PHILADELPHIA'S WET WEATHER MANAGEMENT PROGRAMS

COMBINED SEWER MANAGEMENT PROGRAM ANNUAL REPORT

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

STORMWATER MANAGEMENT PROGRAM ANNUAL REPORT

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

Reporting Period July 1st 2010 to June 30th 2011

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

ACSP	Audobon Cooperative Sanctuary Program
ANS	Academy of Natural Science
BEHI	Bank Erosion Hazard Index
BLS	Bureau of Laboratory Services, Philadelphia Water Department
BMP	Best Management Practice
CAC	Citizens Advisory Council
CCIWMP	Cobbs Creek Integrated Watershed Management Plan
CCR	Comprehensive Characterization Report
CCTV	Closed Circuit Television
CIP	Capital Improvement Project
CNP	Coastal Non-Point Pollution
CO&A	Consent Order and Agreement
CPCs	Compounds of Potential Concern
CSO	Combined Sewer Overflow
CSOMP	Combined Sewer Overflow Management Program
CWP	Clean Water Partners
DCNR	Department of Conservation and Natural Resources
DMR	Discharge Monitoring Report
DRBC	Delaware River Basin Commission
DWO	Dry Weather Overflow
E&S	Erosion and Sedimentation
EDCs	Endocrine Disrupting Compounds
EWS	Early Warning System
FGM	Fluvial Geomorphology
FOW	Friends of the Wissahickon
FPC	Fairmount Park Commission
FWWIC	Fairmount Water Works Interpretive Center
GIS	Geographic Inforamtion Systems
HHW	Household Hazardous Waste
HSI	Habitat Suitability Index
I/I	Inflow and Infiltration
IPM	Integrated Pest Management
IWMP	Integrated Watershed Management Plan
IWU	Industrial Waste Unit
LID	Low Impact Development
LTCPU	Long Term Control Plan Update
MS4	Municipal Separate Storm Sewer System
NBS	Near Bank Stress
NLNA	Northern Liberties Neighborhood Association
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
PPR	Philadelphia Parks and Recreation
PCB	Polychlorinated Biphenyl
PCIWMP	Pennypack Creek Integrated Watershed Management Plan
PCSMP	Pre-Construction Stormwater Management Plan
PCWCCR	Pennypack Creek Watershed Comprehensive Characterization Report
PDE	Partnership for the Delaware Estuary
PFBC	Pennsylvania Fish and Boat Commission
PMP	Pollutant Minimization Plan
POTW	Publicly Owned Treatment Works
PWD	Philadelphia Water Department
QAPP	Quality Assurance Project Plan
RBP	Rapid Bioassessment Protocol
RCP	River Conservation Plan
RTC	Real Time Control
SAN	Schuylkill Action Network
SAP	Sewer Assessment Program
SCEE	Schuylkill Center for Environmental Education
SEC	Senior Environmental Corps
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
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
TTF	Tookany/Tacony-Frankford
TTFIWMP	Tookany/Tacony-Frankford Integrated Watershed Management Plan
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
WCIWMP	Wissahickon Creek Integrated Watershed Management Plan
WCWCCR	Wissahickon Creek Watershed Comprehensive Characterization Report
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 in order to provide better convenience.

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, 2010 through June 30th, 2011, 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 the PWD's CSO strategy, and in accordance with its NPDES permits, the PWD submitted to the Pennsylvania Department of Environmental Protection on September 27, 1995, "CSO Documentation: Implementation of Nine Minimum Controls". The nine minimum controls 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. In general, PWD's NMC program includes comprehensive, aggressive measures to maximize water quality improvements through the following measures:

1. Review and improvement of on-going operation and maintenance programs

2. Measures to maximize the use of the collection system for storage

3. Review and modification of PWD's industrial pretreatment program

4. Measures to maximize flow to the wastewater treatment facilities

5. Measures to detect and eliminate dry weather overflows

6. Control of the discharge of solid and floatable materials

7. Implementation of programs to prevent generation and discharge of pollutants at the source

8. Public Notification of CSO impacts

9. Comprehensive inspection and monitoring programs to characterize and report overflows and other conditions in the combined sewer system.

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 the Philadelphia Water Department completed a data conversion project that resulted in the creation of GIS coverages for all of the city's water, sewer, and high pressure fire infrastructure. The conversion project consisted of extracting data from over 250,000 engineering documents that exist in digital format and have been indexed by location.

The project was executed in three phases. The Initiation Phase included a series of workshops designed to ensure that the conversion process properly utilized the 85 different types of source documents maintained by the department. It also included customization of data conversion tools to meet the project's data specifications, the development of a detailed conversion work plan, and conversion of the data for a 2-block area within the city. The Pilot Phase included further definition of the project's data dictionary and conversion tools and applied both to data from 2 of the City's 121 map tiles. The Production Phase included conversion of the remaining tiles and the establishment of links between the GIS data and legacy databases related to valves, hydrants, and storm sewer inlets.

The project was supported through the use of customized conversion tools for data collection, data scrubbing, data entry, graphical placement, and quality control. Conflicts and anomalies in the data were tracked using a web-based tool and database.

PWD utilizes the GIS coverages as the foundation for many of their operations including maintenance management, capital improvements, and hydraulic modeling.

To insure PWD's investment in GIS and data conversion does not go to waste, a comprehensive maintenance plan has been put into practice to ensure that the data is as accurate and up to date as possible. Edits and improvements are made on a daily basis to the data. Using a web based application, GIS editors are able to check out work and check it back in when it's complete. The application tracks all changes made out in the field that are recorded on as-built plans. Real-time kinematic (RTK) accurate GPS devices are also employed for high spatial accuracy for new construction projects.

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

PWD has implemented a comprehensive sewer assessment program (SAP) to provide for continued inspection and maintenance of the collection system using closed circuit television. The SAP program was developed by PWD and consultants and was finalized in March 2006. This program development encompassed 2.5 years and cost over $6 million.

The major goals of the SAP development project were to:

- Develop new sewer evaluation protocol and prioritization system that integrates with new and existing computerized databases
- Develop recommendations and schedules for an on-going sewer inspection program
- Create training tools and train PWD personnel
- Apply techniques to pilot areas in the City totaling 7% of the total collection system

Some selected highlights of the SAP development project are:

- Development of unique "smart" GIS manhole numbering system
- Implementation of National Association of Sewer Service Companies (NASSCO) standard protocol for uniform evaluation of sewers called Pipeline Assessment & Certification Program (PACP)
- Development of rating and scoring system to prioritize segments for repairs or replacement.
- Development of Intranet-based viewer for digital closed circuit television (CCTV) inspection projects and structural scores with GIS front-end (SINSPECT)
- Development of Intranet-based CCTV Inspection Request and Tracking System with GIS front-end (SAPReq)
- Development of Pre-Inspection (CCTV) Program
- Creation of internal monthly sewer defect review committee (SAP Committee-5)

Any infiltration observed during the on-going CCTV sewer inspection program is coded as part of the NASSCO Pipeline Assessment and Certification Program. The infiltration is categorized based on a range of 5 levels: Weepers, Drippers, Light Runners, Heavy Runners, or Gushers. All occurrences of Heavy Runners or Gushers are reported to PWD's Water Conveyance Leak Detection Unit immediately for investigation.

The SAP is being 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 2010 – June 2011, the length of TV inspections averaged about 4.32 miles a month for a total of over 51 inspected miles, as can be seen in **TABLE II.A-1 MONTHLY TV INSPECTIONS**.

Table II.A-1 Monthly TV Inspections

Date	Miles Inspected
Jul-10	5.41
Aug-10	4.32
Sep-10	4.12
Oct-10	5.87
Nov-10	4.45
Dec-10	3.78
Jan-11	2.73
Feb-11	4.49
Mar-11	4.13
Apr-11	3.27
May-11	4.94
Jun-11	4.36
Average	**4.32**
Total	**51.87**

II.A.3 Other Initiatives

II.A.3.1 CSO Regulator Inspection & Maintenance Program

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 158 and any changes are discussed below.

In response to the CSO compliance inspection performed by DEP in November 2002, PWD has committed to demonstrating an improved follow-up response to sites experiencing a DWO. PWD has 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 2011, 6168 inspections were completed on 201 regulator units. There were 15 discharges with a total of 232 blocks cleared. Details of the inspections during the past fiscal year can be found on page 3 of **APPENDIX A – FY11 FLOW CONTROLS ANNUAL REPORT.**

II.A.3.2 Tide Gate Inspection and Maintenance Program

In FY 2011, CSO tide gate preventative maintenance was completed 18 times at PWD's Tidal affected CSO regulator sites. Summaries of the tide gate inspection and maintenance completed during the past fiscal year are found on page 12 of **APPENDIX A – FY11 FLOW CONTROLS ANNUAL REPORT**, which documents the locations where preventative maintenance was performed on the tide gates.

II.A.3.3 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 tracked to further refine the frequency of cleaning necessary to maintain adequate capacity in the Somerset Intercepting sewer. During FY 2011, an estimated 150 tons of grit was removed from the Somerset Grit Chamber.

Somerset Grit Chamber cleaning details, specifically tonnage removed and dates of cleaning during the past fiscal year are available on page 12 of **APPENDIX A – FY11 FLOW CONTROLS ANNUAL REPORT.**

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

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. The components of the SWMM model used in the development of the Philadelphia watershed and wastewater conveyance model were the RUNOFF and EXTRAN modules.

The RUNOFF module was developed to simulate the quantity and quality of runoff in a drainage basin and the routing of flows and contaminants to sewers or receiving waters. The program can accept an arbitrary precipitation (rainfall or snowfall) hyetograph and performs a step by step accounting of snowmelt, infiltration losses in pervious areas, surface detention, overland flow, channel flow, and water quality constituents leading to the calculation of one or more hydrographs and/or pollutagraphs at a certain geographic point such as a sewer inlet. The driving force of the RUNOFF module is precipitation, which may be a continuous record, single measured event, or artificial design event. The RUNOFF module also simulates Rainfall Dependant Inflow and Infiltration (RDI/I) in separate sanitary areas using three sets of unit hydrographs defined by R, T, and K values to represent the shape of the RDI/I hydrograph response to the input precipitation hyetograph.

The EXTRAN module was developed to simulate hydraulic flow routing for open channel and/or closed conduit systems. The EXTRAN module receives hydrograph inputs at specific nodal locations by interface file transfer from an upstream module (e.g. the RUNOFF module) and/or by direct user input. The module performs dynamic routing of stormwater and wastewater flows through drainage systems and receiving streams.

The Runoff and Extran modules have been consolidated in the newest release, EPA SWMM 5. PWD is currently in the process of updating all models to use EPA SWMM 5.

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

The Philadelphia Water Department continues to maintain a CSO PermanentMonitoring network and temporary monitoring programs to support planning for future CSO control projects and to minimize dry weather overflows and tidal inflows. PWD will continue to review, replace, and update network equipment in order to continue to support the above functions.

II.B.2.1 Permanent Flow Monitoring Program

In fiscal year 2008 the Department purchased and installed a new data acquisition system and RTU's (remote telemetry units) manufactured by Telog Enterprise. This new system replaces a customized solution that was unreliable and difficult to maintain and offers better communications options and system diagnostics which should allow PWD to greatly increase the data capture rate. Thus far 303 RTU's have been switched out to the new system with the balance expected to be completed in fiscal year 2012. As of the end of fiscal year 2011, the 303 remote monitoring sites were greater than 80.0% operational. The listing of permanent flow monitors can be found in **APPENDIX B – FLOW MONITORING TABLE 1- LISTING OF MONITORED OUTLYING COMMUNITY CONNECTIONS.**

II.B.2.2 Temporary Flow Monitoring Program

The PWD temporary flow-monitoring program was initiated in July 1999 with the deployment of portable flow meters throughout targeted Philadelphia sewershed areas to quantify wastewater flow through sanitary sewers and characterize the tributary sewersheds. The identification and quantification of rainfall dependent inflow/infiltration (RDII) into sanitary sewers contributing to the City of Philadelphia's service area is a key component in assessing potential reductions in combined sewer overflow impacts.

The data collected allows for the quantification of wet and dry weather flows in combined and separate sanitary sewers for a specified list of sites over a given period. The flow monitoring data is subjected to rigorous QA/QC procedures resulting in consistently good data quality over the monitoring period. Further analysis of the flow monitoring data is performed using hydrograph separation techniques in order identify the primary flow components.

During FY 2011, PWD, through a contract with CSL Services, Inc. monitored 30 sites continuously for the purposes of model calibration, I/I identification and design support.

The listing of all the temporary flow monitors, their location, and the deployment projects can be found in **APPENDIX B – FLOW MONITORING: TABLE 1- LISTING**

OF MONITORED OUTLYING COMMUNITY CONNECTIONS AND TABLE 5 - LISTING OF ALL TEMPORARY FLOW MONITORS DEPLOYED BY PROJECTS.

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.

These scenarios include combinations of traditional large scale infrastructure improvement projects based on increased transmission, storage and treatment of combined sewer flows, as well as, system-wide implementation of low impact development and green infrastructure source control projects utilizing decentralized storage, infiltration, evapotranspiration, and slow release of stormwater before it enters the combined sewer system.

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

Modeling work was performed in support of the project to remediate Poquessing Creek Interceptor Extreme Wet Weather Overflows at manhole PC-30. Modeling was used to help design the construction and operation of a relief sewer structure to transmit extreme wet weather flows from the Poquessing Creek Interceptor sanitary sewer system to the Northeast Water Pollution Control Plant (NEWPCP).

More details on the parallel relief sewer being installation constructed for relief of PC-30 can be found in **SECTION III.B.2.1.1 INFLOW/INFILTRATION (I/I) CONTROLS** on page 98.

II.B.3.3 Storm Flood Relief

Flooding is an on-going concern for PWD, often intense rain storms can result in basement backups or property damage. Rain storms on the following dates are suspected to have caused basement backups in combined sewered neighborhoods and stormwater flooding of basements due to street flooding or overflow of backyard streams in separate sewered areas:

- July 12th, 2004
- August 1st, 2004
- September 28th, 2004
- June 6th, 2005
- October 8th, 2005
- June 2nd, 2006
- August 28th, 2006
- September 6, 2008
- December 11, 2008
- July 31, 2009
- August 2, 2009
- August 9, 2009

- August 21, 2009
- August 22, 2009
- October 24, 2009
- December 9, 2009
- March 13, 2010
- March 29, 2010
- July 13, 2010
- October 1, 2010
- April 16, 2011
- June 17, 2011

*The summers of 2007 and 2008 were not characterized by intense rain storms resulted in basement backups or property damage

Update of Comprehensive Flooding & Sewer Overflow Mitigation Program

PWD has initiated a large-scale project to analyze and reduce property damage from flooding and basement backups. Since the interim report on basement flooding (9/1/2005) and the 1st update (3/1/2006), PWD has been working hard on multiple fronts to both understand the causes of flooding as well as to start implementation of items that would be helpful to flood prone properties.

PWD has embarked upon a huge effort to investigate, evaluate, analyze, and look for solutions to these problems. As part of this effort, PWD has begun and will continue to:

1. Inspect sewers in flood prone areas to determine if there are any obstructions and schedule appropriate maintenance where problems are found or schedule capital projects if structural problems are observed.

2. Collect and update data from property owners impacted by flooding.

3. Analyze the sewer system by hydraulically modeling the system to determine how the sewer system responds to storm events.

4. Coordinate with other government entities and enhance the legal framework for managing stormwater.

5. Provide possible remedies/solutions based upon the modeling information, which in turn is based on all of the data collected.

6. Initiate a Basement Back-up Protection Program

Sewer System Inspection and Maintenance

PWD routinely sends maintenance crews to inspect sewers in blocks that have experienced and reported flooding, in order to look for blockages, obstructions, or other defects that may have contributed to flooding.

To date, PWD has inspected multiple sewers and identified no obstructions or accumulation of debris that would result in basement flooding. The small amounts of debris that were observed in a few isolated blocks have been cleaned. As part of this investigation, PWD identified two blocks that have structurally failing sewers. These locations have been added to the PWD sewer reconstruction capital program and given a high priority.

Property Data Collection

Input from neighborhoods and individual customers are essential in defining the extent and cause of the problem. In order to better understand the extent and severity of backups, PWD has modified its customer complaint system to allow for basement backup data to be collected in a more useful way. As it is impossible for PWD to observe conditions in every home, it is critically important that residents work with their civic leaders to accurately record, and communicate information about the date, time, depth, and duration of basement backups. It is also important to characterize the type and elevation (height from basement floor) of each basement plumbing fixture from which the backup has been observed. This information is needed to hydraulically model the storm event, evaluate the sewer system response to the rainfall, and identify measure to resolve backups.

PWD met with several community groups to discuss the flooding issue and has attempted to obtain more information from affected property owners. To facilitate information gathering, PWD generated a flooding questionnaire to help standardize data collection. The information gathered has been vital in helping PWD understand the limits of the affected areas as well as calibrating and verifying the hydraulic modeling of the sewer system. The questionnaire has been distributed at all community meetings on the subject as well as given to community group leaders for distribution to individuals who may have been unable to attend the public meetings.

Sewer System Analysis

PWD has made a significant investment in the latest technology in order to understand and analyze this city's infrastructure. PWD also has made a large investment in the ability to hydraulically model and analyze the sewer system and how it reacts and functions during wet weather events. In order for the hydraulic modeling results to be valid the model must be calibrated to ensure that the results reflect how the system is truly functioning. Building the computerized model of the sewer system and calibrating it is time consuming. Calibration quite often requires flow monitors to be installed in the sewers at key locations. The monitors will provide actual data of sewer flows and depths during wet weather events. This data will in turn be utilized in the hydraulic model to ensure that the model reflects the actual response of the sewer system to rainfall and that flood relief alternatives can indeed be effective.

PWD has installed temporary flow monitors in the sewer system at many key locations in order to obtain flow data during rain events. The monitors were installed in specific locations that would provide the most beneficial information to PWD modelers. In order for the information to be relevant, the monitors must be in place for several rain events, typically for several months. The information gathered is then used in conjunction with the hydraulic model to calibrate and/or verify that the model reflects what is actually taking place in the sewer system.

The modeling has been completed for the following trunk sewer systems:

- Snyder/McKean St. sewershed east of Broad St. (South Philadelphia)
- Lombard St. sewershed east of Broad St. (Washington Square West)
- Laurel St. sewershed (Northern Liberties/Old Kensington)
- Tasker and Reed St. sewersheds (South Philadelphia)
- Shunk St., Porter St., Wolf St. sewersheds east of Broad St. (South Philadelphia)
- Passyunk Ave. and Shunk St. sewersheds west of Broad St. (South Philadelphia)
- Moore St Sewershed east of 10th St.

Many individual projects have subsequently been identified that are required to increase the capacity of these trunk sewer systems in order to handle intense rain events. These projects are being incorporated into the PWD Capital Program. As PWD designs and ultimately constructs the sewer improvement projects, modifications to the size and location of new sewers may arise from the design process. PWD engineering staff continues to re-evaluate these projects to determine if there are better, less disruptive, or more efficient ways of achieving the required results.

The projects are large and complicated and will take several years to design and construct. Based upon conservative assumptions, the hydraulic model indicates that the sewer systems improvements will eliminate or greatly reduce the potential for flooding based upon historical storm events. The hydraulic model indicates that these sewer system improvements greatly reduce the number of events that caused flooding and the severity, but may not be able to handle all possible rain events. PWD is sensitive to the fact that the improvement projects are disruptive to the community, and will do everything it can to minimize residential discomfort.

A listing of the current construction SFR projects can be found in **TABLE II.B.3.3-1**. For each area, several system improvement scenarios were proposed based on model simulations in order to effectively relieve basement backups during extreme wet weather events. Additionally, modifications to proposed SFR projects designed to increase capture and treatment of combined sewage flows during small to moderate storm events were also evaluated using system hydraulic modeling.

Table II.B.3.3-1 Storm Flood Relief Sewer Improvement Projects

Project Name	Location	Design Engineer(s)	Construction Estimate	Anticipated Construction Start	Project Status
Northern Liberties Phase 1	Delaware Avenue and Laurel Street	Urban Engineers/ PWD	$3.38 million ($3.31 M final cost)	April 2010	Construction Complete
Northern Liberties Phase 2	Canal Street Chamber	Hatch Mott MacDonald / PWD	$3.7 million	Summer 2012	Design 70% Complete
Northern Liberties Phase 3	Delaware Ave to River (SugarHouse Site)	Hatch Mott MacDonald / PWD	$3.9 million	Spring 2013	Design Started
Northern Liberties Phase 4	Canal & Laurel Sts. to Germantown Ave. & Wildey St.	Hatch Mott MacDonald / PWD	$8.56 million	Spring 2013	Design 70% Complete
Northern Liberties Phase 5	Germantown Ave. from Wildey St. to Girard Ave.	Hatch Mott MacDonald / PWD	$4.14 million	Spring 2014	Design 30% Complete
Northern Liberties Phase 6	Germantown Ave. & Thompson St. to Master & Randolph Sts.	Hatch Mott MacDonald / PWD	$6.8 million	Spring 2015	Design 30% Complete
Moore Street	Moore St. ROW, Christopher Columbus Blvd. to Delaware River	Hatch Mott MacDonald / PWD	$5 million	Spring 2012	Design 70% complete
Oregon Ave. Flood Relief Tunnel	Oregon Avenue from Broad to Front	Hatch Mott MacDonald (Feasibility Study)	$100 million	N/A	Preliminary Planning
Weccacoe Avenue	Weccacoe Avenue, Wolf Street and Oregon Avenue	Birdsall (former CMX) / PWD	$13 million	N/A	Preliminary Planning
Washington West	Washington Ave. from 13th Street to the Delaware River	Birdsall (former CMX) / PWD	$25 million	N/A	Preliminary Planning
Porter Street	Porter, 10th to Broad	Birdsall (former CMX) / PWD	$3.5 million ($3.15M final cost)	June 2010	Construction Complete
Snyder Avenue	Snyder, Front to 4th	Pennoni / PWD	$5 million	N/A	On Hold

PWD is continuing to move forward with its Storm Flood Relief (SFR) Sewer Designs for combined sewer neighborhoods in Northern Liberties, Washington Square West and several neighborhoods in South Philadelphia (Moore St, Oregon Ave, Weccacoe Ave, Porter St and Snyder Ave). The original SFR project that was slated for Pine Street has been relocated to Washington Avenue. The Washington Ave. SFR will provide additional storm flow capacity to the Lombard system, which serves Washington Square West, and the Reed Street system, which serves portions of South Philadelphia. Community meetings concerning the design and construction of this system have taken place since April 2009 with a number of diverse civic associations whose neighborhoods will be impacted by this construction.

PWD is also in the midst of investigating storm sewer modifications and source control opportunities for the separate sewer neighborhoods that were impacted by intense rainstorms. Sections of the City including Chestnut Hill, East Falls, Andorra, Roxborough and E. Germantown experienced street and property flooding.

Government and Regulatory Initiatives

PWD is sensitive to the impact stormwater, particularly urban runoff, has on the combined sewer system. Regulations requiring modern stormwater management practices in Philadelphia became effective January 1, 2006, and are described in detail in **SECTION F.5 – MONITOR AND CONTROL STORMWATER FROM CONSTRUCTION ACTIVITIES** on page 237**.** The stormwater regulations aim to prevent worsening of basement flooding, and ultimately reduce stormwater runoff even as Philadelphia re-develops.

Individual Property Solutions

As an interim practice to protect properties in CSO neighborhoods against basement backups while awaiting the construction of the SFR projects, PWD created the Basement Protection Program (info at www.phila.gov/water) which provides interested customers with a plumbing inspection and the installation of backwater valves on sewer laterals or plumbing fixtures. The pilot program allows for the development of an anticipated and proposed scope of work for the department's contracted plumbers, and to determine related costs for this work, which involves restoring the portions of the basement or sidewalk affected by the installation of backwater valves.

Application forms may be obtained by calling the PWD hotline (215-685-6300). To qualify for the program, the applicant must be the property owner of record; the property should be located within the identified flooding neighborhoods; and the property's water/sewer bill should be paid to date. The property owner will be required to sign a Basement Backflow Prevention Agreement. Once a scope of work has been defined for the property work may proceed. Backwater valves require regular maintenance in order to keep them clean and functioning properly. In properties experiencing basement backups, basement fixtures can be elevated, plugged, individually retrofitted with a backwater valve, or eliminated. Homeowners can also have a licensed engineer or registered plumber evaluates the feasibility of installing a backwater valve and or ejector pump.

PWD has budgeted over $225,000 in FY 2011 for the implementation of this program and other backwater valves. To date, PWD has retrofitted 387 properties while also developing a program protocol that will allows for a larger pool of customers to participate in the program which is free to eligible property owners. During FY2011, PWD has made 74 repairs relating to the Basement Protection Program, these repairs cost PWD $202,139 with each repair averaging at $2,731.60.

Flood Relief Project Summary

PWD understands the hardships caused by basement flooding, and therefore the solution to this issue is one of the highest priorities for PWD. This complex problem will require time and resources to implement targeted solution. PWD has budgeted for the installation of back water valves which include those that occur at individual property laterals and other solutions that prevent back ups. PWD has worked diligently to analyze and identify sewer system improvements, and is now beginning to implement solutions. PWD identified approximately $200 million in sewer system projects to improve the conveyance of stormwater from intense rain events more efficiently, and ultimately reduce the potential for basement flooding. PWD's capital budget has also been increased to fund the sewer improvement projects. PWD will continue to modify the size and location of projects based upon knowledge gained through the design process in order to optimize the results of each project while minimizing disruption to the community during construction.

II.B.3.4 Real Time Control Evaluation

The PWD has completed the installation of an inflatable dam in the Rock Run Relief Sewer and is constructing a crest gate in the trunk sewer of regulating structure T14 ("I" St. and Ramona Avenue) to reduce CSO discharges to the Tacony Creek as part of the Long-Term CSO Control Plan. These capital projects achieve reductions in CSO volumes through utilization of in-system storage in the Rock Run Relief and T14 trunk sewer in a cost-effective manner. Modeling analyses were performed to evaluate control logics for the inflatable dam and gate that optimize storage utilization and minimize flooding impacts of the projects. Analyses were also performed to develop control logics for the projects' drain-down control gates and to size Dry Weather Outlet (DWO) pipes for the Rock Run Relief project. For more details on the in-system storage projects, please refer to **SECTION III.B.1.5 IN-LINE SYSTEM STORAGE PROJECTS** on page 91.

System hydraulic modeling was performed to evaluate the performance benefit of Real Time Control (RTC) projects in the Southwest Drainage District (SWDD). These projects included the completed phase of raising the overflow dam height and DWO pipes size at Cobbs Creek High Level Interceptor CSO regulating chamber C17. Ongoing phases also being evaluated using system hydraulic models include reconstruction of the triple barrel gravity sewer dispersion chamber control gates and increasing the DWO pipe size at the Lower Schuylkill West Side Interceptor regulating chamber S45 in order to deliver more wet weather flow to the Southwest Water Pollution Control Plant (SWWPCP) for treatment. Other real time control related modeling work included evaluating in-system storage benefits from real time control on the gates at the D07 regulator.

System hydraulic modeling was performed to evaluate the performance improvements realized through implementation of the Main Relief Inflatable Dam project. PWD modeling group developed and evaluated a modified control scheme for the Main Relief storage project. The inflatable bag was developing problems due to water pressure. A new control scheme allows the project to continue to function under lower water pressures. For more details on the Main Relief Inflatable Dam storage project, please refer to **SECTION II.B.5.1 MAIN RELIEF** on page 29.

II.B.3.5 Other Capital Project Support

PWD modeling group has also been involved in efforts to evaluate the effectiveness of interceptor lining work. PWD has deployed flow monitors within the interceptors and established a baseline for inflow and infiltration. After the lining process, the monitors will be redeployed to collect post-lining data. The SWMM models will be used to assess the overall benefit of the project. For more details on the interceptor lining work, please refer to **SECTION III.B.2.1.1 INFLOW/INFILTRATION (I/I) CONTROLS** on page 100.

Other conducted Capital Projects support by the PWD modeling group includes evaluating a re-design of the regulating structure due to PennDOT's need to move the chamber to accommodate construction during the upcoming I-95 expansion at the D25 regulator and a re-design of the regulating structure caused by Sugarhouse Casinos' need to relocate the existing chamber at the D44 regulator. PWD modeling group also assisted in evaluating the CSO benefit for the Indian Creek Stream Daylighting and CSO project being partnered with the Army Corps of Engineers please refer to **SECTION III.C.2.4 WETLAND ENHANCEMENT AND CONSTRUCTION** on page 139.

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

The construction of the Collector System Real Time Control Center (RTC) building was completed in the summer of 2003. The Real Time Control Center became operational in September 2006. The center, located at the Collector System Headquarters at Fox St. and Abbottsford Rd., is currently attended to during the day shift and for major storm events. The 24 ft. by 46 ft. room incorporates a two high by three wide matrix of video projection cubes for a total video screen wall of 89.4 square feet. The ergonomically designed room and furniture layout enables large groups of people to simultaneously view the display screens.

The display screens make use of the Decision Support System that has been under development since 2002. This web-based application consolidates many of PWD's information sources into one application making real-time and static information easier for the decision maker to use. Some of the information sources currently in use are: pump station and CSO control site SCADA and alarm systems, Collector System monitoring network data, the Department's wide variety of GIS data, sewer system and equipment scanned drawings, CCTV inspections video and reports, Collector Systems work order management systems, and weather and tide predictions.

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 fiscal year 2007 and is currently in operation. The Department 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. The Main Relief Sewer provides flood relief to combined sewer areas in all three of PWD's drainage districts (Northeast, Southeast and Southwest). It discharges to the Schuylkill River at Fairmount Park, a highly visible recreational area.

Construction of the storage project was started in September of 2004, following a lengthy system start up/ tune-up period, the project was closed out at a final total cost of $1,068,031 in May of 2007. The dam did not become fully automated until the Dauphin Street job, which used a portion of the Main Relief Sewer as a bypass during construction, was completed in the fall of 2006.

In March 2009 during the annual preventative maintenance inspection large sections of the rubber fabric along the perimeter showed signs of stress tears up to 1/3 rd of the material depth exposing the reinforcing fabric. Numerous deep gashes on the outside rubber surface were also found at those times which were probably due to sharp debris cutting into the rubber material when inflated.

Due to this unsafe condition the inflatable dam controls were set to the limp mode which keeps the bag inflated to 1 psi which is roughly 80% of the sewer diameter. It was hoped that the inflatable dam manufacturer would give us guidance on repairing or replacing the rubber material but they no longer support or manufacture this product.

Given the current operation parameters mentioned above, PWD estimates the dam prevents about 13.5 to 6.8 million gallons (high and low estimates) of combined from overflowing to the Schuylkill River and facilitates capture of about 29.5 to 18.8 million gallons in the Southwest drainage district.

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 permits all significant industrial users (SIUs) in its service area, which includes SIUs in both separate and combined sewer systems. These permits are site-specific and are intended to control the introduction of pollutants from the industrial users which may pass through or interfere with wastewater treatment processes.

The City has done an analysis on the issuance of general permits for industrial dischargers and concluded that there would be no additional benefit over the site-specific permits that are currently issued. These site-specific permits regulate all wastewater discharged from the facility, which includes contaminated storm water (i.e. rainfall contaminated by products, by-products, waste products, or other materials). Additionally all SIUs are required to monitor their flow to the sewer system. Due to the large amount of regulatory changes that would be necessary to enact the use of general permits, namely it would require a change to the City's Wastewater Control Regulations, the EPA's approval, and promulgation into City Law, the City would like to continue to use the site-specific permits and will continue to demonstrate that there is no detriment in using the site-specific permits over the general permits.

The City has updated its Industrial Waste Inspection Forms to include a stormwater management component used during inspections that place during enforcement activities as part of its Pretreatment program. The updated form was faxed to Jennifer Fields, Regional Manager, PADEP on March 29th, 2006. A copy of the Industrial Waste Inspection Forms can also be found in **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD**.

Through the Pretreatment Program, the City attempts to inspect each of its SIUs at least once per year, PWD's Industrial Waste Unit regulates about 150 SIU that discharge to the sanitary system. During FY 2011, 125 SIU inspections were conducted.These inspections provide an opportunity to give guidance on possible pollution prevention activities. Pollution prevention is reducing or eliminating waste at the source by modifying production processes, promoting the use of non-toxic or less-toxic substances, implementing conservation techniques, and re-using materials rather than putting them into the waste stream. Pollution prevention is viewed as a win-win situation for both the City and its SIUs. As such, the City intends to provide industrial stormwater BMP guidance to its SIUs and evaluate those efforts during inspections.

