
17	40d 0m 38s	75d 3m 13s	Comly St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_08
18	40d 0m 34s	75d 3m 18s	Dark Run La and Milnor St.	Delaware River	Upper Delaware Low Level	D_09
19	40d 0m 21s	75d 3m 28s	Sanger St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_11
20	40d 0m 2s	75d 3m 43s	Bridge St. Se of Garden St.	Delaware River	Upper Delaware Low Level	D_12

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
21	39d 59m 53s	75d 3m 47s	Kirkbride St. and Delaware Ave.	Delaware River	Upper Delaware Low Level	D_13
22	39d 59m 24s	75d 4m 4s	Orthodox St. and Delaware Ave.	Delaware River	Upper Delaware Low Level	D_15
23	40d 2m 36s	75d 1m 15s	Frankford Avenue & Ashburner Street	Pennypack Creek	Pennypack	P_01
24	40d 2m 36s	75d 1m 16s	Frankford Avenue & Holmesburg St.	Pennypack Creek	Pennypack	P_02
25	40d 2m 13s	75d 1m 19s	Torresdale Ave. NW of Pennypack Ck.	Pennypack Creek	Pennypack	P_03
26	40d 2m 23s	75d 1m 21s	Cottage Avenue & Holmesburg Avenue	Pennypack Creek	Pennypack	P_04
27	40d 2m 2s	75d 1m 21s	Holmesburg Ave SE of Hegerman St	Pennypack Creek	Pennypack	P_05
28	40d 4m 34s	75d 9m 44s	Williams Avenue SE of Sedgewick	Tacony Creek	Frankford High Level	T_01
29	40d 2m 28s	75d 6m 56s	Complost Ave West of Tacony Creek	Tacony Creek	Frankford High Level	T_03
30	40d 2m 11s	75d 6m 48s	Rising Sun Ave East of Tacony Creek	Tacony Creek	Frankford High Level	T_04
31	40d 2m 9s	75d 6m 48s	Rising Sun Ave West of Tacony Creek	Tacony Creek	Frankford High Level	T_05
32	40d 2m 3s	75d 6m 41s	Bingham Street East of Tacony Creek	Tacony Creek	Frankford High Level	T_06
33	40d 1m 51s	75d 6m 43s	Tabor Road West of Tacony Creek	Tacony Creek	Frankford High Level	T_07
34	40d 1m 42s	75d 6m 47s	Ashdale Street West of Tacony Creek	Tacony Creek	Frankford High Level	T_08
35	40d 1m 37s	75d 6m 48s	Roosevelt Blvd. West of Tacony Creek	Tacony Creek	Frankford High Level	T_09
36	40d 1m 37s	75d 6m 47s	Roosevelt Blvd. East of Tacony Creek	Tacony Creek	Frankford High Level	T_10

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
37	40d 1m 29s	75d 6m 43s	Ruscomb Street East of Tacony Creek	Tacony Creek	Frankford High Level	T_11
38	40d 1m 23s	75d 6m 41s	Whitaker Avenue East of Tacony Creek	Tacony Creek	Frankford High Level	T_12
39	40d 1m 22s	75d 6m 42s	Whitaker Avenue West of Tacony Ck	Tacony Creek	Frankford High Level	T_13
40	40d 0m 59s	75d 6m 28s	I Street & Ramona Ave.	Tacony Creek	Frankford High Level	T_14
41	40d 0m 57s	75d 6m 20s	J Street & Juniata Park	Tacony Creek	Frankford High Level	T_15
42	40d 0m 57s	75d 5m 51s	Castor Avenue at Unity Street Circle	Frankford Creek	Upper Frankford Low Level	F_03
43	40d 0m 52s	75d 5m 42s	Wingohocking St East of Adams Ave	Frankford Creek	Upper Frankford Low Level	F_04
44	40d 0m 41s	75d 5m 41s	Bristol Street West of Adams Avenue	Frankford Creek	Upper Frankford Low Level	F_05
45	40d 0m 25s	75d 5m 33s	Worrel Street East of Frankford Creek	Frankford Creek	Upper Frankford Low Level	F_06
46	40d 0m 26s	75d 5m 34s	Worrel Street West of Frankford Creek	Frankford Creek	Upper Frankford Low Level	F_07
47	40d 0m 21s	75d 5m 36s	Torresdale Ave & Hunting Park Ave	Frankford Creek	Upper Frankford Low Level	F_08
48	40d 0m 19s	75d 5m 34s	Frankford Ave North of Frankford Ck	Frankford Creek	Upper Frankford Low Level	F_09
49	40d 0m 19s	75d 5m 35s	Frankford Ave South of Frankford Ck	Frankford Creek	Upper Frankford Low Level	F_10
50	40d 0m 15s	75d 5m 26s	Orchard Street South of Vandyke Creek	Frankford Creek	Upper Frankford Low Level	F_11
51	39d 59m 56s	75d 5m 14s	Sepviva Street North of Butler Street	Frankford Creek	Upper Frankford Low Level	F_12
52	39d 59m 49s	75d 5m 3s	Duncan Street Under Delaware Exp.	Frankford Creek	Lower Frankford Low Level	F_13

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
54	40d 0m 16s	75d 4m 15s	Wakeling Street NW of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_21
55	40d 0m 19s	75d 4m 5s	Bridge Street NW of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_23
56	40d 0m 18s	75d 4m 5s	Bridge Street SE of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_24
57	40d 0m 15s	75d 4m 15s	Ash Street West of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_25
58	40d 0m 30s	75d 3m 20s	Levick St. & Everett Ave.	Delaware River	Wakling Relief Sewer	D_FRW
59	40d 2m 16s	75d 6m 53s	Nedro Ave & 7th St.	Tacony Creek	Rock Run Flood Relief Sewer	T_FRRR
60	40d 0m 36s	75d 5m 44s	Castor Ave. & East Hunting Park Ave.	Frankford Creek	Frankford High Level Relief Sewer	F_FRFG
NPDES Permit # 0026662 – Southeast						
2	39d 58m 9s	75d 7m 19s	Dyott Street & Delaware Ave.	Delaware River	Lower Delaware Low Level	D_38
3	39d 58m 7s	75d 7m 23s	Susquehanna Ave. East of Beach Street	Delaware River	Lower Delaware Low Level	D_39
4	39d 58m 5s	75d 7m 26s	Berks Street East of Beach Street	Delaware River	Lower Delaware Low Level	D_40
5	39d 58m 3s	75d 7m 37s	Palmer Street East of Beach Street	Delaware River	Lower Delaware Low Level	D_41
6	39d 57m 54s	75d 7m 42s	Columbia Avenue East of Beach Street	Delaware River	Lower Delaware Low Level	D_42
7	39d 57m 56s	75d 7m 48s	Marlborough Street & Delaware Ave	Delaware River	Lower Delaware Low Level	D_43
8	39d 57m 53s	75d 7m 54s	Shackamaxon St East of Delaware Ave	Delaware River	Lower Delaware Low Level	D_44
9	39d 57m 48s	75d 8m 0s	Laurel Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_45

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
10	39d 57m 41s	75d 8m 11s	Penn Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_46
11	39d 57m 37s	75d 8m 9s	Fairmont Ave West of Delaware Ave	Delaware River	Lower Delaware Low Level	D_47
12	39d 57m 28s	75d 8m 13s	Willow Street West of Delaware Ave	Delaware River	Lower Delaware Low Level	D_48
13	39d 57m 24s	75d 8m 20s	Callowhill Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_49
14	39d 57m 21s	75d 8m 13s	Delaware Avenue North of Vine Street	Delaware River	Lower Delaware Low Level	D_50
15	39d 57m 11s	75d 8m 17s	Race Street West of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_51
16	39d 57m 7s	75d 8m 25s	Delaware Avenue & Arch Street	Delaware River	Lower Delaware Low Level	D_52
17	39d 56m 57s	75d 8m 23s	Market Street & Front Street	Delaware River	Lower Delaware Low Level	D_53
20	39d 56m 50s	75d 8m 24s	Front Street South of Chestnut Street	Delaware River	Lower Delaware Low Level	D_54
21	39d 56m 26s	75d 8m 32s	South Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_58
22	39d 56m 12s	75d 8m 33s	Catharine Street East of Swanson Street	Delaware River	Lower Delaware Low Level	D_61
23	39d 56m 10s	75d 8m 32s	Queen Street East of Swanson Street	Delaware River	Lower Delaware Low Level	D_62
24	39d 56m 5s	75d 8m 33s	Christian St West of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_63
25	39d 55m 59s	75d 8m 35s	Washington Ave East of Delaware Ave	Delaware River	Lower Delaware Low Level	D_64
26	39d 55m 45s	75d 8m 29s	Reed Street East of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_65

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
27	39d 55m 37s	75d 8m 28s	Tasker Street East of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_66
28	39d 55m 26s	75d 8m 21s	Moore Street East of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_67
33	39d 54m 6s	75d 8m 12s	Pattison Avenue & Swanson Street	Delaware River	Lower Delaware Low Level	D_73
36	39d 58m 21s	75d 6m 58s	Cumberland St East of Richmond St	Delaware River	Lower Delaware Low Level	D_37
37	39d 57m 12s	75d 8m 24s	Race Street West of Delaware Avenue, North of D-51	Delaware River	Lower Delaware Low Level	D_51A
29	39d 55m 13s	75d 8m 20s	Snyder Avenue & Delaware Avenue	Delaware River	Oregon	D_68
30	39d 54m 60s	75d 8m 13s	Delaware Ave North of Porter Street	Delaware River	Oregon	D_69
31	39d 54m 44s	75d 8m 15s	Oregon Avenue & Delaware Avenue	Delaware River	Oregon	D_70
32	39d 54m 33s	75d 7m 59s	Bigler Street & Delaware Avenue	Delaware River	Oregon	D_71
34	39d 54m 24s	75d 8m 8s	Packer Avenue East of Delaware Ave	Delaware River	Oregon	D_72
NPDES Permit # 0026671 - Southwest						
2	39d 56m 17s	75d 12m 17s	Reed Street & Schuylkill Avenue	Schuylkill River	Lower Schuylkill East Side	S_31
3	39d 55m 54s	75d 12m 28s	35th St. and Mifflin St.	Schuylkill River	Lower Schuylkill East Side	S_36A
4	39d 55m 41s	75d 12m 38s	Vare Avenue & 29th Street	Schuylkill River	Lower Schuylkill East Side	S_37
5	39d 55m 12s	75d 12m 5s	Passyunk Avenue & 29th Street	Schuylkill River	Lower Schuylkill East Side	S_42
6	39d 55m 12s	75d 12m 5s	Passyunk Avenue & 28th Street	Schuylkill River	Lower Schuylkill East Side	S_42A

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
7	39d 54m 57s	75d 12m 16s	26th Street 700' North of Hartranft St	Schuylkill River	Lower Schuylkill East Side	S_44
8	39d 53m 53s	75d 12m 39s	Penrose Avenue & 26th Street	Schuylkill River	Lower Schuylkill East Side	S_46
9	39d 57m 38s	75d 10m 50s	24th Street 155' South of Parktown Pl	Schuylkill River	Central Schuylkill East Side	S_05
10	39d 57m 39s	75d 10m 49s	24th Street 350' South of Parktown Pl	Schuylkill River	Central Schuylkill East Side	S_06
11	39d 57m 39s	75d 10m 50s	24th Street East of Schuylkill River	Schuylkill River	Central Schuylkill East Side	S_07
12	39d 57m 29s	75d 10m 43s	Race Street & Bonsall Street	Schuylkill River	Central Schuylkill East Side	S_08
13	39d 57m 30s	75d 10m 45s	Arch Street West of 23rd Street	Schuylkill River	Central Schuylkill East Side	S_09
14	39d 57m 16s	75d 10m 49s	Market Street 25' East of 24th Street	Schuylkill River	Central Schuylkill East Side	S_10
15	39d 57m 11s	75d 10m 51s	24th St. N of Chestnut St. Bridge	Schuylkill River	Central Schuylkill East Side	S_12A
16	39d 57m 7s	75d 10m 52s	Sansom Street West of 24th Street	Schuylkill River	Central Schuylkill East Side	S_13
17	39d 57m 5s	75d 10m 53s	Walnut Street West of 24th Street	Schuylkill River	Central Schuylkill East Side	S_15
18	39d 57m 1s	75d 10m 56s	Locust Street & 25th Street	Schuylkill River	Central Schuylkill East Side	S_16
19	39d 56m 57s	75d 11m 0s	Spruce Street & 25th Street	Schuylkill River	Central Schuylkill East Side	S_17
20	39d 56m 52s	75d 11m 5s	Pine Street West of Taney Street	Schuylkill River	Central Schuylkill East Side	S_18
21	39d 56m 49s	75d 11m 9s	Lombard Street West of 27th Street	Schuylkill River	Central Schuylkill East Side	S_19

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
22	39d 56m 47s	75d 11m 12s	South Street East of 27th Street	Schuylkill River	Central Schuylkill East Side	S_21
23	39d 56m 44s	75d 11m 18s	Schuylkill Avenue & Bainbridge Street	Schuylkill River	Central Schuylkill East Side	S_23
24	39d 56m 34s	75d 11m 28s	Schuylkill Avenue & Christian Street	Schuylkill River	Central Schuylkill East Side	S_25
25	39d 56m 29s	75d 11m 35s	Ellsworth St West of Schuylkill Avenue	Schuylkill River	Central Schuylkill East Side	S_26
26	39d 58m 1s	75d 11m 17s	Mantua Avenue & West River Drive	Schuylkill River	Central Schuylkill West Side	S_01
27	39d 57m 54s	75d 11m 7s	Haverford Avenue & West River Drive	Schuylkill River	Central Schuylkill West Side	S_02
28	39d 57m 51s	75d 11m 4s	Spring Garden St W of Schuylkill Expy	Schuylkill River	Central Schuylkill West Side	S_03
29	39d 57m 53s	75d 11m 4s	Powelton Ave W of Schuylkill Expy	Schuylkill River	Central Schuylkill West Side	S_04
30	39d 57m 16s	75d 10m 53s	Market St West of Schuylkill Expy	Schuylkill River	Central Schuylkill West Side	S_11
31	39d 57m 5s	75d 10m 58s	Schuylkill Expressway & Walnut Street	Schuylkill River	Central Schuylkill West Side	S_14
32	39d 56m 51s	75d 11m 14s	440′ Northwest of South Street	Schuylkill River	Central Schuylkill West Side	S_20
33	39d 56m 46s	75d 11m 22s	660′ South of South St E of Pennfield	Schuylkill River	Central Schuylkill West Side	S_22
34	39d 56m 43s	75d 11m 26s	1060′ South of South St E of Pennfield	Schuylkill River	Central Schuylkill West Side	S_24
35	39d 56m 32s	75d 12m 27s	46th Street & Paschall Avenue	Schuylkill River	Southwest Main Gravity	S_30
36	39d 56m 36s	75d 12m 18s	43rd St. and Locust St.	Schuylkill River	Southwest Main Gravity	S_50

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
37	39d 56m 13s	75d 12m 23s	49th Street South of Botanic Street	Schuylkill River	Lower Schuylkill West Side	S_32
38	39d 56m 8s	75d 12m 24s	51st Street South of Botanic Street	Schuylkill River	Lower Schuylkill West Side	S_33
39	39d 55m 43s	75d 12m 45s	56th Street East of P&R Railroad	Schuylkill River	Lower Schuylkill West Side	S_38
40	39d 54m 39s	75d 12m 55s	64th St. and Buist Ave.	Schuylkill River	Lower Schuylkill West Side	S_45
41	39d 56m 10s	75d 14m 6s	60th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek High Level	C_18
51	39d 58m 51s	75d 16m 4s	City Line Avenue & 73rd Street	Cobbs Creek	Cobbs Creek High Level	C_01
52	39d 58m 51s	75d 16m 1s	City Line Ave 100' South Side of Creek	Cobbs Creek	Cobbs Creek High Level	C_02
54	39d 58m 30s	75d 15m 26s	Lebanon Ave Southwest of 73rd Street	Cobbs Creek	Cobbs Creek High Level	C_05
55	39d 58m 31s	75d 15m 25s	Lebanon Avenue & 68th Street	Cobbs Creek	Cobbs Creek High Level	C_06
56	39d 58m 26s	75d 15m 26s	Lansdowne Avenue & 69th Street	Cobbs Creek	Cobbs Creek High Level	C_07
57	39d 57m 51s	75d 14m 56s	54th Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_09
58	39d 57m 50s	75d 14m 53s	Gross Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_10
59	39d 57m 43s	75d 14m 53s	Cobbs Creek Pky South of Market St	Cobbs Creek	Cobbs Creek High Level	C_11
60	39d 57m 27s	75d 14m 60s	Spruce Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_12
61	39d 56m 45s	75d 14m 58s	62nd Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_13
62	39d 56m 36s	75d 14m 50s	Baltimore Avenue & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_14

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
63	39d 56m 31s	75d 14m 26s	59th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek High Level	C_15
64	39d 56m 26s	75d 14m 23s	Thomas Avenue & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_16
65	39d 56m 13s	75d 14m 6s	Beaumont Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_17
66	39d 58m 29s	75d 16m 48s	Cobbs Creek Pky S of City Line Ave	Cobbs Creek	Cobbs Creek High Level	C_31
67	39d 58m 12s	75d 15m 56s	Brockton Road & Farrington Road	Cobbs Creek	Cobbs Creek High Level	C_33
68	39d 58m 40s	75d 15m 44s	Woodcrest Avenue & Morris Park	Cobbs Creek	Cobbs Creek High Level	C_34
69	39d 58m 47s	75d 15m 54s	Morris Park West of 72nd Street & Sherwood Road	Cobbs Creek	Cobbs Creek High Level	C_35
70	39d 58m 49s	75d 15m 35s	Woodbine Ave South of Brentwood Rd	Cobbs Creek	Cobbs Creek High Level	C_36
71	39d 57m 55s	75d 15m 15s	Cobbs Creek Parkway South of 67th & Callowhill Streets	Cobbs Creek	Cobbs Creek High Level	C_37
72	39d 58m 22s	75d 16m 11s	Cobbs Creek Parkway & 77th Street	Cobbs Creek	Cobbs Creek High Level	C_32
82	39d 58m 38s	75d 15m 28s	Malvern Ave. and 68th St.	Cobbs Creek	Cobbs Creek High Level	C_04A
42	39d 55m 57s	75d 14m 19s	Mount Moriah Cemetary & 62nd Street	Cobbs Creek	Cobbs Creek Low Level	C_19
43	39d 55m 46s	75d 14m 39s	65th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_20
44	39d 55m 37s	75d 14m 40s	68th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_21
45	39d 55m 27s	75d 14m 46s	70th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_22
46	39d 55m 15s	75d 14m 52s	Upland Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_23

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
47	39d 55m 1s	75d 14m 49s	Woodland Avenue East of Island Ave.	Cobbs Creek	Cobbs Creek Low Level	C_25
49	39d 54m 44s	75d 14m 56s	Claymont Street & Grays Avenue	Cobbs Creek	Cobbs Creek Low Level	C_29
50	39d 54m 34s	75d 15m 1s	77th Street West of Elmwood Avenue	Cobbs Creek	Cobbs Creek Low Level	C_30
78	39d 54m 49s	75d 14m 50s	Island Ave. Southeast of Glenmore Ave	Cobbs Creek	Cobbs Creek Low Level	C_28A
75	39d 57m 59s	75d 11m 3s	16th St. & Clearfield St.	Schuylkill River	Main Relief Sewer	S_FRM
83	39d 56m 31s	75d 14m 25s	56th St. & Locust	Cobbs Creek	Thomas Run Relief Sewer	C_FRTR
84	39d 57m 49s	75d 14m 53s	Arch Street & Cobbs Creek	Cobbs Creek	Arch Street Relief Sewer	C_FRA

Table 2 - Overflow Summary for 7/1/12 – 6/30/2013

District	Regulator	Frequency	Duration (hours)	Volume (ft^3)
Northeast	D_FRW	55	570	38,307,195
Northeast	D02	51	997	60,264,502
Northeast	D03	51	957	16,826,585
Northeast	D04	36	845	1,390,692
Northeast	D05	67	1064	121,236,774
Northeast	D06	38	632	5,002,665
Northeast	D07	41	704	49,917,839
Northeast	D08	49	635	3,766,800
Northeast	D09	14	207	272,947
Northeast	D11	31	598	11,577,429
Northeast	D12	50	508	314,921
Northeast	D13	15	186	513,740
Northeast	D15	13	170	1,729,126
Northeast	D17	52	757	12,967,908
Northeast	D18	51	521	9,857,397
Northeast	D19	54	576	8,060,987
Northeast	D20	42	531	4,842,127
Northeast	D21	47	539	9,623,009
Northeast	D22	82	886	39,040,153
Northeast	D23	50	388	413,173
Northeast	D25	79	795	156,374,183
Northeast	F_FRFG	78	1119	152,550,559
Northeast	F03	43	485	5,483,365
Northeast	F04	77	652	15,089,958
Northeast	F05	80	561	1,740,485
Northeast	F06	33	132	1,399,433
Northeast	F07	50	360	4,658,766
Northeast	F08	48	384	2,604,852
Northeast	F09	72	609	1,421,238
Northeast	F10	80	735	5,135,257
Northeast	F11	81	760	23,717,133
Northeast	F12	43	358	1,195,089
Northeast	F13	53	505	2,837,465
Northeast	F21	79	838	137,887,394
Northeast	F23	50	572	2,465,393
Northeast	F24	52	451	1,078,484
Northeast	F25	10	171	3,965,851

District	Regulator	Frequency	Duration (hours)	Volume (ft^3)
Northeast	P01	31	299	808,076
Northeast	P02	58	513	10,175,970
Northeast	P03	44	594	5,223,417
Northeast	P04	36	490	27,014,051
Northeast	P05	43	663	74,424,226
Northeast	T_FRRR	34	449	9,693,804
Northeast	T01	75	731	7,230,399
Northeast	T03	60	465	5,436,799
Northeast	T04	59	539	3,829,502
Northeast	T05	51	400	2,252,018
Northeast	T06	48	444	15,850,953
Northeast	T07	25	186	372,712
Northeast	T08	78	890	119,731,305
Northeast	T09	51	396	1,576,758
Northeast	T10	71	651	4,392,241
Northeast	T11	60	463	2,355,591
Northeast	T12	18	160	107,667
Northeast	T13	68	541	7,673,297
Northeast	T14	64	792	208,056,093
Northeast	T15	58	602	11,035,638
Southeast	D37	63	676	30,732,633
Southeast	D38	53	541	32,024,162
Southeast	D39	57	699	41,172,676
Southeast	D40	74	644	2,519,766
Southeast	D41	52	479	2,942,680
Southeast	D42	28	208	290,890
Southeast	D43	21	179	183,820
Southeast	D44	50	725	9,797,528
Southeast	D45	41	488	62,649,049
Southeast	D46	27	263	1,008,122
Southeast	D47	85	742	12,676,366
Southeast	D48	46	448	25,597,030
Southeast	D49	6	91	34,011
Southeast	D50	22	189	311,397
Southeast	D51	82	829	3,745,702
Southeast	D51A	64	548	2,515,366
Southeast	D52	30	241	575,283
Southeast	D53	10	156	1,974,766

District	Regulator	Frequency	Duration (hours)	Volume (ft^3)
Southeast	D54	23	271	11,873,143
Southeast	D58	37	341	1,288,285
Southeast	D61	52	405	1,267,673
Southeast	D62	34	236	474,066
Southeast	D63	40	423	16,144,744
Southeast	D64	38	276	274,135
Southeast	D65	41	400	10,667,139
Southeast	D66	43	468	11,443,328
Southeast	D67	43	449	5,343,204
Southeast	D68	58	624	32,416,207
Southeast	D69	33	428	8,467,403
Southeast	D70	19	305	8,825,198
Southeast	D71	47	597	12,034,897
Southeast	D72	32	487	9,376,247
Southeast	D73	51	587	18,749,116
Southwest	C_FRA	17	140	1,078,683
Southwest	C_FRTR	93	739	26,164,012
Southwest	C01	27	182	343,193
Southwest	C02	7	75	35,487
Southwest	C04A	30	607	1,741,757
Southwest	C05	20	127	464,152
Southwest	C06	68	464	7,062,365
Southwest	C07	35	232	1,627,590
Southwest	C09	44	328	2,228,195
Southwest	C10	21	172	205,024
Southwest	C11	52	437	16,996,174
Southwest	C12	51	371	2,911,931
Southwest	C13	46	349	1,831,842
Southwest	C14	46	384	4,555,172
Southwest	C15	31	270	594,708
Southwest	C16	4	46	28,486
Southwest	C17	64	600	67,144,526
Southwest	C18	44	368	5,894,108
Southwest	C19	23	127	753,877
Southwest	C20	22	164	418,989
Southwest	C21	25	196	562,960
Southwest	C22	45	312	2,452,330
Southwest	C23	14	147	212,711

District	Regulator	Frequency	Duration (hours)	Volume (ft^3)
Southwest	C25	27	239	3,086,828
Southwest	C28A	50	363	386,293
Southwest	C29	56	382	2,795,738
Southwest	C30	42	351	1,420,460
Southwest	C31	50	405	1,830,708
Southwest	C32	41	286	1,754,823
Southwest	C33	34	192	595,598
Southwest	C34	17	108	353,427
Southwest	C35	13	99	134,193
Southwest	C36	9	83	119,775
Southwest	C37	24	131	174,038
Southwest	S_FRM	5	97	3,249,298
Southwest	S01	51	435	14,590,194
Southwest	S01T	38	617	2,335,521
Southwest	S02	54	386	1,379,211
Southwest	S03	18	138	131,982
Southwest	S04	86	577	3,131,989
Southwest	S05	80	675	34,364,858
Southwest	S06	84	642	16,856,966
Southwest	S07	25	223	1,442,598
Southwest	S08	46	327	236,991
Southwest	S09	42	391	7,154,087
Southwest	S10	65	567	3,189,731
Southwest	S11	62	743	939,347
Southwest	S12A	51	353	905,922
Southwest	S13	27	139	393,883
Southwest	S14	74	616	2,692,049
Southwest	S15	31	204	319,275
Southwest	S16	78	490	1,408,084
Southwest	S17	33	247	613,358
Southwest	S18	65	526	7,258,395
Southwest	S19	37	273	296,243
Southwest	S20	91	737	22,315,325
Southwest	S21	29	219	159,218
Southwest	S22	46	372	2,581,333
Southwest	S23	65	491	1,624,155
Southwest	S24	46	525	768,570
Southwest	S25	53	393	1,904,084

District	Regulator	Frequency	Duration (hours)	Volume (ft^3)
Southwest	S26	82	681	18,793,145
Southwest	S30	9	89	55,971
Southwest	S31	63	497	4,963,555
Southwest	S32	18	145	185,307
Southwest	S33	85	670	20,865,493
Southwest	S36A	78	611	8,442,622
Southwest	S37	68	539	3,493,584
Southwest	S38	39	308	7,993,291
Southwest	S42	49	469	10,683,614
Southwest	S42A	84	659	24,158,566
Southwest	S44	29	364	3,824,752
Southwest	S45	50	524	23,707,895
Southwest	S46	28	396	1,613,012
Southwest	S50	73	1132	222,902,572

Table 3 - Overflow Summary for Typical Year Precipitation

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
C01	15	7.25	1.22	93.97%
C02	2	0.5	0.00	99.85%
C04	19	14.5	1.57	90.93%
C04A	11	5.5	1.85	99.14%
C05	14	7.75	1.56	92.39%
C06	59	161.5	34.69	62.48%
C07	20	24	6.29	81.12%
C09	32	48	9.19	83.23%
C10	15	26	0.85	49.28%
C11	41	106.5	83.76	71.60%
C12	40	87.5	13.30	73.72%
C13	30	59.25	7.78	79.38%
C14	32	82.5	23.25	65.30%
C15	19	51	2.65	69.44%
C16	2	0.5	0.00	99.89%
C17	55	254	390.67	54.75%
C18	31	78.25	30.75	63.59%
C19	18	9	2.24	95.83%
C20	13	8.75	1.16	94.92%
C21	16	13.5	1.69	93.89%
C22	37	63	9.82	79.36%
C23	5	11.25	0.62	61.46%
C24	20	51.75	7.22	71.48%
C25	22	29	4.61	89.38%
C26	3	3.75	0.13	97.69%
C27	5	4.25	0.42	97.99%
C28A	39	41.75	1.51	91.42%
C29	48	166.75	14.36	45.88%
C30	30	107.5	6.90	59.16%
C31	40	75	7.92	73.88%
C32	30	40	6.72	84.50%
C33	18	11.5	1.97	92.00%
C34	12	4.25	0.89	96.17%
C35	6	1.75	0.12	97.11%
C36	6	1.75	0.11	97.79%
C37	13	5.75	0.32	95.02%
D02	42	419.75	265.39	7.44%
D03	42	406.75	76.21	4.75%
D04	33	179	5.73	57.86%
D05	57	446.75	601.29	34.70%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
D06	20	63.5	10.43	55.55%
D07	53	375.5	406.18	30.84%
D08	44	164.5	10.61	41.55%
D09	5	3	0.65	97.18%
D11	18	39.5	33.28	78.30%
D12	48	101.75	1.77	85.96%
D13	10	12.25	1.68	93.31%
D15	14	18.75	7.69	89.05%
D17	49	153.5	64.79	74.30%
D18	50	155.75	53.79	72.07%
D19	52	190	41.44	73.14%
D20	36	74	22.27	75.22%
D21	41	110.5	48.04	68.80%
D22	71	487.75	242.06	46.81%
D23	42	60.5	1.79	89.01%
D24	24	32.25	0.94	82.21%
D25	66	398	952.14	46.80%
D37	56	382.25	360.49	27.44%
D38	50	259.5	364.60	43.52%
D39	55	309	523.51	59.34%
D40	60	371.5	30.49	44.60%
D41	47	191.25	35.53	58.18%
D42	26	46.25	4.48	77.98%
D43	24	41.75	3.17	80.49%
D44	49	213.25	129.42	50.34%
D45	45	208.25	868.41	70.78%
D46	33	87.5	14.12	64.21%
D47	65	488	147.49	42.40%
D48	46	178.75	284.57	55.30%
D49	12	8.5	1.13	89.36%
D50	23	27.25	3.93	78.91%
D51	67	683	36.22	56.99%
D51A	57	260.5	27.56	74.90%
D52	28	53.75	6.43	72.70%
D53	18	25	29.76	86.53%
D54	31	92	162.21	70.47%
D58	32	79.75	14.70	69.96%
D61	48	135.5	14.32	62.51%
D62	34	71.25	5.13	69.02%
D63	39	124	180.89	66.23%
D64	32	64	2.68	79.39%
D65	37	119.75	123.19	63.09%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
D66	42	160.5	128.38	59.22%
D67	38	123.5	55.48	64.70%
D68	49	254.5	306.81	46.41%
D69	36	130.75	109.01	63.96%
D70	27	86.5	114.40	72.62%
D71	44	215	157.44	49.92%
D72	42	224.25	171.81	54.66%
D73	47	230.25	257.01	51.10%
F03	35	41.75	10.53	84.99%
F04	63	206.75	49.71	69.87%
F05	68	243.75	6.45	71.69%
F06	20	23.75	3.05	67.64%
F07	40	71.75	14.55	80.89%
F08	39	61	7.74	84.25%
F09	61	202.25	7.37	77.60%
F10	66	299.5	22.45	54.41%
F11	71	408.75	110.87	57.52%
F12	31	34	3.27	83.62%
F13	45	100.75	8.66	73.57%
F14	35	38.75	1.01	88.60%
F21	67	360	734.15	53.34%
F23	44	95.75	9.03	68.47%
F24	45	78.25	4.14	75.09%
F25	7	8.75	6.97	96.06%
P01	17	11.25	3.30	93.11%
P02	49	99.25	22.09	71.49%
P03	22	28.25	2.36	88.42%
P04	21	68	55.73	-94.05%
P05	33	171	180.17	-34.74%
R01	66	228.75	9.31	67.96%
R01A	74	439	95.40	53.11%
R02	68	224.75	1.05	71.92%
R03	42	58.75	0.51	87.79%
R04	84	475.5	11.96	58.50%
R05	70	260.25	2.74	74.15%
R06	49	113	27.15	85.81%
R07	14	7.5	3.52	99.16%
R08	39	90.25	198.82	88.04%
R09	19	110	2.98	93.09%
R10	49	219.25	8.06	84.58%
R11	36	41.5	5.71	90.70%
R11A	6	1.5	0.02	99.85%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
R12	8	6.5	9.60	84.06%
R12R	8	7.75	13.40	96.69%
R13	37	60.75	57.81	93.08%
R13A	10	5	4.22	99.11%
R14	86	199.5	126.27	93.94%
R15	8	6	5.54	99.32%
R18	65	303	85.34	97.24%
R20	5	9.5	0.93	99.67%
R21	3	1	1.94	99.71%
R24	11	3.75	3.99	98.30%
S01	41	108.25	79.05	74.33%
S01T	35	56	16.39	90.49%
S02	49	129	7.21	69.05%
S03	11	4.75	0.46	95.85%
S04	72	329.5	17.85	69.56%
S05	66	284.75	215.05	62.73%
S06	68	269.5	101.39	58.86%
S07	15	18.5	7.38	85.86%
S08	34	51.25	1.06	85.30%
S09	37	55.75	40.06	77.65%
S10	56	166.25	18.33	69.29%
S11	54	134.25	4.95	73.16%
S12	45	63	1.99	35.84%
S12A	43	51	2.96	85.83%
S13	17	7.75	1.67	94.09%
S14	63	232.75	15.64	56.79%
S15	22	19.5	1.55	90.09%
S16	66	193.5	8.41	73.32%
S17	24	24.5	3.31	89.34%
S18	52	161.5	45.05	75.39%
S19	27	22	1.56	86.92%
S20	79	465.25	140.76	39.39%
S21	23	15.75	0.86	91.27%
S22	39	64.75	13.27	86.77%
S23	56	150	9.45	70.36%
S24	39	62.25	3.75	77.39%
S25	45	87.75	10.42	84.59%
S26	66	331.5	123.78	58.25%
S27	67	393.5	1275.04	57.53%
S28	7	2.25	0.33	98.21%
S30	6	2	0.23	97.89%
S31	56	140.25	28.58	75.82%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
S32	14	7.75	0.72	92.55%
S33	71	318.75	129.62	22.15%
S34	78	424.25	128.25	47.13%
S35	5	1.5	0.12	97.04%
S36	30	30.5	1.34	75.68%
S36A	65	280.5	52.00	59.38%
S37	61	206.75	20.70	64.93%
S38	28	59	45.07	63.26%
S39	21	57.75	24.22	63.84%
S40	20	38	13.88	72.91%
S42	48	152.5	85.38	76.75%
S42A	72	449	167.80	52.49%
S43	61	302.75	84.49	33.50%
S44	41	101.25	51.55	71.15%
S45	41	100	134.08	77.69%
S46	25	37.25	8.19	88.66%
S47	59	440.25	84.52	-10.52%
S50	62	330.75	1329.49	14.49%
S51	3	0.75	0.06	98.43%
T01	66	235.25	35.94	65.53%
T03	61	128.25	19.88	72.93%
T04	60	111.75	13.36	66.93%
T05	43	44.5	5.68	82.33%
T06	37	51.25	42.44	81.52%
T07	9	4.25	0.49	96.40%
T08	71	381.75	629.84	58.65%
T09	44	49.75	4.83	81.72%
T10	64	205.25	18.73	55.98%
T11	55	90.75	7.93	72.54%
T12	7	2.25	0.06	98.69%
T13	62	170	31.53	65.22%
T14	62	233.5	898.07	71.92%

Note: For the 2013 NPDES Annual CSO Status Report, the models used to simulate the typical year precipitation were updated to reflect the conditions that were assumed to exist during the second quarter of 2013.

Table 4 - July 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
7/1/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/2/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/3/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/4/2012	0.01	0	0.01	0.02	0.03	0	0.01	0	0	0.02	0	0.02	0	0	0	0	0.02	0	0	0.01	0	0	0.01	0
7/5/2012	0.01	0	0.07	0.1	0.02	0	0.01	0.03	0	0.09	0.03	0.04	0.05	0	0.02	0.05	0.05	0	0.03	0.183	0.01	0.01	0	0.16
7/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/7/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/8/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/9/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10/2012	0.1	0.24	0	0	0	0	0	0	0	0	0	0.06	0	0	0	0	0	0	0	0	0	0.01	0	
7/11/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/13/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/14/2012	0.49	0.65	0.26	0.25	0.48	0.5	0.34	0.38	0.56	0.22	0.33	0.48	0.28	0.35	0.4	0.55	0.31	0.39	0.34	0.17	0.39	0.65	0.52	0.22
7/15/2012	0.21	0.44	1.08	0.82	0.23	0.68	0.77	0.63	0.59	1.05	0.58	0.33	0.72	0.63	0.52	0.48	0.82	0.39	0.71	1.05	1	0.45	0.28	1.01
7/16/2012	0.02	0.01	0.01	0.03	0.02	0	0.01	0.01	0	0.01	0	0.01	0.01	0.04	0.02	0.02	0.02	0	0	0.01	0	0	0	0.01
7/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/18/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/19/2012	0	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/20/2012	0.4	0.64	1.12	0.55	0.36	1.09	0.92	0.97	0.54	1.15	1.09	0.17	1.19	0.43	0.94	1.1	0.98	1.25	1.34	0.921	1.47	0.55	0.37	1.43
7/21/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/22/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/23/2012	0	0	0	0.01	0	0	0.01	0.01	0	0	0.01	0	0.01	0	0	0	0.01	0	0.01	0.006	0.01	0	0	0
7/24/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/25/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/26/2012	0.58	0.51	0.43	0.36	0.55	0.47	0.37	0.37	0.34	0.4	0.3	0.45	0.37	0.36	0.27	0.4	0.3	0.39	0.29	0.358	0.33	0.22	0.49	0.3
7/27/2012	0.01	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.021	0.01	0.03	0.01	0.01
7/28/2012	0.33	0.4	0.28	0.62	0.32	0.36	0.57	0.27	0.59	0.49	0.25	0.76	0.22	0.65	0.34	0.24	0.39	0.48	0.07	0.525	0.22	0.45	0.07	0.57
7/29/2012	0.01	0.07	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0
7/30/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/31/2012		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5 - August 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
8/1/2012	0.37	0.01	1.52	0.25	1.17	0.00	0.70	0.02	0.01	0.50	0.26	1.00	1.26	1.06	0.33	0.05	1.04	0.14	0.02	0.32	0.04	0.00	0.32	0.00
8/2/2012	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/3/2012	0.01	0.07	0.00	0.00	0.15	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.28	0.43	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00
8/4/2012	0.00	0.00	0.80	0.49	0.01	0.21	0.18	0.30	0.04	0.36	0.69	0.10	0.58	0.04	0.00	0.02	0.26	0.00	0.14	0.36	0.12	0.04	0.01	0.00
8/5/2012	0.35	0.22	0.68	0.42	0.61	0.28	0.41	0.45	0.36	0.60	0.51	0.72	0.64	0.30	0.33	0.34	0.41	0.30	0.36	0.63	0.34	0.35	0.55	0.00
8/6/2012	0.02	0.03	0.18	0.19	0.04	0.03	0.13	0.08	0.02	0.28	0.18	0.43	0.18	0.03	0.01	0.01	0.10	0.02	0.05	0.29	0.04	0.01	0.16	0.00
8/7/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/8/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/9/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/10/2012	0.99	0.92	0.34	0.37	0.52	0.67	0.44	0.47	0.69	0.32	0.50	0.47	0.35	0.42	0.50	1.05	0.35	0.57	0.49	0.25	0.56	0.73	1.26	0.00
8/11/2012	0.14	0.03	0.17	0.00	0.03	0.05	0.25	0.28	0.20	0.35	0.32	0.03	0.19	0.01	0.14	0.12	0.16	0.29	0.17	0.01	0.83	0.21	0.11	0.00
8/12/2012	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.01	0.00	0.00
8/13/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/14/2012	0.74	0.51	0.51	0.69	0.58	0.34	0.64	0.49	0.55	0.66	0.56	0.37	0.60	0.72	0.80	0.56	0.57	0.97	0.75	0.76	0.80	0.52	0.55	0.63
8/15/2012	0.29	0.31	0.07	0.06	0.32	0.21	0.11	0.07	0.28	0.18	0.08	0.31	0.07	0.11	0.11	0.14	0.07	0.12	0.06	0.06	0.08	0.41	0.55	0.20
8/16/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/17/2012	0.64	0.64	0.32	0.23	0.64	0.74	0.47	0.76	0.46	0.43	0.59	0.38	0.36	0.31	0.47	0.69	0.36	0.51	0.60	0.27	0.36	0.39	0.62	0.34
8/18/2012	0.44	0.36	0.22	0.28	0.29	0.29	0.30	0.22	0.29	0.28	0.22	0.24	0.24	0.28	0.34	0.36	0.25	0.24	0.26	0.23	0.43	0.30	0.55	0.36
8/19/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/20/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/21/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/22/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/23/2012	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/24/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/25/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/26/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/27/2012	0.67	0.40	0.76	0.22	0.52	0.86	0.44	0.51	0.52	0.00	0.52	1.05	0.74	0.51	0.49	0.68	0.53	0.76	0.67	0.35	0.42	0.68	1.04	0.85
8/28/2012	0.17	0.18	0.17	0.18	0.18	0.12	0.16	0.17	0.13	0.00	0.19	0.20	0.18	0.15	0.15	0.17	0.17	0.14	0.14	0.19	0.14	0.13	0.22	0.16
8/29/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/30/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/31/2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6 - September 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
9/1/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/2/2012	0.19	0.22	0.1	0.1	0.11	0.04	0.08	0.06	0.1	0.18	0.07	0.21	0.08	0.08	0.04	0.03	0.03	0.06	0.05	0.04	0.05	0.18	0.24	0.32
9/3/2012	0.93	0.87	1.62	1.12	0.61	0.78	0.81	0.64	0.56	1.59	0.98	0.5	1.5	1.13	0.75	0.8	1.09	0.5	0.81	1.04	0.51	0.41	0.44	1.39
9/4/2012	2.47	2.4	4.05	2.8	2.56	1.63	2.49	3.57	2.14	3.07	3.61	2.02	4.03	2.05	2.14	2.24	2.77	1.71	0.58	3.1	0.34	2.174	3.01	2.7
9/5/2012	0	0	0.17	0.35	0.01	0.56	0.52	0.56	0.28	0	0.291	0	0.27	0.38	0.14	0	0.45	0.43	0.01	0.05	0.04	0.307	0	0
9/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/7/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/8/2012	0.36	0.47	0.21	0.23	0.29	0.42	0.28	0.32	0.45	0.36	0.214	0.36	0.21	0.24	0.28	0.42	0.24	0.37	0.32	0.21	0.3	0.443	0.45	0.35
9/9/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/11/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/13/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/15/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/16/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/18/2012	1.11	1.43	1.14	0.6	0.77	1.06	1.23	0.98	1.07	0.98	1.04	0.79	1.19	0.78	1.17	1.39	1.17	0.89	0.95	0.85	1.1	1.079	0.95	1.01
9/19/2012	0	0.04	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	0.01	0	0.01	0.02	0.01	0.01	0	0.01	0	0.02	0.011	0	0.01
9/20/2012	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/21/2012	0	0.03	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0.001	0	0
9/22/2012	0.66	0.98	0.42	0.84	0.62	0.92	0.88	0.66	0.99	0.25	0.6	0.59	0.51	0.9	0.92	1.1	0.69	0.8	0.31	0.35	0.23	0.95	0.68	0.13
9/23/2012	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/24/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/25/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
9/26/2012	0.01	0.04	0.11	0.04	0.01	0.11	0.19	0.11	0.1	0.13	0.14	0	0.12	0.08	0.1	0.1	0.15	0.24	0.12	0.07	0.11	0.03	0	0.1
9/27/2012	0.12	0.18	0.09	0.19	0.15	0.15	0.12	0.12	0.16	0.08	0.11	0.25	0.1	0.22	0.16	0.19	0.12	0.12	0.11	0.09	0.15	0.18	0.17	0.08
9/28/2012	0	0.03	0.19	0.09	0.01	0.25	0.21	0.17	0.13	0.27	0.12	0.01	0.19	0.1	0.08	0.05	0.14	0.17	0.1	0.03	0.06	0.05	0	0.21
9/29/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/30/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 7 - October 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
10/1/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/2/2012	0.11	0.15	0.14	0.16	0.1	0.22	0.12	0.12	0.15	0.15	0.14	0.08	0.14	0.15	0.16	0.14	0.13	0.16	0.2	0.15	0.29	0.13	0.11	0.16
10/3/2012	0.01	0.05	0.01	0.01	0.01	0.02	0.05	0.02	0.06	0.07	0.01	0.01	0.01	0	0.01	0.03	0.03	0.03	0.1	0.01	0.09	0.07	0.01	0.04
10/4/2012	0.01	0.05	0.01	0	0.02	0.08	0.04	0.02	0.02	0.02	0.03	0.19	0.02	0.18	0.01	0.01	0.02	0.05	0.08	0	0.03	0.01	0.03	0.01
10/5/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/7/2012	0.15	0.17	0.2	0.16	0.17	0.22	0.16	0.21	0.21	0.24	0.21	0.17	0.2	0.16	0.15	0.16	0.15	0.23	0.2	0.18	0.23	0.18	0.19	0.19
10/8/2012	0.01	0.02	0.01	0.02	0.02	0.01	0.03	0.01	0.03	0.01	0.02	0.01	0.01	0	0.01	0.01	0.02	0.01	0	0.01	0.01	0.02	0.04	0.01
10/9/2012	0.11	0.16	0.17	0.09	0.01	0.17	0.12	0.14	0.14	0.13	0.16	0.02	0.18	0.06	0.11	0.13	0.13	0.14	0.1	0.11	0.13	0.09	0.07	0.1
10/10/2012	0	0	0.01	0.02	0	0	0	0.01	0.01	0.02	0.01	0	0.01	0	0	0	0	0	0	0.02	0	0	0.01	0.03
10/11/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/13/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/15/2012	0.12	0.28	0.26	0.32	0.1	0.34	0.35	0.38	0.52	0.2	0.33	0.06	0.29	0.2	0.33	0.31	0.34	0.31	0.16	0.4	0.36	0.48	0.12	0.03
10/16/2012	0	0	0	0	0	0	0	0.01	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0
10/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/18/2012	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0.004
10/19/2012	0.47	0.49	0.94	1	0.57	0.71	0.77	0.67	0.68	0.85	0.77	0.58	0.79	0.738	0.68	0.61	0.7	0.49	0.55	0.96	0.6	0.65	0.39	0.894
10/20/2012	0	0	0.01	0.01	0	0	0.01	0	0	0.01	0	0.01	0	0.004	0	0	0	0	0.01	0.01	0.01	0	0	0.009
10/21/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/22/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0
10/23/2012	0.01	0.04	0	0	0	0.01	0	0	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0	0
10/24/2012	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/25/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/26/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/27/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/28/2012	0.35	0.44	0.13	0.16	0.21	0.32	0.13	0.11	0.3	0.14	0.13	0.16	0.15	0.13	0.16	0.19	0.12	0.13	0.16	0.12	0.26	0.29	0.37	0.12
10/29/2012	2.96	2.87	2.17	2.74	4.52	3	2.56	2.03	3.07	2.24	2.38	1.16	2.51	2.48	2.65	2.53	2.35	1.5	2.43	2	3.31	2.78	2.71	1.74
10/30/2012	0.36	0.33	0.06	0.03	0.04	0.4	0.11	0.06	0.36	0.08	0.11	0.27	0.05	0.09	0.16	0.3	0.06	0.34	0.33	0.05	0.46	0	0.37	0.07
10/31/2012	0	0	0	0	0	0	0	0	0	0.01	0.01	0	0.01	0	0.01	0.01	0.01	0.01	0	0	0	0	0.01	0.01

Table 8 - November 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
11/1/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/2/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/3/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/4/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/5/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/7/2012	0.4	0.42	0.6	0.6	0.28	0.5	0.5	0.4	0.5	0.5	0.5	0.3	0.5	0.6	0.5	0.4	0.5	0.2	0.3	0.5	0.4	0.47	0.4	0.32
11/8/2012	0	0	0	0.1	0.01	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0.02	0	0.01
11/9/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/10/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/11/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/13/2012	0.1	0.18	0.2	0.2	0.17	0.3	0.2	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.23	0.2	0.11
11/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/15/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/16/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/18/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/19/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/20/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/21/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/22/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/23/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/24/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/25/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/26/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/27/2012	0.5	0.53	0.6	0.7	0.52	0.6	0.6	0.6	0.7	0.7	0.7	0.4	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.7	0.48	0.5	0.64
11/28/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/29/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/30/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 9 - December 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
12/1/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/2/2012	0	0	0.03	0.04	0.01	0.01	0.03	0.04	0	0.04	0.06	0.01	0.05	0.01	0	0	0.04	0.01	0.06	0.03	0.05	0	0.01	0.04
12/3/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/4/2012	0	0	0.01	0	0	0	0.01	0	0	0.01	0.01	0	0	0	0	0	0	0	0	0.01	0.01	0	0	0.01
12/5/2012	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
12/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/7/2012	0.18	0.177	0.13	0.16	0.15	0.15	0.13	0.1	0.16	0.15	0.11	0.13	0.13	0.13	0.14	0.15	0.13	0.16	0.15	0.15	0.18	0.14	0.14	0.14
12/8/2012	0.27	0.263	0.24	0.32	0.28	0.13	0.26	0.22	0.14	0.2	0.24	0.23	0.25	0.33	0.3	0.29	0.26	0.14	0.16	0.24	0.17	0.12	0.28	0.19
12/9/2012	0.36	0.356	0.31	0.32	0.34	0.34	0.28	0.27	0.31	0.33	0.29	0.36	0.3	0.38	0.35	0.33	0.27	0.3	0.31	0.3	0.31	0.28	0.4	0.31
12/10/2012	0.06	0.059	0.06	0.1	0.07	0.02	0.09	0.06	0.04	0.05	0.07	0.07	0.09	0.07	0.07	0.06	0.06	0.05	0.03	0.06	0.03	0.02	0.08	0.03
12/11/2012	0.11	0.11	0.1	0.09	0.12	0.12	0.09	0.09	0.11	0.09	0.11	0.08	0.1	0.1	0.1	0.11	0.09	0.1	0.09	0.09	0.09	0.09	0.13	0.08
12/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/13/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/15/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/16/2012	0.08	0.079	0.09	0.09	0.09	0.08	0.07	0.06	0.07	0.1	0.08	0.04	0.08	0.07	0.08	0.07	0.06	0.09	0.08	0.06	0.1	0.06	0.05	0.08
12/17/2012	0.03	0.028	0.04	0.06	0.06	0.03	0.03	0.03	0.03	0.07	0.04	0.03	0.05	0.06	0.04	0.03	0.03	0.04	0.04	0.05	0.04	0.02	0.04	0.06
12/18/2012	0.4	0.396	0.47	0.31	0.29	0.2	0.42	0.4	0.3	0.44	0.41	0.26	0.45	0.32	0.37	0.39	0.37	0.3	0.33	0.46	0.3	0.3	0.41	0.32
12/19/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/20/2012	0.25	0.251	0.22	0.19	0.25	0.26	0.23	0.24	0.27	0.22	0.24	0.25	0.22	0.23	0.23	0.25	0.22	0.26	0.25	0.16	0.25	0.27	0.26	0.21
12/21/2012	1.5	1.509	1.48	0.88	1.36	1.73	1.35	1.22	1.63	1.73	1.6	1.19	1.41	1.36	1.36	1.68	1.41	1.58	1.64	1.34	2.19	1.73	1.47	1.71
12/22/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/23/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/24/2012	0.16	0.159	0.18	0.19	0.19	0.16	0.17	0.16	0.17	0.05	0.2	0.1	0.15	0.18	0.18	0.16	0.18	0.1	0.19	0.18	0.04	0.17	0.15	0.2
12/25/2012	0.01	0.009	0.01	0.01	0	0.03	0.01	0.03	0.01	0.2	0.01	0.01	0.09	0	0.01	0	0.01	0.11	0.01	0.01	0.18	0.01	0	0.03
12/26/2012	1.27	1.255	1.08	1.52	1.27	1.02	1.17	1.12	1.19	1.14	1.27	0.59	1.26	0.98	1.26	1.14	1.2	0.86	1.03	1.04	1.08	1.29	0.96	1.07
12/27/2012	0	0.007	0.08	0.11	0.02	0.28	0.13	0.13	0.22	0.08	0.11	0.01	0.1	0.11	0.15	0.04	0.12	0.09	0.05	0.05	0.06	0.12	0.06	0.06
12/28/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/29/2012	0.28	0.266	0.25	0.2	0.24	0.17	0.25	0.191	0.07	0.236	0.26	0.2	0.05	0.22	0.22	0.25	0.18	0.21	0.26	0.22	0.211	0.07	0.25	0.22
12/30/2012	0	0	0	0	0	0	0	0.09	0.02	0.03	0	0	0.03	0	0	0	0	0.04	0	0	0.08	0.12	0	0
12/31/2012	0	0	0	0	0	0.03	0	0.05	0.03	0.02	0	0	0.03	0	0	0	0.01	0.03	0	0	0.02	0	0	0

Table 10 - January 2013 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
1/1/2013	0	0	0	0	0	0.01	0	0	0.03	0.05	0	0	0.06	0	0	0	0	0.06	0	0	0.04	0	0	0
1/2/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/3/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/4/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/5/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/6/2013	0.11	0.106	0.03	0.04	0.08	0.05	0.04	0.04	0.05	0.03	0.04	0.08	0.05	0.05	0.06	0.06	0.04	0.04	0.03	0.04	0.03	0.05	0.09	0.03
1/7/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/8/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/9/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/10/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/11/2013	0.6	0.593	0.41	0.418	0.61	0.46	0.42	0.39	0.43	0.48	0.43	0.62	0.42	0.51	0.53	0.54	0.41	0.39	0.38	0.41	0.39	0.41	0.64	0.51
1/12/2013	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0	0.01
1/13/2013	0	0	0.01	0.015	0.01	0.01	0.01	0	0.02	0.03	0.02	0.01	0.02	0.01	0.01	0	0.01	0.03	0.02	0.01	0.02	0.01	0.02	0.02
1/14/2013	0.24	0.238	0.22	0.213	0.2	0.27	0.21	0.2	0.22	0.27	0.21	0.18	0.23	0.22	0.22	0.22	0.2	0.18	0.26	0.19	0.26	0.18	0.21	0.26
1/15/2013	0.38	0.376	0.28	0.29	0.34	0.36	0.31	0.29	0.33	0.3	0.31	0.31	0.3	0.32	0.33	0.32	0.31	0.3	0.28	0.28	0.26	0.3	0.33	0.26
1/16/2013	0.95	0.938	0.85	0.872	0.91	0.96	0.86	0.89	0.88	0.98	0.94	0.72	0.93	0.9	0.92	0.87	0.87	0.85	0.86	0.84	0.83	0.8	0.79	0.82
1/17/2013	0	0	0	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0
1/18/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/19/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/20/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/21/2013	0	0	0.01	0.008	0	0	0.01	0	0	0	0.01	0	0	0	0	0.02	0	0	0	0.01	0	0	0.01	0.01
1/22/2013	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/23/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/24/2013	0	0	0	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/25/2013	0	0	0.02	0.027	0	0	0.02	0	0	0	0.04	0	0	0	0	0.03	0	0	0.03	0.05	0	0	0.02	0.03
1/26/2013	0	0	0	0.003	0	0.03	0.01	0	0	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0.01	0.01
1/27/2013	0	0	0	0.002	0	0	0	0.01	0.01	0.01	0	0	0.01	0	0	0	0	0.01	0	0	0.02	0	0	0
1/28/2013	0.12	0.15	0.16	0.15	0.13	0.2	0.16	0.17	0.179	0.26	0.18	0.14	0.18	0.18	0.17	0.15	0.18	0.12	0.14	0.19	0.18	0.15	0.13	0.22
1/29/2013	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/30/2013	0.35	0.42	0.25	0.17	0.3	0.43	0.28	0.26	0.43	0.25	0.28	0.3	0.26	0.26	0.28	0.34	0.23	0.35	0.35	0.15	0.4	0.46	0.37	0.26
1/31/2013	0.69	0.77	0.95	0.62	0.76	0.87	0.88	0.91	0.92	1.1	1.05	0.66	1.02	0.74	0.79	0.98	0.95	0.82	0.76	0.94	1.11	1	0.66	0.98

Table 11 - February 2013 PWD Rain Gage Records

	Rain Gage Number																							
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	**23**	**24**
2/1/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/2/2013	0	0	0.02	0	0	0	0.01	0	0	0	0.03	0	0	0	0	0.01	0	0	0.02	0.01	0	0	0.01	0.03
2/3/2013	0.01	0.02	0.02	0.02	0.02	0.04	0.02	0.03	0.02	0.03	0.02	0.02	0.05	0.01	0.01	0	0.01	0.02	0.01	0.03	0	0.01	0.02	0.03
2/4/2013	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/5/2013	0.01	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	0.01	0.01	0.02	0.01	0.02	0	0.01	0	0.01	0	0.01	0.01
2/6/2013	0	0.01	0	0.01	0.01	0	0	0	0.01	0.02	0	0.02	0	0.01	0	0	0	0.02	0	0	0.02	0.01	0	0
2/7/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/8/2013	0.33	0.34	0.27	0.35	0.32	0.38	0.29	0.22	0.35	0.32	0.31	0.18	0.25	0.3	0.36	0.29	0.26	0.19	0.26	0.32	0.339	0.33	0.25	0.26
2/9/2013	0.01	0.02	0.09	0.01	0.02	0.05	0.06	0.04	0.05	0.087	0.05	0.01	0.08	0.01	0.02	0.05	0	0.03	0.05	0.051	0.046	0.03	0.1	0.13
2/10/2013	0	0	0	0.03	0	0	0	0.01	0.01	0.001	0	0	0.01	0	0	0	0.01	0	0	0.015	0.001	0	0	0
2/11/2013	0.48	0.46	0.35	0.43	0.46	0.45	0.42	0.41	0.46	0.373	0.41	0.46	0.4	0.44	0.46	0.45	0.42	0.4	0.39	0.409	0.41	0.41	0.47	0.42
2/12/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/13/2013	0.24	0.19	0.15	0.17	0.19	0.19	0.15	0.1	0.15	0.148	0.15	0.2	0.16	0.18	0.18	0.17	0.15	0.09	0.18	0.157	0.16	0.19	0.24	0.13
2/14/2013	0	0.02	0.02	0.02	0.01	0.08	0.02	0.07	0.06	0.022	0.02	0.01	0.03	0.01	0.01	0.01	0.02	0.09	0.02	0.023	0.049	0.02	0	0.03
2/15/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0
2/16/2013	0.02	0.04	0.03	0.03	0.02	0.07	0.03	0.03	0.06	0.05	0.05	0.01	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.035	0.05	0.04	0.03	0.04
2/17/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/18/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/19/2013	0.2	0.23	0.2	0.19	0.21	0.18	0.23	0.19	0.2	0.2	0.22	0.22	0.22	0.24	0.26	0.26	0.23	0.15	0.17	0.194	0.2	0.19	0.22	0.19
2/20/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/21/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/22/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.002	0	0	0	0.01
2/23/2013	0.09	0.14	0.14	0.16	0.13	0.17	0.14	0.14	0.16	0.19	0.17	0.07	0.18	0.15	0.15	0.13	0.12	0.15	0.14	0.11	0.16	0.14	0.1	0.16
2/24/2013	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0
2/25/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/26/2013	0.47	0.42	0.34	0.47	0.51	0.42	0.39	0.38	0.47	0.36	0.4	0.21	0.41	0.4	0.43	0.45	0.37	0.39	0.49	0.26	0.51	0.49	0.32	0.32
2/27/2013	0.14	0.15	0.27	0.37	0.21	0.18	0.2	0.18	0.19	0.32	0.25	0.04	0.33	0.26	0.22	0.18	0.26	0.18	0.21	0.22	0.21	0.21	0.08	0.27
2/28/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0