II.C.2 Incorporate guidance on BMPs for industrial stormwater discharges into Stormwater Management Regulations guidance

The Stormwater Management Guidance Manual incorporates guidance on BMPs for industrial stormwater dischargers. The Stormwater Management Guidance Manual is intended to guide the developer in meeting the requirements of the Stormwater Regulations. The Manual is laid out to guide the developer through the entire site design process, beginning with initial site design considerations, through the Post-Construction Stormwater Management Plan (PCSMP) submittal elements, and ultimately PWD prerequisite approval on Building Permit approval. Tools are provided to assist in completion and submittal of a PCSMP consistent with the requirements of PWD. These tools work together to address stormwater management on the development site from concept to completion. The manual was revised in the Spring of 2011 to include more information on stormwater management requirements and updated forms, specific information on sections that were updated can be found in the revised Stormwater Management Guidance Manual.

One of the tools in the Guidance is the Stormwater Management Practice Design Guidelines (SMPs), which presents technical design guidance for managing stormwater and specifications for structural SMPs. These SMPs include technologies such as green roofs, rain barrels and cisterns, filters, bioinfiltration / bioretention, detention basins, porous pavement, etc. Each of the technologies is described and illustrated to show which applications it would be appropriate for. This assists industrial stormwater dischargers decide which BMPs are most appropriate for industrial applications. More information along with the full version of the revised Stormwater Management Guidance Manual can be found at:

http://www.phillyriverinfo.org/Programs/SubprogramMain.aspx?Id=StormwaterManual

Please refer to **SECTION F.5.B. - POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT** on page 242 for more information on stormwater regulations and stormwater management practices conducted during the fiscal year.

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

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, as well as create blight in City neighborhoods, and contribute to short dumping and other environmental harms to area waterways, the City will: (1) continue to participate with the USEPA and PADEP in a multi-governmental task force to conduct random inspections of these facilities; (2) provide compliance assistance to scrap yard operators on the various relevant laws and regulations; (3) provide educational assistance on measures that can be undertaken by the industry to control runoff from storage or transport areas; and (4) where necessary, support comprehensive enforcement actions in cases where facilities are unwilling to cooperate.

The Scrap Yard Task Force (SYTF) is in its third year of operation since it was reorganized on September 5, 2008. Vince Dougherty from the city Commerce Department has taken over as the new head chairman of the SYTF. The PWD, through Jim D'Agostino, has assumed the role of coordinator for the SYTF. Inspections and meetings have been taking place once a month in an effort to reach more scrap yards and get them into compliance. A geodatabase has been created that displays in GIS the location and outline of all scrap yard parcels in the city. The geodatabase contains information about the scrap yards that will be important in the future operation of the task force, such as: the address, owner, surface area, last inspection, and previous violations. Currently, there are 209 licensed scrap yards, 174 are auto salvage yards and 35 are junk yards. It is the intent of the SYTF to be more efficient by operating frequently, knowing the scrap yards better, and following up on the results of the inspections.

During the period from July 2010 to July 2011, the SYTF conducted inspections 9 times and inspected 35 scrap yards. Violation notices of varying types from different agencies were issued to the majority of the sites. No sites were shut down and the incidence of stolen vehicles and parts was moderate. In several cases, stolen vehicles were found and arrests were made. Three sites were investigated by the police and found to be major stolen car rings. Several sites were revisited to gauge the level of compliance achieved since previous inspections. There was improvement in all cases. February and March inspections were cancelled due to unusual weather conditions and July was cancelled for scheduling difficulties. The enhanced inspection schedule has resulted in greater awareness throughout the business community with noticeable benefits. Violations are in large part not as egregious as in previous inspections, and corrective measures have been implemented by many of the facilities. It has become obvious that the Scrap and Junk Yard community is taking the Scrap Yard Task Force seriously and as a whole greater strides are seen each year.

II.D Maximization of Flow to the Publicly Owned Treatment Works 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 basic strategy of flow maximization, or Modified Regulator Plan (MRP) was to deliver more flow to the WPCPs more frequently and enable greater pollutant removals. The results of the hydraulic modeling of the interceptor sewers under the flow maximization scenarios indicate that significantly higher rates of flow can be delivered to the WPCPs more frequently than under current conditions. To date, 100% of the projected flow increase associated with the Modified Regulator Plan has been implemented. Some additional modifications may be made in the future to prioritize certain overflows or to reflect an improved understanding of the collection system dynamics as identified throughout the ongoing modeling work, but no additional capture is expected to result on a system wide basis.

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

Increasing the treatment capacity of the WPCPs and increasing the transmission of flows to the WPCPs is being analyzed as past of the LTCPU. Please refer to **SECTION III.B.1.3.1"EVALUATE STRESS TEST REPORT OPTIONS IN THE LTCPU"** on page 87 for more information on this analysis.

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

Bucks County Water & Sewer Authority

Bensalem Township's wastewater is delivered to PWD's system under a contract assumed by the Bucks County Water & Sewer Authority (BCWSA) in 1999. Under the terms of a recently negotiated agreement with PWD, BCWSA has installed meters at all connection points not previously monitored.

In addition, BCWSA has agreed to construct a 1.8 million gallon surge tank and pump station. This effort has been proposed by BCWSA as an effective manner in which to address high peak flows to PWD's system. BCWSA is continuing to work on the surge tank and pump station, and PWD is satisfied that reasonable progress is being made on the aforementioned project. Although the project was supposed to be completed by September of 2010, it has been delayed due to issues with acquiring property rights. The current expected completion date is late 2011.

Cheltenham Township

Cheltenham Township entered a five year contract with PWD on June 30, 2010. The agreement required the Township to immediately begin Act 537 planning and established strict oversight of Cheltenham's efforts to reduce its Sanitary System Overloads (SSO's). The Township is required to meet with PWD at established intervals to report on progress in developing its Act 537 Official Plan. Within the five year term of the new agreement Cheltenham is required to be in full compliance with its contractual flow rates. The Agreement provides for significant financial penalties in the event of noncompliance by the Township.

Delaware County Regional Water Quality Control Authority (DELCORA)

A new, short-term contract with DELCORA was executed effective July 25, 2011 and will expire on July 25, 2013. Within the first year of the contract, PWD will provide DELCORA with an accurate estimate of its proportionate share of the City's Long Term Control Plan (LTCP) costs. At the conclusion of the contract, DELCORA will either have to agree to pay their proportionate share of the City's LTCP infrastructure to reduce combined sewer overflows, or pay $2,000,000 annually to PWD towards their share of the City LTCP, until such time that DELCORA has built or expanded its treatment facilities that would process the wastewater that is now sent to PWD.

Lower Southampton

Lower Southampton Township has also executed a new wastewater agreement with PWD, effective June 23, 2010. This new contract imposes financial penalties in the event the Township exceeds its contractual flow limits. As a result of this new agreement Lower Southampton is aggressively undertaking an Infiltration/Inflow mitigation program to reduce it wet weather related peak flows to PWD's system.

Future Plans

PWD has notified two additional satellite municipalities that it will be seeking to enter new wastewater agreements, Springfield Township (Montco) and Lower Moreland Township have been advised that their peak flows will have to be reduced and new contracts will include language to enforce and encourage action by the satellite municipalities to make significant reductions in their wet weather peak flows to the PWD system. The list of outlying community contracts can be found below in **TABLE II.D-1: LISTING OF WHOLESALE WASTEWATER CUSTOMER CONTRACTS AND CAPACITIES.**

Table II.D-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		9.542		
Bensalem	6.133		11.740	5,340	3,734
Bucks	24.000	37.00	85.080	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

II.D.3.1 Monitoring and Modeling

PWD is currently aware of 63 connections from outlying communities. Presently, permanent flow monitors are installed at 38 connections and temporary monitors at 22 connections, there are 3 unmonitored coonnections. Through temporary deployments, average flow statistics were determined. **APPENDIX B – FLOW MONITORING: TABLE 1** contains the list of all known connections, their location and weather or not the connection is permanently monitored.

The U.S. EPA's Storm Water Management Model (SWMM) was used to develop the watershed-scale model for the PWD combined sewer system. The components of the SWMM model used in the development of the Philadelphia watershed and wastewater conveyance model were the RUNOFF and EXTRAN modules. 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.

II.D.3.2 Outlying Community Contracts

Please refer to **SECTION 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"** on page 35 for information pertaining to outlying communitiy contracts.

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

Dry weather discharges at CSO outfalls can occur in any combined sewer system on either a chronic (i.e., regular or even frequent) basis or on a random basis (i.e., as a result of unusual conditions, or equipment malfunction). Random dry weather discharges can occur at virtually any CSO outfall following sudden clogging by unusual debris in the sewer, structural failure of the regulator, or hydraulic overloading by an unusual discharge of flow by a combined sewer system user. Chronic dry weather discharges can and should be prevented from occurring at all CSO outfalls. Random discharges cannot be prevented, but they can and must be promptly eliminated by cleaning repair, and/or identification and elimination of any excessive flow and/or debris sources.

Regular and reactive inspections and maintenance of the CSO regulators are performed throughout the City. These programs ensure that sediment accumulations and/or blockages are identified and corrected immediately to avoid dry weather overflows. The CSO maintenance group utilizes the remote monitoring network system daily as a 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. For FY 2011, there were a total of 232 blockages cleared from CSO regulators. The detailed inspection report summaries are included on pages 6 and 9 of **APPENDIX A – FY11 FLOW CONTROLS ANNUAL REPORT**.

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

The control of floatables and solids in CSO discharges addresses aesthetic quality concerns of the receiving waters. The ultimate goal of NMC 6 is to reduce if not eliminate, by relatively simple means, the discharge of floatables and coarse solids from combined sewer overflows to the receiving waters where feasible. The initial phase of the NMC process has and will continue to focus on the implementation of, at a minimum, technology-based, non-capital intensive control measures.

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

The Inlet Cleaning Unit's primary responsibility is the inspection and cleaning of approximately 76,043 active stormwater inlets within the City, this number is lower than previous years due to consolidation of older inlets. This unit is also charged with the responsibility for the following areas: retrieving and installing inlet covers, installing original replacement covers that are missing, installing locking covers, unclogging choked inlet traps and outlet pipes so that inlets can take water; alleviating flooded streets and intersections when hydrants are opened, broken water mains, rain storms and other weather related problems. Inlet Cleaning is also charged with answering flood complaints at the Philadelphia Business Center. Finally, Inlet Cleaning has budgeted five highway crews, whose duties are to clean high volume traffic areas during the night hours, 11 PM - 7 AM.

To insure the efficient and effective operation of the City's inlets and connecting stormwater sewers, it has been found necessary to use specialized inlet cleaning equipment to work along with the various units of the PWD as well as other government agencies and the private sector. The unit also cleans inlets on PWD properties.

About 80% of inlet cleaning work orders are scheduled jobs, while the remaining 20% are in response to customer calls or requests from other departments. Scheduled cleaning routes for an area are created by the crew chief and assigned to the crews.

For the period of July 2010– June 2011, 87,272 inlets were inspected, 71,749 inlets were cleaned. Average amount of debris removed from each cleaned inlet was 272.7lbs. This is an average of every inlet being examined or cleaned and examined 1.16 times during this period. Additional statistics and information pertaining to Inlet Cleaning from FY11 can be found in **TABLE II.F.1-1 AND FIGURE II.F.1-1.**

Table II.F.1-1: FY11 Inlet Cleaning Statistics

Total Inlets Inspected	87,272
Total Inlets Cleaned	71,749
Total Covers Replaced	897
Tons of Debris Removed	9,782
Avg. Lbs./ Inlet	272.7

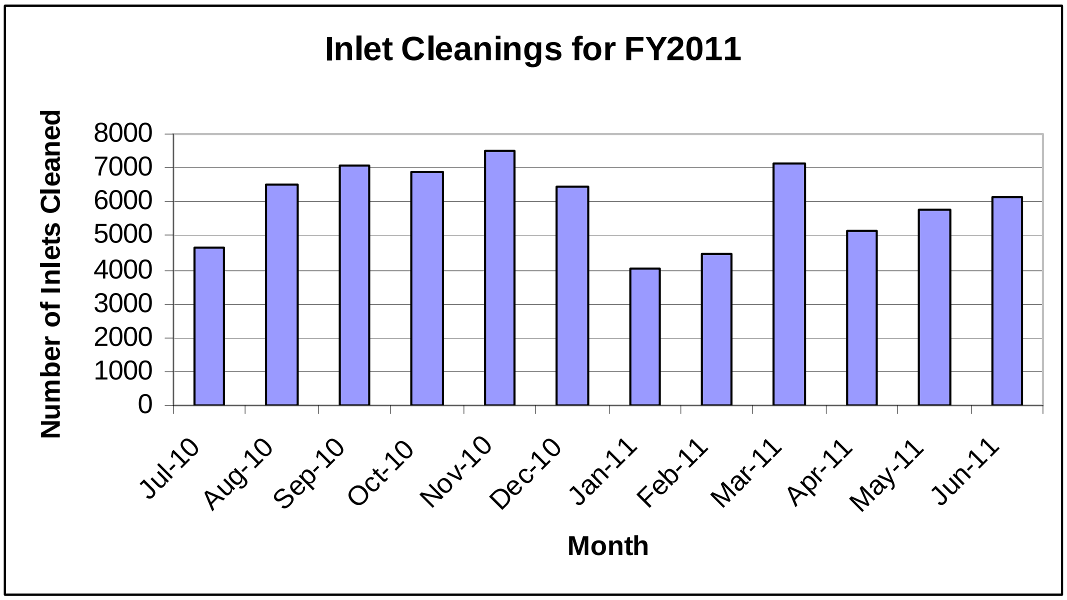


Figure II.F- 1 Monthly Inlet Cleaning Statistics

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 removing large trash – cars, shopping carts, and other short dumped debris - from the 100 miles of stream systems that define our City neighborhoods. This crew also restores eroded streambanks and streambeds around exposed or threatened PWD infrastructure and in tributaries as a part of PWD's goal to naturally restore our streams while meeting Clean Water Act permit requirements. The team is focused on the completion of in-stream restoration work that protects the department's sewer infrastructure in the banks and beds of our streams, while also using Natural Stream Channel Design to restore these streams to a habitat supporting waterway and a community amenity. The Waterways Restoration Team works in partnership with the PPR staff and the various Friends of the Parks groups to maximize resources and the positive impacts to our communities.

The WRT performs stream clean up work throughout the city, in the city's streams – Cobbs, Wissahickon, Tacony, Pennypack, and Poquessing creeks, and their tributaries, along the banks of the non-tidal Schuylkill River, in addition to the Manayunk Canal.

Typical tasks for the WRT include:

- Debris and trash removal - This is one of the most basic tasks of the WRT – the removal of trash and large debris from our waterways. In addition to satisfying one of the primary goals of the Clean Water Act, ensuring that our streams and rivers are clean and beautiful, it enhances public stewardship as people will only seek and value waterways and parks that look are aesthetically pleasing and odor-free. Public willingness to pay for the protection of our waterways is intricately linked to the recognition that these waterways are being maintained and valued by the City. Residents will care little about the quality of the water emptying into our streams if the streams are smelly eyesores. If the public does not have a desire to go to these waterways, they will not care about them.

- Watershed assessments - WRT watershed assessments include visual inspections of the banks of Cobbs, Wissahickon, Pennypack, Poquessing and Tacony Creeks and are completed once per year. This field survey work essentially involves the inspection of stream segments (upstream to downstream) to check for evidence of exposed or damaged infrastructure, chronic pollution sources, dry weather sewer overflows along Cobbs and Tacony Creek. These assessments also support the implementation of the completed watershed management plans for these stream systems.

- Sanitary discharge clean-ups - The WRT is recruited to clean up sanitary discharges to our streams or parks.

- Property restoration repair - The WRT is recruited to restore natural areas on public and private land impacted by water main breaks.

- Operation of PWD Floatables Pontoon Boat in spring/summer/fall

- Restoration projects such as plunge pool removals and stream restorations

- Inspection of intake walls

- Woody debris removal

- General maintenance - General Maintenance responsibilities include the fish ladder, PWD plunge pool and streambank restoration projects, and other PWD land-based stormwater management facilities. Currently, the WRT performs ongoing maintenance at the following habitat improvement or best management practice sites:

    - Saylor Grove stormwater treatment wetland

    - Fairmount fish ladder

    - Marshall Road streambank restoration project in Cobbs Creek

- Wises Mill streambank restoration project in Wissahickon Creek

- West Mill Creek tree trenches

- Mill Creek urban farm street runoff diversion

- Manayunk Canal boom maintenance and algae removal

In FY 2011, WRT cleaned a total of 750 tons of debris, including 11 vehicles, 1,392 tires and 89 shopping carts, were removed from the City's waterways (**TABLE II.F.2-1**). A listing of projects that WRT has either completed or have planned to date can be found on **TABLES II.F.2.-2 & 3.**

Table II.F.2- 1 Summary of Waterways Restoration Team - Performance Measurements FY 2006-2011

Waste Removed	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Debris Removed (tons)	425	441	326	657	1,438	750
Cars Removed	21	41	80	15	12	11
Tires Removed	396	1,201	861	924	1,062	1392
Shopping Carts Removed	161	84	72	268	102	89
Number of Clean-up Sites	124	142	178	375	335	459

Table II.F.2-2 Completed WRT restoration projects to date

Project	Watershed	Description
Cobbs Creek at Springfield Ave	COBB	Removed dumped wood lathe scraps
Cobbs Creek at Spruce St	COBB	Streamside footpath was cleared and debris removed
CC Creek 61st Street Repair	COBB	Emergency streambank restoration after a sewer line rupture
Indian Creek	COBB	Interim stabilization completed by WRT; future restoration project to be completed by a contractor
Marshall Road Restoration Work	COBB	Stream restoration where erosion had exposed a sanitary sewer lateral
Indian Creek Daylighting Project	COBB	Rerouting stormwater overflow from the west branch and unclogging the entrance to the existing culvert
63rd and Market Interceptor Sewer	COBB	DRW, installed road to allow access to sewer
Cobb's Creek and City Line	COBB	Outfall Cleanup
Indian Creek and Landsowne	COBB	Stream Restoration and Clean Up
Cobbs Creek and Locust	COBB	Debris Removal
Cobb's Creek and Ludlow	COBB	Debris Removal
Cobb's Creek and Catharine	COBB	Debris Removal
Naylors Run and Cobb's Creek Confluence	COBB	Debris Removal
Baltimore and Cobb's Creek	COBB	Debris Removal
Whitby Ave and Cobb's Creek	COBB	Debris Removal
Cobb's Creek and 70th St	COBB	Debris Removal
Cobb's Creek and Woodland Ave.	COBB	Debris Removal, Stream and bank Restoration
Redd Rambler Run at Redd Rambler Dr.	PPK	Debris Removal
Maxwell Place Outfall	PPK	Plunge pool removal
PP Rock Ramp	PPK	Fish passage project;
Winchester Outfall	PPK	Plunge pool removal and tributary restoration.
Pennypack Creek and Frankford	PPK	Debris Removal
Wooden Bridge Run at Angus	PPK	Debris Removal
Wooden Bridge Run	PPK	Exposed manhole in stream will be protected with heavy rock
Poquessing Creek at Blackburn & Rawle	POQ	Downed Tree Removal
Byberry Creek - Waldermire	POQ	Monitoring of Byberry at Waldermere Dr
ByBerry Creek - Nottingham	POQ	Stream Bank Restoration
Byberry Creek @ Chesterfield & Berea	POQ	Stream clean-up
Walton's Run	POQ	Debris Removal
Poquessing Creek - Ernie Davis Circle	POQ	Debris Removal
Poquessing Creek - Century Lane	POQ	Debris Removal
NEC Ditman & Eden	POQ	Outfall Restoration and Stabilization
F St. and Whitaker Ave	TTF	Boulders installed to prevent vehicle access to prevent dumping
Adams Ave Fish Ramp	TTF	Fish passage project

Project	Watershed	Description
Crescentville Outfall	TTF	Plunge pool removal and culvert restoration with boulders
Awbury Stream Daylighting	TTF	Phase I included development of a bioswale and daylighting of a spring/stream
Bingham Street Sewer Crossing	TTF	Plunge pool removal
Bingham and Garland	TTF	Stream Bed Habitat Modification
Tookany-Tacony park view apartments	TTF	Debris Removal
Tookany - Tacony F Street	TTF	Debris Removal
Tookany- Tacon - Penway	TTF	Debris Removal
86th and Luther	SCH	DRW, installed road to allow access to infras. Sewer
Strawberry Mansion Bridge	SCH	Repair Headwall and Stream Restoration
Spring Garden	SCH	DRW, installed road to allow access to infras. Sewer
Concourse Lake	SCH	Stream restoration
Mount Pleasant and Greene	WISS	Outfall Restoration
Wises Mill Run	WISS	Lower segment; interim stabilization
Gorgas Run	WISS	Interim stabilization; infrastructure protection with boulders
Carpenters Woods	WISS	Stormwater outfall restoration; 3 outfalls discharged to one location creating severe erosion
Rex Ave Bridge	WISS	Built a rock wall along the Wissahickon to stabilize and protect a location which had been severely eroded due to a break in a 30″ water main.
Wissahickon Creek and Cherokee	WISS	Storm Cleanup
Wissahickon Creek and Monastary	WISS	Outfall Cleanup
Wissahickon Creek and Lincoln	WISS	Storm Cleanup
Hartwell Lane	WISS	Stream restoration
St Martin's Lane Bridge	WISS	A bridge is in disrepair, needs stabilization.
Saint Georges	WISS	Tributary Cleanup

Table II.F.2-3 Planned or On-going WRT restoration projects

Project	Watershed	Status	Description
Springfield Ave	COBB	In progress	Trail restoration
Naylors Run Wetland	COBB	On-going	Repair Swale
Cobb's creek and Daggot	COBB	On-going	Cleanup Restoration
Cobb's Creek Stream Restoration Baltimore	COBB	On-going	Stream Restoration and Infrastructure protection
Indian Creek Daylighting Project	COBB	In Design	Reopened west branch to a culvert, protected sewer line, interim stabilization implemented; future large-scale restoration project to be completed by a contractor
Pleasanthill Park	DD	In Progress	Basin Modifications
Bustleton & Scotchbrook	PPK	In Design	Stream/Outfall restoration project.
Tustin Street Outfall Restoration	PPK	In Project Controls	Outfall restoration project, interim stabilization work on exposed interceptor, further creak stabilization is to come.
Hower Creek (Formerly called Martin's Creek)	PPK	In Design	Outfall Restoration and additional restoration of ~300 feet of stream where there has been chronic erosion.
Pennypack & the Blvd	PPK	In Design	Stream restoration/Fish passage (Also looking at Dam Removal)
Paul's Run	PPK	In Design	Stream restoration
Holmes Ave & Crispen Field	PPK	In progress	Debris removal
Poquessing Creek at Cretmont Ave	POQ	Planned	Downed tree removal
Bennett Rd Daylighting Project	POQ	On hold	Stream Daylighting, landowner is looking into implementing SW management to receive SW credit
Kelly Drive at Strawberry Mansion - East Park Canoe House	SCH	In Design	Installation of a deflector for the dock that will also provide fish habitat
Invasive Plants Control	TTF	On-going	Control of invasive plants in support of stream restoration projects
Field Survey	TTF	On-going	Monitoring three times a year to assess stream condition
Eadom St Parking lot	TTF	In progress	Parking lot depaving / planting
Wissahickon Creek at Wissahickon Dam	WISS	Planned	Downed tree removal
Walnut Lane Golf Course	WISS	On-going	Wetland creation
George's Lane	WISS	In Design	Culvert restoration
FPC Tree House/ Andorra Education Center	WISS	In Design	SW BMPs will be implemented where significant erosion has occured
Oriole Street	WISS	On-going	Repair Swale
Mt.Plesant Place	WISS	On-going	Plunge-Pool Modification
Manayunk Canal	WISS	In progress	Alge removal/debris removal
Wissahickon and Cathedral	WISS	In Design	Stream Bank Restoration and Vegetation
Fountain Street Stairs	WISS	In Design	Infrastructure Restoration
Forbidden Drive & the Covered Bridge	WISS	Planned	Stream restoration
Valley Green Road	WISS	In Design	Stream Restoration

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 skimmer vessel also allows for a mobile control program capable of managing debris at various locations, increasing the effectiveness of this control measure. In addition, the boat will be a visible control and will increase the public awareness and education of floatables impacts.

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

The Philadelphia Water Department's large skimming vessel is a 39-ft, front loading, single hull, shallow draft, debris skimming vessel with a hydraulically controlled grated bucket and a 5.6 cubic yard on-board hold equipped with a main diesel engine, Caterpillar Model 3056 205-hp.

Construction of the floatables skimming vessel was initiated in June 2004 and the completed vessel was delivered to PWD in July 2005. The total cost of the vessel was $526,690. The vessel, now known as the R. E. Roy, was operated in-house by PWD personnel from delivery until April 2006. During this time, PWD was in the process of securing a contractor for the permanent operation of the skimming vessel. River Associates was the contractor selected for the operations of the vessel and they have been operating it since April 2006.

The vessel is operated approximately five days per week, 8 months of the year. The vessel's main purpose is to perform general debris collection and removal on both the Delaware and Schuylkill Rivers. The vessel is also used to clean up for and serve as a highlight for public relations events such as the Schuylkill Regatta.

During the 2011 fiscal year, the skimmer vessel was in operation from April 2010 through November 2011 before shutting down for winter maintenance. It resumed operation again in April 2011. The total amount of debris collected in FY 2011 from July 1, 2010 to June 30, 2011 was 34.82 tons. The weights of debris collected during each month are displayed in **TABLE II.F.3-1.**

Table II.F.3-1 Debris Collected by R.E. Roy Skimming Vessel

Month	Tons of Debris Collected
July 2010	5.45
August 2010	2.25
September 2010	2.28
October 2010	9.64
November 2010	7.00
December 2010	No winter service
January 2011	No winter service
February 2011	No winter service
March 2011	No winter service
April 2011	3.31
May 2011	2.39
June 2011	2.41
FY 2011Total	**34.82**

II.F.3.2 Floatables Pontoon Vessel

In order to extend the City's debris removal program that already occurs on the tidal portions of the Delaware and Schuylkill rivers, the Philadelphia Water Department has purchased a pontoon vessel that is being used as a workboat on the Upper Schuylkill, Lower Schuylkill, and Delaware Rivers within Philadelphia. The vessel is used 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 offloaded by hand. The pontoon vessel can be utilized in the tight spaces found in marinas, among piers, and in near shore areas.

The pontoon vessel was acquired by PWD in June 2006. PWD manages a skimming operation for floatable debris on the through use of the pontoon vessel. The public outreach component of the pontoon skimming vessel program is one of the greatest benefits.

The operational area of the Pontoon Vessel includes:

1. The Lower Schuylkill above Fairmount Dam up to Flatrock Dam (7.2 miles)

2. The Lower Tidal Schuylkill down to the confluence with the Delaware River (8.1 miles)

3. The Delaware River from the confluence up to the Philadelphia City Boundary (18.8 miles)

During fiscal year 2011, the pontoon vessel was operated 5 times. 3 trips during the summer/fall 2010 removed a total of 3.7 cubic yards of mixed trash from the non-tidal Schuylkill River. The spring /summer 2011 season saw 2 trips with a total removal of 1.52 cubic yards of bottles and containers and 1.1 cubic yards of mixed trash. The enhanced separation scheme introduced in the spring/summer 2010 season resulting in a more accurate count of the types of materials collected is still being employed. In addition to containers and mixed trash, the following has also been removed from the river: 3 tires and various types and sizes of lumber and various plastic items.

Similar to FY'10 there has been a further reduction in material removal when one compares this year to last. This is likely attributable to 2 major factors. First, the user groups on the river have joined forces with PWD and have made great strides to ensure that participants are more aware of their effects on the river. Secondly, the extremely low rainfall during the early portion of the 2011 summer season (May –July) has not allowed for the migration of material from the city sewers nor from areas upstream. A result of this lighter than anticipated loading on the river has been a reduction in the number of trips the Pontoon vessel made this season. In an effort to avoid wasting man hours searching the river banks for very limited floatables loading, the schedule continues to be cut back to ensure the vessel is used in an efficient manner.

PWD continues it partnership with Streets Department for the recycling of appropriate material that has been removed from the river.

II.F.4 Other Initiatives

II.F.4.1 Pilot Netting Facility

A pilot, in-line, floatables netting chamber was constructed as part of a sewer reconstruction project at CSO T4 Rising Sun Ave. East of Tacony Creek. The construction of the chamber was completed in March of 1997 and the netting system continues to operate. The quantity of material collected is weighed with each net change. The City has compared the floatables removed from the net with other floatables control technologies employed. More specifically, on an area weighted basis the inlet cleaning program data suggests that street surface litter dominates the volume of material that can enter the sewer system. The pilot in-line netting system installed at T4 has also been shown to capture debris on the same order as the WPCP influent screens indicating that effective floatables control needs to target street surface litter in order to effectively reduce the quantity of debris likely to cause aesthetic concerns in receiving streams. In FY 2011, 3 net removals were done and a total of 490 lbs of debris was collected. The dates and amount of debris captured from this facility during the reporting period are available on page 12 of **APPENDIX A-FY2011 FLOW CONTROLS ANNUAL REPORT.**

A letter was sent to the Department in October of 2010 requesting permission for the removal of these nets due to PWD's belief that the nets are inefficient and resources could be better used elsewhere. PWD is currently awaiting for a response from the Department until then PWD will continue to operate this program.

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 then become lodged in a tide gate thus causing inflow to occur. Additionally, these debris grills provide entry restriction and some degree of floatables control. During FY 2011, 20 debris grill inspections and cleanings were done. The list of the debris grills receiving preventative maintenance is available on page 12 of **APPENDIX A – FY2011 FLOW CONTROLS ANNUAL REPORT.**

II.G Pollution Prevention (NMC 7)

Most of the city ordinances related to NMC7 are housekeeping practices that help to prohibit litter and debris from actually being deposited on the streets and within the watershed area. These include litter ordinances, hazardous waste collection, illegal dumping policies and enforcement, bulk refuse disposal practices, and recycling programs. As pollutant parameters accumulate within the watershed, practices such as street sweeping and regular maintenance of catch basins can help to reduce the amount of pollutants entering the combined system and ultimately, the receiving water. Examples of these programs are ongoing and are presented in the NMC document. The City will continue to provide public information about the litter and stormwater inlets as part of the implementation this minimum control as well as continue to develop the following new programs.

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

The Philadelphia Water Department began the development of an extensive CSO LTCPU Public Participation Program in Spring, 2007, and has continued to distribute materials and host community meetings and events to date. The following components of the Public Participation Program have been completed thus far.

The Philadelphia Water Department began the development of an extensive CSO LTCPU Public Participation Program in Spring, 2007, and has continued to distribute materials and host community meetings and events to date. PWD develops numerous publications for the public that are distributed throughout the City at advisory committee meetings, public meetings, and other public events, in addition to being distributed through the water bill to PWD customers.

The following components of the Public Participation Program have been shared to the public during FY2011:

Billstuffers

<u>Rate Increase billstuffer – July 2010</u>

A billstuffer was distributed to explain to customers about the increase in water, sewer and stormwater charges and how the Water Department changed the way stormwater collection and treatment charges are calculated.

<u>Water Emergency Preparedness Billstuffer – September 2010</u>

A brochure distributed to Philadelphia rate payers in their monthly water, sewer and stormwater bill detailing the Water Department's procedures in the event a resident experiences a loss of water in their home and the homeowner's responsibility with regard to their home's plumbing system.

<u>Keeping Out the Cold Billstuffer – January 2011</u>

A billstuffer distributed to customers about how to protect their homes water pipes from freezing.

Advertisements
Advertisements were placed June 9 – 13, 2011 in the Daily News, Inquirer, Bucks County Courier Times and the Bucks County Courier Times to inform the public of a public meeting being held to present the Pennypack Watershed Act 167 Stormwater Management Plan.

Media Advisories
November 3, 2010 - Water Department, Rebuilding Together Philadelphia Kick-off the Green Homes Project; Cobbs Creek Residents to Get City's First "Extreme Green Makeover".

January 14, 2011 - Make a Wish and Donate to Honor Dr. Martin Luther King Jr.
Local City Students Gather to Build a "Wishing Well" for Clean Water

May 7, 2011 – Spokesdog Finalists to Face Off at Pageants - The Water Department and the Partnership for the Delaware Estuary hosted the Philly Water's Best Friend Competition where the purpose was to reduce water pollution by teaching pet owners about the importance of picking up dog waste.

May 31, 2011 – Philadelphia Water Department and PA Department of Environmental Protection Sign Historic Agreement to Launch Green City, Clean Waters

Letters to the Editor
March 7, 2011 – The Water Commissioner submitted a letter to the editor to Forbes.com in response to Morgan Brennan's February 28 article on, titled, *America's 10 Most Toxic Cities*, highlighting the accomplishments of the Department.

May 11, 2011 - The Water Commissioner submitted a letter to the editor in response to William Bender's May 9 Daily News article, *Dread in the Water: High Levels of Iodine,* correcting its discrepancies.

Newsletters
<u>Monoshone Watershed Quarterly Water Quality Update – July and December 2010</u>
A Quarterly Water Quality Update for the Monoshone Creek which provides updates on PWD's Saylor Grove Treatment Wetland and more detailed sampling information.

<u>Healthy Cities Magazine – Green Roof Article – April 2011</u>
PWD submitted an article about green roofs to Healthy Cities Magazine. The article also highlighted the Department's 25-year, $2 billion stormwater infrastructure management program to protect and enhance the region's waterways by managing stormwater runoff in ways that significantly reduce need for additional underground infrastructure.

Public Releases
For a list of PWD public releases that occurred during FY2011 please refer to **TABLE 2** in **APPENDIX D - WATERSHED PUBLIC EDUCATION AND OUTREACH EVENTS & ACTIVITIES.**

Annual Publications

2010 Water Quality Report – May 2011

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

2010 Annual Financial Report – June 2011

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, Office of Watersheds, Information, Science & Technology and Public Affairs.

WaterWheel – June 2011

An annual publication included in the annual Water Quality Report that is distributed to all the rate payers. Green Stormwater Infrastructure was highlighted in the June 2011 edition.

Green City, Clean Waters Partner Master List

The Philadelphia Water Department manages a *Green City, Clean Waters* Master List, which is compromised of email addresses of participants of *Green City, Clean Waters* public participation programs and other PWD endorsed public outreach events and programs. Those on the list receive periodic emails notifying them of *Green City, Clean Waters* relevant programs and events. The Public Affairs Unit plans to also produce e-campaigns and e-newsletters for these supporters, which will provide more detailed accounts and updates on the *Green City, Clean Waters* initiative. The *Green City, Clean Waters* Master List is currently comprised of approximately 5,000 email addresses.

Green City, Clean Waters Blog

The Philadelphia Water Department manages a daily blog that covers green stormwater infrastructure, stream restoration and other relevant water-related news. The blog enables PWD to inform the public of current programs and events, relevant partner initiatives and programs that support green stormwater infrastructure, the City's waterways, parks and the urban landscape. The URL is: http://phillywatersheds.org/blog. For more information the blog and other features of the Phillywatershed.org website please refer to **SECTION II.G.2.1 PHILLYWATERSHEDS.ORG/ PHILLYRIVERINFO.ORG** on page 59.

Facebook

The Philadelphia Water Department has a Facebook page and Facebook wall dedicated to the Green Cities, Clean Waters program **(FIGURE II.G.1-5)**. Facebook, a free-access social networking website, enables PWD to reach out to an audience that may otherwise not choose to become familiarized with its programs. This page helps PWD build its *Green City, Clean Water* fan base and keep its "Friends" up-to-date on *Green City, Clean Waters* blog posts, news and upcoming events. It also provides PWD with a direct link to an interested public and a forum to gather feedback on projects and programs. Additionally, social media creates opportunities to promote and cross-promote partner programs and events. As of September 2011 the PWD's Green Cities, Clean Waters Facebook wall has approximately 182 "friends" and the page has been "like" by 112 Facebook subscribers. By "like"-ing the Facebook page, members can gain access a RSS feed to the Phillywatersheds Blog's to receive updates on PWD events. To access PWD's Facebook page, visit http://www.facebook.com/green.cities.clean.waters.

Figure II.G.1-5 Facebook Screenshot

Green City, Clean Waters Documentary Video Series

The Philadelphia Water Department and GreenTreks Network, Inc. are working together to produce engaging documentary videos that communicate the stories behind *Green City, Clean Waters*. The *Green City, Clean Waters* videos are shown at public meetings, public events and conferences, on television and at the Fairmount Water Works Interpretive Center. They are also available on-line on PWD's web page and the *Green City, Clean Waters* Facebook page. The primary URL for these videos is: http://vimeo.com/channels/greencity. Several videos have already been successfully produced and PWD plans to continue producing videos with GreenTreks Network, Inc. over the next year.

Green Stormwater Infrastructure Signage

The Philadelphia Water Department and the Philadelphia Department of Parks and Recreation are currently developing a standard template and process for green stormwater infrastructure interpretive signage. PWD will continue to support the development and implementation of a template and process for interpretive signage. For more information on interpretive signage created green stormwater infrastructure please refer to **SECTION III.C.3.5 INTERPRETIVE SIGNAGE** on page 152.

Green Streets Outreach Process

The Philadelphia Water Department has developed a Green Streets Outreach Process in order to more effectively work with impacted communities on the planning, design and construction of Green Streets projects. Through a thoughtful notification process, PWD gathers feedback on the design and construction of the project and provides educational opportunities for the schools and recreation centers in the impacted communities. PWD believes that these efforts will help increase understanding and ultimately adoption of Green Streets projects.

The Green Streets Outreach Process may serve as a template as PWD develops outreach processes for other green public programs, such as green open space, green school, ect.

Table II.G.1 – 1 Green Streets Outreach Process

Phase	Philadelphia Water Department to Partners	Purpose
I. Design	Philadelphia Water Department to Philadelphia Parks and Recreation	To notify and distribute design plans to impacted site leaders and district managers from whom PWD will then solicit feedback
	Philadelphia Water Department to Philadelphia Parks and Recreation	To notify environmental educators who will contact recreation centers to coordinate education programs
	Philadelphia Water Department to Philadelphia School District	To notify capital programs and the School Improvement Team to inform them of work planned in the impacted school area and to obtain feedback on the design
	Philadelphia Water Department to Philadelphia Schools	To notify principals of impacted schools and to obtain contact information for science teachers and others who may be interested in environmental education programming
	Philadelphia Water Department to Philadelphia Parks and Recreation	To notify environmental educators of impacted schools, so that they can reach out to the schools with environmental education programs and introduce green stormwater infrastructure
	Philadelphia Water Department to Civics	To notify impacted civic groups of green stormwater infrastructure projects in their community.
II. Construction	Philadelphia Water Department to the selected contracting company	To request that the contractor notify all residents and businesses directly impacted by the project
	Philadelphia Water Department to Civics, Philadelphia Parks and Recreation, partners and schools	To provide a project status update and to be available for questions and/or presentation requests; To discuss project "adoption" opportunities for operation, monitoring & maintenance
III. Launch and Celebration	Philadelphia Water Department with civics, community and media	To host an event, such as a ribbon cutting, to celebrate the green stormwater infrastructure project completion. The Philadelphia Water Department will also develop educational materials and will promote the project and event through PWD websites, social media and other appropriate outlets.
IV. Continued partnership	Philadelphia Water Department to civics, schools, and recreation centers	To be available for requests and to provide updates

Philadelphia Parks & Recreation (PP&R) Green City, Clean Waters Outreach Program

A number of educational materials and programs have been developed with additional outreach tools currently in production. Philadelphia Parks and Recreation has led a series of free walks in the Philadelphia Neighborhoods and they have also offered a free environmental education program in schools and in recreation centers for children. Philadelphia Parks and Recreation has also produced a number of informational fact sheets and handouts, regarding tree care and maintenance.

Below is a description of the components of the Philadelphia Parks & Recreation (PP&R) Green City, Clean Waters Outreach Program.

Public Programs & Walks

2010 thru 2011

A variety of innovative programs and walks focusing on the importance of neighborhood trees to capture storm water runoff and beautify streets and neighborhoods were offered to community members in both model neighborhoods and Pennypack and Wissahickon watersheds.

Programs included: *Exploration of Clean Land/Clean Water in Columbus Square; Self-Guided Nature Walk and Nature Make-&-Take Activities at the Mayor's Walk in Cobbs Creek; Earth Day and Seed Planting activities for the Cobbs Creek 5K Run; Tabling Activity at Coast Day; Rain Garden Workshop & Native Plant Sale; Rain Barrel Workshop.*

- 6 program offerings
- 705 participants

Summer Children's Program – "Clean Land, Clean Water"

Summer 2010

Four exciting programs focusing on water, water pollution, and the importance of trees in controlling stormwater runoff were offered to library, church, and Philadelphia Department of Recreation summer camps located in the model neighborhoods.

Programs included: *Greener Bubbles; Trash Toss; Big Tree Bingo; Where Does the Water Go?; Watershed Walkabout*

- 12 programs taught
- 333 children and adults (contact times)

Summer Children's Program – "Stepping into Nature!"

Summer 2010

A discovery walk along Fairmount Park's wooded trails at Wissahickon and Pennypack Environmental Centers was offered to Philadelphia Recreation Department summer camps throughout the city. Campers learned why clean streams are so important and how a natural watershed functions.

- 38 programs taught
- 1237 children and adults (contact times)

School Program – "Clean Land, Clean Water" and "Clean Water & You" for model neighborhood schools

September 2010 thru June 2011

Two series of water-related programs were offered to Philadelphia public, charter, private, and parochial schools located in the model neighborhoods.

<u>Programs included</u>: *Philadelphia Watersheds: a first look; Schoolyard Watershed Walk; Watershed Walkabout: the connection of land and water; Where the Dirty Water Goes!; Green City, Clean Waters; Mapping Your Schoolyard; The Greenest Street: Model-making; The Greenest Street; Greener Home; Creek Critters; Creek Study Field Trip.*

- Grades 3 thru 6 (primarily 4, 5, 6)
- 120 classes taught
- 18 schools reached
- 2654 students and teachers (contact times)

<u>Participating Schools</u>

Anderson School	Maritime Charter School
Anna Blakiston Day School	Nueva Esperanza Academy
Baldi Middle School	Phila. HS for Perform Arts
Ethan Allen School	Solis Cohen
Farrell School	St. Donato School
Greenberg School	St. Peters School
Hancock Elementary	Visitation BVM
John Welsh	West Oak Lane Charter
LaSalle Academy	William Hunter Elementary

Green Stormwater Infrastructure Tours

The Philadelphia Water Department regularly offers tours to highlight local examples of green stormwater infrastructure. In FY2011, PWD continue to offer tours of green stormwater infrastructure to partners and the general public. PWD has led 225 participants on tours in FY2011.

Table II.G.1 – 2 FY2011 Green Stormwater Infrastructure Tours

Date of Tour	Tour Length	Locations Visited
May 15th 2010	4 hour	Fairmount Water Works, Free Public Library, Greenfield Elementary, Herron Playground, Liberty Lands
June 6th, 2010	6 hours	Greenfield Elementary, Herron Playground, Liberty Lands, Kensington High School, Overbrook Environmental Education Center
July 27th, 2010	4.5 Hours	APM (Sheridan), Big Green Block, New Kensington High School, Liberty Lands
August 2nd, 2010	5 hours	Various Locations
August 3rd, 2010	2-3 hours	Columbus Square, Herron Playground, Liberty Lands
December 8, 2010	3.75 hours	PECO, Albert Greenfield Elementary School, Friends Center

Green Homes
The Philadelphia Water Department continues to support the development of projects and programs that provide homeowners with guidance, technical resources and experiences that PWD believes may inspire residents to take on green stormwater infrastructure projects on their own properties and in their communities.

Rain Barrel Program -
The Philadelphia Water Department, PWD, has partnered with the Energy Coordinating Agency, ECA, to continue its goal of providing rain barrels to residents of Philadelphia's watersheds free of charge in order to promote the reduction of stormwater flows to the local sewer system and creeks **(See FIGURE II.G.1-4)**. The rain barrels are recycled; food-grade barrels which are assembled and installed by ECA trained crews. This new program has enabled us to provide more rain barrels to residents than in past years as well as the creation of "green" jobs for Philadelphia's unemployed.

This project consists of the implementation of rain barrels as a method of reduction of stormwater runoff on residential private property. The primary goal of this project is to implement a property-level best management practice to aid in reducing the volume of stormwater reaching the receiving stream or to increase the length of time it takes the stormwater to reach the receiving stream.

At the workshop, residents are instructed on how to properly use and maintain their rain barrel. They also learn about the environmental benefits of operating a rain barrel and how stormwater affects the sewer system and local waterways. After successfully completing the workshop, they are scheduled for an installation date. This program has been a success and there is great demand to continue and expand this program. To date, over 30 workshops have been held and more than 2,000 rain barrels have been given out. More information on PWD's Rain Barrel program can be found by going to: http://www.phillywatersheds.org/rainbarrel/.

Figure II.G.1-4 Rain Barrel Program

Rebuilding Together Philadelphia (RTP) Block Builds
In November of 2010, PWD partnered with RTP staff and approximately 100 volunteers to install 20 downspout planters, 15 rain barrels and a rain garden on three blocks in the Cobbs Creek neighborhood of Philadelphia as a Green Homes demonstration project. Block Builds are an on-going program of RTP designed to improve the lives of homeowners in need. Projects often focus on energy efficiency upgrades, repair projects, clean-ups, water conservation and such projects that improve the safety, security and value of their homes. After the success of the Green Homes demonstration project, RTP has decided to include GSI tools as a home upgrade option for homeowners in all future Block Builds.

Green Roof Bus Shelters
The Philadelphia Water Department will continue to develop green stormwater infrastructure demonstration projects in partnership with other City agencies. In June, 2011, PWD partnered with the Mayor's Office of Transportation and Utilities (MOTU), Mayor's Office of Sustainability, Titan, and Roofmeadow on the installation of a demonstration green roof bus shelter at 15th and Market Streets. The goal of this highly visible project is to inspire homeowners to implement green stormwater management projects on their properties and in their communities. PWD and its partners are exploring the possibility of constructing additional green roof bus shelters throughout the City, funded by advertisement dollars. PWD will continue to partner with City agencies on innovative and educational demonstration projects and pocket parks. For more information on the green roof bus shelter project, please visit: http://www.phillywatersheds.org/green-roof-bus-shelter.

Green Home Events & Guidance Documents
PWD continued to create opportunities for homeowners to manage stormwater runoff better on their properties and in their communities. Recently, PWD hosted a Green Homes panel discussion as a component of the Schuylkill Soundings lecture series at the Fairmount Water Works Interpretive Center. PWD will also continue to support partner projects that increase awareness around residential stormwater management tools. Recently, the Pennsylvania Horticultural Society (PHS), in partnership with PWD, hosted a Green Homes Charrette to challenge local professionals to design better stormwater residential tools for homeowners. The PWD Green Homes webpage provides technical guidance, designs and other resources at: http://www.phillywatersheds.org/residents.

Green Industry, Business, Commerce and Institutions – Citizens Advisory Council (CAC)
The Philadelphia Water Department will continue to work closely with the stormwater fee Citizens Advisory Council (CAC) in the coming years. The CAC was formed to provide advisory opinions to PWD in response to the economic impacts and concerns regarding the transition from a meter-based stormwater billing system to a parcel-based system. The stormwater fee CAC will hold ten meetings throughout the spring, summer, and fall of 2011. The first nine meetings will focus on educating and getting feedback from the group on the environmental issues at stake, billing requirements, and

constraints. At the tenth meeting, the CAC will provide their final recommendations to PWD.

Stormwater Fees CAC Meeting Schedule

April 28, 2011 - Introduction
May 19, 2011 - Rate Issues: Stormwater Programs and Costs
June 9, 2011 - Rate Relief: Cost Reallocation
June 30, 2011 - Rate Relief: Extended Phase-In and Caps
July 21, 2011 - Special Issues: Direct Dischargers
August 11, 2011 - Rate Relief: IA/GA
September 1, 2011 - Incentives
September 22, 2011 - Stormwater Credits
October 13, 2011 - Stormwater Credits
November 11, 2011 - Final Meeting

The objective of the CAC is to create an informed and engaged customer group that can provide recommendations and feedback based on a sound understanding of the issues paired with personal experiences as customers. PWD is dedicated to identifying who is impacted by the new stormwater billing structure and gathering their feedback. Special accommodations to facilitate the billing transition will be considered to the extent possible. However, PWD feels that the nation is trending towards parcel-based billing as a more equitable approach to stormwater billing.

Members include representatives from many types of communities including: residential property owners, non-profits, City organizations, consultants, real estate, faith-based organizations, higher education institutions, law firms, small local businesses and large corporations. The diverse CAC membership is meant to help develop a wider understanding of customer concerns about stormwater billing.

Citizens Advisory Council Members

Community Legal Services
Philadelphia University
Perfecseal Philadelphia
Residential Property Owner
Manko Gold Katcher & Fox
PennFuture
City of Philadelphia - Commerce
Elgart & Son
UBOAP/WTARF/TCR
Archdiocese of Philadelphia
Brandywine Realty Trust
Chapman Auto Group

For more information on the CAC, visit:
http://www.phillywatersheds.org/what_were_doing/stormwater_cac.

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

II.G.2.1 Phillywatersheds.org / phillyriverinfo.org

An important PWD-affiliated website, www.phillywatersheds.org, acts as a hub for all of the related PWD Office of Watershed (OOW) and partnership information. The website describes what PWD is doing for the watersheds of Philadelphia, includes educational tools, public meeting materials, maps and most of the reports currently available on Phillyriverinfo.org (which is gradually being phased out). The website also documents what issues are currently problematic for the City's watersheds, what PWD is doing to address these issues, and what citizens of Philadelphia can do to help improve watershed health.

In May 2011, a blog was added to the site to increase public awareness of the City's projects, events and announcements. Updated daily, the blog (www.phillywatersheds.org/blog) also covers watershed-wide news and issues, ranging from educational topics to partner events. To encourage more exposure via social media, the blog's RSS feed is synchronized with the Green City, Clean Waters Facebook page. A series of videos featuring information on PWD's green infrastructure initiatives are embedded on the blog's main page.

One of the most exciting features of the website is interactive mapping. These maps are based on the freely available and popular Google Maps API. 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 that is retrieved from PWD's sewer monitoring network. The map is available 24 hours a day and displays the most up-to-date data available. A SWMM model was added to the CSOcast system to function as a check for the sewer monitoring data.

The website has a section for the Rain Barrel Workshop site. This site allows citizens to register for PWD's rain barrel workshops and to find out more information about rain barrels. It also features a map showing the locations of the all the rain barrels that have been given out through the workshop program. The site has been used successfully for numerous workshops and has received great feedback from the community.

Due to the daily activity on the blog and an extremely popular online poll for PWD's spokesdog contest, site traffic at www.phillywatersheds.org more than doubled compared to last year, according to Google Analytics. Traffic increased from 20,998 unique visitors in FY 2010 to 56,731 unique visitors in FY 2011, and the site's usage statistics continue to trend upward.

II.G.2.2 Rivercast

RiverCast is the first operable web-based recreational warning system in the United States. Using real-time flow, precipitation, and turbidity data, RiverCast predicts bacteria levels within a section of the Schuylkill River heavily used by the public for swimming, rowing, and boating. RiverCast translates the predicted bacteria levels into one of three ratings, each of which corresponds to suggested guidelines for recreation. High bacteria levels, for example, translate to a "red" rating, in which RiverCast advises against any direct or indirect contact with the river. Over 350,000 users have visited RiverCast, which can be accessed at www.phillyrivercast.org, since it was first released in June 2005. 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 recreational use of the Schuylkill River, while promoting public awareness of water quality concerns and indirectly engaging support for source water protection measures.

II.G.2.3 Schuylkill Action Network

Philadelphia is the furthest downstream city in the Schuylkill River watershed, which provides a source of drinking water for Philadelphia residents. The primary source of impairment of the Schuylkill watershed is stormwater. The majority of these impaired stream miles are within and just outside Philadelphia. A preliminary restoration analysis found that it would cost approximately $288 million to design and reconstruct all impaired stream miles through natural stream channel design. The Schuylkill Action Network (SAN) Stormwater Workgroup was formed to identify a cost-effective approach to stormwater management through project prioritization and planning. The workgroup is a partnership of representatives from the Philadelphia Water Department, Pennsylvania Department of Environmental Protection, 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.

Publicly owned lands (including schools, parks and golf courses) represent an important potential resource for addressing stormwater in the Schuylkill watershed, and are a significant focus for the SAN Stormwater Workgroup. The SAN Stormwater Workgroup identified the largest landowners in the Schuylkill watershed in order to reach the most people and make the biggest impact. Selected landowners include 61 school districts, each with several campuses, and golf courses with lands comprising 11,600 total acres located along 43 stream miles. As of 2009, with the help of a $1.15 million grant from the EPA, the workgroup implemented best stormwater management practices at seven of these priority lands while raising several hundred thousand dollars of additional funds for continued action on priority lands.

One of the key tasks of the SAN Stormwater Workgroup has been to collaboratively address stormwater issues by targeting municipalities located in Berks, Montgomery and Chester counties – areas with significantly impaired streams due to stormwater. The workgroup assisted these municipalities in adopting consistent stormwater ordinances, developing Environmental Advisory Committees and conducting other activities beyond what is required under current regulations.

Other accomplishments of the SAN Stormwater Workgroup include:

- Mapping MS4 areas, PA Act 167 plan developments, and stream impairments due to stormwater contributions to identify priorities and coordinate strategies with the SAN Education/Outreach Workgroup for MS4 outreach to municipalities. Through the municipal outreach prioritization process, partnerships between workgroup members have been strengthened and the group has begun to explore new ways to potentially improve stormwater management in the watershed, including implementing watershed-wide Act 167 planning and developing stormwater authorities.

- Working closely with PADEP to investigate the feasibility of a watershed-wide Act 167 plan, to review and provide input on DEP's new stormwater model ordinance, and to develop ideas for a collection of demonstration BMPs for the SAN website.

- Working closely with PADEP to provide assistance and support for MS4 program administration and BMP education.

- Providing support and input for Environmental Advisory Council development in key municipalities in the watershed.

- Providing input into the Environmental Finance Center's efforts to cultivate new stormwater financing solutions.

- Developing outreach to Homeowners Associations and municipalities regarding stormwater management.

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. The SAN website has been redesigned by a web consulting firm 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. It also includes a public component that conveys SAN's message about protecting and improving the Schuylkill River to outside audiences. The SAN website, together with phillywatersheds.org, has replaced the Source Water Assessment Program websites in providing data and reports from the source water assessments for the Schuylkill River.

II.G.2.4 Early Warning System

Background

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 and lower Delaware River watersheds. The EWS was developed in 2002 with funding provided by the Pennsylvania Department of Environmental Protection (PADEP) and the United States Environmental Protection Agency (USEPA) and was deployed as a fully functional system in 2004. PWD initiated the development of the EWS after identifying the need for such a system while collaborating with upstream treatment plant operators during completion of the Source Water Assessments for the Schuylkill and Lower Delaware Rivers between 1998 and 2000. 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 is comprised of 4 principal components; the EWS Partnership, the notification system, the monitoring network, and the web-based database and portal. The EWS Partnership is comprised of stakeholders and includes representatives from both public and private drinking water treatment plants in the coverage area, industries who withdraw water from the Schuylkill and Delaware rivers for daily operations, and representatives of government agencies from both PA and NJ. The notification system includes both automated telephone notification and web-based notification capabilities. The monitoring network is comprised of on-line water quality and flow monitoring stations located at USGS sites and water treatment plant intakes throughout the Schuylkill and Delaware River watersheds. The web-site and database portal are the backbone of the EWS and are fully integrated with the notification system and monitoring network. Each component of the EWS is discussed in more detail below.

The telephone notification system is a powerful tool that allows a caller to initiate emergency notifications to multiple recipients through a single call. The system accepts calls from emergency responders, water utility personnel, and municipal and industrial dischargers. The system records event information via touch-tone responses to a standard question and answer process, and makes telephone and email notifications to affected EWS participants. The integration of the CodeRED emergency notification system allows outgoing calls to be completed in less than four minutes. This automated process reduces the burden on emergency responders and other information providers by providing multiple and redundant calls to system participants, while also reducing the possibility that a notification gets lost or mis-routed.

The EWS website provides a dynamic and interactive user interface to the EWS database, allowing users to access and share event and water quality information via the internet. Various user interface formats are available, including forms for reporting and viewing the details of a water quality event, maps to identify the location of an event, water quality graphs, and a time of travel estimator. The time of travel estimator uses real-time flow data from USGS gauging stations to provide plug-flow travel time estimates for each downstream intake based on current river conditions. These tools allow PWD and the other water purveyors within the Schuylkill and Delaware River watersheds to be more informed about water quality throughout the watershed and thereby better prepared to react to changing or emergency conditions.

The water quality monitoring network compiles both near real-time and historic water quality data. The near real-time network utilizes continuous water quality monitors that are located at select water treatment plant intakes and USGS gauging stations. The network transmits data collected at those locations to the EWS server, thus making the data accessible via the website. The water quality monitoring network provides water suppliers with near real-time information about water quality upstream of their intakes so that they can anticipate changes in water quality and adjust their treatment accordingly. Real-time monitoring is currently limited to simple water quality parameters such as turbidity and pH, but the network will be expanded in future years as monitoring technologies advance and as other monitoring needs are identified. In addition to the near real-time data, utilities will submit the results of their routine operational monitoring, creating a historical database against which real-time data can be compared. The system has the potential to incorporate sophisticated monitoring equipment like gas chromatographs and bio-monitors that can detect changes in water quality that might result from major discharges or intentional contamination.

One of the unique features of the Delaware Valley EWS is that the system operates essentially unmanned. Once an event is reported via telephone or the Internet, the system will automatically perform the time-of-travel estimations, and notify downstream users. System users can then report updates and additional information on the website as the event develops. In order to further strengthen the monitoring and notification capabilities of the EWS, PWD recently implemented the following system enhancements:

- integrating industrial users with intakes into the EWS partnership and designing an industrial user fee based on withdrawal and position in the watershed;
- adding the City of Philadelphia Office of Emergency Management (OEM) as an EWS member as part of a pilot expansion of the EWS partnership to include county OEMs;
- creating the Spill Model Analysis Tool which allows users to test the travel time of a spill without generating an event that notifies other users. This effort included incorporation the National Hydrologic Data stream network into all EWS mapping functionality, resulting in more accurate calculations of spill paths and travel times;
- creating a simplified report, making it easier for users to supply hazard information;
- adding a confidentiality disclaimer to all emails generated by the EWS;
- adding telephone testing to existing administrator tools and allowing users to subscribe or unsubscribe to telephone notifications generated by test events; and,

- adding a stream designation component to the EWS telephony application that enables the notifying party to identify the affected stream in a municipality. This technical enhancement, which required a detailed analysis of the relationships of streams to municipalities, yields a more accurate spill route and travel time and also limits notifications to members tied to the affected intakes along the spill route.

The above enhancements help lay the groundwork for the development and implementation of a 5 year Strategic Plan for the EWS, which PWD is currently in the process of finalizing. Through the strategic planning process, PWD evaluated the system's core functions, user base, and potential funding sources. PWD's focus through the 5 year Strategic Plan is to implement an expanded set of functionalities that will enable the EWS to expand and evolve, ultimately meeting future goals for the system. The future goals that PWD hopes to reach through the Strategic Plan implementation process include the following:

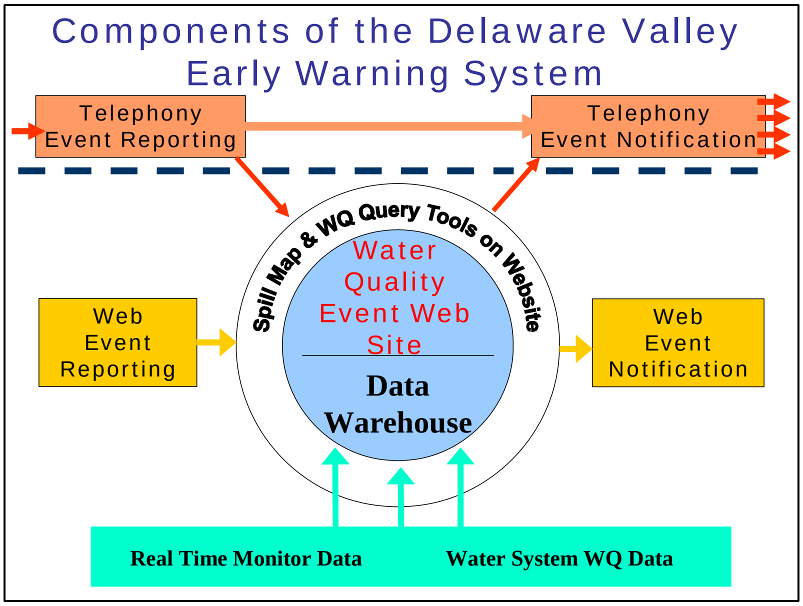
- expand the system's coverage area through both the user base and service area;
- expand system functionalities to support incorporation of Marcellus Shale-related water quality events into the EWS;
- update the EWS hardware and software systems;
- enhance EWS Partnership and Steering Committee communication; and,
- expand EWS funding and work toward creating a self-sustaining source of funding.

In May 2011, PWD was also awarded grant funding under a Delaware Bay Area Maritime Port Security Grant Program to implement a EWS Tidal Spill Trajectory Tool to accurately predict the movement of any chemical, biological and radiological agents that might be discharged in the lower Delaware River and travel under tidal influence. The grant project will also enhance and upgrade GIS mapping technologies used by the EWS for locating spills. Improved GIS technologies are needed to more robustly locate spills and expand geographic coverage of the river contamination reporting system. These system enhancements will improve reporting capabilities for agencies such as the US Coast Guard, while also speeding overall response time.

Early Warning System Protocol

The EWS can be used to fulfill several different source water protection needs. First and foremost, it is a communication and notification system that emergency response personnel and water suppliers can use to share information about source water contamination events. Second, it provides access to water quality data throughout the watershed, thus alerting water suppliers to a change in water quality long before it reaches their intake. In the future, dischargers will be encouraged (preferably required) to use the EWS to make downstream notifications of overflows, spills and accidental discharges. The technical features of the EWS are illustrated in **FIGURE II.G.2.4 -1** and described in detail below.

Figure II.G.2 -1 Components of the Early Warning System



Emergency response personnel and water suppliers often observe a water quality event or are notified by the public. A water quality event can be anything from a transportation accident, to a fire, sewage overflow, or illegal dumping which results in a discharge to the river or sewer system. Upon being made aware of and confirming an event, the responding party can use the EWS to notify downstream users by calling the EWS telephone notification system or by reporting the event to the EWS website (www.DelawareValleyEWS.org). In reporting the event, the reporting party will supply information about the time, location, risk level, cause, and result of the event. The EWS uses the location information to identify the appropriate parties to notify. A recent technical enhancement added to the EWS telephony application enables the notifying party to identify the affected stream in a municipality. This technical enhancement, which required a detailed analysis of the relationships of streams to municipalities, yields a more accurate spill route and travel time and also limits notifications to members tied to the affected intakes along the spill route.

Notifications are made by phone for high risk events or by email for lower risk events (additional flexibility for notifications is a future goal of the system). If a telephone notification is delivered, the notification consists of a standard message that informs the recipient that a water quality event has occurred followed by specific information about time and location of the event and, if available, a message from the reporting party. If an email notification is sent, the email message contains critical information including the time, location and description of the event, and advises the recipient to go to the web-site for additional information. The recipient of the notification will then either call the telephone system or log onto the website to receive more information. The web-site will have an event report with all of the information that the responding party provided. The web-site also has a time-of-travel estimator that uses real-time USGS flow data to estimate the time at which the contaminant will arrive at downstream intakes. Downstream water suppliers can also access water quality data associated with the event. The water suppliers can use the time-of-travel and water quality information to plan their response strategies. As the event progresses, the information provided on the web-site can be updated by the initiator of the report or by other participants as they learn more about the event. In this way, the water supply community can communicate and be kept abreast of the event as it unfolds. All of this information exchange occurs in a secure environment.

The EWS water quality monitoring network collects continuous water quality data from select drinking water intakes along the main stem Delaware River and transmits that information to the EWS server, thus making it available to the EWS participants via the EWS web-site. Currently, there are twenty participating water utilities and fifteen participating industries in the EWS monitoring network**.** EWS users can log on to the EWS web-site on a daily basis to see water quality information from the monitoring locations, which span from Easton, Pennsylvania to Philadelphia. The EWS monitoring network currently consist of 8 water quality monitoring stations and 87 USGS sites. Access to this data allows water suppliers to identify changes in water quality associated with both natural and accidental contamination events. For example, storm events and algae events are two naturally occurring events that will impact the water treatment process. Fortunately, both are easily identifiable using simple on-line monitors like turbidity and pH. A downstream utility can track changes in these water quality parameters and gather the information necessary to gauge if and when water treatment process modifications need to be initiated. Similarly, significant accidental spills to the river may be detected through changes in pH or conductivity. In essence, the EWS water quality monitoring network enables water suppliers to be more proactive, rather than reactive, when it comes to responding to changes in water quality.