Table 12 - March 2013 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
3/1/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/2/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/3/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/4/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
3/5/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/6/2013	0.18	0.22	0.11	0.14	0.4	0.16	0.16	0.13	0.19	0.16	0.18	0.395	0.18	0.13	0.17	0.14	0.17	0.09	0.13	0.08	0.15	0.18	0.11	0.09
3/7/2013	0	0	0	0	0	0	0	0.01	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/8/2013	0.02	0.06	0.15	0.23	0.05	0.16	0.14	0.14	0.16	0.08	0.18	0.05	0.22	0.13	0.09	0.06	0.14	0.05	0.11	0.15	0.11	0.06	0.03	0.26
3/9/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/10/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/11/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/12/2013	0.95	0.92	0.94	0.74	0.84	1.02	0.88	0.98	1.04	1.15	1.04	0.87	0.96	0.82	0.76	1.01	0.89	1.11	0.96	0.96	1.24	1.03	0.92	1.13
3/13/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/14/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/15/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/16/2013	0.14	0.16	0.15	0.18	0.16	0.19	0.24	0.17	0.16	0.13	0.18	0.1	0.16	0.22	0.2	0.2	0.18	0.11	0.17	0.11	0.08	0.18	0.04	0.13
3/17/2013	0	0	0	0.03	0	0.03	0	0.01	0.05	0.03	0	0	0.04	0.03	0.05	0	0.01	0.13	0	0	0.07	0	0	0
3/18/2013	0.54	0.56	0.49	0.68	0.61	0.55	0.53	0.53	0.56	0.61	0.58	0.29	0.61	0.58	0.58	0.57	0.52	0.54	0.6	0.43	0.62	0.56	0.41	0.54
3/19/2013	0.28	0.23	0.26	0.32	0.29	0.22	0.25	0.26	0.23	0.27	0.29	0.18	0.29	0.28	0.29	0.27	0.27	0.2	0.21	0.26	0.23	0.22	0.26	0.23
3/20/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/21/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/22/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/23/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/24/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/25/2013	0.53	0.54	0.52	0.79	0.51	0.55	0.55	0.51	0.54	0.68	0.61	0.35	0.68	0.55	0.57	0.52	0.57	0.49	0.5	0.53	0.53	0.53	0.37	0.35
3/26/2013	0	0.01	0	0	0.02	0.01	0	0	0.01	0.02	0	0.01	0.01	0	0.01	0.01	0	0	0	0	0.04	0	0	0
3/27/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/28/2013	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/29/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/30/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/31/2013	0.18	0.14	0.19	0.19	0.18	0.14	0.16	0.14	0.13	0.19	0.17	0.19	0.17	0.17	0.19	0.17	0.18	0.15	0.13	0.22	0.15	0.13	0.2	0.23

Table 13 - April 2013 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
4/1/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/2/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/3/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/4/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/5/2013	0.08	0.08	0.02	0.05	0.09	0.03	0.07	0.03	0.06	0	0.03	0.1	0.03	0.08	0.08	0.08	0.05	0.03	0	0.02	0	0.05	0.1	0
4/6/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/7/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/8/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/9/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/10/2013	0.29	0.35	0.41	0.48	0.28	0.54	0.39	0.44	0.49	0.58	0.49	0.16	0.45	0.42	0.32	0.32	0.41	0.3	0.47	0.5	0.53	0.41	0.16	0.07
4/11/2013	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0	0	0.01	0
4/12/2013	1.28	1.14	1.13	1.69	1.38	1.21	1.33	1.3	1.25	1.14	1.34	1	1.29	1.12	1.2	1.12	1.31	1.1	0.96	1.15	0.9	1.07	1.15	1.18
4/13/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/14/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/15/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/16/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/17/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/18/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/19/2013	0.41	0.48	0.32	0.25	0.43	0.49	0.36	0.37	0.5	0.35	0.342	0.39	0.34	0.35	0.43	0.46	0.34	0.35	0.38	0.27	0.42	0.53	0.44	0.3
4/20/2013	0.16	0.2	0.16	0.18	0.19	0.19	0.18	0.16	0.18	0.18	0.169	0.19	0.17	0.19	0.18	0.2	0.18	0.15	0.18	0.17	0.2	0.17	0.19	0.14
4/21/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/22/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/23/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/24/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/25/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/26/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/27/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/28/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/29/2013	0.26	0.35	0.39	0.3	0.27	0.53	0.41	0.45	0.45	0.45	0.393	0.28	0.4	0.3	0.33	0.31	0.34	0.51	0.62	0.36	0.69	0.5	0.31	0.49
4/30/2013	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.011	0	0.01	0	0.01	0.01	0.02	0.02	0.01	0	0.03	0.01	0.02	0.01

Table 14 - May 2013 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
5/1/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/2/2013	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/3/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/4/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/5/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/6/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/7/2013	0.07	0.08	0.09	0.05	0.05	0.12	0.21	0.19	0.09	0.13	0.17	0.05	0.2	0.13	0.12	0.08	0.14	0.26	0.15	0.05	0.22	0.08	0.07	0.07
5/8/2013	0.49	0.43	0.31	0.19	0.17	0.66	0.27	0.48	0.44	0.36	0.73	0.17	0.52	0.54	0.16	0.43	0.64	0.21	0.3	0.54	0.56	0.58	0.4	0.32
5/9/2013	0.56	0.53	0.48	0.58	0.47	0.5	0.52	0.53	0.51	0.6	0.57	0.48	0.53	0.53	0.59	0.49	0.53	0.52	0.51	0.42	0.44	0.5	0.55	0.53
5/10/2013	0.14	0.22	0.16	0.22	0.13	0.48	0.14	0.24	0.36	0.24	0.16	0.11	0.14	0.14	0.11	0.13	0.15	0.27	0.45	0.16	0.48	0.38	0.12	0.18
5/11/2013	0.49	0.54	0.57	0.44	0.32	0.55	0.48	0.53	0.66	0.77	0.59	0.24	0.51	0.38	0.47	0.55	0.53	0.69	0.54	0.48	0.55	0.58	0.48	0.63
5/12/2013	0.06	0.09	0.03	0.03	0.08	0.06	0.04	0.05	0.07	0.04	0.04	0.07	0.04	0.05	0.06	0.09	0.04	0.05	0.07	0.03	0.06	0.07	0.16	0.01
5/13/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/14/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/15/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/16/2013	0	0.02	0.06	0.01	0.01	0	0.01	0.02	0.01	0.03	0.04	0.06	0.05	0.01	0.01	0.01	0.01	0	0.02	0.03	0.01	0.01	0.04	0.01
5/17/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/18/2013	0.33	0.28	0.18	0.24	0.31	0.24	0.26	0.18	0.21	0.15	0.23	0.32	0.2	0.25	0.21	0.25	0.21	0.21	0.21	0.14	0.14	0.2	0.21	0.19
5/19/2013	0.04	0.13	0.19	0.1	0.05	0.21	0.11	0.14	0.14	0.28	0.19	0.04	0.18	0.07	0.05	0.06	0.11	0.26	0.27	0.21	0.28	0.13	0.09	0.4
5/20/2013	0	0	0.01	0.01	0.01	0	0.01	0	0.01	0.01	0.01	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	0	0.01
5/21/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/22/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/23/2013	0.14	0.39	0.31	0.11	0.15	1.14	0.62	0.69	1.08	0.25	0.66	0.33	0.71	0.39	0.2	0.25	0.21	0.8	0.52	0.2	0.49	1.13	0.15	0.23
5/24/2013	0.08	0.15	0.46	0.24	0.17	0.32	0.2	0.19	0.25	0.66	0.31	0.11	0.28	0.16	0.18	0.2	0.4	0.25	0.33	0.33	0.19	0.17	0.09	0.29
5/25/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/26/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/27/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/28/2013	0.16	0.19	0.28	0.25	0.18	0.31	0.25	0.28	0.23	0.3	0.29	0.19	0.26	0.24	0.24	0.25	0.26	0.31	0.3	0.32	0.29	0.19	0.17	0.21
5/29/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0.05
5/30/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/31/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 15 - June 2013 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
6/1/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/2/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/3/2013	0.95	1.07	1.4	1.14	0.65	1.45	1.11	1.35	1.12	1.67	1.45	0.77	1.7	0.68	0.76	0.9	1.16	1.22	0.8	1.12	0.71	0.97	1.29	0.94
6/4/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/5/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/6/2013	0.03	0.07	0.08	0.04	0.06	0.12	0.05	0.05	0.09	0.13	0.08	0.06	0.07	0.04	0.05	0.06	0.05	0.09	0.12	0.06	0.18	0.08	0.06	0.17
6/7/2013	3.51	3.89	3.51	3.81	3.45	3.79	3.61	3.28	3.6	3.61	3.64	3	3.96	3.7	3.73	3.74	3.66	3.28	3.3	3.47	3.55	3.34	3.34	4.07
6/8/2013	0.24	0.26	0.25	0.32	0.25	0.27	0.2	0.18	0.41	0.34	0.2	0.25	0.25	0.3	0.27	0.25	0.26	0.21	0.15	0.26	0.02	0.22	0.31	0.41
6/9/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/10/2013	2.03	1.82	1.89	2.27	1.96	1.83	1.99	1.58	1.74	2.01	2.05	1.91	2.02	2	2.19	2.05	1.97	1.36	1.6	2.09	1.98	1.69	2.02	2.59
6/11/2013	0.02	0.04	0.1	0.07	0.04	0.04	0.08	0.07	0.03	0.11	0.09	0.03	0.09	0.06	0.08	0.06	0.11	0.05	0.06	0.11	0.04	0.04	0.03	0.13
6/12/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/13/2013	0.57	0.53	0.4	0.33	0.67	0.47	0.4	0.42	0.46	0.42	0.44	0.57	0.43	0.52	0.66	0.7	0.43	0.46	0.46	0.32	0.59	0.49	0.4	0.21
6/14/2013	0.06	0.07	0.09	0.27	0.11	0.06	0.07	0.06	0.05	0.09	0.07	0.08	0.1	0.08	0.12	0.08	0.09	0.05	0.05	0.13	0.07	0.04	0.07	0.06
6/15/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/16/2013	0	0.01	0	0	0	0.03	0	0	0.02	0	0	0	0	0.01	0.01	0	0	0.01	0	0	0.01	0	0	0
6/17/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/18/2013	2.03	1.28	0.38	0.33	0.99	0.83	0.42	0.38	0.68	0.32	0.39	1.73	0.44	0.58	0.67	0.76	0.428	0.41	0.47	0.35	0.55	0.8	1.38	0.28
6/19/2013	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0.002	0.01	0	0	0	0	0	0
6/20/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/21/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/22/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/23/2013	0	0	0.21	0.138	0.1	0	0.27	0.04	0	0.06	0.09	0.05	0.28	0.04	0.23	0.01	0.21	0.09	0.01	0	0	0	0	0.08
6/24/2013	0.39	0.6	0.04	0.015	0.49	0.06	0.06	0	0.14	0	0	0.78	0	0.72	0.46	0.25	0	0.01	0.01	0	0.04	0.14	0.58	0.03
6/25/2013	0.06	0.06	0.15	0.149	0.27	0.05	0.11	0.22	0.14	0.16	0.24	0.05	0.16	0.11	0.13	0.21	0.12	0.05	0.28	0.14	0.18	0.19	0.06	0.18
6/26/2013	0.03	0.01	0.28	0.262	0.05	0.19	0.16	0.58	0.34	0.36	0.37	0.23	0.29	0.44	0.57	0.34	0.34	0.16	0.42	0.14	0.54	0.44	0.02	0.09
6/27/2013	0.88	0.64	0.68	0.754	0.79	0.6	1.06	1.18	0.7	1.03	1.17	0.6	0.9	0.59	0.64	1.04	0.75	0.68	0.64	0.65	0.64	0.67	0.84	1.19
6/28/2013	0.11	0.18	0.08	0.089	0.15	0.12	0.09	0.12	0.12	0.06	0.11	0.44	0.09	0.08	0.11	0.16	0.12	0.11	0.07	0.09	0.08	0.13	0.36	0.04
6/29/2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30/2013	0.32	0.25	0.16	0.227	0.19	0.24	0.12	0.16	0.25	0.21	0.18	0.28	0.16	0.13	0.12	0.23	0.14	0.19	0.21	0.4	0.28	0.28	0.4	0.17

Table 16 - Rain Gage records by year and month for FY 2013

		Rain Gage Number											
year	month	1	2	3	4	5	6	7	8	9	10	11	12
2012	7	2.17	3	3.28	2.79	2.03	3.11	3.03	2.69	2.64	3.44	2.61	2.35
2012	8	4.83	3.68	5.75	3.38	5.08	3.81	4.28	3.83	3.56	3.96	4.63	5.31
2012	9	5.86	6.7	8.1	6.37	5.15	5.93	6.82	7.2	5.99	6.93	7.175	4.74
2012	10	4.68	5.05	4.12	4.72	5.77	5.5	4.45	3.79	5.55	4.18	4.31	2.75
2012	11	1.11	1.129	1.42	1.55	0.976	1.43	1.38	1.26	1.38	1.55	1.36	0.82
2012	12	4.96	4.924	4.78	4.59	4.74	4.76	4.72	4.501	4.77	5.196	5.11	3.56
2013	1	3.44	3.591	3.19	2.829	3.34	3.65	3.25	3.18	3.499	3.76	3.51	3.02
2013	2	2	2.05	1.9	2.27	2.12	2.22	1.98	1.81	2.2	2.131	2.09	1.45
2013	3	2.82	2.84	2.81	3.3	3.06	3.03	2.92	2.88	3.07	3.33	3.23	2.435
2013	4	2.49	2.62	2.45	2.96	2.67	3.01	2.75	2.76	2.94	2.71	2.775	2.12
2013	5	2.56	3.05	3.13	2.47	2.1	4.59	3.13	3.52	4.06	3.82	3.99	2.18
2013	6	11.23	10.78	9.7	10.214	10.22	10.15	9.8	9.67	9.89	10.58	10.58	10.83
		Rain Gage Number											
year	month	13	14	15	16	17	18	19	20	21	22	23	24
2012	7	2.87	2.49	2.54	2.87	2.92	2.91	2.8	3.374	3.44	2.37	1.76	3.71
2012	8	5.4	4.033	3.96	4.62	4.29	4.06	3.714	3.876	4.155	3.78	5.94	2.543
2012	9	8.2	5.97	5.8	6.33	6.86	5.29	3.37	5.83	2.91	5.815	5.94	6.31
2012	10	4.37	4.202	4.44	4.43	4.06	3.4	4.32	4.02	5.78	4.7	4.43	3.417
2012	11	1.37	1.39	1.29	1.12	1.29	1.05	1.11	1.36	1.33	1.203	1.1	1.083
2012	12	4.84	4.55	4.86	4.95	4.64	4.47	4.68	4.46	5.391	4.81	4.69	4.76
2013	1	3.51	3.19	3.31	3.53	3.21	3.15	3.11	3.11	3.55	3.37	3.28	3.42
2013	2	2.18	2.05	2.15	2.04	1.91	1.75	1.99	1.836	2.175	2.07	1.86	2.03
2013	3	3.32	2.91	2.91	2.95	2.93	2.87	2.81	2.75	3.22	2.89	2.34	2.96
2013	4	2.69	2.46	2.55	2.5	2.65	2.46	2.63	2.48	2.77	2.74	2.38	2.19
2013	5	3.62	2.9	2.41	2.8	3.24	3.84	3.68	2.93	3.72	4.02	2.53	3.13
2013	6	10.94	10.08	10.8	10.84	9.84	8.44	8.65	9.33	9.46	9.52	11.16	10.64

Table 17 - SSO Statistics for Period July 1 2012 – June 30 2013

Main & Shurs					
Event No.	**Start of Overflow Date Time**	**End of Overflow Date Time**	**Event Duration (hours:mins)**	**Flow Volume (ft^3)**	**Flow Volume (Millions of gallons)**
1	7/20/2012 5:42	7/20/2012 5:45	0:02	43	0.00032
2	10/19/2012 10:00	10/19/2012 11:15	1:15	8555	0.064
3	10/29/2012 8:00	10/29/2012 18:30	10:30	81978	0.613
4	12/21/2012 1:15	12/21/2012 7:45	6:30	336	0.0025
5	12/26/2012 19:15	12/26/2012 21:15	2:00	55	0.0004
6	1/31/2013 3:17	1/31/2013 4:02	0:45	3287	0.025
7	6/7/2013 15:10	6/7/2013 20:45	5:35	27973	0.209
8	6/10/2013 7:35	6/10/2013 18:10	10:35	2089	0.016

PC-30					
Event No.	**Start of Overflow Date**	**End of Overflow Date**	**Event Duration (hours:mins)**	**Flow Volume (ft^3)**	**Flow Volume (Millions of gallons)**
1*	9/4/2012	9/4/2012	Unknown	Unknown	unknown

* Evidence of an overflow was observed at PC30 on 9/4/2012, however the rainfall exceeded the threshold for the design event as described in the Consent Order.

APPENDIX E – MONITORING LOCATIONS

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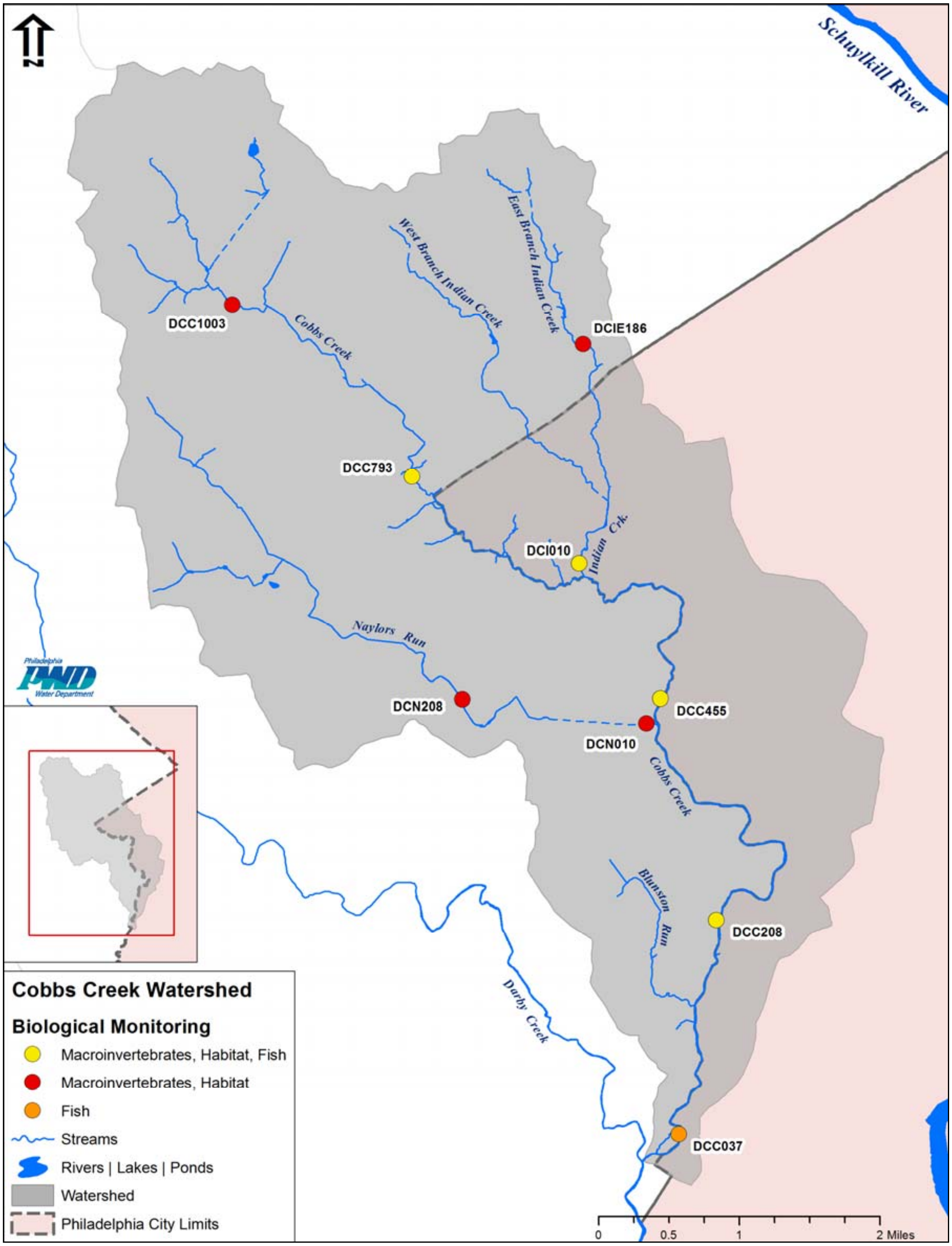

Figure 1 - Biological and Physical assessment locations in Cobbs Creek Watershed

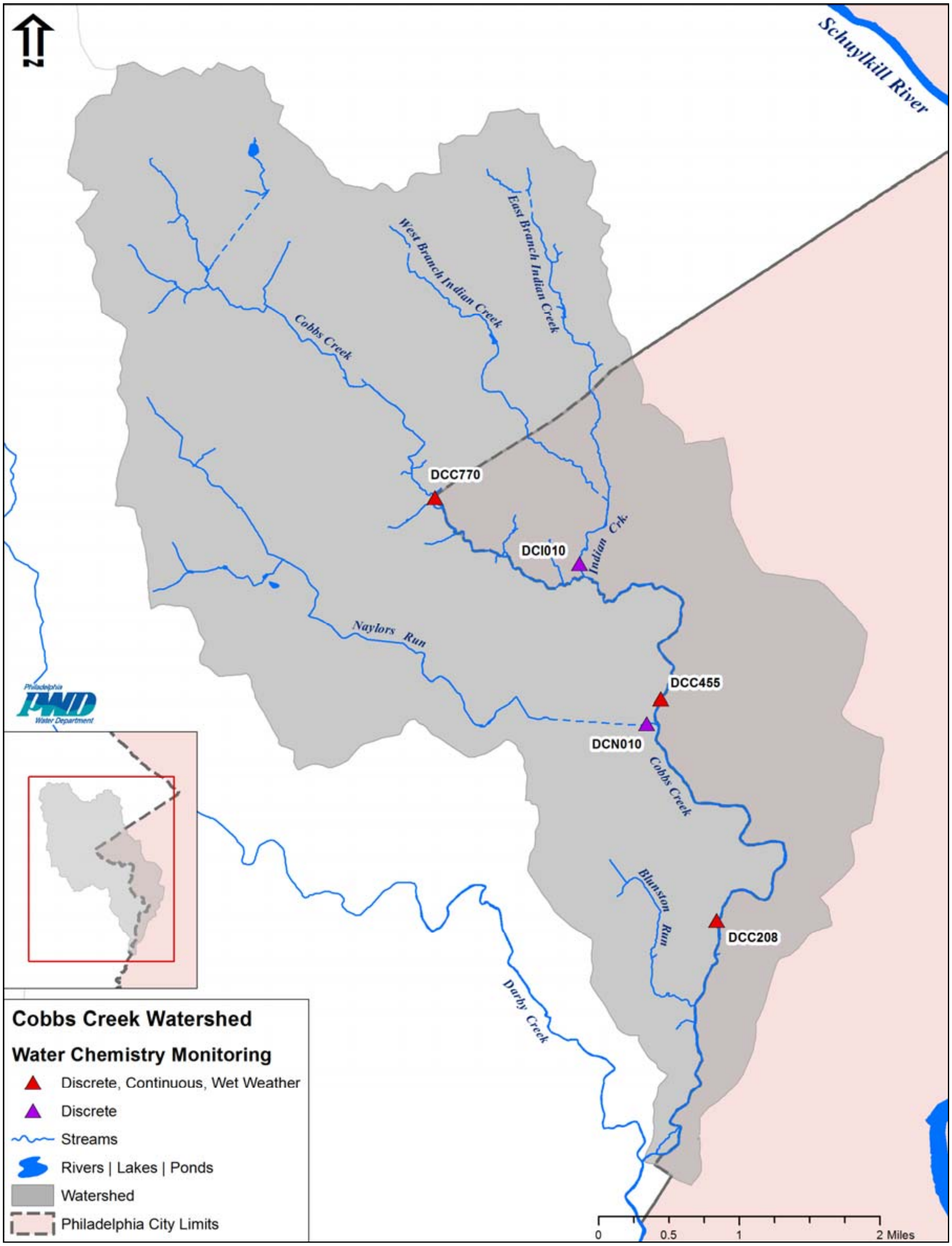

Figure 2 - Chemical monitoring locations in Cobbs Creek Watershed

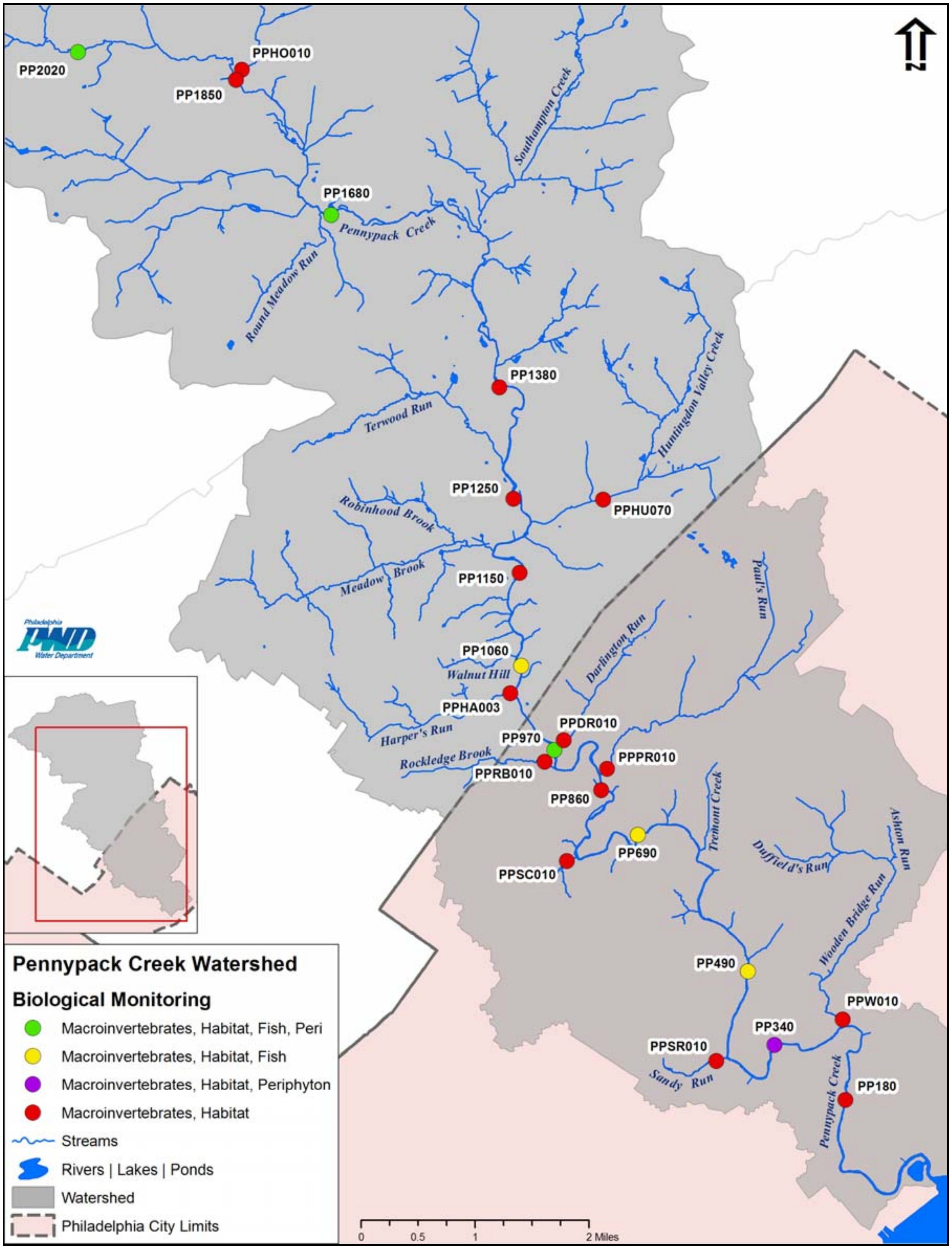

Figure 3 - Biological and Physical assessment locations in Pennypack Watershed

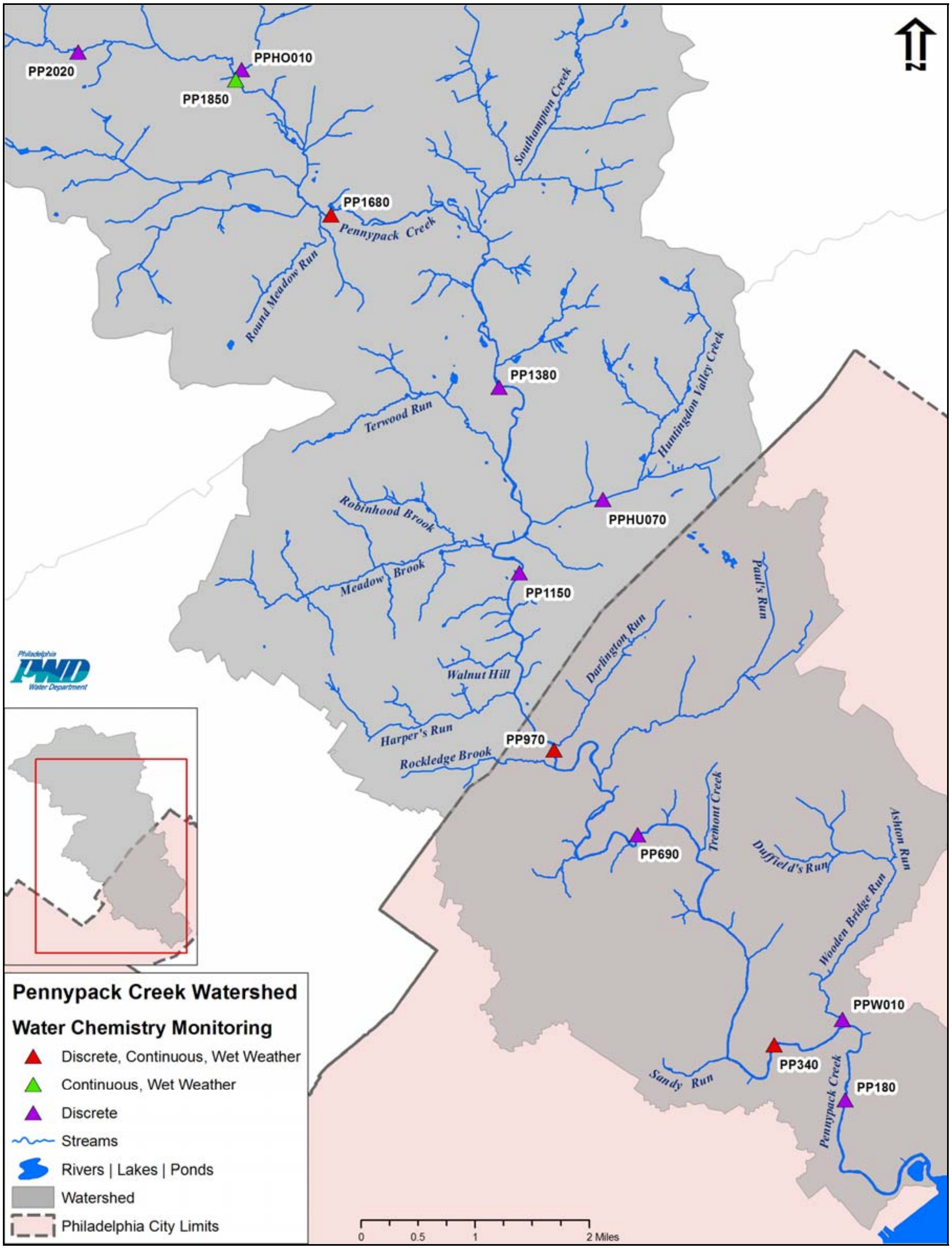

Figure 4 - Chemical monitoring locations in Pennypack Watershed

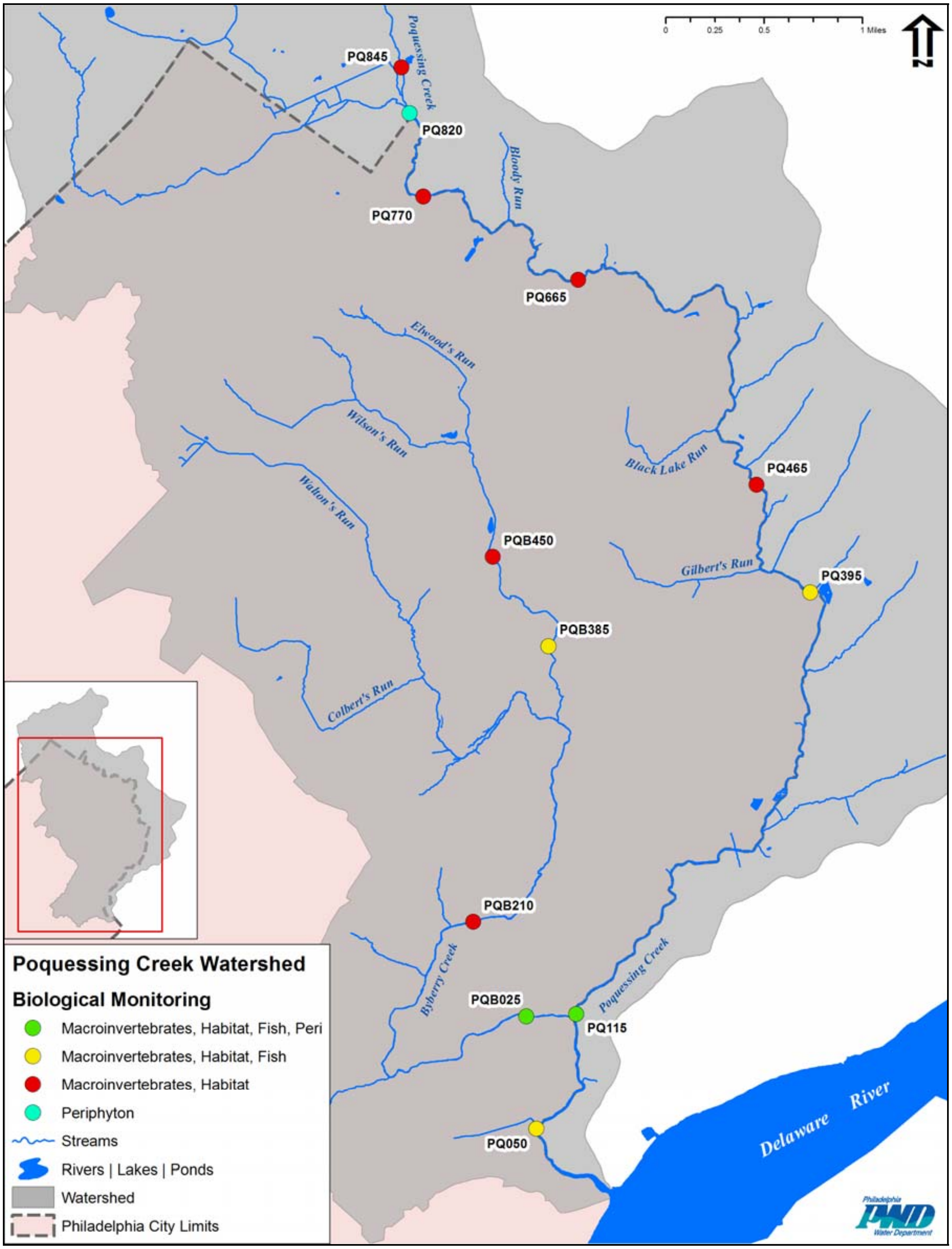

Figure 5 - Biological and Physical assessment locations in Poquessing-Byberry Watershed

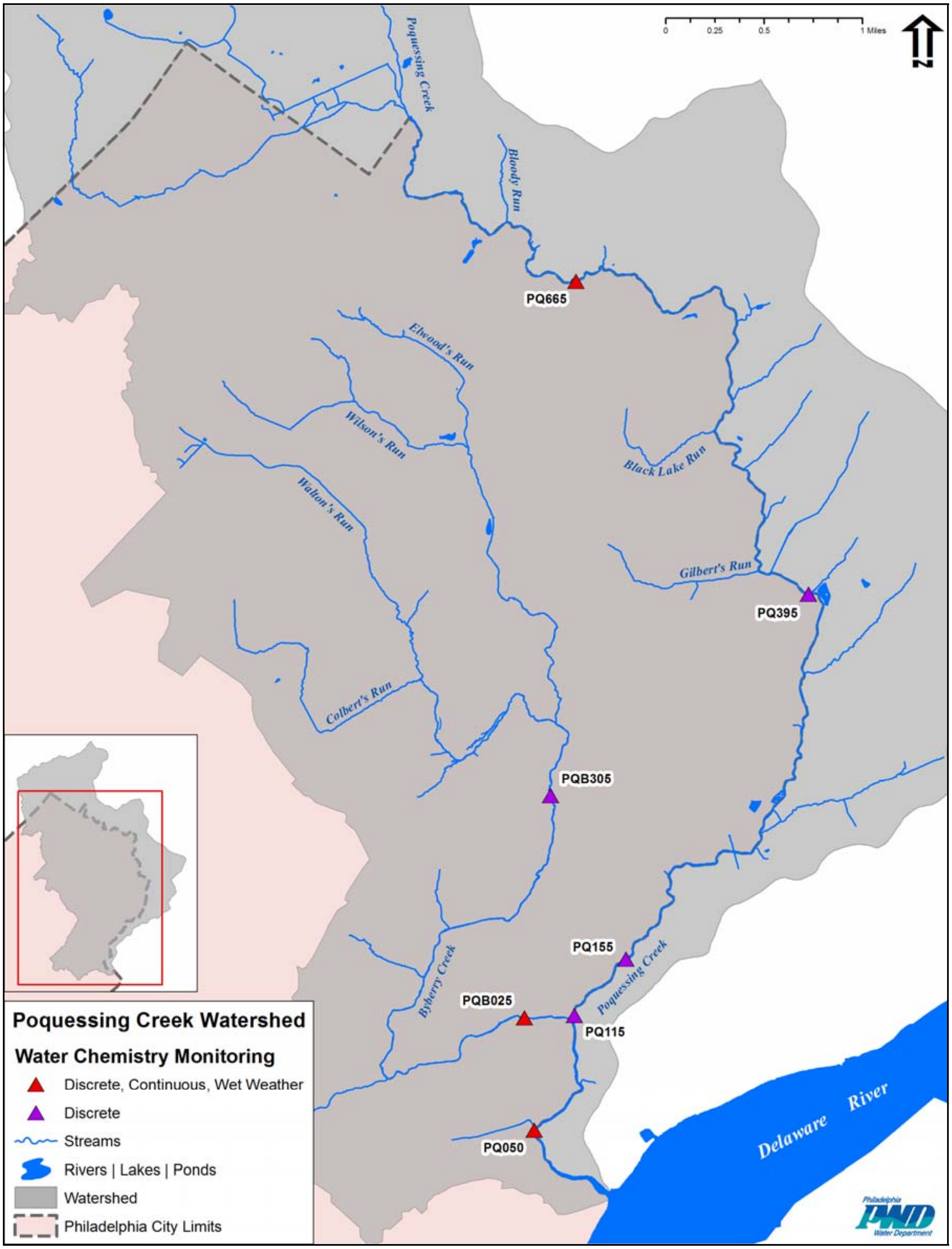

Figure 6 - Chemical monitoring locations in Poquessing-Byberry Watershed

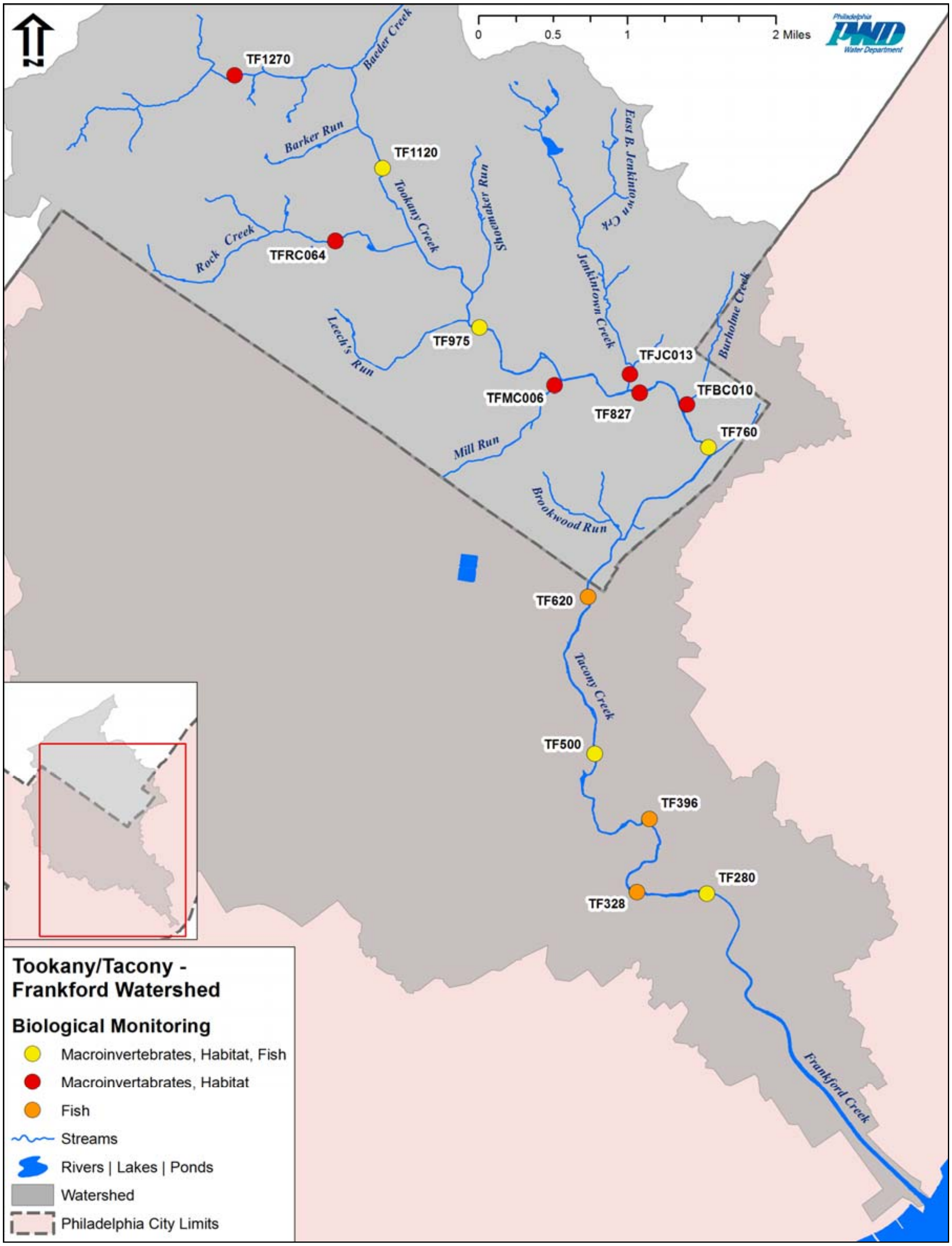

Figure 7 - Biological and Physical assessment locations in Tacony-Frankford Watershed

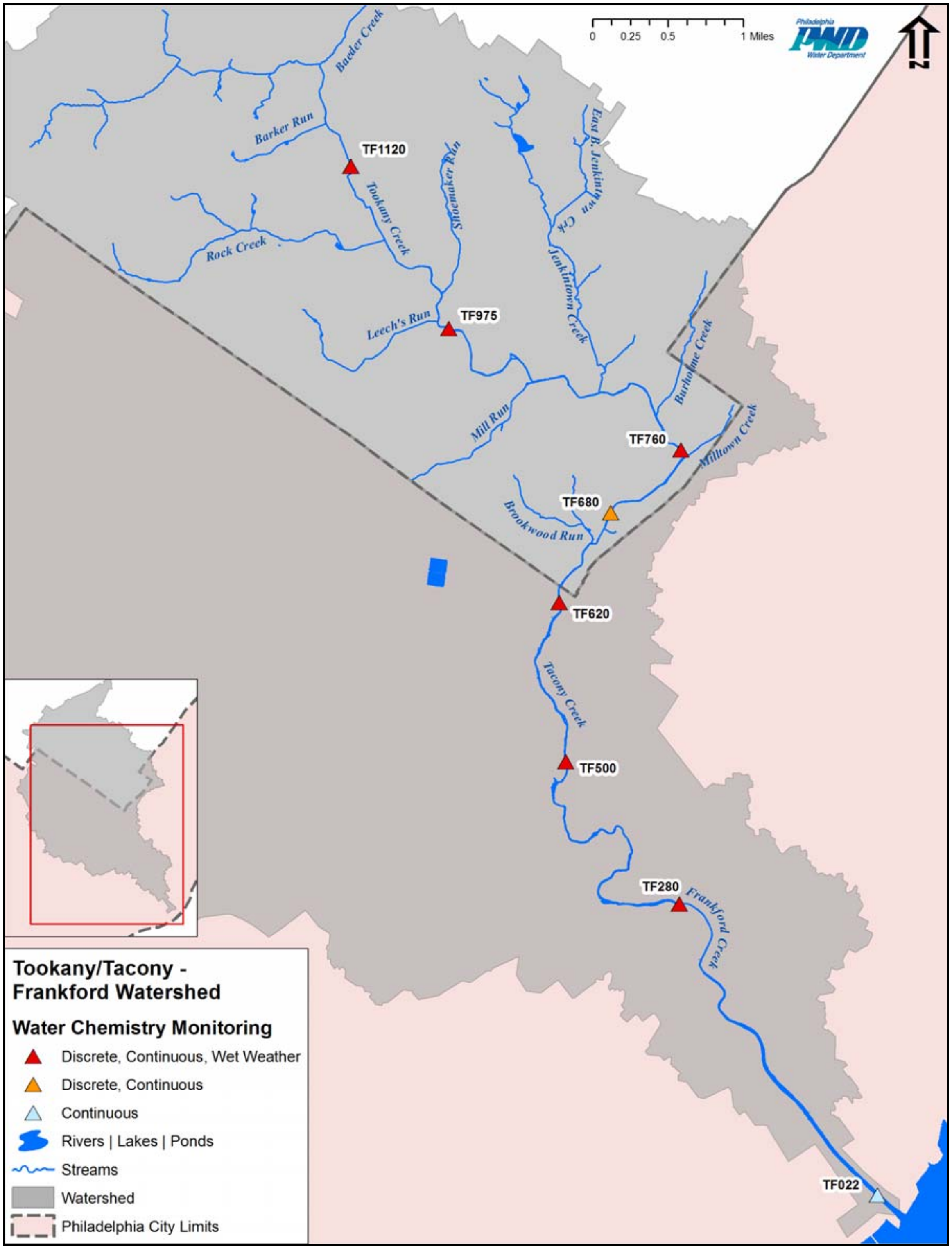

Figure 8 - Chemical monitoring locations in Tacony-Frankford Watershed

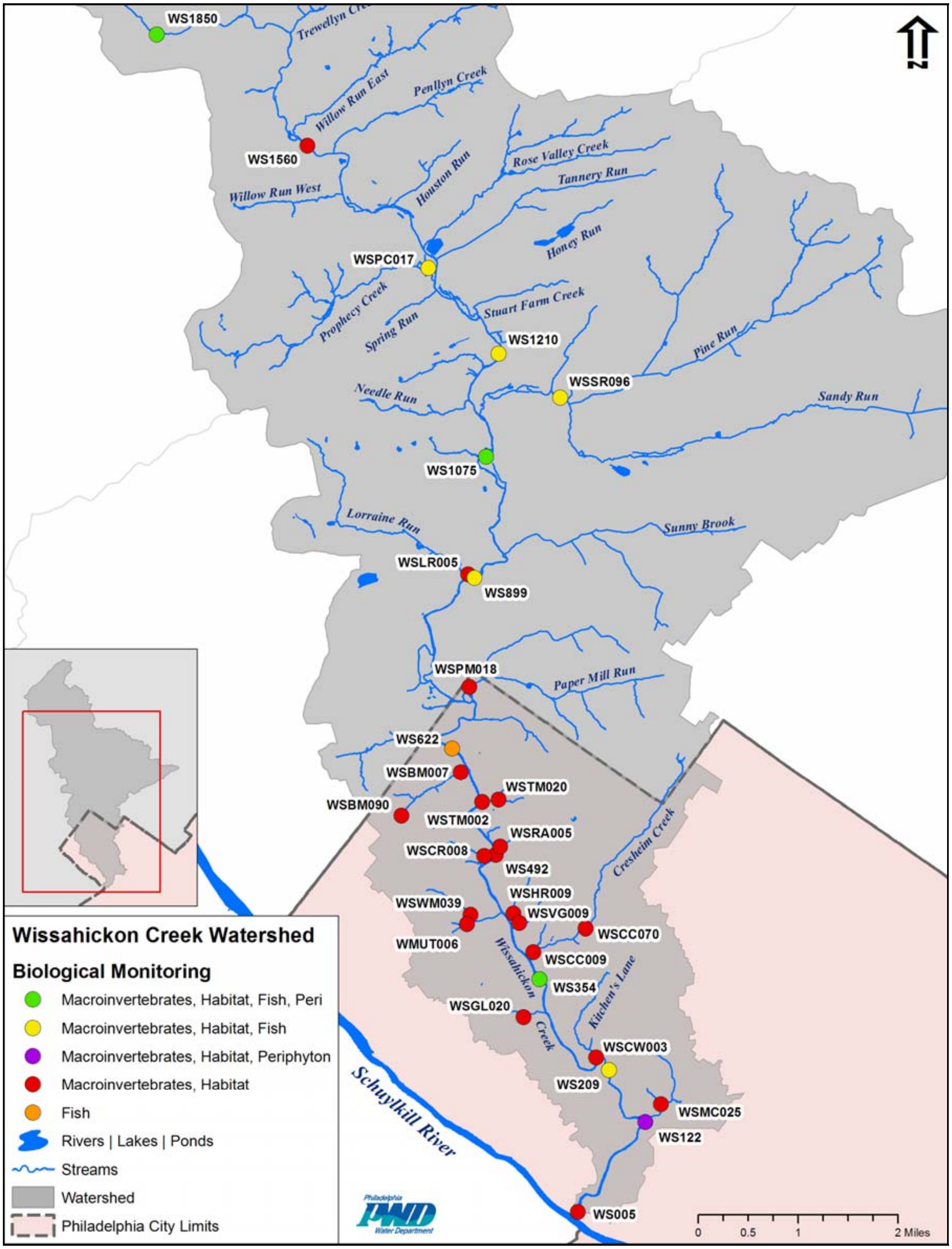

Figure 9 - Biological and Physical assessment locations in Wissahickon Watershed

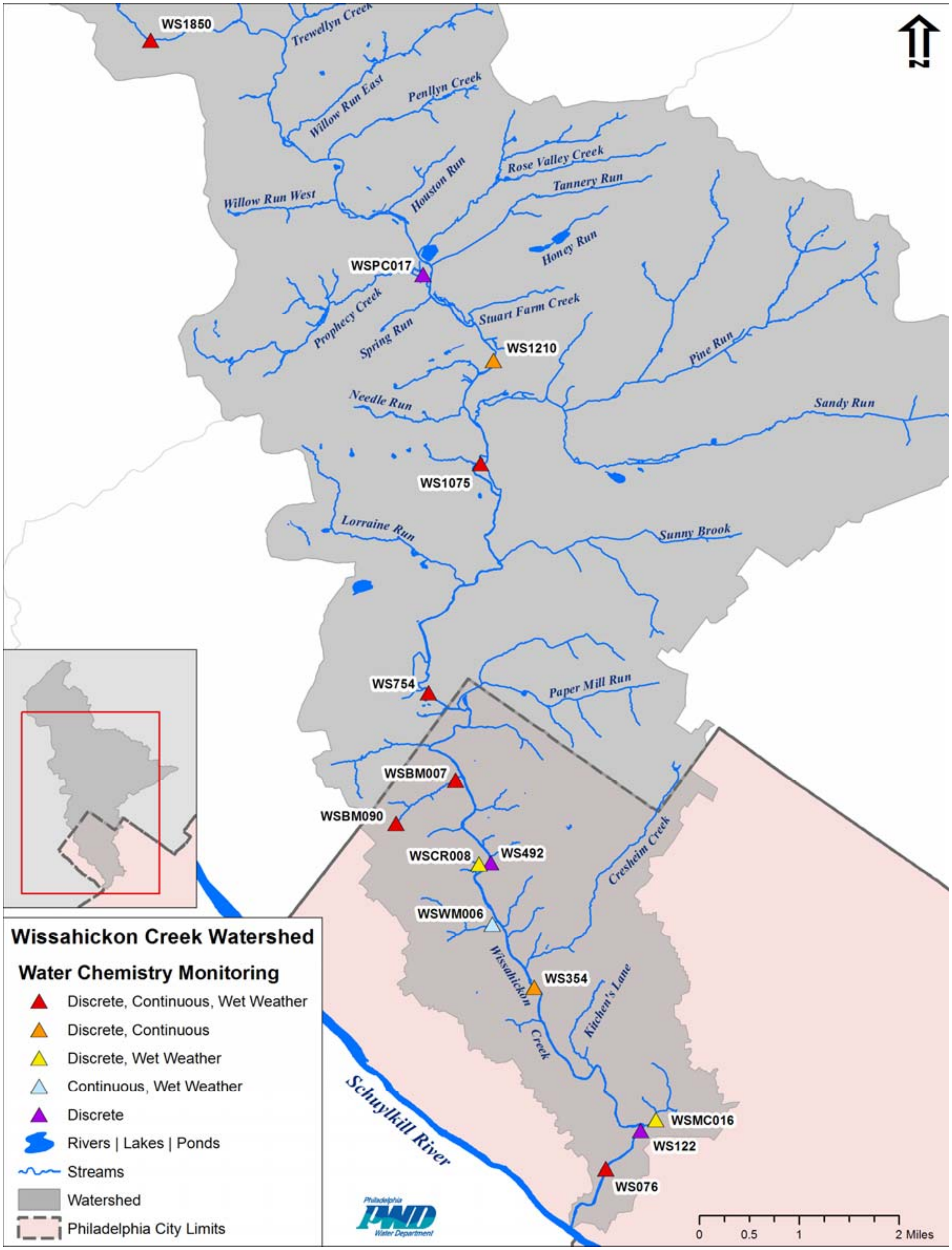

Figure 10 - Chemical monitoring locations in Wissahickon Watershed

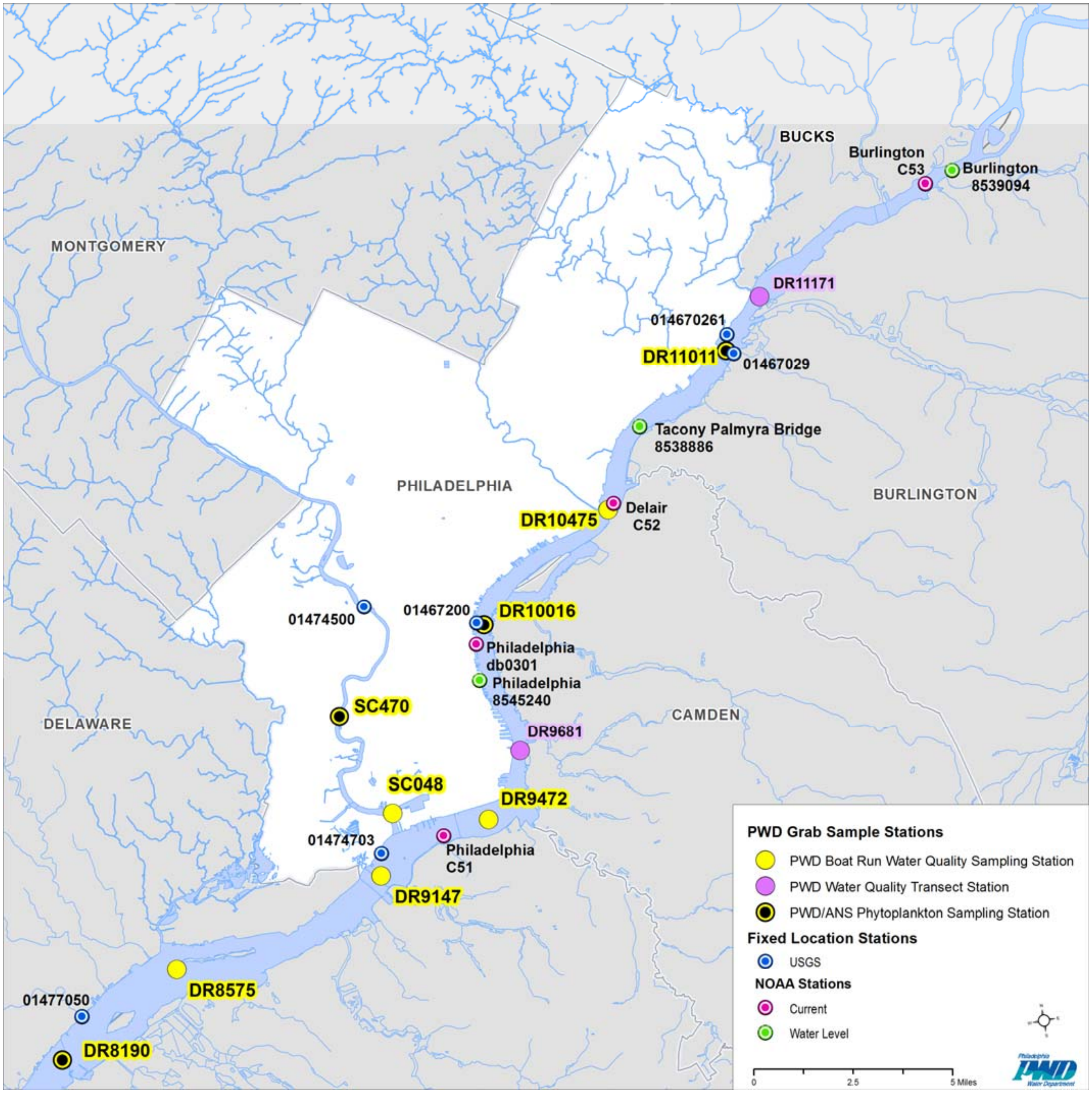

Figure 11 - Chemical monitoring locations in Delaware Estuary and Lower Schuylkill River Watershed

Table - 1 Water Quality Standards and Reference Values

Parameter	Criterion	Water Quality Criterion or Reference Value	Source
Alkalinity	Minimum	20 mg/L	PA DEP
Aluminum	Aquatic Life Acute Exposure Standard	750 ug/L	PA DEP
Aluminum	Aquatic Life Chronic Exposure Standard	87 ug/L (pH 6.5-9.0)	53FR33178
Chlorophyll a	Reference reach frequency distribution approach for Ecoregion IX, subregion 64, 75th percentile	3 ug/L, (Spectrophotometric) ***	EPA 822-B-00-019
Dissolved Cadmium	Aquatic Life Acute Exposure Standard	0.0043 mg/L*	PA DEP
	Aquatic Life Chronic Exposure Standard	0.0022 mg/L*	PA DEP
	Human Health Standard	0.010 mg/L*	PA DEP
Dissolved Chromium	Aquatic Life Acute Exposure Standard	0.015 mg/L*	PA DEP
	Aquatic Life Chronic Exposure Standard	0.010 mg/L*	PA DEP
Dissolved Copper	Aquatic Life Acute Exposure Standard	0.013 mg/L *	PA DEP
	Aquatic Life Chronic Exposure Standard	0.0090 mg/L *	PA DEP
	Human Health Standard	1000 mg/L	PA DEP
Dissolved Iron	Maximum	0.3 mg/L	PA DEP
Dissolved Lead	Aquatic Life Acute Exposure Standard	0.065 mg/L *	PA DEP
	Aquatic Life Chronic Exposure Standard	0.025 mg/L *	PA DEP
	Human Health Standard	50 mg/L	PA DEP
Dissolved Zinc	Aquatic Life Acute Exposure Standard	0.120 mg/L *	PA DEP
	Aquatic Life Chronic Exposure Standard	0.120 mg/L *	PA DEP
	Human Health Standard	5000 mg/L	PA DEP
Dissolved Oxygen	Average Min (August 1 to February 14)	5 mg/L	PA DEP
	Instantaneous Min (August 1 to February 14)	4 mg/L	PA DEP
	Average Min (February 15 to July 31)	6 mg/L	PA DEP
	Instantaneous Min (February 15 to July 31)	5 mg/L	PA DEP

Parameter	**Criterion**	**Water Quality Criterion or Reference Value**	**Source**
Fecal Coliform	Maximum	200/100mL (Swimming season) or 2000/100mL (Non-swimming season)	PA DEP
Fluoride	Maximum	2.0 mg/L	PA DEP
Iron	Maximum	1.5 mg/L	PA DEP
Manganese	Maximum	1.0 mg/L	PA DEP
NH3-N	Maximum	pH and temperature dependent	PA DEP
NO2-3-N	Nitrates – Human Health Consumption for water + organisms	2.9 mg/L ***	EPA 822-B-00-019
NO2 + NO3	Maximum (Public Water Supply Intake)	10 mg/L	PA DEP
Periphyton Chl-a		Ecoregion IX – 20.35 mg/m2	EPA 822-B-00-019
pH	Acceptable Range	6.0 - 9.0	PA DEP
TDS	Maximum	750 mg/L	PA DEP
Temperature		Varies w/ season. **	PA DEP
TKN	Maximum	0.675 mg/L ***	EPA 822-B-00-019
TN	Maximum	4.91 mg/L ***	EPA 822-B-00-019
TP	Maximum	140 ug/L ***	EPA 822-B-00-019
TSS	Maximum	25 mg/L	Other US states
Turbidity	Maximum	8.05 NTU ***	EPA 822-B-00-019
* - Water quality standard requires hardness correction; value listed is water quality standard calculated at 100 mg/L CaCO3 hardness			
** - Additionally, discharge of heated wastes may not result in a change of more than 2°F during a 1-hour period.			
*** - Ecoregion IX, subregion 64 seasonal median			

Appendix F – PWD Quarterly Dry Weather Water Quality Monitoring Program

Background

In 2009, the Philadelphia Water Department (PWD) initiated a dry weather water quality sampling program designed to work in tandem with the continuous data collection efforts of the PWD/USGS Cooperative Continuous Water Quality Monitoring Program. Grab samples are collected from 10 sites covering all six of Philadelphia County's watersheds on a quarterly basis by the staff of PWD's Bureau of Laboratory Services (BLS). Data collected through this program are most pertinent to Target A (Dry Weather Water Quality & Aesthetics) of PWD's Integrated Watershed Management Plan (IWMP) Strategy, as outlined in the following section.

The IWMP Target Strategy

IWMPs are designed to meet the goals and objectives of numerous water resources-related regulations and programs. Each IWMP results in a series of implementation recommendations that utilize adaptive management approaches to achieve measurable, watershed-wide benefits. By working with stakeholder groups to prioritize goals and evaluate options, PWD has learned that stakeholder priorities can at times differ from those identified by the data-driven problem identification process. This can present challenges in development and approval of a management alternative for watershed implementation. PWD has developed an approach that addresses what often emerges as a set of high-priority stakeholder concerns while simultaneously addressing the scientifically defined priorities.

By defining three distinct targets to meet the overall plan objectives, priorities identified by stakeholders can be addressed simultaneously with those identified through scientific data. Two of the targets were defined so they could be fully met through implementation of a limited set of options, while the third target would be best addressed through an adaptive management approach. In addition to the three targets, a fourth category has been developed to capture the more programmatic implementation options related to planning, outreach, reporting and continuation of the Watershed Partnership.

Targets are defined here as groups of objectives that each focus on a different problem related to the urban stream system. They can be thought of as different parts of the ultimate goal of fishable and swimmable waters through improved water quality, more natural flow patterns and restored aquatic and riparian habitat. Targets are specifically designed to help focus plan implementation. By defining these targets, and designing alternatives and an implementation plan to address the targets simultaneously, the plan will have a greater likelihood of success. It also achieves some of the objectives within a relatively short time frame, providing incentives to the communities and agencies involved in the restoration, as well as immediate benefits to the people living in the watershed. PWD's IWMP planning targets are defined below:

3 Targets of the IWMP

- Aesthetically appealing, accessible streams during dry weather
- Improved stream habitat for fish and macroinvertebrates
- Wet weather water quality that meets fishable and swimmable criteria

Program Support

A number of implementation options deemed appropriate for a given watershed are "programmatic" in nature. While these options may support achievement of Targets A, B, and/or C, implementation of these options alone would not result in achievement of a particular target. These "Program Support" associated options include items such as monitoring, reporting, feasibility studies, outreach/education, and continuation of the Watershed Partnership.

Target A: Dry Weather Water Quality and Aesthetics

Streams should be aesthetically appealing (look and smell good), accessible to the public, and an amenity to the community. Target A was defined with a focus on eliminating sources of sewage discharge and other pollution during dry weather, along with trash removal and litter prevention. Access and interaction with the stream during dry weather has the highest priority, because dry weather flows occur about 60-65% of the time during the course of a year. These are also the times when the public is most likely to be near or in contact with the stream. In dry weather, stream water quality should be similar to background concentrations in groundwater, particularly with respect to bacteria.

Figure 1. Eroded stream bank at Poquessing Creek

Target B: Healthy Living Resources

Improvements to the number, health, and diversity of benthic macroinvertebrate and fish species need to focus on habitat improvement and the creation of refuges for organisms to avoid high velocities during storms. Fluvial geomorphological studies, wetland and streambank restoration/creation projects, and stream modeling should be combined with continued biological monitoring to ensure that correct procedures are implemented to increase habitat heterogeneity within the aquatic ecosystem.

Improving the ability of an urban stream to support viable habitat and fish populations focuses primarily on the elimination or remediation of the more obvious impacts of urbanization on the stream. These include loss of riparian habitat, eroding and undercut banks, scoured streambed or excessive sediment deposits, channelized and armored stream sections, trash buildup, and invasive species. Thus, the primary tool to accomplish Target B is stream restoration.

Target C: Wet Weather Water Quality and Quantity

The third target is to restore water quality to meet fishable and swimmable criteria during wet weather. Improving water quality and flow conditions during and after storms is the most difficult target to meet in the urban environment. During wet weather, extreme increases in streamflow are common, accompanied by short-term changes in water quality. Where water quality and quantity problems exist, options may be identified that address both. Any stormwater management practice that increases infiltration or detains flow will help decrease the frequency of damaging floods; however, the size of such structures may need to be increased in areas where flooding is a major concern. (Reductions in the frequency of erosive flows and velocities will also help protect the investment in stream restoration made as part of Target B.)

Target C must be approached somewhat differently from Targets A and B. Full achievement of this target means meeting all water quality standards during wet weather, as well as elimination of flood-related issues. Meeting these goals will be difficult. It will be expensive and requires a long-term effort. A rational approach to achieve this target includes stepped implementation with interim goals for reducing wet weather pollutant loads and stormwater flows, along with monitoring for the efficacy of control measures.

Monitoring Locations

Water quality samples are taken at 10 USGS gage sites in the USGS/PWD Cooperative Monitoring Program (Figure 2). Site identification codes used by PWD's Bureau of Laboratory Services (BLS) and rivermile-based site ID codes are presented alongside USGS gage station numbers in Table 1. USGS stream gaging stations are ideal

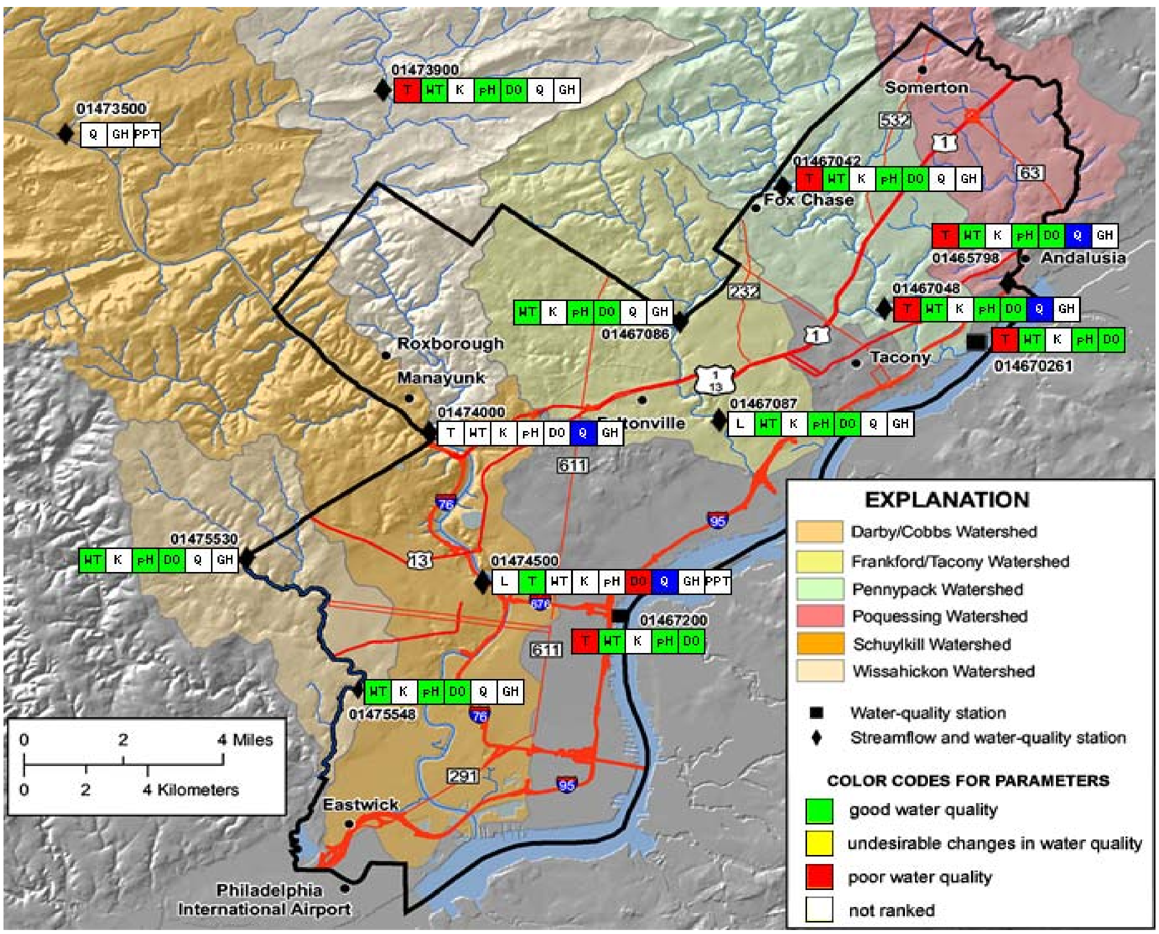

Figure 2. Philadelphia Water Quality Gage Stations as Viewed on Cooperative USGS-PWD Website (http://pa.water.usgs.gov/pwd/).

monitoring points as they allow discrete sample data to be coupled with continuous discharge data being collected year-round at these sites for loading estimate purposes. Furthermore, grab sample results and field meter readings taken at the time of grab sampling may be invaluable when evaluating continuous water quality data from these USGS gages.

PWD is implementing a City-wide approach to dry weather water quality monitoring, rather than focusing on an individual watershed. Because a number of Green Stormwater Infrastructure (GSI) and other stormwater management projects are in the early stages of implementation, water quality benefits will only be observable over a period of several years. Gauging the success of such projects on a more immediate scale is best accomplished solely by hydrological analysis. Therefore, the strategic value of the widespread sampling approach is that as more GSI projects are completed over the coming years, the water quality data should gradually begin to reflect their positive environmental impacts.

Table 1. Monitoring Locations in the PWD/USGS Cooperative Program with Location IDs used by PWD Bureau of Laboratory Services and River Mile-Based Site IDs.

Description	USGS Gage #	BLS Location ID	Site ID
Cobbs Creek at US Rte. 1 (City Line Ave.)	01475530	COBB700	DCC770
Cobbs Creek at Mt. Moriah Cemetery	01475548	COBB355	DCC251
Schuylkill River at Fairmount Dam	01474500	SCHU154	SC825
Wissahickon Creek at Ft Washington (Rte. 73)	01473900	WISS500	WS1075
Wissahickon Creek at Ridge Ave.	01474000	WISS130	WS076
Tacony Creek at Castor Ave.	01467087	TACO250	TF280
Tacony Creek at Adams Ave.	01467086	TACO435	TF597
Pennypack Creek at Pine Rd.	01467042	PENN407	PP993
Pennypack Creek at Rhawn St.	01467048	PENN175	PP340
Poquessing Creek at Grant Ave.	01465798	POQU150	PQ050

Table 2. PWD/USGS Quarterly Dry Weather Grab Sample Dates

Sample date	Season	Recreational Use Season
30-Jun-09	summer	Swimming
02-Oct-09	fall	Non-Swimming
17-Dec-09	winter	Non-Swimming
11-Mar-10	spring	Non-Swimming
22-Jun-10	summer	Swimming
15-Sep-10	fall	Swimming
20-Dec-10	winter	Non-Swimming
29-Mar-11	spring	Non-Swimming
27-Jun-11	summer	Swimming
15-Sep-11	fall	Swimming
13-Dec-11	winter	Non-Swimming
20-Mar-12	spring	Non-Swimming
18-Jun-12	summer	Swimming
26-Sep-12	fall	Swimming
02-Jan-13	winter	Non-Swimming
04-Apr-13	spring	Non-Swimming

Quarterly Dry Weather Monitoring July 2009 – April 2013

Sample Collection Dates

This report summarizes cumulative results from 16 sets of quarterly grab samples that were collected from June 2009 through April 2013. Samples were categorized by season (winter, spring, summer, fall) as well as according to PA DEP seasonal recreational use water quality criteria for interpretation of microbial sample results (Non-Swimming season or Swimming season) (Table 2). Due to prolonged wet-weather conditions, the sampling event scheduled for June 2013 did not take place. That sample will be collected in July and data will be published in next year's annual report. PWD is not aware of any spills, discharges or unusual conditions that would cause misleading results in the water quality data from any of these grab samples.

Nutrient Analysis

The macronutrients phosphorus and nitrogen are essential to the growth and overall survival of all plants. However, when occurring in surplus they can be extremely detrimental to aquatic ecosystems, and in turn to the human population that utilizes these water bodies for drinking water and recreational activities such as fishing, boating, and swimming. Elevated nutrient concentrations in rivers and streams can most often be attributed to anthropogenic pollution sources. In these situations, the most common sources of both nutrients are runoff from fertilized lawns/farmland and wastewater discharge.

The most immediate result of excessive nutrient concentrations in any natural water body is excessive plant growth, seen in a variety of growth forms from suspended algae to aquatic macrophytes. As the first step in the process of eutrophication, this unnatural acceleration of aquatic plant growth can start a chain reaction leading to highly adverse effects to that ecosystem. For example, in small shallow streams, unnaturally high densities of algal periphyton can cause pronounced fluctuations in dissolved oxygen and pH and also adversely affect aquatic habitat by forming thick mats of filamentous algae or algal scums on stream substrates. Moreover, alteration of the algal community structure can lead to the proliferation of nuisance taxa, taste and odor problems in the drinking water supply, increased water treatment costs and, in rare cases, production of toxins (*e.g.*, from cyanobacteria blooms). As a result of these direct and indirect responses, streams and rivers can suffer severe impacts to both aquatic biodiversity and human recreational use.

It should be noted that several phosphorus-containing compounds, known as polyphosphates, can be found in the region's waterways, but they are naturally occurring and are present due to the geologic composition of the area. Furthermore, these polyphosphates pose little ecological threat as they are not present in a biologically available form. Only over long periods of time can these compounds be broken down into orthophosphates, which plants and algae can absorb and utilize for growth. Therefore, aside from the relatively minor contributions of the region's geology, the most significant source of orthophosphates in rivers and streams is human-generated pollution. It is for this reason that orthophosphates, along with nitrates, are included as components of this water quality monitoring program. These forms of N and P are readily available to stream producers.

Ammonia, present in surface waters as un-ionized ammonia gas (NH_3) or as ammonium ion (NH_4^+), is produced by deamination of organic nitrogen-containing compounds such as proteins, and also by hydrolysis of urea. In the presence of oxygen, ammonia is converted to nitrate (NO_3^-) by a pair of bacteria-mediated reactions, together known as the process of nitrification. Nitrification occurs quickly in oxygenated waters with sufficient densities of nitrifying bacteria, effectively reducing ammonia concentration, although at the expense of increased NO_3^- concentration. Ammonia is a primary form of nitrogen produced from excretory waste products and other organic material in sewage. Thus, presence of ammonia can be an indicator of sewage pollution. As ammonia is converted to nitrate in oxygenated streams, ammonia is a non-conservative pollution indicator that tends to decrease in concentration with increasing distance from the source of pollution. PA DEP water quality criteria for NH_3 reflect the relationship between stream pH, temperature, and ammonia dissociation. Ammonia toxicity is inversely related to hydrogen ion [H^+] concentration (*e.g.*, an increase in pH from 7 to 8 increases NH_3 toxicity by approximately an order of magnitude). At pH 9.5 and above, even background concentrations of NH_3 may be considered potentially toxic.

Ammonia may be introduced to streams through fertilizers, breakdown of natural organic material, stables and livestock operations, stormwater runoff, and in some cases from more serious anthropogenic sources of untreated sewage such as defective laterals, crossed/illicit connections, and sanitary sewer overflows (SSOs). PWD has established intensive field infrastructure trackdown, infrared photography, sewer camera monitoring, and dye testing programs to identify and correct these problems where and when they occur.

Nutrient Results

Nutrient data collected thus far at each of the sites are generally consistent with the data collected for Comprehensive Characterization Reports (CCRs) prepared for each of the respective watersheds. Five of 10 sites are not affected by treated wastewater discharges and had orthophosphate concentration less than the reporting limit, which was 0.1 mg/L for samples collected in June 2009 and 0.05 mg/L for the remaining 15 quarterly samples collected to date

(Figure 3). Conversely, Pennypack and Wissahickon creeks had multiple instances of elevated orthophosphate concentration, which is likely attributable to point source discharge of treated wastewater. Dilution effects were seen between upstream and downstream gages, particularly in the cases of Pennypack and Wissahickon creeks.

Though the Schuylkill River sampling station is downstream from several discharges of treated wastewater, nutrient concentrations are generally smaller than those observed from the Pennypack and Wissahickon creeks, perhaps reflecting the Schuylkill station's much larger overall watershed size and accompanying dilution capacity.

Summary statistics for the orthophosphate samples, including results from the application of the PA DEP Chemistry Statistical Assessments protocol (PA DEP, 2007), are shown in Table 3. Exceedances were evaluated relative to the US EPA (2000) Subecoregion 64 guideline for orthophosphate of 0.02625 mg/L, *i.e.*, the median of the 25th percentile seasonal concentrations. Since the detection limit is greater than the guideline, all non-detected samples were considered "possible exceedances." The nonparametric statistical assessment results show that the locations at Pennypack and Wissahickon creeks, and the Schuylkill River, failed to attain water quality consistent with this guideline. The other locations are classified as needing further evaluation due to the predominance of samples below the detection limit that are all possible exceedances.

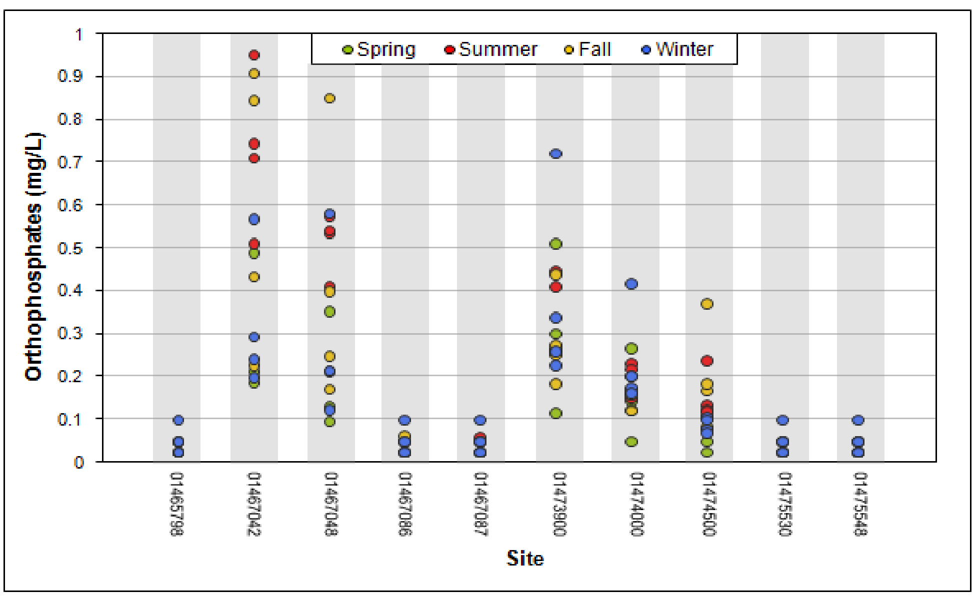

Figure 3. Orthophosphate concentration at 10 USGS gage stations, July 2009-April 2013

Table 3. Orthophosphate Summary Statistics and Assessments. (Concentrations in mg/L)

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceedances	Possible Exceedances	Assessment
01465798	0.056	0.050	0.017	0.050	0.100	16	16	0	16	Needs more evaluation
01467042	0.500	0.486	0.276	0.186	0.953	15	0	14	0	Non-attaining
01467048	0.347	0.298	0.220	0.096	0.852	16	0	14	0	Non-attaining
01467086	0.057	0.050	0.017	0.050	0.100	16	15	1	15	Needs more evaluation
01467087	0.057	0.050	0.017	0.050	0.100	16	15	1	15	Needs more evaluation
01473900	0.327	0.269	0.148	0.112	0.723	16	0	14	0	Non-attaining
01474000	0.183	0.163	0.079	0.050	0.414	16	1	13	1	Non-attaining
01474500	0.127	0.107	0.081	0.050	0.367	16	3	11	3	Non-attaining
01475530	0.056	0.050	0.017	0.050	0.100	16	16	0	16	Needs more evaluation
01475548	0.056	0.050	0.017	0.050	0.100	16	16	0	16	Needs more evaluation

Similar examples of wastewater discharge impacts and upstream/downstream dilution were also observed in the nitrate data that has been collected. The data seem to indicate a trend toward decreased nitrate concentrations during warmer months, which would correspond to the increased uptake of nutrients by plant life during those growing seasons (Figure 4). The only exceptions are the Pennypack and Wissahickon Creek gage sites, which as previously stated are directly impacted by treated wastewater discharge.

Summary statistics for the nitrate samples, including results from application of the PA DEP Chemistry Statistical Assessment protocol (PA DEP, 2007), are shown in Table 4. Exceedances were evaluated relative to a) the PA DEP water quality standard for nitrite and nitrate of 10 mg/L, and b) the US EPA (2000) subecoregion 64 guideline for nitrite and nitrate of 0.995 mg/L, *i.e.*, the median of the 25th percentile seasonal concentrations. The nonparametric statistical assessment results show that with respect to the PA DEP standard, all locations were in attainment except the upstream Wissahickon gage. One exceedance at 12 mg/L was observed at that site, and more data is needed to make an evaluation. All sites failed to attain water quality consistent with the US EPA subecoregion-based guideline.

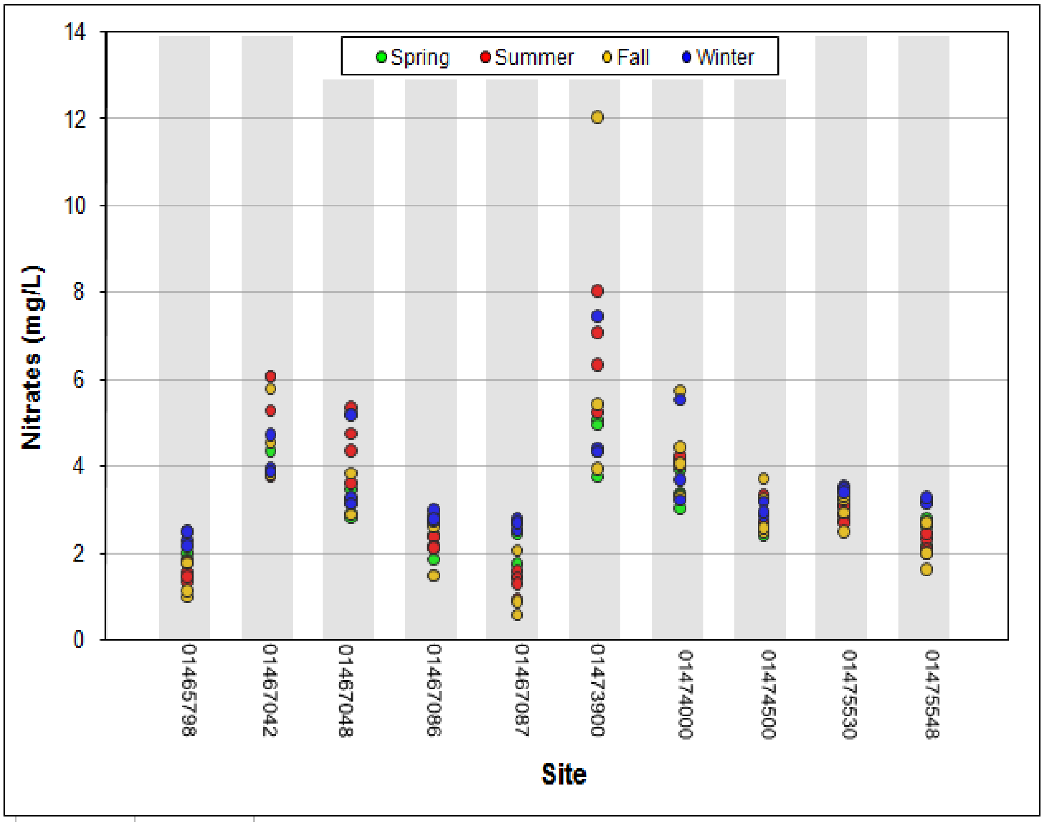

Figure 4. Nitrate concentration at 10 USGS gage stations, July 2009-April 2013

Table 4. Nitrate Summary Statistics and Assessments. Concentrations are in mg/L.

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceedances, PADEP	Exceedances, Subecoregion	PADEP Assessment	EPA Subecoregion Assessment
01465798	1.784	1.799	0.454	1.027	2.491	15	0	0	15	Attaining	Non-attaining
01467042	4.640	4.347	0.896	3.798	6.104	13	0	0	13	Attaining	Non-attaining
01467048	3.825	3.504	0.910	2.840	5.346	15	0	0	15	Attaining	Non-attaining
01467086	2.325	2.363	0.461	1.517	2.974	15	0	0	15	Attaining	Non-attaining
01467087	1.862	1.746	0.746	0.609	2.767	15	0	0	12	Attaining	Non-attaining
01473900	5.969	5.280	2.282	3.786	12.039	14	0	1	14	Needs more evaluation	Non-attaining
01474000	4.028	4.014	0.787	3.032	5.770	15	0	0	15	Attaining	Non-attaining
01474500	2.889	2.709	0.396	2.417	3.747	15	0	0	15	Attaining	Non-attaining
01475530	3.085	3.073	0.306	2.489	3.521	15	0	0	15	Attaining	Non-attaining
01475548	2.555	2.612	0.521	1.626	3.280	15	0	0	15	Attaining	Non-attaining

Quarterly dry-weather analysis of ammonia began in the fall of 2011, limiting the size of the current dataset to seven results per location. PWD laboratory reporting limits for ammonia fluctuated based on the performance of lab analytical equipment with spiked and blank samples. Ammonia concentration detection limits were 0.5 mg/L for the fall 2011 sample set, and the subsequent three sample set results had detection limits of 0.1 mg/L. Ammonia concentration exceeded the detection limit in only 6 of the 70 samples: Four of these 6 occurrences were recorded at the downstream Tacony site (01467087), with a maximum concentration of 0.289 mg/L observed in spring 2012.

There were no observed exceedances of ammonia water quality criteria at any site during this limited period of dry-weather monitoring. With 64 of the 70 sample results characterized as non-detects due to laboratory reporting limits, ammonia criteria was calculated with corresponding temperature and pH values to determine if possible exceedances existed (i.e., the criteria fell below the detection limit). None of the non-detect samples had the potential to exceed water quality criteria.

Microbial Analysis

Fecal indicator bacteria, found naturally in the gut of warm-blooded animals, can be used in detection of human or animal waste contamination in a body of water. While these bacteria themselves are generally harmless to humans, they are considered to be very reliable indicators of the presence of other, more serious fecal-borne pathogens such as viruses, protozoa and other bacteria. The extent to which a water body is contaminated with fecal indicator bacteria can indicate the likelihood that the water has been contaminated by human or animal wastes. In urban environments, the most likely dry weather pollution sources are domestic animals, wildlife and untreated sewage from improperly connected or leaking sanitary sewers.

PWD performs three fecal indicator bacteria tests, including fecal coliform, *Escherichia coli (E. coli.)*, and enterococci. The fecal coliform test covers a relatively wide subgroup of fecal-specific bacteria; however, it does include some species that are not necessarily fecal in origin. *E. coli*, on the other hand, is a single coliform species that is noteworthy due to the fact that it occurs only in the fecal matter of humans and other warm-blooded animals. This qualifies *E. coli* as an excellent indicator of human waste. The final coliform group tested, the enterococci, are significant in that they tend to mimic many enteric pathogens with their ability to thrive in saline conditions over a wide range of temperatures. This makes the enterococci test very useful in waterways that may have a marine influence, or in any river or stream that may have above normal salinity due to geology.

Microbial Analysis Results

PA DEP has established seasonal bacteria water quality criteria that are more stringent in warmer months, or the “swimming season.” For the period May 1 through September 30, water quality standards require that the geometric mean of a group of at least five samples collected on non-consecutive days over a 30-day period not exceed 200 fecal coliform CFU (colony forming unit) per 100mL. During the non-swimming season, this value increases to 2000 CFU/100mL.

While samples were collected on a quarterly basis and not within a 30-day period as required by PA DEP water quality criteria, results of microbial analyses from the seven swimming season samples generally indicate fecal coliform geometric means greater than 200CFU/100mL

(Table 5). The only exceptions were the downstream Wissahickon Creek and Schuylkill River gage sites, which each had fecal coliform geometric means less than 200 CFU/100mL, based on seven samples each. The 2000 CFU/100mL geometric mean standard for non-swimming season samples was not exceeded at any of the 10 sites, based on nine samples at each site.

US EPA recommended water quality criteria (1986) were used as guidelines for evaluation of sample results for other microbial parameters, as PA DEP does not have recreational use water quality criteria for *E. coli* or enterococci. Guidelines used for *E. coli* and enterococci were geometric means of 126 and 33 CFU/100mL, respectively. The *E. coli* geometric mean guideline was exceeded at five of the 10 sites. The enterococci geometric mean guideline was exceeded at eight of the 10 sites (Table 6).

Table 5. Fecal Coliform Geometric Mean Results and PA DEP Water Quality Recreational Use Criteria Achievement Status by Season

Gage	n	n, non-detects	Geometric mean (CFU/100 mL)	Season	Achieving Standard
1465798	9	1	45	non-swimming	Yes
1465798	7	0	482	swimming	No
1467042	9	1	28	non-swimming	Yes
1467042	7	0	298	swimming	No
1467048	9	0	391	non-swimming	Yes
1467048	7	0	2348	swimming	No
1467086	9	0	317	non-swimming	Yes
1467086	7	0	1181	swimming	No
1467087	8	0	220	non-swimming	Yes
1467087	7	0	589	swimming	No
1473900	9	0	48	non-swimming	Yes
1473900	7	0	317	swimming	No
1474000	9	1	20	non-swimming	Yes
1474000	7	0	149	swimming	Yes
1474500	9	1	25	non-swimming	Yes
1474500	7	2	70	swimming	Yes
1475530	9	1	83	non-swimming	Yes
1475530	7	0	346	swimming	No
1475548	9	0	95	non-swimming	Yes
1475548	7	0	1033	swimming	No

Table 6. *E. Coli* and Enterococci Geometric Mean Results and US EPA Recreational Use Water Quality Guideline Achievement

	n, non-detects		Geometric mean (CFU/100 mL)		Achieving Guideline	
Gage	**E. coli**	**Enterococci**	**E. coli**	**Enterococci**	**E. coli**	**Enterococci**
01465798	1	0	118	70	Yes	No
01467042	1	0	78	48	Yes	No
01467048	0	0	765	154	No	No
01467086	1	0	405	113	No	No
01467087	0	1	267	60	No	No
01473900	0	0	101	56	Yes	No
01474000	1	1	41	22	Yes	Yes
01474500	4	2	35	8	Yes	Yes
01475530	1	0	138	154	No	No
01475548	1	0	196	81	No	No

Results for all three microbial parameters were similar seasonally, with samples collected during spring and winter generally having smaller concentrations than fall and summer samples (Figures 5 through 7). Bacteria samples collected from 2009-2013 indicate a fair correlation between fecal coliform and *E. coli* (r = 0.82), and weaker correlations between fecal coliform and enterococci (r = 0.27), and *E. coli* and enterococci (r = 0.35) (Figures 8-10).

The small number of samples limits any conclusive statements for microbial parameters at this time, particularly in the case of fecal coliform where the number of results is further reduced by categorization according to swimming vs. non-swimming season. As the quarterly dry weather monitoring program continues, more samples will be obtained allowing for more rigorous statistical analyses in the future.

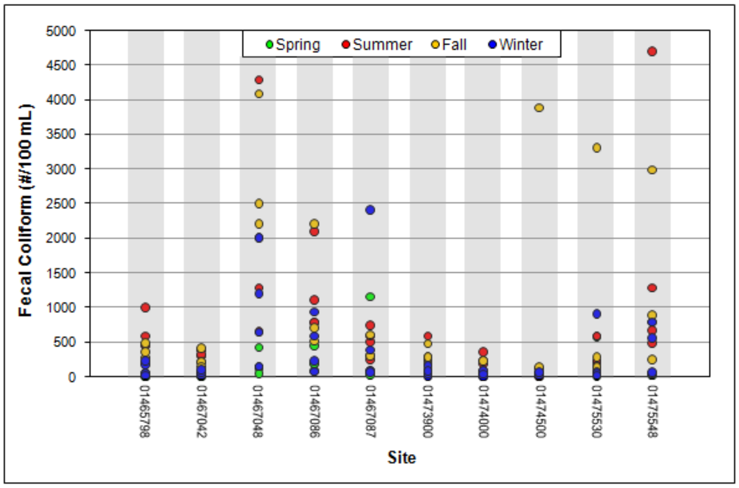

Figure 5. Fecal coliform results at 10 USGS gage stations, July 2009-April 2013

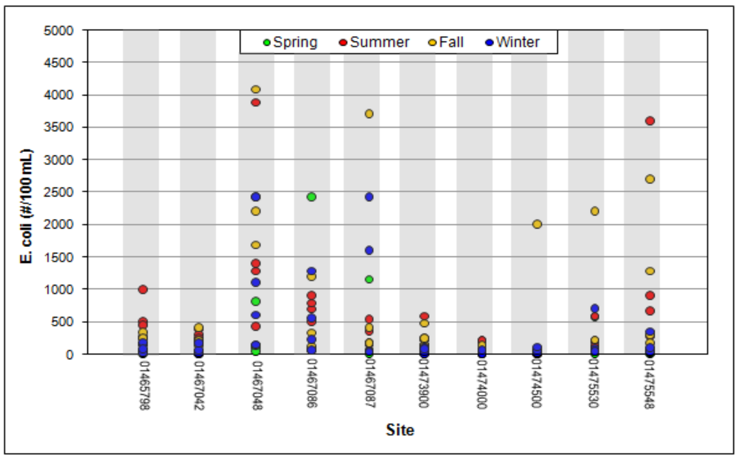

Figure 6. E. coli results at 10 USGS gage stations, July 2009 - April 2013

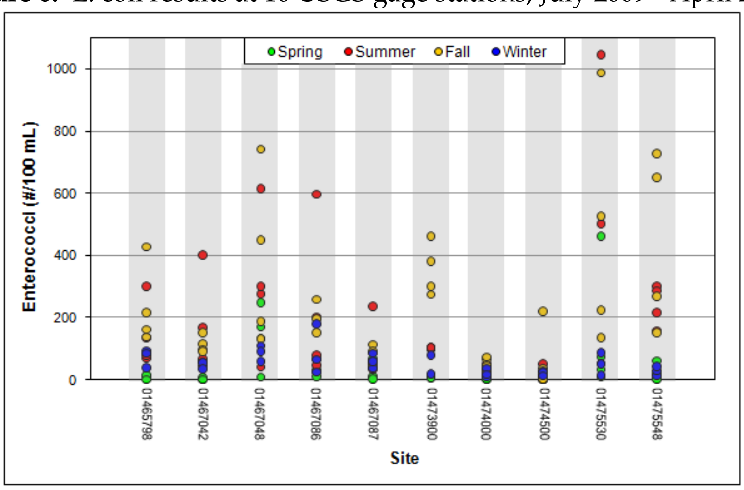

Figure 7. Enterococci results at 10 USGS gage stations, July 2009 - April 2013

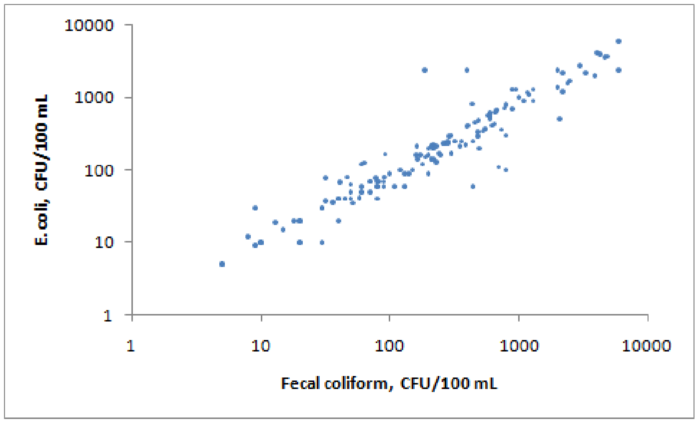

Figure 8. Scatterplot of 2009-2013 Data Correlating E. coli and Fecal coliform (x-y axes plotted in log10 scale)

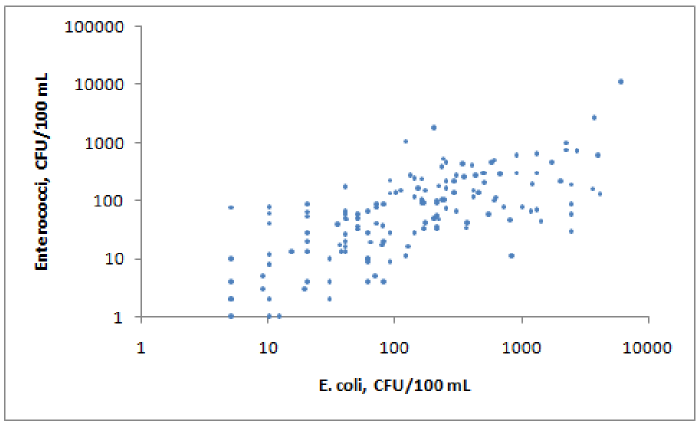

Figure 9. Scatterplot of 2009-2013 Data Correlating Enterococci and E. coli (x-y axes plotted in log10 scale)

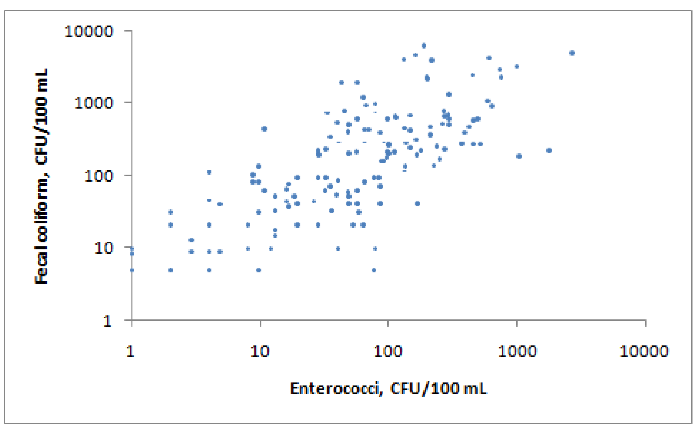

Figure 10. Scatterplot of 2009-2013 Data Correlating Fecal coliform and Enterococci (x-y axes plotted in log10 scale)

Physicochemical Analysis

In addition to nutrient and microbial analyses, a basic set of physicochemical parameters were also monitored as part of the discrete quarterly sampling program. These parameters (dissolved oxygen, pH, temperature, and specific conductance) were specifically chosen to coincide with those being measured by the USGS continuous water quality monitoring gages. These data can then be utilized as valuable field checks when analyzing continuous water quality data from USGS gages. The physicochemical data are summarized by parameter in Figures 11-14.

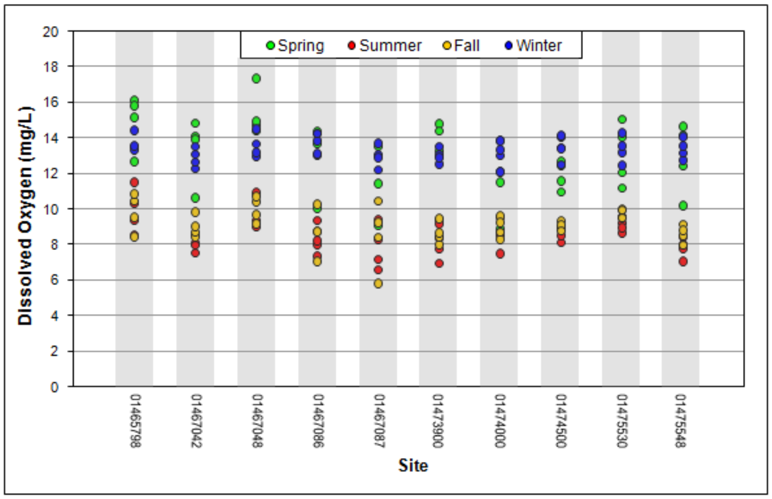

Figure 11. Dissolved oxygen results at 10 USGS gage stations, July 2009 – June 2013

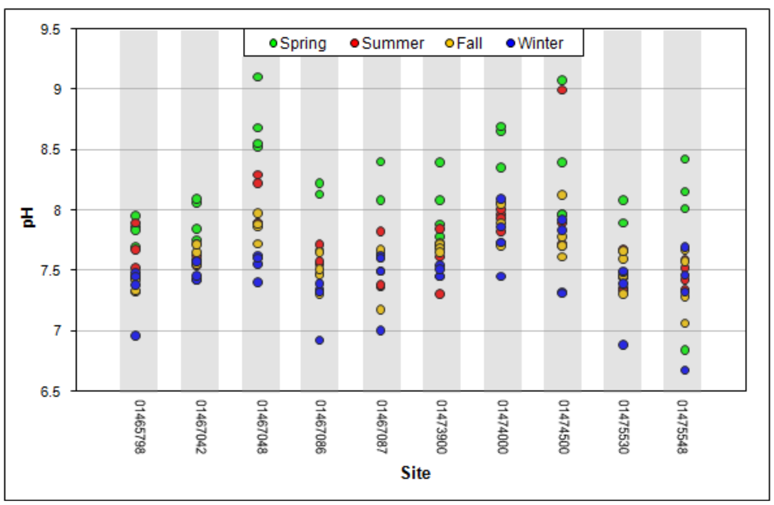

Figure 12. pH results at 10 USGS gage stations, July 2009 – June 2013

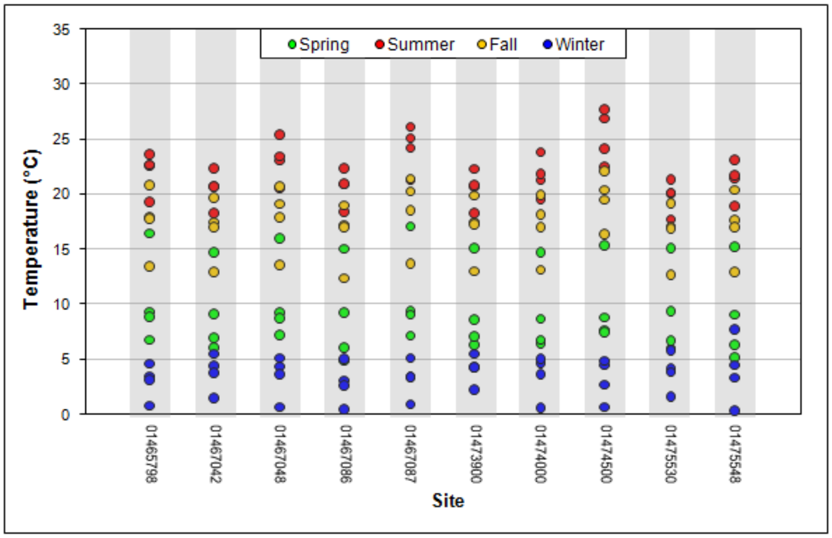

Figure 13. Temperature results at 10 USGS gage stations, July 2009 – June 2013

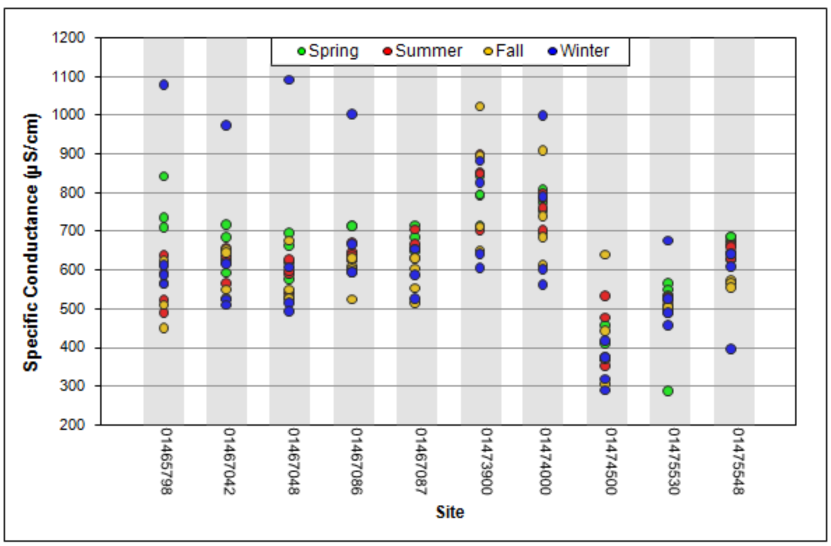

Figure 14. Specific conductance results at 10 USGS gage stations, July 2009 – June 2013

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Appendix G –

PWD-USGS Cooperative Water Quality Monitoring Program Annual Summary

Background

PWD and the United States Geologic Survey (USGS) have constructed and/or refurbished gaging stations in 10 locations throughout Philadelphia's watersheds. USGS staff is responsible for construction and maintenance of the gage structure, stream stage monitoring instruments, data communications, maintaining and verifying stage-discharge rating curves and pumping apparatus. PWD staff is responsible for installation and maintenance of continuous water quality instrumentation. Data collected through the PWD/USGS cooperative water quality monitoring program are disseminated through the USGS National Water Information System (NWIS) Web Interface (http://waterdata.usgs.gov/pa/nwis/nwis), as well as a website specifically dedicated to Philadelphia's watersheds (Figure 1).

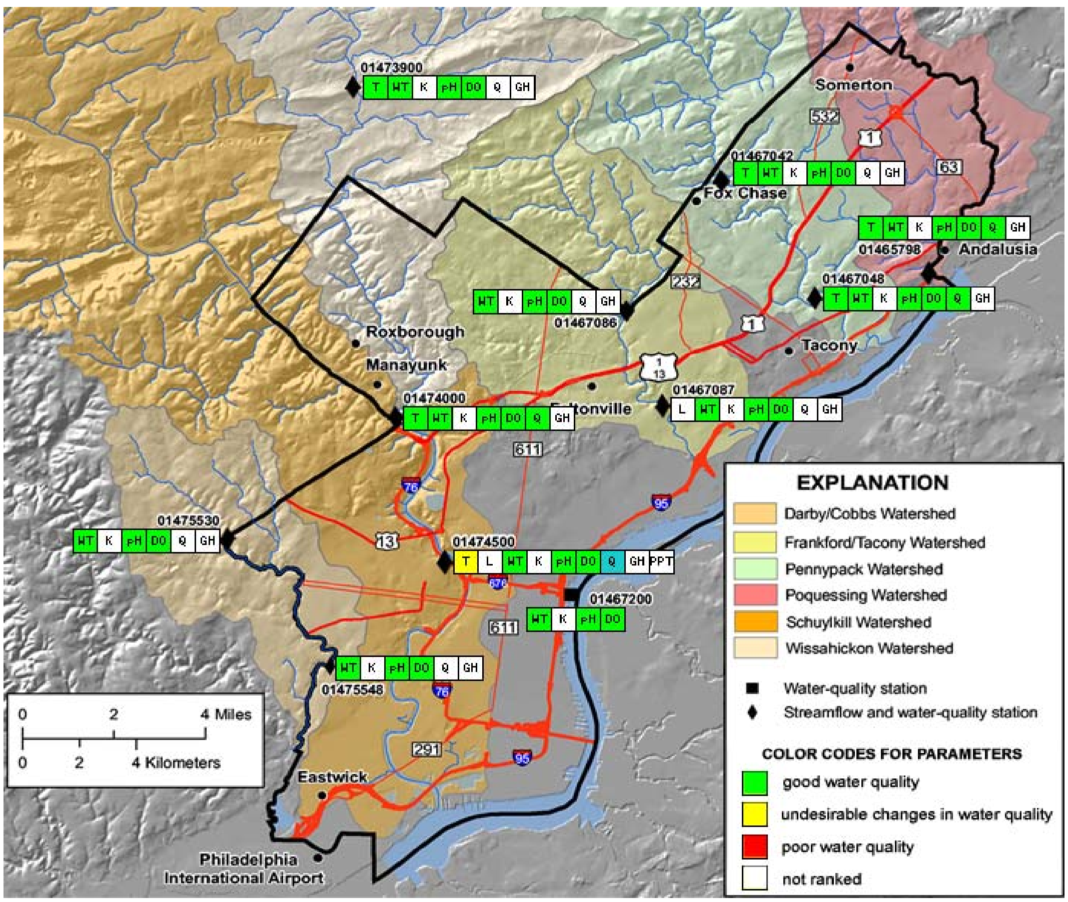


Figure 1. Philadelphia Water Quality Gauge Stations as Viewed on Cooperative USGS-PWD Website (http://pa.water.usgs.gov/pwd/).

Monitoring Locations

The PWD/USGS Cooperative Monitoring Program builds upon the widespread network of USGS gages that were formerly operated throughout Philadelphia. These gages are logically situated and/or have a continuous period of record, making them ideal for water quality monitoring purposes. Within a given watershed, downstream-most historic stations were chosen to represent water quality, as these streams flow through Philadelphia into the receiving waters (*i.e.*, the Schuylkill and Delaware rivers).

Regarding upstream stations, three gages (Pennypack Creek at Pine Rd, Tacony Creek at Adams Ave, and Cobbs Creek at US Rte 1) are strategically located to monitor water quality of the streams as they enter Philadelphia (Figure 1). The upstream Wissahickon Creek monitoring station is located at Rte 73 in Fort Washington, which is approximately 3.7 river miles upstream of the City. This location was chosen due to its extensive period of record (Table 1). Upstream water quality is not measured in the Poquessing-Byberry Creek Watershed. The Schuylkill River gage is in an ideal location to provide data related to the Schuylkill River Fairmount Dam Fish Ladder Renovation Project and was equipped with water quality monitoring instrumentation upon project completion in early 2009.

This annual report summarizes water quality data from July 1, 2012 – June 30, 2013, excluding the period of December 2012 through February 2013, during which time monitoring probes were not deployed in order to protect the equipment from cold temperatures. Per agreement with USGS, water quality data at the Delaware River gage 01467200 was not available for an additional month, from December 2012 through March 2013. Water quality data at the Delaware River gage 014670261 was collected year round. Due to routine maintenance such as cleaning and calibration, gages are periodically taken offline, usually for no more than the span of two hours, and do not collect data.

In order to summarize hydrologic conditions during the monitoring period, daily mean discharge was plotted along with the median of all daily flows for USGS gage 01474000 (Wissahickon Creek at Ridge Ave.). The period of record for this gage is 46 years. The influence of Hurricane Sandy (October 29, 2012) can be observed in Figure 2, as well as an unusually wet June. The National Weather Service reported June 2013 to have record-setting rainfall in Philadelphia, with 10.56 inches falling at Philadelphia International Airport.

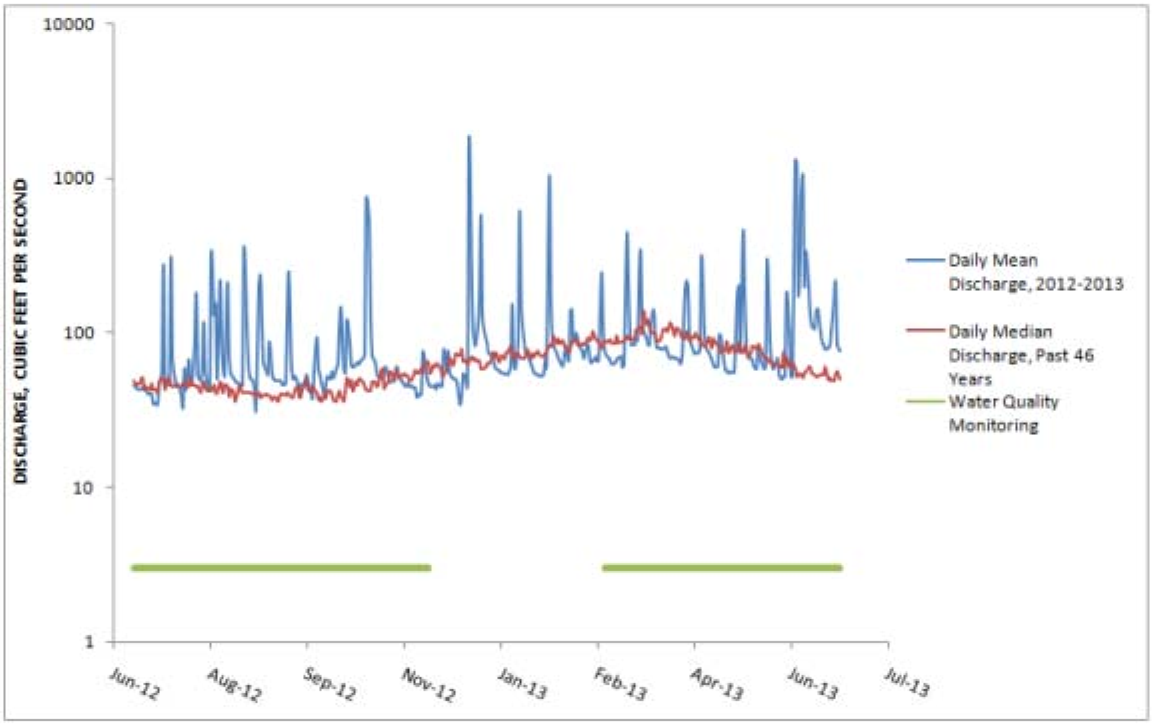


Figure 2. Daily mean flow July 1 2012-June 30 2013 and daily median flow for 46 years of record at USGS gage 01474000 (Wissahickon Creek at Ridge Ave.)

Table 1. PWD/USGS Cooperative Water Quality Monitoring Program Gages

Gage Number	Gage name	Flow Data Record
01465798	Poquessing Creek at Grant Avenue, Philadelphia, PA	July 1965 to Present
01467042	Pennypack Creek at Pine Road, Philadelphia, PA	August 1964 to September 1974; September 2007 to Present
01467048	Pennypack Creek at Lower Rhawn St Br., Philadelphia, PA	June 1965 to Present
01467086	Tacony Creek at County Line, Philadelphia, PA	October 1965 to September 1986; September 2005 to Present
01467087	Frankford Creek at Castor Ave, Philadelphia, PA	July 1982 to Present
014670261	Delaware River near Pennypack Woods, PA	February 2011 to Present
01467200*	Delaware River at Ben Franklin Bridge, Philadelphia, PA	August 1949 to Present
01473900**	Wissahickon Creek at Ft. Washington, PA	September 1961 to September 1968; June 2000 to Present
01474000	Wissahickon Creek at Mouth, Philadelphia, PA	June 1897 to September 1903; January 1905 to July 1906; October 1965 to Present
01474500	Schuylkill River at Philadelphia, PA	October 1931 to Present
01475530	Cobbs Creek at U.S. Highway No. 1, Philadelphia, PA	October 1964 to September 1981; September 2004 to Present
01475548	Cobbs Creek at Mt. Moriah Cemetery, Philadelphia, PA	October 2005 to Present

*Funding for the operation of this gage is provided by USGS and the Delaware River Basin Commission (DRBC)
**Funding for the operation of this gage is provided by DRBC

USGS Gage Data Processing & Analysis Procedures

With 10 USGS gages collecting data for multiple water quality parameters at half-hour intervals, a large amount of data are produced. PWD Office of Watersheds (OOW) staff have developed procedures for the processing and analysis of these data using Microsoft Excel and Access software, as well as R, a free software environment for statistical computing and graphics. Most aspects of the data processing and analysis have been automated with custom Visual Basic and R code.

OOW independently maintains databases of water quality and streamflow via automated regular retrievals of these data from USGS NWIS. On a monthly basis, the databases are queried and results for each gage are imported into MS Excel workbooks. If available, any field data collected during that period (*e.g.*, hand meter readings from field maintenance checks, water quality grab samples, etc.) are also imported. Once all required data have been entered, separate plots are produced for each parameter (dissolved oxygen, turbidity, pH, specific conductance, and temperature) to enable a subjective review of data quality.

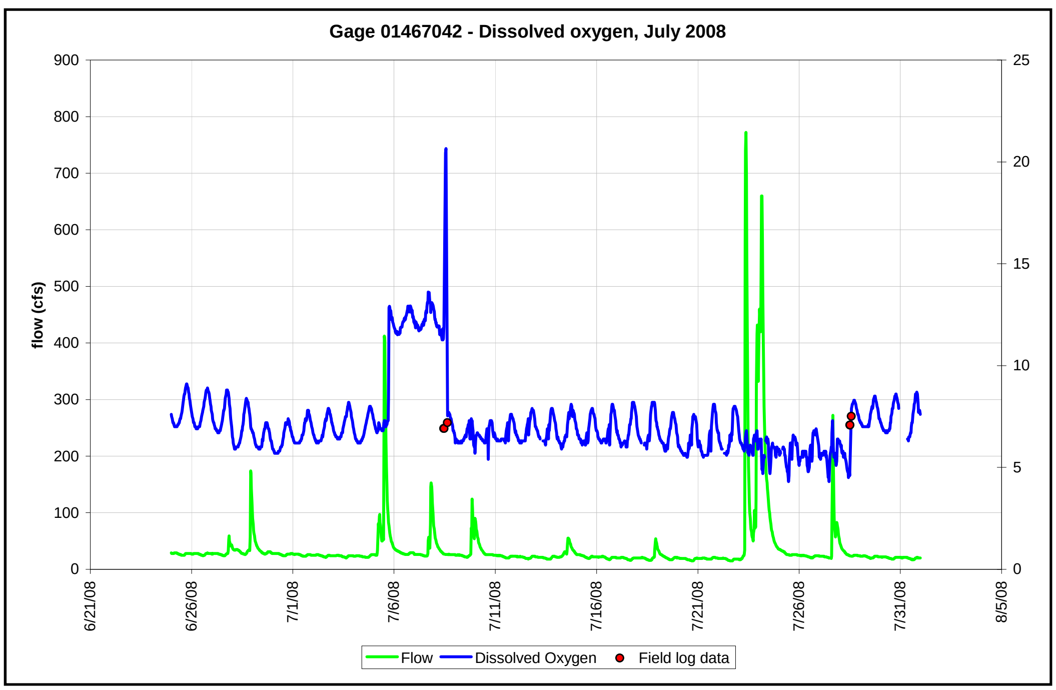


Figure 3. Example of an Excel-generated data processing/analysis plot; Gage 01467042, Dissolved Oxygen, July 2008.

These plots are examined and are the primary basis for the selection of good vs. questionable data for a given month. Intervals of questionable data are located and added to a table of "flagged" data for that particular parameter, which is then used to update the water quality database.