PWD worked closely with PADEP's Emergency Response team in the development of the EWS. During this process both PWD and PADEP agreed that one of the mutual goals of the system is to have dischargers add the EWS to their downstream notification list. In this way, PWD could insure that downstream water suppliers receive information about overflows, spills and accidental discharges. PWD has been in the process of working with PADEP to meet this goal, which may eventually necessitate PADEP incorporating the EWS into the dischargers' permit requirements. If such a requirement is implemented, the notifying discharger would call the EWS telephone system or enter the event into the EWS web-site to initiate downstream notifications. Having dischargers contact the EWS directly will increase the number and geographic diversity of downstream notifications with just a single phone call.

The Delaware Valley EWS has tremendous potential to reduce the time in which water suppliers become aware of and react to water quality events of all kinds. The system is a tool designed to help water suppliers respond to accidental, natural, and deliberate water contamination events that cannot be prevented by standard source water protection measures. In this way, the EWS is a perfect complement to a well developed source water protection program.

II.G.2.5 Other PWD related websites

Stormwater Billing
PWD also has a stormwater billing program website to help non-residential properties determine the cost of their bill based on the new stormwater billing charges which is guided by the amount of impervious surface on a property. The website and tool can be found in the following location: http://www.phila.gov/water/stormwater_billing.html. For more information on the stormwater billing program please refer **SECTION III.C.1.3 – PARCEL-BASED STORMWATER BILLING** on page 126.

Development Review Program Website
PWD's Development Review Program has a website where developers can go to for guidance in the review process:
http://www.phillyriverinfo.org/PWDDevelopmentReview/home.aspx.

WaterQuality Website
PWD's general water quality website can be found in the following location:
http://www.phila.gov/water/Water_Quality.html.

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

Please refer to **SECTION II.G.1 "CONTINUE TO DEVELOP AND SHARE A VARIETY OF PUBLIC INFORMATION MATERIALS CONCERNING THE CSO LTCP"** on page 49 for information on this section.

II.G.3.2 Additional PWD and Partner Sponsored Events

PA Coast Day
The Philadelphia Water Department along with Partnership for the Delaware Estuary and Pennsylvania DEP Coastal Zone Management Program sponsored the 9th Annual Pennsylvania Coast Day on Sunday September 11, 2010. Due to the tremendous success the previous year, the event was again advertised to every resident of Philadelphia through a flyer inside the monthly water bill. The same promotional piece was also placed at nearby hotels, museums and various other public places to promote the day. The event was held at Penn's Landing, on the Delaware Riverfront with a record breaking attendance. In all, nearly 20 local and regional organizations took part, providing educational and interactive displays for Coast Day visitors. Over 260 people participated in enough activities at the various organizations' booths to qualify for prizes in the Clean Water Challenge.

The event also featured face painting and crafts for kids. This year 1200 passes were distributed to attendees for a free ride on the Delaware RiverLink Ferry. Many of which had never been on a boat, got to experience Philadelphia from the River's perspective.

Furthermore over 50 people also got to try their hand at sailing on the Meerwalk and Northwinds tall ships. In addition to all of the activities taking place at Coast Day over 350 people visited the neighboring Independence Seaport Museum (significantly higher than usual attendance) as well as over 330 adults and children took a free shuttle to the Fairmount Water Works Interpretive Center.

A 2011 Coast Day Event is currently scheduled for Saturday, September 10th, 2011. For more information on Coast Day visit:
http://www.delawareestuary.org/news_coastday.asp

Philly FUN Fishing Fest

As a result of the revitalization of our region's rivers, PWD has witnessed the return of a variety of sporting fish to the Schuylkill River and believes that this good news is worth spreading. In celebration of the improving water quality, the Philadelphia Water Department and its partners, the Fish and Boat Commission and the Schuylkill River Development Corporation – has hosted the annual Philly FUN Fishing Fest on the banks of the Schuylkill River. The event takes place in September every year. In 2009, over 200 individuals participated and approximately 65 fish were caught during the tournament. In 2010, approximately 150 individuals participated and approximately 235 fish were caught during the tournament. The 2011 event was planned to take place Saturday, September 10, 2011 but due to recent inclement weather, the 2011 Philly Fun Fishing Fest was postponed to Saturday, September 24. As of September 1, 2011, 216 people have registered to attend the event.

The fishing festival is open to the public - all skill levels and ages. 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. For more information on the Philly Fun Fishing Fest, please visit: http://www.phillyriverinfo.org/fishingfest/.

Protect Philadelphia's Hidden Streams Art Contest

The Partnership for the Delaware Estuary and Philadelphia Water Department sponsored its twelfth art contest for Philadelphia public, private and home-schooled students, grades K-12 in January 2011. Students were asked to create an original piece of artwork that shows how Philadelphians can help prevent stormwater runoff pollution. Or, participants could 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 was used to promote pollution prevention messages on SEPTA buses, and in the creation of a calendar. Along with the drawings, the calendar also provided monthly tips to help prevent water pollution. This year, there were nearly 800 drawings and videos entered into the contest, with over 20 classrooms and several home school students participating. An awards ceremony was held in April at the Fairmount Water Works Interpretive Center. Winning artwork and videos can be viewed at http://www.flickr.com/photos/delawareestuary/sets/72157626380234961/.

Stormwater Best Management Practices (BMP) Recognition Program

In 2005, PWD and partners developed the Stormwater Best Management Practices Recognition Program to recognize developers, engineers, architects, and others that are designing and implementing innovative and environmentally-friendly stormwater BMPs in southeastern Pennsylvania. Projects, such as rain gardens, green roofs, infiltration swales, and treatment wetlands - stormwater management systems based on nature's best designs are recognized to provide inspiration for future similar projects in the region. The number of submissions has grown steadily every year. Approximately 80 submissions have been received to date.

A certificate is distributed to each awardee to recognize their good work. Each certificate recipient is also provided with an opportunity to present their awarded project at an event, such as the Urban Watersheds Revitalization Conference. The recognized projects are promoted in the PWD Water Wheel newsletter, distributed to over a half million residents and businesses in Philadelphia and on the website (http://www.stormwaterbmp.org).

During the Spring of 2011, a call for BMP projects was initated for the 2011 Stormwater BMP Recognition Program. Awards and projects that will be recognized will be announced this fall at the Philadelphia Low Impact Development Symposium being held on September 25-28, 2011.

Urban Watersheds Revitalization Conference

Since 2005, the PWD, along with its partners, has hosted a conference, titled the Urban Watersheds Revitalization Conference bi-annualy. The event gives PWD an opportunity to explore current watershed-related themes that are relevant to the City of Philadelphia and the suburban communities that drain to the City. The conference is held at different locations and it targets the urban and suburban (or mostly developed) communities in southeastern Pennsylvania. The audience is diverse – comprised of local planners, engineers, municipal representatives, community activists, among others. The event is offered at a nominal fee or it is free of charge. Over 200 attendees participated in the 2010 conference, which was held in Houston Hall at the University of Pennsylvania on October 15, 2010. The theme was *Green City, Clean Waters*.

Educational Publications

Kids Let's Learn About Water Activity Booklet

One of PWD's most successful community publications is the student activity book (grades 3 – 8) "Let's Learn About Water". This publication develops the concepts of definition of a watershed, impact of non-point source pollution, and personal responsibility for protecting our water supply. It is in great demand by schools, communities and government officials. This book was developed with the Partnership for the Delaware Estuary and was funded in part through DEP Coastal Zone Management funds. The curriculum has already been used in a number of middle schools to meet state required science-based credits. In 2005, the Activity Booklet was updated and made full color. The FWWIC was also highlighted in some of the activities to encourage students to visit with their families. The booklet has been reprinted several times including 20,000 in 2008. During FY 2011 the pages of the activity booklet were clicked on 9,649 times s on http://www.delawareestuary.org/pdf/ActivityBooklets/philly/pwd_activity_booklet.pdf for download.

Kids Schuylkill River Watersheds Maps
In FY 2007, a fold out map of the Schuylkill River Watersheds was created, printed, and inserted into the activity book whenever it is being used by students who live within that watershed. In addition to the Schuylkill Watershed Map, a map was created of the City of Philadelphia showing all of its sub watersheds and the schools located in those watersheds. This has also been a highly demanded piece by teachers. Both are still being distributed upon request.

Homeowner's Guide for Stormwater Management & Campus Guide to Stormwater Management
In 2004, PWD staff developed Philadelphia's first *Homeowner's Guide to Stormwater Management*. The document targets homeowners and residents that want to take an active role in helping to transform their properties and communities into healthier components of the watershed through environmentally-friendly stormwater management. The guide lays out specific steps and actions homeowners or community residents can take to improve stormwater management on their properties and in their communities.

In 2007, PWD developed a PowerPoint presentation titled "A Homeowners' Guide to Stormwater Management" to accompany the guide. This presentation was given on September 27, 2007 at the North Wales Borough Hall (Wissahickon Watershed).

Information from the Homeowner's Guide was later used to create a Campus Guide to Stormwater Management. Both of these guides provide comprehensive information for property owners to reduce the amount of stormwater runoff pollution entering local waterways from their properties. In FY 11 the Homeowners Guide was downloaded 1,649 times and the School Campus Guide 553 times.

Delaware Estuary Water Education Resource Guide
A directory for educators that lists materials and programs available through local non-profit organizations and governmental agencies on topics relating to water resources was updated and reprinted this year. Along with the 1500 copies that were printed and distributed, the directory is also searchable online at http://www.delawareestuary.org/pdf/ResourceGuides/2010_resource_guide.pdf. The goal of this directory is to provide teachers and other environmental educators with new ideas and resources for making environmental connections in the classroom. In FY 11 the Resource Guide was downloaded 940 times.

Green Guide for Property Management
The Philadelphia Water Department (PWD) in cooperation with the Partnership for the Delaware Estuary and AKFR, Inc. just released the Green Guide for Property

Management (http://www.phila.gov/water/Stormwater/pdfs/PWD_GreenGuide.pdf) a Green Business Program of PWD's Green City, Clean Waters initiative (http://www.phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan). The guide is intended for commercial property owners, providing them with ideas for reducing their stormwater fees through innovative green projects on their properties. Included in each PWD customer's monthly water bill is a charge for stormwater management services. Historically, this charge has been based on a property's water meter size, which measures the volume of drinking water being used by a property. Beginning July 1, 2010, the charges for non-residential and condominium properties will be based on a property's size and surface characteristics. More specifically, non-residential and condominium properties will be charged based on the total size of the property (known as "Gross Area") and the amount of land that doesn't allow water to soak into the ground. Land where rain and melting snow is unable to soak into the ground is referred to as "Impervious Area." Impervious Area includes rooftops, concrete, asphalt, or any other surface where rainwater becomes polluted, runs off into storm drains, and burdens the City's sewer system. This guide is designed to assist owners who may be eligible for credits to reduce their stormwater fee. The guide can be downloaded from: http://www.phila.gov/water/Stormwater/pdfs/PWD_GreenGuide.pdf. In addition to being downloaded 588 times online, 5,000 guides were printed for distribution in FY 2011.

Smart Boating, Clean Waters Program

PWD initiated an outreach, education, and notification program for marinas, personal watercraft users, and boaters, titled the Smart Boating, Clean Waters Program. This program is led by the Coastal Nonpoint Pollution Program (CNPP) Specialists in the region and it is funded by the Coastal Nonpoint Pollution Program (CNPP) grant awarded by PA DEP. Most of the marinas, yacht clubs, boat launch ramps and fishing locations targeted for the program in Philadelphia are located near CSO outfalls on the Delaware River.

Various educational projects have resulted from the Smart Boating, Clean Waters Program. Projects, such as a water-proof brochure titled "A Boater's Guide to Clean Waters," and user surveys and interviews with marina and yacht club operators help to advise them how to best adopt more environmentally friendly operation and maintenance practices.

Bilge Socks

In 2005, PWD staff worked with CNPP Specialists in the region to develop a bilge sock program, developing a logo to place on the bilge sock, creating an instructional tag to attach to the sock, and distributing the socks to marinas and boaters in the region. In 2006, the bilge socks were distributed to all marinas and yacht clubs in Philadelphia. In 2007, PWD partnered with the U.S. Coast Guard in order for the Coast Guard to distribute the socks. The bilge socks were also distributed at Frankford Arsenal during Safe Boating Day in June, 2007. In 2008, PWD partnered with the Penn's Landing

Corporation to also help distribute socks. The annual Safe Boating Day took place at Penn's Landing in June of 2011 where more bilge socks were distributed.

Monofilament Line Recovery & Recycling Program

In 2007, PWD worked with CNPP Specialists in the region to develop a Monofilament Line Recovery and Recycling Program for the southeast region of Pennsylvania. In 2008, Fairmount Park received recycling bins. They were distributed throughout the park in 5 popular fishing locations in the summer of 2008. Fairmount Park continued to collect the line in FY 2011.

Aquatic Invasive Species Watch Card and Posters

Aquatic Invasive Species (AIS) pose a major threat to maintaining biodiversity, particularly in Philadelphia's wetlands, streams, rivers and lakes. Pennsylvania's aquatic taxa are some of the most imperiled, with many native freshwater mussels, crayfish, and fish listed as Pennsylvania's Species of Greatest Need of Conservation. In recognition of the risk AIS pose to biodiversity, the Pennsylvania Fish and Boat Commission identified management of AIS as a priority topic.

The Philadelphia Water Department Aquatic Invasive Species program has four major tasks:

1) Prevent the spread of AIS by city employees through adopted HAACP protocols,
2) Train city employees to identify AIS and report observations to department heads,
3) Public education and outreach regarding AIS, and
4) Establish a chain of communication for the public to report observations of AIS to the appropriate agencies.

Part of the public outreach portion of this program includes an exhibit on the topic of AIS at the Fairmount Waterworks Interpretative Center, which is free to the public. The posters and complimentary educational literature was created in 2007 and the exhibit was displayed in the summer of 2008. The complimentary literature - watch cards - will be distributed to boaters and other frequent water-way users, as well as to those visiting the Water Works Interpretive Center. The watch cards are wallet-size and water-proof. The invasive species watch cards and posters that were originally designed by Sea Grant have been updated by PWD with new text and additional logos. The materials continued to be distributed in 2009-2011.

Delaware Estuary Watershed Workshop for Teachers

The 15th Annual Teacher Workshop was held July 11-15, 2011 in conjunction with the Partnership for the Delaware Estuary, Delaware National Estuarine Research Reserve and Brandywine Creek State Park. Thirteen teachers registered for the week-long workshop. Workshop activities included a boat trip along the St. Jones River, visiting water quality BMP projects, performing chemical, physical and biological analysis in fresh and estuarine waters, discovering wetlands, dissecting oysters, learning about local Climate Change impacts, and much more. The Philadelphia Water Department hosted the teachers on tours of the Fairmount Water Works Interpretive Center, to multiple BMPs / Green City, Clean Water project locations, and Southeast Water Pollution Control Plant. This segment of the teacher workshop provided the participants with crucial information on non-point source pollution and the local waterways as a source of their drinking water and the process undergone to return the water in an acceptable condition. For more information on the teachers' workshop visit: http://www.delawareestuary.org/acivities_teachers_watershed_workshop.asp.

Philadelphia Flower Show – PWD Exhibit

The theme for the flower show was "Springtime in Paris." In March 2011, the Philadelphia Water Department designed an exhibit titled "L'art de L'eau - the art of water." With the recent launch of the Green City, Clean Waters Plan, green infrastructure techniques were the main subject matter of the flower show exhibit. The display highlighted some water saving and purifying techniques that can be used by a Parisian flower shop. Some of these stormwater BMPs included downspout planters, sidewalk stormwater planters, and porous pavers. A brochure as well as educational signage were produced more information on these BMPs exhibited. Over 200,000 pass through the Philadelphia Flower Show.

Senior Citizen Environment Corps (SEC)

The Water Department continues to work with the Senior Citizen Corps to address stormwater pollution problems and water quality monitoring programs for the Monoshone Creek, a tributary to the Wissahickon Creek and to the Tookany Creek. The SEC performs biomonitoring, collects water samples, and conducts physical assessments of the stream. The Water Department assists SEC efforts through the provision of municipal services, education about stormwater runoff and the department's Defective Lateral Program, and mapping services such as GIS. The Corps has also partnered with PWD on its Saylor Grove Wetland Demonstration Project, assisting with public education and outreach, and providing tours to local students since the fall of 2006. The SEC, in partnership with Chestnut Hill College, also began water quality monitoring at the Saylor Grove Wetland in the summer of 2006. In FY2011, the SEC continue to provide efforts to PWD's water quality programs.

Water Quality Council (formerly Citizens Advisory Council, CAC)

In 2001, the Water Quality CAC was formed from a merger of the Stormwater and the Drinking Water Quality CACs. Over the past few years, source water protection had become more of a concern for drinking water quality. The Drinking Water CACs focus has been drawn naturally toward non-point source pollution, a focus traditionally undertaken by the Stormwater CAC. Finally, this merging of the two CACs complemented the PWD's, PADEP's and EPA's new approach to looking at and addressing water quality issues on a holistic basis. The Partnership for the Delaware Estuary facilitates what is now referred to as the Citizens Advisory Council meetings. New projects as well as updates for ongoing programs are presented to council members for feedback. Sometimes tours of the new projects are given as well. In FY 2011 the following topics were presented:

- Fairmount Water Works Interpretive Center Strategic Planning & Behind the Scenes Tour
- Green Sticker Prescription Drug Program
- Sustainable 19125 Green Block Program
- Green City, Clean Waters Neighborhood Projects

The committee consists of representatives from the following groups:

- Arcadia University
- Associacion Puertorriquenos en Marcha (APM)
- Awbury/Cliveden
- Bucks Co. Water & Sewer Auth.
- Center in the Park
- Cheltenham Township
- Clean Water Action
- Cobb's Creek Block Captain
- Cobbs Creek Community Enviro. Ed Ctr.
- Community Legal Services of Philadelphia
- Conservation Voters of Pennsylvania
- Cranaleith
- Delaware River Basin Commission
- Delaware Valley Green Building Council
- Delaware Valley Regional Planning Commission
- Drexel University
- East Fall Tree Tenders
- Fairmount CDC
- Fairmount Park Commission
- Fairmount Park Wissahickon Env. Center
- Friend's Center
- Friends of High School Park
- Friends of Historic Rittenhouse Town
- Friends of Poquessing Creek Watershed
- Friends of Tacony Creek Park
- Haddington Achievability
- Lower Moyamensing C. A.
- Lutheran Theological Seminary at Philadelphia
- MANNA
- Mishkan Shalom
- Monumental Baptist Church
- Neighborhood Interfaith Movement
- New Kensington CDC
- Northern Liberties Neighbors Association
- Nueva Esperanza CDC
- Overbrook Environmental Education Center
- PA DEP
- PA Immigration and Citizenship Coalition
- Partnership for the Delaware Estuary
- Passyunk Square/Columbus Square
- Penn PIRG
- PennFuture
- Pennsylvania Horticultural Society
- Pennypack Ecological Restoration Trust
- Pennypack Environmental Center
- Philadelphia Arab Amer. CDC/Al-Aqsa Islamic Soc.
- Philadelphia Corporation for Aging
- Philadelphia Department of Public Health
- School District of Philadelphia
- Schuylkill Navy
- Schuylkill River Development Corporation

- Southhampton Watershed Assoc.
- Tookany/Tacony - Frankford Watershed Partnership
- Transition Towns Cheltenham
- U.S. EPA Region 3
- Water Res. Assn.of DRB
- Weavers Way
- Wissahickon Charter School

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.

The mission of the Center is to: "educate citizens to understand their community and environment, especially the urban watershed, know how to guide the community and environment in the future, and understand the connections between daily life and the natural environment."

Teachers and students are invited on an adventure to explore Water in Our World at the Fairmount Water Works Interpretive Center. Students travel through time as they learn about the role of water in Philadelphia's past, present and future.

Innovative exhibits and interactive educational programs meld the history, technology and science of providing water to a regional urban watershed. Short descriptions of the FWWIC programs follow.

<u>Education Programs</u>
Water in Our World
This general orientation to the Interpretive Center provides the perfect overview for the teacher focusing on a variety of water issues, past, present and future. Students are introduced to a variety of concepts and vocabulary using activity booklets in exhibits on the natural water cycle, watersheds, the water use cycle, land use and pollution. They also learn about their individual relationship to local, regional and global water quality issues on Planet Earth.

Land and Water: A Delicate Balance
Every day, people make choices about how they will use the land around them - often without considering how their use of land may affect the water they drink. Students come to understand the delicate relationship of land use to water quality through a matching card activity using the exhibits in the Interpretive Center. Students will also study a variety of maps to understand the development of land over time, and then plan fictional communities of their own in a way that would protect water quality.

From Street to Stream: Slow the Flow
Students focus on stormwater runoff (one of the greatest sources of water pollution today), watersheds, and the different kinds of land pollution that affect our water quality - past and present. Students explore, on foot, the Water Works site and surroundings as a way to better understand the concepts of point- and non-point-source pollution. The lesson will also give students a look into the Philadelphia Water Department's demonstrations of best management practices for existing and future land development.

Seeing is Believing
The FWWIC's newest permanent installation is "See Is Believing." Grants from the Claneil Foundation, Connelly Foundation, Duffield Associates and individual donors underwrote the cost of laboratory equipment and internet connections to link students and visitors at the Interpretive Center's lab to Water Department scientists for real-time experiments and programs.

Fairmount Fish Ladder
The fish ladder at the Fairmount Dam, reconstructed by the Army Corps of Engineers, will officially open in the spring, to the delight of migrating species. A new outdoor classroom will allow visitors closer views of the shad and other migratory fish as they make their way upstream. For more information on the Fairmount Fish Ladder please refer to **SECTION III.C.2.5 FISH PASSAGE PROJECTS** on page 146**.**

Web-based Programs
A partnership with Global Education Motivators (GEM) and Internet for Educational Institutions (MAGPI) enable the FWWIC to offer lessons and programs in real time through video-conferencing technology. The FWWIC has connected with schools in Pennsylvania, Kentucky, New York, Paraguay and Mexico and the United Nation's office in Rome. In addition, the FWWIC has a two-year relationship with Community College of Philadelphia, hosting a two-day educational program as part of an environmental conservation class.

Weekends
Quiet moments are rare at the Interpretive Center. On weekends visitors enjoy Saturday family programs and the Sunday film series. The Schuylkill Soundings programs for adults bring authors, scientists, artists and the occasional musical group to the Interpretive Center. The Urban Shad Watch in March is a sure sign spring has come. Also in March, the FWWIC celebrates World Water Day.

Partnerships
The FWWIC partners with regional, national and international organizations to present innovative programs. Among them are the Pennsylvania Horticultural Society, Partnership for the Delaware Estuary, The United Nations Association of Greater Philadelphia, Oliver Evans Society of Industrial Archaeology, Schuylkill River Greenway Association, Society of American Military Engineers, American Institute of Landscape Architects, Society for Environmental Graphic Designers, East Coast

Greenway Association, Garden Workers of America, Institute for Collaborative Education, Schuylkill River National and State Heritage Area, Delaware River Basin Commission, The Philadelphia Water Department's Office of Watersheds, the Fairmount Park Council for Historic Sites, the Department of Environmental Protection and the Environmental Protection Agency.

Schuylkill Soundings

In 2006, the FWWIC began its Schuylkill Soundings program – a series of informative presentations on environmental projects, issues and challenges in the region.

Table II.G.4-1 FY2011 Schedule of Schuylkill Soundings Presentations at the Fairmount Water Works

Presenter	Date	Topic
Joan Blaustein and Tom Witmer, PPR	July 15, 2010	Models of the Ecological Restoration in Philadelphia
Adam Levine	August 18, 2010	From Creek to Sewer:The Transformation of Philadelphia's Topography, 1682-2010
Erik Haniman and Lance Butler	October 20, 2010	Rebuilding our Cobbs and Tacony Creeks – an Ecological and Community Vision for the Future
Rachel Vassar, PennFutures	November 17, 2010	Revitalizing Philadelphia's Riverfronts
Kelly Anderson and Paula Conolly	December 15, 2010	Marcellus Shale and Gas Drilling in Pennsylvania from a Delaware Perspective
Sarah Wu, Mayor's Office of Sustainability	February 16, 2011	Greenworks Philadelphia: Sustaining Growth

Table II.G.4-2 2010-2011 Fairmount Water Works Interpretive Center Visitors

2010-2011 Fiscal Year Fairmount Water Works Interpretative Center Visitors	
School Groups	174 classes, totaling 7,732 students
Special Exhibits	(5 Events) 10,894
Special Events	2,764
Visiting Authors, Lecturers, Environmental Leaders	(12 events) 553
Community Programs	4,686
General Visitors	23,337
Calendar Year 2010 Total Visitors	**38,073**

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

As discussed in **SECTION II.G.1** of this report, PWD has developed and will continue to develop a series of informational brochures and other materials about its CSO discharges and the potential affects of these discharges on the receiving waters. The brochures provide phone contacts for additional information. The opportunity to recruit citizen volunteers to check or adopt CSO outfalls in their watersheds (i.e., notifying the PWD of dry weather overflows, etc.) will be explored through the watershed partnership framework. Brochures and other educational materials discuss the detrimental effects of these overflows and request that the public report these incidences to the department. In addition, PWD has enlisted watershed organizations to assist in this endeavor. PWD will continue this focus to raise the level of citizen awareness about the function of combined and stormwater outfalls through a variety of educational mediums. The watershed partnerships will also continue to be used for this type of education.

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.

The program consists of backgrounders, billstuffers, and waterwheels distributed to partners and the public. PWD's phillywatersheds.org acts as a hub for all OOW and partnership websites to inform the public about projects in the City's watersheds. The website also features CSOcast, a system that notifies the public of any overflows that occur in any of the City's 164 outfalls. RiverCast is another web-based system that forcasts the water quality of the Schuylkill River.

Please refer to **SECTION II.G.3 – "CONTINUE TO PROVIDE ANNUAL INFORMATION TO CITY RESIDENTS ABOUT PROGRAMS VIA TRADITIONAL PWD PUBLICATIONS"** on page 67 for additional information on PWD's public notification.

Please refer to **SECTION III.C.3.5 "INTERPRETIVE SIGNAGE"** on page 152 for information on the pilot CSO signage project.

Please refer to **SECTION II.G.2 "CONTINUE TO MAINTAIN WATERSHED MANAGEMENT AND SOURCE WATER PROTECTION PARTNERSHIP WEBSITES"** on page 59 for information on the web and telephone based Early Warning System for water suppliers and industrial users and OOW website development.

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

The Philadelphia Water Department developed a unique, web-based water quality forecasting system for the Schuylkill River called RiverCast (www.phillyrivercast.org). Based on real-time turbidity, flow, and rainfall data, it provides up-to-the-hour public service information on the estimated current fecal coliform concentrations in the river and the acceptable types of recreation based on those conditions. The system is designed to maximize accuracy while avoiding recommendations that suggest water quality is better than it is likely to be (avoidance of false positives). The Philly RiverCast is a forecast of water quality that predicts potential levels of pathogens in the Schuylkill River between Flat Rock Dam and Fairmount Dam (i.e., between Manayunk and Boathouse Row).

In order to expand RiverCast, the PWD has developed another internet-based notification system called CSOcast, 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 up to a period of 24 hours following a rainfall event, it is unsafe to recreate in the water body due to possible pollutant contamination.

Instead of using water quality parameters to forecast conditions, CSOcast relies on a network of flow sensors throughout the city to notify the public when overflows are occurring. This public notification system is based on PWD analysis of monitoring network data which is used to determine the likelihood of combined sewer overflows. The PWD has maintained an extensive permanent monitoring network since 1995 including level sensors which record data throughout the combined sewer system. PWD currently operates and maintains monitoring equipment at, or near, the 164 combined sewer outfalls throughout the city. The data used to identify overflows is collected from PWD's extensive sewer monitoring and rain gage network. Data is processed in real time using common database software and Philadelphia's watershed and wastewater conveyance model, which was developed through U.S. EPA's Storm Water Management Model (SWMM). SWMM model output is used to validate flow monitoring data, ensuring a second level of accuracy. The data on the website is updated daily.

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.

During the past fiscal year, CSOcast reported on all 24 rain gages and 147 monitors twice a day. The system failed to report in January 2011 when it was down for maintenance. The Philadelphia Combined Sewer Overflow Public Notification System is a pilot program. The 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.

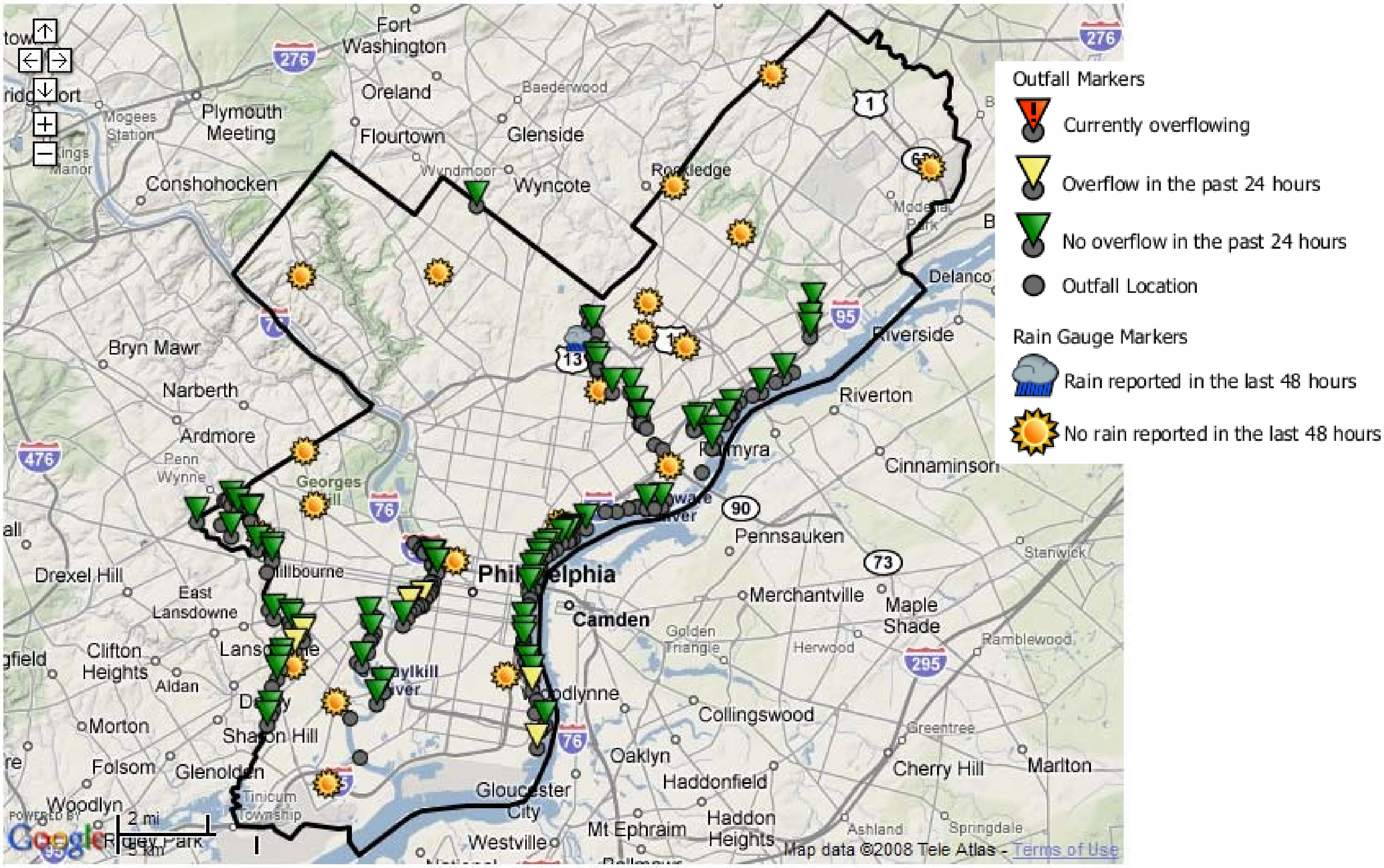


Figure II.H-1 Screen Capture of the CSOcast Website

The Green icon represents an outfall that has not overflowed in the last 24 hours. The Yellow icon represents an outfall that has overflowed in the last 24 hours but is not necessarily currently overflowing. The Red icon represents an outfall that is currently overflowing. The Gray icon represents an outfall where data is not currently available – for these sites, outfalls in close proximity can be referenced for an approximation of overflow status.