The final step of the procedure utilizes R, a statistical programming language and software environment. The R software code developed by OOW staff analyzes all of the water quality data in a database, as well as the good and questionable flags, and generates statistical and graphic results in a variety of forms. These include monthly plots for all data parameters for each site, showing accepted and questionable data, water quality criteria, grab sample data, and streamflow (Figure 4); assorted statistics including accepted and questionable data comparisons, monthly attainment percentages, and comparisons of wet and dry weather periods; and additional plots, including average dissolved oxygen (DO), percent DO saturation, and pH/percent DO saturation.

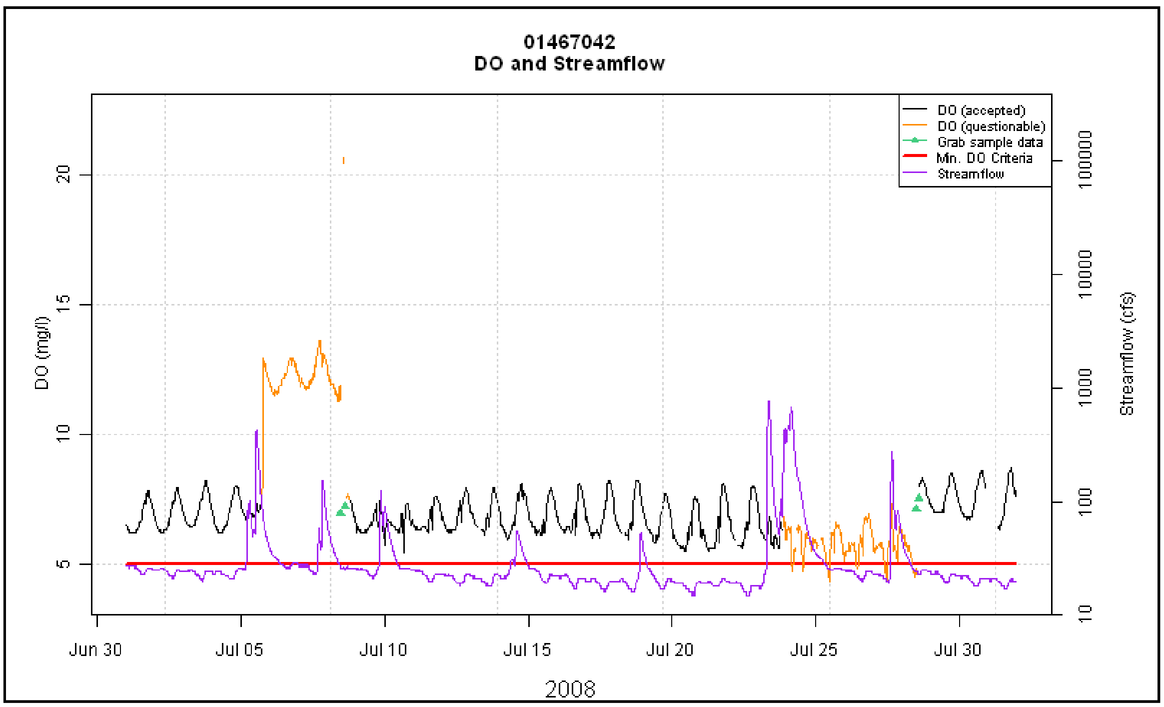


Figure 4. Example of an R-generated plot showing accepted and questionable data, and minimum water quality criteria; Gage 01467042, Dissolved Oxygen, July 2008.

Continuous Water Quality Monitoring Results Annual Summary, July 2012 - June 2013

Dissolved Oxygen

Background

Dissolved oxygen concentrations are a concern in several of Philadelphia's watersheds. Dissolved oxygen concentration is suppressed by high temperatures, respiratory activity of stream organisms, and nitrification and other oxidation reactions. Streams generally develop problems with dissolved oxygen due to water column BOD, sediment oxygen demand (SOD) and eutrophication due to increased nutrient concentration. These processes are inter-related, and physical conditions can also affect dissolved oxygen concentrations.

Designated Uses

Streams in the Philadelphia region are affected by ambient temperatures, which can be quite warm in the spring and summer months. For this reason, these streams cannot support natural self-sustaining populations of cold water fish. Different water quality criteria for dissolved oxygen and temperature are applied to different stream segments. Of the sites that were instrumented for water quality, the Wissahickon and Pennypack Creek gages (*i.e.*, 01473900, 01474000, 01467042, and 01467048) are each designated as a Trout Stocking Fishery (TSF) with conditions appropriate for maintenance of stocked trout over the period February 15 to July 31. Water quality criteria for dissolved oxygen are more stringent for these sites, with a daily instantaneous minimum criterion of 5 mg/L and daily mean criterion of 6 mg/L. Dissolved oxygen criteria for Warm Water Fisheries (WWF) are 4 mg/L and 5 mg/L, respectively. The Delaware River gage 01467200 dissolved oxygen criteria are defined by the Delaware River Basin Commission (DRBC) criteria for Zone 3 (DRBC, 2007) with a daily mean of 3.5 mg/L and a seasonal mean (April 1 to June 15, and September 16 to December 31) of 6.5 mg/L. The same seasonal criteria applies to Delaware River gage 014670261 (Zone 2), but there is a more stringent daily mean guideline of 5.0 mg/L (Table 2).

Table 2. PADEP Dissolved Oxygen Water Quality Criteria

Gage number	Designated Use	DO Minimum Criterion	DO Daily Mean Criterion
01465798	WWF	4.0 mg/L	5.0 mg/L
014670261	DRBC**	None	5.0 mg/L
01467042	TSF*	5.0 mg/L	6.0 mg/L
01467048	TSF*	5.0 mg/L	6.0 mg/L
01467086	WWF	4.0 mg/L	5.0 mg/L
01467087	WWF	4.0 mg/L	5.0 mg/L
01467200	DRBC**	None	3.5 mg/L
01473900	TSF*	5.0 mg/L	6.0 mg/L
01474000	TSF*	5.0 mg/L	6.0 mg/L
01474500	WWF	4.0 mg/L	5.0 mg/L
01475530	WWF	4.0 mg/L	5.0 mg/L
01475548	WWF	4.0 mg/L	5.0 mg/L

*TSF criteria for DO only apply from February 15 - July 31. WWF criteria are applicable from August 1 – January 31.
**A seasonal mean criterion of 6.5 mg/L also applies from April 1 - June 15, and September 16 - December 31.

Results

Results were processed as follows for Table 3. The "total hours accepted data" are the total hours of data that were not flagged; that quantity divided by 24 yields the "total days accepted data." The remainder of the table lists the percent of total hours of data that was flagged, and the percentages of accepted data that attained or failed to attain water quality standards were calculated.

Results were processed as follows for Table 4. If a single day contained at least one flagged measurement, the entire day was considered flagged for calculating the daily mean. Thus the "percent days flagged data" corresponds to the percentage of total days of data that contained at least one flag in a single day. Conversely, if none of the measurements in a single day were flagged, that day was considered one day of accepted data, and the total amount of accepted days was calculated. Finally, the percentages of accepted data that attained or failed to attain water quality standards were calculated.

Water quality at the downstream Tacony Creek site (gage 01467087) frequently failed to attain DO minimum and daily mean criteria. At all other sites, the DO minimum criteria were attained at least 97.5% of the time, and the daily mean criteria were attained at least 94.3% of the time. A more in-depth discussion of potential causes of DO problems at gage 01467087 is presented in the Monthly Results section. A notable portion of flagged data at 01467087 and other sites is related to the fouling of sonde pipes due to sediment and debris that inhibit data collection. The DO probes are particularly susceptible to the effects of trapped sediment; when routine cleaning of the sonde pipes show that low DO readings were affected by fouling, the questionable data prior to cleaning is flagged.

Table 3. USGS Gage July 2012 - June 2013 Dissolved Oxygen Minimum Criterion Summary Results

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% days non-attaining	% hrs. attainin g
01465798	WWF	6541.0	272.5	0.9	1.0	99.0
014670261*	DRBC	NA	NA	NA	NA	NA
01467042	TSF	6508.0	271.2	1.2	0.0	100.0
01467048	TSF	6288.5	262.0	3.4	0.1	99.9
01467086	WWF	5992.5	249.7	9.2	1.8	98.2
01467087	WWF	5665.0	236.0	14.2	23.8	76.2
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	6403.0	266.8	3.0	2.5	97.5
01474000	TSF	6545.0	272.7	0.8	0.0	100.0
01474500	WWF	6578.0	274.1	0.3	0.0	100.0
01475530	WWF	6551.0	273.0	0.7	0.0	100.0
01475548	WWF	6330.0	263.8	4.1	1.7	98.3

*No minimum DO criterion applies at gages 01467200 and 014670261

Table 4. USGS Gage July 2012 - June 2013 Dissolved Oxygen Daily Mean Criterion Summary Results

Gage number	Designated Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining
01465798	WWF	252.0	8.3	0.8	99.2
014670261	DRBC	331.0	9.3	3.9	96.1
01467042	TSF	216.0	21.3	0.0	100.0
01467048	TSF	233.0	14.1	0.4	99.6
01467086	WWF	228.0	17.1	2.2	97.8
01467087	WWF	203.0	26.2	36.0	64.0
01467200	DRBC	216.0	13.6	0.0	100.0
01473900	TSF	245.0	10.9	5.7	94.3
01474000	TSF	253.0	8.0	0.0	100.0
01474500	WWF	262.0	4.7	0.0	100.0
01475530	WWF	259.0	5.8	0.0	100.0
01475548	WWF	245.0	10.9	4.1	95.9

Table 5. USGS Gage 01467200 and 014670261 Dissolved Oxygen Seasonal Mean Criterion Summary Result

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Seasonal mean	Attained Standard?
01467200	DRBC	1792.5	74.7	1.7	8.3	Yes
014670261	DRBC	1806.0	75.3	1.0	8.9	Yes

pH

Background

pH has been identified as a parameter of potential concern for some of Philadelphia's watersheds, primarily because of algal effects on the dissolved inorganic carbon (DIC) composition of stream water. Algae take up CO_2 during photosynthesis and shift the composition of DIC toward the alkaline carbonates, resulting in occasional failure to attain maximum pH criteria at some sites (Table 6). pH fluctuations are typically observed concomitant with pronounced dissolved oxygen fluctuations, as detailed in the Monthly Results section.

At gages 01467200 and 014670261, pH criteria (regulated by DRBC) are bounded by 6.5 and 8.5. At all other gages, pH criteria are bounded by daily minima and maxima of 6.0 and 9.0, respectively, as defined by PA DEP water quality standards.

Results

Results were processed as follows for Table 6. The "total hours accepted data" are the total hours of data that were not flagged; that quantity divided by 24 yields the "total days accepted data." The remainder of the table lists the percentage of total hours of data that was flagged, the percentages of accepted hours that attained or failed to attain criteria, and the percentages of daily minima and maxima that attained or failed to attain criteria.

Minimum pH criteria were attained at all gages for the reporting time frame. Algal blooms may be responsible for daily maximum pH criterion exceedance at several sites during March and April. Significant (greater than 10%) daily exceedances occurred at upstream and downstream Wissahickon, upstream Tacony, and downstream Cobbs sites.

Table 6. USGS Gage July 2012 - June 2013 pH Criteria Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	6541.0	272.5	0.9	0.2	1.8	0.0	0.0	99.8	98.2
014670261	8671.5	361.3	1.0	1.0	3.6	0.0	0.0	99.0	96.4
01467042	6508.0	271.2	1.2	2.1	8.0	0.0	0.0	97.9	92.0
01467048	6288.0	262.0	3.5	3.0	6.4	0.0	0.0	97.0	93.6
01467086	6575.0	274.0	0.4	3.4	14.2	0.0	0.0	96.6	85.8
01467087	6449.0	268.7	2.3	0.0	0.0	0.0	0.0	100.0	100.0
01467200	5878.5	244.9	2.0	0.0	0.0	0.0	0.0	100.0	100.0
01473900	6456.0	269.0	2.2	3.5	12.9	0.0	0.0	96.5	87.1
01474000	6546.5	272.8	0.8	2.7	10.9	0.0	0.0	97.3	89.1
01474500	6578.0	274.1	0.3	4.0	6.9	0.0	0.0	96.0	93.1
01475530	6529.0	272.0	1.1	0.2	1.8	0.0	0.0	99.8	98.2
01475548	6305.5	262.7	4.4	3.9	10.9	0.0	0.0	96.1	89.1

Turbidity

Background

Turbidity in Philadelphia's streams increases with increased flow as inorganic sediment and additional constituents of stormwater runoff are introduced to the stream or scoured/eroded from the stream channel. There are no numeric PA DEP water quality criteria for turbidity, so PWD watershed management plans used a reference value for turbidity that was derived from EPA Guidance document EPA 822-B-00-023 (*i.e.*, 2.825 NTU). This value is surpassed more often in wet weather than in dry weather (Tables 82-83). Turbidity data has also been used to help investigate sediment loading and transport in the Wissahickon Creek Watershed for the Wissahickon Creek Sediment TMDL.

Results

Results were processed as follows for Table 7. The "total hours accepted data" are the total hours of data that were not flagged; that quantity divided by 24 yields the "total days accepted data." The remainder of the table lists the percentage of total hours of data that was flagged, and the percentages of accepted hours that either surpassed or fell below the maximum guideline.

Among the tributary sites, the maximum guideline was most frequently surpassed at the downstream Pennypack Creek gage, and least frequently surpassed at the upstream Wissahickon gage.

Table 7. USGS Gage July 2012 - June 2013 Turbidity Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	6385.5	266.1	3.2	34.0	66.0
014670261	8659.0	360.8	1.1	87.6	12.4
01467042	6264.5	261.0	4.9	30.4	69.6
01467048	6249.5	260.4	4.0	46.3	53.7
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	5922.5	246.8	10.3	38.5	61.5
01474000	6404.0	266.8	3.0	29.0	71.0
01474500	6344.0	264.3	3.9	55.0	45.0
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA

*Turbidity is not continuously monitored at these locations

Specific Conductance

Background

Specific Conductance is a measure of the ability of water to conduct electricity over a given distance, expressed as microsiemens/cm (corrected to 25°C). Conductivity in Philadelphia streams is extremely sensitive to changes in flow, as stormwater (diluent) usually contains smaller concentrations of dissolved ions than stream baseflow. Stormwater runoff typically lowers conductivity in streams; an exception sometimes occurs in winter or early spring, when road salt applied prior to snowstorms enters the stream in runoff or during snowmelt. Data collected in the report timeframe were generally consistent with earlier observations. When significant changes in conductivity are observed during dry weather, it can be an indicator of anthropogenic influence or pollution in the stream; stations receiving inputs of treated wastewater generally had greater conductivity.

Results

There is no water quality standard for specific conductance. Table 8 merely illustrates the total hours of data that was not flagged and considered "accepted," the equivalent quantity in day-units, and the percentage of total hours of data that was flagged. More detailed results at each site are described in the Monthly Results section.

Table 8. USGS Gage July 2012 - June 2013 Specific Conductance Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	6541.0	272.5	0.9
014670261	8607.0	358.6	1.7
01467042	6508.0	271.2	1.2
01467048	6288.0	262.0	3.5
01467086	6575.0	274.0	0.4
01467087	6449.5	268.7	2.3
01467200	5879.0	245.0	2.0
01473900	6457.0	269.0	2.2
01474000	6546.5	272.8	0.8
01474500	6578.0	274.1	0.3
01475530	6573.5	273.9	0.4
01475548	6446.0	268.6	2.3

Temperature

Background

Streams in the Philadelphia region are designated Warm Water Fisheries (WWF) or Trout Stocking Fisheries (TSF), with separate corresponding temperature criteria (Table 9). These criteria are “stepped” (remaining constant for 15- or 30-day intervals), while streams tend to warm up and cool down more gradually due primarily to changes in ambient temperature. (Gages 01467200 and 014670261 are the exceptions and are subject to a DRBC criterion of 30°C maximum). Stream temperatures were observed to exceed these criteria, somewhat frequently in springtime. These exceedances are generally natural, as there are no major sources of heated wastes. It is possible that baseflow diminution is partially responsible for a lack of buffering against temperature increases.

Table 9. PADEP Temperature Water Quality Criteria

Date range start	Date range end	WWF maximum (°C)	WWF maximum (°F)	TSF maximum (°C)	TSF maximum (°F)
1/1	1/31	4	40	4	40
2/1	2/29	4	40	4	40
3/1	3/31	8	46	8	46
4/1	4/15	11	52	11	52
4/16	4/30	14	58	14	58
5/1	5/15	18	64	18	64
5/16	5/31	22	72	20	68
6/1	6/15	27	80	21	70
6/16	6/30	29	84	22	72
7/1	7/31	31	87	23	74
8/1	8/15	31	87	27	80
8/16	8/30	31	87	31	87
9/1	9/15	29	84	29	84
9/16	9/30	26	78	26	78
10/1	10/15	22	72	22	72
10/16	10/31	19	66	19	66
11/1	11/15	14	58	14	58
11/16	11/30	10	50	10	50
12/1	12/31	6	42	6	42

Results

Results were processed in the same manner as the parameters described above. The highest exceedance rate occurred at the downstream Pennypack Creek gage. Aside from the Delaware River gages, the lowest exceedance rates were observed at the Poquessing, both Cobbs, both Tacony Creek, and the Schuylkill River gages (Table 10). Those six gages are all designated as WWF and have less stringent criteria.

Table 10. USGS Gage July 2012 - June 2013 Temperature Maximum Criteria Summary Results

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	6541.0	272.5	0.9	11.1	88.9
014670261	DRBC	8674.0	361.4	1.0	0.0	100.0
01467042	TSF	6506.0	271.1	1.2	25.6	74.4
01467048	TSF	6288.5	262.0	3.4	29.9	70.1
01467086	WWF	6575.0	274.0	0.4	10.9	89.1
01467087	WWF	6449.0	268.7	2.3	12.9	87.1
01467200	DRBC	5871.5	244.6	2.1	0.0	100.0
01473900	TSF	6449.0	268.7	2.3	24.4	75.6
01474000	TSF	6551.5	273.0	0.7	23.6	76.4
01474500	WWF	6578.0	274.1	0.3	12.9	87.1
01475530	WWF	6574.0	273.9	0.4	8.8	91.2
01475548	WWF	6446.5	268.6	2.3	11.3	88.7

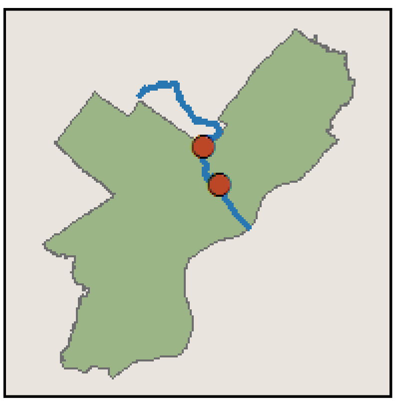
Monthly Results, July 2012 - June 2013

This section summarizes results at the monthly time scale. Results were processed in the same manner as in the previous section. Gages are grouped according to the type of sewer system that impacts water quality at the site.

Gages in Combined Sewer System Watersheds

The combined sewer system serves more than three-quarters of Philadelphia's residents and covers the oldest and densest parts of the city. Combined sewer outfalls affect the Tookany/Tacony-Frankford and Darby-Cobbs watersheds. (The Delaware and Schuylkill rivers also contain combined sewer outfalls but are detailed in a later section focused on large watersheds.) The gages in this section are subject to the deleterious effects of periodic combined sewer overflows during wet weather and snowmelt.

Tookany/Tacony-Frankford Creek (Gages 01467086 and 01467087)



Dissolved oxygen and pH

Dissolved oxygen concentrations were markedly worse between the upstream and downstream Tacony Creek gages. The monthly minima, percentage of hours the minimum criterion was not attained, and percentage of days the daily mean criteria was not attained were typically much worse at the downstream gage (Tables 11-14). For example, DO was particularly poor at the downstream Tacony Creek gage during August 2012; the minimum DO criterion was not attained throughout much of the month (Figure 5). Poor DO was also observed in the same month at the upstream gage. However, the minimum criterion was usually attained at gage 01467086 (Figure 6). This difference likely reflects the additional stormwater runoff and sewage overflows that entered the creek between the two gages.

The lowest DO concentrations are typically seen in the period after storm events, reflecting both the immediate and lingering, oxygen-depleting effects of stormwater runoff and biochemical oxygen demand (BOD) entering the stream (Figure 7).

Diel DO fluctuations are suppressed for a few days following a storm event because the event either scours away algae or temporarily inhibits their growth. As dry weather continues, the algae recover and diel DO and pH fluctuations typically increase, sometimes resulting in non-attainment of pH maximum criteria, as observed at the upstream gage in March 2012 (Figure 8). Percent DO saturation extremes of 50% at night and over 175% in daylight were observed at gage 01467086 in April 2013, indicating high levels of algal activity (Figure 9; PAR is defined as photosynthetically active radiation). Diel DO fluctuations tended to increase with prolonged periods of sunlight, further indicating high levels of algal activity.

Interestingly, water quality at the downstream gage attained pH maximum criteria throughout the reporting period. A lower monthly mean pH was consistently observed at gage 01467087, along with generally less pronounced diel pH fluctuations, probably due to an increased buffering capacity at the downstream gage and a lesser degree of algal growth (Tables 15-16).

Table 11. Gage 01467086 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	WWF	742.0	30.9	0.3	1.8	98.2	2.6	13.0	6.81
Aug-12	WWF	670.5	27.9	9.9	3.4	96.6	1.2	12.9	6.70
Sep-12	WWF	641.5	26.7	10.9	0.2	99.8	3.6	12.7	7.87
Oct-12	WWF	742.5	30.9	0.2	0.9	99.1	1.5	13.8	8.00
Nov-12	WWF	641.5	26.7	10.9	0.0	100.0	6.7	17.0	11.18
Mar-13	WWF	739.5	30.8	0.5	0.0	100.0	7.8	19.8	13.16
Apr-13	WWF	717.0	29.9	0.4	0.8	99.2	2.5	20.4	10.67
May-13	WWF	536.0	22.3	28.0	9.0	91.0	0.2	14.5	7.19
Jun-13	WWF	562.0	23.4	21.9	1.8	98.2	0.1	11.5	7.63

Table 12. Gage 01467087 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	WWF	601.0	25.0	19.2	43.9	56.1	0.6	10.5	4.67
Aug-12	WWF	571.5	23.8	23.2	70.3	29.7	0.1	8.2	3.14
Sep-12	WWF	665.0	27.7	7.6	52.2	47.8	0.3	8.8	3.90
Oct-12	WWF	550.5	22.9	26.0	34.3	65.7	0.1	9.0	4.59
Nov-12	WWF	597.5	24.9	17.0	0.3	99.7	3.4	11.7	8.22
Mar-13	WWF	738.5	30.8	0.6	0.0	100.0	6.4	13.8	11.63
Apr-13	WWF	690.5	28.8	4.1	4.1	95.9	2.0	12.8	7.96
May-13	WWF	562.5	23.4	24.4	6.8	93.2	0.1	8.9	5.55
Jun-13	WWF	688.0	28.7	4.4	11.1	88.9	0.2	8.7	5.65

Table 13. Gage 01467086 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	WWF	29.0	6.5	3.4	96.6	4.9	8.5	6.80
Aug-12	WWF	26.0	16.1	3.8	96.2	4.5	8.0	6.70
Sep-12	WWF	25.0	16.7	0.0	100.0	5.8	9.5	7.91
Oct-12	WWF	30.0	3.2	3.3	96.7	4.9	10.8	8.01
Nov-12	WWF	25.0	16.7	0.0	100.0	7.5	13.9	11.14
Mar-13	WWF	27.0	12.8	0.0	100.0	9.5	14.8	13.10
Apr-13	WWF	27.0	10.0	0.0	100.0	6.7	14.0	10.69
May-13	WWF	17.0	45.2	11.8	88.2	3.0	9.5	7.46
Jun-13	WWF	22.0	26.7	0.0	100.0	6.3	8.9	7.76

Table 14. Gage 01467087 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	WWF	21.0	32.3	52.4	47.6	2.1	6.5	4.75
Aug-12	WWF	20.0	35.5	90.0	10.0	0.8	5.4	3.08
Sep-12	WWF	25.0	16.7	80.0	20.0	0.8	6.9	3.88
Oct-12	WWF	20.0	35.5	55.0	45.0	0.7	7.8	4.73
Nov-12	WWF	23.0	23.3	0.0	100.0	6.0	10.6	8.24
Mar-13	WWF	26.0	16.0	0.0	100.0	9.0	13.0	11.61
Apr-13	WWF	25.0	16.7	4.0	96.0	3.9	11.7	8.20
May-13	WWF	18.0	41.9	33.3	66.7	3.8	6.9	5.61
Jun-13	WWF	25.0	16.7	24.0	76.0	3.6	8.2	5.79

Table 15. Gage 01467086 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.9	7.61
Aug-12	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.9	7.51
Sep-12	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.7	9.0	7.72
Oct-12	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.9	7.70
Nov-12	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	9.0	7.73
Mar-13	739.5	30.8	0.5	16.3	71.0	0.0	0.0	83.7	29.0	7.2	9.5	8.20
Apr-13	717.0	29.9	0.4	14.1	56.7	0.0	0.0	85.9	43.3	7.0	9.5	8.09
May-13	737.0	30.7	0.9	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.6	7.36
Jun-13	719.5	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.1	7.37

Table 16. Gage 01467087 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.4	8.2	7.04
Aug-12	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.1	7.4	6.82
Sep-12	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.3	7.4	6.89
Oct-12	620.5	25.9	16.6	0.0	0.0	0.0	0.0	100.0	100.0	6.4	7.2	6.90
Nov-12	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.3	7.02
Mar-13	738.0	30.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.0	7.44
Apr-13	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.1	7.28
May-13	738.0	30.8	0.8	0.0	0.0	0.0	0.0	100.0	100.0	6.4	7.4	6.97
Jun-13	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.4	7.4	7.06

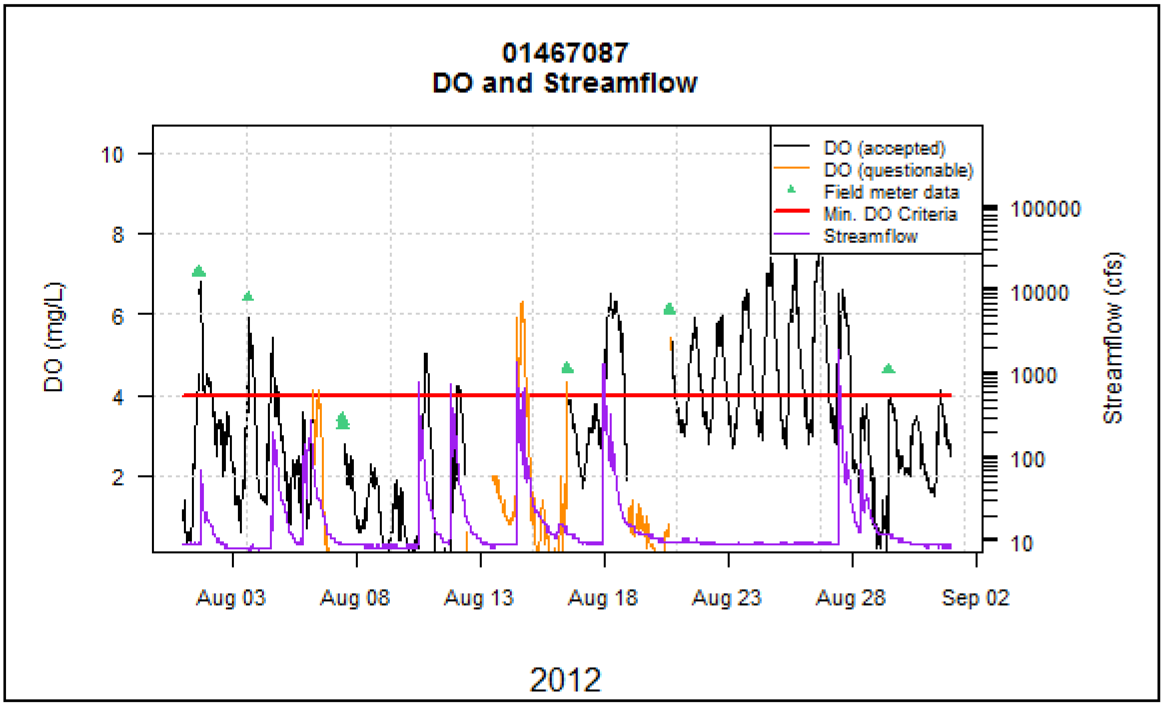


Figure 5. Gage 01467087, Dissolved Oxygen and Streamflow, August 2012.

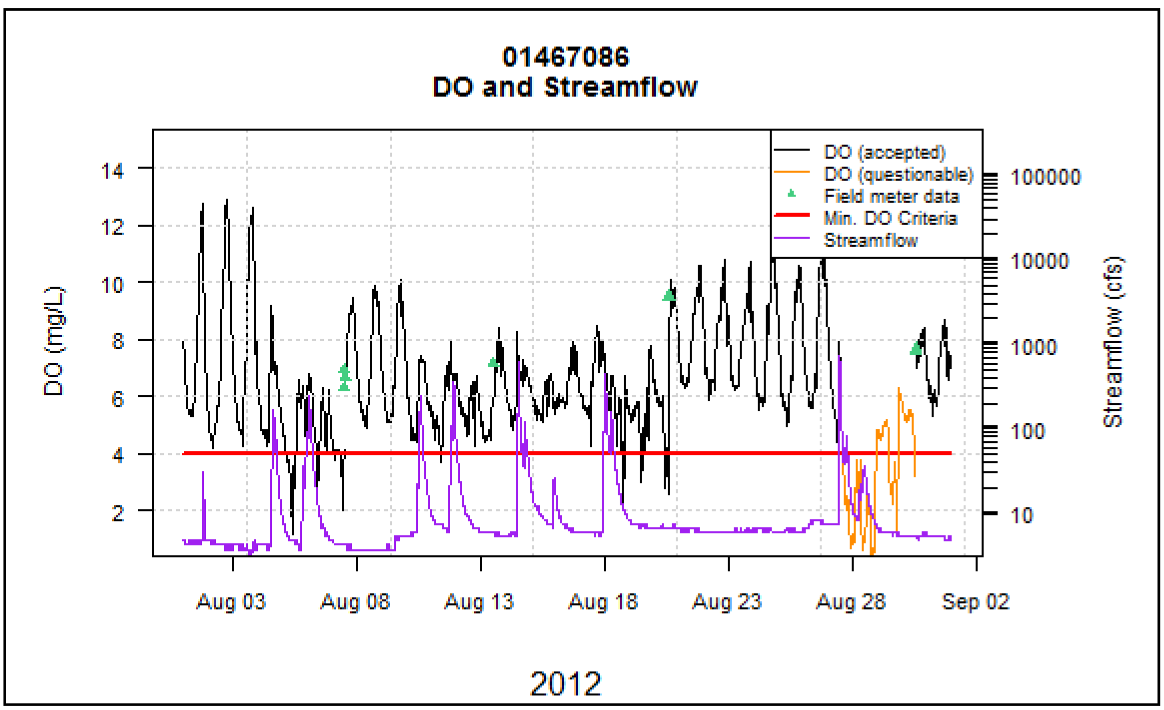


Figure 6. Gage 01467086, Dissolved Oxygen and Streamflow, August 2012.

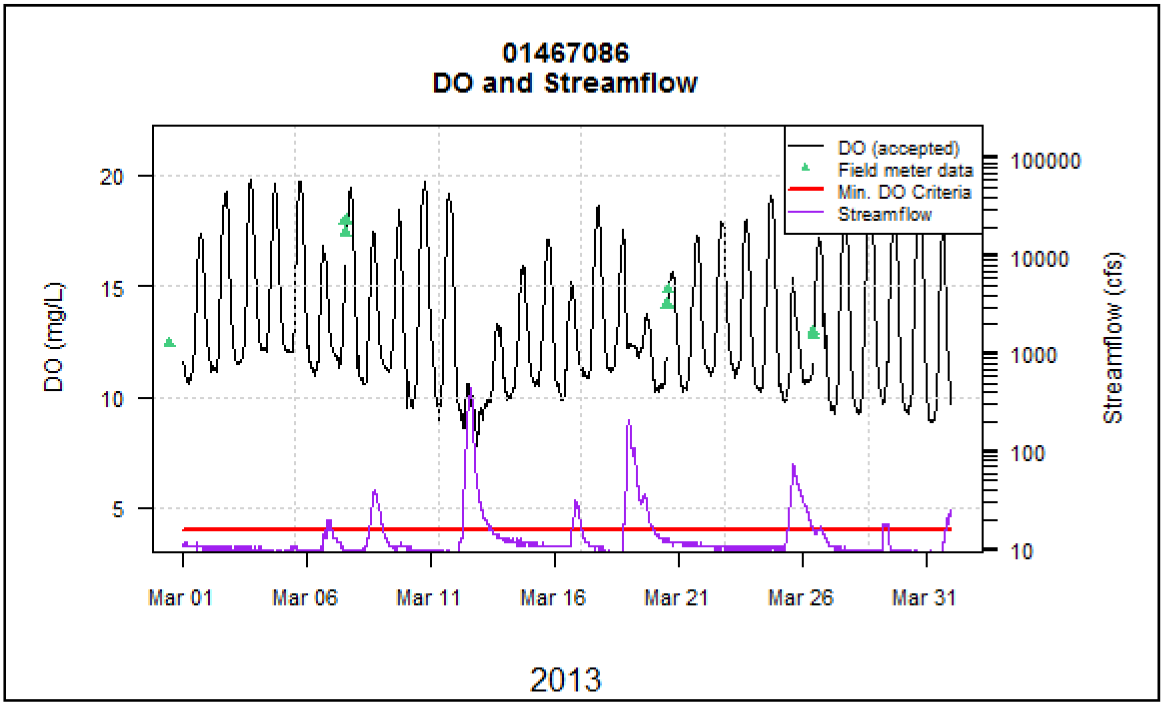


Figure 7. Gage 01467086, Dissolved Oxygen and Streamflow, March 2013.

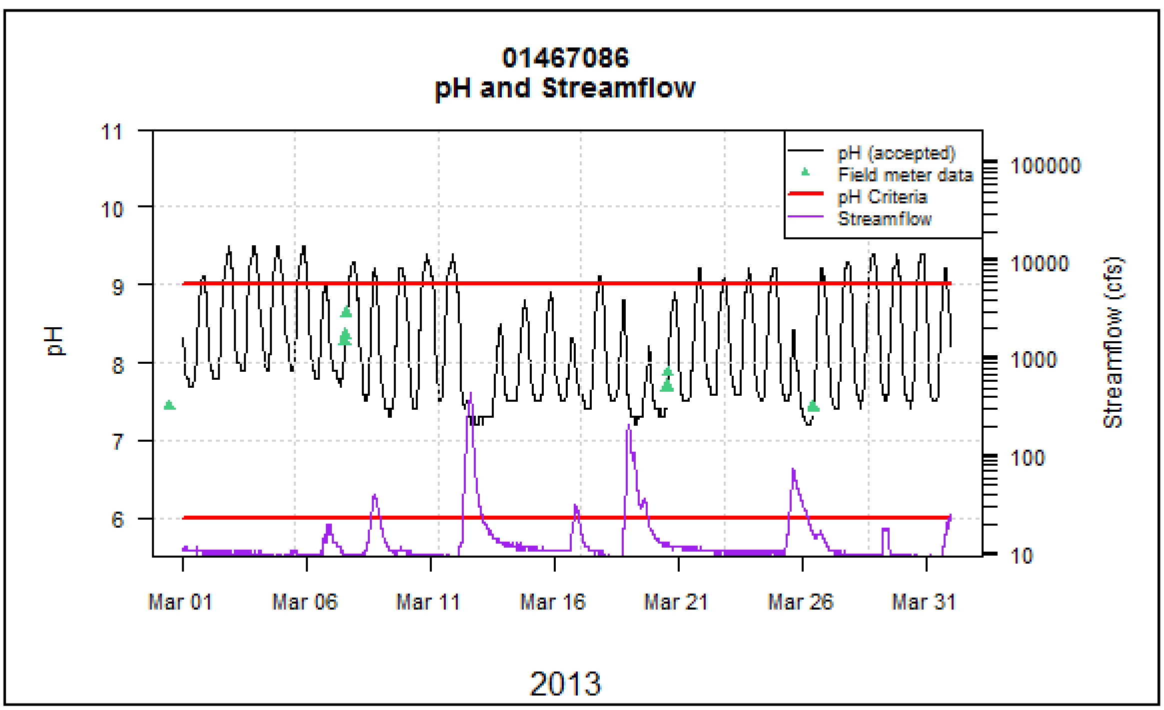


Figure 8. Gage 01467086, pH and Streamflow, March 2013.

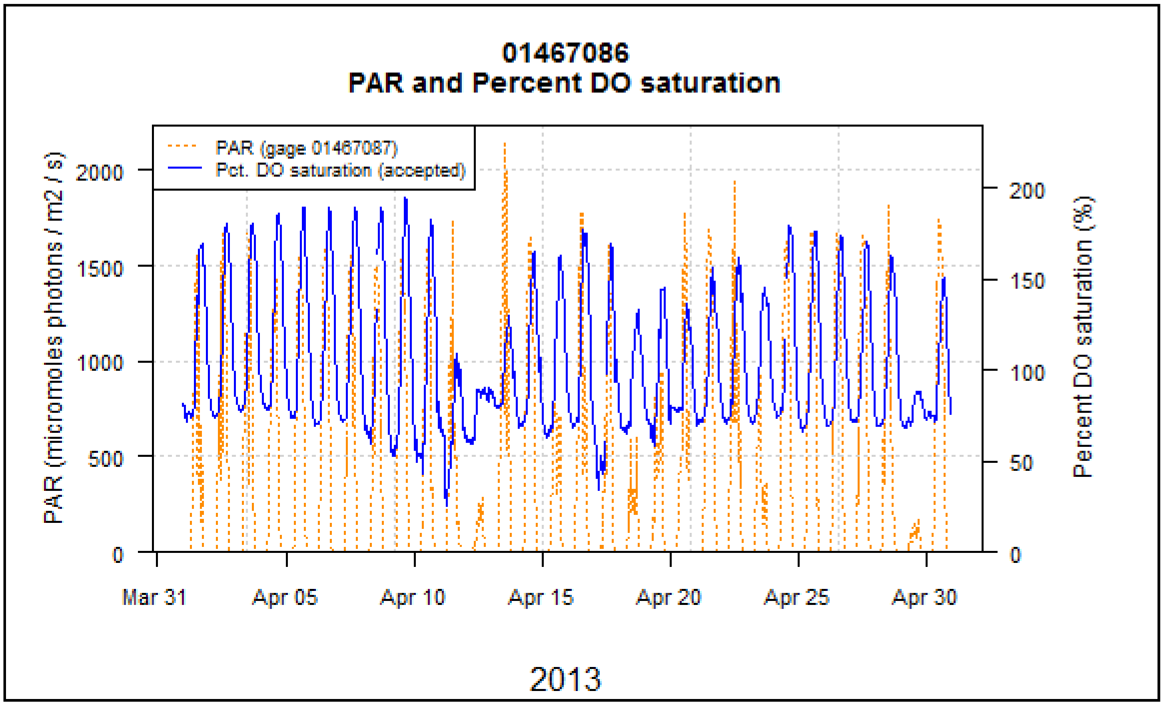


Figure 9. Gage 01467086, PAR and Percent Dissolved Oxygen Saturation, April 2013.

Figure 10. Gage 01467086, Tacony Creek at Adams Ave

Figure 11. Gage 01467087, Frankford Creek at Castor Ave., looking downstream

Specific Conductance

Specific conductance observations were usually consistent between the two gage sites (Tables 17-18). During the relatively wet month of August, low conductivity values correspond to rainwater diluting the mineral concentrations in the stream.

Table 17. Gage 01467086 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	742.0	30.9	0.3	100.0	680.0	553.75
Aug-12	742.5	30.9	0.2	116.0	665.0	429.50
Sep-12	717.5	29.9	0.3	29.0	663.0	479.20
Oct-12	742.5	30.9	0.2	74.0	668.0	506.87
Nov-12	717.5	29.9	0.3	335.0	672.0	593.71
Mar-13	739.5	30.8	0.5	212.0	3230.0	859.15
Apr-13	717.0	29.9	0.4	189.0	740.0	596.79
May-13	737.0	30.7	0.9	126.0	682.0	544.34
Jun-13	719.5	30.0	0.1	68.0	677.0	504.12

Table 18. Gage 01467087 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	741.0	30.9	0.4	97.0	694.0	526.6
Aug-12	741.0	30.9	0.4	119.0	670.0	393.9
Sep-12	718.0	29.9	0.3	51.0	667.0	421.3
Oct-12	620.5	25.9	16.6	216.0	642.0	511.3
Nov-12	718.5	29.9	0.2	335.0	675.0	583.0
Mar-13	738.5	30.8	0.6	258.0	2800.0	856.3
Apr-13	717.0	29.9	0.4	114.0	742.0	596.1
May-13	738.0	30.8	0.8	144.0	688.0	505.5
Jun-13	717.0	29.9	0.4	48.0	681.0	405.4

Temperature

Monthly mean temperatures observed at the downstream gage were consistently higher than at the upstream gage. Consequently, a higher rate of temperature criteria exceedance was typically observed at the downstream gage in March, April and May. Exceedance rates were generally similar at the two gages, with the exception of the months of June and July, when exceedances occurred at the downstream gage only. Temperature criteria were attained from August through Nov 30 at both gages. (Tables 19-20).

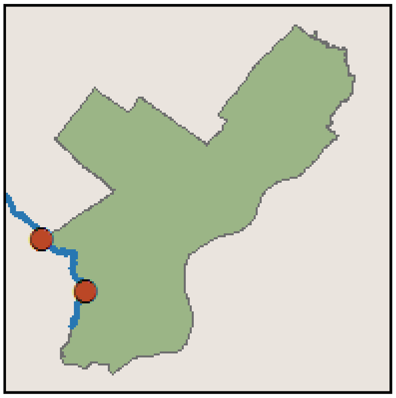
Table 19. Gage 01467086 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.3	742.0	30.9	20.0	29.2	24.8
WWF	1-Aug	15-Aug	0.0	100.0	0.3	359.0	15.0	20.1	28.5	23.7
WWF	16-Aug	31-Aug	0.0	100.0	0.1	383.5	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.7	357.5	14.9	13.9	25.4	20.0
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	9.0	20.3	14.7
WWF	16-Oct	31-Oct	0.0	100.0	0.4	382.5	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.4	358.5	14.9	2.8	11.5	7.1
WWF	16-Nov	30-Nov	0.0	100.0	0.3	359.0	15.0			
WWF	1-Mar	31-Mar	23.7	76.3	0.0	739.5	30.8	3.0	13.1	6.6
WWF	1-Apr	15-Apr	58.9	41.1	0.3	359.0	15.0	5.3	22.1	13.4
WWF	16-Apr	30-Apr	57.8	42.2	0.6	358.0	14.9			
WWF	1-May	15-May	21.0	79.0	0.3	359.0	15.0	11.1	24.8	17.2
WWF	16-May	31-May	11.9	88.1	1.6	378.0	15.8			
WWF	1-Jun	15-Jun	0.0	100.0	0.1	359.5	15.0	16.5	25.7	21.0
WWF	16-Jun	30-Jun	0.0	100.0	0.0	360.0	15.0			

Table 20. Gage 01467087 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.3	99.7	0.4	741.0	30.9	20.7	31.3	26.2
WWF	1-Aug	15-Aug	0.0	100.0	0.7	357.5	14.9	21.3	29.5	24.9
WWF	16-Aug	31-Aug	0.0	100.0	0.1	383.5	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	16.7	26.4	21.3
WWF	16-Sep	30-Sep	0.0	100.0	0.6	358.0	14.9			
WWF	1-Oct	15-Oct	0.0	100.0	0.1	359.5	15.0	11.1	20.7	15.5
WWF	16-Oct	31-Oct	0.0	100.0	32.2	260.5	10.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.1	359.5	15.0	4.0	11.1	7.3
WWF	16-Nov	30-Nov	0.0	100.0	0.3	359.0	15.0			
WWF	1-Mar	31-Mar	23.4	76.6	0.0	738.5	30.8	4.0	11.9	6.8
WWF	1-Apr	15-Apr	60.1	39.9	0.0	360.0	15.0	7.8	21.2	13.9
WWF	16-Apr	30-Apr	76.2	23.8	0.8	357.0	14.9			
WWF	1-May	15-May	25.5	74.5	0.8	357.0	14.9	13.8	26.7	18.1
WWF	16-May	31-May	19.9	80.1	0.8	381.0	15.9			
WWF	1-Jun	15-Jun	1.1	98.9	0.1	359.5	15.0	17.7	27.5	22.1
WWF	16-Jun	30-Jun	0.0	100.0	0.7	357.5	14.9			

Cobbs Creek (Gages 01475530 and 01475548)



Dissolved oxygen and pH

The pattern of dissolved oxygen and pH values between the upstream (01475530) and downstream (01475548) Cobbs Creek gages is likely due to greater algal activity at the downstream gage. During March and April—key months for algal growth—higher pH was observed at the downstream gage (Tables 25-26). Algae remove CO_2 during photosynthesis, raising pH by shifting the dissolved inorganic carbon (DIC) balance toward alkaline carbonates. Furthermore, the diel fluctuations in DO were more pronounced at the downstream gage during these months (Figures 12-13). A third indicator of increased algal activity at 01475548 is the supersaturation of oxygen caused by photosynthesis. During April, the upstream gage recorded peak DO saturation levels over 120% during the day, while the downstream gage recorded peak DO saturation levels over 150% (Figures 14-15).

Table 21. Gage 01475530 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	WWF	744.0	31.0	0.0	0.0	100.0	5.6	10.5	7.38
Aug-12	WWF	742.5	30.9	0.2	0.0	100.0	4.9	11.3	7.49
Sep-12	WWF	694.5	28.9	3.5	0.0	100.0	6.4	11.4	8.18
Oct-12	WWF	742.5	30.9	0.2	0.0	100.0	7.1	12.8	9.23
Nov-12	WWF	718.0	29.9	0.3	0.0	100.0	7.9	14.1	11.01
Mar-13	WWF	743.0	31.0	0.0	0.0	100.0	9.9	15.2	12.44
Apr-13	WWF	717.5	29.9	0.3	0.0	100.0	6.7	14.8	10.19
May-13	WWF	729.5	30.4	1.9	0.0	100.0	6.2	12.3	8.57
Jun-13	WWF	719.5	30.0	0.1	0.0	100.0	5.9	9.9	7.92

Table 22. Gage 01475548 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	WWF	615.0	25.6	17.3	12.6	87.4	1.1	9.8	5.59
Aug-12	WWF	706.0	29.4	5.1	1.4	98.6	2.7	11.3	6.23
Sep-12	WWF	719.0	30.0	0.1	0.0	100.0	4.4	12.5	7.58
Oct-12	WWF	742.5	30.9	0.2	0.0	100.0	6.9	12.1	8.84
Nov-12	WWF	718.5	29.9	0.2	0.0	100.0	9.2	14.9	11.39
Mar-13	WWF	741.0	30.9	0.3	0.0	100.0	9.3	19.1	13.85
Apr-13	WWF	718.5	29.9	0.2	0.0	100.0	4.1	17.8	10.46
May-13	WWF	735.5	30.6	1.1	0.2	99.8	2.3	12.3	7.97
Jun-13	WWF	634.0	26.4	11.9	3.0	97.0	3.0	9.8	6.89

Table 23. Gage 01475530 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	WWF	31.0	0.0	0.0	100.0	6.8	8.0	7.38
Aug-12	WWF	30.0	3.2	0.0	100.0	6.5	8.6	7.49
Sep-12	WWF	27.0	10.0	0.0	100.0	6.9	9.1	8.15
Oct-12	WWF	30.0	3.2	0.0	100.0	8.1	10.7	9.22
Nov-12	WWF	29.0	3.3	0.0	100.0	9.3	12.5	11.01
Mar-13	WWF	30.0	3.1	0.0	100.0	10.4	13.1	12.44
Apr-13	WWF	28.0	6.7	0.0	100.0	8.2	12.1	10.13
May-13	WWF	25.0	19.4	0.0	100.0	7.8	9.6	8.72
Jun-13	WWF	29.0	3.3	0.0	100.0	7.0	8.6	7.91

Table 24. Gage 01475548 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	WWF	25.0	19.4	20.0	80.0	2.5	7.3	5.54
Aug-12	WWF	29.0	6.5	10.3	89.7	4.8	8.0	6.22
Sep-12	WWF	29.0	3.3	0.0	100.0	5.5	9.6	7.57
Oct-12	WWF	30.0	3.2	0.0	100.0	7.8	10.0	8.88
Nov-12	WWF	28.0	6.7	0.0	100.0	9.7	12.8	11.41
Mar-13	WWF	28.0	9.6	0.0	100.0	10.6	14.9	13.80
Apr-13	WWF	28.0	6.7	0.0	100.0	6.3	13.8	10.58
May-13	WWF	25.0	19.4	0.0	100.0	5.9	9.6	7.93
Jun-13	WWF	23.0	23.3	8.7	91.3	4.2	7.9	6.99

Table 25. Gage 01475530 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.8	7.76
Aug-12	742.5	30.9	0.2	1.5	16.1	0.0	0.0	98.5	83.9	7.0	9.2	7.95
Sep-12	672.5	28.0	6.6	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.7	7.74
Oct-12	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.0	7.38
Nov-12	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.9	7.46
Mar-13	743.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.6	7.49
Apr-13	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.8	7.59
May-13	729.5	30.4	1.9	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.2	7.36
Jun-13	719.5	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.8	7.34

Table 26. Gage 01475548 pH Criteria Summary Results by Month

Month	total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	615.0	25.6	17.3	0.0	0.0	0.0	0.0	100.0	100.0	6.3	8.3	7.08
Aug-12	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.6	7.24
Sep-12	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.2	8.7	7.41
Oct-12	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.4	8.6	7.47
Nov-12	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.4	7.55
Mar-13	741.0	30.9	0.3	21.9	64.5	0.0	0.0	78.1	35.5	7.3	9.6	8.42
Apr-13	719.5	30.0	0.1	11.3	30.0	0.0	0.0	88.7	70.0	7.0	9.5	8.13
May-13	597.0	24.9	19.8	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.4	7.50
Jun-13	711.0	29.6	1.3	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.1	7.40

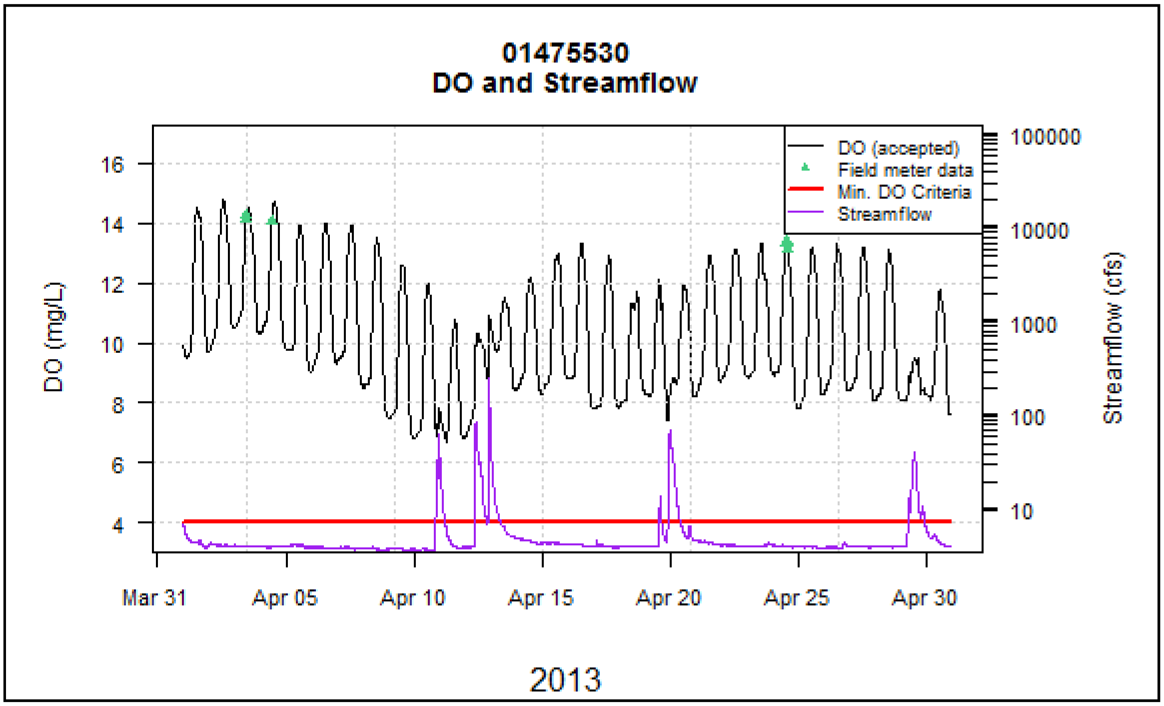


Figure 12. Gage 01475530, Dissolved Oxygen and Streamflow, April 2013.

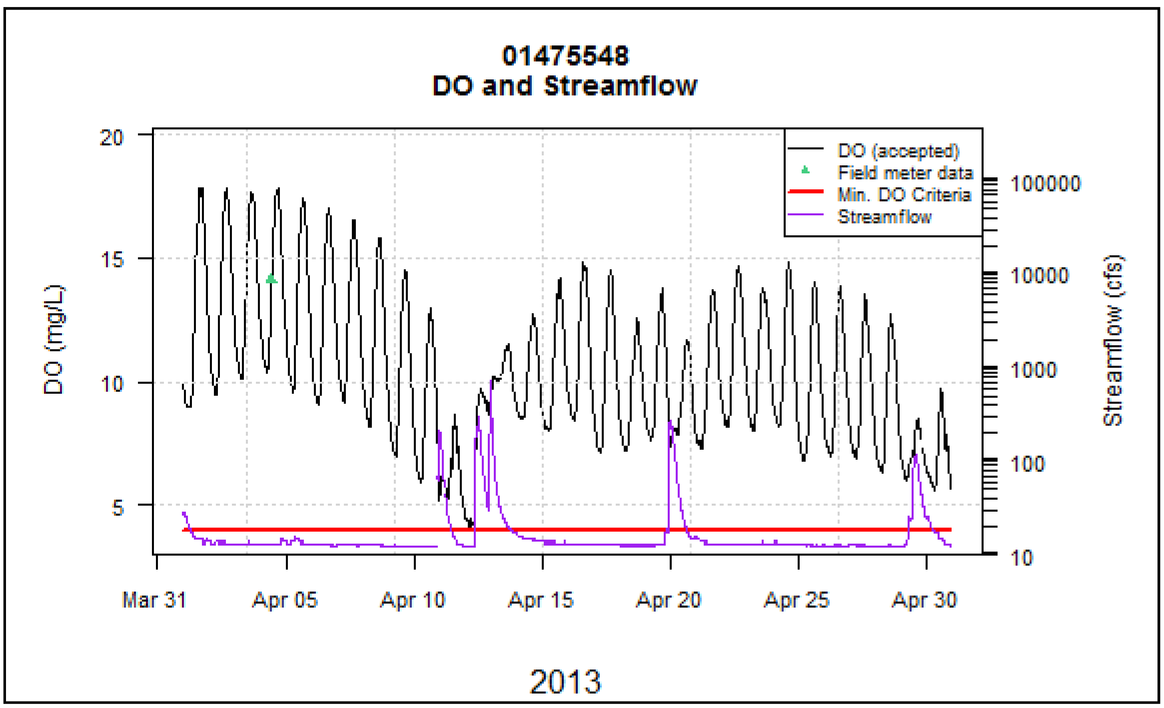


Figure 13. Gage 01475548, Dissolved Oxygen and Streamflow, April 2013.

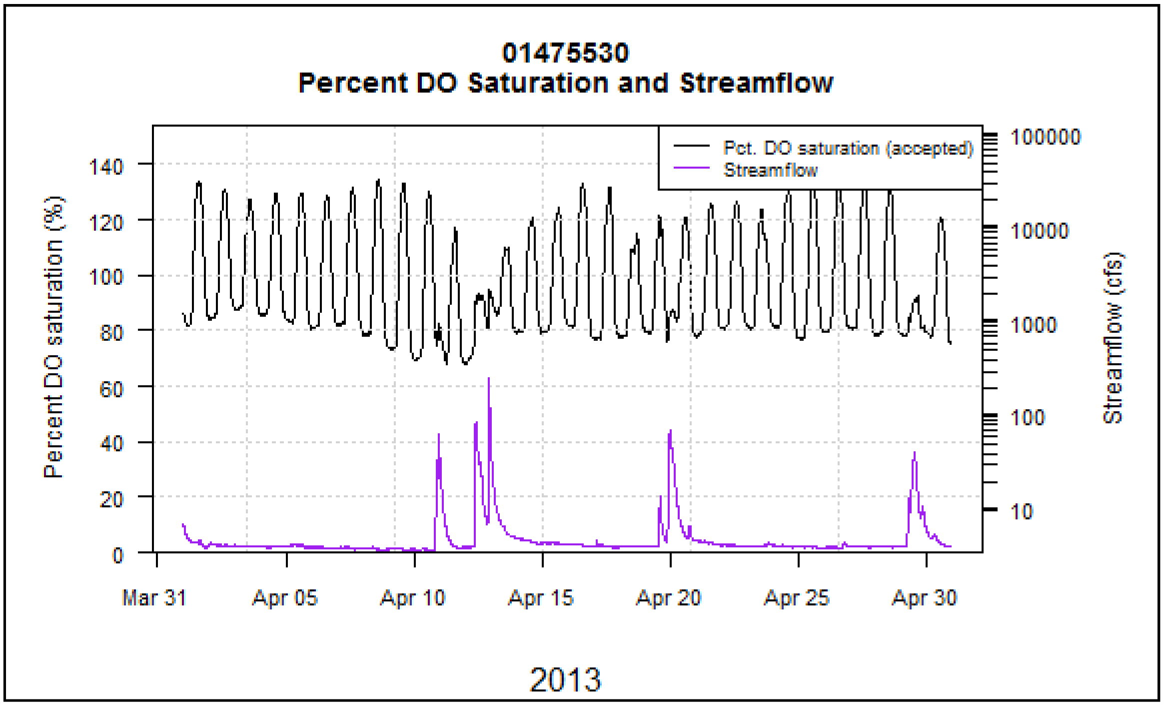


Figure 14. Gage 01475530, Percent DO Saturation and Streamflow, April 2013.

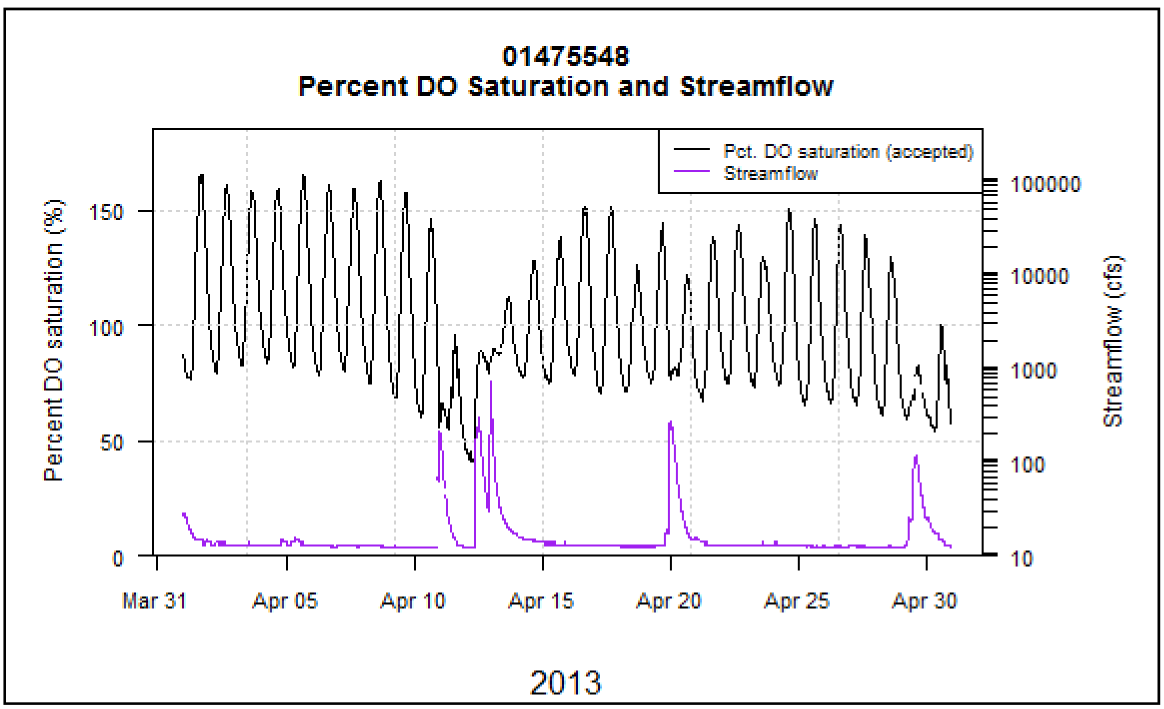


Figure 15. Gage 01475548, Percent DO Saturation and Streamflow, April 2013.