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 Status Report, combined with the Stormwater Annual Status 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

PWD has completed the Philadelphia Combined Sewer Overflow (CSO) Long Term Control Plan Update (LTCPU) as of September 1st, 2009. The CSO LTCPU details PWD's plan to increase capture and reduce CSOs through a variety of infrastructure. The evaluation of alternative control measures was consistent with the guidance provided in Chapter 3 of the Combined Sewer Overflows: Guidance for Long-Term Control Plan, Office of Water EPA 832-B-95-002, September, 1995 ("Guidance for LTCP"). Additionally, the plan addressed the following components:

a) PWD conducted flow monitoring and assessed the performance of the CSO control alternatives and the efficacy of implemented controls with a hydrologic and hydraulic model of the collection system.

b) Evaluated the technical applicability and feasibility of the full range of alternatives. Alternatives included projects that:

i. Link the City's development and land management practices to achieve CSO reductions through the application of innovative storm water management regulations and low impact development and re-development practices.

ii. Directly restore aquatic ecosystems through stream rehabilitation and wetland construction.

iii. Expand its collection and treatment systems to increase the capture and treatment of combined sewage and ensure adequate transport capacity for dry and wet weather flows.

c.) Assessed the watershed wide reductions in pollutant loads achieved by the CSO controls and other controls as developed in the watershed management plans.

d.) Evaluated the Project Costs for each alternative or mix of alternatives.

e.) Analyzed the benefits of the additional treatment applied to wet-weather flow through its secondary treatment processes and assessed the performance of the CSO controls.

f.) The watershed partnerships were utilized for evaluation and prioritization of management alternatives including additional CSO controls.

g.) Characterization of each individual watershed's physical, chemical, and biological components.

h.) Assessment of the financial capability to establish the burden of compliance on both ratepayers and the permittee.

i.) Schedule of implementation of the selected CSO control alternative.

The full Philadelphia Combined Sewer Overflow Long Term Control Plan Update report can be found at the following address: http://www.phillywatersheds.org/ltcpu.

Between July 1, 2010 and June 30, 2011, PWD responded to written questions and met with PADEP staff to amend the terms of the LTCPU as submitted on September 1, 2009. These negotiations resulted in an amended Consent Order & Agreement signed by PWD and PADEP on June 1, 2011. The Green City, Clean Waters Program has been amended as follows:

- Program commitment: $1.2B net present value (represents $2.4B capital construction plus operating and maintenance costs, in terms of actual future expenditures) for addressing water quality goals as set both by the Pennsylvania and the National CSO Control Policies. These projects will be implemented over a 25-year period, with metrics and milestones developed to measure progress along the way.

- The stream restoration program included in the original LTCPU has been removed from the Program's CSO compliance goals. However, the City intends to continue its stream restoration and wetland creation efforts and is committed to spending $125M net present value ($260M future expenditures) toward achieving the goal of restoring the biological resources of the City's streams.

- The City's plan is based on a Presumption Approach, as described in the National CSO Policy, to approach the water quality requirements of the Clean Water Act (CWA) and the Pennsylvania Clean Streams Law as follows: The City will construct and place into operation the controls described as the selected alternative in the amended LTCPU to achieve the elimination of the mass of the pollutants that otherwise would 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.

Please refer to **APPENDIX C – COA ANNUAL REPORT** for a summary of annual report supplements to be provided each year as a result of the amended Consent Order & Agreement.

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 implement CSO capital improvement projects that were planned during the previous permit cycle and plan to develop, propose, and implement additional capital projects to continue to increase the capture and treatment of combined sewage.

III.B.1 On-going Capital Improvement Projects

III.B.1.1 Completion and Operation of the Real-time Control Center

Please refer to **SECTION II.B.4 - FULLY INTEGRATE THE REAL-TIME CONTROL FACILITY INTO THE OPERATIONS OF PWD** on page 28 in the CSO portion of the Annual Report for information pertaining to this topic.

III.B.1.2 Rehabilitate and Maintain the 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 20 in the CSO portion of the Annual Report for information pertaining to this topic.

III.B.1.3 WPCP Wet Weather Treatment Maximization (NE)

The plant stress-testing project established:

- Maximum and average flows that should be treated in various unit processes for current and future operations;
- Ranges of hydraulic, solids, and BOD_5 loads that could be applied to the various unit processes and yet obtain maximum removal efficiencies in each unit process;
- Changes in plant processes and operations (such as increased loads, MLSS levels, changes in sludge wasting, return activated sludge ratios, detention times, etc.) that would increase removal efficiencies; and
- Magnitudes of excess capacity, if any, in each unit operation of the plant (increased flow through plant process units) that could be achieved and still meet the discharge permit requirements for each plant.

The results of stress testing allow for a determination of existing and future optimum flows, loads, and operations of the various unit processes. The identification of choke points, deficiencies and unit process capacities are provided in the stress testing summary report that has been developed for each WPCP. Specific WPCP capital improvement projects (CIP) have been identified as potential projects resulting from the findings of the stress testing which were provided as part of the summary reports. The actual need for additional CIPs, and the resulting prioritization of the CIPs and the budgeting, appropriation of monies, scheduling and actual implementation of the CIPs was accomplished within the context of the overall watershed approach to CSO abatement defined in the LTCP.

CH2MHill submitted the final reports for each of the three WPCPs on May 1, 2001. The reports provided the following information: project objectives and methodology, current performance, maximum instantaneous flow, current sustainable treatment capacity, and potential upgrades. The report also included hydraulic and treatment throughput capacities for each plant process, capacity limiting factors, and the potential operating modifications or capital projects whose purpose would be to increase plant throughput.

Recommended modifications or upgrades were prioritized and categorized into those potential projects that could be considered for either immediate implementation, resulting in enhanced treatment, or capital improvement projects that could also increase treatment capability but would require PWD expenditures. The various CIPs were also categorized by four treatment objectives including: process improvements, peak primary treatment capacity, peak secondary treatment capacity, and wet weather treatment capacity. This second categorization provided anticipated combined CIP costs for each of the treatment objectives as well as the peak treatment capacities.

Table III.B-1 Potential Upgrade Options at the NE Plant identified in the Stress Test

Option Number	Description	Priority Classification	Estimated Conceptual Cost
1	Improve mixing in mixed liquor channel to secondary clarifiers 9 through 16	A	$472,000
2	Polymer addition on Set 1 secondary clarifiers to maintain effluent quality	B	$22,000
3	Separate flow measurement of secondary effluent from sets 1 and 2	C	currently undetermined
4	Automation of step feed operation for aeration tanks	A/B	$161,000
5	Modify Set 2 secondary effluent channels to reduce hydraulic restrictions under high flow conditions	B/D	$223,000
6	Modify the existing RAS system in the secondary clarifiers	C	$2,183,000
7	Provide a second conduit to the Set 2 primary clarifiers to convey additional flow to Set 2 Primary tanks	D	$3,312,000
8	Reduce losses and increase capacity between the grit tanks and Set 1 clarifiers by installing another conduit and venturi meter	D	$707,000
9	Provide a bypass from the primary effluent channels to the chlorine contact chamber	D	$8,291,000
10	Provide separate primary sludge thickening	D	$12,254,000
11	Reuse abandoned ABCD tanks in wet weather treatment facility	C	$5.0 - 10.0 million
12	Increase raw sewage pumping and screening by:	D	-
12a	50 mgd	D	$10.0 - 20.0 million
12b	150 mgd	-	$20.0 - 24.0 million
12c	300 mgd	-	$36.0 - 40.0 million

III.B.1.3.1 Evaluate Stress Test Report options in the LTCPU

The LTCPU submission on September 1, 2009 included a forward-looking framework for the evaluation and selection of cost-effective wet-weather treatment technologies at the three existing WPCPs to support the development of a long-term wet-weather treatment strategy. LTCPU Supplemental Documentation Volumes 9 through 11, available at: http://www.phillywatersheds.org , document evaluation of a range of wet-weather treatment options for each facility and provide an overall treatment strategy sufficient to support the PWD CSO LTCP Update process. The LTCPU examined treatment technologies that can be reasonably applied on the existing plant footprint and within reasonably obtainable land adjacent to the WPCPs. The LTCPU provided baseline information that can be used for the future development of a long-term wet-weather treatment facility plan for the Northeast, Southeast, and Southwest WPCPs.

The objectives of the planning-level study included in the LTCPU were to:

1. Document existing conditions at the plants utilizing information in the existing stress test reports (dated 2001) and the NE Plant Expansion Study (March 2007) and noting capital and operational changes made to these facilitates subsequent to these reports.

2. Identify and review the range of technologies applicable to the treatment of wet-weather flows, up to the maximum limits imposed by available land.

3. Perform a preliminary screening and recommend technologies for further evaluation across a full range of criteria.

4. Short-list treatment options to carry forward for further evaluation.

5. Conduct site visits, as appropriate, for technologies selected.

6. Select preferred technologies and develop concept-level sizing and performance criteria along a range of incrementally higher flows.

7. Prepare conceptual-level design, capital, and operating cost estimates.

8. Integrate the wet-weather treatment plan into the overall LTCPU approach and plan.

Wet weather treatment capacity expansion at each of the Water Pollution Control Plants was incorporated into several alternatives (combinations of control technologies including source control, treatment, transmission, and storage) in the CSO Long Term Control Plan Update (LTCPU). Several wet weather treatment technologies were evaluated: 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 Water Pollution Control Plants in more detail and LTCPU Supplemental

Documentation Volumes 9 through 11 are the individual full reports. Each document can be found at: http://www.phillywatersheds.org/ltcpu

III.B.1.3.2 Implement Options 1, 2, and 4 from the Stress Test Report

Options 1, 2, and 4 from the Stress Test Report have been implemented.

Option 2 - Polymer addition on Set 1 secondary clarifiers to maintain effluent quality was completed in 2000 and has been in operation since that time.

Option 1 (Improve mixing in mixed liquor channel to secondary clarifiers 9 through 16) and Option 4 (Improve step feed modes during wet weather events by converting the manual gate operators to motor driven operators) work was done under PWD Work #71033 – General construction for aeration system rehabilitation at Northeast Water Pollution Control Plant and #71034 - Electrical work for aeration system rehabilitation at Northeast Water Pollution Control Plant. The purpose of this project was to renew the secondary treatment system which includes new air grid system and diffusers and selector technology. Course bubble diffusers were installed in both Final Sedimentation Tank - Set 2 mixed liquor channels. New motor gate operators were installed on the "A" and "C" bay inlet gates on the west side of the aeration tanks. The Mechanical work was done by C&T Associates, Inc. for a total cost of $9,483,859.31. The electrical work was done by Philips Bros. Elec. Contrs., Inc. for a total cost of $800,439.90. The Notice to Proceed for this project was issued in February 2003 and the construction was complete by January 2006.

III.B.1.3.3 Plan, Design, and Construct Options 2 & 6 of the Stress Test Report to Increase the Secondary Plant Capacity to 435 MGD

The Northeast WPCP Stress Test report, completed in 2000, included as upgrade option #5 the modification of Set 2 secondary effluent channels to reduce hydraulic restrictions under high flow conditions. This was to be accomplished through the modification or elimination of the "double decker" effluent channel in order to reduce head loss. After conducting an in-depth hydraulic analysis, including computation flow dynamic (CFD) modeling, the observed head loss was determined to be attributable instead to the bulkhead and the nonsymmetrical conduit base elevations. These restrictions will be removed through the rerouting of the return activated sludge (RAS) piping and the construction of a new effluent conduit. A contract has been awarded and this project (#71068) is currently in a Notice to Proceed status. The estimated date for the completion of this work is February 2012.

Identified as upgrade option #7 in the 2000 Northeast WPCP Stress Test, the purpose of this project (#71069) is to increase the hydraulic throughput capacity of the Set 2 primary clarifiers by constructing four 48" diameter conduits between junction chamber C and the Set 2 primary influent channel. This will introduce flow to the clarifiers in a more uniform fashion. A contract has been awarded and this project is currently in a Notice to Proceed status. Electrical work has been initiated and the pipe has been ordered (note: a long fabrication and delivery period is expected). The estimated date for the completion of this work is October 2011.

III.B.1.3.4 Explore increasing the preliminary treatment, primary treatment, and final effluent disinfection treatment capacities in excess of the existing secondary treatment capacity at the WPCP

In order to increase primary treatment and final effluent disinfection treatment capacities, PWD will first increase the flow into the plant by rehabilitating an existing gravity main in the Frankford high-level sewer. The main rehab design is completed and has been sent to PWD Projects Control Unit (#71079). The public bid process for this project is expected to open in mid-to-late September 2011.

A preliminary design was completed for the construction of a second pretreatment facility and a diversion chamber from the Frankford high-level sewer to increase preliminary treatment. This project entered into the Final Design phase as of June 2011. PWD anticipates completion of a 90% design and submittal of bid-ready documents in December 2012. Due to land area constraints, additional land may need to be acquired for this facility. At this time, the exact layout of the proposed pretreatment facility is undecided; as the design progresses through the 30% and 60% design milestones, the layout will be confirmed and the need for acquisition of additional off-site land and/or relocation of on-site infrastructure will be identified. After land acquisition and/or relocation of infrastructure (as necessary) and completion of the 90% design, construction is anticipated to be completed within one and a half years.

Following pretreatment, the increased flow into the plant will enter the Set 2 primary clarifiers and then flow through a bypass to the chlorine contact chamber. Disinfection will be achieved in the bypass itself and in the chlorine contact chamber at the effluent of the plant. The bypass conduit is discussed in greater detail in **SECTION III.B.1.3.5 – INITIATE THE FACILITY PLANNING AND DESIGN FOR THE BY-PASS CONDUIT** on page 90.

PWD is planning for a new pretreatment facility and increasing overall plant capacity as part of PWD's LTCPU. PWD is evaluating three design and construction alternatives with the design consultant prior to completion of the conceptual design. More details shall follow in the NE facility concept plan which will include details on specific engineering and construction proposed to increase the maximum wet weather flow rate, capture rate of combined sewage, design and construction performance standards. This plan is not expected to be completed until June of 2013 as noted as a deliverable in the COA.

III.B.1.3.5 Initiate the Facility Planning and Design for the By-pass Conduit

Identified as Option 12 in the 2000 NE WPCP Stress Test report, this upgrade will include the construction of bypass conduits connecting the Set 1 primary effluent channels directly to the chlorine contact chamber. This upgrade will enable the bypass of secondary treatment during high flow events while ensuring solids removal and disinfection. On April 1, 2009 the PA DEP issued a letter accepting the concept of the bypass of secondary treatment for 100 MGD of additional wet weather flow. The Department acknowledges that a Water Quality Management (WQM) permit amendment must follow before construction of the bypass conduit.

CFD modeling was completed to show the hydraulic feasibility of a bypass conduit from the Set 1 primary effluent conduit to the chlorine contact chamber and to evaluate the effectiveness of chlorine mixing within the bypass. As a result of the modeling, it was determined that the bypass was hydraulically feasible and that adequate disinfection of the primary effluent was achieved during typical bypass flow.

A bench-scale disinfection study was also conducted to identify the chlorine reaction kinetics and estimate the required chlorine dosage for the bypass conduit to reduce total coliform below effluent permit levels. The study identified a chlorine dosage of 2.5-3.0 milligrams per liter of a 3% sodium hypochlorite solution for wet weather (i.e. bypass) flows. Based on study results, the bypass effluent is expected to have a lower fecal count than the secondary effluent before the two flow streams mix immediately upstream of the contact tank. As a result, the bypass disinfection will cause an effective reduction in the plant's effluent fecal coliform count.

The 100% design of the bypass, which incorporates the results of the CFD modeling and chlorine study and includes the design of the conduits, chemical feed system, and flow control systems was completed in August 2011 and is currently being reviewed by the City. The construction completion date for the bypass is tentatively scheduled for March 2014.

III.B.1.3.6 Report to the DEP the Status of these Projects in the Annual Status Reports when Major Work Elements are Completed

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

III.B.1.4 85% Capture (NE) - 85% Flow Capture Technical Report

The technical memo documenting 85% capture in the Pennypack was completed in August 2008 and submitted to the DEP on August 15, 2008. This technical memo documents the completed alterations to the CSO system and models the estimated capture using high, median, and low flow estimates. Based on the modeling results, the percent capture from the Pennypack CSOs is between 70% and 92% capture using the high and low modeling estimates. The median estimate shows approximately an 85% CSO capture in the Pennypack.

III.B.1.5 In-Line System Storage Projects (NE)

III.B.1.5.1 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. Currently, 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 to use as much of this storage as possible, a control structure is needed in the sewer. Installation of a crest gate is proposed in order to retain flow within the sewer. This gate will reduce 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 still 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.

This project will reduce the discharge of combined sewage into Tacony Creek, one of the more-sensitive water bodies exposed to CSO discharges in the City of Philadelphia. The gate installation at T-14, combined with the Rock Run project, will result in a reduction of roughly 600MG of CSO discharges annually. This represents a 12% reduction in the average annual volume of CSO and a significant reduction in the pollutant discharge (bacteria and organic matter from untreated wastes, litter and other solid materials in both wastewater and stormwater runoff, etc.) at this location near an area where golfing and other recreational activities frequently occur. Since this project modifies an existing structure rather than constructing a new one, it provides very cost-effective control.

The engineering firm of O'Brien & Gere completed the bid documents for this project in December of 2007. This project was bid in August 2008 with a notice to proceed issued March 31, 2009. JPC Group Inc. won the contract with a bid of $3,965,000. In FY2010, the new operations' building was completed. The crest and sluice gates have been installed. The new HPU and PLC units have been installed and tested. All training on the HPU's and PLC has been completed. On July 5, 2011 the system was placed into its 120 day acceptance test. The project is scheduled to be on-line and in service functioning in manual control by November 2011.

III.B.1.5.2 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). Currently, CSOs discharge into the Tacony Creek at the Rock Run Relief Sewer outfall – an 11′ by 14′ sewer - during periods of moderate or greater rainfall. Installation of an inflatable dam in the Rock Run

Relief Sewer allows for utilization of in-system storage to retain combined flows during a majority of these 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 provides an additional margin of protection against dry weather overflows while maintaining flood protection for upstream areas.

This project will reduce the discharge of combined sewage into Tacony Creek, one of the more-sensitive water bodies exposed to CSO discharges in the City of Philadelphia This project will cause a significant reduction in the pollutant discharge (bacteria and organic matter from untreated wastes, litter and other solid materials in both wastewater and stormwater runoff, etc.) at this location near an area where golfing and other recreational activities frequently occur. Since this project modifies an existing structure rather than constructing a new one, it provides very cost-effective control.

A design memorandum was completed that documents the expected environmental benefits of the Rock Run Relief Project, quantifies the flooding risks associated with the project, and documents the recommended control logic for the inflatable dam's operation and drain-down control. In support of this memorandum, 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 affects of the project at other CSO regulators on the Tacony Creek. Hatch Mott MacDonald was the design engineer on this project.

On June 13, 2006, the project construction bid was awarded to AP Construction in the amount of $3,665,000. Electrical problems with the HPU caused delays but the system was placed into service on 8/11/10. The 120- day test period has been completed and the system has been accepted by Operations. Flow Control is slowly incrementing the level controls to observe the operation of the automatic equipment under actual storm conditions. It is anticipated that the system will be fully operational by December 2011..

Due to unsafe conditions observed at Main Relief, PWD's other Inflatable Dam storage project (**SECTION II.B.5.1 – MAIN RELIEF** on page 29), the inflatable dam controls were set to the limp mode which keeps the bag inflated to 15ft which is roughly 50% of the sewer diameter. Given these current operating conditions, it is estimated that the average annual reduction in CSO volume of 95 MG is achieved at the Rock Run Relief Sewer outfall through use of the available in-system storage volume. PWD is currently evaluating modifications the upstream diversion structure to convey additional flows to this storage facility so additional storage can be reached. This work is currently in the design phase.

III.B.1.6 Real Time Control (RTC) and Flow Optimization for the Southeast Drainage (SE)

Since no project with this name exists, this may actually be referring content contained within **SECTION III.B.1.8: REAL TIME CONTROL (RTC) AND FLOW**

OPTIMIZATION FOR THE SOUTHWEST DRAINAGE (SW) which will be discussed on page 94 of this report.

III.B.1.7 WPCP Wet Weather Treatment Maximization (SW)

III.B.1.7.1 Implementation of the Southwest Plant Stress Test Report Option 1

The SW Stress Test identified 7 potential upgrade options at the Southwest WPCP.

Table III.B-2 Potential upgrade options at the SW Plant identified in the Stress Test

Option Number	Description	Priority Classification	Estimated Conceptual Cost
1	Replace caulking on secondary clarifier launders to improve flow distribution	A	$1,640,000
2	Provide preliminary treatment for the BRC centrate that is recycled in the plant	B/C	$8,585,000
3	Modify existing RAS system in the secondary clarifiers	C	$4,256,000
4	Provide primary effluent bypass to secondary clarifiers	D	$902,000
5	Provide separate facilities for primary sludge thickening	D	$9,892,000
6	Resolve hydraulic limitations between primary clarifiers and aeration basin	D	$5,429,000
7	Provide and additional effluent pump at the effluent pumping station	D	$806,000

The purpose of this project was to implement Option 1 - to inspect and repair leaking weirs and concrete surfaces in the final sedimentation tanks at the Southwest Plant. The leaking through the weirs was causing short circuiting through the tanks and thus adversely impacting solids settling. This work was done under PWD Work #73018 – SW Concrete Repairs in Final Sedimentation Tanks. The contractor for the construction was Ross Araco Corp. The Notice to Proceed was issued in August of 2000 and the project was completed by April 2002. The total cost of the project was $1,640,980.

III.B.1.7.2 Analyze wet weather treatment capacity expansion as part of LTCPU

Please refer to **SECTION III.B.1.3.1 "EVALUATE STRESS TEST REPORT OPTIONS IN THE LTCPU"** on page 87 in the CSO portion of the Annual Report for information on how wet weather treatment capacity expansion was analyzed as part of the LTCPU.

III.B.1.8 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 interrelated 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. Each of the high-level interceptor systems that discharge to the SWWPCP can influence the hydraulic capacity and treatment rate of the other high-level interceptor systems, as they compete for capacity in the Southwest Main Gravity (SWMG) into the plant. Therefore, several integrated projects were proposed to establish a protocol for prioritizing flow from each interceptor system. The RTC system will control the Triple Barrel reach of the SWMG and will control the diversion from the SWMG to the Lower Schuylkill West Side Interceptor (LSWS), thereby enabling use of the full capacities of these interconnected conduits during wet-weather.

The SWDD RTC conceptual design memorandum outlines recommendations for the modifications to the SWDD collection system in three phases. Phase I includes enlarging the DWO pipe and raising the diversion dam at the C17 regulator, modifying the operation of CSPS based on the level in the CCLL interceptor, and regulating inflows from S27 to the SWMG using a DWO sluice gate under RTC. In addition, installation of a side-overflow weir at the West Barrel at the 70th & Dicks Triple Barrel and opening the East and Center Barrels for dry weather flow is encompassed in Phase I of the RTC project. Phase II concentrates on decreasing overflows in the LSWS by enlarging the S45 DWO pipe and regulating inflows using a gate. The strategy for Phase II also incorporates closing DWO shutter gates at S43 and S47. The 3rd phase of the RTC conceptual design is enlargement of the S38 DWO pipe and regulation of flows using a computer-controlled DWO gate.

C17

The contract award for this project was $1.7 million. On 8/19/05, the gate on the 66 inch reinforced concrete DWO pipe was installed and functioning to specification. On 1/9/06, the old dam and 20 inch DWO pipe upstream of the new gate & dam were sealed and removed from service. The project was closed out on September 3, 2006.

Operation changes to the Central Schuylkill Pump Station (CSPS) will be evaluated after construction is complete on the 70th and Dicks Triple Barrel.

70th and Dicks Triple Barrel (Projects # 75021 & 75022)

The design for the rehabilitation of the DWO sluice gate chamber was completed with the aid of the consulting engineering firm of Gannett Fleming and was bid through Projects Control in April of 2006. The bid was awarded to JPC Group in the amount of $1,729,530. A construction notice to proceed was issued in November 2006. Three existing sluice gates have now been replaced with three new sluice gates. Under this contract, each gate has been equipped with a new electric actuator and is motorized.

The gates are to be controlled from the RTC at Flow Control. There is also an electrical control box on site so that the gates can be controlled locally from street level at 70th and Dicks. The control box has been installed on the side lawn of 2700 South 70th St. There are also several other small items that were completed under this contract (i.e. new sump pumps to pump water out of the control chamber where the actuators are located, new seals and hatches to prevent sewer water from penetrating control chamber). The project was substantially completed on November 17th, 2008. Project #75021 was closed out on March 30, 2010 and Project #75022 was closed out on April 12, 2010.

S45 (Project #40433)
The S45 chamber at 67th Street regulates the flow of combined sewage into the LSWS interceptor. The chamber modifications included upsizing the DWO pipe from 24 to 36 inches and the installation of a manual gate to control inflows into the LSWS interceptor. Design was completed in 2008 by the consultant engineering firm of Hatch Mott MacDonald. Bid documents were forwarded to Projects Control in January 2008. This project was bid in July 2008. The low bidder was A.P. Construction at a cost of $535,000. The notice-to-proceed for construction was issued on December 9, 2008. The project was substantially completed on September 30, 2009. PWD contract #40433 has now been closed out.

S38
After extensive hydrologic and hydraulic modeling, it was determined that modifications to S38 are unnecessary. The goal of maximizing flow to the SW Plant through the Lower Schuylkill West Side Interceptor can be achieved solely through modifications to the S45 regulating chamber.

S27, S43 & S47
Regulator S27 is currently operating under local control. It was determined that future modifications on S27, S43 and S47 are not necessary. All other projects related to Real Time Control (RTC) and Flow Optimization for the Southwest Drainage District has been completed.

III.B.1.9 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 29 of the CSO portion of the Annual Report for information pertaining to this topic.

III.B.1.10 Eliminate CSO/Dobsons Run Project (SW) - Construction and Implementation of the Dobson's Run Project

<u>Stokely & Roberts (R22) - Dobson's Run Phase I</u>
This project will eliminate 2 of the City's intercepting chambers and will completely eliminate CSO overflows at R22, resulting in a 173-MG reduction in overflow volume on on an average annual basis.

This project entails the reconstruction of the storm and sanitary sewer from Wissahickon Ave. to Roberts Ave. and elimination of the overflow chamber located at Stokely & Roberts (R22). The contract was awarded to A.P. Construction and construction commenced on 7/18/1996. The construction, including the elimination of the R22 chamber, was completed on 10/4/1998 at a total cost of $7,040,000. The estimated construction cost was $5.8 million.

Kelly Drive (S01T) - Dobson's Run Phase II & Phase III

Phase II of the Dobson's Run Reconstruction consists of the sewer reach from Henry Ave. to Kelly Drive and eliminates branch sewer contributions of sanitary sewage from reaching temporary CSO S01T. Phase III will eliminate all CSO discharge from occurring at S01T. In order to take advantage of economies of scale, design work for Phase II and III of Dobson's Run has been combined into one project because both phases involve tunneling. The project consists of tunneling beneath 32nd St., Allegheny Ave. and the Laurel Hill Cemetery to a new storm water outfall on Kelly drive. The new sewer redirects storm water away from properties surrounding Ridge Ave. and Scotts Lane. This section of the Dobson Run system augments the function of the storm water system that conveys drainage to the Schuylkill River from the Philadelphia neighborhoods of East Falls, Nicetown, and Germantown.

The design engineer was the team of CMX (former Schoor DePalma) and Dawn Engineering. The contract was awarded in February 2007 for $36.4 million, with a contingency that brings the limit of contract to $38.5 million. The project, which included tunneling, outfall and drop structure, was substantially completed as of 07/01/10 and is now in operation. This project was closed out on 2/21/2011.

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

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, the PWD has proposed construction of a three million gallon offline storage tank which will capture and store excess flows thereby eliminating surcharges and preventing overflow conditions at relief point R20. The 3 million gallon concrete storage tank, head house building, and a performing arts center are to be 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. Placed back on top of the tank after construction will be several recreation areas, a new performing arts center, and a head house building to provide public space in the Manayunk region of Philadelphia.

The final bid documents for the Manayunk Sewer Basin and Venice Island Recreation Center Project were transmitted to the PWD's Projects Control Unit on February 15, 2011 to start the public advertising and bidding process. Bids were received on May 10, 2011. The project was bid as a multi-prime project and bids were received for the general construction, electrical construction, plumbing construction and HVAC construction. The responsible low bidders and their bid amounts are listed in the table below:

Table III.B-3 Main and Shurs Construction Bid Awarded Information

Project #	Construction Type	Low Bidder	Bid Amount
70013	General Construction	Daniel J. Keating Co.	$38,067,000
70014	Electrical Construction	Riggs Distler & Co. Inc.	$4,299,200
70015	Plumbing Construction	Five Star Inc.	$277,000
70016	HVAC Construction	Five Star Inc.	$1,996,000

The notice to proceed to start construction was issued to the contractors on July 22, 2011.

The consent order issued for Main and Shurs also includes sewer relinings to be done around R-20 in an effort to reduce inflow and infiltration. One of the current relining projects is in the Upper Schuylkill Intercepting Sewer. The relining will include Nixon St, Main St, Domino Lane, Rector St, Levering St, Leverington Ave, and Parker Ave. Construction on the project started on 2/27/2010, approximately 11,870 feet of the interceptor has been lined from Shawmont and Nixon down to Main and Locke/Jamestown Street. The small local sewers crossing the canal at Domino Lane, Leverington Avenue, and Rector Street have also been lined.

Sewer relining projects are being planned at Wilde St., Ridge Ave., Dupont St, Silverwood St and many other locations which are located within the R20 sewershed. A bid has been awarded and the contract should be getting a Notice to Proceed in September 2011 and would start shortly thereafter. Sanitary pipes in Conarroe, Krams, Mitchell, Ridge Avenue, Roxborough and Wilde will be lined to fix structural defects and to eliminate inflow and infiltration.

Local sewers in Parker and Levering were not completed due to circumstances found in the field that did not allow for lining at this time (possible reconstruction/inaccesible manholes). These locations will have to be re-evaluated at a later date. Manhole rehabilitation will also be completed within the next few months to seal approximately 100 manholes on the interceptor from I/I groundwater and infiltration. Bolted down, water tight manhole covers will be installed to eliminate storm water from coming in around the frame and lid during rain events.

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

The PWD has begun implementation of 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 15 for more information on this topic.

Please refer to **SECTION II.A.2 "IMPLEMENT A COMPREHENSIVE SEWER ASSESSMENT PROGRAM (SAP)""** on Page 15 for more information on this topic.

Please refer to **II.B – "CONTINUE TO INSTITUTIONALIZE A COMPREHENSIVE MONITORING AND MODELING PROGRAM"** on Page 19 for more information on this topic.

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

Opportunities exist to reduce CSO impacts by means of reducing the entry of stormwater runoff, rainfall-derived I/I, and groundwater into the sewer system. Appropriate measures will be identified, evaluated, and implemented, where appropriate and cost-effective. There are four basic approaches to CSO control through I/I reduction:

1. Reduce the entry of stormwater runoff (including perennial stream baseflow) into the combined sewer system by diverting streamflow directly to a receiving stream.

2. Reduce the entry of groundwater to the combined sewers, interceptor sewers, and/or upstream separate sanitary sewers.

3. Reduce the entry of rainfall-derived I/I from upstream sanitary sewer systems.

4. Monitor and study the tidal inflows from river levels exceeding emergency overflow weir elevations at tide gates.

Each of the above methods enables CSO reduction by effectively increasing the capacity in the intercepting sewers and WPCPs available for the capture and treatment of combined wastewater.

Since I/I is relatively clean water that occupies conveyance and treatment capacity, eliminating it from the system frees up capacity for the more contaminated combined wastewater. This reduces CSO discharges and enables greater pollutant capture throughout the combined sewer system. An additional benefit of reduced infiltration (and diversion of any perennial streamflow) is the reduction in the operating costs associated with continuously pumping and treating these flows.

Tide Inflow

The System Inventory and Characterization Report (SIAC) identified 88 CSOs influenced by the tides. Many of these sites have openings above the tide gate. During extreme high tides inflow into the trunk sewer can occur. During these events, significant quantities of additional flow can be conveyed to the treatment plant and thus reduce capacity for storm flow, as well as increasing treatment costs. A program was previously implemented to install tide gates, or other backflow prevention structures, at regulators having an emergency overflow weir above the tide gate. This program, completed in June 1999, protects all openings up to 1.5′ City Datum and results in significant inflow reductions. PWD currently inspects and maintains the tide gates to ensure their continued performance.

Sewer Assessment Program

The permittee has implemented a comprehensive sewer assessment program (SAP) to provide for continued inspection and maintenance of the collection system using closed circuit television. The SAP is one of the tools used to indentify 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 15 for more information on this program.

City Wide GIS Mapping

The PWD utilizes the comprehensive Geographic Information System (GIS) of the City sewer system to target locations for inspection and potential maintenance where I/I may be a problem. Two such examples, are intake walls; locations where springs and creeks directly enter the sewer system, and creek crossings; locations where sewers travel directly under a waterbody.

Infrastructure Assessments

PWD actively conducts efforts to inventory and prioritize sewerage infrastructure potentially affected by either infiltration or exfiltration through spatial data collection for all points that either hydraulically alter the flow of the creek or infrastructure points that are affected by stream migration. These studies have identified over 300 points in the Cobbs Watershed (completed in 2002), 1000 points in the Tookany/Tacony-Frankford Watershed (2004), over 2000 points in Wissahickon Watershed (2005-2006), over 3000 points in Pennypack Watershed (2007-2008) and approximately 1200 points of infrastructure in the Poquessing Watershed (2008).

The data collected includes the spatial locations along the waterbody of all bridges, channelization, confluences, culverts, dams, manholes, outfalls, and pipes. In addition to spatial locations and depending on the type of infrastructure point, the following information is also collected: size, material type, length and height of exposed portion, condition, presence and quality of dry weather flow, bank location, level of submergence, digital photos, descriptions, and additional field notes. Corrective actions are taken when points of concern are identified.

Interceptor Relining

As a part of PWD's commitment to achievement of Target A (Improvement of water quality and aesthetics in dry weather) in both the Cobbs and Tacony-Frankford watersheds, the integrated watershed management plans include commitments to relining the interceptors that run along the mainstems of each.

Benefits:

- Decrease pollutant loads to surface waters by decreasing exfiltration
- Decrease amount of flow in sewer system by decreasing Inflow/Infiltration (I/I)
- Rehabilitation of sewers will increase the efficiency of the sewer system

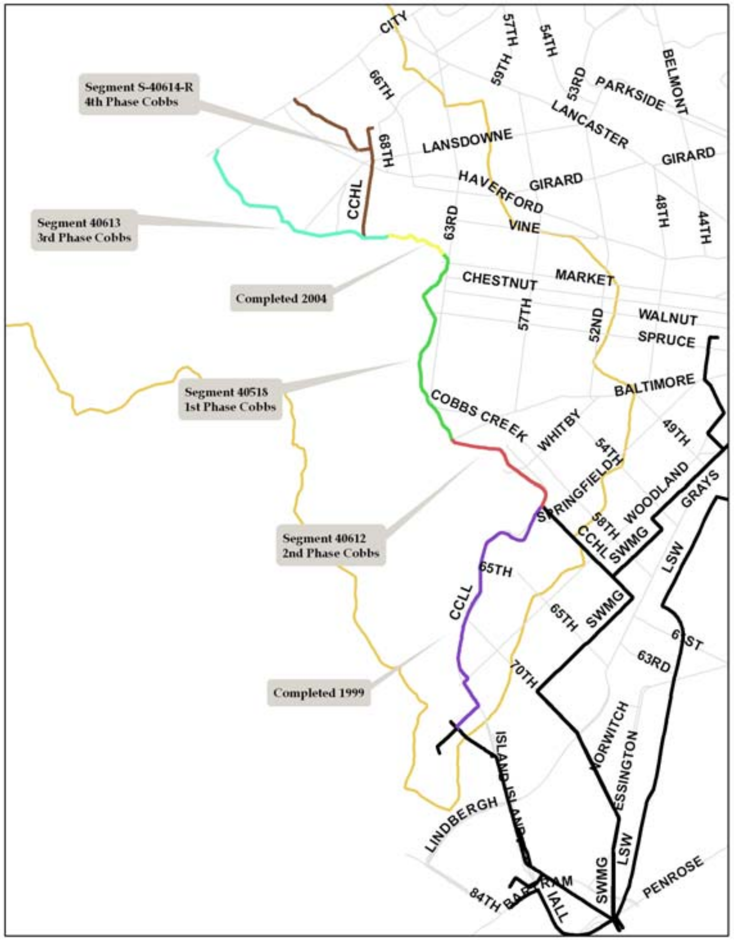
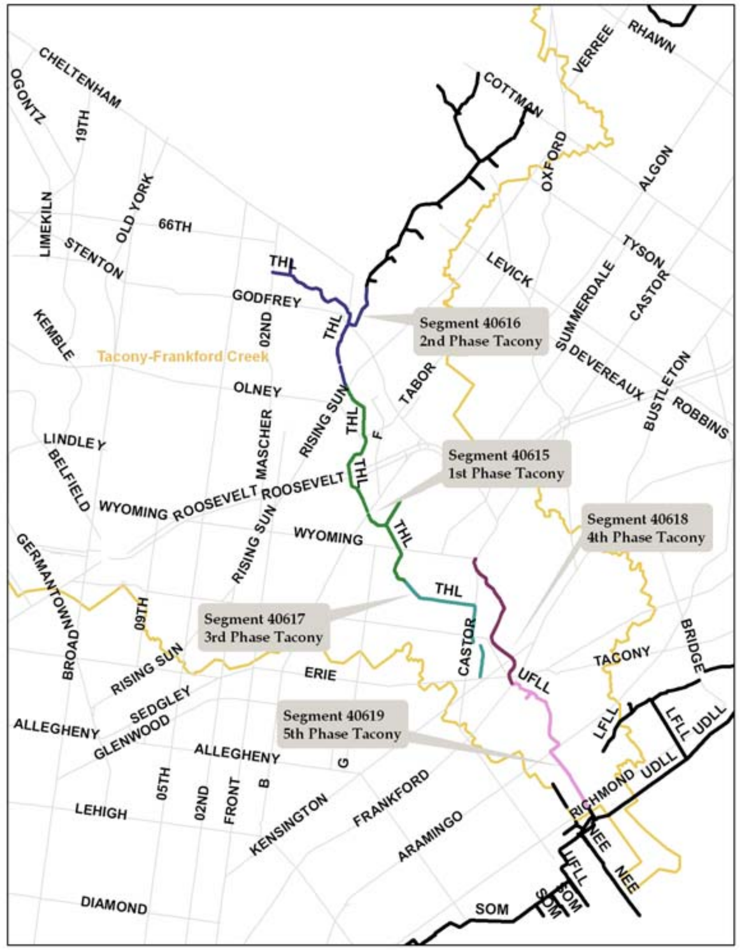
Planning and Design is underway for the relining of the entire length of interceptor within Philadelphia in the Cobbs and Tacony-Frankford Watersheds. For planning purposes, the interceptors within both watersheds were split into sections/projects of approximately 1.5 miles in length, with plans to reline one section per year. In the Cobbs Watershed, two of these segments have already been relined, one in 1999 and the other in 2004 at a cost of $3,500,000. Construction began on the first of the four remaining sections/projects in the Cobbs Watershed during FY 2011. The total estimated cost of these projects is $12,500,000. The Tacony-Frankford Watershed interceptor was split into 5 sections/projects and relining of the first segment began in March 2010. The total estimated cost of these projects is $20,600,000. The following tables describe the interceptor relining project within each watershed and the figures provide a map view.

Table III.B.2-1 Cobbs Watershed Sewer Relining Project Data

Project Title	Design Status:	Construction Status:	Extents:
40518 - Cobbs Creek Interceptor Phase 1 CIPP Lining Contract	Design Complete	In Progress	63rd and Market to 62nd and Baltimore
40612 - Cobbs Creek Intercepting Sewer Lining Phase 2	Design Complete	In Projects Control	61st and Baltimore to 60th and Warrington
40613 - Cobbs Creek Interceptor Lining Phase 3	Design 95 % Complete	-	City Avenue to D R/W in former 67th Street
40614 - Cobbs Creek Intercepting Sewer Lining Phase 4 (Indian Creek Branch)	Design 95 % Complete	-	City Avenue to D R/W in former 67th Street

Table III.B.2-2 Tacony – Frankford Watershed Sewer Relining Project Data

Project Title	Design Status:	Construction Status:	Extents:
40615 - Tacony Creek intercepting Sewer Lining Phase 1	Design Complete	In Progress	Chew & Rising Sun to I & Ramona
40616 - Tacony Creek intercepting Sewer Lining Phase 2	Design Complete	In Projects Control	2nd St & 64th Ave to Chew & Rising Sun; DRW Mascher to Tacony Interceptor; Cheltenham Ave to Crescentville & Godfrey
40617 - Tacony Creek intercepting Sewer Lining Phase 3	Design 30% Complete	-	I & Ramona to O & Erie
40618 - Upper Frankford LL Collector/Tacony Intercepting Sewer Lining Phase 4	Design 30% Complete	-	Castor & Wyoming to Frankford/Hunting Park
46019 - Upper Frankford Creek LL Collector/Tacony Intercepting Sewer Lining Phase 5	Design Started	-	Frankford/Hunting Park to Luzerne & Richmond

Figure III.B.2-1 - Segment Order for Relining in the Cobbs Creek	Figure III.B.2-2 - Segment Order for Relining in the Tacony – Frankford Creek
	

<u>Mill Creek Diversion Project</u>

The PWD is working with the Philadelphia division of the United States Army Corp of Engineers (USACE) to conduct a feasibility study of stopping stream flow from entering the Mill Creek combined sewer. The proposed project is to divert and attenuate the stream flow generated in Montgomery County from the combined sewer by constructing an alternate channel to either the Schuylkill River via City Line Avenue or the West Park section of Fairmount Park, or the East Branch of Indian Creek. Diverting flow from the combined sewer to the East Branch of Indian Creek will increase base flows in the Indian Creek and possibly improve habitat conditions and water quality, while decreasing the quantity of CSO discharge to the Schuylkill River during storm events. Diverting flow to West Park could augment water levels in existing lakes and improve their value as wildlife habitat. In November of 2010, an interim geotechnical and environmental report was prepared by URS which evalvated several channeling and tunneling alternatives. URS concluded that an at-grade channel option would be the lowest cost option without considering right-of-way issues and surface impacts. USACE will prepare a final report that outlines the options evaluated and the pros and cons of each. The final report is currently on hold due to the USACE's attention on projects in the Cobbs Creek Watershed required by stimulus funding but expects to wrap-up the study once the priority projects have been completed.

<u>PC-30 Relief Sewer</u>

PWD is in the process of constructing a parallel relief sewer to eliminate overflows at manhole PC-30 as per a consent order issued by the DEP on 9/26/2007. 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. 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 has proposed measures to reduce I/I in the interceptor during wet weather events. The parallel relief sewer being constructed in State Road will be approximately two miles in length and will capture and convey extraneous wet weather flows to the Upper Delaware low-level interceptor. The contract (PWD#S40621B) was awarded to JPC Group, Inc on 7/16/2009 with a Notice to Proceed issued on 9/30/2009. The box sewer construction and the relay of water mains have been substantially completed. The 54in. and 60in. connecting sewer piping from existing to the new tank is approximately 95% complete while work on the two terminal chambers is about to commence. The substantial completion for this project will be in the last quarter of 2011. DEP granted the City an extension of time on it Consent Order and Agreement, so this project's milestone for both Construction Completion and Final Compliance is now 12/31/11.

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. The sewer linings at Cottman Ave. which is a major source of I/I, will have significant reduction of I/I related overflows. A Notice to Proceed for this project (PWD contract #40707) was issued on 8/11/2010 and the lining work at Cottman Ave. from Milnor St. to an intercepting chamber near the Delaware River was completed in April 2011.

Sewer linings at Colman Rd, Colman Place, Colman Terrace, Basile Rd. will be completed under PWD contract # 40648. The project notice to proceed is dated 3/18/2011. Work has commenced and the scheduled completion date is 1/2/2012. Sewer linings at London Road, Narcissus Road, Red Lion, Derry Terrace, Fairdale Road, Morning Glory, and Academy Road will be completed under PWD contract #40685. This project is in our Projects Control group and has not been advertised yet. Comly Rd along with several other streets around the PC-30 area are currently also in Projects Control.

Other Sewer Relining Projects

Relining Sewers helps to reinforce, seal and rehabilitate the existing sewers. Specifically it prevents 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.

Sewer relining projects are also being done around R-20 as part of the consent order issued for Main and Shurs. More information on these projects can be found in **SECTION III.B.1.11 "ELIMINATE CSO/MAIN AND SHURS OFF-LINE STORAGE"** on page 96.

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.

Venice Island Storage Tank

Please refer to **SECTION III.B.1.11 "CONSTRUCTION AND IMPLEMENTATION OF THE MAIN AND SHURS OFF-LINE STORAGE PROJECT"** on page 96 for information pertaining to this topic.

Tacony-Frankford Storage Feasibility Study

PWD is currently working with the Army Corp of Engineers on a feasibility study to identify cost-effective options for reduction of wet weather water pollution and peak flow volumes into PWD's combined sewer system within the Tacony-Frankford Watershed. Two options that this feasibility study analyzes are off-line storage facilities. The first is a 60MG storage tank located at "Logan Triangle", an area where sinking homes were demolished and the land currently remains empty. This storage facility would reduce combined sewer discharges to the Tacony Creek by 600 million gallons per year from, eliminate the need for approximately $26 million of new fill for the site, and provide a stable foundation for future redevelopment of the neighborhood.

The second tank option being considered is 13.5MG storage tank under "Old Frankford Creek". Currently there are four regulators with outfalls along Old Frankford Creek: F21, F23, F24 and F25. Collecting these outfalls in a storage tank beneath the creek would potentially reduce overflows from these outfalls by 600 MG per year.

A third, non-storage option, the dechannelization of the bottom of lower Frankford Creek is also being studied.

Due to the attention by the Army Corp to projects in the Cobbs Creek Watershed required by stimulus funding, the Tacony feasibility study was put on hold.

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

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. 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 Combined Sewer Overflow (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. Coordination of these different programs has been greatly facilitated by PWD's creation of the Office of Watersheds (OOW). This organization is composed of staff from the PWD's planning and research, CSO, collector systems, laboratory services, and other key functional groups, allowing the organization to combine resources to realize the common goal of watershed protection. OOW is responsible for characterization and analysis of existing conditions in local watersheds to provide a basis for long-term watershed planning and management.

The City of Philadelphia has committed to developing an Integrated Watershed Management Plan (IWMP) for each of the 5 major waterways that drain to the City of Philadelphia, including the Cobbs, Tookany/Tacony-Frankford, Wissahickon, Pennypack and Poquessing as well as Implementation Plans (IPs) for the Schuylkill and Delaware Rivers.

PWD's IWMP planning process is based on a carefully developed approach to meet the challenges of watershed management in an urban setting. It is designed to meet the goals and objectives of numerous water resources related regulations and programs, and it relies on an adaptive management framework to implement recommendations. PWD's focus is on attaining priority environmental goals in a phased approach, making use of the consolidated goals of the numerous existing programs that directly or indirectly require watershed planning. They are designed to meet the goals and objectives of numerous water resource related regulations and programs and draw from the similarities contained in many watershed-based planning approaches authored by the Pennsylvania Department of Environmental Protection (PADEP) and the U.S. Environmental Protection Agency (USEPA). Further, watershed planning is mandated by the CSO policy and guidance documents and also is consistent with the current Clean Water Act (CWA) and its regulations, as well as the priorities announced by EPA's Office of Water (See EPA's Watershed Approach Framework, Office of Water, June 1996).

Water bodies receiving CSO discharges in the PWD service area include the Cobbs/Darby Creeks, the Pennypack Creek, the Tacony/Frankford Creeks, the Schuylkill River and the Delaware River. There are 164 point sources of CSO discharge from the PWD sewer system to these waterways. **TABLE III.C-1** below indicates the number of CSO point sources and the number of major separate stormwater outfalls on each waterway, as identified in the City's NPDES permits. Although the Wissahickon and Poquessing Creeks do not have CSO discharges, they also have water quality and quantity issues and are important waterways within the PWD service area and therefore PWD has committed to developing integrated watershed management planning approaches for each of these watersheds through the City's Stormwater Permit.

Table III.C-1 - CSO and Stormwater Point Source Discharges to Tributaries

Waterway	Number of CSO Point Sources
Delaware/Schuylkill Rivers (tidal)	94
Cobbs/Darby Creeks	34
Tacony/Frankford Creeks	31
Pennypack Creek	5
Schuylkill River (non-tidal)	0
Poquessing Creek	0
Wissahickon	0

PWD's established Planning Approach for developing IWMPs addresses requirements of each of the following programs including TMDL(s), Phase I and Phase II Stormwater Regulations, PA Act 537 Sewage Facilities Planning, Storm Water Management PA Act 167, EPA's Combined Sewer Overflow (CSO) Control Policy and drinking water source protection program. Stakeholder support is critical to the success of this type of regional planning initiative. A diversity of stakeholder perspectives must be involved with the development of each stage in the planning process in order to ensure that the plan is representative of stakeholder interests. The Act 167 Stormwater Management Planning process gains essential buy-in for the watershed approach and lays the groundwork for both the technical analysis of stormwater runoff and the support of individual municipalities. For these reasons in addition to the momentum gained by the state in developing Act 167 plans in the Southeast Region, PWD develops the IWMPs after the establishment of a watershed partnership and the development of an Act 167 Plan. The Darby-Cobbs and Tookany Tacony Frankford Watersheds have already completed their Act 167 Stormwater Management Plans.

The Pennypack Creek Act 167 was recently completed and is currently being vetted and adopted by the municipalities within that watershed. With that watershed-wide groundwork in place, PWD is not forging ahead on development of the Pennypack Creek IWMP, which at this timeline is on target for completion by late spring, 2012. The Poquessing Creek Act 167 should be completed by the summer of 2012, the Poquessing Creek IWMP will follow about 6-12 months later; and the Wissahickon Creek Act 167 should be complete by the summer 2013, Wissahickon Creek IWMP will follow about 6-12 months later. 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.

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.

Watershed planning includes various tasks ranging from monitoring and resources assessment to technology evaluation and public participation. PWD has established a Planning Approach for developing IWMPs that addresses requirements of each of the following programs including TMDL(s), Phase I and Phase II Stormwater Regulations, PA Act 537 Sewage Facilities Planning, Storm Water Management PA Act 167, EPA's Combined Sewer Overflow (CSO) Control Policy and drinking water source protection program. This IWMP development process is outlined below:

Establishment of Watershed Stakeholder Partnership

Stakeholder support is critical to the success of this type of regional planning initiative. A diversity of stakeholder perspectives must be involved with the development of each stage in the planning process in order to ensure that the plan is representative of stakeholder interests. This stakeholder buy-in is most critical to ensuring ultimate implementation of the plan. Recognizing this, PWD has helped to develop stakeholder watershed partnerships for each watershed where an IWMP is being initiated. At a minimum, a Watershed Partnership should be comprised of representatives from each of the following: federal, state, and local government agencies, industries, local businesses, nonprofit organizations and watershed residents, as well as any other interested stakeholders in the watershed.

Table III.C-2 Watershed Partnerships and Status

Watershed Partnership	Status
Darby-Cobbs Watershed Partnership	Initiated in 1999; Public Education and Outreach Committee and Steering Committees convened on a quarterly basis
Tookany/Tacony-Frankford Watershed Partnership	Initiated in 2000; as of 2007 this partnership had evolved into an independent 501(c)3 nonprofit organization with a mission of implementing the Integrated Watershed Management Plan for the TTF Watershed
Pennypack Creek Watershed Partnership	Initiated in 2004 for the development of a River Conservation Plan; re-convened in 2008 for the development of an Integrated Watershed Management Plan
Wissahickon Creek Watershed Partnership	Initiated in 2005 for the development of an Integrated Watershed Management Plan
Poquessing Creek Watershed Partnership	Initiated in 2006 for the development of a River Conservation Plan; to be reconvened in 2009 for the development of an Integrated Watershed Management Plan
Delaware Direct Stakeholder Partnership	Initiated in 2007 for the development of a River Conservation Plan for the Delaware Direct drainage area of the City of Philadelphia
Schuylkill Action Network and Tidal Schuylkill Work Group	The SAN is a large-scale watershed-wide stakeholder initiative initiated in 2003; supported by PWD. The Tidal Schuylkill work group is a new initiative – currently being incubated by a partnership between PWD, the Partnership for the Delaware Estuary and the Schuylkill River Development Corporation. This group will be charged with supporting PWD in developing the Implementation Plan for the in-City portion of the watershed.

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. The partnership is charged with driving the process and ensuring that the process remains representative of the diversity of stakeholder perspectives. The partnerships discuss priorities and the actions necessary to make the plan successful. These actions become a part of the implementation strategy, and address the desire to improve the water and land environment through a number of avenues. The ultimate goal is to cultivate a partnership committed to implementing the plan once completed.

Tookany/Tacony-Frankford Watershed Partnership

In 2000, the PWD launched the Tookany/Tacony-Frankford Watershed Partnership (TTF) with its partners, as an effort to connect diverse stakeholders as neighbors and stewards of the watershed. The partnership was integral in developing the Tookany/Tacony-Frankford Integrated Watershed Management Plan (TTF IWMP).

In 2005, the TTF Partnership formally incorporated as an independent non-profit, composed of environmental organizations, community groups, government entities, and other watershed stakeholders. Now the Partnership has embarked on implementing the TTF IWMP and advancing a wide range of initiatives for the good of the watershed

This partnership has elected a Board of Directors and has received its tax-exempt status as the first multi-municipal Watershed Partnership in the region and this year hired its first Executive Director of the organization. The Executive Director began working for the organization in the spring of 2007. The mission of the Partnership is the implementation of the watershed management plan.

The mission of the TTF Watershed Partnership is

"To increase public understanding of the importance of a clean and healthy watershed; to instill a sense of appreciation and stewardship among residents for the natural environment; and to improve and enhance our parks, streams, and surrounding communities in the Tookany/Tacony-Frankford watershed."

Table III.C-3 Current Members of Tookany-Tacony/Frankford Partnership

Abington Township	Ogontz Avenue Revitalization Corporation
Awbury Arboretum	PA DEP
Cheltenham Township	PA Environmental Council
FPC, Env. Stewardship and Ed. Division	PA Horticultural Society
Frankford Group Ministry	Philadelphia Water Department
Friends of Tacony Creek Park	Rockledge Borough
Jenkintown Borough	Senior Environmental Corps.
Melrose Park Neighbors Association	US Environmental Protection Agency
Montgomery County Commissioners	US National Park Service
Montgomery County Conservation District	

The Tookany/Tacony-Frankford Watershed Partnership was convened for the over 100 meetings and events over the past year. A full listing of these events that occurred during FY2011 can be found in **APPENDIX D – WATERSHED PUBLIC EDUCATION AND OUTREACH EVENTS & ACTIVITIES.**

Darby – Cobbs Watershed Partnership

In 1999, the Darby Cobbs Watershed Partnership (DCWP) was initiated in an effort to connect residents, businesses, and government as neighbors and stewards within the vast drainage area. Over the course of the last nine years, this partnership has provided a driving force for stakeholder planning and implementation of the Darby Cobbs Integrated Watershed Management Plan (DC IWMP).

The Darby Cobbs Watershed Partnership (DCWP) mission is:

"To improve the environmental health and safe enjoyment of the Darby Cobbs Watershed by sharing resources through cooperation of the residents and other stakeholders in the Watershed. The goals of the initiative are to protect, enhance, and restore the beneficial uses of the Darby-Cobbs waterways and riparian areas."

A range of public education and outreach activities and events have resulted from the watershed planning approach in the Darby Cobbs Watershed.

Darby-Cobbs Watershed Partnership Activities:

- March 14th Partnership Meeting focused on DELCORA infiltration and inflow study, Eastern Delaware County Council of Governments' stormwater manager project, and PWD's Cobbs Creek restoration.
- Promoted municipal involvement with PWD Cobbs Creek Restoration Plan. A Delaware County Technical Advisory Team and an Outreach Team were formed to support the restoration effort. Walk conducted to view Cobbs Creek Golf Course restoration opportunities.

Darby-Cobbs Watershed Partnership Public Education and Outreach Committee Activites:

- October 9th Walk with the Mayor event for over 100 people
- 58th Street Greenway BMP poster presented at October 15th Urban Watersheds Revitalization Conference.
- Outreach for Green Streets projects in Haddington and Cobbs neighborhoods.
- November 6th Green Homes project with Rebuilding Together Philadelphia and GreenTreks
- Co-organized 7 clean up sites along Cobbs Creek as part of the national Keep America Beautiful clean up day, which strategically coincided with the 2011 Philadelphia Mayor's Clean Up.
- Conducted the First Annual Cobbs Creek 5k Run/Walk on April 23, 2011, which had over 130 participants, 20+ volunteers, and raised over $3,000 for park programs.
- VISTA volunteer recruited who provided over 1,000 hours of service to the partnership.

Pursued opportunities for PWD to collaborate with Eastern Delaware County Council of Governments (COG) on regional stormwater management

- COG manager provided status report at March Partnership meeting and has been made aware of partnership goals and activities. As the Stormwater collaboration ends its inaugural 'demonstration' phase, partnership is searching for an opportunity to collaborate with the COG.

Facilitated creation of Model Neighborhood Coalition in Cobbs Creek sewershed.

- Facilitated meetings to educate & coordinate neighborhood submission of petitions to become model neighborhoods.

- Trained and organized volunteers and residents to participate in a large Green Homes demonstration project on Spruce Street, installing over 10 rain barrels, 10 flow-through planters, and 1 rain garden.

Outreach to Delaware County Regional Water Quality Control Authority (DELCORA) regarding sanitary and stormwater issues.

- Reviewed DELCORA I&I report and met with DELCORA on March 11th. DELCORA focused on I&I public education program, which includes I&I education video (presented at March 14th DC meeting). Outcome of meeting and conversations indicates DELCORA wants to see municipal adoption of I&I inspection programs/ordinance (e.g., via point of house sale).

Pennypack Creek Watershed Partnership

The Pennypack Watershed covers 56 square miles and covers portions of 11 municipalities and the City of Philadelphia. The watershed is located within the lower Delaware River Basin and discharges into the Delaware River in the City of Philadelphia. PWD led an effort to develop a RCP for this watershed, which was completed in 2005.

A range of public education and outreach activities and events have resulted from the watershed planning approach in the Pennypack Watershed. Please refer to the following list for a description of the watershed-related events and activities that took place over the past year.

Pennypack Watershed Partnership meetings: Partnership focused on municipal involvement in Act 167 plan (e.g., through Watershed Project Advisory Committee):

- October 19th partnership meeting focused on Act 167 Plan
- January 28th partnership meeting focused on review/comments for Act 167 Plan.
- February 15th elected officials meeting addressed general partnership goals, Act 167 ordinance, and strategy for funding stormwater BMP projects.
- June 14th Act 167 public hearing held for final Act 167 plan.
- An Integrated Watershed Management Plan (IWMP) for the watershed is also being drafted by PWD that complements the Act 167 plan.

Pennypack Public Education and Outreach Activities:

- Abington EAC April 9th Stream Buffer Workshop.
- Blair Mill Elementary School meadow planting project. Planted meadow with school students on November 17.
- Municipal employee MS4 workshop in Abington Township that focused on MCM 6 and on meadows. Held for TTF Partnership with invitations to Wissahickon and Pennypack.
- Stream buffer planting demonstration project installed at Fountain Point Condominiums

Poquessing Creek Watershed Partnership

The final Poquessing Creek Watershed River Conservation Plan (RCP) was completed in July, 2007. The final RCP report was submitted to the Department of Conservation and Natural Resources in the winter of 2007 and is on the Pennsylvania Rivers Registry.

A range of public education and outreach activities and events have resulted from the watershed planning approach in the Poquessing Watershed. Please refer to the following list for a description of the watershed-related events and activities that took place over the past year.

Poquessing Watershed Partnership meetings:

- September 29th partnership meeting that focused on Act 167 updates.
- March 30th partnership meeting that focused on Benjamin Rush State Park, Comprehensive Characterization report, and Act 167 plan update

Poquessing Watershed Partnership Public Education and Outreach Activities:

- Partnership provided outreach for PIDC stormwater best management practice workshop held on August 25 to help property owners with new stormwater rate structure.
- Saint Christopher's Elementary School meadow planting project (follow-up to spring 2010 tree/shrub planting at adjacent site). Planted meadow with 5th grade class on Nov. 16.

Delaware Direct Watershed Partnership

The Delaware Direct Watershed Partnership was formed in the fall of 2007 to support the River Conservation planning process for the Delaware Direct River Conservation Plan. A myriad of stakeholders are involved– non-profits, state and local government, in addition to community representatives. Each of the stakeholders represents a current planning initiative, such as the GreenPlan Philadelphia, the Central Delaware Master Plan, and the DRBC Water Resources Plan, among others. Through the Partnership, the representatives come together in a coordinated manner to communicate the best possible method to achieve protection of the natural resources and their sustainability in the urbanized Delaware Direct Watershed.

Delaware Direct Watershed Partnership Meetings (focused on linking stakeholder plans and programs to PWD Green City, Clean Waters plan):

- October 5th partnership meeting that focused on ecological restoration.
- April 26th partnership meeting that focused on final River Conservation Plan and urban tree canopy study.

Ecological Restoration initiatives addressing urban Delaware River waterfront:

- A series of Army Corps, PWD, Delaware River Waterfront Corporation, and Delaware River City Corporation meetings explored prioritization and funding for ecological restoration projects along the Delaware. Army Corps pursuing federal restoration funding.

- Bridesburg riverfront parcel identified as a "Park on the Near Horizon" in the Parks and Recreation Greenway 2015 plan. Conceptual restoration design completed for this parcel.
- Delaware River Waterfront Corporation opened a new riverfront park at Washington Green, incorporated ecological restoration features. Members of partnership served on park development advisory committee that addressed recreation and ecological restoration.

Delaware Direct Public Education and Outreach activities:

- Paddle Penn's Landing program ran through summer; included kayak and swan boat excursions and environmental education. More than 2,300 people participated, including 150 teenagers from the Philadelphia Dept. of Parks and Recreation, who participated in the program for free.
- River Ambassador Program launched by Pennsylvania Environmental Council. Ten plus Ambassador's finished training and starting projects that include fishing derby, river tours, and kayak trips.

Wissahickon Creek Watershed Partnership

The Wissahickon Watershed Partnership was convened in 2005 for the purposes of guiding the development of a watershed-wide Integrated Watershed Management Plan. Over the past 5 years it has been determined that due to the complexity of regulatory obligations facing this drainage area, PWD would move forward with developing a watershed plan for the portion of the drainage area - specifically a plan to address the City's TMDL obligations. PWD will continue to convene the Wissahickon Watershed Partnership over the coming years in hopes that the upstream portion of the watershed will come together to formulate a complimentary implantation approach in order to realize a watershed-wide restoration vision – especially in light of the watershed-wide Act 167 process currently ongoing.

The Wissahickon Watershed Partnership is convened on a quarterly basis.

Wissahickon Watershed Partners:

Abington Township
Ambler Wastewater Treatment Plant
Clean Water Action
Fairmount Park Commission
Friends of the Wissahickon
F X Browne, Inc.
Lansdale Borough
Lower Gwynedd Township
McNeil CSP
Merck, Inc.
Montgomery County Conservation District
Montgomery County Planning Commission
Morris Arboretum
North Wales Borough
North Wales Water Authority
PA DEP
PA Environmental Council
Philadelphia University
Philadelphia Water Department
Schuylkill Center for Environmental Education
Schuylkill Riverkeeper

Senior Environmental Corps, Center in the Park
Temple University, Center for Sustainable Communities
Upper Dublin Township
Upper Gwynedd Township
US Environmental Protection Agency
Whitemarsh Township
Whitpain Township
Wissahickon Restoration Volunteers
Wissahickon Valley Watershed Association

The Education and Outreach Committee of the Wissahickon Watershed Partnership continues to meet and develop materials and programs.

Wissahickon Watershed Partnership:

- October 7th partnership meeting to launch Wissahickon Watershed Act 167 Stormwater Management Plan
- Follow-up with municipalities by letter, phone call, and e-mail to collect data (problem areas, stormwater and flood infrastructure) for Act 167 plan.