Figure 17. Gage 01475548, Cobbs Creek at Mt. Moriah Cemetery

Specific Conductance

Specific conductance observations were similar to those observed in Tacony Creek, with the exception of consistently higher conductance observed at the downstream gage 01475548 (Tables 27-28). The typical pattern of stormwater lowering conductance levels in the stream is well-observed during the frequent storms that occurred in June (Figures 18-19).

Table 27. Gage 01475530 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	744.0	31.0	0.0	97.0	519.0	456.99
Aug-12	742.5	30.9	0.2	84.0	512.0	398.20
Sep-12	718.0	29.9	0.3	67.0	517.0	385.56
Oct-12	742.5	30.9	0.2	60.0	511.0	310.20
Nov-12	718.0	29.9	0.3	159.0	862.0	456.53
Mar-13	742.0	30.9	0.1	169.0	4800.0	462.64
Apr-13	717.5	29.9	0.3	66.0	893.0	461.57
May-13	729.5	30.4	1.9	100.0	562.0	433.95
Jun-13	719.5	30.0	0.1	48.0	509.0	287.20

Table 28. Gage 01475548 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	615.0	25.6	17.3	185.0	640.0	468.76
Aug-12	742.0	30.9	0.3	143.0	633.0	420.93
Sep-12	719.0	30.0	0.1	72.0	657.0	435.97
Oct-12	742.5	30.9	0.2	78.0	607.0	490.76
Nov-12	718.5	29.9	0.2	355.0	732.0	596.22
Mar-13	741.0	30.9	0.3	171.0	2870.0	738.77
Apr-13	720.0	30.0	0.0	196.0	722.0	596.13
May-13	737.0	30.7	0.9	165.0	656.0	489.48
Jun-13	711.0	29.6	1.3	85.0	637.0	427.12

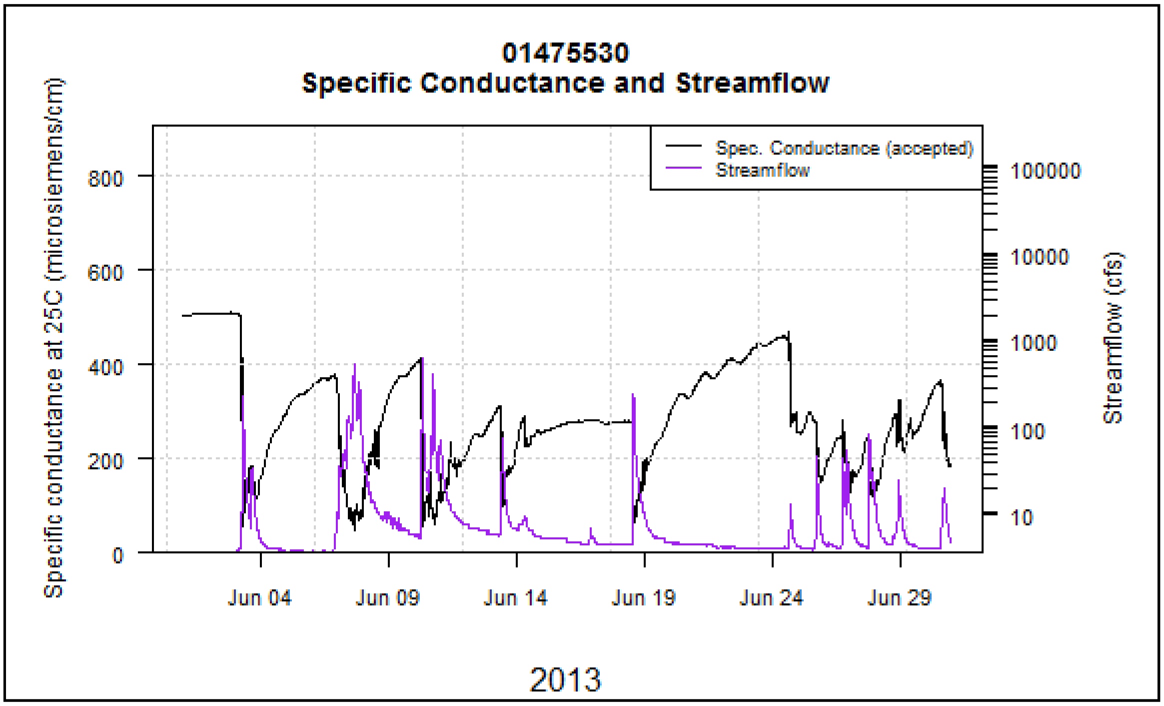


Figure 18. Gage 01475530, Specific Conductance and Streamflow, June 2013.

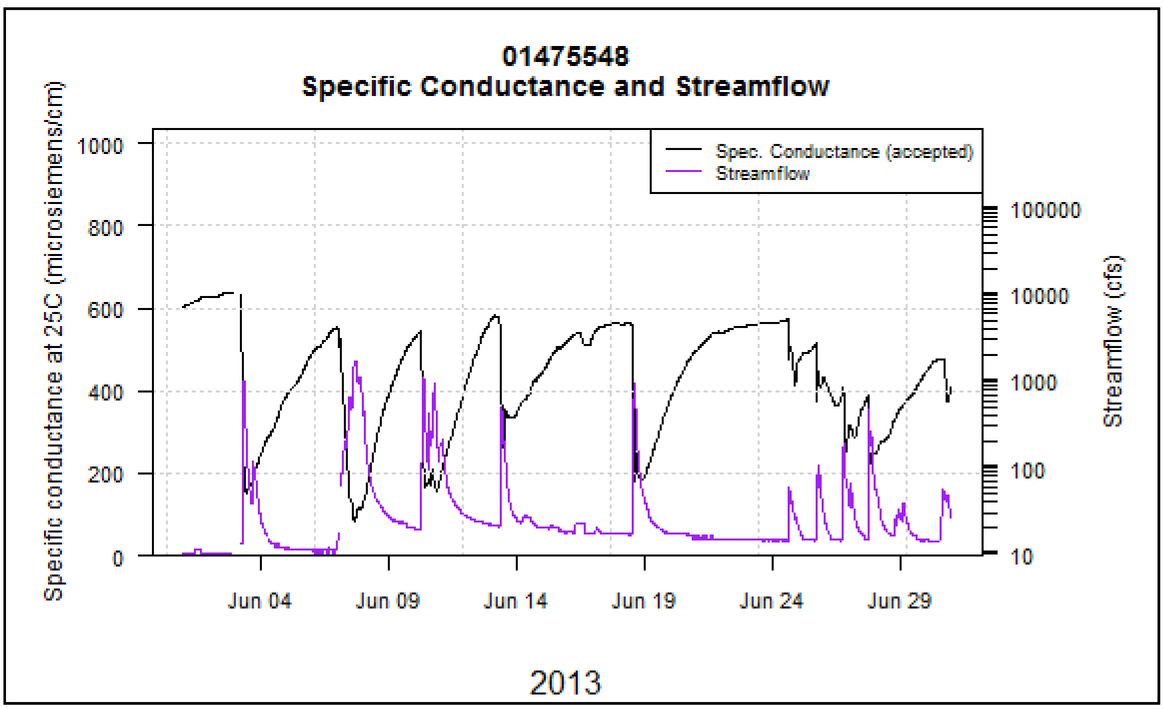


Figure 19. Gage 01475548, Specific Conductance and Streamflow, June 2013.

Temperature

As was also observed in Tacony Creek, slightly higher temperatures were usually recorded at the downstream gage in Cobbs Creek, resulting in more frequent exceedance of temperature maximum criteria at the downstream gage in April and May (Tables 29-30).

Table 29. Gage 01475530 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.0	744.0	31.0	19.9	27.5	23.4
WWF	1-Aug	15-Aug	0.0	100.0	0.4	358.5	14.9	19.4	27.0	22.7
WWF	16-Aug	31-Aug	0.0	100.0	0.0	384.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	13.7	25.9	19.3
WWF	16-Sep	30-Sep	0.0	100.0	0.6	358.0	14.9			
WWF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	9.6	19.7	14.4
WWF	16-Oct	31-Oct	0.0	100.0	0.4	382.5	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.0	360.0	15.0	3.4	12.9	7.7
WWF	16-Nov	30-Nov	0.0	100.0	0.6	358.0	14.9			
WWF	1-Mar	31-Mar	22.8	77.2	0.0	743.0	31.0	3.4	11.7	6.7
WWF	1-Apr	15-Apr	56.3	43.7	0.3	359.0	15.0	5.3	20.7	12.9
WWF	16-Apr	30-Apr	43.7	56.3	0.4	358.5	14.9			
WWF	1-May	15-May	10.9	89.1	0.4	358.5	14.9	10.8	24.0	16.3
WWF	16-May	31-May	3.8	96.2	3.4	371.0	15.5			
WWF	1-Jun	15-Jun	0.0	100.0	0.3	359.0	15.0	16.5	26.6	20.1
WWF	16-Jun	30-Jun	0.0	100.0	0.0	360.0	15.0			

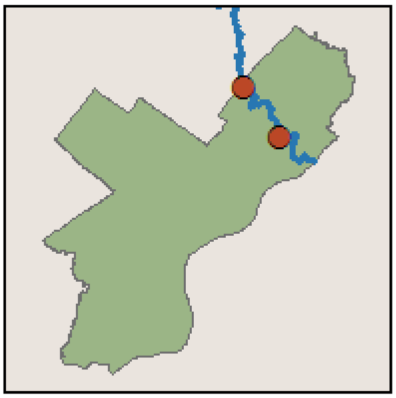
Table 30. Gage 01475548 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	17.3	615.0	25.6	20.7	29.0	24.9
WWF	1-Aug	15-Aug	0.0	100.0	0.4	358.5	14.9	20.7	28.0	24.0
WWF	16-Aug	31-Aug	0.0	100.0	0.0	384.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.3	359.0	15.0	14.5	25.7	20.2
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	10.0	20.5	14.8
WWF	16-Oct	31-Oct	0.0	100.0	0.4	382.5	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.1	359.5	15.0	3.2	11.3	7.3
WWF	16-Nov	30-Nov	0.0	100.0	0.3	359.0	15.0			
WWF	1-Mar	31-Mar	21.9	78.1	0.0	741.0	30.9	3.4	11.8	6.6
WWF	1-Apr	15-Apr	59.2	40.8	0.0	360.0	15.0	5.9	21.5	13.5
WWF	16-Apr	30-Apr	62.6	37.4	0.1	359.5	15.0			
WWF	1-May	15-May	24.5	75.5	0.8	357.0	14.9	11.9	25.7	17.5
WWF	16-May	31-May	11.4	88.6	0.9	380.5	15.9			
WWF	1-Jun	15-Jun	0.0	100.0	2.5	351.0	14.6	17.8	26.4	21.6
WWF	16-Jun	30-Jun	0.0	100.0	0.0	360.0	15.0			

Gages in Separate Sewer System Watersheds

Gages in the Pennypack, Wissahickon and Poquessing watersheds are situated in the separate sewer system areas of Philadelphia. Although these sites are not affected by combined sewer overflows, discharge of untreated stormwater runoff from stormwater outfalls can negatively affect water quality.

Pennypack Creek (Gages 01467042 and 01467048)



Dissolved oxygen and pH

Both the upstream (01467042) and downstream (01467048) gages of Pennypack Creek showed pronounced diel fluctuations in dissolved oxygen and pH as a result of algal activity. These patterns are most evident during dry weather periods, when algal growth is able to excel because of abundant sunshine and a lack of storm events that might otherwise scour the algal population.

At both upstream and downstream Pennypack Creek gages, periods of dry weather in warm months are conducive to excessive algal growth. During these periods, algal populations seemed to flourish, with daily DO fluctuations sometimes higher than 10 mg/L during April (Figures 20-21).

In April, maximum daily pH fluctuations of approximately 1.5 units were observed (Figures 22-23). Maximum pH criteria exceedance occurred mainly at both gages in the spring. It would be reasonable to conclude that if not for periodic interruptions of algal activity due to rainfall, those extreme fluctuations and chronic pH criteria exceedance would likely occur through the entire season.

Algal communities in the area of both gages recover quickly after storm events, as seen in April 2012 (Figures 20-21). Prior to the storm event in April 2013, both DO and pH showed the typical pronounced fluctuations indicative of strong algal activity. This stopped abruptly with the storm, when much of the algae was likely scoured away and overcast conditions likely inhibited further growth, as indicated by the PAR data at 01467048 for April 2012 (Figure 24). However, within 3-4 days of the conclusion of the rainfall and the return of sunny conditions, fluctuations of DO and pH resumed, indicative of high algal density. This not only demonstrates the resilience of the algal population in this ecosystem, but also a likely abundance of nutrients that allows regrowth to occur so quickly.

During the first two weeks of April, a small, recurring spike in pH was observed at 01467048, occurring daily in the evening hours (Figure 23). This pH spike coincided with a similar bump in temperature, suggesting some regular discharge into the stream that affects both parameters. BLS staff alerted PWD's Industrial Waste Unit to the issue, but no explanation has been found. Sensor equipment at 01467048 appeared to be operating without malfunction.

Table 31. Gage 01467042 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	TSF	742.5	30.9	0.2	0.0	100.0	5.1	10.2	7.08
Aug-12	TSF	736.0	30.7	1.1	0.0	100.0	5.7	10.8	7.47
Sep-12	TSF	717.5	29.9	0.3	0.0	100.0	5.9	11.9	8.66
Oct-12	TSF	735.5	30.6	1.1	0.0	100.0	6.2	12.0	8.58
Nov-12	TSF	715.0	29.8	0.7	0.0	100.0	9.2	15.7	11.67
Mar-13	TSF	710.0	29.6	2.9	0.0	100.0	9.4	19.0	12.94
Apr-13	TSF	716.5	29.9	0.5	0.0	100.0	6.1	20.3	10.52
May-13	TSF	738.5	30.8	0.7	0.0	100.0	6.3	11.5	8.32
Jun-13	TSF	696.5	29.0	3.3	0.0	100.0	5.7	10.8	7.92

Table 32. Gage 01467048 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	TSF	739.5	30.8	0.6	0.0	100.0	5.3	12.3	7.66
Aug-12	TSF	740.5	30.9	0.5	0.0	100.0	6.1	15.0	8.04
Sep-12	TSF	718.5	29.9	0.2	0.0	100.0	6.1	13.8	8.66
Oct-12	TSF	609.5	25.4	18.1	0.0	100.0	7.5	12.9	9.38
Nov-12	TSF	681.5	28.4	5.3	0.0	100.0	10.3	15.2	12.03
Mar-13	TSF	652.5	27.2	0.7	0.0	100.0	10.6	16.1	12.71
Apr-13	TSF	714.0	29.8	0.8	0.0	100.0	6.9	19.0	10.97
May-13	TSF	739.0	30.8	0.7	0.0	100.0	6.2	14.2	8.78
Jun-13	TSF	693.5	28.9	3.7	0.9	99.1	0.1	13.0	8.21

Table 33. Gage 01467042 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	TSF	30.0	3.2	0.0	100.0	6.2	7.9	7.08
Aug-12	TSF	24.0	22.6	0.0	100.0	6.6	8.6	7.47
Sep-12	TSF	27.0	10.0	0.0	100.0	7.2	10.0	8.71
Oct-12	TSF	23.0	25.8	0.0	100.0	7.4	10.4	8.62
Nov-12	TSF	27.0	10.0	0.0	100.0	9.8	13.4	11.71
Mar-13	TSF	17.0	44.2	0.0	100.0	11.1	14.0	12.81
Apr-13	TSF	28.0	6.7	0.0	100.0	7.8	14.2	10.51
May-13	TSF	26.0	16.1	0.0	100.0	7.1	9.1	8.32
Jun-13	TSF	14.0	53.3	0.0	100.0	6.5	8.9	7.50

Table 34. Gage 01467048 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	TSF	26.0	16.1	0.0	100.0	6.7	8.6	7.71
Aug-12	TSF	28.0	9.7	0.0	100.0	7.1	9.6	8.10
Sep-12	TSF	28.0	6.7	0.0	100.0	7.5	10.2	8.64
Oct-12	TSF	22.0	29.0	0.0	100.0	8.6	10.8	9.36
Nov-12	TSF	26.0	13.3	0.0	100.0	10.7	13.3	12.05
Mar-13	TSF	24.0	12.3	0.0	100.0	11.1	13.5	12.74
Apr-13	TSF	26.0	13.3	0.0	100.0	8.3	14.3	10.90
May-13	TSF	28.0	9.7	0.0	100.0	7.5	10.1	8.80
Jun-13	TSF	25.0	16.7	4.0	96.0	5.5	9.8	8.21

Table 35. Gage 01467042 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hours max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.43
Aug-12	736.0	30.7	1.1	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.0	7.41
Sep-12	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.3	7.53
Oct-12	735.5	30.6	1.1	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.53
Nov-12	715.0	29.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.6	7.79
Mar-13	710.5	29.6	2.8	8.0	38.7	0.0	0.0	92.0	61.3	7.3	9.6	8.13
Apr-13	716.5	29.9	0.5	11.3	33.3	0.0	0.0	88.7	66.7	7.4	9.7	7.96
May-13	738.5	30.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.9	7.48
Jun-13	696.5	29.0	3.3	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.9	7.35

Table 36. Gage 01467048 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	739.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.9	9.0	7.80
Aug-12	740.5	30.9	0.5	1.2	9.7	0.0	0.0	98.8	90.3	6.9	9.1	7.70
Sep-12	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.8	9.0	7.76
Oct-12	609.5	25.4	18.1	0.9	7.7	0.0	0.0	99.1	92.3	7.2	9.2	8.11
Nov-12	681.0	28.4	5.4	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.8	8.11
Mar-13	652.5	27.2	0.7	1.6	7.1	0.0	0.0	98.4	92.9	7.3	9.2	8.04
Apr-13	714.0	29.8	0.8	22.9	33.3	0.0	0.0	77.1	66.7	7.2	9.6	8.23
May-13	739.0	30.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.8	7.54
Jun-13	693.5	28.9	3.7	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.7	7.47

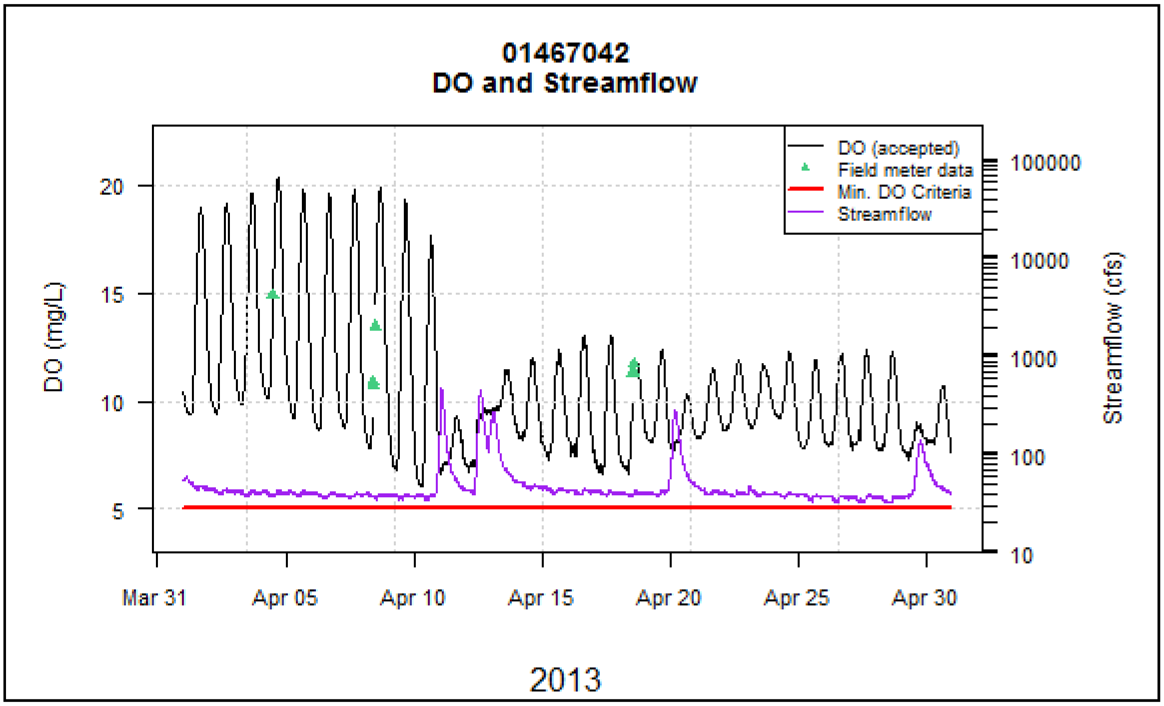


Figure 20. Gage 01467042, Dissolved Oxygen and Streamflow, April 2013.

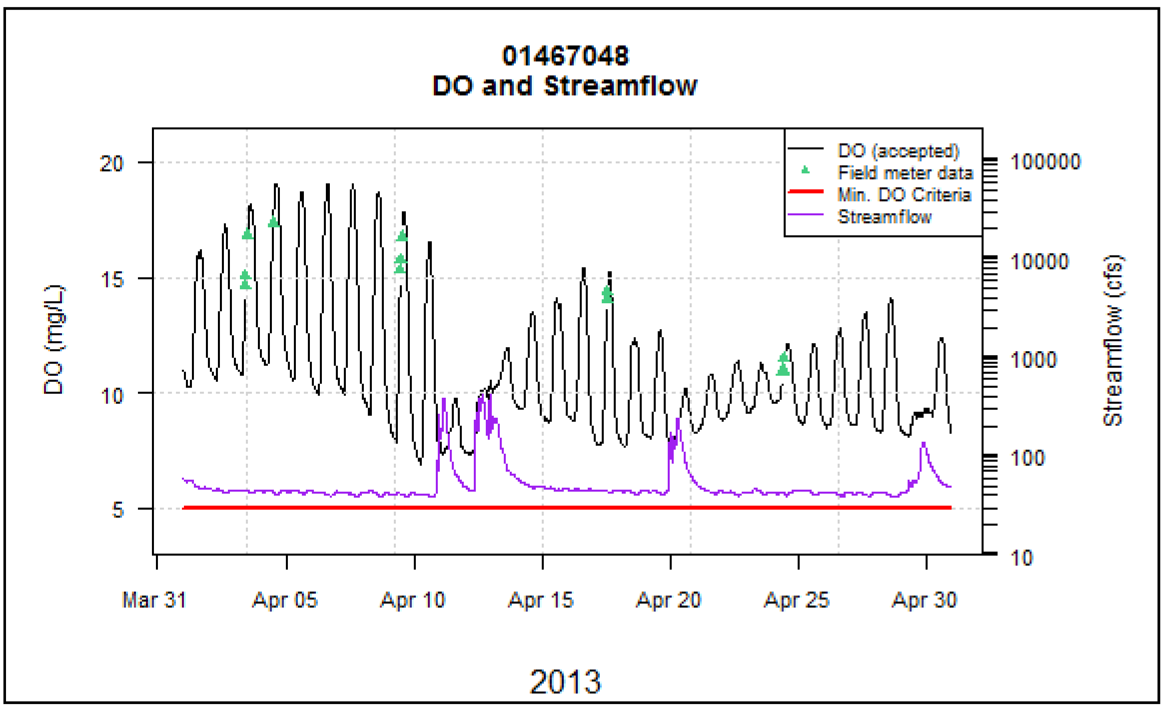


Figure 21. Gage 01467048, Dissolved Oxygen and Streamflow, April 2012.

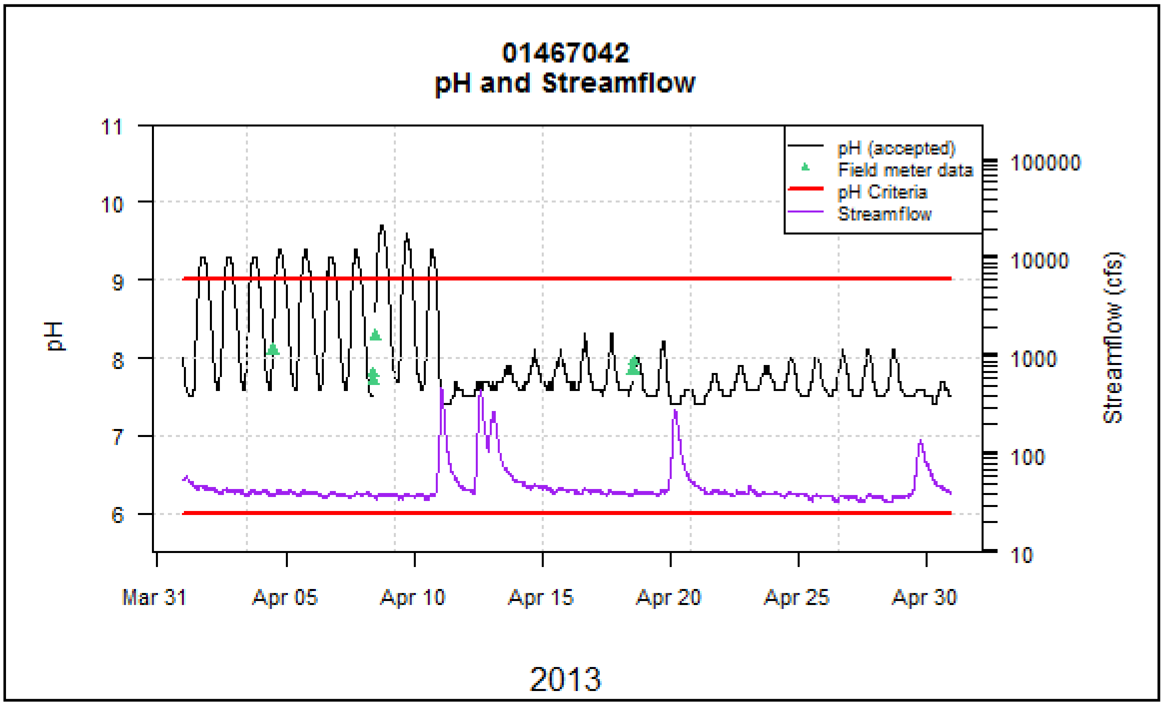


Figure 22. Gage 01467042, pH and Streamflow, April 2013.

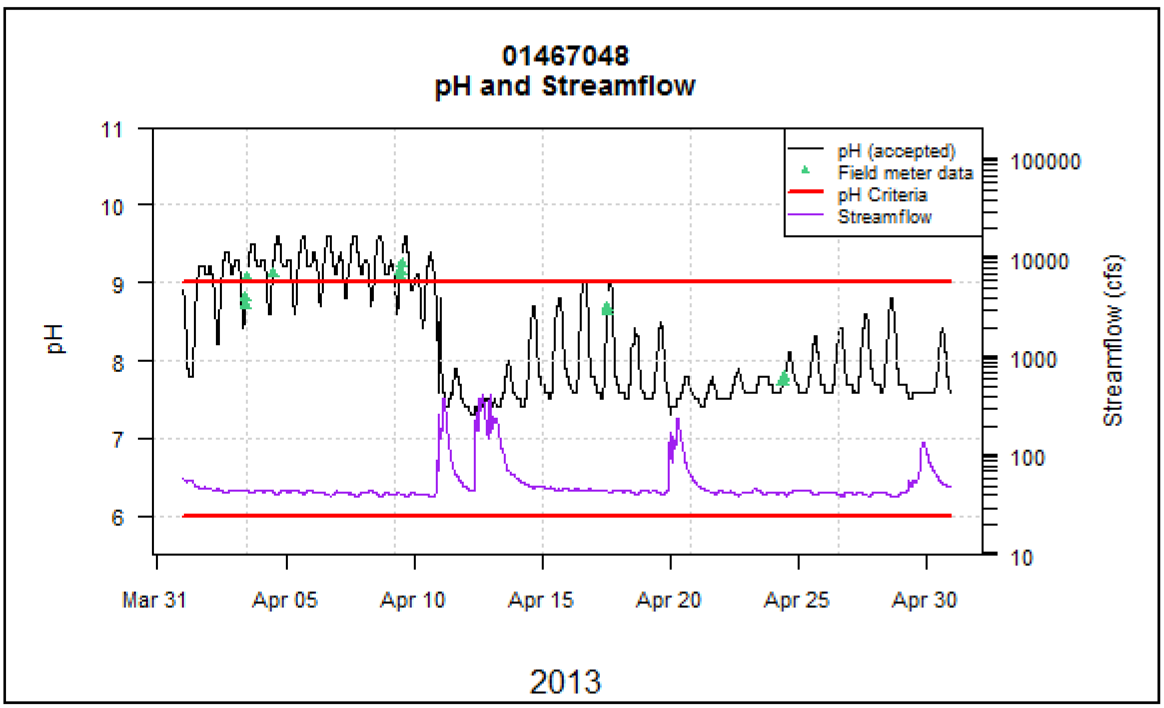


Figure 23. Gage 01467048, pH and Streamflow, April 2013.

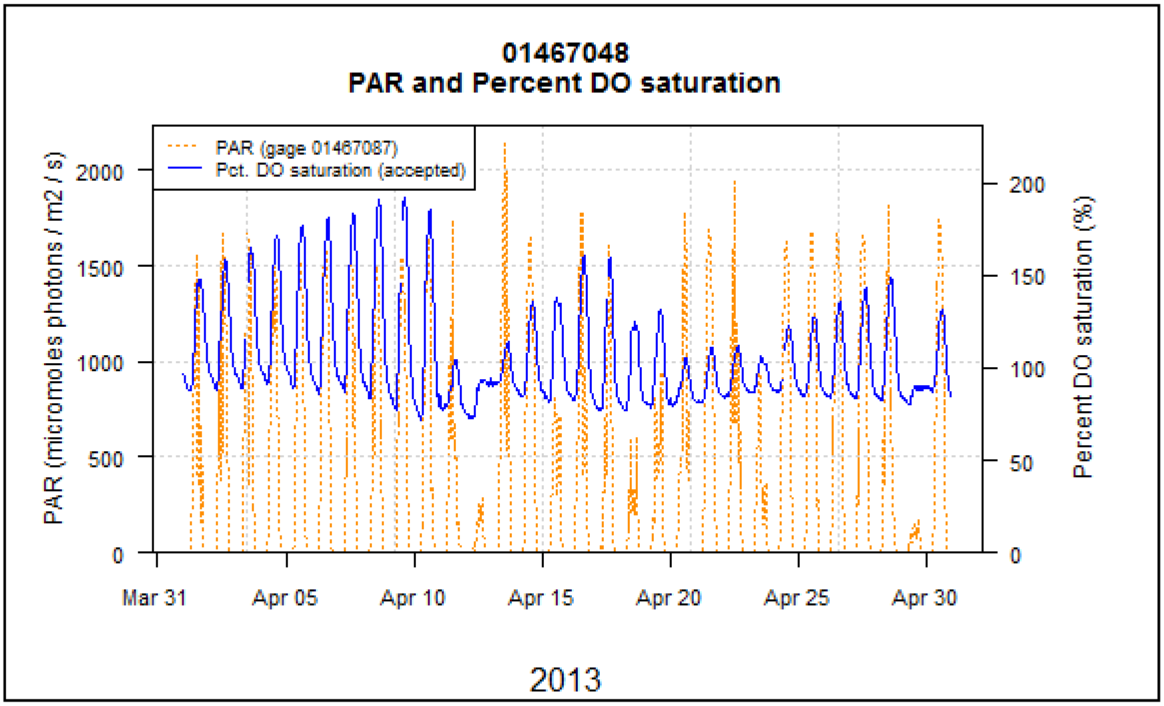


Figure 24. Gage 01467048, PAR and Percent Dissolved Oxygen Saturation, April 2013.

Figure 26. Gage 01467048, Pennypack Creek at Lower Rhawn St. Bridge, looking upstream

Turbidity

Turbidity data at the Pennypack Creek gages tend to reflect streamflow conditions. When there is high flow (*i.e.,* during and after storms), increases in turbidity are common and expected, as sediment in the creek bed is resuspended and particles present in runoff enter the stream. A cursory comparison of turbidity plots from the upstream gage (01467042) reveals that the frequent storms in June 2013 corresponded with elevated turbidity, while the mostly dry month of November 2012 corresponded with low turbidity (Figures 27-28). These two months represent the extremes of turbidity data for the upstream gage, with June 2013 having the highest monthly mean and percentage of hours above the maximum guideline, and November 2012 having the lowest monthly mean and percentage of hours above the maximum guideline (Table 37). The downstream gage generally exhibited higher turbidity values throughout the year.

Table 37. Gage 01467042, Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-12	681.0	28.4	8.5	32.1	67.9	0.0	290.0	7.23
Aug-12	690.0	28.8	7.3	53.6	46.4	0.0	290.0	10.08
Sep-12	671.0	28.0	6.8	12.9	87.1	0.5	220.0	2.73
Oct-12	736.0	30.7	1.1	17.9	82.1	0.0	180.0	4.05
Nov-12	715.0	29.8	0.7	8.5	91.5	0.6	8.3	1.49
Mar-13	708.5	29.5	3.1	18.9	81.1	1.0	150.0	4.31
Apr-13	716.5	29.9	0.5	32.9	67.1	1.2	54.0	3.70
May-13	657.0	27.4	11.7	42.6	57.4	1.5	200.0	6.80
Jun-13	689.5	28.7	4.2	56.1	43.9	1.3	550.0	14.91

Table 38. Gage 01467048, Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-12	723.5	30.1	2.8	38.3	61.7	0.0	270.0	7.31
Aug-12	740.5	30.9	0.5	49.4	50.6	0.4	380.0	9.91
Sep-12	718.5	29.9	0.2	22.8	77.2	0.8	260.0	9.19
Oct-12	609.0	25.4	18.1	18.0	82.0	0.0	140.0	3.52
Nov-12	681.5	28.4	5.3	16.0	84.0	0.6	84.0	2.27
Mar-13	652.5	27.2	0.7	65.4	34.6	1.5	180.0	6.93
Apr-13	714.0	29.8	0.8	69.7	30.3	1.5	86.0	5.03
May-13	716.5	29.9	3.7	70.1	29.9	1.4	820.0	28.45
Jun-13	693.5	28.9	3.7	63.7	36.3	0.9	570.0	20.72

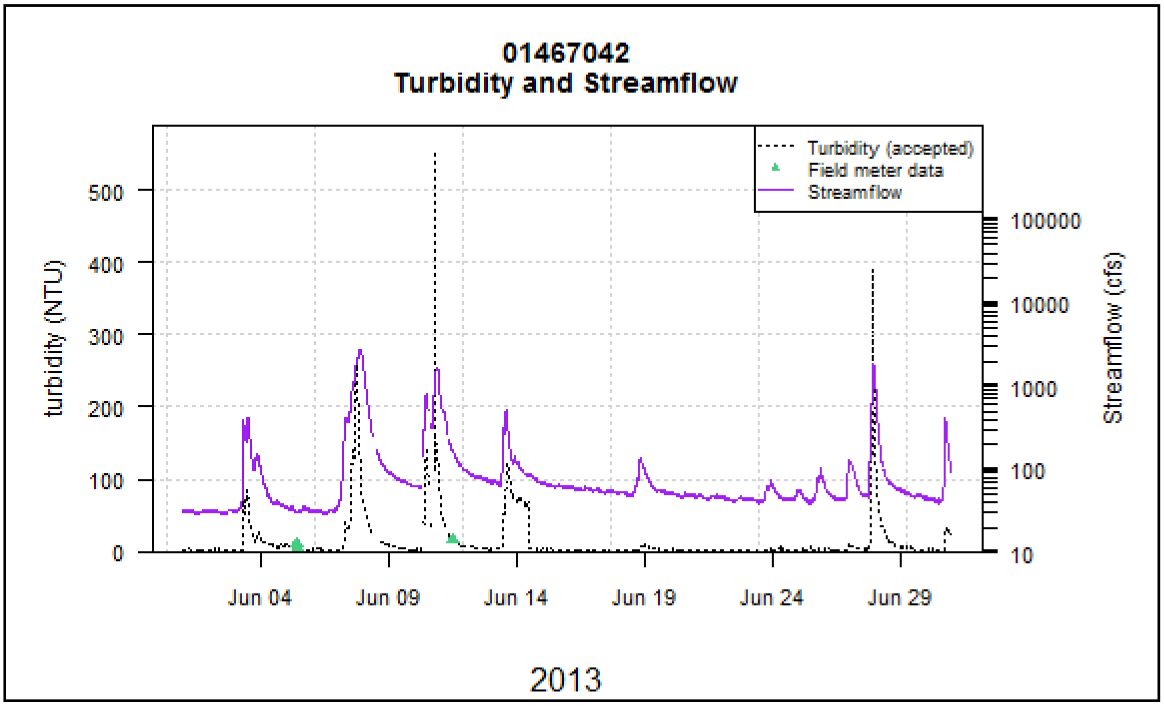


Figure 27. Gage 01467042, Turbidity and Streamflow, June 2013.

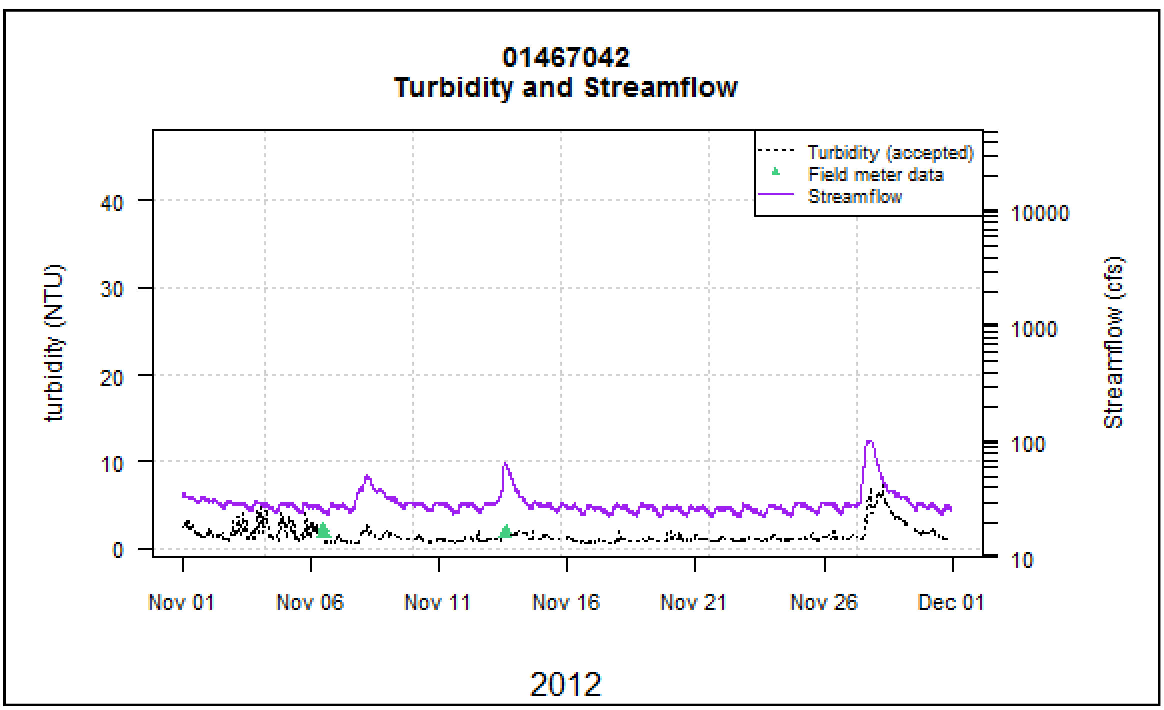


Figure 28. Gage 01467042, Turbidity and Streamflow, November 2012.

Specific Conductance

Specific conductance data were similar to other Philadelphia area streams. Elevated mean and maximum conductance values at both gages in November and March may be evidence of the effects of stormwater runoff and snowmelt containing road salt.

Table 39. Gage 01467042 Specific Conductance Summary Results by Month

Month	Total hours accepted data	Total days accepted data	Percent hours flagged data	Min.	Max.	Mean
Jul-12	742.0	30.9	0.3	210.0	718.0	541.65
Aug-12	736.0	30.7	1.1	134.0	647.0	437.36
Sep-12	717.5	29.9	0.3	127.0	682.0	529.87
Oct-12	735.5	30.6	1.1	147.0	702.0	540.84
Nov-12	715.0	29.8	0.7	412.0	1470.0	699.41
Mar-13	710.5	29.6	2.8	362.0	1860.0	851.00
Apr-13	716.5	29.9	0.5	406.0	781.0	643.75
May-13	738.5	30.8	0.7	219.0	718.0	578.41
Jun-13	696.5	29.0	3.3	111.0	677.0	492.51

Table 40. Gage 01467048 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	739.5	30.8	0.6	83.0	687.0	489.59
Aug-12	740.0	30.8	0.5	88.0	631.0	380.36
Sep-12	718.5	29.9	0.2	42.0	633.0	464.01
Oct-12	609.5	25.4	18.1	123.0	701.0	514.71
Nov-12	681.5	28.4	5.3	375.0	1330.0	658.37
Mar-13	652.5	27.2	0.7	369.0	1680.0	838.67
Apr-13	714.0	29.8	0.8	236.0	751.0	603.92
May-13	739.0	30.8	0.7	183.0	682.0	539.36
Jun-13	693.5	28.9	3.7	96.0	639.0	453.75

Temperature

Temperature data showed variable attainment of maximum temperature criteria (Tables 41-42). The main periods that exceeded maximum criteria were July 2012, and March-June 2013. Spring and early summer months are always subject to major air temperature fluctuations, and reliably predicting average stream temperatures during these periods is difficult at best. Maximum criteria for the summer months, for example, do not take into account natural summer temperature peaks. Above normal air temperatures are the likely cause of high stream temperature exceedance rates in July 2012 (Figures 29-30).

Table 41. Gage 01467042 Temperature Summary Results by Maximum Criteria Period

Des. Use	Date range start	Date range end	Percent hours exceedance	Percent hours attaining	Percent hours flagged data	Total hours accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	87.9	12.1	0.2	742.5	30.9	20.1	27.9	24.6
TSF	1-Aug	15-Aug	0.8	99.2	1.5	354.5	14.8	19.9	27.2	23.3
TSF	16-Aug	31-Aug	0.0	100.0	1.0	380.0	15.8			
TSF	1-Sep	15-Sep	0.0	100.0	0.6	358.0	14.9	14.4	24.6	19.7
TSF	16-Sep	30-Sep	0.0	100.0	0.1	359.5	15.0			
TSF	1-Oct	15-Oct	0.0	100.0	0.4	358.5	14.9	9.9	19.8	14.8
TSF	16-Oct	31-Oct	0.0	100.0	1.8	377.0	15.7			
TSF	1-Nov	15-Nov	0.0	100.0	1.1	356.0	14.8	3.4	12.1	7.5
TSF	16-Nov	30-Nov	0.0	100.0	0.4	358.5	14.9			
TSF	1-Mar	31-Mar	25.8	74.2	0.0	711.0	29.6	3.9	11.5	7.0
TSF	1-Apr	15-Apr	58.7	41.3	0.6	358.0	14.9	5.9	20.8	13.3
TSF	16-Apr	30-Apr	58.1	41.9	0.6	358.0	14.9			
TSF	1-May	15-May	13.7	86.3	0.6	358.0	14.9	11.6	25.0	17.1
TSF	16-May	31-May	27.2	72.8	0.9	380.5	15.9			
TSF	1-Jun	15-Jun	31.8	68.2	4.9	342.5	14.3	16.7	25.8	20.8
TSF	16-Jun	30-Jun	40.9	59.1	1.8	353.5	14.7			

Table 42. Gage 01467048, Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	92.4	7.6	0.6	739.5	30.8	20.6	30.8	25.6
TSF	1-Aug	15-Aug	8.7	91.3	0.6	358.0	14.9	20.8	28.5	24.1
TSF	16-Aug	31-Aug	0.0	100.0	0.4	382.5	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	0.3	359.0	15.0	15.0	26.5	20.4
TSF	16-Sep	30-Sep	0.0	100.0	0.1	359.5	15.0			
TSF	1-Oct	15-Oct	0.0	100.0	0.8	357.0	14.9	9.9	21.1	15.1
TSF	16-Oct	31-Oct	0.0	100.0	34.2	252.5	10.5			
TSF	1-Nov	15-Nov	0.0	100.0	10.4	322.5	13.4	3.1	11.4	6.9
TSF	16-Nov	30-Nov	0.0	100.0	0.3	359.0	15.0			
TSF	1-Mar	31-Mar	25.7	74.3	6.3	652.5	27.2	3.7	11.9	6.9
TSF	1-Apr	15-Apr	59.3	40.7	1.0	356.5	14.9	6.4	21.3	13.7
TSF	16-Apr	30-Apr	71.2	28.8	0.7	357.5	14.9			
TSF	1-May	15-May	24.8	75.2	0.8	357.0	14.9	12.5	26.3	17.8
TSF	16-May	31-May	30.8	69.2	0.5	382.0	15.9			
TSF	1-Jun	15-Jun	36.1	63.9	7.2	334.0	13.9	17.6	27.4	21.7
TSF	16-Jun	30-Jun	57.3	42.7	0.1	359.5	15.0			

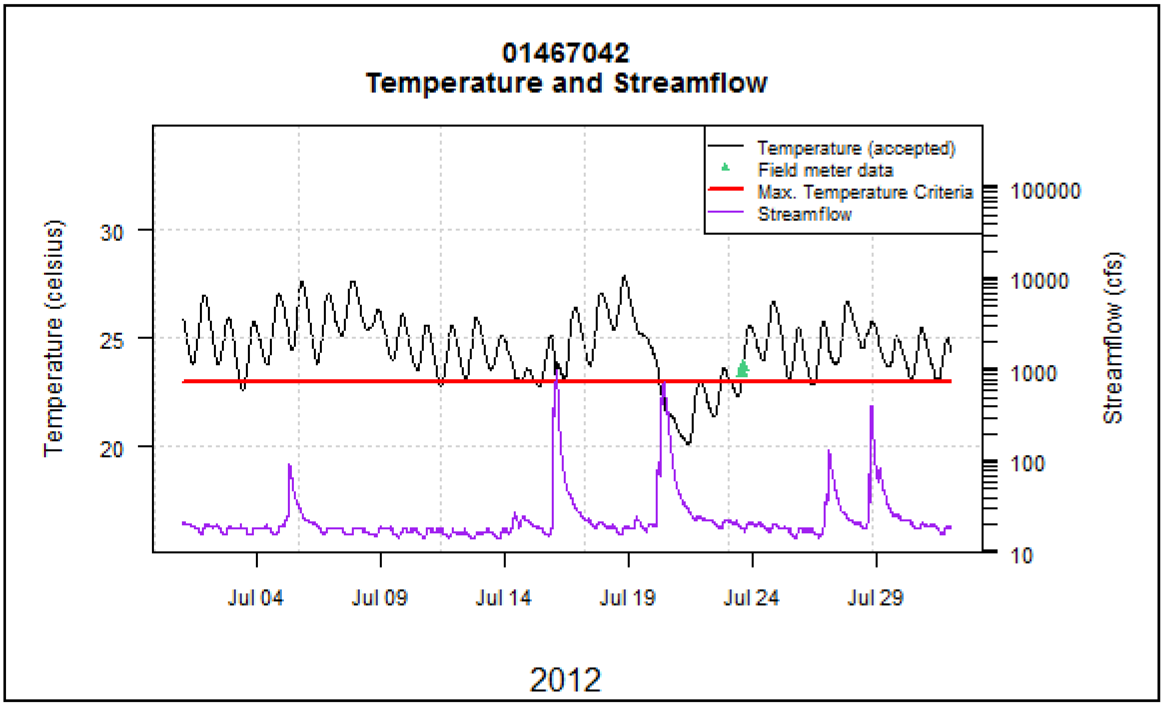


Figure 29. Gage 01467042, Temperature and Streamflow, July 2012.

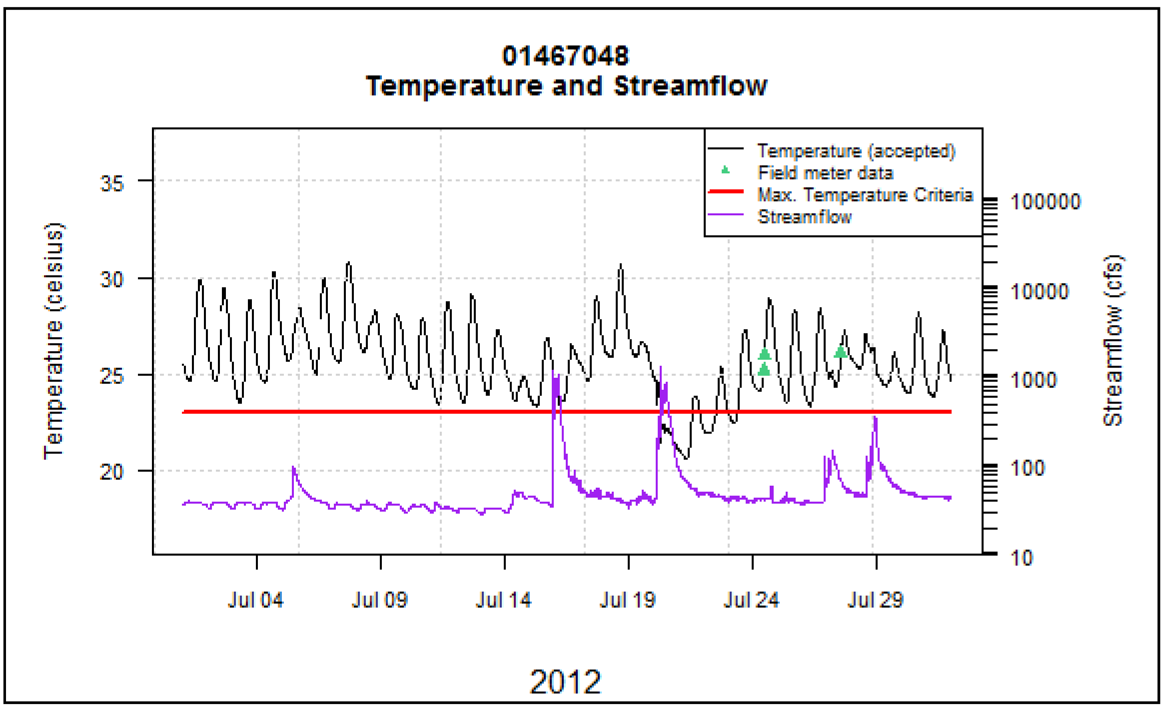
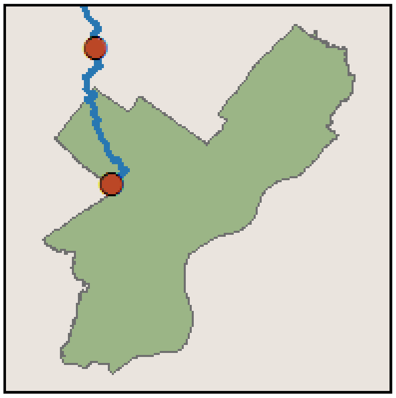


Figure 30. Gage 01467048, Temperature and Streamflow, July 2012.

Wissahickon Creek (Gages 01473900 and 01474000)



During this reporting period, the upstream Wissahickon gage location at Fort Washington (01473900) was moved 50-60 feet downstream of its previous location. The relocation of the water quality monitoring sonde was due to a pump failure on or around June 14, 2013. The new location of the monitoring equipment is in deeper water with better flow, and it no longer requires water to be pumped past the probes. The initial pump set-up was problematic in that it frequently needed to be flushed of sediment and debris after storm events. Because of the pump failure and relocation of the sonde, water quality data was not collected at 01473900 from June 15 to June 19. The absence of this data is reflected in the statistical data below for the month of June.

Dissolved oxygen and pH

Dissolved oxygen and pH data collected from the Wissahickon Creek gages also show signs of strong algal activity in the form of diel fluctuations. The upper gage (01473900) exhibits some of the most dramatic diel fluctuations of any of the Philadelphia USGS gage sites. In April 2013, dissolved oxygen is seen fluctuating from 23.3 to 8.7 mg/L in a single day/night period (Figure 31), with pH ranging from approximately 7.8 to 9.5 at the same time (Figure 32). Nearly 70 percent of the days in March exceeded pH maxima, a direct result of algal activity (Table 47). Similar conditions existed at the downstream gage, with 64.5 percent of the days exceeding pH maxima at 01474000.

Table 43. Gage 01473900 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	TSF	742.0	30.9	0.3	0.0	100.0	5.3	12.9	7.85
Aug-12	TSF	742.5	30.9	0.2	0.0	100.0	5.8	13.7	7.96
Sep-12	TSF	718.5	29.9	0.2	0.0	100.0	4.9	11.9	7.87
Oct-12	TSF	740.0	30.8	0.5	3.7	96.3	2.1	10.4	7.10
Nov-12	TSF	713.0	29.7	1.0	0.0	100.0	8.2	18.1	11.62
Mar-13	TSF	728.0	30.3	0.5	0.0	100.0	7.8	23.9	13.73
Apr-13	TSF	713.5	29.7	0.9	1.1	98.9	4.5	23.3	10.74
May-13	TSF	740.0	30.8	0.5	5.1	94.9	3.7	15.3	7.48
Jun-13	TSF	565.5	23.6	21.5	15.2	84.8	1.7	8.9	6.25

Table 44. Gage 01474000 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	TSF	740.0	30.8	0.5	0.0	100.0	6.2	13.5	8.80
Aug-12	TSF	740.0	30.8	0.5	0.0	100.0	6.8	11.9	8.49
Sep-12	TSF	718.0	29.9	0.3	0.0	100.0	7.6	12.1	9.10
Oct-12	TSF	721.5	30.1	3.0	0.0	100.0	7.8	12.8	9.64
Nov-12	TSF	717.0	29.9	0.4	0.0	100.0	9.4	15.1	12.09
Mar-13	TSF	730.0	30.4	0.0	0.0	100.0	10.5	18.8	13.73
Apr-13	TSF	718.0	29.9	0.3	0.0	100.0	6.9	18.3	10.71
May-13	TSF	742.0	30.9	0.3	0.0	100.0	7.1	12.4	8.98
Jun-13	TSF	718.5	29.9	0.2	0.0	100.0	6.7	11.6	8.60

Table 45. Gage 01473900 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	TSF	28.0	9.7	0.0	100.0	6.9	8.7	7.84
Aug-12	TSF	30.0	3.2	0.0	100.0	6.9	9.3	7.94
Sep-12	TSF	29.0	3.3	0.0	100.0	6.7	8.9	7.86
Oct-12	TSF	28.0	9.7	7.1	92.9	3.5	8.4	7.09
Nov-12	TSF	27.0	10.0	0.0	100.0	9.8	13.2	11.73
Mar-13	TSF	27.0	11.5	0.0	100.0	9.4	15.2	13.64
Apr-13	TSF	26.0	13.3	0.0	100.0	7.5	14.4	10.88
May-13	TSF	28.0	9.7	17.9	82.1	4.9	9.5	7.47
Jun-13	TSF	22.0	26.7	31.8	68.2	3.9	7.4	6.23

Table 46. Gage 01474000 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	TSF	28.0	9.7	0.0	100.0	7.8	9.8	8.78
Aug-12	TSF	27.0	12.9	0.0	100.0	7.6	9.3	8.52
Sep-12	TSF	28.0	6.7	0.0	100.0	8.1	10.0	9.11
Oct-12	TSF	26.0	16.1	0.0	100.0	8.6	11.1	9.56
Nov-12	TSF	28.0	6.7	0.0	100.0	10.3	13.5	12.16
Mar-13	TSF	29.0	4.7	0.0	100.0	11.0	14.7	13.69
Apr-13	TSF	28.0	6.7	0.0	100.0	8.4	13.8	10.65
May-13	TSF	30.0	3.2	0.0	100.0	7.8	9.7	8.96
Jun-13	TSF	29.0	3.3	0.0	100.0	7.5	9.4	8.60

Table 47. Gage 01473900 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.6	7.83
Aug-12	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.76
Sep-12	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.3	7.69
Oct-12	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.8	7.48
Nov-12	713.0	29.7	1.0	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.8	7.91
Mar-13	728.0	30.3	0.5	17.9	67.7	0.0	0.0	82.1	32.3	7.4	9.6	8.35
Apr-13	713.5	29.7	0.9	13.4	46.7	0.0	0.0	86.6	53.3	7.3	9.5	8.19
May-13	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.8	7.65
Jun-13	618.0	25.8	14.2	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.8	7.56

Table 48. Gage 01474000 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.9	8.30
Aug-12	739.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.8	8.13
Sep-12	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.7	8.7	8.25
Oct-12	723.5	30.1	2.8	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.6	8.15
Nov-12	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.9	8.8	8.38
Mar-13	730.0	30.4	0.0	13.4	64.5	0.0	0.0	86.6	35.5	7.6	9.3	8.61
Apr-13	718.0	29.9	0.3	11.2	33.3	0.0	0.0	88.8	66.7	7.5	9.3	8.34
May-13	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.6	7.94
Jun-13	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.95

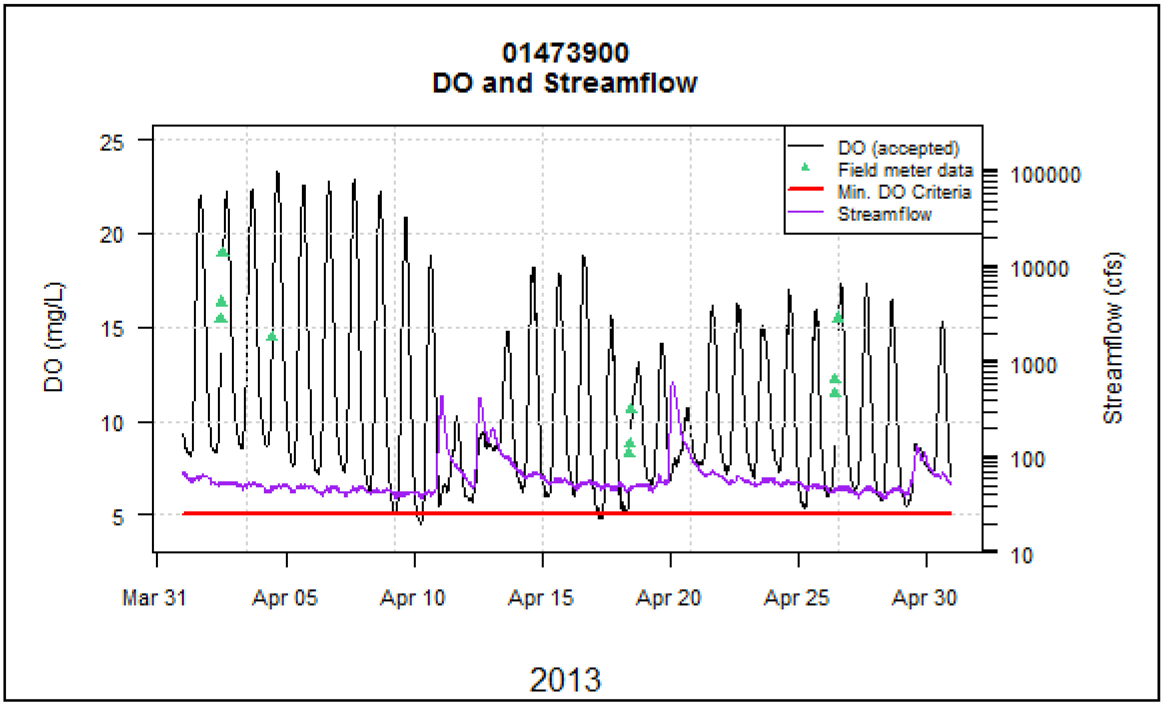


Figure 31. Gage 01473900, Dissolved Oxygen and Streamflow, April 2013.