Wissahickon Watershed Partnership Public Education and Outreach Activities:

- September 21st Stream Buffer Workshop held by Whitemarsh Township.
- September 30th Montgomery County Land Trust workshop at Bryn Athyn College addressed stormwater BMPs.
- Managing Your MS4 Permit workshop presented by PEC, AMEC Earth and Environmental and the Montgomery County Planning Commission to township and borough officials on November 5, 2010 in Lansdale.
- March presentation to Whitpain Township Council on stormwater ordinance revisions suggested by Wissahickon Roundtable.
- Mowing to Meadow public education event; May 13th and 14th planting days with volunteers at Whitemarsh Koontz Park meadow basin.
- Jarrettown rain garden; April 18 site tour to identify O&M needs, followed by June 22nd supplemental planting with Upper Dublin Township staff.
- Illicit Discharge Detection and Elimination Program Webinar (April 28th) and Class/Field Workshop (May 31st) held with Center for Watershed Protection.

PWD/Exelon/Schuylkill River Heritage Area Basin Retrofit Program. Stormwater basin retrofit activities focused on construction-related activities at municipal basins**:**

- Summer-fall 2010, Upper Dublin staff continued to install native plants in the basin, and care for plants previously installed in 2009 and spring 2010 (mulching and watering). They also installed a berm in front of the inlet structure in the upper basin in order to spread the water out across the upper basin.
- August 30th Exelon/Schuylkill River Heritage Area press release event at Aiden Lair basin retrofit project. Educated elected officials and other area leaders on broader goals of partnership and specific goals of basin retrofit.
- September 25, 2010 community planting event attracted eight volunteers.
- October 15, 2010 planting and mulching with 33 McNeill Company volunteers.
- Spring 2011, Upper Dublin continued to add native vegetation to the basin. Working with Drew Gilchrist of the National Lands Trust, they installed meadow plugs on the floor and wall of the upper and lower basins. They also

continued to care for the plants previously installed in the basin (mulching, grass cutting, weeding).

- At the North Wales Center Street Basin, the Borough and their new consulting engineer (Gilmore Associates) continued to work with the private owners of the basin. They made several design changes to address esthetic concerns of the landowners. They also negotiated an easement that protects the basin retrofit work going forward and establishes operation/maintenance responsibilities of the Borough and the landowner.
- North Wale Borough finalized the design and landowner easement documents, and issued a request for proposal for the retrofit work. The contract was awarded in spring 2011, with construction occurring May 2011 and continuing into the summer months to address an infiltration issue (infiltration trenches had to be installed under the two rain gardens). Infiltration is being achieved, and the project is now entering operation/maintenance phase in close coordination with landowner, Borough, and Pennsylvania Environmental Council (via Exelon grant).
- The Village Circle basin construction project in Whitpain is delayed after two unsuccessful bid attempts. However, Whitpain did complete two basin retrofit projects in 2010 (one in the Wissahickon Watershed at Valentine's Estate) using a Growing Greener grant and the Township's stormwater fee fund (see http://www.whitpaintownship.net/pdfs/stormwater_basin_retrofit.pdf). The Township indicated they will eventually complete the Village Circle basin but first need to build back up their stormwater fee fund.
- Pennsylvania Environmental Council surveyed the Wissahickon community to identify another basin retrofit project using remaining funds from their Exelon grant. At this time a proposal has been made for a basin retrofit project at Penn Brook Elementary School in Upper Gwynedd through the Wissahickon Valley Watershed Association (pending further grant support from Exelon).

Pennsylvania Environmental Council Public Education and Outreach: PEC conducted several basin retrofit educational events in spring 2011, including:

- May 12, 2011 Stakeholder Construction Visit Tour at the North Wales basin.
- June 6, 2011 Operation/Maintenance (O/M) Training at the established Sidley basin retrofit project in East Whiteland Township. The original designers (Tavis Dockwiller and Susan McDaniels) conducted the training/site visit to inspect basin conditions at this 5 year old project.
- June 14, 2011 Basin Retrofit Workshop. A "lessons learned" basin retrofit workshop. Representatives from Upper Dublin, Whitpain, and North Wales presented on the basin retrofit projects, addressing what was successful and lesson learned. The workshop ended with a tour of the Aiden Lair project.
- GreenTreks Video. GreenTreks is currently producing a basin retrofit educational video that addresses stormwater and green infrastructure. Taping for the video was completed in June at the Aiden Lair basin, Whitpain's Valentine's Estate basin, and a separate basin planting project in Whitemarsh Township.

Stormwater Basin Retrofit Implementation Team:

- Aligned with the above noted project work, the Partnership launched a stormwater basin retrofit implementation team that met three times during the year to identify barriers to more wide spread basin retrofit practices in partnership watersheds and to identify cost effective retrofit strategies. Recommendations and findings of the implementation team are being developing (e.g., common features for basin retrofits, case studies/costs, and permit requirements).

Mowing to Meadow Initiative: A "mowing to meadow" implementation team is now being organized, with the goal of determining why there are not more meadows, what information would help decision makers create more meadows, and how to distribute such information. This work is being aligned with following meadow creation case studies:

- Koontz Park, Whitemarsh Township stormwater basin meadow
- Aiden Lair Park, Upper Dublin Township three meadow and basin projects
- Mondauk Park, Upper Dublin Township meadow project.

<u>Schuylkill Watershed Partnership (Philadelphia-Based Partnership)</u>

Key Person Interviews:

- The Key Person Interview (KPI) process was completed. A total of five interviews with ten stakeholders were held during 2009-10 year, with six follow-up interviews.
- A data base containing 132 stakeholder organizations and individuals was assembled.
- A KPI summary document and partnership database (132 stakeholder organizations and individuals) was prepared for incorporation into the Integrated Watershed Management Plan document.
- Partnership launch delayed to align with Long Term Control Plan finalization (now scheduled for October 2011).

Assessment of Current Watershed Status; Identification of Problems

PWD implements a detailed monitoring program in each planning shed that includes chemical, biological and physical assessments to characterize the current state of the watershed and identify existing problems and their sources.

Data Collection, Organization, and Analysis

Development of the CCR includes the collection and organization of existing data on surface water hydrology and quality, wastewater collection and treatment, stormwater control, land use, stream habitat and biological conditions, and historic and cultural resources in order to gain an understanding of existing data, which will serve as a historic reference data set for comparison against newly collected information. Additionally, existing ordinances, regulations, and guidelines pertaining to watershed management at federal, state, basin commission, county, and municipal levels are examined for coherence and completeness in facilitating the achievement of watershed planning goals. Data are collected from various agencies and organizations in a variety of forms, ranging from reports to databases and Geographic Information System (GIS) files.

This data is then supplemented by PWD's extensive physical, chemical and biological monitoring program, which is initiated for roughly one year in each watershed. A compendium document is produced following the analysis of all collected data; this document titled the Comprehensive Characterization Report (CCR) is shared with watershed partners for comments and feedback. These CCR documents are available on the partnership website at http://www.phillywatersheds.org . The CCR assessment serves to document the watershed baseline prior to implementation of any plan recommendations, allowing for the measure of progress as implementation takes place upon completion of the plan. The CCR status of each watershed is:

Table III.C-5 CCR Status of each Watershed

Darby-Cobbs	Completed 2004
Tookany/Tacony-Frankford	Completed 2005
Wissahickon	Completed 2007
Pennypack	Completed 2009
Poquessing	Completed 2010

<u>Watershed Planning Process</u>

Development of Plan Goals, Objective, Indicators and Options

PWD's watershed-wide goal setting process begins with the development of a "base set" of goals for the watershed – incorporating all available goal related statements captured within existing plans and reports. This base set of goals is then presented to the stakeholder group for evaluation. A facilitated discussion is held during which the partners are invited to add to this list of goals and finally to adopt this master list as the initial goal set for the watershed area.

Often times, this stakeholder insight may reveal "information gaps" not addressed by problem analysis that requires additional data collection. Ultimately, with stakeholder collaboration, a final list of goals is established that should reflect the multitude of stakeholder interests in the watershed.

The following example clarifies the difference between a goal and an objective for the purposes of the PWD Watershed Planning process:

Goal: These are to be general and not specifically measurable. Goals represent a series of "wishes" for the watershed. (e.g. Improve water quality)

Objective: Objectives translate the goal statements into measurable parameters. The objective should lead toward the establishment of a target value and could help to establish a trend over time. There can be multiple objectives for a single goal. (e.g. Meet state numeric criteria for bacteria in dry weather.)

Based on the preceding descriptions, each of the stakeholder goals is further evaluated and translated into objectives so that progress would be measurable as management options are implemented in the future.

Management Option: A management option is a technique, measure, or structural control that addresses one or more objectives (e.g., a stormwater best management practice (BMP) that is installed, an ordinance that gets passed, or an educational program that gets implemented).

Each objective is then evaluated for the identification of potential management options that could be implemented to achieve measurable progress toward the goal. This evaluative process results in a comprehensive list of potential options that will need to be individually evaluated for feasibility under the conditions of a given watershed area.

Indicator: Indicators can be used to characterize the current condition of a watershed area and can be used to measure progress toward achieving goals as management options are implemented. (e.g. Percentage of samples meeting state criteria for bacteria)

A list of indicator measures is developed to address each of the objectives so that as management options are implemented, progress can be measured toward attainment of the watershed goal.

Screening of Management Options

Clear, measurable objectives provide guidance for developing options designed to meet the watershed goals. Lists of management options are developed to meet each of the goals and objectives established for the watershed and once evaluated, only those options deemed feasible and practical are considered in the final list of management options. Options were developed and evaluated in three steps:

1. Development of a Comprehensive Options List. Virtually all options applicable in the urban environment are collected. These options are identified from a variety of sources, including other watershed plans, demonstration programs, regulatory programs, literature, and professional experience.

2. Initial Screening. Some options can be eliminated as impractical for reasons of cost, space required, or other considerations. Options that already planned and/or committed to, are mandated by another program, or are agreed upon as vital are chosen for inclusion in the final list as not needing further evaluation. The remaining options are screened for applicability to the watershed as well as for their relative cost and the degree to which they meet the project objectives. Only the most cost-effective options are considered further.

3. Detailed Evaluation of Structural Options. Structural best management practices for stormwater management are subjected to a modeling analysis as necessary to assess effects on runoff volume, peak stream velocity, and pollutant loads at various levels of coverage.

Water Quality Goal Setting Update

PWD's stakeholder goal setting process is one that has been refined with each watershed plan undertaken. PWD has an established a guiding set of seven "Umbrella Goals" for the IWMP process. These goals were originally established in 2002 by the Darby-Cobbs Watershed Partnership – then upheld by the Tookany/Tacony-Frankford Partnership in 2003, then adopted by the Pennypack and Poquessing River Conservation Planning processes in 2006-2008. PWD has determined that these "Umbrella Goals" because of their broadly worded nature should be utilized to guide the City's IWMP planning process, objective development and ultimately implementation commitments.

Wissahickon Creek Watershed

As documented in the FY07 Stormwater Annual Report, PWD initiated a watershed-wide goal setting process with the Wissahickon Watershed Partnership in winter/spring 2007 which resulted in a list of stakeholder goals, which consisted of 23 stakeholder goals for the Wissahickon Creek Watershed. These goals have been arranged such that they fit under the broader headings of the "Umbrella Goals".

Table III.C-5 Proposed Goals and Objectives for the Philadelphia Portion of the Wissahickon Creek Integrated Watershed Management Plan

IWMP "Umbrella" Goal	Wissahickon Watershed Partnership Goal Subset for City of Philadelphia	Measurable Objectives for the City of Philadelphia to Guide Implementation Process
Water Quality and Pollutant Loads. Improve stream quality to reduce the effects on public health and aquatic life.	Protect drinking water quality	• Continue to meet requirements of the LT2ESWTR
	Protect drinking water taste and odor	• Limit geosmin concentrations to <10ng/L between April and May
	Improve and protect surface water quality	• Meet state numeric criteria for bacteria in dry weather. • Meet State Water Quality Standards for dissolved oxygen • Meet state criteria for pH at all sites and times. • Remove Wissahickon Creek from the state list of impaired waters.
	Eliminate untreated sewage discharges to Wissahickon Creek	• Eliminate cross-connections of sanitary to storm sewers. • Eliminate sanitary sewer discharges to the stream in dry weather.
Instream Flow Conditions. Reduce the impact of urbanized flow on living resources.	Improve and maintain baseflow through increased infiltration to support water quality and aquatic community health.	• Maintain average annual dry weather flow, excluding treated wastewater effluent, at a minimum average annual flow of 59 cfs at the mouth. • Reduce amount of Directly Connected Impervious Cover (DCIA) by 1%.

<table>
<tr><th>IWMP “Umbrella” Goal</th><th>Wissahickon Watershed Partnership Goal Subset for City of Philadelphia</th><th>Measurable Objectives for the City of Philadelphia to Guide Implementation Process</th></tr>
<tr><td>Streamflow and Living Resources. Improve stream habitat and integrity of aquatic life.</td><td>Restore aquatic ecosystem health</td><td>• Increase benthic quality index to 80% of reference reaches.
• Increase IBI to 40 averaged at all sampling sites.</td></tr>
<tr><td rowspan="2">Stream Corridors. Protect and restore stream corridors, buffers, floodplains, and natural habitats including wetlands.</td><td>Reduce channel erosion and sediment loads caused by runoff</td><td>• Reduce annual sediment load from overland flow by 10%.
• Reduce annual sediment load from channel erosion by 75%</td></tr>
<tr><td>Improve aquatic habitat</td><td>• Restore X miles of stream channel and habitat such that habitat scores are X% comparable to reference conditions.</td></tr>
<tr><td>Flooding. Identify flood prone areas and decrease flooding by similar measures</td><td>Reduce the frequency and severity of damaging (out of bank) flooding</td><td>• Reduce [flooding indicator] to [value at a specific location].
• Prioritize most vulnerable areas and ensure flood mitigation planning</td></tr>
<tr><td rowspan="2">Quality of Life. Enhance community environmental quality of life.</td><td>Improve awareness of watershed issues at a local level (municipalities and stakeholders)</td><td>• Convene a watershed partnership stakeholder forum
• Establish a partnership website to serve as an information resource</td></tr>
<tr><td>Make stormwater/watershed related educational opportunities available to every stakeholder in the watershed</td><td>• Educate residents about benefits of rain barrel installation; have 10% of watershed resident install rain barrels on their homes.
• Develop and implement at least 3 stormwater management/ watershed issues related workshops within each 5 year implementation planning timeline</td></tr>
<tr><td>Stewardship, Communication, and Coordination. Foster community stewardship and improve inter-municipal, inter-county, state-local, and stakeholder cooperation and coordination on a watershed basis.</td><td>Increase preparedness for natural hazards, spills, discharges and terrorism</td><td>• Obtain agreements from the 5 WWTPs and industrial users sign up as users or the Early Warning System emergency reporting phone number
• Increase the amount of continuous water quality data collected from the Wissahickon Creek (Reactivation of Ft. Washington USGS gauge station)
• Utilize fish biomonitoring station to assess water quality</td></tr>
</table>

IWMP "Umbrella" Goal	Wissahickon Watershed Partnership Goal Subset for City of Philadelphia	Measurable Objectives for the City of Philadelphia to Guide Implementation Process
	Increase communications within the watershed	• Create a Wissahickon Creek "event notification system" for the public

PWD has been working on developing an implementation commitment to address the City's sediment load reductions as prescribed by the Wissahickon TMDL for Siltation in the shorter term, but will be developing a longer-term watershed-wide approach for addressing these goals by completing a Wissahickon IWMP along-side the Act 167 Stormwater Management Plan – scheduled to be initiated in fall 2010.

Pennypack Creek Watershed

In the spring of 2008, PWD initiated a watershed-wide stakeholder goal setting process for the Pennypack Creek Watershed as a part of the IWMP development process. The purpose was to derive a comprehensive watershed-wide "wish list" of goals for the watershed. These goals are not intended to be specifically measurable at this time. Upon completion of the watershed-wide goal setting process, the planning team will evaluate and translate each of them into measurable "objectives" so that progress would be assessable as management options are implemented in the future. Utilizing the input from the Pennypack Watershed Partnership, this goal setting process was designed to be inclusive of a multitude of stakeholder perspectives.

PWD staff prepared for the goal setting process by reviewing existing watershed plans and reports. Since the Pennypack Creek River Conservation Plan was recently completed (2005) and that planning initiative included a stakeholder goal setting process, the RCP goals were deemed an appropriate starting point from which stakeholders could begin evaluating for completeness. These goals along with others culled from additional existing sources such as the Pennypack Greenway Partnership's Strategic Planning process and the Pennypack stakeholder "Key Person Interviews" were synthesized into a list of broad goals and measurable objectives and shared with the watershed stakeholders for evaluation.

A diversely representative group consisting of roughly 27 stakeholders actively participated in the goal setting process. Of these, 7 participants represented municipalities within the drainage area, 2 represented nonprofit organizations, 2 represented the PADEP, 5 represented Bucks and Montgomery County agencies, 1 attended on behalf of a Pennsylvania State legislator's office, 1 represented a golf course, 2 represented local parks and 5 represented City of Philadelphia agencies. This stakeholder assemblage is currently evaluating a final "wish list" consisting of 8 broad goals for the Pennypack Creek Watershed.

Table III.C-6 Draft Pennypack Watershed Stakeholders Goals and Objectives

Habitat and Ecological Protection/Restoration • Improve Stream Habitat and Restore Aquatic Communities • Restore Ecological Integrity • Protection and enhancement of high quality sites
Stormwater Management • Improve In-stream Flow Conditions • Stormwater management planning
Improvement of Water Quality • Improve Water Quality and Reduce Pollutant Loads
Erosion Reduction • Improve and Protect Stream Corridors
Flooding • Mitigate Flooding
Open Space Preservation, Recreation and Cultural Opportunities • Enhance and Improve Recreational Opportunities • Permanently preserve land to ensure a protected greenway • Preserve cultural and historic resources • Build a Trial • Enhancement of tributary streams and mainstem of Pennypack Creek
Quality of Life • Enhance Quality of life for Watershed Residents
Stakeholders Involvement • Improve Stewardship, Communication and Coordination among Watershed Stakeholders and Residents • Increase understanding of, affinity for and commitment to natural systems

In the fall of 2008 the Pennypack Watershed Partnership were reconvened to approve this list of proposed goals and adopt them as representative of stakeholder goals for the watershed.

Poquessing Creek Watershed

The Partnership will be convened in the coming year alongside the Act 167 planning process in order to affirm the stakeholder goals established by the River Conservation Plan planning process as representative of the stakeholder goals. The River Conservation Plan goals closely aligned with the PWD "Umbrella Goals".

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. By defining three distinct "targets" to meet the overall plan objectives, priorities identified by stakeholders could be addressed simultaneously with those identified through scientific data. Two of the targets were defined so that they could be fully met through implementation of a limited set of options, while the third target would best be addressed though 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 overall goal of fishable and swimmable waters through improved water quality, more natural flow patterns, and restored aquatic and riparian habitat. 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 will result in realizing some of the objectives within a relatively short time frame, providing positive incentive to the communities and agencies involved in the restoration, and more immediate benefits to the people living in the watershed.

PWD's IWMP planning targets are defined below:

Program Support (Planning, Outreach & Reporting)
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), be accessible to the public, and be an amenity to the community. Target A was defined with a focus on trash removal and litter prevention, and the elimination of sources of sewage discharge during dry weather. 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.

Target B: Healthy Living Resources
Improvements to the number, health, and diversity of the benthic macroinvertebrate and fish species needs 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 silt 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. 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 will require 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.

PWD has committed to developing and executing four sequential 5-year Implementation Plans for the City of Philadelphia portion of the drainage area within each planning shed. Thus far Implementation Plans have been developed for the Cobbs and Tookany/Tacony-Frankford Watersheds (available at www.phillywatersheds.org); the plans have matching implementation timelines, running from 2006 through 2011, and an implementation plan for the Wissahickon Creek Watershed is in development. Adaptive management will be utilized as necessary at each 5-year planning interval to ensure that progress is being achieved.

Table III.C-7 - 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		Initiated in 2008	Implementation plan to be developed following completion of RCP	Plan in development, draft due in spring 2012
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. New implementation plan to be developed to align with 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. New implementation plan to be developed to align with Green City, Clean Waters program commitments.
Pennypack Creek	2002	2007-2008	Completed in 2005	Initiated in winter 2008, to be completed by 2011/2012	To be developed 2012
Schuylkill River (tidal, non-tidal)	Monitoring Only		Completed in 2001 by the Academy of Natural Sciences, Natural Lands Trust, and the Conservation Fund	Implementation Plan to be developed for the City of Philadelphia portion of the drainage area in 2011/2012	To be developed 2011/2012
Poquessing Creek	2001	2008-2009	Completed in 2007	To be initiated in spring 2009, scheduled for completion in 2012	To be developed 2012
Wissahickon Creek	2001	2005-2006	Completed in 2000 by FPC	Initiated in 2005, anticipated completion along-side Act 167 plan – 2012/2013.	Wissahickon TMDL implementation commitment to be developed in 2011/2012; IWMP implementation plan to be completed in 2013

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, effective January 1, 2006, provided the 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, infill projects which involve earth disturbance between 5,000 and 15,000 square feet, or projects which involve earth disturbance over 1 acre and require a PA DEP NPDES permit. PWD is considering additional ways to improve and strengthen its stormwater programs during the LTCPU process by looking at reducing the minimum area to trigger the stormwater regulations to 5000 ft^2. Additional incentives are being considered to further stimulate innovative stormwater designs, including:

- Fee in lieu: allowing stormwater controls to be transferred to another location if efficiency is improved
- Green permit expediting: green designs are fast tracked through the permit review process
- Evaluate the potential for linking green stormwater infrastructure to other incentives related to zoning, such as density/setback incentive bonuses for increased stormwater control beyond the minimum requirements.

The full stormwater regulations for the City of Philadelphia can be found at
http://www.phillyriverinfo.org/Programs/SubprogramMain.aspx?Id=Regulations

Please refer to the Stormwater Management Report **SECTION F.5.B "POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT"** on page 242 for more information on the Stormwater Management Regulations.

III.C.1.2 Conduct workshops on LID

The Plan Review team holds weekly Plan Review walk-in hours each week on Tuesdays from 11am – 1pm. 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

Parcel-based Stormwater Billing

For many years, the Water Department has recovered the costs for the operation and maintenance of its stormwater system components (pipes, storm drains, pump stations, treatment facilities, and billing) through a service charge related to our customers' water meter size. This method was considered a reasonable means to approximate the relative contribution of a property to stormwater runoff volumes since properties with larger water meters are usually larger parcels of impervious land. In 1994, the Water Department convened a diverse group of stakeholders, the Stormwater Charge Citizens Advisory Council (CAC), to make recommendations for improving the stormwater charge methodology.

The CAC recommended that the City use a formula based billing approach to more accurately calculate the relative volume of stormwater generated from a property. The CAC recommended that 80 percent of the stormwater costs be recovered based on a property's impervious area and 20 percent of the stormwater costs be based on the property's gross area. The CAC recognized that providing a detailed analysis of each of the City's 450,000 residential properties would be expensive and not provide a significant improvement in the fairness of the residential property based charge. They recommended that the City's residential properties be treated as a single parcel with total gross area and imperviousness area factors with the total cost divided among all residences. This recommendation was implemented in the FY 2002 tariff and resulted in a decrease in stormwater costs to residences and other smaller meter customers.

At the time when the FY 2002 rates were being developed, the City did not have accurate or adequate parcel information to transition from a meter based charge to a property based stormwater charge among its non-residential customers. Accordingly, the meter based charge was maintained to distribute the stormwater-related costs among non-residential customers. In early 2006, the Water Department began the process of validating the City's parcel data information with the Bureau of Revisions and Taxes (BRT) database and orthographic (impervious) information. The impervious area information was procured from the contracted flyover of the City in 2004. Water Department staff has analyzed the approximately 85,000 non-residential parcels to determine, on an individual customer basis, the stormwater runoff contribution of each large customer parcel. The new stormwater charge will be calculated using the following formula:

Stormwater Charge = ((Total Parcel Area / 500) * Gross Area Rate) + (Parcel Impervious Area / 500) * Impervious Area Rate)

The Water Department started the transition to parcel-based stormwater charges among its non-residential customer base in FY 2011. Accordingly, the first bills based on this new methodology went out July 1st, 2010. Below is a chart describing the phase-in:

Table III.C.1-1 Phase-in to the New Billing System

Duration	Meter Size Based Stormwater Charge (Old Method)	Parcel Area Based Stormwater Charge (New Method)	Total Monthly SWMS Charge
July 1, 2010 through June 30, 2011	**75%**	**25%**	**100%**
July 1, 2011 through June 30, 2012	**50%**	**50%**	**100%**
July 1, 2012 through June 30, 2013	**25%**	**75%**	**100%**
July 1, 2013 through June 30, 2014	**0%**	**100%**	**100%**

This transition will result in more equitable stormwater charges that closely match the cost of managing stormwater runoff from each property. For those customers that will see noticeable increases in their stormwater fees, the department will assist in identifying opportunities on their property to decrease the amount of their impervious area and thus decrease their stormwater fees.

The Water Department is going to charge a stormwater fee to properties that do not presently have a water/sewer account. These parcels generate stormwater runoff that is managed by the City and therefore should be reasonably charged for such service. Current non-customers include parking lots, utility right-of-ways, and vacant lands. Large meter customers have recognized this discrepancy and demanded these currently unbilled parcels share the cost burden of stormwater management. The Water Department is applying the same formula to these properties as is being applied to all other non-residential customers.

The CAC also encouraged the City to provide a means for customers to ease the burden of property based stormwater charges. Customers who have the ability to decrease the amount of directly connected impervious area (hard surfaces that direct runoff to the City's sewer system) on their property may do so using any number of stormwater management practices (rain gardens, infiltration islands, porous asphalt and sidewalks, vegetated swales, green roofs). Once a property has been retrofit with any of these features, the Water Department will re-evaluate the property's stormwater fee based on the remaining unmanaged impervious area and the total area of the property.

In addition to the data processing and maintenance necessary to ensure the successful implementation of this project, PWD has ensured public outreach to potentially affected customers be made a priority. During the lead-up to the launch of this project in July 2011, PWD held numerous public meetings and reached out to individual customers who will see a significant increase in the stormwater portion of their bills. PWD also retained a consultant design firm to offer a free site inspection and conceptual stormwater management design that, if implemented, will reduce their stormwater charge.

If a property owner feels their stormwater bill is being improperly calculated, they can submit an appeal through the PWD Stormwater Appeals program. This program allows property owners to submit corrections to the PWD maintained gross and impervious area, the BRT maintained property ownership information, and the PWD maintained water account data. If a correction is order, once it is made, the stormwater bill for the property is recalculated.

BMP and LID projects

From here foreward, BMP and LID projects will be referred to as green stormwater infrastructure projects to reflect the language used in the Green City, Clean Waters Long Term Control Plan Update. A comprehensive list of green stormwater infrastructure projects are presented in tables within **APPENDIX E – PWD GREEN STORMWATER INFRASTRUCTURE PROJECT LIST**. The tables include projects predominantly in combined sewersheds, with some projects also in MS4 areas. The variety of project types and locations will be monitored for success in order to improve upon later designs and implemented technologies. There are four project stages presented in **APPENDIX E** : construction complete, in construction, design complete, and in design.

Construction Complete: The project has been fully constructed.
In Construction: The project was under construction in FY 2011.
Design Complete: The project has been fully designed and is ready either for contractor bids or construction to begin.
In Design: The project is currently being designed by PWD staff and partners in FY 2011.

In addition, **APPENDIX E** includes a map showing green stormwater infrastructure project locations and statuses.

Since the FY 2010 Stormwater Annual Report, great progress has been made in the construction, design, and initiation of new green stormwater infrastructure projects. Since FY 2010, PWD and its partners have continued ramping up the design and construction of green stormwater infrastructure projects across the city. A total of 10 projects were in construction in FY2010. 16 projects completed design in FY2011, and 85 projects are in design in FY2011.

As of September 2011, the Philadelphia Water Department has completed or is in the process of designing:

- 91 Stormwater tree trenches
- 24 Rain gardens
- 12 Porous paving projects
- 9 Swales
- 7 Stormwater planters
- 33 Downspout planters
- 9 Stormwater bumpouts
- 6 Infiltration/storage trenches
- 3 Stormwater wetlands
- 1 Stormwater basin

This table and the map (**FIGURE 2**) provided in **APPENDIX E – PWD GREEN STORMWATER INFRASTRUCTURE PROJECT LIST** are frequently updated on our website, please refer to the following website: http://www.phillywatersheds.org/BigGreenMap for future updates to this information.

PWD's Land-based Program

The PWD's Land-based Program is part of a major city initiative to transform Philadelphia into one of the most sustainable cities in the country. The Land-based Program can be thought of as a series of individual programs, each targeting a different source of stormwater runoff. There are 10 key programs and associated subprograms that will be utilized to help PWD and the City of Philadelphia manage the existing impervious area.

With the development of the LTCPU, PWD will be detailing the Land-based Program and the tools that are needed to implement each program. The 10 major programs of the land-based Program are: Green Streets, Green Alleys and Driveways, Green Schools, Public Facilities, Green Parking, Public/Open Spaces, Green Homes, Green Industry, Green Businesses and Commerce, and Green Institutions.

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

Please refer to **CSO SECTION II.F.1 "CONTROL THE DISCHARGE OF SOLIDS AND FLOATABLES BY CLEANING INLETS AND CATCH BASINS"** on page 38.

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 new parcel-based stormwater billing system, plan review for development and re-development incentives, and working with PennDOT on the I-95 improvements.

<u>Parcel-based Stormwater Billing</u>

Under Philadelphia's new stormwater management regulations, development and redevelopment is helping to significantly reduce the amount of directly-connected impervious cover.

Please refer to **SECTION III.C.1.3 "IMPLEMENTATION OF STOMWATER BMPS AND LID - CONTINUE TO IMPLEMENT BEST MANAGEMENT AND LID DEMONSTRATION"** on page 126 for information on Parcel-based Stormwater Billing.

<u>I95 Redevelopment</u>

PennDOT is re-constructing the I-95 corridor within the City of Philadelphia to improve traffic flow, on the interstate and on the local roads near interchanges. In order to meet Philadelphia's stormwater regulations, PennDOT will pipe stormwater generated from the highway directly to the Delaware River. Since their stormwater drainage system is designed to prevent flooding on the elevated highway, the stormwater pipes will be large in diameter. PennDOT has agreed to work with PWD to over-size the stormwater pipes to the river. The increased capacity in these stormwater conveyance pipes will accommodate stormwater runoff from all future riverfront development between the interstate and the River, thereby disconnecting the area from Philadelphia's combined sewer system. All development or redevelopment projects regulated by the 2006 stormwater regulations are required to build two lateral pipes to the curb line, one for sanitary wastewater and a second for stormwater. Therefore, regardless if the waterfront development projects occur before or after the new separate stormwater pipes are constructed, disconnection of the waterfront area will occur with minor capital costs.. If all parcels between I-95 and the Delaware River are disconnected from the combined sewer system, it will reduce the total combined sewer service area of the City of Philadelphia by 2%.

The 2011 Master Plan for the Central Delaware depicts the waterfront area as fully built-out with high density development between I-95 and the Delaware River, including the "Uplands" from The Benjamin Franklin Bridge to Frankford Avenue, as shown in **FIGURE III.C.1-2**. This is indicated as its development potential due to proximity to the Northern Liberties neighborhood and DRWC's primary investment area at Festival Pier at the terminus of Spring Garden Street.

Figure III.C.1-2: Images from the Master Plan for the Central Delaware Showing Build out Development Between Interstate 95 and the Delaware River

Implementation Schedule

The schedule for disconnection from the CSO system will depend on PennDOT's construction timeline in combination with outside forces affecting waterfront development. This will require continuous coordination with PWD. PennDOT has proposed a general schedule of design and construction of six sections, from Race Street north to Academy Boulevard; and has hired engineering firms to manage the design of each section. **FIGURE III.C.1-3** illustrates the proposed schedule for the planned and designed segment of construction over the next five years. PennDOT is starting on the re-design and construction of the Cottman-Princeton Interchange (CPR) and the Girard Interchange (GIR), and will follow with the interchange and highway areas in between.

PennDOT has agreed to participate in a cost-sharing agreement to build the storm water pipes for the water front disconnection through their entire project area. Discussions between PWD and PennDOT to refine cost sharing and project details are ongoing through the stormwater plan review process for each section of highway expansion as each segment is planned and designed. For the first segment of highway to undergo construction (CPR), PennDOT will build a stormwater conveyance system and temporarily connect to a PWD outfall conduit below the regulator structure. For the second segment of highway construction (GR3), in approximately 2013, PennDOT will build new outfalls. PWD will provide assistance in acquiring permits for new stormwater outfalls and to use existing PWD utility right-of-ways. Once constructed, PWD will own and operate the new outfalls and pipes that are located between the river and the Water Quality (WQ) vortex treatment device, while PennDOT will retain ownership of the WQ device, the pipes and scuppers collecting stormwater runoff from I-

95. This segment will serve as a model to base future cost-sharing agreements on throughout the I-95 construction project.