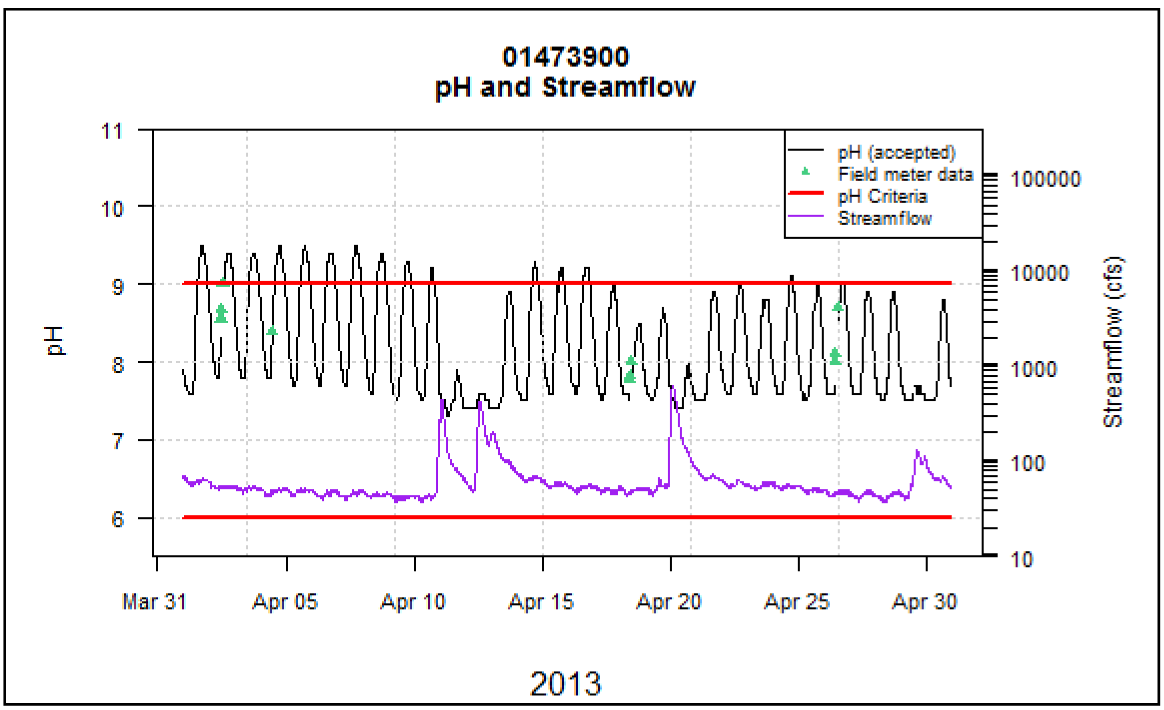


Figure 32. Gage 01473900, pH and Streamflow, April 2013.

Figure 33. Gage 01473900, Wissahickon Creek at Ft.Washington, looking downstream

Figure 34. Gage 01474000, Wissahickon Creek at mouth, looking downstream

Turbidity

Turbidity in the Wissahickon, as with most of Philadelphia's streams, increases drastically with increased flow from rainfall. During the wet month of June 2013, turbidity averaged well above the guideline (Tables 48-49). However, during dry periods between storm events, turbidity quickly decreased. A number of storm events during June (Figure 35) resulted in sharp increases in stream turbidity. However, those levels decreased rapidly afterward as streamflow returned to normal. Such is the case with nearly all storm-related high turbidity events in Philadelphia's streams.

Table 49. Gage 01473900 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-12	716.5	29.9	3.7	28.2	71.8	0.2	180.0	4.74
Aug-12	642.5	26.8	13.6	45.7	54.3	0.0	890.0	33.51
Sep-12	717.5	29.9	0.3	18.3	81.7	0.0	76.0	3.12
Oct-12	685.5	28.6	7.9	21.2	78.8	0.0	390.0	6.27
Nov-12	642.5	26.8	10.8	8.5	91.5	0.0	11.0	0.99
Mar-13	728.0	30.3	0.5	32.6	67.4	1.5	82.0	4.74
Apr-13	712.5	29.7	1.0	51.5	48.5	1.4	52.0	5.03
May-13	512.5	21.4	31.1	81.9	18.1	2.2	800.0	32.54
Jun-13	565.0	23.5	21.5	76.2	23.8	1.4	180.0	21.83

Table 50. Gage 01474000 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-12	740.0	30.8	0.5	21.1	78.9	1.1	190.0	5.44
Aug-12	740.0	30.8	0.5	53.3	46.7	1.3	240.0	11.18
Sep-12	699.5	29.1	2.8	19.7	80.3	0.0	68.0	3.40
Oct-12	719.0	30.0	3.4	18.5	81.5	0.0	190.0	5.17
Nov-12	704.0	29.3	2.2	13.0	87.0	0.5	20.0	1.60
Mar-13	728.0	30.3	0.3	25.1	74.9	1.3	240.0	4.81
Apr-13	614.0	25.6	14.7	36.3	63.7	1.2	43.0	4.40
May-13	741.0	30.9	0.4	32.5	67.5	0.8	210.0	6.01
Jun-13	718.5	29.9	0.2	41.6	58.4	0.4	650.0	12.03

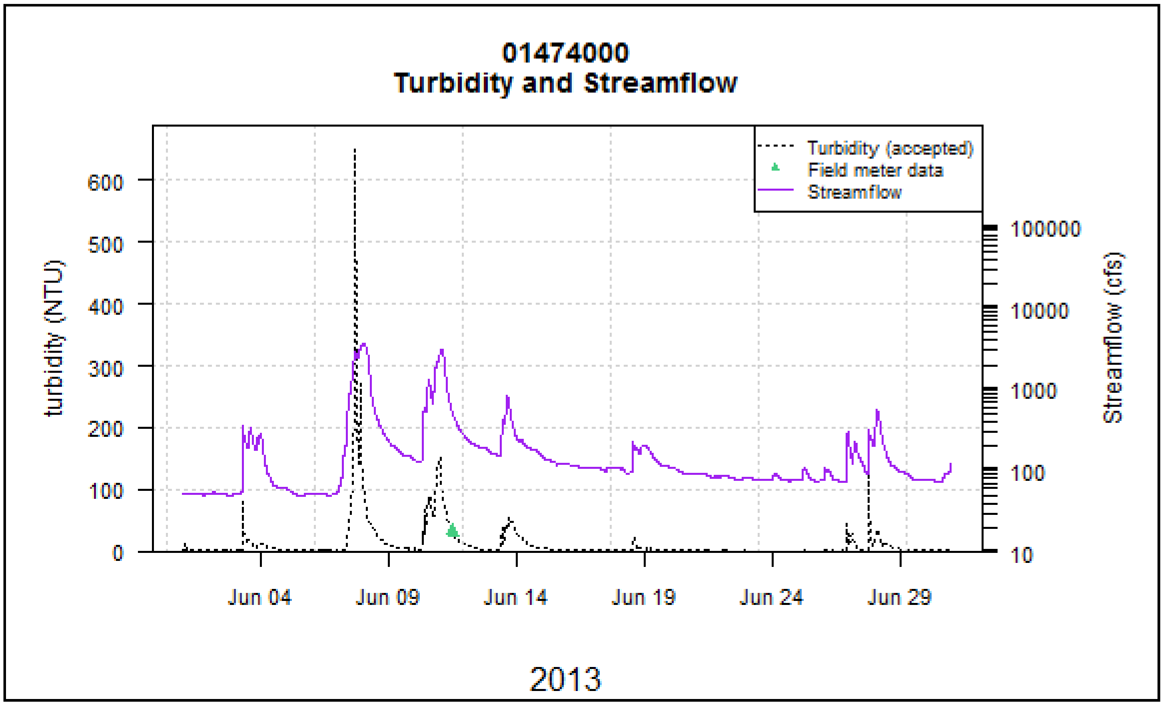


Figure 35. Gage 01473900, Turbidity and Streamflow, June 2013.

Specific Conductance

Specific conductance data at the Wissahickon Creek gage sites generally follow the established pattern in other Philadelphia streams: Runoff from rain events dilutes the stream and decreases conductivity. However, a reversal in this trend sometimes occurs during winter storms, when it is presumed that the application of road salt (sodium chloride) prior to the storm washes into Wissahickon Creek and causes conductivity to increase in conjunction with streamflow (Figure 36). This pattern is also sometimes observed in early March, when higher conductivity in the stream is likely attributable to road salt present in snowmelt.

Table 51. Gage 01473900 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	742.0	30.9	0.3	214.0	1060.0	822.80
Aug-12	742.5	30.9	0.2	158.0	931.0	608.93
Sep-12	718.5	29.9	0.2	195.0	943.0	729.96
Oct-12	740.5	30.9	0.5	151.0	1010.0	794.72
Nov-12	714.0	29.8	0.8	500.0	1480.0	862.42
Mar-13	728.0	30.3	0.5	448.0	2080.0	897.80
Apr-13	713.5	29.7	0.9	390.0	853.0	738.69
May-13	740.0	30.8	0.5	263.0	846.0	689.51
Jun-13	618.0	25.8	14.2	112.0	849.0	588.10

Table 52. Gage 01474000 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	740.0	30.8	0.5	154.0	854.0	713.17
Aug-12	740.0	30.8	0.5	215.0	777.0	490.15
Sep-12	718.0	29.9	0.3	220.0	801.0	625.45
Oct-12	723.5	30.1	2.8	167.0	883.0	697.52
Nov-12	717.0	29.9	0.4	333.0	1100.0	687.98
Mar-13	730.0	30.4	0.0	459.0	1470.0	854.25
Apr-13	718.0	29.9	0.3	408.0	855.0	722.01
May-13	742.0	30.9	0.3	300.0	799.0	661.29
Jun-13	718.0	29.9	0.3	125.0	773.0	564.63

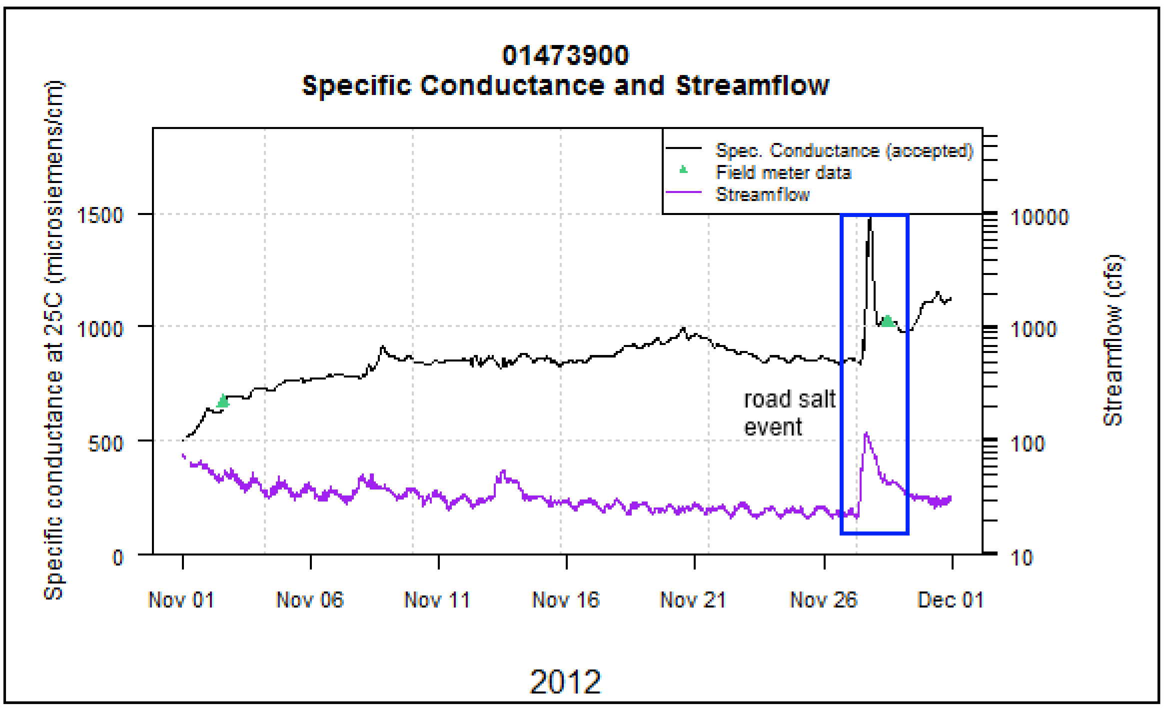


Figure 36. Gage 01473900, Specific Conductance and Streamflow, November 2012.

Temperature

Temperature trends and exceedance rates in Wissahickon Creek Watershed were similar to those observed in Pennypack Creek, with frequent exceedances during the spring (Tables 52-53, Figures 37-38).

Table 53. Gage 01473900 Temperature Summary Results by Month by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	78.9	21.1	0.5	740.0	30.8	20.2	27.8	24.2
TSF	1-Aug	15-Aug	0.3	99.7	0.0	360.0	15.0	19.9	27.1	23.2
TSF	16-Aug	31-Aug	0.0	100.0	0.4	382.5	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	14.6	24.6	19.9
TSF	16-Sep	30-Sep	0.0	100.0	0.6	358.0	14.9			
TSF	1-Oct	15-Oct	0.0	100.0	0.6	358.0	14.9	10.2	20.1	15.1
TSF	16-Oct	31-Oct	0.0	100.0	0.4	382.5	15.9			
TSF	1-Nov	15-Nov	0.0	100.0	1.3	355.5	14.8	3.9	13.2	8.2
TSF	16-Nov	30-Nov	0.0	100.0	1.0	356.5	14.9			
TSF	1-Mar	31-Mar	27.2	72.8	0.0	727.0	30.3	4.0	12.3	7.1
TSF	1-Apr	15-Apr	60.7	39.3	0.7	357.5	14.9	6.2	20.8	13.4
TSF	16-Apr	30-Apr	60.6	39.4	1.3	355.5	14.8			
TSF	1-May	15-May	15.5	84.5	0.8	357.0	14.9	11.3	24.7	17.0
TSF	16-May	31-May	25.0	75.0	0.5	382.0	15.9			
TSF	1-Jun	15-Jun	25.3	74.7	3.9	346.0	14.4	16.8	25.3	20.6
TSF	16-Jun	30-Jun	44.1	55.9	24.7	271.0	11.3			

Table 54. Gage 01474000 Temperature Summary Results by Month by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	78.1	21.9	0.5	740.0	30.8	20.1	26.6	24.0
TSF	1-Aug	15-Aug	0.0	100.0	0.6	358.0	14.9	20.2	25.6	23.0
TSF	16-Aug	31-Aug	0.0	100.0	0.5	382.0	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	0.6	358.0	14.9	15.1	23.8	19.7
TSF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
TSF	1-Oct	15-Oct	0.0	100.0	4.4	344.0	14.3	10.6	18.8	14.6
TSF	16-Oct	31-Oct	0.0	100.0	0.0	384.0	16.0			
TSF	1-Nov	15-Nov	0.0	100.0	0.8	357.0	14.9	3.4	11.2	7.2
TSF	16-Nov	30-Nov	0.0	100.0	0.0	360.0	15.0			
TSF	1-Mar	31-Mar	18.7	81.3	0.0	730.0	30.4	4.0	10.9	6.6
TSF	1-Apr	15-Apr	57.6	42.4	0.4	358.5	14.9	6.7	19.9	13.3
TSF	16-Apr	30-Apr	64.7	35.3	0.1	359.5	15.0			
TSF	1-May	15-May	11.5	88.5	0.6	358.0	14.9	12.9	24.0	17.2
TSF	16-May	31-May	22.5	77.5	0.0	384.0	16.0			
TSF	1-Jun	15-Jun	29.6	70.4	0.4	358.5	14.9	17.6	25.2	21.0
TSF	16-Jun	30-Jun	44.6	55.4	0.0	360.0	15.0			

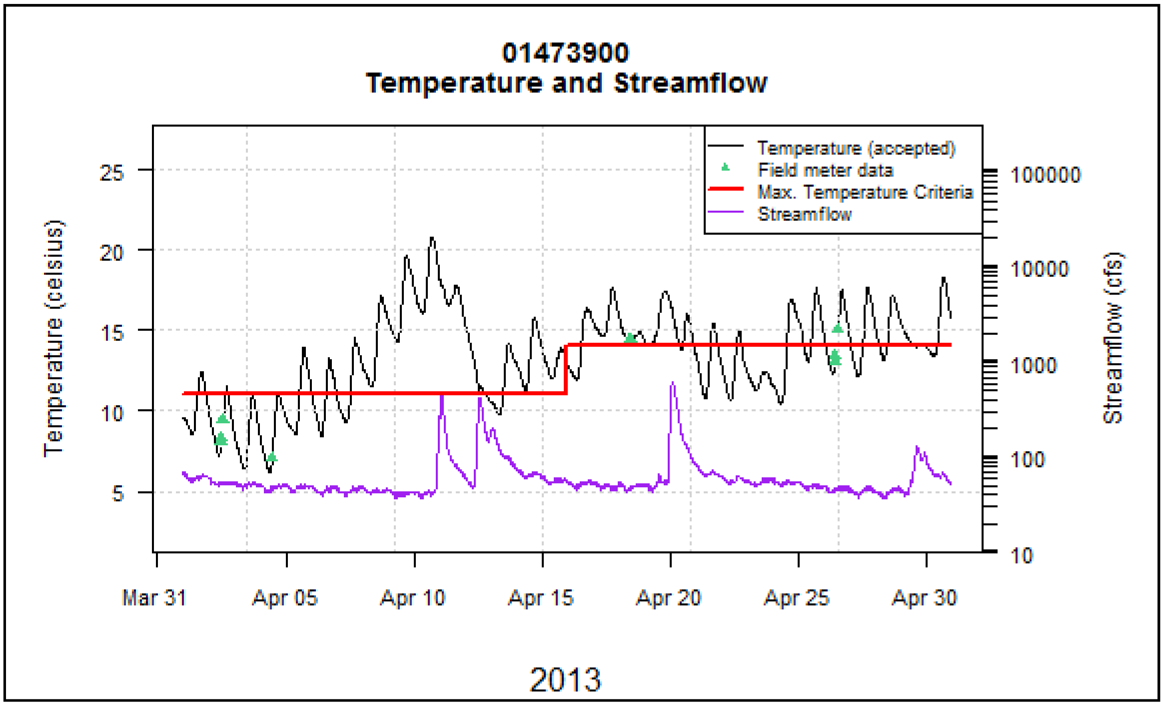


Figure 37. Gage 01473900, Temperature and Streamflow, April 2013.

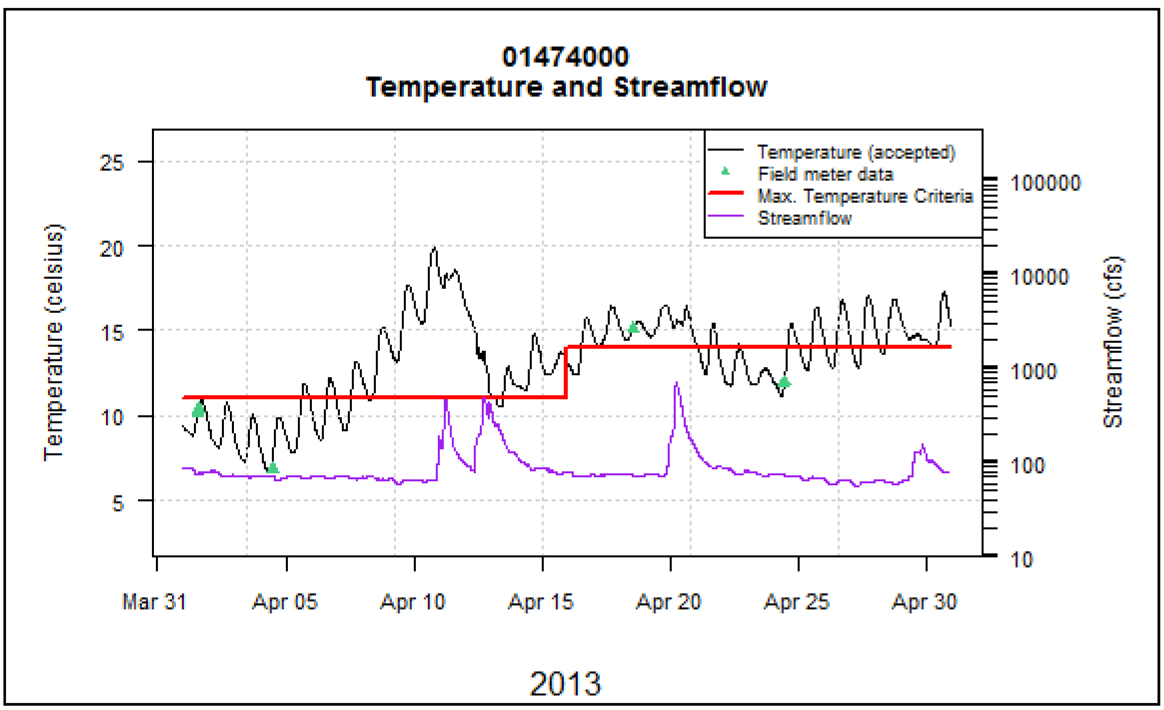
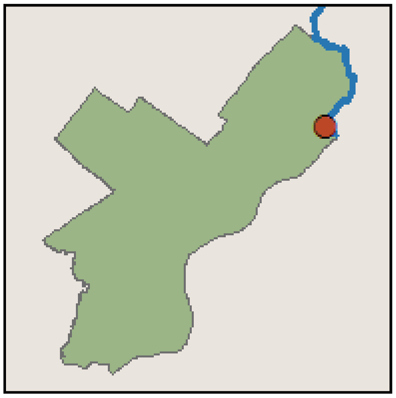


Figure 38. Gage 01474000, Temperature and Streamflow, April 2013.

Poquesssing Creek (Gage 01465798)



Dissolved oxygen and pH

Dissolved oxygen and pH at this gage site were usually within acceptable ranges and seldom fell below the minimum DO criterion or exceeded the pH maximum criterion (Tables 55-57). Data collected from Poquessing Creek did exhibit classic signs of algal activity, as indicated by diel fluctuations in both DO and pH (Figure 39).

As seen with previous sites, the algal activity and related diel fluctuations in DO and pH are only suppressed by storm events. These suppressions, however, are only very temporary. Given an adequate period of uninterrupted algal growth, such as occurred in April 2012 (Figure 40), one can expect steadily increasing DO and pH fluctuations. June was the only month during which the minimum and mean DO criteria were not fully attained at 01465798.

Table 55. Gage 01465798 Dissolved Oxygen Min. Criteria Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	WWF	715.0	29.8	3.9	0.0	100.0	4.1	12.3	7.08
Aug-12	WWF	740.5	30.9	0.5	0.0	100.0	4.6	13.2	7.59
Sep-12	WWF	716.5	29.9	0.5	0.0	100.0	5.9	14.7	8.35
Oct-12	WWF	739.5	30.8	0.6	0.0	100.0	6.2	14.0	8.90
Nov-12	WWF	716.5	29.9	0.5	0.0	100.0	8.0	15.9	11.22
Mar-13	WWF	741.5	30.9	0.2	0.0	100.0	9.6	19.0	13.14
Apr-13	WWF	718.5	29.9	0.2	0.0	100.0	6.3	17.2	10.60
May-13	WWF	735.0	30.6	1.2	0.0	100.0	4.2	12.0	7.59
Jun-13	WWF	718.0	29.9	0.3	8.8	91.2	1.0	13.8	7.10

Table 56. Gage 01465798 Dissolved Oxygen Mean Criteria Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	WWF	26.0	16.1	0.0	100.0	6.1	8.3	7.10
Aug-12	WWF	27.0	12.9	0.0	100.0	6.5	8.8	7.55
Sep-12	WWF	28.0	6.7	0.0	100.0	7.0	10.1	8.33
Oct-12	WWF	28.0	9.7	0.0	100.0	7.4	11.0	8.91
Nov-12	WWF	28.0	6.7	0.0	100.0	9.3	13.3	11.22
Mar-13	WWF	29.0	6.3	0.0	100.0	10.6	14.8	13.09
Apr-13	WWF	29.0	3.3	0.0	100.0	7.7	13.0	10.58
May-13	WWF	28.0	9.7	0.0	100.0	5.6	9.0	7.62
Jun-13	WWF	29.0	3.3	6.9	93.1	4.1	10.3	7.14

Table 57. Gage 01465798 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	740.0	29.8	3.9	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.8	7.35
Aug-12	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.5	8.8	7.26
Sep-12	714.5	29.9	0.5	0.3	3.3	0.0	0.0	99.7	96.7	6.6	9.2	7.44
Oct-12	705.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.4	7.27
Nov-12	714.5	29.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.7	7.29
Mar-13	584.0	30.9	0.2	0.7	6.5	0.0	0.0	99.3	93.5	7.1	9.2	7.70
Apr-13	666.0	29.9	0.2	0.3	3.3	0.0	0.0	99.7	96.7	7.0	9.1	7.60
May-13	688.5	30.6	1.2	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.7	7.19
Jun-13	667.5	29.9	0.3	0.1	3.3	0.0	0.0	99.9	96.7	6.6	9.1	7.50

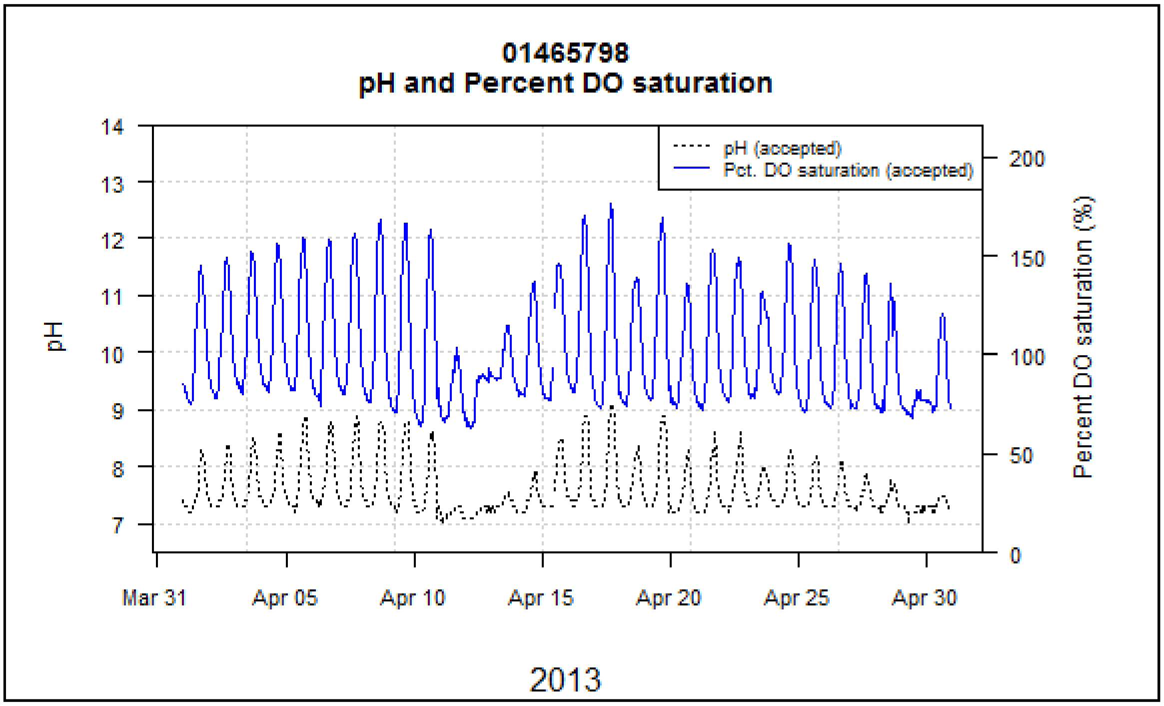


Figure 39. Gage 01465798, pH and Percent DO Saturation, April 2013.

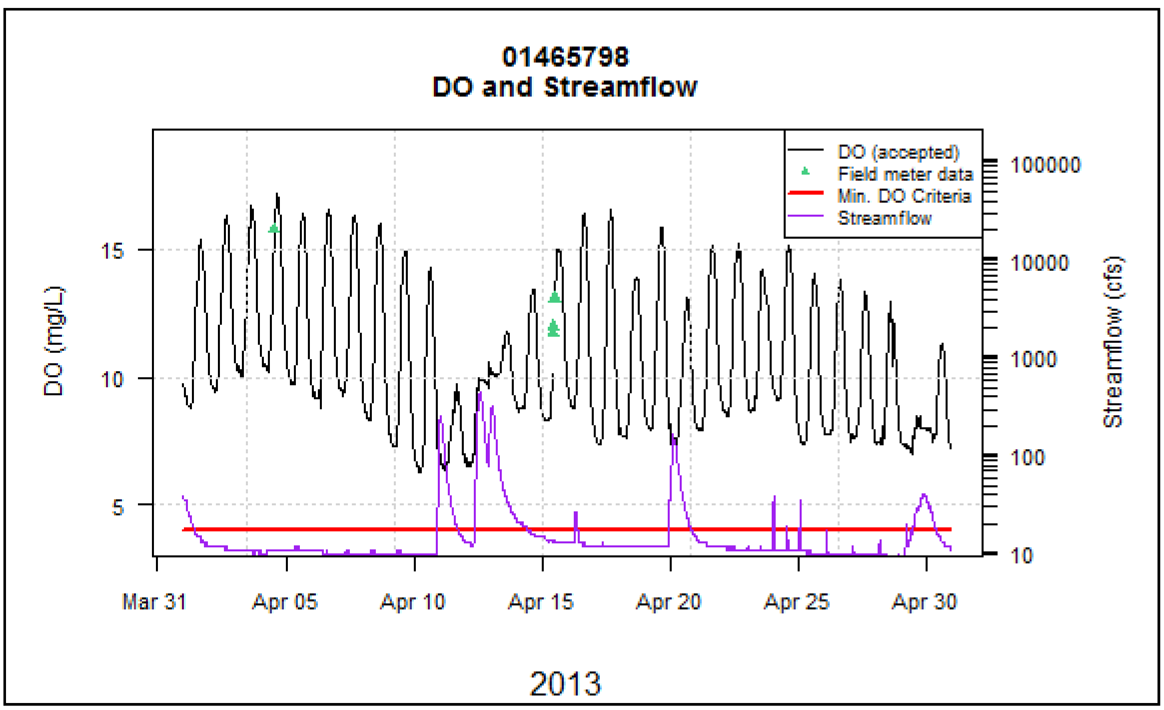


Figure 40. Gage 01465798, DO and Streamflow, April 2013.

Figure 41. Gage 01465798, Poquessing Creek at Grant Ave., looking upstream

Turbidity

As in other Philadelphia streams, high turbidity levels accompanied storm events and increased streamflow.

Table 58. Gage 01465798 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-12	695.0	29.0	3.9	50.5	49.5	0.0	480.0	10.75
Aug-12	649.5	27.1	12.7	51.7	48.3	0.4	280.0	8.02
Sep-12	716.5	29.9	0.5	26.2	73.8	0.4	240.0	8.08
Oct-12	739.5	30.8	0.6	23.0	77.0	0.3	190.0	4.67
Nov-12	716.5	29.9	0.5	12.6	87.4	0.3	18.0	1.55
Mar-13	677.0	28.2	8.9	33.8	66.2	0.6	170.0	7.47
Apr-13	718.5	29.9	0.2	24.2	75.8	0.6	380.0	23.10
May-13	735.0	30.6	1.2	41.6	58.4	0.4	140.0	5.92
Jun-13	718.0	29.9	0.3	45.8	54.2	0.0	360.0	10.99

Specific Conductance

Specific conductance data were similar to other Philadelphia streams.

Table 59. Gage 01465798 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	715.0	29.8	3.9	101.0	652.0	419.04
Aug-12	740.5	30.9	0.5	111.0	597.0	325.38
Sep-12	716.5	29.9	0.5	46.0	1400.0	437.24
Oct-12	739.5	30.8	0.6	76.0	606.0	470.26
Nov-12	716.5	29.9	0.5	373.0	946.0	637.56
Mar-13	741.5	30.9	0.2	362.0	1980.0	878.71
Apr-13	718.5	29.9	0.2	211.0	822.0	621.53
May-13	735.0	30.6	1.2	164.0	695.0	509.95
Jun-13	718.0	29.9	0.3	65.0	646.0	419.92

Temperature

Temperature exceedance rates observed in Poquessing Creek were similar to those in other WWF designated-use creeks (*e.g.*, Tacony and Cobbs Creeks).

Table 60. Gage 01465798 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	3.9	715.0	29.8	20.1	30.2	24.9
WWF	1-Aug	15-Aug	0.0	100.0	0.4	358.5	14.9	20.2	28.5	23.9
WWF	16-Aug	31-Aug	0.0	100.0	0.5	382.0	15.9			
WWF	1-Sep	15-Sep	0.0	100.0	0.4	358.5	14.9	14.6	26.3	20.2
WWF	16-Sep	30-Sep	0.0	100.0	0.6	358.0	14.9			
WWF	1-Oct	15-Oct	0.0	100.0	0.6	358.0	14.9	9.6	20.7	14.9
WWF	16-Oct	31-Oct	0.0	100.0	0.7	381.5	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.6	358.0	14.9	2.9	11.5	7.2
WWF	16-Nov	30-Nov	0.0	100.0	0.4	358.5	14.9			
WWF	1-Mar	31-Mar	22.3	77.7	0.0	741.5	30.9	2.8	12.8	6.4
WWF	1-Apr	15-Apr	58.3	41.7	0.4	358.5	14.9	5.5	22.3	13.4
WWF	16-Apr	30-Apr	59.6	40.4	0.0	360.0	15.0			
WWF	1-May	15-May	22.7	77.3	0.1	359.5	15.0	11.4	26.6	17.4
WWF	16-May	31-May	13.6	86.4	2.2	375.5	15.6			
WWF	1-Jun	15-Jun	1.3	98.7	0.6	358.0	14.9	17.4	27.6	21.6
WWF	16-Jun	30-Jun	0.0	100.0	0.0	360.0	15.0			

Gages in Large Watersheds

Schuylkill River (Gage 01474500)

Dissolved oxygen and pH

DO water quality criteria were never exceeded at this location (Tables 61-62). pH criteria were exceeded in July 2012, as well as in March and April 2013 (Table 63). Supersaturated DO conditions were observed concomitant with daily pH peaks around 9.0 in the beginning of July (Figure 42), indicating high algal activity.

Table 61. Gage 01474500 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-12	WWF	742.5	30.9	0.2	0.0	100.0	5.5	19.4	8.75
Aug-12	WWF	740.5	30.9	0.5	0.0	100.0	6.2	9.3	7.37
Sep-12	WWF	718.5	29.9	0.2	0.0	100.0	6.2	9.2	8.09
Oct-12	WWF	738.0	30.8	0.8	0.0	100.0	8.3	10.7	9.65
Nov-12	WWF	717.5	29.9	0.3	0.0	100.0	10.7	13.4	11.78
Mar-13	WWF	742.0	30.9	0.1	0.0	100.0	11.6	15.3	13.17
Apr-13	WWF	717.5	29.9	0.3	0.0	100.0	7.7	13.8	10.33
May-13	WWF	742.0	30.9	0.3	0.0	100.0	7.3	9.6	8.48
Jun-13	WWF	719.5	30.0	0.1	0.0	100.0	5.8	8.7	7.62

Table 62. Gage 01474500 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-12	WWF	30.0	3.2	0.0	100.0	6.2	14.8	8.81
Aug-12	WWF	29.0	6.5	0.0	100.0	6.7	8.2	7.36
Sep-12	WWF	29.0	3.3	0.0	100.0	6.6	9.1	8.12
Oct-12	WWF	29.0	6.5	0.0	100.0	8.6	10.5	9.66
Nov-12	WWF	29.0	3.3	0.0	100.0	10.9	13.1	11.79
Mar-13	WWF	29.0	6.3	0.0	100.0	11.8	14.4	13.10
Apr-13	WWF	28.0	6.7	0.0	100.0	8.0	12.9	10.36
May-13	WWF	30.0	3.2	0.0	100.0	7.5	9.3	8.50
Jun-13	WWF	29.0	3.3	0.0	100.0	6.4	8.6	7.61

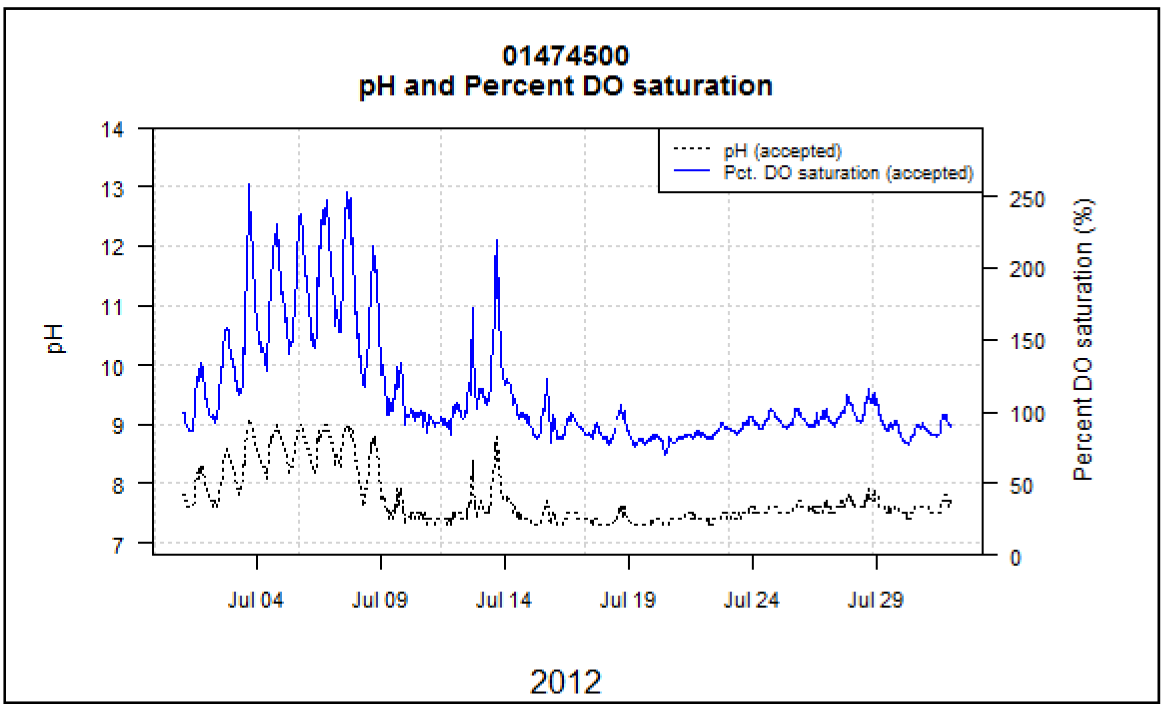


Figure 42. Gage 01474500, pH and Percent Dissolved Oxygen Saturation, July 2012.

Table 63. Gage 01474500 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	742.5	30.9	0.2	0.1	3.2	0.0	0.0	99.9	96.8	7.3	9.1	7.74
Aug-12	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.0	7.56
Sep-12	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.0	7.64
Oct-12	738.0	30.8	0.8	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.0	7.75
Nov-12	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.1	7.82
Mar-13	742.0	30.9	0.1	16.5	25.8	0.0	0.0	83.5	74.2	7.7	9.4	8.51
Apr-13	717.5	29.9	0.3	19.6	33.3	0.0	0.0	80.4	66.7	7.5	9.5	8.29
May-13	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.4	7.8	7.63
Jun-13	719.5	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.9	7.58

Temperature

Table 64. Gage 01474500 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	1.4	98.6	0.2	742.5	30.9	24.8	32.1	28.1
WWF	1-Aug	15-Aug	0.0	100.0	0.4	358.5	14.9	23.7	29.9	26.6
WWF	16-Aug	31-Aug	0.0	100.0	0.5	382.0	15.9			
WWF	1-Sep	15-Sep	0.0	100.0	0.4	358.5	14.9	19.1	27.0	22.6
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.8	357.0	14.9	11.6	20.1	15.7
WWF	16-Oct	31-Oct	0.0	100.0	0.8	381.0	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.7	357.5	14.9	3.9	11.5	7.7
WWF	16-Nov	30-Nov	0.0	100.0	0.0	360.0	15.0			
WWF	1-Mar	31-Mar	12.7	87.3	0.3	742.0	30.9	4.2	9.2	6.2
WWF	1-Apr	15-Apr	54.0	46.0	0.0	360.0	15.0	8.5	19.0	13.7
WWF	16-Apr	30-Apr	80.3	19.7	0.7	357.5	14.9			
WWF	1-May	15-May	51.7	48.3	0.0	360.0	15.0	15.6	24.1	18.8
WWF	16-May	31-May	19.5	80.5	0.5	382.0	15.9			
WWF	1-Jun	15-Jun	0.0	100.0	0.0	360.0	15.0	18.6	27.8	23.5
WWF	16-Jun	30-Jun	0.0	100.0	0.1	359.5	15.0			

Figure 43. Gage 01474500, Schuylkill River at the Fairmount Dam, looking upstream

Turbidity

Turbidity levels at the Schuylkill gage were less susceptible to extreme peaks due to storms and increased flow, with the exception of major events such as Hurricane Sandy in October.

Table 65. Gage 01474500 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-12	738.5	30.8	0.7	55.8	44.2	0.0	15.0	3.20
Aug-12	737.5	30.7	0.9	49.1	50.9	0.0	13.0	2.72
Sep-12	717.5	29.9	0.3	35.1	64.9	0.0	42.0	3.53
Oct-12	738.0	30.8	0.8	51.4	48.6	0.6	180.0	9.93
Nov-12	717.5	29.9	0.3	38.2	61.8	1.4	36.0	4.38
Mar-13	742.0	30.9	0.1	62.5	37.5	1.5	64.0	6.31
Apr-13	604.0	25.2	16.1	62.1	37.9	1.7	58.0	10.71
May-13	629.5	26.2	15.4	81.2	18.8	0.0	21.0	6.68
Jun-13	719.5	30.0	0.1	63.8	36.2	0.3	210.0	19.97

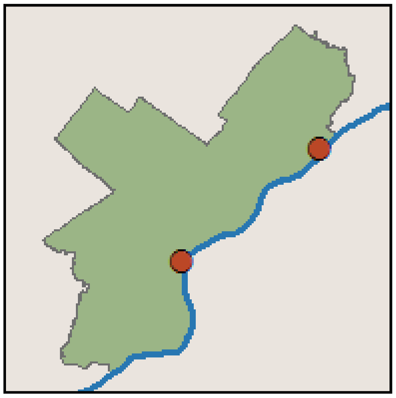
Specific Conductance

The Schuylkill River generally exhibits intermediate conductance, lower than the small Philadelphia tributary streams described elsewhere in this report, but greater than that observed in the Delaware River. Observed differences are likely due to geology and preponderance of anthropogenic sources in the respective watersheds.

Table 66. Gage 01474500 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	742.5	30.9	0.2	384.0	567.0	484.86
Aug-12	740.5	30.9	0.5	315.0	555.0	433.67
Sep-12	718.5	29.9	0.2	239.0	555.0	418.72
Oct-12	738.0	30.8	0.8	186.0	499.0	368.57
Nov-12	717.5	29.9	0.3	204.0	520.0	365.50
Mar-13	742.0	30.9	0.1	293.0	484.0	416.66
Apr-13	717.5	29.9	0.3	286.0	503.0	415.46
May-13	742.0	30.9	0.3	287.0	481.0	397.24
Jun-13	719.5	30.0	0.1	165.0	467.0	368.99

Delaware River (Gages 01467200 and 014670261)



Dissolved oxygen and pH

The DRBC DO daily mean and pH criteria for Zone 3 was attained at Gage 01467200 for the entire reporting period (Tables 67 and 69). The Zone 2 DO daily mean criteria was most frequently exceeded at Gage 014670261 in July, and the maximum pH guideline was exceeded most often in April (Tables 68 and 70). In 2013, the collection of data at gage 01467200 began March 26. Thus, data for that month is incomplete for that location. Data is collected year round at 014670261.

Figure 44. Delaware River at Ben Franklin Bridge, near Gage 01467200

Table 67. Gage 01467200 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Jul-12	DRBC	20.0	35.5	0.0	100.0	3.7	5.5	4.54	3.1	6.3
Aug-12	DRBC	28.0	9.7	0.0	100.0	4.0	4.8	4.37	3.5	5.4
Sep-12	DRBC	29.0	3.3	0.0	100.0	4.2	7.1	5.49	3.5	7.5
Oct-12	DRBC	29.0	6.5	0.0	100.0	6.2	8.8	7.34	5.6	8.9
Nov-12	DRBC	30.0	0.0	0.0	100.0	8.6	10.5	10.00	8.4	10.8
Mar-13*	DRBC	0.0	100.0	-	-	-	-	-	11.5	12.4
Apr-13	DRBC	25.0	16.7	0.0	100.0	7.6	11.6	9.55	7.1	11.9
May-13	DRBC	27.0	12.9	0.0	100.0	6.1	9.9	7.81	5.7	10.3
Jun-13	DRBC	28.0	6.7	0.0	100.0	5.6	8.9	6.99	4.9	9.8

*2013 data collection began March 26

Table 68. Gage 014670261 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Jul-12	DRBC	27.0	12.9	37.0	63.0	4.3	6.7	5.34	4.0	6.9
Aug-12	DRBC	30.0	3.2	6.7	93.3	5.0	6.0	5.29	4.5	6.4
Sep-12	DRBC	25.0	16.7	4.0	96.0	4.9	7.8	6.26	4.7	7.9
Oct-12	DRBC	28.0	9.7	0.0	100.0	7.2	9.3	8.41	7.0	9.5
Nov-12	DRBC	26.0	13.3	0.0	100.0	9.2	11.9	11.05	8.8	12.0
Dec-12	DRBC	28.0	9.7	0.0	100.0	11.6	13.0	12.1	11.4	13.1
Jan-12	DRBC	29.0	6.5	0.0	100.0	12.4	14.0	13.2	12.3	14.2
Feb-12	DRBC	27.0	3.6	0.0	100.0	12.8	13.8	13.4	12.4	13.8
Mar-13	DRBC	30.0	3.1	0.0	100.0	11.4	13.6	12.64	11.2	13.7
Apr-13	DRBC	27.0	10.0	0.0	100.0	8.2	12.1	10.19	7.8	12.3
May-13	DRBC	25.0	19.4	0.0	100.0	6.0	9.8	8.00	5.6	11.7
Jun-13	DRBC	30.0	0.0	0.0	100.0	6.1	10.9	7.65	5.9	11.6

Table 69. Gage 01467200 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.0	6.83
Aug-12	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.1	6.86
Sep-12	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.3	7.06
Oct-12	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.4	7.11
Nov-12	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.3	7.16
Mar-13*	60.0	2.5	53.5	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.5	7.34
Apr-13	697.5	29.1	3.1	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.6	7.33
May-13	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.5	7.15
Jun-13	715.5	29.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.5	7.5	6.98

*2013 data collection began March 26

Table 70. Gage 014670261 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-12	717.0	29.9	3.6	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.4	7.11
Aug-12	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.3	7.13
Sep-12	716.5	29.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.4	7.14
Oct-12	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.5	7.24
Nov-12	715.5	29.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.6	7.41
Dec-12	739.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.5	7.80
Jan-13	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.3	7.78
Feb-13	670.5	27.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.3	7.9	7.60
Mar-13	743.0	31.0	0.0	2.2	6.5	0.0	0.0	97.8	93.5	7.3	8.8	7.84
Apr-13	711.0	29.6	1.3	6.3	26.7	0.0	0.0	93.7	73.3	7.5	8.9	7.95
May-13	737.5	30.7	0.9	0.9	3.2	0.0	0.0	99.1	96.8	7.3	8.8	7.67
Jun-13	720.0	30.0	0.0	2.3	6.7	0.0	0.0	97.7	93.3	7.1	8.8	7.43

Temperature

Temperature criteria for the Delaware River were never exceeded at either gage.

Table 71. Gage 01467200 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Jul	31-Jul	0.0	100.0	0.0	744.0	31.0	25.5	28.7	27.4
DRBC	1-Aug	31-Aug	0.0	100.0	0.1	743.0	31.0	26.4	28.3	27.4
DRBC	1-Sep	30-Sep	0.0	100.0	0.1	719.5	30.0	19.6	26.8	23.8
DRBC	1-Oct	31-Oct	0.0	100.0	0.3	742.0	30.9	13.1	20.1	16.8
DRBC	1-Nov	30-Nov	0.0	100.0	0.0	720.0	30.0	6.1	13.2	8.7
DRBC	26-Mar	31-Mar	0.0	100.0	51.2	63.0	2.6	4.8	6.5	5.6
DRBC	1-Apr	30-Apr	0.0	100.0	4.5	687.5	28.6	6.3	14.9	12.1
DRBC	1-May	31-May	0.0	100.0	0.6	739.5	30.8	14.6	20.9	18.1
DRBC	1-Jun	30-Jun	0.0	100.0	1.0	713.0	29.7	18.6	26.0	21.6

Table 72. Gage 014670261 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Jul	31-Jul	0.0	100.0	3.6	717.0	29.9	26.0	29.5	27.9
DRBC	1-Aug	31-Aug	0.0	100.0	0.0	744.0	31.0	25.9	28.9	27.4
DRBC	1-Sep	30-Sep	0.0	100.0	0.3	717.5	29.9	18.4	26.7	23.1
DRBC	1-Oct	31-Oct	0.0	100.0	0.3	742.0	30.9	12.6	19.5	15.9
DRBC	1-Nov	30-Nov	0.0	100.0	0.6	715.5	29.8	5.1	12.5	7.8
DRBC	1-Dec	31-Dec	0.0	100.0	0.6	739.5	30.8	2.2	7.1	5.3
DRBC	1-Jan	31-Jan	0.0	100.0	0.4	741.0	30.9	0.1	5.3	2.4
DRBC	1-Feb	28-Feb	0.0	100.0	0.3	670.0	27.9	0.4	4.0	2.2
DRBC	1-Mar	31-Mar	0.0	100.0	0.0	743.0	31.0	3.2	7.8	5.1
DRBC	1-Apr	30-Apr	0.0	100.0	1.3	711.0	29.6	7.2	15.9	12.3
DRBC	1-May	31-May	0.0	100.0	0.9	737.5	30.7	14.8	20.9	18.4
DRBC	1-Jun	30-Jun	0.0	100.0	0.0	720.0	30.0	18.0	26.5	21.8

Specific Conductance

The Delaware River exhibits much lower conductivity than the small Philadelphia tributary streams described elsewhere in this report. This is likely caused by differences in geology and proportionally fewer anthropogenic sources in the less-developed Delaware River watershed.

Table 73. Gage 01467200 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	1487.0	31.0	0.1	226.0	289.0	255.60
Aug-12	1480.0	30.8	0.5	238.0	305.0	267.62
Sep-12	1439.0	30.0	0.1	161.0	315.0	247.04
Oct-12	1484.0	30.9	0.3	142.0	237.0	196.14
Nov-12	1440.0	30.0	0.0	151.0	211.0	180.67
Mar-13*	125.0	2.6	51.6	234.0	252.0	242.12
Apr-13	1397.0	29.1	3.0	196.0	260.0	230.79
May-13	1467.0	30.6	1.4	196.0	256.0	228.23
Jun-13	1439.0	30.0	0.1	128.0	258.0	179.93

*2013 data collection began March 26

Table 74. Gage 014670261 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-12	1430.0	29.8	3.9	210.0	264.0	235.83
Aug-12	1487.0	31.0	0.1	173.0	262.0	237.64
Sep-12	1306.0	27.2	9.3	129.0	273.0	213.80
Oct-12	1484.0	30.9	0.3	130.0	241.0	185.65
Nov-12	1431.0	29.8	0.6	139.0	258.0	180.63
Dec-12	1479.0	30.8	0.6	106.0	278.0	209.05
Jan-13	1482.0	30.9	0.4	192.0	338.0	222.82
Feb-13	1341.0	27.9	0.2	160.0	436.0	265.65
Mar-13	1486.0	31.0	0.0	170.0	406.0	258.92
Apr-13	1422.0	29.6	1.3	185.0	295.0	227.56
May-13	1474.0	30.7	0.9	195.0	291.0	221.97
Jun-13	1440.0	30.0	0.0	122.0	228.0	174.70

Turbidity

Turbidity guidelines at 014670261 were frequently exceeded throughout the year. Gage 01467200 turbidity results are not available.

Table 75. Gage 014670261 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-12	715.0	29.8	3.9	94.3	5.7	1.2	40.0	6.41
Aug-12	743.5	31.0	0.1	88.9	11.1	1.3	34.0	5.51
Sep-12	716.5	29.9	0.5	89.1	10.9	1.3	27.0	6.37
Oct-12	741.0	30.9	0.4	91.6	8.4	1.1	210.0	6.66
Nov-12	711.0	29.6	1.3	95.3	4.7	1.1	46.0	7.15
Dec-12	738.5	30.8	0.7	89.2	10.8	1.6	67.0	9.37
Jan-13	740.0	30.8	0.5	97.0	3.0	2.1	68.0	6.80
Feb-13	669.5	27.9	0.4	97.8	2.2	2.0	51.0	8.20
Mar-13	741.0	30.9	0.3	69.6	30.4	1.1	23.0	4.69
Apr-13	711.5	29.6	1.2	63.5	36.5	0.7	25.0	3.71
May-13	736.0	30.7	1.1	84.0	16.0	1.4	29.0	4.84
Jun-13	719.5	30.0	0.1	91.8	8.2	1.0	43.0	8.11

Wet Weather and Dry Weather Results

Annual Summary, July 2012 - June 2013

Water quality data was also categorized as wet or dry for the purpose of evaluating weather effects on water quality, and specifically the incidence of non-attainment of water quality criteria. A wet weather condition was defined as rainfall greater than 0.05 inches in the preceding 72 hours, as measured at the nearest PWD rain gage.

In general, more frequent non-attainment of DO criteria was observed in wet weather due to the tendency of storm events to decrease DO via the introduction of stormwater runoff and BOD (Tables 76-79). The turbidity maximum guideline was also usually more frequently surpassed in wet weather (Tables 82-83). Conversely, the pH maximum criterion was more frequently exceeded in dry weather due to the effects of algal growth (Tables 80-81). Temperature criteria were also more likely to be exceeded in dry weather conditions (Tables 86-87).

Table 76. USGS Gage July 2012 - June 2013 Dissolved Oxygen Minimum Criterion Summary Results During Wet Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining
01465798	WWF	4135.0	172.3	0.9	1.2	98.8
01467042	TSF	4041.5	168.4	0.8	0.0	100.0
01467048	TSF	3987.5	166.1	3.8	0.2	99.8
01467086	WWF	3641.5	151.7	11.1	2.7	97.3
01467087	WWF	3562.0	148.4	18.2	26.6	73.4
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	3774.0	157.3	4.6	3.7	96.3
01474000	TSF	4029.5	167.9	1.1	0.0	100.0
01474500	WWF	4193.5	174.7	0.3	0.0	100.0
01475530	WWF	3912.0	163.0	0.7	0.0	100.0
01475548	WWF	4038.5	168.3	3.0	2.7	97.3
014670261*	DRBC	NA	NA	NA	NA	NA

*No minimum DO criterion applies at these locations.

Table 77. USGS Gage July 2012 - June 2013 Dissolved Oxygen Minimum Criterion Summary Results During Dry Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining
01465798	WWF	2406.0	100.3	0.5	0.6	99.4
01467042	TSF	2466.5	102.8	0.8	0.0	100.0
01467048	TSF	2301.0	95.9	3.4	0.0	100.0
01467086	WWF	2351.0	98.0	6.0	0.4	99.6
01467087	WWF	2103.0	87.6	6.3	19.0	81.0
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	2629.0	109.5	0.4	0.7	99.3
01474000	TSF	2515.5	104.8	0.4	0.0	100.0
01474500	WWF	2384.5	99.4	0.3	0.0	100.0
01475530	WWF	2639.0	110.0	0.2	0.0	100.0
01475548	WWF	2291.5	95.5	0.1	0.0	100.0
014670261*	DRBC	NA	NA	NA	NA	NA

*No minimum DO criterion applies at these locations.

Table 78. USGS Gage July 2012 - June 2013 Dissolved Oxygen Daily Mean Criterion Summary Results During Wet Weather

Gage number	Designated Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining
01465798	WWF	155.0	1.3	0.6	99.4
01467042	TSF	159.0	0.6	0.0	100.0
01467048	TSF	150.0	4.5	0.0	100.0
01467086	WWF	138.0	12.7	3.6	96.4
01467087	WWF	126.0	25.0	38.1	61.9
01467200	DRBC	144.0	0.0	0.0	100.0
01473900	TSF	145.0	5.2	0.7	99.3
01474000	TSF	154.0	1.3	0.0	100.0
01474500	WWF	161.0	0.6	0.0	100.0
01475530	WWF	147.0	1.3	0.0	100.0
01475548	WWF	155.0	3.1	7.1	92.9
014670261	DRBC	207.0	0.0	3.9	96.1

Table 79. USGS Gage July 2012 - June 2013 Dissolved Oxygen Daily Mean Criterion Summary Results During Dry Weather

Gage number	Designated Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining
01465798	WWF	81.0	0.0	0.0	100.0
01467042	TSF	88.0	0.0	0.0	100.0
01467048	TSF	77.0	3.8	0.0	100.0
01467086	WWF	81.0	6.9	0.0	100.0
01467087	WWF	71.0	9.0	26.8	73.2
01467200	DRBC	73.0	0.0	0.0	100.0
01473900	TSF	94.0	0.0	0.0	100.0
01474000	TSF	89.0	0.0	0.0	100.0
01474500	WWF	79.0	0.0	0.0	100.0
01475530	WWF	93.0	0.0	0.0	100.0
01475548	WWF	76.0	0.0	0.0	100.0
014670261	DRBC	109.0	0.0	5.5	94.5

Table 80. USGS Gage July 2012 - June 2013 pH Criteria Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	4135.0	172.3	0.9	0.1	1.0	0.0	0.0	99.9	99.0
01467042	4042.5	168.4	0.7	1.0	5.0	0.0	0.0	99.0	95.0
01467048	3987.0	166.1	3.8	2.6	5.0	0.0	0.0	97.4	95.0
01467086	4079.5	170.0	0.4	2.1	9.5	0.0	0.0	97.9	90.5
01467087	4263.0	177.6	2.1	0.0	0.0	0.0	0.0	100.0	100.0
01467200	3725.0	155.2	0.4	0.0	0.0	0.0	0.0	100.0	100.0
01473900	3827.0	159.5	3.3	2.6	8.4	0.0	0.0	97.4	91.6
01474000	4030.5	167.9	1.1	1.5	6.5	0.0	0.0	98.5	93.5
01474500	4193.5	174.7	0.3	3.5	6.8	0.0	0.0	96.5	93.2
01475530	3905.0	162.7	0.9	0.0	0.0	0.0	0.0	100.0	100.0
01475548	4093.5	170.6	1.7	3.3	8.5	0.0	0.0	96.7	91.5
014670261	5457.5	227.4	0.1	0.6	3.0	0.0	0.0	99.4	97.0

Table 81. USGS Gage July 2012 - June 2013 pH Criteria Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	2406.0	100.3	0.5	0.3	2.2	0.0	0.0	99.7	97.8
01467042	2465.5	102.7	0.8	4.0	11.1	0.0	0.0	96.0	88.9
01467048	2301.0	95.9	3.4	3.6	8.1	0.0	0.0	96.4	91.9
01467086	2495.5	104.0	0.2	5.5	16.7	0.0	0.0	94.5	83.3
01467087	2186.0	91.1	2.6	0.0	0.0	0.0	0.0	100.0	100.0
01467200	2153.5	89.7	0.3	0.0	0.0	0.0	0.0	100.0	100.0
01473900	2629.0	109.5	0.4	4.9	14.1	0.0	0.0	95.1	85.9
01474000	2516.0	104.8	0.3	4.7	13.6	0.0	0.0	95.3	86.4
01474500	2384.5	99.4	0.3	4.9	8.8	0.0	0.0	95.1	91.2
01475530	2624.0	109.3	0.8	0.4	3.5	0.0	0.0	99.6	96.5
01475548	2212.0	92.2	3.6	5.0	11.8	0.0	0.0	95.0	88.2
014670261	3214.0	133.9	0.1	1.6	3.3	0.0	0.0	98.4	96.7

Table 82. USGS Gage July 2012 - June 2013 Turbidity Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	4003.0	166.8	4.1	50.0	50.0
01467042	3895.0	162.3	4.4	43.3	56.7
01467048	3949.5	164.6	4.7	60.3	39.7
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	3431.0	143.0	13.3	52.0	48.0
01474000	3956.5	164.9	2.9	45.3	54.7
01474500	4047.5	168.6	3.8	56.9	43.1
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA
014670261	5452.0	227.2	0.2	86.9	13.1

*Turbidity not continuously monitored at this location

Table 83. USGS Gage July 2012 - June 2013 Turbidity Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	2382.5	99.3	1.5	7.2	92.8
01467042	2369.5	98.7	4.7	9.2	90.8
01467048	2300.0	95.8	3.4	22.3	77.7
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	2491.5	103.8	5.6	19.9	80.1
01474000	2447.5	102.0	3.1	2.7	97.3
01474500	2296.5	95.7	4.0	51.5	48.5
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA
014670261	3207.0	133.6	0.3	88.7	11.3

*Turbidity not continuously monitored at this location

Table 84. USGS Gage July 2012 - June 2013 Specific Conductance Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	4135.0	172.3	0.9
01467042	4042.0	168.4	0.7
01467048	3987.0	166.1	3.8
01467086	4079.5	170.0	0.4
01467087	4263.5	177.6	2.1
01467200	3730.0	155.4	0.2
01473900	3828.0	159.5	3.2
01474000	4030.5	167.9	1.1
01474500	4193.5	174.7	0.3
01475530	3934.5	163.9	0.2
01475548	4154.5	173.1	0.3
014670261	5446.0	226.9	0.3

Table 85. USGS Gage July 2012 - June 2013 Specific Conductance Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	2406.0	100.3	0.5
01467042	2466.0	102.8	0.8
01467048	2301.0	95.9	3.4
01467086	2495.5	104.0	0.2
01467087	2186.0	91.1	2.6
01467200	2149.0	89.5	0.5
01473900	2629.0	109.5	0.4
01474000	2516.0	104.8	0.3
01474500	2384.5	99.4	0.3
01475530	2639.0	110.0	0.2
01475548	2291.5	95.5	0.1
014670261	3161.0	131.7	1.7

Table 86. USGS Gage July 2012 - June 2013 Temperature Maximum Criteria Summary Results During Wet Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	4135.0	172.3	0.9	9.6	90.4
01467042	TSF	4040.5	168.4	0.8	24.4	75.6
01467048	TSF	3987.5	166.1	3.8	28.9	71.1
01467086	WWF	4079.5	170.0	0.4	9.2	90.8
01467087	WWF	4263.0	177.6	2.1	12.9	87.1
01467200	DRBC	3717.5	154.9	0.6	0.0	100.0
01473900	TSF	3823.0	159.3	3.4	20.5	79.5
01474000	TSF	4035.5	168.1	1.0	20.5	79.5
01474500	WWF	4193.5	174.7	0.3	11.9	88.1
01475530	WWF	3935.0	164.0	0.1	8.6	91.4
01475548	WWF	4154.0	173.1	0.3	10.3	89.7
014670261	DRBC	5459.0	227.5	0.1	0.0	100.0

Table 87. USGS Gage July 2012 - June 2013 Temperature Maximum Criteria Summary Results During Dry Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	2406.0	100.3	0.5	13.6	86.4
01467042	TSF	2465.5	102.7	0.8	27.5	72.5
01467048	TSF	2301.0	95.9	3.4	31.6	68.4
01467086	WWF	2495.5	104.0	0.2	13.6	86.4
01467087	WWF	2186.0	91.1	2.6	13.0	87.0
01467200	DRBC	2154.0	89.8	0.3	0.0	100.0
01473900	TSF	2626.0	109.4	0.5	30.1	69.9
01474000	TSF	2516.0	104.8	0.3	28.6	71.4
01474500	WWF	2384.5	99.4	0.3	14.6	85.4
01475530	WWF	2639.0	110.0	0.2	9.2	90.8
01475548	WWF	2292.5	95.5	0.1	13.3	86.7
014670261	DRBC	3215.0	134.0	0.1	0.0	100.0

References

Delaware River Basin Commission, 2007. Delaware River Basin Water Code: 18 CFR Part 410 (With Amendments Through September 27, 2006). West Trenton, NJ.

Appendix H – PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments

PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments

Background

Since 1999, the Philadelphia Water Department (PWD) has been using benthic macroinvertebrate sampling and instream physical habitat assessments in order to characterize watershed conditions and track trends in watershed health. Assessments are performed by the staff of PWD's Bureau of Laboratory Services (BLS) using PADEP Instream Comprehensive Evaluation (ICE) methods. As benthic invertebrates may be exposed to both short and long-duration stressors, data collected through this program are pertinent to all targets of PWD's Integrated Watershed Management Plan (IWMP) Strategy.

Common Acronyms Used in This Report

IBI - Index of Biotic Integrity, a biological assessment tool to indicate the capability of a stream to support a healthy aquatic community.
ICE - Instream Comprehensive Evaluation, a protocol to survey and evaluate wadeable streams.
PTV - Pollution Tolerance Values, a numeric measure of an organism's ability to withstand environmental degradation.
EPT - Ephemeroptera + Plecoptera + Trichoptera, the common names for pollution-sensitive mayflies, stoneflies and caddisflies.

Assessment Study Design

In recent years, agencies tasked with evaluating water quality have attempted to incorporate statistical sampling designs, or a "probabilistic" approach, to selecting sampling sites (Paulsen 2008, Borsuk *et al*. 2001) rather than relying on fixed sites. Statistical sampling design is particularly important when the goal of monitoring is to make an estimate of the percentage of waters affected by pollution. Another advantage of probabilistic study design is that the assessment units are distributed over a larger geographic area. When monitoring efforts are directed at individual watersheds on a rotating basis, as has been the case with PWD programs, the possibility arises that larger scale patter ns may be missed. For example, the effects of floods or drought conditions are widespread, but only the watershed that is being monitored within the same time period will have data reflecting these effects. Disadvantages of a probabilistic approach include the technical demands of establishing and randomly selecting from geographic data sets containing all possible sampling locations as well as additional field reconnaissance work when conduct the actual monitoring.

The current PWD monitoring strategy is intended to be a compromise, recognizing the benefits of collecting data from randomly selected sites but also the importance of maintaining a consistent monitoring effort at selected locations over time. This plan is based on a similar monitoring program implemented by USGS in Chester County (Reif 2004, Reif 2012). The plan also reflects the manpower constraints of collecting and processing samples with the PADEP ICE protocol. It is hoped that this compromise approach (Table 1) will achieve some of the benefits of a randomized approach, while providing periodic re-evaluation of our watersheds required to inform the watershed planning process and comply with environmental mandates.

Stream Conditions

This report summarizes results from samples that were collected between March 6 and March 19, 2012. PWD is not aware of any spills, discharges or unusual conditions that would tend to cause misleading results.

Table 1. PWD Proposed Wadeable Streams Assessments Schedule

Period	Monitoring Activity (number of samples)
2011	USGS gage samples (8); Randomly selected sites (16)
2012	Cobbs Creek Assessment (6*); USGS gage samples (9); Random (10)
2013	Tookany/Tacony Creek (10*) USGS gage samples (9); Random (6)
2014	Wissahickon Creek Tributaries (11) USGS gage samples (9); Random (5)
2015	Wissahickon Creek (12*) USGS gage samples (9); Random (4)
2016	Pennypack Creek Tributaries
2017	Pennypack Creek
2018	Poquessing Creek

* Number of monitoring sites excludes 2 USGS gage sites in target watershed

Methods

Benthic Macroinvertebrate Sample Collection

Using the PADEP Instream Comprehensive Evaluation (ICE) protocol (PADEP 2009), macroinvertebrate samples were collected by placing a handheld D-frame net (500µm) at the downstream portion of a riffle. Stream substrate directly upstream of the D-frame net was then disturbed for approximately one minute to a depth of approximately 10 cm as substrate allowed. This procedure was repeated at other riffle locations of variable flow within the 100-m reach such that the sample at each station was a composite of six riffle samples. Composited samples from each biological monitoring location were then preserved in 95% ETOH (ethyl alcohol) and returned to the laboratory in polyethylene containers.

Benthic Macroinvertebrate Laboratory Procedures

Benthic macroinvertebrate samples were processed according to PADEP ICE protocols (PADEP 2009). Each composited sample was placed into an 18 x 12 x 3.5-inch pan marked with 28 four-square-inch grids. Four grids were randomly selected by drawing numbers. All material was extracted from the selected grids using a four-square-inch circular "cookie cutter," and placed into another identical empty pan. From this second pan, organisms were picked from randomly selected grids or “plugs” until a minimum of 200, but not more than 240, individuals were subsampled. This procedure was a misinterpretation of the actual technique, which stipulates a count of 200 (+/- 20%) individuals. When picking either the four initial “plugs” or additional plugs results in subsampling more than 240 individuals, the PADEP ICE protocol outlines a procedure for redistributing the subsample into a clean, gridded pan and “back counting” grids until a subsample consisting of 200 (+/-20%) is obtained. Invertebrates were identified under magnification, with taxonomic classification following PADEP 2009 guidelines.

Habitat Assessment

After collecting benthic invertebrates, biologists surveyed habitat features within the monitoring station and recorded scores for 12 habitat attributes according to the PADEP ICE protocol (Table 2). Biologists completed the survey independently and then discussed the interpretation of individual habitat attribute scores, averaging individual scores when necessary.

Table 2. PA DEP ICE Protocol Habitat Metrics

Habitat Parameter	Description
Instream Cover (Fish)	Mix of boulder, cobble or other stable habitat
Epifaunal Substrate	Length/width of riffles; characterization of boulders, gravel, cobble
Embeddedness	Presence/absence of fine sediment around boulders, gravel, cobble
Velocity/Depth Regimes	Presence/absence of four velocity/depth regimes
Channel Alteration	Degree of channelization or dredging
Sediment Deposition	Measure of sediment deposits, degree of change at the bottom
Frequency of Riffles	Occurrence of riffles and distance between riffles
Channel Flow Status	Degree to which water fills the available channel
Condition of Banks	Stability of streambanks and presence of erosion or bank failure
Bank Vegetative Protection	Percentage of streambank surface covered by vegetation
Grazing or Other Disruptive Pressure	Degree to which vegetation disrupted by grazing or mowing
Riparian Vegetative Zone Width	Width of riparian zone and determination of impact on vegetation by human activities

Data Analysis

Benthic macroinvertebrate and habitat data were compiled in a Microsoft Access database and queries were used to calculate scoring metrics. Individual metric standardized scores and the PADEP Index of Biotic Integrity (IBI) were calculated using the ICE protocol (Table 3).

Table 3. PADEP ICE Protocol Metrics and Metric Standardization Values

Metric	Standardization Value
Total Taxa Richness	33
EPT Taxa Richness (PTV 0-4)	19
Beck's Index, version 3	38
Hilsenhoff Biotic Index (HBI)	1.89
Shannon Diversity	2.86
Percent Sensitive Individuals (PTV 0-3)	84.5

Monitoring Locations

Assessments were performed at nine USGS gage sites, six sites in the Cobbs Creek Watershed, and 10 randomly chosen sites from PWD’s watershed assessment site network between 3/6/2012 and 3/19/2012 (Figure 1, Tables 4-6). Cobbs Creek Watershed sites were originally assessed in 2003, and the 2012 assessment data will also be documented in the Cobbs Creek Watershed Integrated Watershed Management Plan update, to be published in 2013. USGS stream gaging stations are used as long term monitoring points at which streamflow and continuous water chemistry data are collected (refer to PWD-USGS Cooperative Water Quality Monitoring appendix). Water chemistry grab sampling for nutrient and bacterial parameters is also conducted at these USGS gage stations on a quarterly basis (refer to PWD Quarterly Dry Weather Water Quality Monitoring appendix). Combining different forms of monitoring at the same station allows for better integration of information and may enable more sophisticated analyses in the future.

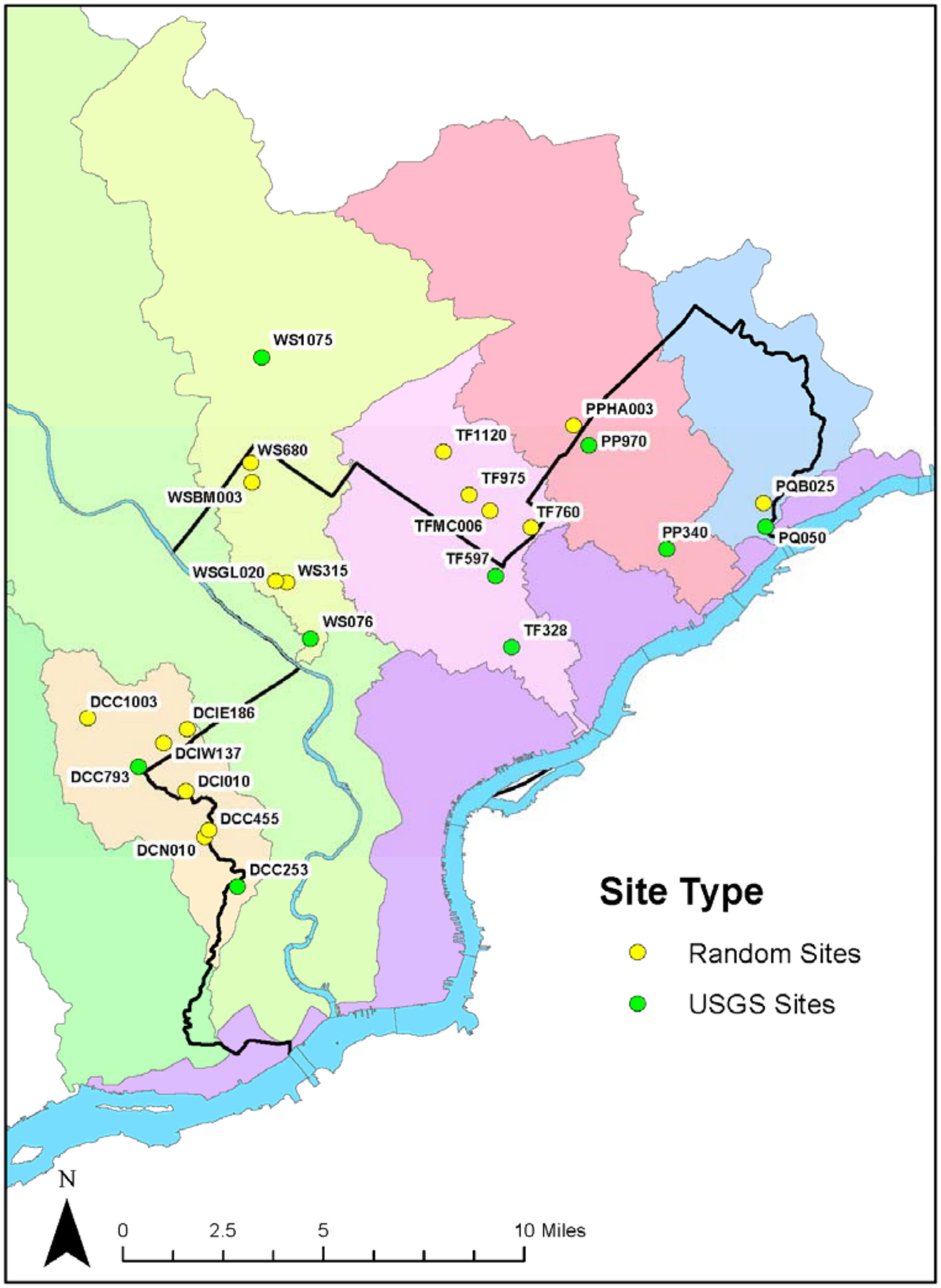


Figure 1. PWD Wadeable Streams Assessment Locations - Spring 2012

Table 4. PWD-USGS Cooperative Monitoring Program Monitoring Locations

Site ID	USGS Gage	Site Description	Drainage Area (mi2)
DCC253	01475548	Cobbs Creek at Mount Moriah Cemetery	19.78
DCC793	01475530	Cobbs Creek at City Line Ave.	4.6
PP340	01467048	Pennypack Creek at Lower Rhawn St bridge	49.84
PP970	01467042	Pennypack Creek at Pine Rd.	39.34
PQ050	01465798	Poquessing Creek at Holy Family College	21.67
TF328*	01457087	300 ft downstream of outfall T-14	29.69
TF597	01467086	Tacony Creek below Adams Ave. Bridge	16.25
WS076	01474000	Wissahickon Creek at Ridge Ave.	63.22
WS1075	01473900	Wissahickon Creek at Ft. Washington	40.44

*Actual monitoring site is 500 meters upstream of TF328, at site TF324.
For consistency, this site is referred to as TF328 throughout this report.

Table 5. Randomly Selected Monitoring Locations - Spring 2012

Site ID	Site Description	Drainage Area (mi2)
PPHA003	150 ft upstream of Pennypack confluence (Moredon Rd)	1.25
PQB025	700 ft upstream of Knights Rd bridge	7.39
TF760	Ashbourne Rd bridge	14.31
TF975	50 ft downstream of High School Rd bridge	9.16
TF1120	Upstream side of Route 73 (Washington Ln) bridge	5.36
TFMC006	600 ft downstream of Ashbourne Rd bridge	1.65
WS315	400 ft upstream of Mount Airy Rd bridge	59.9
WS680	Chestnut Hill College tennis courts	52.48
WSBM003	150 ft upstream of Wissahickon confluence	0.49
WSGL020	500 ft downstream of Henry Rd bridge	0.69

Table 6. Targeted Cobbs Creek Watershed Monitoring Locations - Spring 2012

Site ID	Site Description	Drainage Area (mi2)
DCC455	Cobbs Creek near CCCEEC	12.95
DCC1003	Hathaway bridge off Hathaway Ln	2.38
DCI010	CC Golf Course Near Haverford Ave	3.96
DCIE186	Lankenau Hospital parking area	1.2
DCIW137	Indian Creek West Branch at Manoa and Wiltshire	1.26
DCN010	Naylor's Run at Walnut Park by CCEEC	4.59

*Excludes two USGS gages located in Cobbs Creek Watershed and listed in Table 4.

Benthic Macroinvertebrate Monitoring Results - Spring 2012

A total of 5,763 benthic macroinvertebrates from 32 taxa were collected from the 25 sampling sites. When compared to PADEP ICE protocol metric reference conditions, all assessment sites were classified as impaired. Not one of the sites achieved 63% comparability of the reference IBI for attaining the designated use (Figure 2). All sites fell far below 50% comparability, meaning that they are not meeting the Aquatic Life Use (ALU) designation. Percent comparability with the standard reference IBI score ranged from 11% to 27%. All sites were characterized by low taxa richness, few or absent modified EPT taxa, and elevated Hilsenhoff Biotic Index scores (Table 7, Figures 2-7).

Table 7. PADEP ICE Metric Scores

Site ID	Taxa Richness	EPT richness (PTV 0-4)	% Sensitive individuals	Beck's Index	HBI	Shannon Index	IBI score
DCC253	6	0	0.43	0	6.01	0.22	12.6
DCC455	6	0	0.87	1	6.04	0.28	13.4
DCC793	13	1	0.42	0	5.95	0.73	20.1
DCC1003	13	1	0.85	1	5.92	0.80	21.1
DCN010	5	0	0.00	0	6.02	0.13	11.2
DCI010	8	1	0.84	0	5.89	0.48	16.3
DCIW137	9	1	1.31	0	5.83	0.80	18.9
DCIE186	10	1	0.84	0	5.94	0.65	18.2
PPHA003	11	2	2.18	3	5.93	0.69	21.4
TF328	4	0	0.00	0	6.53	0.46	11.8
TF1120	5	0	0.00	0	6.09	0.18	11.6
WSBM003	4	0	0.00	0	6.00	0.31	12.0
WS680	12	1	0.84	0	5.74	1.58	25.0
WS315	10	1	0.00	0	5.99	0.72	18.4
WS1075	7	0	0.42	1	6.31	0.59	15.1
WSGL020	8	0	0.00	0	6.08	0.46	14.8
WS076	8	0	0.00	0	5.98	0.29	14.0
PP340	8	1	0.46	0	5.96	0.48	16.1
PP970	17	2	0.84	0	5.80	1.36	27.1
PQB025	9	0	0.00	0	6.02	0.59	16.2
PQ050	8	0	0.94	1	5.97	0.21	14.2
TFMC006	9	0	5.29	0	5.84	0.60	17.7
TF597	6	1	0.00	0	6.03	0.24	13.5
TF760	10	1	0.00	0	6.05	0.67	18.0
TF975	8	0	3.86	0	5.94	0.47	15.9

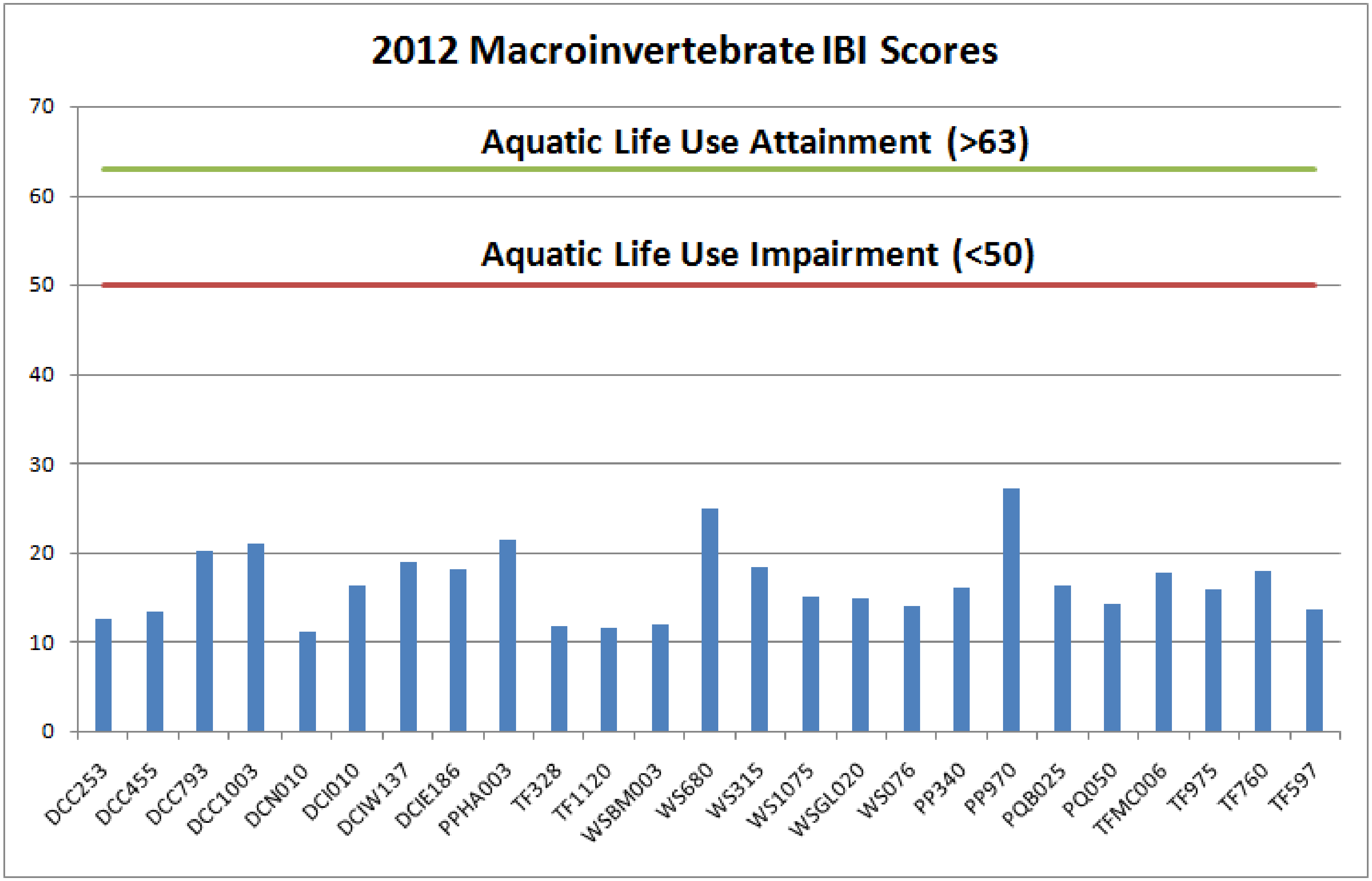


Figure 2. Macroinvertebrate IBI Scores - Spring 2012

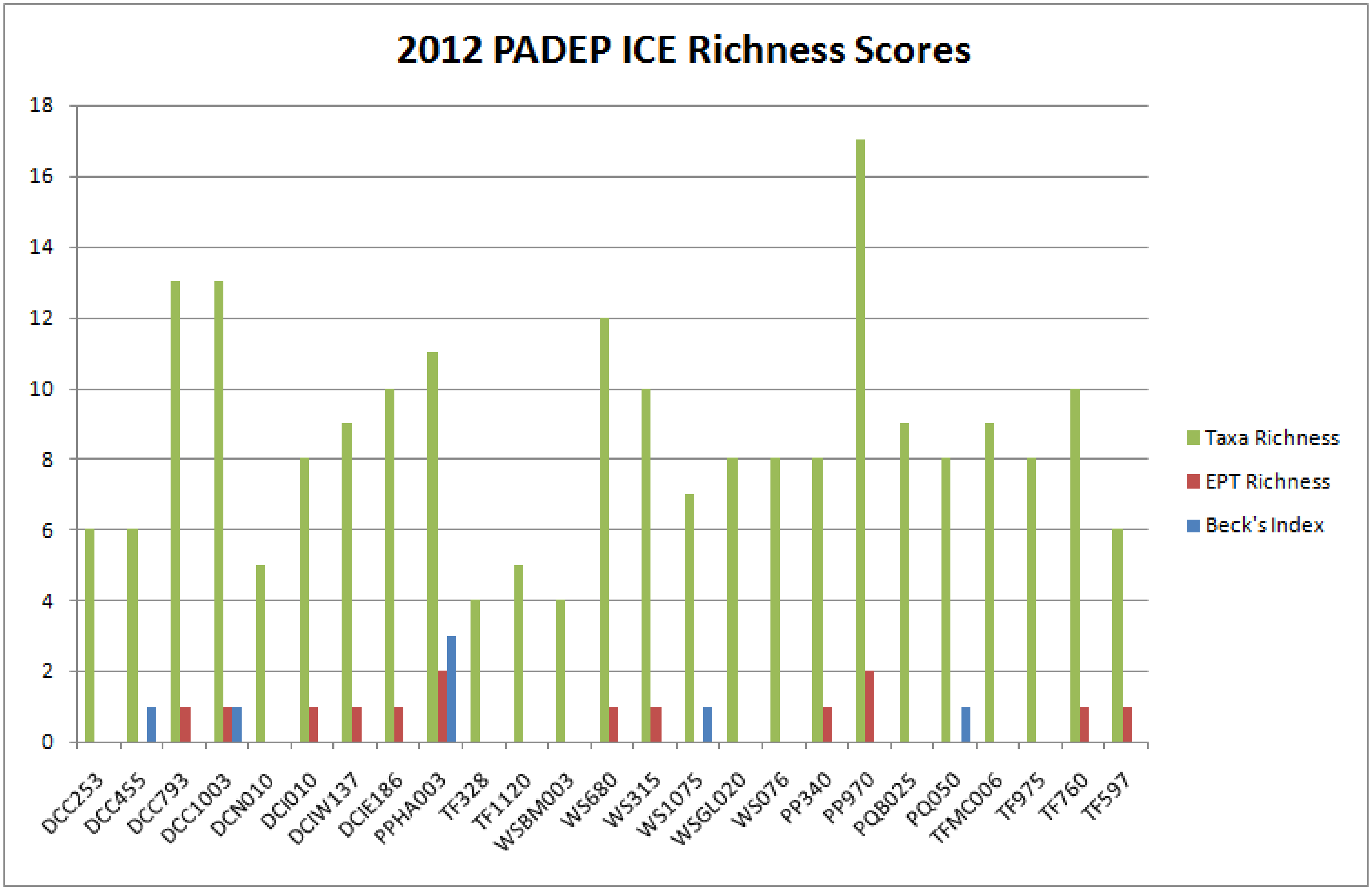


Figure 3. PADEP ICE Richness Scores - Spring 2012

PADEP ICE Metrics

PADEP ICE metrics (Table 3, Table 7) may be categorized as based on richness (total taxa richness, EPT Richness, Beck's Index) or proportional abundance (percent sensitive individuals, HBI, Shannon Index). In the context of urban water pollution studies, richness metrics may be useful for identifying subtle differences between sites, or even detecting early signs of potential improvement in aquatic community structure, as sensitive or specialized taxa may be expected to initially be found at low densities. The total number of taxa collected at sites sampled in 2012 ranged from 4 at sites TF328 and WSBM003 to 17 at site PP970, indicating very low richness relative to the PADEP IBI standardization value of 33 taxa.

The EPT (PTV ≤4) richness and Beck's Index metric results were poor for all sites sampled, indicating a general lack of sensitive EPT groups and very sensitive taxa, respectively (Figure 3). Out of the 25 sites assessed, very sensitive taxa (PTV ≤2) were present at only 5 sites (DCC1003, DCC455, PPHA1003, PQ050 and WS1075). The most common very sensitive taxon was *Ancyronyx* (Coleoptera: Elmidae) which has a pollution tolerance value of 2, and was the sole reason 4 of the 5 sites had a sensitive taxon with a score of 2 or less. Site PPHA003 did not contain any *Ancyronyx* individuals, but had the highest Beck's Index score (n=3) due to the presence of *Dolophilodes* (Trichoptera: Philopotamidae), which has a pollution tolerance value of zero. Overall, the richness metrics provide some information about the presence of a few sensitive groups that are still represented at some sites despite the effects of urbanization. This information is best interpreted alongside the results of proportional abundance metrics, as the sensitive taxa were often found in very low densities.

Diversity generally decreases with increasing ecosystem stress, due to increasing dominance of pollution-tolerant organisms. Overall diversity was very low at sites sampled in 2012. Overall, non-biting midges (Diptera: Chironomidae) were the dominant taxon at all assessment locations, with proportional abundance ranging from (74.06% to 97.85%) (Figure 4). Chironomids and other pollution-tolerant, generalist species increase in proportional dominance with increased disturbance due to the loss of optimal habitat conditions for less tolerant, more specialized species.

Figure 4. Chironomid, or non-biting midge. Photo: ©Entomart

The Shannon Diversity Index scores for mainstem sites ranged from 0.13 to1.58 and were poor compared to the PADEP IBI standardization value of 2.86. Scores for the percent sensitive individuals (PTV ≤3) metric ranged from 0% to 5.29% and were very poor relative to the PADEP IBI standardization value of 84.5%.

The Hilsenhoff Biotic Index (HBI) is a metric used to determine the overall pollution tolerance of a site's benthic macroinvertebrate community. Oriented toward the detection of organic pollution, HBI scores can range from zero (very sensitive) to 10 (very tolerant). The average HBI for sites sampled in 2012 was 5.99, and individual site HBI values ranged from 5.74 to 6.53 (Figure 5).

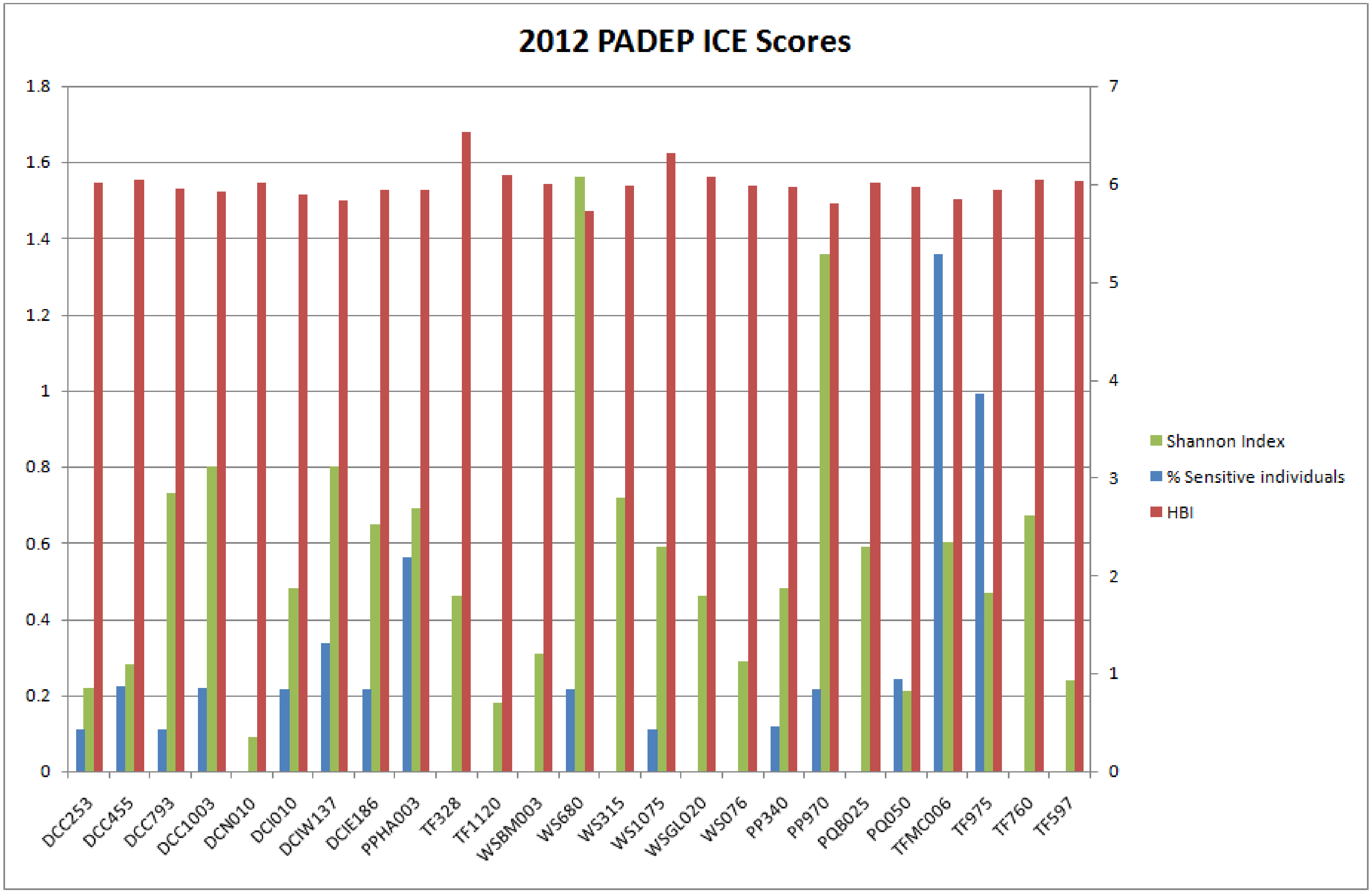


Figure 5. PADEP ICE Metric Scores - Spring 2012

Additional Metrics

In addition to PADEP IBI metrics, additional attributes of macroinvertebrate community structure were also addressed. Invertebrate data collected from spring 2012 sampling sites were analyzed to determine the proportional abundance of taxa categorized as intolerant (PTV ≤4), moderately tolerant (PTV 5-7), and tolerant (PTV≥8). Although similar to PADEP IBI percent sensitive individuals and Beck's Index metrics, this simple tolerance classification is computed for all taxa, not just EPT groups, and not weighted, as is the Beck's Index. Invertebrate community trophic structure (*i.e.*, the distribution of feeding strategies) was also determined for each assessment site.

As should be expected given the overall dominance by chironomids, generalist feeders such as collector/gatherers (90.94%) and filterer/collectors (6.35%) dominated at all assessment sites (Figure 6). Specialized feeders—a group that is generally more sensitive to perturbation than generalist feeders—were absent or found in low abundance. Scrapers made up only 1.86% of all taxa collected. The scrapers in question were usually not sensitive insect larvae but rather aquatic snails and *Stenelmis* (Coleoptera: Elmidae). Other functional feeding groups such as predators (0.76%) and shredders (0.09%), were very rarely observed in the macroinvertebrate assessment.. Analysis of the aquatic trophic structure can indicate potential stressors such as sedimentation/siltation and eutrophication, and it may identify food resource limitations. However, it cannot distinguish between the interactions of the two factors.

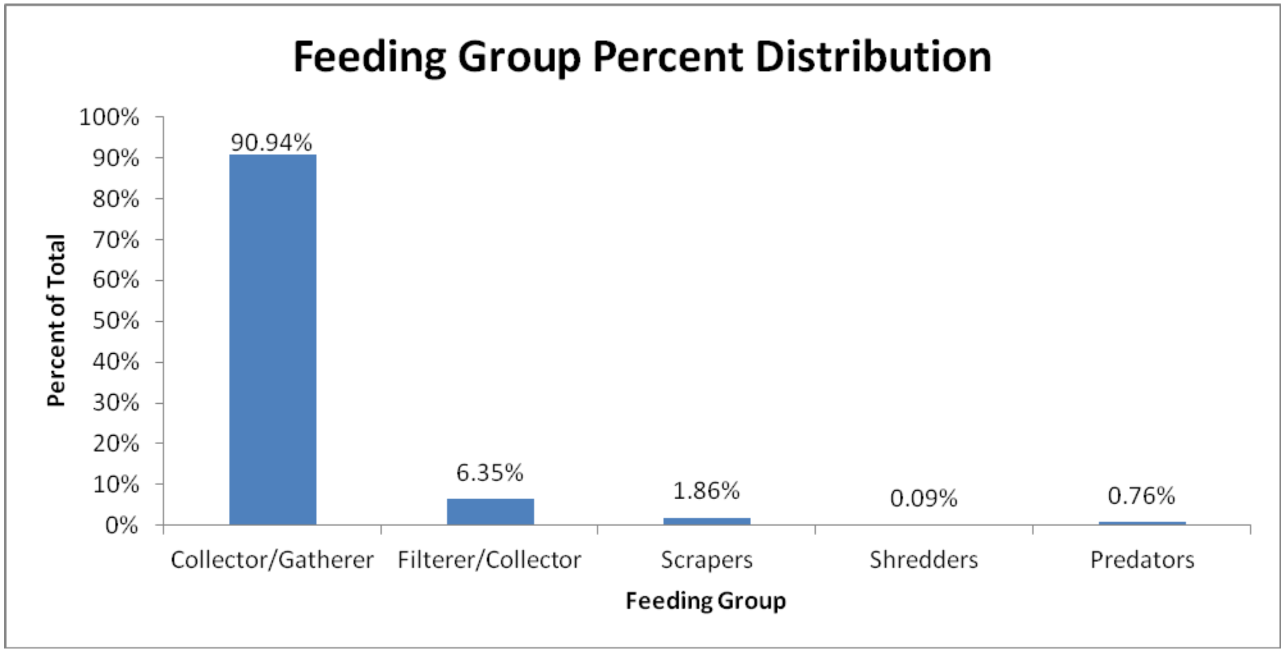


Figure 6. Feeding Group Percent Distribution - Spring 2012

The proportion of moderately tolerant individuals at all sites averaged 95.10%, with a range of 86.70% to 100%. The site with the greatest proportion of moderately tolerant taxa was WSBM003, with 100% dominance directly related to a large proportion of Chironomidae (92.89%) found within the sorted sample. Tolerant taxa accounted for an average of 2.55% of all taxa, and the proportion of tolerant taxa at each monitoring site ranged from 0.47%-13.30%.

Intolerant taxa were found to be poorly represented, averaging just 2.38% of all taxa collected at the 2012 assessment sites. The highest proportion of intolerant taxa was collected at site PP970 (7.53%). The rarity of intolerant taxa suggests a response to watershed wide perturbation, such as water quality degradation. Other potential explanations for the rarity of intolerant taxa are habitat degradation caused by fine sediment delivered to the stream channel via bank erosion or stormwater runoff and changes in seasonal base flow and temperature that tend to accompany urbanization. The cranefly *Antocha* (Diptera: Tipulidae) was found at 14 sites and was the most commonly collected intolerant taxon.

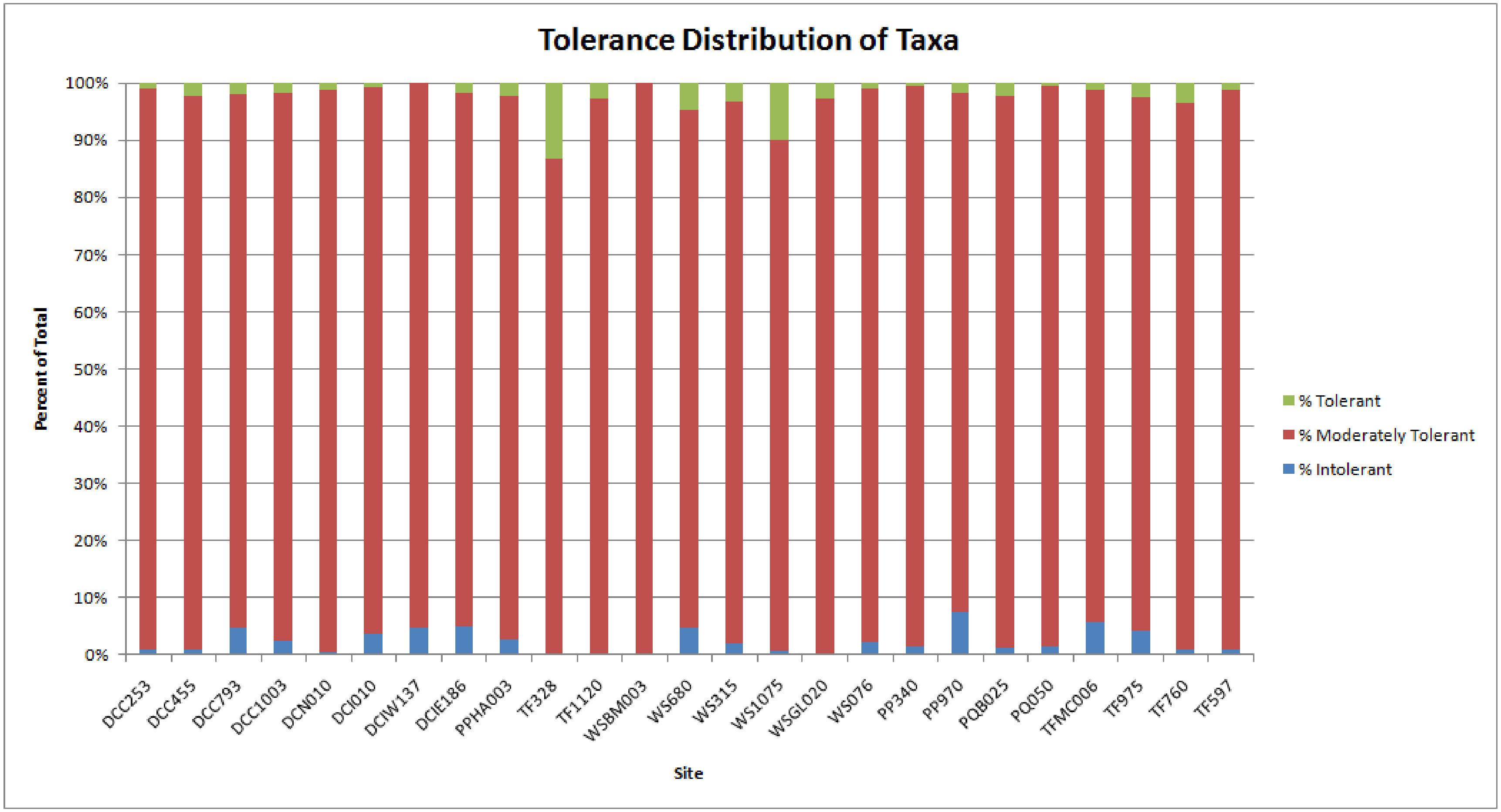


Figure 7. Tolerance Distribution of Taxa - Spring 2012

Although it is much too early to draw conclusions regarding trends at the eight long-term PWD-USGS cooperative monitoring sites, IBI and taxa richness results are shown below (Figures 8-9). Site TF328 was not assessed in 2011. Many factors contribute to interannual variability in the data, and it is hoped that future work will provide some insight into long-term trends.

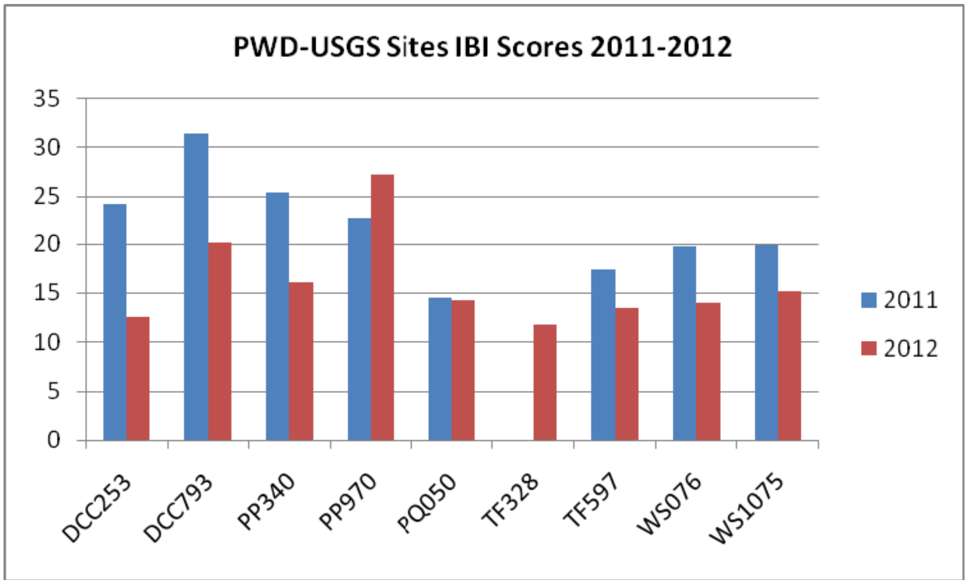


Figure 8. Comparison of IBI Scores at PWD-USGS Sites, 2011-2012

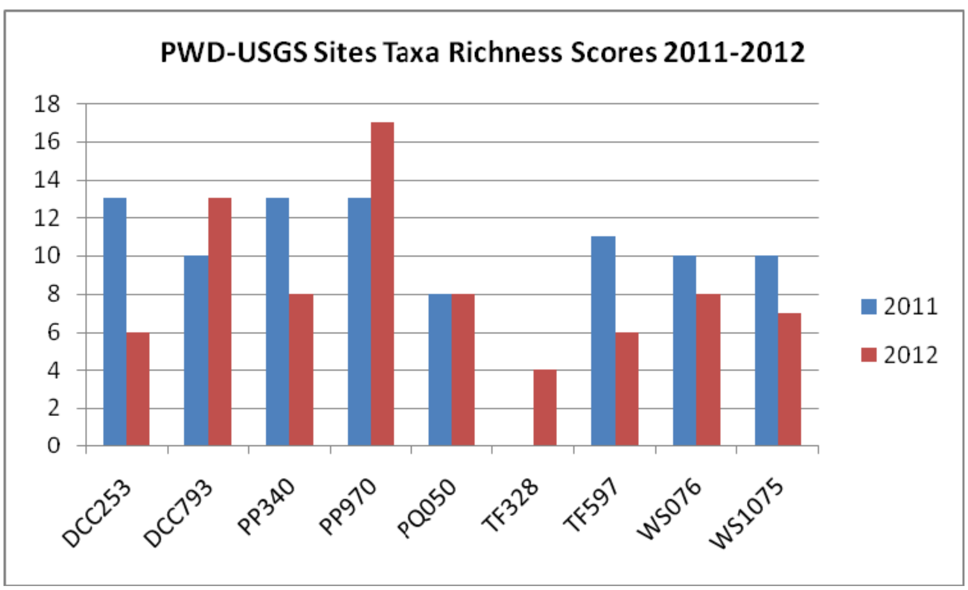


Figure 9. Comparison of Taxa Richness Scores at PWD-USGS Sites, 2011-2012

Physical Habitat Monitoring Results - Spring 2012

Habitat impairments such as hydrologic extremes (*i.e.*, low base flow and accentuated flow during storm events), physical obstructions, and sedimentation/siltation appear to be the major environmental stressors at the study sites. Accumulation of sediment in the interstitial spaces of riffles has been shown to limit available habitat and possibly smother benthic invertebrate life stages (Runde and Hellenthal, 2000). No site received an optimal score for embeddedness or sediment deposition in the 2012 habitat assessment (Table 8, Figures 10-11). Fifteen of the 25 assessment sites received a poor score for embeddedness. Six sites received marginal scores and four were classified as suboptimal. Fifteen sites scored poor for sediment deposition. Eight sites scored in the marginal category, while only two sites scored in the suboptimal category. The lower Tacony Creek site TF328 had the lowest overall habitat score of all sites, while Wissahickon Creek site WS315 had the highest overall score.

Table 8. Physical Habitat Scores at All Monitoring Sites - Spring 2012

Site ID	Instream	Epifaunal	Embed	Veldep	Chanalt	Seddep	Riffreq	Chanflo	Bankcond	Vegpro	Graze	Ripveg	Total Score
DCC253	7	7.5	5	7.5	11	12	9.5	12	11	12	13	14	107.5
DCC455	8.5	11	11	10	12.5	6	5	10	11	14	16	16	115
DCC793	12	10	9.5	11	16	8.5	12.5	9.5	8.5	14	14	16	125.5
DCC1003	9	9.5	11	11	10	10	11	9.5	7.5	13.5	9	10	111
DCN010	3	3	3	6	4	6	11	7	11	11	11.5	10	76.5
DCI010	14.5	12.5	8	14	16	6	13.5	6.5	12.5	15	16	15	134.5
DCIW137	6	6	5	7	7	8.5	9	11	13	16	15	8	103.5
DCIE186	6.5	7	5	7.5	7	11	11.5	9.5	9	6	5	4.5	85
WS076	8	9	8	11	7.5	5	3.5	9.5	4.5	4.5	6.5	8	77
WS315	17.5	14	13	17.5	17.5	11	10	11.5	15	17	18	16	162
WS680	11	11.5	6.5	11	7.5	9.5	9.5	15	4	8.5	10	7.5	104
WS1075	8.5	8.5	5	11	13.5	6.5	6	16	10	14.5	13.5	16.5	113
WSGL020	6.5	11	15	9	11	12.5	16.5	8.5	3.5	13.5	10	14	117
WSBM003	3.5	6	5	6	5.5	5	14	8	10	4	5	10	72
TF328	4	2	3	6	5	7	3	9	4	5	6	6	54
TF597	6	6	5	7.5	7	5	5	8	10	11	10	14	80.5
TF760	6	8	5	8.5	4	5	11	9	5	8.5	9.5	5	79.5
TF975	5	6	4	7.5	9.5	4.5	12.5	7	5	9.5	9.5	6	80
TF1120	6	6	5	11	5	5	8.5	8	11	5	6	4.5	76.5
TFMC006	6	6	5	8	5	6	10	10	8	13.5	5	5	82.5
PQ050	10	8.5	6	11	14	5	9	8.5	5	11	11.5	13	99.5
PQB025	12.5	6	5	11	15	4.5	7.5	10	5	6.5	8.5	6	91.5
PP340	11	11	6	11	12	2	12	9	11	15	16	15	116
PP970	15	13.5	14	15	16	5	15	7	7	11.5	9	16	128
PPHA003	10	12	14	13	13	6	16	8	11.5	14	16	16	133.5

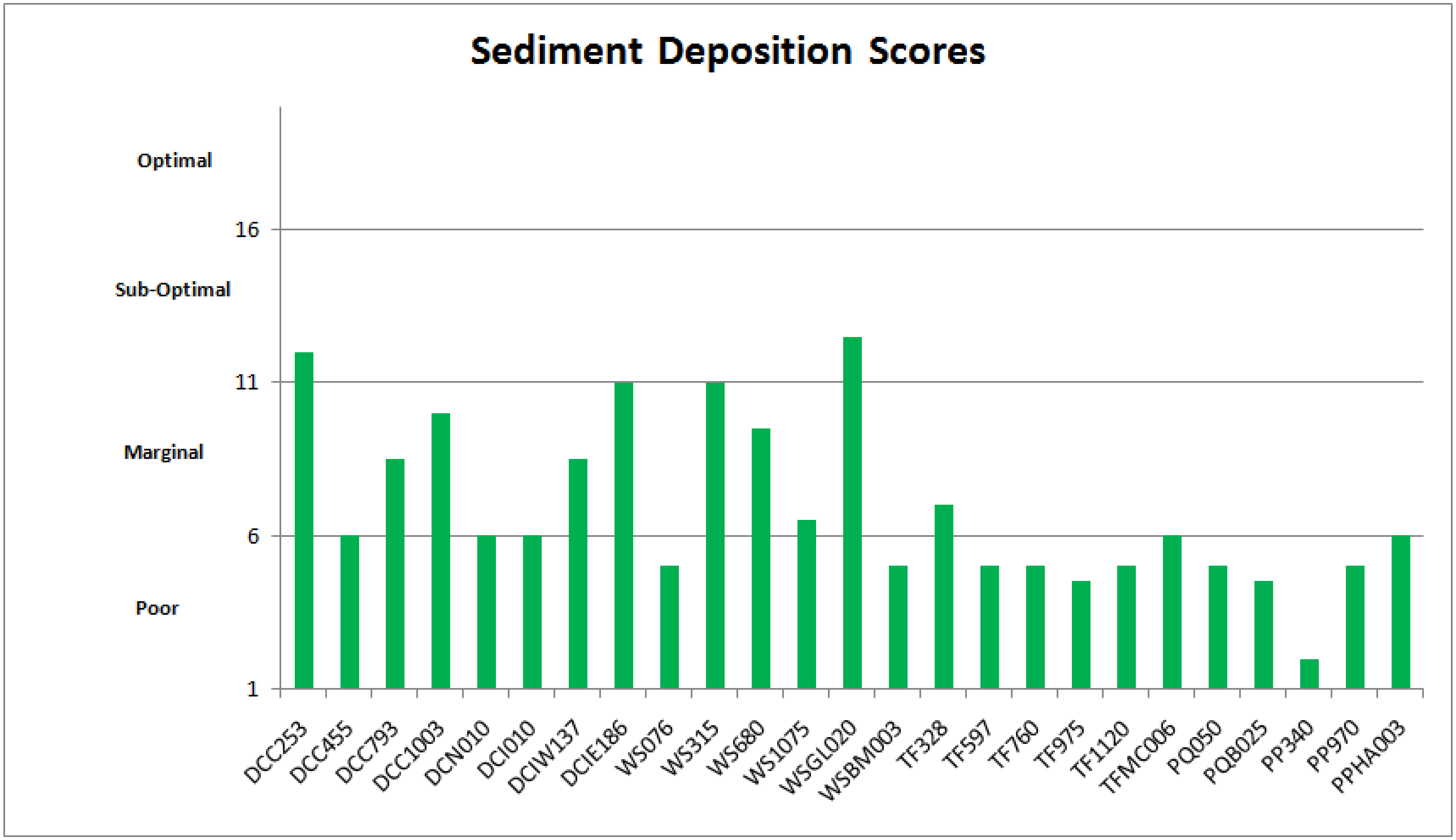


Figure 10. Sediment Deposition Scores - Spring 2012

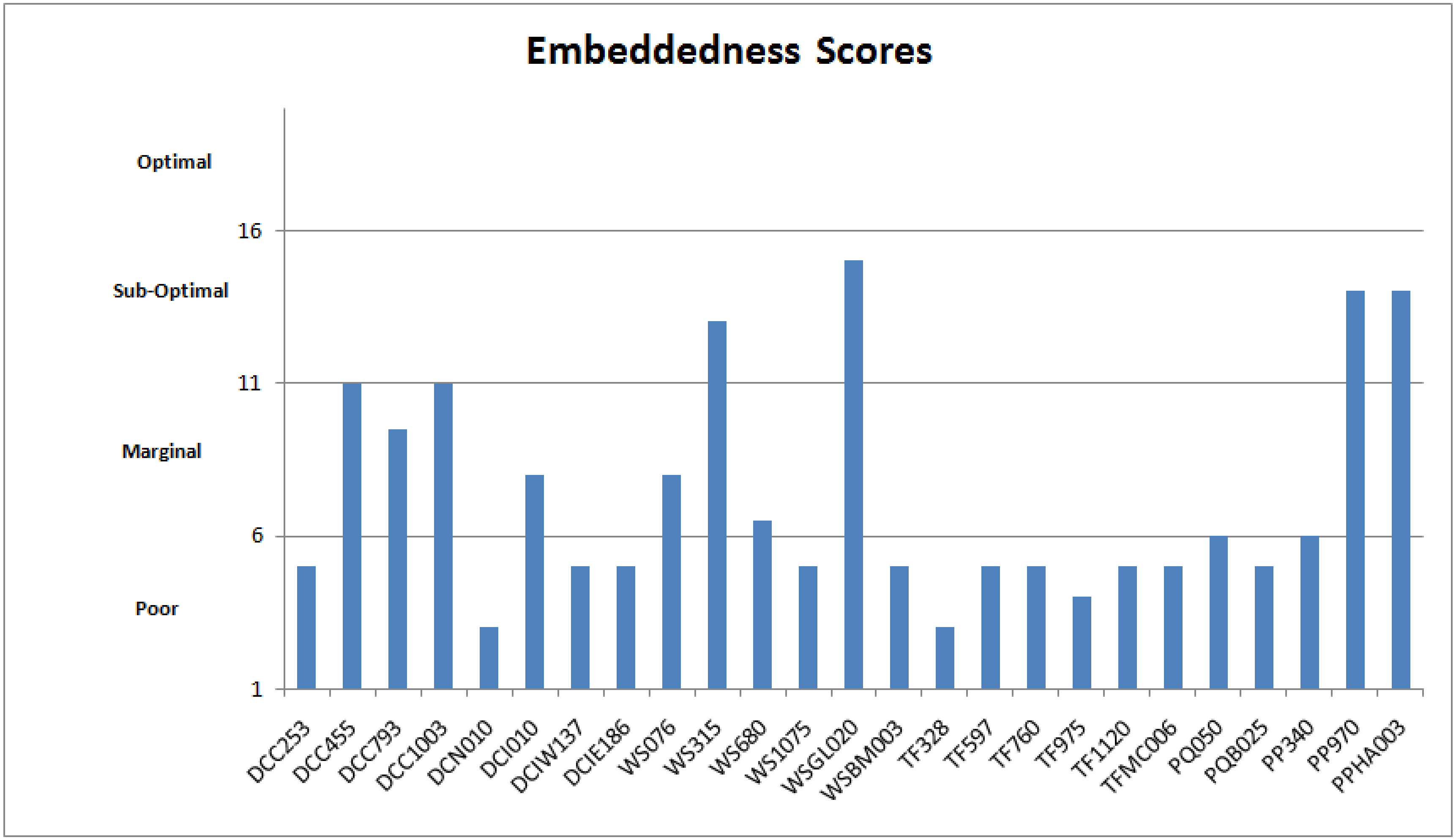


Figure 11. Embeddedness Scores - Spring 2012

Although it is much too early to draw conclusions regarding trends at the eight long-term PWD-USGS cooperative monitoring sites, embeddedness and sediment deposition results are shown below (Figures 12-13). Site TF328 was not assessed in 2011. Many factors contribute to interannual variability in the data, and it is hoped that future work will provide some insight into long-term trends.

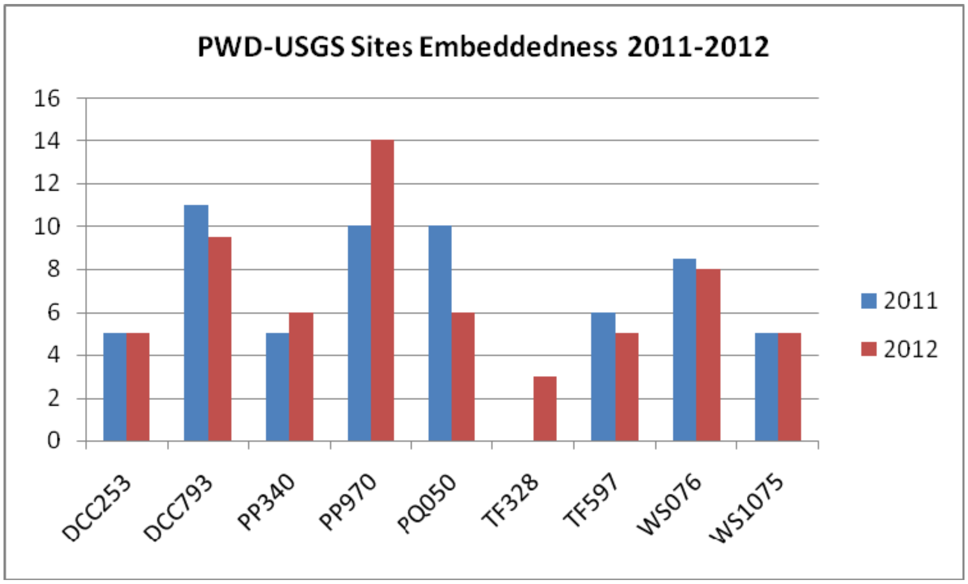


Figure 12. Comparison of PWD-USGS Sites Embeddedness Scores, 2011-2012

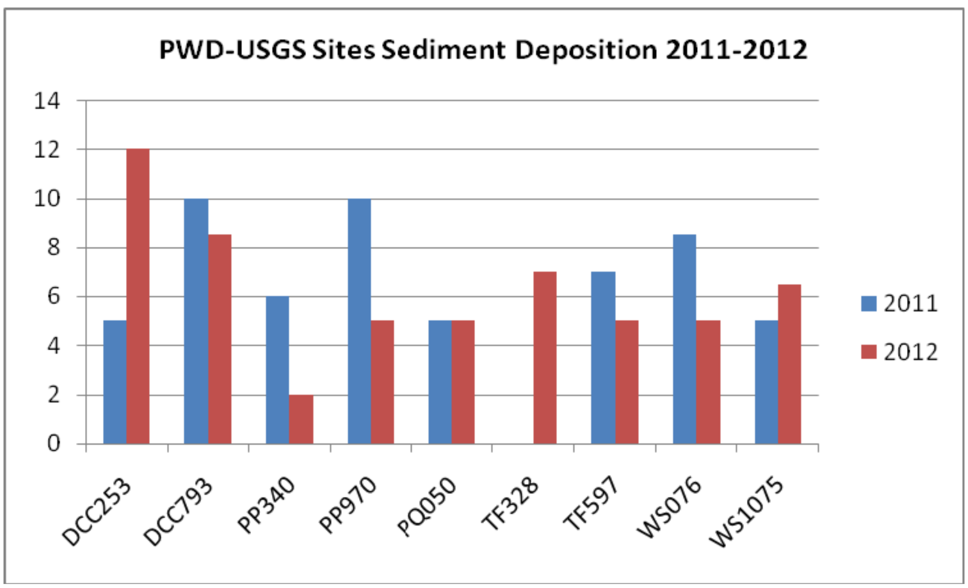


Figure 13. Comparison of PWD-USGS Sites Sediment Deposition Scores, 2011-2012

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APPENDIX I –
NPDES PERMITTED DISCHARGERS

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
1	PAR600091	A&H AUTO PARTS PASSYUNK AVE FAC	6255 W. PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
2	PAR800029	ABF FREIGHT SYSTEM INC	2011 WOODHAVEN RD, PHILADELPHIA, PA 19116	PHILADELPHIA	MS4	POQUESSING
3	PAR800080	ABF FREIGHT SYSTEM INC	4000 RICHMOND ST, PHILADELPHIA, PA 19137	PHILADELPHIA	MS4	TACONY
4	PAR800118	ACADEMY RECYCLING TORRESDALE FAC	8901 TORRESDALE AVENUE, PHILADELPHIA, PA 19154	PHILADELPHIA	MS4	PENNYPACK
5	PAR600034	ACER ENGINEERS INC	JIMMIES AUTO PARTS, PHILADELPHIA, PA 19137	PHILADELPHIA	CSO	DELAWARE
6	PA0057690	AKER PHILA SHIPYARD	2100 KITTY HAWK AVE, PHILADELPHIA, PA 19112	PHILADELPHIA	CSO	DELAWARE
7	PAR600107	ALLEGHENY AUTO PARTS FAC	310-400 W ALLEGHENY AVE 19133	PHILADELPHIA	MS4	FRANKFORD
8	PAR600026	ALLEGHENY IRON & METAL TACONY ST FAC	TACONY STREET AND ADAMS AVENUE, PHILADELPHIA, PA 19124	PHILADELPHIA	CSO	TACONY
9	PAR700019	ALLIED TRANSPORT INDIANA AVE FACILITY	1801 W. INDIANA AVE, PHILADELPHIA, PA 19132	PHILADELPHIA	CSO	DELAWARE
10	PAR200002	ALLIED TUBE & CONDUIT NORCOM RD PLT	11350 NORCOM ROAD, PHILADELPHIA, PA 19154	PHILADELPHIA	MS4	POQUESSING
11	PAR600054	AMERICAN AUTO PARTS & SALV CO	3501 S 61ST ST, PHILADELPHIA, PA 191533522	PHILADELPHIA	NON-CONTRIBUTING	SCHUYLKILL
12	PA0050202	AMTRAK RACE ST/PENN COACH YARD FAC.	30TH AND RACE STREETS, PHILADELPHIA, PA 19104	PHILADELPHIA	CSO	SCHUYLKILL
13	PAR600112	ARCA ADVANCED PROC N DELAWARE AVE FAC	4301 N DELAWARE AVE 19137	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
14	PAR230068	ARDEX LABS INC	2050 BYBERRY RD 19116	PHILADELPHIA	MS4	BYBERRY
15	PAR230044	ASHLAND CHEM	2801 CHRISTOPHER COLUMBUS BOULEVARD, PHILADELPHIA, PA 19148	PHILADELPHIA	CSO	DELAWARE

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
16	PAR600080	ATLANTIC USED AUTO PARTS W PASSYUNK AVE FAC	6030 W PASSYUNK AVE, PHILA, PA 19153	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL
17	PAR600056	B & L AUTO PARTS 61ST STREET FAC	3404 S 61ST ST, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
18	PAR800041	BFI TRANSF SYS OF PA CHRISTOPHER COLUMBUS BLVD FAC	2904 S CHRISTOPHER COLUMBUS BLVD, PHILADELPHIA, PA 19148	PHILADELPHIA	CSO	DELAWARE
19	PAR600109	BLUE MOUNTAIN RECYCLING ELLSWORTH ST FAC	2904 ELLSWORTH ST 19146	PHILA	MS4	SCHUYLKILL
20	PAR600073	BRUCE PAUL AUTO PARTS	LEHIGH AVE FAC, PHILADELPHIA, PA 19125	PHILADELPHIA	CSO	DELAWARE
21	PAR200036	BUDD COMP	PHILADELPHIA PLANT, PHILADELPHIA, PA 19129	PHILADELPHIA	MS4	SCHUYLKILL
22	PAR600081	BUTCHS AUTO PARTS	SOUTH 61ST ST FAC, PHILADELPHIA, PA 19142	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL
23	PAR800159	CANADIAN PACIFIC PHILA NAVY YD FAC	LANGLEY AVE 19148	PHILA	NON-CONTRI BUTING	SCHUYLKILL
24	PAR600074	CARTEL AUTO PARTS W PASSYUNK AVE FAC	6339 W PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
25	PAR800055	CF MOTOR FREIGHT PHL	2625 E CASTOR AVE, PHILADELPHIA, PA 19134	PHILADELPHIA	CSO	DELAWARE
26	PAR600028	CIMCO TERMINAL INC	C/O CAMDEN IRON & METAL INC, PHILADELPHIA, PA 19125	PHILADELPHIA	CSO	SCHUYLKILL
27	PAR900017	CLEAN EARTH OF PHILA FAC	3201 SOUTH 61ST STREET, PHILADELPHIA, PA 19153	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL
28	PAR600114	CLEARFIELD RECYCLING PHILADELPHI A FACILITY	547 W. CLEARFIELD ST, PHILADELPHIA, PA 19133	PHILADELPHIA	CSO	DELAWARE
29	PA0040991	CONOCO PHILLIPS CO	PHILADELPHIA TERMINAL, PHILADELPHIA, PA 19124	PHILADELPHIA	CSO	TACONY
30	PAR800019	CROWLEY AMERICAN TRANS	TIOGA MARINE TERMINAL, PHILADELPHIA, PA 19134	PHILADELPHIA	CSO	DELAWARE

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
31	PAR200023	CROWN CORK & SEAL CO INC	9300 ASHTON RD 19136	PHILADELPHIA	NON-CONTRI BUTING	PENNYPACK
32	PAR800088	CSX INTERMODAL	GREENWICH YARD, PHILADELEPHIA, PA 19148	PHILADELPHIA	CSO	DELAWARE
33	PAR600092	DAVE S DELAWARE VALLEY TOWING PASSYUNK AVE FAC	6159 PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
34	PAR800060	DEGUSSA CORP	DEGUSSA CSX/BIDS FACILITY, PHILADELPHIA, PA 19145	PHILADELPHIA	CSO	DELAWARE
35	PAR900005	DELAWARE VALLEY RECYCLING	3107 SOUTH 61ST STREET, PHILADELPHIA, PA 19153	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL
36	PAR600106	DELCO METALS N 2ND ST FAC	3053 N 2ND ST 19133	PHILA	CSO	FRANKFORD
37	PAR800138	DHL EXPRESS USA INC	HOLSTEIN AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
38	PAR230043	DICKLER CHEMICAL LABORATORIE S INCORPORATE D	4201 TORRESDALE AVENUE, PHILADELPHIA, PA 191241001	PHILADELPHIA	CSO	TACONY
39	PAR120002	DIETZ & WATSON INCORPORATE D	5701 TACONY ST., PHILADELPHIA, PA 19135	PHILADELPHIA	NON-CONTRI BUTING	DELAWARE
40	PAR600089	DRIVE LINE AUTO PARTS	WEST PASSYUNK AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
41	PAR600071	ESSINGTON AVE AUTO PARTS	6746 ESSINGTON AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	CSO	SCHUYLKILL
42	PAG100018	EXELON GENERATION CO LLC	RICHMOND FAC 19137	PHILADELPHIA	MS4	DELAWARE
43	PA0011649	EXELON RICHMOND GENERATING STA	3901 NORTH DELAWARE AVENUE, PHILADELPHIA, PA 19137	PHILADELPHIA	NON-CONTRI BUTING	DELAWARE
44	PAR800113	FEDERAL EXPRESS CORP	3600 GRAYS FERRY AVENUE, PHILADELPHIA, PA 19146	PHILADELPHIA	CSO	SCHUYLKILL
45	PAR800131	FEDEX GROUND	TOWNSEND RD FAC, PHILADELPHIA, PA 19154	PHILADELPHIA	MS4	POQUESSING

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
46	PAR600108	FIFTH STREET AUTO PARTS FAC	3105 N FIFTH ST 19133	PHILADELPHIA	CSO	FRANKFORD
47	PAR600055	FIORES AUTO PARTS	3300 S 61ST ST, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
48	PAR800166	FIRST TRANSIT INC	4201 TACONY STREET, PHILADELPHIA, PA 19124	PHILADELPHIA	MS4	FRANKFORD
49	PA0056502	FORMER ISLAND GREEN COUNTRY CLUB – FAC	RED LION RD, HUNTINGDON VALLEY, PA 19006	MONTGOMERY	NON-CONTRIBUTING	PENNYPACK
50	PA0011533	GIRARD POINT PROCESSING AREA	3144 PASSYUNK AVE, PHILADELPHIA, PA 19145	PHILADELPHIA	CSO	SCHUYLKILL
51	PAR800158	GREENWICH TERM S COL	3301 S COLUMBUS BLVD 19148	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
52	PAR200011	GROSS METALS	221 WEST GLENWOOD AVENUE, PHILADELPHIA, PA 19135	PHILADELPHIA	CSO	DELAWARE
53	PAR600072	HAROLDS USED AUTO PARTS	WHITBY AVE FAC, PHILADEPHIA, PA 19143	PHILADELPHIA	CSO	DARBY-COBBS
54	PAR200007	HENSHELL CORP	2922 NORTH 19TH STREET, PHILADELPHIA, PA 19132	PHILADELPHIA	CSO	DELAWARE
55	PAR230045	HONEYWELL INTL FRANKFORD FAC	4698 BERMUDA STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	CSO	DELAWARE
56	PAR110047	HOWARD MCCRAY REFRIG CO INC	GRANT AVE & BLUE GRASS RD, PHILADELPHIA, PA 19114	PHILADELPHIA	MS4	PENNYPACK
57	PAR120011	HYGRADE FOOD PROD	8400 EXECUTIVE AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
58	PAR130004	IMPERIAL METAL & CHEM	2050 BYBERRY ROAD, PHILADELPHIA, PA 19116	PHILADELPHIA	MS4	POQUESSING
59	PAR140005	INTL PAPER	2100 EAST BYBERRY ROAD, PHILADELPHIA, PA 19116	PHILADELPHIA	MS4	POQUESSING
60	PAR600076	JACKS AUTO PARTS SALES	61ST ST FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	CSO	DARBY-COBBS
61	PA0058947	JDM MATERIALS	2750 GRANT AVE, PHILADELPHIA, PA 19114	PHILADELPHIA	NON-CONTRIBUTING	PENNYPACK

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
62	PA0058955	JDM MATERIALS CO	BARTRAM BATCH PLANT, PHILADELPHIA, PA 19153	PHILADELPHIA	NON-CONTRIBUTING	SCHUYLKILL
63	PAR600084	JIMS AUTO RECYCLING INC	W PASSYUNK FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
64	PAR600090	JKL'S AUTO SALES & PARTS	ESSINGTON AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
65	PAR600065	JOSEPH TRENT DBA JTS USED AUTO	S 61ST ST FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
66	PAR200016	JOWITT & RODGERS STATE RD FAC	9400 STATE RD, PHILADELPHIA, PA 19114	PHILADELPHIA	MS4	DELAWARE
67	PAR210006	JOWITT & ROGERS COMP	9400 STATE RD 19114	PHILADELPHIA	MS4	DELAWARE
68	PAR600079	K & A AUTO SALVAGE	EAST SOMERSET ST FAC, PHILADELPHIA, PA 19134	PHILADELPHIA	CSO	DELAWARE
69	PAR600110	KAN CO METALS BRIDGE	2275 BRIDGE ST 19137	PHILADELPHIA	CSO	FRANKFORD
70	PAR600078	KNOCK OUT AUTO PARTS E TIOGA ST FAC	3201 E TIOGA ST, PHILADELPHIA, PA 19134	PHILADELPHIA	CSO	DELAWARE
71	PAR110048	KURZ HASTINGS INCORPORATED	10901 DUTTON ROAD, PHILADELPHIA, PA 19154	PHILADELPHIA	MS4	POQUESSING
72	PAR600115	KUUSAKOSKI PHILADELPHIA ORTHODOX FACILITY	3150 ORTHODOX STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	MS4	DELAWARE
73	PAR110042	L3 COMMUNICATIONS ROOSEVELT BLVD FAC	13500 ROOSEVELT BOULEVARD, PHILADELPHIA, PA 19116	PHILADELPHIA	MS4	POQUESSING
74	PAR110040	LAVELLE AIRCRAFT COMP	275 GEIGER RD, PHILADELPHIA, PA 19115	PHILADELPHIA	MS4	PENNYPACK
75	PAR150006	LAWRENCE MCFADDEN	7430 STATE RD., PHILADELPHIA, PA 191364299	PHILADELPHIA	CSO	DELAWARE
76	PAR600066	LKQ PENN MAR W PASSYUNK	PO BOX 5346, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
77	PAR110015	MELCO AUTO PARTS	5112 UMBRIA ST, PHILADELPHIA, PA 19128	PHILADELPHIA	MS4	SCHUYLKILL
78	PAR600057	MICHAEL MACHINO DBA	OSCARS AUTO PARTS/PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
79	PAR120025	MONDELEZ GLOBAL ROOSEVELT BLVD PLT	12000 E ROOSEVELT BLVD, PHILADELPHIA, PA 19116	PHILADELPHIA	MS4	POQUESSING
80	PAR600039	MORRIS IRON & STEEL CO INC	7345 MILNOR ST, PHILADELPHIA, PA 19136	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
81	PA0036447	NAVAL SURFACE WARFARE CENTER CARDEROCK DIVISION	5001 SOUTH BROAD STREET, PHILADELPHIA, PA 19112	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
82	PAR600105	NDV RECYCLING N 2ND ST FAC	3630 N 2ND ST 19140	PHILADELPHIA	CSO	FRANKFORD
83	PAR200010	NESBITT DIV OF MESTEK INC	TULIP & RHAWN STS, PHILADELPHIA, PA 19136	PHILADELPHIA	CSO	PENNYPACK
84	PAR800112	NORTHEAST PHILADELPHIA AIRPORT (PNE)	NORTHEAST PHILADELPHIA AIRPORT, PHILADELPHIA, PA 19114	PHILADELPHIA	MS4	PENNYPACK
85	PA0026689	NORTHEAST WPCP	3900 RICHMOND STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	MS4	TACONY
86	PAR600030	ORTHODOX AUTO UNRUH AVE FAC	5247 UNRUH AVE, PHILADELPHIA, PA 19135	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
87	PA0012572	PAPERWORKS INDUSTRIES INC	5000 FLAT ROCK ROAD, PHILADELPHIA, PA 19127	PHILADELPHIA	NON-CONTRIBUTING	SCHUYLKILL
88	PAR600070	PASCO INC	PASCO PASCHALL AVE FACILITY, PHILADELPHIA, PA 19142	PHILADELPHIA	CSO	DARBY-COBBS
89	PA0011657	PECO PESTICIDE DISCHARGES	2301 MARKET ST, PHILADELPHIA, PA 19101	PHILADELPHIA	CSO	SCHUYLKILL
90	PAR600093	PENNSYLVANIA AUTO SALVAGE INC	4001 ASHLAND ST 19124	PHILADELPHIA	MS4	FRANKFORD
91	PAR120003	PEPSI COLA	11701 ROOSEVELT BLVD., PHILADELPHIA, PA 19154	PHILADELPHIA	MS4	POQUESSING
92	PAR140021	PERFECSEAL BUSTLETON AVE FAC	9800 BUSTLETON AVENUE, PHILADELPHIA, PA 19115	PHILADELPHIA	MS4	PENNYPACK
93	PAR900024	PGW PASSYUNK PLANT	3100 W PASSYUNK AVE, PHILADELPHIA, PA 191455208	PHILADELPHIA	CSO	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
94	PA0046876	PHILA GAS WORKS PASSYUNK AVE PLT	3100 PASSYUNK AVE, PHILADELPHIA, PA 19145	PHILADELPHIA	CSO	SCHUYLKILL
95	PA0012882	PHILA GAS WORKS RICHMOND PLT	3100 EAST VENANGO STREET, PHILADELPHIA, PA 191346192	PHILADELPHIA	CSO	DELAWARE
96	PA0026662	PHILA SOUTHEAST POTW	25 PATTISON AVENUE, PHILADELPHIA, PA 19148	PHILADELPHIA	CSO	DELAWARE
	PA0040991	PHILA TERM	4210 G STREET, PHILADELPHIA, PA 19124-4821	PHILADELPHIA	CSO	TACONY
97	PAR120018	PHILADELPHIA BAKING CO	GRANT AVE & ROOSEVELT AVE, PHILADELPHIA, PA 19115	PHILADELPHIA	MS4	PENNYPACK
98	PAR600042	PHILADELPHIA CITY POLICE DEPT	POLICE & AUTO IMPOUNDMENT LOT, PHILADELPHIA, PA 19153	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
99	PAR900013	PHILADELPHIA CITY WATER DEPT	NE/WPCP, PHILADELPHIA, PA 19137	PHILADELPHIA	CSO	DELAWARE
100	PAR900019	PHILADELPHIA CITY WATER DEPT	SOUTHWEST WPC PLANT 19153	PHILADELPHIA	NON-CONTRIBUTING	SCHUYLKILL
101	PA0054712	PHILADELPHIA MS4	1101 MARKET STREET, PHILADELPHIA, PA 19107	PHILADELPHIA	CSO	DELAWARE
102	PA0244431	PHILADELPHIA NAVAL SHIPYARD	5195 SOUTH 19TH STREET, PHILADELPHIA, PA 19112	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
103	PA0057479	PHILADELPHIA NAVAL YARD DRY DOCK 2	5120 SOUTH 17TH STREET, PHILADELPHIA, PA 19112	PHILADELPHIA	NON-CONTRIBUTING	DELAWARE
104	PAR900020	PHILADEPHIA WATER DEPT	SE WPCP, PHILADELPHIA, PA 19148	PHILADELPHIA	CSO	DELAWARE
105	PA0011088	PLAINS PRODUCTS TERMINALS LLC	6850 ESSINGTON AVE., PHILADELPHIA, PA 19153	PHILADELPHIA	SW ONLY	SCHUYLKILL
106	PA0011428	PLAINS PRODUCTS TERMINALS	1630 S 51ST STREET, PHILADELPHIA, PA 19143	PHILADELPHIA	CSO	SCHUYLKILL
107	PAR600075	POOR BOYS USED AUTO PARTS W ANNSBURY ST FAC	532 W ANNSBURY ST, PHILADELPHIA, PA 19140	PHILADELPHIA	CSO	TACONY

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
108	PAR800064	REPUBLIC SVC OF PA PORT RICHMOND HAULING FAC	3000 E HEDLEY ST, PHILADELPHIA, PA 19137	PHILADELPHIA	MS4	DELAWARE
109	PAR800146	REPUBLIC SVC QUICKWAY TRANSFER STATION	2960 ORTHODOX ST, PHILADELPHIA, PA 19137	PHILADELPHIA	CSO	DELAWARE
110	PAR230060	RICHARDSAPE X INC	4202-24 MAIN STREET, PHILADELPHIA, PA 19127	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL
111	PAR800085	ROADWAY EXPRESS	CHURCH & PEARCE STREETS, PHILADELPHIA, PA 19124	PHILADELPHIA	MS4	TACONY
112	PAR600083	ROBERT VOLIO	DBA NICE GUYS AUTO PARTS, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
113	PA0012777	ROHM & HAAS CHEMICAL RICHMOND ST PLT	5000 RICHMOND STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	NON-CONTRI BUTING	DELAWARE
114	PAR600024	S D RICHMAN SONS WHEATSHEAF LN FAC	2435 E WHEATSHEAF LANE, PHILADELPHIA, PA 19137	PHILADELPHIA	MS4	TACONY
115	PAR600082	SAMMY'S AUTO PARTS	3405 SOUTH 61ST ST, PHILADELPHIA, PA 19153	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL
116	PAR800163	SAVAGE SVC E OREGON	52 E OREGON AVE 19148	PHILADELPHIA	CSO	DELAWARE
117	PA0011657	SCHUYLKILL GENERATING STATION	2800 CHRISTIAN ST, PHILADELPHIA, PA 19146	PHILADELPHIA	CSO	SCHUYLKILL
118	PAR800033	SEPTA	ALLEGHENY GARAGE, PHILADELPHIA, PA 19129	PHILADELPHIA	MS4	SCHUYLKILL
119	PAR800035	SEPTA	ROBERTS AVE FAC, PHILADELPHIA, PA 19129	PHILADELPHIA	MS4	SCHUYLKILL
120	PAR140023	SMURFIT STONE CONTAINER ENTER	BLUE GRASS RD PLT, PHILADELPHIA, PA 19114	PHILADELPHIA	MS4	PENNYPACK
121	PAR600025	SPC PENROSE AVE FAC	26TH STREET AND PENROSE AVENUE, PHILADELPHIA, PA 19145	PHILADELPHIA	CSO	SCHUYLKILL
122	PAR600111	STEFFA METALS CHURCH ST FAC	2190 CHURCH ST 19124	PHILADELPHIA	CSO	FRANKFORD
123	PAR600085	STEVEN NGO	DBA STEVES AUTO PARTS II, PHILADELPHIA, PA 19153	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	CSO/SW AREA	RECEIVING WATERBODY
124	PAR230088	SUN CHEM HUNTING PARK AVE PLT	3301 HUNTING PARK AVE., PHILADELPHIA, PA 19129	PHILADELPHIA	CSO	SCHUYLKILL
125	PA0011533	SUNOCO POINT BREEZE PROCESSING REFINERY	3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145	PHILADELPHIA	CSO	SCHUYLKILL
126	PAR120008	SWEET OVATIONS TOMLINSON RD FAC	1741 TOMLINSON RD, PHILADELPHIA, PA 19116	PHILADELPHIA	MS4	POQUESSING
127	PAR600086	T&E AUTO PARTS W PASSYUNK AVE FAC	6219 W PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
128	PAR200038	TJ COPE NORCOM RD FAC	11500 NORCOM RD, PHILADELPHIA, PA 19154	PHILADELPHIA	MS4	POQUESSING
129	PAR800052	TRANSFLO TERM SVC MOORE ST FACILITY	36TH AND MOORE ST, PHILADELPHIA, PA 19145	PHILADELPHIA	CSO	SCHUYLKILL
130	PAR800148	TRANSRIVER PHILADELPHI A	3600 SOUTH 26TH ST 19145	PHILADELPHIA	NON-CONTRI BUTING	SCHUYLKILL
131	PAR230089	UNITED COLOR MANUF INC	EAST TIOGA ST PLANT, PHILADELPHIA, PA 19134	PHILADELPHIA	CSO	DELAWARE
132	PAR800062	US POSTAL SERV	BYBERRY RD FAC, PHILADELPHIA, PA 19116	PHILADELPHIA	MS4	POQUESSING
133	PAR800167	US POSTAL SVC LINDBERGH BLVD FAC	7500 LINDBERGH BLVD, PHILADELPHIA, PA 19176	PHILADELPHIA	MS4	SCHUYLKILL
134	PAR800067	WASTE MGMT OF PA	5245 BLEIGH AVE, PHILADELPHIA, PA 19136	PHILADELPHIA	MS4	DELAWARE
135	PAR600015	WASTE MGMT OF PA INC	3605 GREYS FERRY AVE, PHILADELPHIA, PA 19146	PHILADELPHIA	CSO	SCHUYLKILL
136	PAG100036	WESTWAY TERMINAL HYDROSTATIC TESTING	2900 EAST ALLEGHENY AVE, PHILADELPHIA, PA 19134	PHILADELPHIA	MS4	SCHUYLKILL
137	PAR800170	WESTWAY TERMINAL STORMWATER	2900 EAST ALLEGHENY AVE, PHILADELPHIA, PA 19134	PHILADELPHIA	MS4	SCHUYLKILL
138	PAR600088	WILLIAM DORTONE DBA BILLS AUTO	PASSYUNK AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL
139	PAR700020	121 POINT BREEZE TERMINAL	6310 PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MS4	SCHUYLKILL

APPENDIX J - DEFECTIVE LATERAL GROUP QUARTERLY REPORTS

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STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from July 1, 2012 to September 30, 2012)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

November 14, 2012

DLC Program Update
3rd Quarter 2012

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning July 1, 2012 and ending September 30, 2012.

The body of this report will describe the recent activities of the City during the past quarter within the Priority Outfall areas and at other significant outfalls on the Stormwater Priority Outfall List. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,830 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1. CFD-01 Plymouth St. west of Pittsville St.
2. CFD-02 Pittsville St. south of Plymouth St.
3. CFD-03 Elston St. east of Bouvier St.
4. CFD-04 Ashley St. west of Bouvier St.
5. CFD-05 Cheltenham Ave. east of 19th St.
6. CFD-06 Verbena St. south of Cheltenham Ave.
7. CFD-07 Cheltenham Ave. east of 7th St.
8. CFD-08 7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	9	0	0
CFD-02	8	3	0
CFD-03	6	0	0
CFD-04	5	0	0
CFD-05	7	0	0
CFD-06	5	1	0
CFD-07	8	6	0
CFD-08	7	3	0

The most recent fecal sample value was 8000 fecal colonies per 100 ml. at the outfall on July 2, 2012.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	7	0	0
MFD-02	6	0	0

The most recent fecal sample value was 19000 fecal colonies per 100 ml. at the outfall on July 2, 2012.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 28000 fecal colonies per 100 ml. at the W-068-05 outfall on July 2, 2012.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,477 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was 145 fecal colonies per 100 ml. at the S-058-01 outfall, 4500 fecal colonies per 100 ml. at the S-059-01 outfall, >6000 fecal colonies per 100 ml. at the S-059-02 outfall, 2000 fecal colonies per 100 ml. at the S-059-03 outfall, 3700 fecal colonies per 100 ml. at the S-059-04 outfall, 2600 fecal colonies per 100 ml. at the S-059-05 outfall all on September 25, 2012.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 3,951 Complete tests in this sewershed, identifying 45 Cross-connections, 27 of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	12	0	0

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,016 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	14	3	1

3. A current summary of additional outfalls from the Stormwater Priority Outfall List that the City has performed complete testing or abatements at this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-090-02	879	14	18
Q-110-17	0	0	1
S-051-03	(33)	(2)	(2)
T-079-01	5	0	0
T-096-01	2	1	2
W-077-02	1	0	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter
- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter
- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter
- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter
- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter
- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-090-02
- T-096-01

4. Continue to perform property testing within the following outfalls.

- P-090-02
- T-079-01
- T-096-01
- P-046-09
- P-091-06
- P-091-07
- P-091-09
- P-099-01
- P-113-06
- Q-100-05
- Q-114-12
- Q-115-12
- Q-121-05
- S-046-09
- S-059-02

Table 1
DLC Program Summary
<u>July 1, 2012 to September 30, 2012</u>

<u>Complete Tests:</u>

- 48,128 Complete tests have been performed under the DLC program
- **887 Complete tests were performed this past quarter**
- 879 Complete tests were performed in outfall P-090-02
- (33) Complete tests were performed in outfall S-051-03
- 33 Complete tests were performed in outfall S-059-04
- 5 Complete tests were performed in outfall T-079-01
- 2 Complete tests were performed in outfall T-096-01
- 1 Complete test was performed in outfall W-077-02

<u>Cross-Connections Found:</u>

- 1,221 Cross-connections have been identified under the DLC program
- **15 Cross-connections were identified this past quarter**
- 14 Cross-connections were identified in outfall P-090-02
- (2) Cross-connections were identified in outfall S-051-03
- 2 Cross-connections were identified in outfall S-059-04
- 1 Cross-connection was identified in outfall T-096-01

<u>Abatements:</u>

- 1,202 Abatements have been performed under the DLC program
- **21 Abatements were performed this past quarter**
- 18 Abatements were performed in outfall P-090-02
- 1 Abatement was performed in outfall Q-110-17
- (2) Abatements were performed in outfall S-051-03
- 2 Abatements were performed in outfall S-059-04
- 2 Abatements were performed in outfall T-096-01

<u>Outfall/Manhole Screening and Sampling:</u>

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
July 1, 2012 to September 30, 2012

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	7/2/2012	10:00	Outfall: 7th & Cheltenham	84	180000	0.42	8000	
T-088-01	7/2/2012	10:05	Outfall: 7th & Cheltenham @ Bridge	84	180000	0.41	1730	
W-060-01	7/2/2012	11:30	Outfall: Monastery Lane	5'-0"x4'-4"	1800	<0.10	19000	
W-068-05	7/2/2012	10:45	Outfall: Lincoln & Morris	90	72000	0.27	28000	
S-058-01	9/25/2012	10:05	Outfall: Domino Lane	54	1200	0.37	145	
S-059-01	9/25/2012	10:20	Outfall: Parker	60	600	0.18	4500	
S-059-02	9/25/2012	10:35	Outfall: Fountain	42	60	0.11	>6000	
S-059-03	9/25/2012	10:50	Outfall: Wright	42	300	0.11	2000	
S-059-04	9/25/2012	11:15	Outfall: Leverington	51	300	0.22	3700	
S-059-05	9/25/2012	11:20	Outfall: Leverington (east)	4'-0"x2'-8"	60	0.39	2600	
S-059-09	9/25/2012	11:40	Outfall: Green Lane	36	NF			
B. Permit Inspection Program								

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
01941 Glendale Ave	P-090-02	05-11-2012		09-24-2012	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments

Table 4
Spills to Storm Sewers and/or Receiving Waters
July 1, 2012 to September 30, 2012

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
07/03/12	P-105-13A	9900 Sandy Road Wooden Bridge Run	3009	Sewage	07/03/12	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge into storm sewer. Also flushed storm sewer with dechlorination tabs.
08/14/12	S-052-05	5000 Ridge Avenue Schuylkill River		Sewage	08/14/12	Sewer Maintenance unit flushed 18" diameter sanitary sewer causing approximate <1 gpm discharge from manhole to street during rain event. Also washed down street.
08/17/12	P-104-09	8500 Algon Avenue Pennypack Creek	3011	Sewage	08/17/12	Sewer Maintenance unit flushed 10" diameter sanitary sewer and removed debris from manhole invert causing approximate <1 gpm discharge. Also affected area cleaned.
08/20/12	P-100-05	2700 Tolbut Street Unnamed tributary of Pennypack Creek	3011	Sewage	08/20/12	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge. Also flushed storm sewer with dechlorination tabs and affected area cleaned.
08/24/12	P-100-14	Holme Avenue at Longford Street Wooden Bridge Run	3011	Sewage	08/24/12	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge. Also affected area cleaned.
09/28/12	S-059-04	Baker Street between Mallory Street and Leverington Avenue Manayunk Canal	3009	Sewage	09/28/12	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing approximate 4 gpm discharge. Bypass pump setup. Excavation will be made to enable repairs to the defects in the 8" diameter sanitary sewer and 2' diameter storm sewer.

Source Codes:
3009 - Spill to Storm Sewer
3011 - Spill to Receiving Stream

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from October 1, 2012 to December 31, 2012)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

February 14, 2013

DLC Program Update
4th Quarter 2012

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning October 1, 2012 and ending December 31, 2012.

The body of this report will describe the recent activities of the City during the past quarter within the Priority Outfall areas and at other significant outfalls on the Stormwater Priority Outfall List. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,831 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1. CFD-01 Plymouth St. west of Pittsville St.
2. CFD-02 Pittsville St. south of Plymouth St.
3. CFD-03 Elston St. east of Bouvier St.
4. CFD-04 Ashley St. west of Bouvier St.
5. CFD-05 Cheltenham Ave. east of 19th St.
6. CFD-06 Verbena St. south of Cheltenham Ave.
7. CFD-07 Cheltenham Ave. east of 7th St.
8. CFD-08 7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	8	0	0
CFD-02	8	0	0
CFD-03	8	0	0
CFD-04	8	1	0
CFD-05	7	1	0
CFD-06	6	0	0
CFD-07	9	2	0
CFD-08	8	3	0

The most recent fecal sample value was 570 fecal colonies per 100 ml. at the outfall on October 1, 2012.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	6	0	0
MFD-02	6	0	0

The most recent fecal sample value was 207 fecal colonies per 100 ml. at the outfall on October 1, 2012.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 122000 fecal colonies per 100 ml. at the W-068-05 outfall on October 23, 2012.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,478 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was 9 fecal colonies per 100 ml. at the S-058-01 outfall, 4300 fecal colonies per 100 ml. at the S-059-01 outfall, 200000 fecal colonies per 100 ml. at the S-059-02 outfall, 3400 fecal colonies per 100 ml. at the S-059-03 outfall, 2600 fecal colonies per 100 ml. at the S-059-04 outfall, 72 fecal colonies per 100 ml. at the S-059-05 outfall all on December 4, 2012.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 4,621 Complete tests in this sewershed, identifying 56 Cross-connections, 40 of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	10	0	0

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,016 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	24	2	2

3. A current summary of additional outfalls from the Stormwater Priority Outfall List that the City has performed complete testing or abatements at this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-101-02	1	0	0
Q-101-15	6	0	0
Q-102-02	(6)	0	0
S-051-03	1	1	0
T-079-01	1	1	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-090-02
- S-051-03
- T-079-01
- T-096-01

4. Continue to perform property testing within the following outfalls.

- P-090-02
- S-051-03
- T-079-01
- T-096-01

Table 1
DLC Program Summary
October 1, 2012 to December 31, 2012

Complete Tests:

- 48,803 Complete tests have been performed under the DLC program
- **675 Complete tests were performed this past quarter**
- 670 Complete tests were performed in outfall P-090-02
- 1 Complete test was performed in outfall P-101-02
- 6 Complete tests were performed in outfall Q-101-15
- (6) Complete tests were performed in outfall Q-102-02
- 1 Complete test was performed in outfall S-051-03
- 1 Complete test was performed in outfall S-059-02
- 1 Complete test was performed in outfall T-079-01
- 1 Complete test was performed in outfall T-088-01

Cross-Connections Found:

- 1,234 Cross-connections have been identified under the DLC program
- **13 Cross-connections were identified this past quarter**
- 11 Cross-connections were identified in outfall P-090-02
- 1 Cross-connection was identified in outfall S-051-03
- 1 Cross-connection was identified in outfall T-079-01

Abatements:

- 1,215 Abatements have been performed under the DLC program
- **13 Abatements were performed this past quarter**
- 13 Abatements were performed in outfall P-090-02

Outfall/Manhole Screening and Sampling:

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

- 1 outfall inspection was made as part of the Permit Inspection Program this past quarter
- 1 outfall sample was taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
October 1, 2012 to December 31, 2012

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	10/1/2012	10:50	Outfall: 7th & Cheltenham	84	72000	0.49	570	
T-088-01	10/1/2012	10:55	Outfall: 7th & Cheltenham @ Bridge	84	72000	0.49	721	
W-060-01	10/1/2012	12:50	Outfall: Monastery Lane	5'-0"x4'-4"	2	0.10	207	
W-068-05	10/23/2012	11:15	Outfall: Lincoln & Morris	90	72000	0.35	122000	
S-058-01	12/4/2012	10:05	Outfall: Domino Lane	54	1200	0.35	9	
S-059-01	12/4/2012	10:30	Outfall: Parker	60	600	0.19	4300	
S-059-02	12/4/2012	10:45	Outfall: Fountain	42	60	0.34	200000	
S-059-03	12/4/2012	11:00	Outfall: Wright	42	300	0.14	3400	
S-059-04	12/4/2012	11:20	Outfall: Leverington	51	300	0.22	2600	
S-059-05	12/4/2012	11:25	Outfall: Leverington (east)	4'-0"x2'-8"	60	0.34	72	
S-059-09	12/4/2012	11:40	Outfall: Green Lane	36	NF			
B. Permit Inspection Program								
W-076-13	12/3/2012	12:15	Outfall: Wise's Mill Rd. & Henry Ave.	48	600	0.13	>6000	

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
01941	Glendale	Ave	P-090-02	05-11-2012		09-24-2012	
02202	Lansing	St	P-090-02	05-29-2012		10-04-2012	
01032	Hartel	Ave	P-090-02	06-21-2012		12-13-2012	
01030	Hartel	Ave	P-090-02	06-25-2012		12-17-2012	
07624	Langdon	St	P-090-02	06-25-2012		11-30-2012	

B. Properties Active As Of Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Comments
01025	Friendship	St	P-090-02	08-23-2012		
02215	Afton	St	P-090-02	09-01-2012		

Table 4

Spills to Storm Sewers and/or Receiving Waters

October 1, 2012 to December 31, 2012

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
10/01/12	W-068-05	Greene and W. Duval Streets Monoshone Creek	3009	Sewage	10/01/12	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate 1 gpm discharge.
11/21/12	W-076-13	Wises Mill Road and Henry Avenue Wissahickon Creek	3009	Sewage	11/21/12	Industrial Waste unit investigated a reported discharge. No active problem found.
11/24/12	Q-120-11	Philmont Avenue and County Line Road Poquessing Creek	3009	Sewage	11/24/12	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate 5 gpm discharge. Also flushed storm sewer with dechlorination tabs and affected area cleaned.

Source Codes:

3009 - Spill to Storm Sewer

3011 - Spill to Receiving Stream

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from January 1, 2013 to March 31, 2013)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

May 15, 2013

DLC Program Update
1st Quarter 2013

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning January 1, 2013 and ending March 31, 2013.

The body of this report will describe the recent activities of the City during the past quarter within the Priority Outfall areas and at other significant outfalls on the Stormwater Priority Outfall List. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,831 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1.	CFD-01	Plymouth St. west of Pittsville St.
2.	CFD-02	Pittsville St. south of Plymouth St.
3.	CFD-03	Elston St. east of Bouvier St.
4.	CFD-04	Ashley St. west of Bouvier St.
5.	CFD-05	Cheltenham Ave. east of 19th St.
6.	CFD-06	Verbena St. south of Cheltenham Ave.
7.	CFD-07	Cheltenham Ave. east of 7th St.
8.	CFD-08	7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	10	2	0
CFD-02	9	1	0
CFD-03	6	0	0
CFD-04	5	1	0
CFD-05	5	1	0
CFD-06	6	0	0
CFD-07	9	2	1
CFD-08	9	2	0

The most recent fecal sample value was 18 fecal colonies per 100 ml. at the outfall on January 8, 2013.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	6	0	0
MFD-02	4	0	0

The most recent fecal sample value was 27 fecal colonies per 100 ml. at the outfall on January 8, 2013.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was >2420 fecal colonies per 100 ml. at the W-068-05 outfall on March 5, 2013.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,478 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was 105 fecal colonies per 100 ml. at the S-058-01 outfall on March 18, 2013, 2420 fecal colonies per 100 ml. at the S-059-01 outfall on March 18, 2013, 2420 fecal colonies per 100 ml. at the S-059-02 outfall, 2420 fecal colonies per 100 ml. at the S-059-03 outfall, 1120 fecal colonies per 100 ml. at the S-059-04 outfall, 27 fecal colonies per 100 ml. at the S-059-05 outfall all on March 11, 2013.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 5,297 Complete tests in this sewershed, identifying 69 Cross-connections, 56 of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	7	1	0

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,016 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	18	3	0

3. A current summary of additional outfalls from the Stormwater Priority Outfall List that the City has performed complete testing or abatements at this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-105-02	1	0	0
S-051-03	2	0	0
T-079-01	0	0	1
T-080-02	(2)	0	0
T-080-03	2	0	0
T-096-01	1	0	1

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-090-02
- S-051-03

4. Continue to perform property testing within the following outfalls.

- P-090-02
- T-080-02
- T-079-01
- T-096-01

Table 1
DLC Program Summary
January 1, 2013 to March 31, 2013

Complete Tests:

- 49,483 Complete tests have been performed under the DLC program
- **680 Complete tests were performed this past quarter**
- 676 Complete tests were performed in outfall P-090-02
- 1 Complete test was performed in outfall P-105-02
- 2 Complete tests were performed in outfall S-051-03
- (2) Complete tests were performed in outfall T-080-02
- 2 Complete tests were performed in outfall T-080-03
- 1 Complete test was performed in outfall T-096-01

Cross-Connections Found:

- 1,247 Cross-connections have been identified under the DLC program
- **13 Cross-connections were identified this past quarter**
- 13 Cross-connections were identified in outfall P-090-02

Abatements:

- 1,233 Abatements have been performed under the DLC program
- **18 Abatements were performed this past quarter**
- 16 Abatements were performed in outfall P-090-02
- 1 Abatement was performed in outfall T-079-01
- 1 Abatement was performed in outfall T-096-01

Outfall/Manhole Screening and Sampling:

- 12 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
January 1, 2013 to March 31, 2013

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	1/8/2013	11:25	Outfall: 7th & Cheltenham	84	72000	0.43	18	
T-088-01	1/8/2013	11:30	Outfall: 7th & Cheltenham @ Bridge	84	72000	0.45	63	
W-060-01	1/8/2013	12:55	Outfall: Monastery Lane	5'-0"x4'-4"	7	0.17	27	
W-068-05	1/8/2013	12:05	Outfall: Lincoln & Morris	90	54000	NS	NS	
W-068-05	3/5/2013	12:20	Outfall: Lincoln & Morris	90	54000	0.28	> 2420	
S-058-01	3/18/2013	9:55	Outfall: Domino Lane	54	1200	0.27	105	
S-059-01	3/18/2013	10:15	Outfall: Parker	60	600	0.16	2420	
S-059-02	3/11/2013	10:50	Outfall: Fountain	42	60	0.47	2420	
S-059-03	3/11/2013	10:45	Outfall: Wright	42	300	< 0.10	2420	
S-059-04	3/11/2013	10:15	Outfall: Leverington	51	300	0.20	1120	
S-059-05	3/11/2013	10:20	Outfall: Leverington (east)	4'-0"x2'-8"	60	0.27	27	
S-059-09	3/11/2013	9:50	Outfall: Green Lane	36	NF			
B. Permit Inspection Program								

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
01032	Hartel	Ave	P-090-02	06-21-2012		12-13-2012	
01030	Hartel	Ave	P-090-02	06-25-2012		12-17-2012	
07624	Langdon	St	P-090-02	06-25-2012		11-30-2012	
02215	Afton	St	P-090-02	09-01-2012		01-09-2013	
02203	Napfle	St	P-090-02	09-08-2012		02-06-2013	
02129	Borbeck	Ave	P-090-02	09-29-2012		02-13-2013	
07806	Calvert	St	P-090-02	10-06-2012		02-20-2013	
08119	Dorcas	St	P-090-02	10-24-2012		03-21-2013	
00331	Claremont	Rd	T-079-01	10-27-2012		03-21-2013	
08226	Dorcas	St	P-090-02	11-20-2012		03-28-2013	

B. Properties Active As Of Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Comments
02519	Bleigh	Ave	P-090-02	10-04-2012		

Table 4

Spills to Storm Sewers and/or Receiving Waters

January 1, 2013 to March 31, 2013

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
02/07/13	P-100-08	2821 Shipley Road unnamed tributary of Pennypack Creek	3009	Sewage	02/07/13	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge.
02/14/13	S-059-04	Mitchell Street and Krams Avenue Manayunk Canal		Sewage	02/14/13	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing W/C. Also removed debris from manhole invert.

Source Codes:

3009 - Spill to Storm Sewer

3011 - Spill to Receiving Stream

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from April 1, 2013 to June 30, 2013)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

August 14, 2013

DLC Program Update
2nd Quarter 2013

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning April 1, 2013 and ending June 30, 2013.

The body of this report will describe the recent activities of the City during the past quarter within the 1998 COA Priority Outfall areas and at other significant outfalls on the Stormwater Outfall Priority Score list. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported wastewater spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,831 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1.	CFD-01	Plymouth St. west of Pittsville St.
2.	CFD-02	Pittsville St. south of Plymouth St.
3.	CFD-03	Elston St. east of Bouvier St.
4.	CFD-04	Ashley St. west of Bouvier St.
5.	CFD-05	Cheltenham Ave. east of 19th St.
6.	CFD-06	Verbena St. south of Cheltenham Ave.
7.	CFD-07	Cheltenham Ave. east of 7th St.
8.	CFD-08	7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	13	4	0
CFD-02	13	2	0
CFD-03	11	1	0
CFD-04	11	0	0
CFD-05	9	0	0
CFD-06	9	0	0
CFD-07	15	1	0
CFD-08	15	1	0

The most recent fecal sample value was 236 MPN per 100 ml. at the outfall on April 3, 2013.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	6	0	0
MFD-02	5	0	0

The most recent fecal sample value was 365 MPN per 100 ml. at the outfall on April 8, 2013.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 35 MPN per 100 ml. at the W-068-05 outfall on April 3, 2013.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,478 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was 325.5 MPN per 100 ml. at the S-058-01 outfall, 2419.6 MPN per 100 ml. at the S-059-01 outfall, > 2419.6 MPN per 100 ml. at the S-059-02 outfall, 2419.6 MPN per 100 ml. at the S-059-03 outfall, 1413.6 MPN per 100 ml. at the S-059-04 outfall and 435.2 MPN per 100 ml. at the S-059-05 outfall all on June 20, 2013.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 5,760 Complete tests in this sewershed, identifying 85 Cross-connections, 67 of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	16	0	1

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,016 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	23	2	3

3. A current summary of additional outfalls from the Stormwater Outfall Priority Score list that the City has performed complete testing or abatements this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-083-00	170	2	0
P-116-01	(1)	0	0
Q-107-01	30	1	1
S-051-03	0	0	1
T-080-02	6	0	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-083-03
- P-090-02

4. Continue to perform property testing within the following outfalls.

- P-083-03
- P-090-02
- P-105-02
- P-108-13
- W-084-02

Table 1
DLC Program Summary
April 1, 2013 to June 30, 2013

Complete Tests:

- 50,151 Complete tests have been performed under the DLC program
- **668 Complete tests were performed this past quarter**
- 170 Complete tests were performed in outfall P-083-03
- 463 Complete tests were performed in outfall P-090-02
- (1) Complete test was performed in outfall P-116-01
- 30 Complete tests were performed in outfall Q-107-01
- 6 Complete tests were performed in outfall T-080-02

Cross-Connections Found:

- 1,266 Cross-connections have been identified under the DLC program
- **19 Cross-connections were identified this past quarter**
- 2 Cross-connections were identified in outfall P-083-03
- 16 Cross-connections were identified in outfall P-090-02
- 1 Cross-connection was identified in outfall Q-107-01

Abatements:

- 1,246Abatements have been performed under the DLC program
- **13 Abatements were performed this past quarter**
- 11 Abatements were performed in outfall P-090-02
- 1 Abatement was performed in outfall Q-107-01
- 1 Abatement was performed in outfall S-051-03

Outfall/Manhole Screening and Sampling:

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

- 1 outfall inspection was made as part of the Permit Inspection Program this past quarter
- 1 outfall sample was taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
April 1, 2013 to June 30, 2013

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	4/3/2013	10:35	Outfall: 7th & Cheltenham	84	72000	0.39	236 MPN	
T-088-01	4/3/2013	10:40	Outfall: 7th & Cheltenham @ Bridge	84	72000	0.37	88 MPN	
W-060-01	4/8/2013	11:30	Outfall: Monastery Lane	5'-0"x4'-4"	300	0.11	365 MPN	
W-068-05	4/3/2013	11:25	Outfall: Lincoln & Morris	90	18000	0.28	35 MPN	
S-058-01	6/20/2013	9:45	Outfall: Domino Lane	54	1200	0.21	325.5 MPN	
S-059-01	6/20/2013	10:05	Outfall: Parker	60	600	0.15	2419.6 MPN	
S-059-02	6/20/2013	10:20	Outfall: Fountain	42	60	< 0.1	> 2419.6 MPN	
S-059-03	6/20/2013	10:30	Outfall: Wright	42	300	< 0.1	2419.6 MPN	
S-059-04	6/20/2013	11:05	Outfall: Leverington	51	300	0.14	1413.6 MPN	
S-059-05	6/20/2013	11:10	Outfall: Leverington (east)	4'-0"x2'-8"	60	0.30	435.2 MPN	
S-059-09	6/19/2013	13:40	Outfall: Green Lane	36	NF			
B. Permit Inspection Program								
W-076-13	4/8/2013	12:05	Outfall: Wise's Mill Road	48	6000	0.63	20 MPN	

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
02215	Afton	St	P-090-02	09-01-2012		01-09-2013	
02203	Napfle	St	P-090-02	09-08-2012		02-06-2013	
02129	Borbeck	Ave	P-090-02	09-29-2012		02-13-2013	
07806	Calvert	St	P-090-02	10-06-2012		02-20-2013	
07905	Bustleton	Ave	P-090-02	10-13-2012		04-03-2013	
08119	Dorcas	St	P-090-02	10-24-2012		03-21-2013	
00331	Claremont	Rd	T-079-01	10-27-2012		03-21-2013	
08226	Dorcas	St	P-090-02	11-20-2012		03-28-2013	
01619	Solly	Ave	P-090-02	01-07-2013		05-15-2013	
07722 E	Tabor	Rd	P-090-02	02-13-2013		06-21-2013	
07822	Summerdale	Ave	P-090-02	02-16-2013		06-18-2013	

B. Properties Active As Of Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Comments
07242	Whitaker	Ave	P-090-02	02-19-2013		

Table 4

Spills to Storm Sewers and/or Receiving Waters

April 1, 2013 to June 30, 2013

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
04/16/13	Q-107-02	Deerpath Lane and Dimarco Drive Poquessing Creek		Sewage	04/16/13	Industrial Waste unit investigated a reported discharge. No choked sewer identified.
04/26/13	P-100-08	2710 Welsh Road unnamed tributary of Pennypack Creek	3009	Sewage	04/26/13	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge.
06/13/13	S-059-04	300 block of Krams Avenue Manayunk Canal		Sewage	06/13/13	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing W/C.

Source Codes:

3009 - Spill to Storm Sewer

3011 - Spill to Receiving Stream

APPENDIX K –
POLLUTANT MIGRATION/INFILTRATION TO THE MS4 SYSTEM

Date	Location	Pollutant	Drainage Type	Follow-Up Actions
7/16/2012	5600 Bloyd St.	Car repair fluids to inlet	Combined	Inlets were visibly free of oil, and IWU conducted a full inspection to ensure no oil.
7/29/2012	Academy Rd. & Nanton Dr.	Fire Set In Storm Sewer	Separate	Gasoline odors were detected in the sewer, so a full inspection was conducted to determine safety. There was a high flow in the sewer, and all odors/smoke disappated quickly.
8/5/2012	A branch of the Pennypack Creek behind Pine Rd. and Shady Lane	Gasoline Leaked To Creek	Separate	Gasoline was dripping into the creek from a car crash PFD placed oil dry down on the road surface. Rain made the creek turbulent so there was no sheen visible, and the plume disappated quickly.
8/8/2012	6250 Walnut St.	Oil Leak During Fire	Combined	About 50 gallons of oil was spilled from the tank, but no amount of significance reached the sewer system.
8/17/2012	Brown & Carlisle Streets	Transformer Leak	Combined	A small amount of oil was found floating on the water. PECO pumped the inlet, wiped the walls, and confirmed the oil was non-pcb.
8/17/2012	Algon St. & Krewstown Rd	Sewage Discharged From Outfall	Separate	IWU found sewage discharging from an outfall at approximately 25 gpm. Inspection revealed a choked sanitary sewer at the intersection of Algon & Tustin, and the Sewer Maintenance Team was sent out to repair the issue.
8/29/2012	15th and JFK Blvd	Runoff From Trailers	Combined	IWU did not find any signs of trailers at the site of the complaint, but wet spots were present on JFK Blvd. The owner of the trailer was contacted and prohibitions of discharges to inlets were thoroughly explained.

Date	Location	Pollutant	Drainage Type	Follow-Up Actions
9/5/2012	Clearfield St.	Runoff From Abandoned Property	Combined	Rainwater from an abandoned property infiltrated into neighboring properties, with a strong sewage odor originating in a soil stack. IWU requested assisstance from Customer Service to have the abandoned property sealed with attention to drainage.
9/13/2012	N/A	Tar Spilled To Ground	N/A	IWU found traces of solidified roof tar on the sidewalk, but the sanitary sewer showed no signs of tar. A cleanup was completed, and the spill had no impact on any PWD structures.
9/14/2012	3934 Elser St.	Heating Oil Tank Leak	Combined	Oil flowed across the sidewalk and onto the curb from an auto repair shop. The tank's flow was shut off to prevent any flow into the sewer, and the owner of the property was contacted regarding dishcarge policies.
9/27/2012	Verree Rd. & Rhawn St.	Transformer Leak	Separate	A small amount of oil from a transformer leaked into the sewer inlet. PECO confirmed the oil was non-pcb, and it was less than 50 ppm. PECO will complete cleanup.
10/16/2012	Schuylkill River in front of the Belmont intakes	Heating Oil Leak At Intakes	Non-Contributing	Sheen was visible as the tank leaked red heating oil to the river. The remaining contents were emptied and contained by a clean-up contractor after the the tank was lifted from the river. Belmont intakes were closed for several hours.
11/1/2012	Sansom St. between 10th and 11th Sts	Diesel fuel/oil leak from Generator Fire	Combined	A fire leaked about 200 gal of diesel fuel/oil/water, which was caught by an inlet just outside the building, with two other inlets infiltrating smaller amounts. The inlet just outside the hospital was full from the draining of the fire suppression system by the hospital. IWU spoke with a representative regarding discharge policies.

Date	Location	Pollutant	Drainage Type	Follow-Up Actions
11/10/2012	4th & Luray Streets	Children Pour Gasoline To Inlet	Combined	Children poured gasoline into an inlet and intended to ignite it. The sewer system was flushed to alleviate the gasoline odors and the potential for an explosion. No damage was observed, and no streams were impacted.
11/21/2012	Wise's Mill outfall and retention basin	Sewage In Outfall	Separate	No sheen or sewage was visible upon initial inspection, but samples exhibited a musty odor. IWU is following up with fecal and fluoride samples of the outfall to determine if there is a sewage contribution to the discharge, and will check on cross connections.
1/15/2013	2506 Jackson St.	Generator Oil Spill	Combined	Excess oil flowed onto the ground and settled in a depression in front of the basement window. No oil had reached the sewer system at time of inspection, and a further inspection of the drainage area revealed no oil presence.
1/16/2013	Sewer inlet on Chew Ave.	Cooking Oil Disposed To Inlet	Combined	The complaint was made during wet weather conditions, washing away any evidence of oil that may have been disposed of in the inlet. IWU spoke to the resident regarding discharge policies.
2/13/2013	61st St., near Lindbergh Blvd.	Radiation From X-Ray Equipment	Combined	IWU checked 3 junkyards for x-ray equipment. The owners did not indicate that anything of the type had been disposed, and no drains were in proximity of the yards. The report was forwarded to the Fire Department.
3/30/2013	B & Ontario Sts	#4 Heating Oil	Combined	Approximately 2,000 gal of oil flowed from an abandoned above-ground storage tank. Two vactor trucks were filled with oil and washwater from the cleanup, and the inlet was vacuumed out of all oil and debris.

Date	Location	Pollutant	Drainage Type	Follow-Up Actions
4/5/2013	700 block of S. 21st. St.	Roofing Tar To Inlet	Combined	A five-gallon container of roofing tar spilled onto the pavement, and a small amount flowed into the inlet and solidified. IWU spoke with the owner, who was responsible for clean-up. No tar was present in the sanitary sewer at the time.
4/8/2013	36" concrete Belmont Raw Water Main	Purple Discharge from Main	Non-Contributing	Purple water flowed to a storm sewer and seeped into the ground. No color was present in nearby outfalls. Distribution is charging the out of service main where the water originated.
4/28/2013	18th & Sedgley Sts.	Runoff From Fire	Combined	Runoff entered the inlet at Gratz and Sedgley St, with a slight sheen visible and a sample revealing a pH near, originating from an automobile carborator rebuilding company. No odor or exceedance of LEL was detected.
5/1/2013	6600 block of Jackson St.	Cement Disposed To Inlet	Combined	Cement and washwater had made its way to the inlet at the corner of Jackson and Magee St, and there was white staining and material visible along the curb and inside the inlet. The contractor accepted responsibility for the improper disposal and agreed to conduct a full clean-up.
5/7/2013	Huron Street and St. Martins Lane.	Chlorine to Creek	Separate	A leak detection crew was sent out to determine the location of the leak on the main, but dechloronation tables were placed at the storm water outfall in the interim. Little to no impact on aquatic life was observed.

Date	Location	Pollutant	Drainage Type	Follow-Up Actions
5/8/2013	4510 Loring St.	Gasoline Disposed To Inlet	Combined	Upon inspection of the outside of the property, there were no signs of gasoline in the sewer system. All atmospheric readings were well within normal ranges. IWU was unable to gain access to the inside of the home.
5/28/2013	Spring Garden St. and 31st St.	Construction Runoff To Inlet	Combined	IWU found a trail of dirt entering an inlet on the SWC of Spring Garden and 31st Streets. The construction company that caused the discharge had an expired permit, but was hesitant to stop the discharge in fear of a building collapse. The ground water flow was set-up entering into a box which flowed into another compartment with a sump pump, and a sock filter was put onto the hose going to a sanitary vent stack, as approved by Engineering Support.
5/30/2013	Mingo Creek Pumping Station in front of the pump house	Petroleum at Mingo Creek	Non-Contributing	IWU found clumps of blackish material on the surface of the water in front of the screens of the pump building. IWU checked upstream and found no evidence of the material, and suspects a CSO overflow may have caused the debris. Sampling revealed an overflow occurred earlier in the week, causing an algae bloom at the pumping station.