In the coming five years, PWD will:

1. Coordinate with PennDOT to share costs of construction of stormwater infrastructure for each segment of I-95 construction
2. Monitor the progress of infrastructure and re-development
3. Estimate the area disconnected from the CSS system
4. Refine H&H models as needed

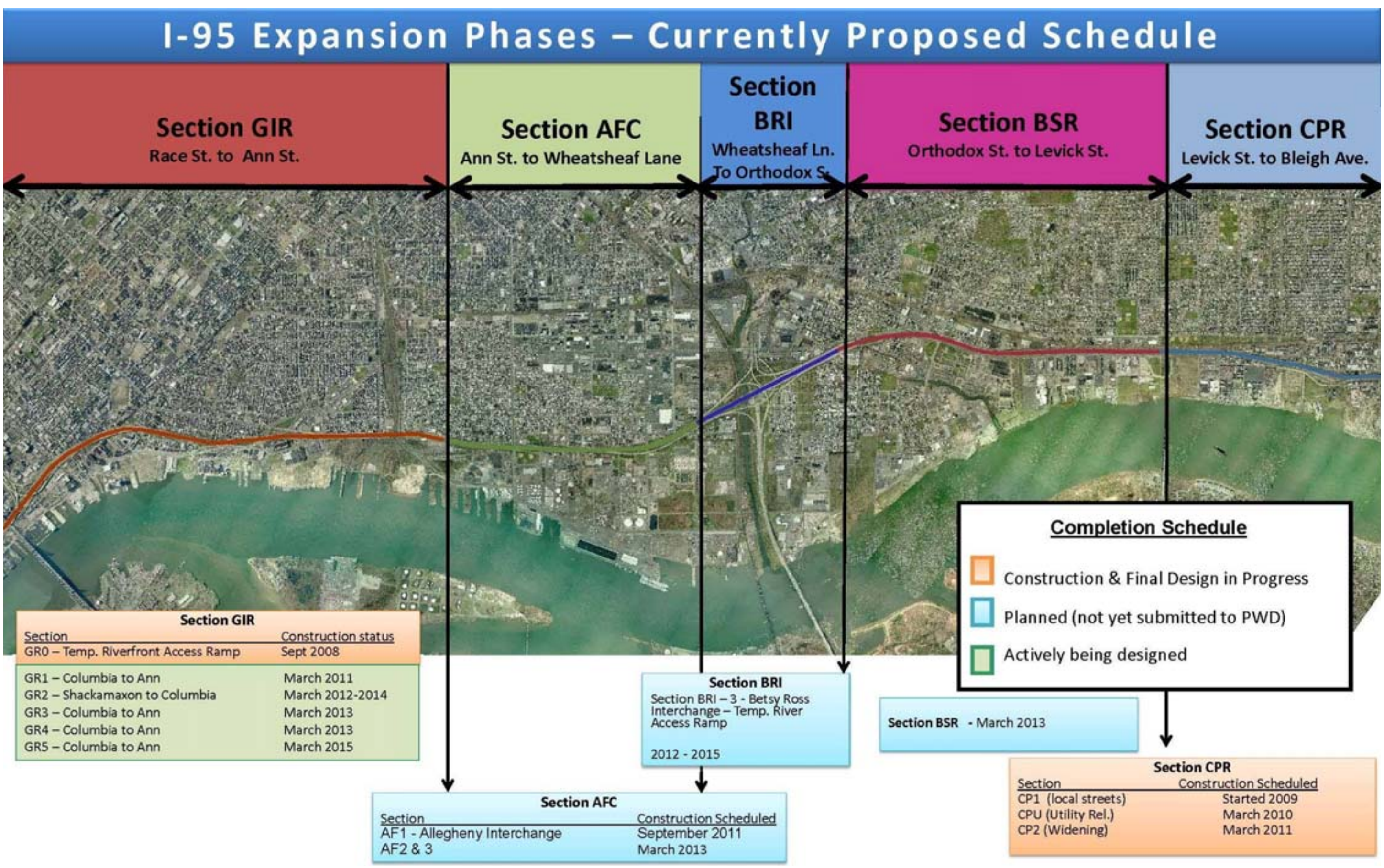


Figure III.C.1-3 Proposed Schedules for the PennDOT Interstate 95 Expansion Phases

Plan Review

Under Philadelphia's new stormwater management regulations, development and redevelopment is helping to significantly reduce the amount of directly-connected impervious cover.

Please refer to the Stormwater portion of the Annual Report **SECTION F.5 "POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT"** for more information on PWD's Plan Review work on page 237.

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

BMP Projects

The OOW is actively involved in numerous projects throughout the city that are increasing the urban tree canopy. These projects include planting street trees, installing stormwater management tree trenches, constructing vegetated bioswales, and other plantings. Please refer to **SECTION III.C.1.3 – IMPLEMENTATION OF STORMWATER BMPS AND LID** on page 128 for information on BMP projects.

Tree Planting

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 green stormwater infrastructure projects. Green stormwater infrastructure diverts stormwater runoff into a vegetated system where it either infiltrates into the ground or is stored and slowly released back into the sewer system. In FY2011, 374 trees were planted as part of green stormwater infrastructure projects and streetscape projects that included green stormwater infrastructure led by PWD and its partners. **TABLE III.C.1-4** provides a list of projects.

Table III.C.1-4 Trees Planted as Part of GSI Projects

Project Name	# New Trees
Lancaster Ave from N 58th St to N 63rd St	219
16th St between Passyunk Ave and Jackson St	9
Palmer St from Frankford Ave to Blair St	5
Hartranft School - 7th St, 8th St, and Cumberland St	6
Percy St from Catharine St to Christian St	0
Eadom Parking Lot Depaving - 5312-50 Eadom St	4
BLS	13
Queen Lane from Henry St to Fox St	6
PHS PennVest Tree Trenches - Reese St	4
PHS PennVest Tree Trenches - Earl St	4
PHS PennVest Tree Trenches - 9th St	4
PHS PennVest Tree Trenches - Front St	6
PHS PennVest Tree Trenches - 8th St	4
Benjamin Franklin Parkway from 21st St to 23rd St	90
Total Trees Planted	**374**

Ongoing stream restoration and wetland creation projects have and will continue to result in substantial tree and shrub planting in and around stream corridors throughout the City of Philadelphia. The Whitaker Avenue Stream Restoration project, constructed in FY 2011, included the planting of 752 trees and 2,256 shrubs. The Wises Mill Wetland Creation and Stream Restoration project, currently in construction, will result in the planting of 104 trees and 223 shrubs. The Cathedral Run Stormwater Treatment, currently in construction, will include 42 trees and 11 shrubs. Finally, the Bells Mill Stream Restoration, currently in construction, will result in the planting of 2,158 trees and 8,118 shrubs. Additionally, PWD has multiple stream restoration projects in planning or design that will result in additional tree and shrub planting in Philadelphia's stream corridors in the coming years.

PWD also encourages tree planting on private development by giving credits toward their stormwater management requirements.

The current city administration has adopted a goal of increasing urban tree canopy to 30% which is equal to planting an additional 300,000 trees city wide. This is a goal the PWD supports and will facilitate as possible.

Living the Partnership

In FY2011, PWD and PP&R began holding monthly meetings to advance programs and mutual interests. One of the subcommittees is dedicated specifically to street trees. Goals of this group include the coordination of site selection for street trees and the design of single tree pits that can receive and manage stormwater.

Tree Vitalize

PWD is an active partner and supporter of the Tree Vitalize program. Tree Vitalize was developed by the Pennsylvania Department of Conservation and Natural Resources (DCNR) in 2004 to increase the tree canopy in the five county Philadelphia area. The Southeast PATree Vitalize partnership is led by the PA Horticultural Society (PHS) and has partnered with numerous community groups throughout this area including the Philadelphia Parks and Recreation (PPR), Penn State Cooperative Extension, the Delaware Valley Regional Planning Commission, Morris Arboretum, and DCNR Service Foresters in order to work toward planting trees in neighborhoods lacking sufficient tree canopy.

During the 2011 Philadelphia International Flower Show (March 2011), PHS announced it's initiative to add one million tree in the 13 counties covering southeastern Pennsylvania, New Jersey, and Delware._Planting one million trees will help reach a goal of 30 to 40 percent canopy cover as the trees mature, in addition to creating jobs, strengthening communities, and improving air and water quality. In Philadelphia, PHS and PPR are working in support of the city's Greenworks sustainability plan, which includes a goal of planting 300,000 trees by 2015. In order to suppor this goal, PPR received $2.354 million from the Pennsylvania Infrastructure Investment Authority (PENNVEST) to dramtically increase tree canopy in North Philadelphia, this grant will cover the cost of procurring and planting approximately 2,500 trees at 42 sites and adjacent streets, along with two years of follow-up care to help the trees establish.

PHS /Tree Vialize is still working on streamlining its tree counting system and developing a yard tree program although in FY2011 it estimates that nearly 17,000 trees were planted, of which over 1,300 trees were planted in Philadelphia.

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

Please refer to **Section II.F.2 "CONTINUE TO FUND AND OPERATE THE WATERWAYS RESTORATION TEAM (WRT)"** on page 39 for information pertaining to the Waterways Restoration Team.

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

Please refer to **Section II.F.2 "CONTINUE TO FUND AND OPERATE THE WATERWAYS RESTORATION TEAM (WRT)"** on page 39 for information pertaining to the Waterways Restoration Team.

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. NSCD aims to restore receiving waters in several ways, including the reconstruction of stream geometry to accommodate present day flows, reestablishing stream access to the flood plain, installing in-stream energy dissipating devices, and creating low velocity nulls by using vernal pools to achieve flood attenuation and treatment. The exploration of the NSCD technique is required in **SECTION 2, STEP 3B** of the City of Philadelphia MS4 NPDES permit on page 220. The permit requires the City to employ and evaluate NSCD as a viable rehabilitation option for channelized, eroded, scoured, silted, and inhospitable streams within Philadelphia County. These techniques are being deployed by PWD to work toward improving the healthy living resources of Philadelphia, including the number, health, and diversity of benthic invertebrates and fish species in watersheds impacted by stormwater.

Cobbs Creek Stream Restoration

In 2008, PWD contracted with the joint venture team of Biohabitats and O'Brien & Gere to guide the long-term vision of aquatic ecological restoration work planned in the Cobbs Creek Watershed. Over the next 20 years, PWD intends to implement natural stream channel and wetland design work along the main stem of the Cobbs Creek within the City of Philadelphia. Anticipated benefits of this riparian corridor restoration are reduced stream bank erosion, decreased channel deposition and scour, and restoration of the natural functions of aquatic habitat and ecosystems.

The joint venture team has been contracted to implement the assessment and project feasibility phase of the plan. During FY 2010, PWD completed the *Cobbs Creek Stream Restoration Feasibility Study*. The project area for this Study includes the stream corridor and floodplain from City Line Avenue to Woodland Avenue, representing more than seven miles of stream. The final report documents impairments throughout the project area and provides conceptual recommendations. Throughout FY 2010, PWD has been conducting outreach with applicable stakeholders along the entire corridor and has been working to prioritize recommended actions moving forward.

PWD, in partnership with the Philadelphia Department of Parks and Recreations, initiated plans to begin the design phase on multiple reaches of Cobbs Creek in FY 2011. An RFP for design phase services was developed for stream restoration in Reaches 6 – 8 of Cobbs Creek (as identified in the Cobbs Creek Feasibility Study, 2010). In total, this project will set out to restore more than 8,000 feet of stream corridor During FY 2012, PWD will award this contract and give notice to proceed to the selected contractor. PWD anticipates a 24 – 30 months design schedule required to accomplish all associated tasks including full contract drawings and specifications, permitting, and public outreach.

Tacony Creek Stream Restoration

In 2008, PWD contracted with the Stantec to guide the long-term vision of aquatic ecological restoration work planned in the Tacony Creek Watershed. Over the next 20 years, PWD intends to implement natural stream channel and wetland design work along the main stem of the Tacony Creek within the City of Philadelphia. Anticipated benefits of this riparian corridor restoration are reduced stream bank erosion, decreased channel deposition and scour, and restoration of the natural functions of aquatic habitat and ecosystems.

During FY 2010, PWD completed the *Tacony Creek Restoration and Ecosystem Enchancement Program Feasibility Study*. This document provides a comprehensive vision of the biological, physical, social impairments present within the Tacony Creek corridor from Cheltenham Avenue to Castor Avenue. Upon assessing these impairments, the Study presents and maps restoration opportunities throughout each individual defined reach.

Moving forward, PWD, in partnership with the Philadelphia Department of Parks and Recreations, initiated plans to begin the design phase on multiple reaches of Tacony

Creek in FY 2011. An RFP for design phase services was developed for stream restoration in Reaches 4-5 of Tacony Creek (as identified in the Tacony Creek Feasibility Study, 2010). In total, this project will accomplish almost 8,000 feet of stream corridor restoration. During FY 2012, PWD will award this contract and give notice to proceed to the selected contractor. PWD anticipates a 24 – 30 months design schedule required to accomplish all associated tasks including full contract drawings and specifications, permitting, and public outreach

Marshall Road

The concept behind this project was to implement a sustainable approach to stream habitat restoration that would mitigate the impacts of urban development and related hydrologic and hydraulic modifications. By enlisting the members of the Darby-Cobbs Watershed Partnership and national experts, this local watershed restoration effort restored 1000 linear feet of the Cobbs Creek stream corridor between Pine Street and Cedar Avenue using natural restoration techniques. The primary goal of this project was to identify and document existing stream conditions, develop conceptual alternatives, prepare final design and construction drawings, and stabilize a reach of Cobbs Creek using fluvial geomorphologic principals and natural channel design techniques. In general, this approach to stream bank stabilization combines the disciplines of fluvial geomorphology, hydraulics, hydrology, and applied ecology. This approach depends on accurate identification of stream classification type, an understanding of hydrologic actions within the watershed and their effects on a stream channel, and clearly defined restoration goals. Sound fluvial geomorphologic principles and an understanding of the natural stream system are integral to creating a stable stream channel that facilitates the restoration of the riparian ecosystem. This project was constructed during the Fall 2004, with additional planting occurring during the Spring 2005.

During the FY 2009 monitoring period, PWD implemented its full NSCD Physical/Biological/Habitat monitoring protocol to comprehensively assess the performance of this natural stream channel design project. This effort, conducted in June, 2009, is summarized in a comprehensive monitoring report which is available upon request. During FY 2010, annual monitoring was conducted. This included quarterly photo monitoring at designated photo points, as well as comprehensive physical monitoring of the restoration site, which was performed in April, 2010.

During FY 2011, PWD updated the comprehensive monitoring report with the monitoring data collected during FY 2010 and continued collecting monitoring data and implementing the Physical/Biological/Habitat monitoring protocol. PWD also began efforts to complete a detailed two-dimensional hydrodynamic model to assess the available aquatic habitat available in the Marshall Road reach. To date, a detailed topographic survey was conducted in combination with a detailed substrate assessment. In FY 2012, this effort, as well as all other monitoring efforts at Marshall Road, will be presented in an updated comprehensive monitoring report that will be written during this reporting period.

Whitaker Avenue

The Tacony Creek – Whitaker Avenue stream restoration project is situated in the Tacony Creek Park located of Roosevelt Boulevard (US 1) downstream of the Whitaker Avenue Bridge and upstream of the Wyoming Avenue Bridge in northeastern Philadelphia. This project will implement a sustainable approach to stream habitat restoration that will mitigate the impacts of urban development and related hydrologic and hydraulic modifications over approximately 2,000 feet of stream length. PWD has assembled a project team to develop an approach for the restoration of Tacony Creek that encompasses the replication of natural hydrologic and ecological cycles, sustainability, enhancement to riparian and in-stream aquatic habitat, improved aesthetics, and significant cost savings over structural solutions. The results of this approach include not just stable stream bank geometry, but also long term ecological stability.

The project site involves 2 stakeholders, Fairmount Park Commission and the Scattergood Foundation, both of whom are partners in working to see this project to fruition.

During FY 2009, PWD finally received joint permit approval from PADEP and USACE. In addition, final plans and specifications were completed. In FY 2010, PWD entered into a cost-share construction agreement with USACE to implement the Whitaker Avenue stream restoration design. After extensive review by USACE, the project was bid and awarded.

During FY 2011, PWD, in partnership with the USACE – Philadelphia District, bid and constructed this project. Construction started in August, 2010 and was completed in November, 2010.

During the spring, 2011, PWD began its monitoring program at this site. The primary focus of these early efforts was the development of a two-dimensional hydrodynamic model to assist in quantifying the aquatic benefits and ecological uplift observed at this restoration site. In FY 2012, PWD will draft the first comprehensive monitoring report for the Whitaker Avenue Stream Restoration project.

Redd Rambler

Over the last three and a half years, PWD has worked diligently with the 89 property owners that border this stream. While this has caused significant delays in the design process, PWD also has felt that these efforts have been worthwhile in ensuring the resident's confidence in the stewardship of the City and its environment.

At this time last year, PWD was dealing with property owners along the stream corridor to get the necessary level of project buy-in. Unfortunately, due to the significant land ownership issues associated with this project, there have significant delays that may actually affect the feasibility of this project. PWD has continued to work with the residents adjacent to Redd Rambler to obtain Temporary Construction Access agreements along the entire project area. While we have received more than 60% of the necessary agreements, the remaining residents have been hesitant to provide PWD with permission to perform work in all areas. In addition, PWD will still require legislation to be passed in City Council to extend Right-of-Way in some areas to assure that PWD can continue to operate and maintain this project in the future. Each of the issues has indefinite time frames associated with them. During FY 2010, PWD continued to work with property owners adjacent to Redd Rambler Run in attempt to get full buy-in on the project. Unfortunately, multiple key property owners were not supportive of this project and it was put on hold in February 2010.

<u>Bell's Mill</u>

Bells Mill is a 2nd order tributary to Wissahickon Creek. The tributary arises from an outfall near the intersection of Lykens and Bells Mill roads. The restoration/stabilization design for Bells Mill Run will focus on specific restoration areas. Streambank stabilization will make use of standard rock vanes, "J" vanes, cross vanes, wing deflectors, root wads, grade control measures and live branch layers. These structures will allow for improved habitat and sediment transport dynamics while protecting critical sewer infrastructure.

In FY 2008, PWD started the design process on restoring approximately 6,000 feet of impaired stream of Bell's Mill Run, a tributary in the Wissahickon Creek Watershed that flows directly into Wissahickon Creek. During FY 2009, PWD continued the design process on this stream. To date, PWD has completed the 60% Design and has submitted to PADEP for permitting. During FY 2010, PWD finalized the design of this project.

In FY 2011, funding was allocated for this project, allowing PWD to proceed with bidding. Through FY 2011, the project was bid and awarded and permitting was finalized. During FY 2012, will be fully constructed and PWD will look to immediately commence with project monitoring.

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

<u>Saylor Grove Wetland in Wissahickon Watershed</u>

A one-acre stormwater wetland was constructed in the fall of 2005 on a parcel of Fairmount Park known as Saylor Grove. The wetland is designed to treat a portion of the 70 million gallons of stormwater generated in the sewershed per year before it is discharged into the Monoshone Creek. The Monoshone Creek is a tributary of the Wissahickon Creek- a source of drinking water for the City of Philadelphia. The function of the wetland is to treat stormwater runoff in an effort to improve source water quality and to minimize the impacts of storm-related flows on the aquatic and structural integrity of the riparian ecosystem. This project is a highly visible urban stormwater BMP retrofit in the Wissahickon Watershed.

During the FY 2009 reporting period, PWD resurveyed the Saylor Grove to determine the amount of sedimentation taking place within the facility. Approximately 22,000 cubic feet of material accumulated within the first two and a half years since construction. In addition, invasive plant species have colonized within the facility. During the FY 2010 reporting period, PWD dredged portions of the stormwater wetland, removing more than 150 tons of sediment. Invasive species management was also conducted in partnership with the Fairmount Park. PWD also continued water level monitoring in support of calibrating the H&H model for the facility.

In FY 2011, PWD completed all necessary water level monitoring and finalized calibration of the H&H model. This model allows PWD to assess the stormwater management performance of Saylor Grove using actual rainfall data. In FY 2012, PWD will aim to complete its comprehensive monitoring at Saylor Grove, culminating in a comprehensive monitoring report documenting the physical, biological, and chemical performance of the facility.

Wises Mill Wetland in Wissahickon Watershed

Wises Mill Run is a steep first-order tributary to the mainstem of the Wissahickon Creek. The Wises Mill Run watershed consists of a 92 acre southern portion and a 169 acre northern portion that merge just north of Wises Mill Road before meeting the Wissahickon Creek. Both branches are negatively affected by urbanization and large storm events. Severe entrenchment has occurred in both branches and excessive amounts of sediment have been transported to the Wissahickon Creek. Picking up on the restoration work on the 250 foot reach constructed by PWD's Waterways Restoration Team, during FY 2008, PWD commenced the design of a stormwater treatment wetland on a 2-acre area of Fairmount Park. The wetland will infiltrate, detain, and treat a portion of stormwater from a 90-acre watershed prior to discharging to the headwaters of Wises Mill's lower branch. In addition, this effort aims to restore and stabilize areas of Wises Mill Run that have been significantly undermined by stormwater infrastructure and dams on this stream. These efforts will target several hundred feet of stream along the 6,800 foot long tributary to Wissahickon Creek. Overall, sediment erosion will be reduced and aquatic and macro-invertebrate life will be improved.

During FY 2010, PWD received final necessary permits, and bid and awarded this project.

In FY 2011, PWD began construction of this facility with completion expected by December, 2011.

Cathedral Run Stormwater Wetland

Cathedral Run is a 1st order tributary to Wissahickon Creek. The stream originates from springs downstream of Courtesy Stables near the intersection of Cathedral and Glen Campbell Roads. PWD is designing a stormwater treatment wetland just west of the current location of outfall W-076-01. The wetland will be located in a natural depression area, approximately one acre in size. The project will provide more than 94,445 ft^3 of storage and will substantially reduce flows to an impaired reach of Cathedral Run. During dry weather, the facility will provide one acre of valuable wet meadow habitat.

During FY 2010, PWD received final necessary permits, and bid and awarded this project.

In FY 2011, PWD began construction of this facility with completion expected by December, 2011.

Gorgas Run Stormwater Wetland and Stream Restoration

Gorgas Run is a steep headwater tributary to the Wissahickon Creek with a drainage area of 499 acres. Due to high peak stormwater flows, Gorgas Run has been severely degraded and is rated as an 'F' Type stream channel. To mitigate the impacts of development in the Gorgas Run watershed, PWD is proposing to create a stormwater treatment wetland facility to manage stormwater prior to discharge into Gorgas Run. The facility could potentially provide over 200,000 ft^3 of treatment volume, significantly reducing the peak flows and volumes impacting Gorgas Run, and eventually Wissahickon Creek. In addition, PWD is proposing to apply NSCD principles to restore the 1,800 feet of stream channel that encompasses Gorgas Run. In combining these efforts, PWD believes that the quality of both Gorgas Run and Wissahickon Creek will be improved. During FY 2010, PWD began conceptual design of this project, which included topographic survey, soil borings, and groundwater monitoring wells.

During FY 2011, PWD continued to move forward with final design plans and submitted all necessary permit applications, with hopes of constructing this project during FY 2012-13.

Indian Creek Stream Daylighting & CSO Storage Project

The Cobbs Creek Integrated Watershed Management Plan dated June 2004 recommends implementation of this project as a means to reduce streambank and channel deposition and scour, and to protect and restore the natural functions of aquatic habitat and ecosystems, streambanks, and stream channels. Without implementation of this project, the Cobbs Creek and Indian Creek Watersheds will continue to degrade in terms of environmental quality, aquatic habitat, and public health and safety preventing the City from obtaining its goal of reduction or elimination of point source discharges of pollutants to its watersheds.

This project involves the design and construction of approximately 650 to 1,000 feet of new stream channel that connects the West Branch Indian Creek to the East Branch Indian Creek and bypasses the combined sewer system. The project would divert the creek out of the existing 700-foot brick culvert and restore the surrounding stream channel, which is severely degraded and prone to flooding. In addition, the vacated culvert will serve as storage for the majority of CSO discharges from C_05 during wet weather and release the flow back to the collection system as capacity becomes available for conveyance to the Southwest Water Pollution Control Plant (SWWPCP). PWD initiated the project as part of its watershed management program, completing the preliminary design effort.

PWD quantified the estimated improvements to CSO overflows using the period 1990-91, 93-94, 96 & 98. This 6-year period is representative of the long-term rainfall record observed at the Philadelphia International Airport and is consistently used by PWD when quantifying CSO abatement. Through these proposed modifications, 180,000 gallons of storage will be available to store flow from the SWO of regulator C_05 that would otherwise discharge directly to Indian Creek. With this amount of storage available, average annual overflow frequency from C_05 would decrease from 24 per year to 3 per year with a reduction in discharge volumes from 2.9 to 1.2 million gallons per year.

One of the major goals of PWD is the reduction or elimination of point source discharges of pollutants to its watersheds. This is especially important in the more sensitive receiving streams and tributaries that are found in the Cobbs Creek watershed. The daylighting of the West Branch Indian Creek will provide a convenient and cost-effective opportunity of achieving this goal.

The benefits of both the modification of existing infrastructure and the day-lighting of West Indian Creek include:

- Stream bed and bank stabilization.
- Habitat creation/enhancement.
- Elimination of the maintenance/debris accumulation at the culvert intake wall.
- An average annual CSO volume reduction from 2.9 to 1.2 million gallons (58% reduction) from regulator C_05.
- An average annual reduction in CSO frequency reduction from 24 to 3 overflows per year from regulator C_05.

During FY 2010, PWD entered into a design-construction agreement with USACE-Philadelphia District to move towards implementing this project and the preliminary design was completed.

During FY 2011, PWD continued to work with USACE moving the project design to 60% plans. In the coming year it is expected that final plans and specifications will be completed. Once this milestone has been reached, the project team will aim to allocate funding for construction and bid the project.

Watershed Mitigation Registry

The City of Philadelphia's Watershed Mitigation Registry (WMR) is an innovative OOW program initiated in 2007. The 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. The intent of the WMR is to facilitate the matching of projects that the City of Philadelphia has determined to be high priority elements of its Integrated Watershed Management Plans (IWMPs) with those mitigation needs that arise from waterfront development and projects, transportation improvement projects, or other development and redevelopment projects. The selection process requires close coordination among the developer, the City of Philadelphia, the Pennsylvania Department of Environmental Protection (PADEP), and the US Army Corps of Engineers (USACE). An important part of the process is the development of a procedure to compare the value of the losses at the proposed development or redevelopment site with the environmental value that would be achieved at proposed mitigation projects. This procedure has been completed and is awaiting comments. As Philadelphia developed over the past 200 years, many of its streams, riparian corridors and aquatic resources have been lost or degraded. The remaining aquatic and riparian areas are critical resources to the region. Major impacts include the impairment of almost every mile of stream within Philadelphia, impediments to migratory fish passage, loss of habitat and wetlands, degraded water quality, etc. Even remaining areas of high value are threatened, such as the impacts of future degradation of the Cobbs Creek on Heinz Wildlife Refuge.

Though the past impacts have been considerable, significant opportunities to restore and improve the riparian corridors and aquatic resources within Philadelphia are available and are being strongly supported by a range of initiatives Since 1997, the City of Philadelphia has invested millions of dollars in creating watershed management plans to advance the restoration of riparian environmental resources. Since 1997, the Philadelphia Water Department (PWD) and the Fairmount Park Commission (FPC) have invested millions of dollars in creating environmental resource inventories (including wetland inventories) for the City of Philadelphia, and integrated watershed management plans for environmental and aquatic resource impact recovery. These plans are based on park master plans, source water protection plans, river conservation plans, and recent field work. Efforts by PWD and FPC parallel other City planning initiatives such as GreenPlan Philadelphia, which is the City's comprehensive open space plan.

Planning work is also being conducted to identify stream and wetland enhancement opportunities, which are compiled into a Watershed Mitigation Registry. Philadelphia's Watershed Mitigation Registry takes a watershed approach to aquatic resource protection by considering the entire riparian system and its ecosystems as interdependent. This approach is consistent with federal guidelines for wetlands mitigation. Implementation of projects organized within a comprehensive watershed management framework help achieve greater environmental benefit at reduced cost by addressing environmental, regulatory, and local community concerns in an integrated fashion.

The project registry is designed to function in a similar manner to wetland mitigation banks, with important differences. Unlike mitigation banks that consist of completed wetland projects ready for purchase, the mitigation registry presents conceptual plans for projects ready to be designed and constructed. These plans encompass a range of riparian corridor improvements, including new and restored aquatic habitats, streambanks, wetlands, and flood and stormwater management. Although much research has been conducted to characterize the relative effectiveness of different wetlands types at performing a range of different environmental functions, no single method provides a technique for assessing the effectiveness of riparian corridor improvements to mitigate impacted wetlands.

The combined result of the City's planning efforts is the identification of numerous areas targeted for restoration and enhancement, many of which are now listed in the WMR for the Philadelphia Region. Thus far the WMR has compiled 272 targeted areas identified in the aforementioned inventories and management plans. Targeted areas are categorized as wetland creation (72), wetland enhancement (88), wetland enhancement – invasive management (24), tidal mudflat - wetland restoration (33), stream restoration (41), stream daylighting (2), pond buffer (2), and wetland preservation (4). The WMR functions as a straightforward way to search for a project by watershed, project type, project size, and a variety of other variables. Reports, which include pictures and a potential project description, are automatically generated based on queries allowing information to be disseminated to interested parties in a timely fashion.

A registry program utilizing these projects would help achieve greater environmental benefit at reduced cost by addressing environmental and/or regulatory requirements in an integrated fashion. Selected projects could achieve goals encompassed by FPC Master Plans, PWD's SMP, CSOMP, and water quality goals and pollutant reduction targets set by total maximum daily loads (TMDLs). These projects will also help mitigate damage to the environment caused by infrastructure improvements, create economic benefits, and improve recreational value. In addition, many of these projects are located in areas with low income and minority neighborhoods that would be enhanced by the proposed upgrades.

During FY 2009, PWD worked with multiple interested parties on the implementation of projects at some of the registry locations. For the most part, these parties represented developers with wetland mitigation needs for their projects based on permit requirements imposed by USACE and PADEP.

During FY 2010, PWD began to investigate the feasibility of sponsoring an In-lieu Fee (ILF) Program following the guidelines set forth by USACE/EPA regulations. A draft prospectus was developed and informally reviewed by USACE and PADEP. As discussion occurred between PWD, PADEP, and USACE, it became apparent that a partnership between PADEP and PWD may be the most appropriate vehicle to implement a viable ILF program in the Philadelphia region.

In FY 2011, PWD began working on formalizing its role in the statewide ILF program being submitted by PADEP. PWD took part in multiple meetings and conference calls with PADEP. In addition, PWD drafted a Memorandum of Agreement in effort to formalize, PWD's role in this program. This document is still under review by PADEP. In the coming year, PWD aims to come to an agreement with PADEP formalizing the Department's role with respect to ILF mitigation the Philadelphia Region.

Tidal Schuylkill Wetland Restoration

Historically, freshwater tidal wetlands extended from Trenton, New Jersey to Chester, Pennsylvania, but urbanization has reduced the area by 95%, with only small remnants of freshwater tidal wetlands on the Pennsylvania side of the Delaware River. Approximately 76% of the land area surrounding the tidal portion of the Schuylkill River is urban or residential. The banks along the lower reach, from the Delaware River confluence to stream mile 5, are dominated by industrial uses such as oil refineries. Continuing upstream, the River runs though Center City Philadelphia, a heavily developed area. The tidal Schuylkill is impacted by urban runoff, industrial sources, and combined sewer overflows.

Wetlands are essential habitat highly utilized by fish for foraging, nesting, spawning, and refuge from predators or environmental extremes (i.e. temperature). Particularly for migratory fish, wetlands play an important role in establishing a safe and productive migratory corridor to and from spawning grounds. Tidal freshwater wetlands are also important habitat for migratory birds and waterfowl. The Philadelphia area is within the Atlantic Flyway and important during both northbound and southbound migrations.

PWD assessed the tidal Schuylkill River for existing wetland areas and potential wetland restoration areas in October 2006. One existing wetland area (0.5 acre) and 13 wetland restoration areas (29.2 acres) were identified and mapped. The area between the Mingo Creek surge basin and the main channel of the Schuylkill River ranked first priority for wetland restoration.

The project area was surveyed in May and October 2007 in order to identify and delineate suitable planting areas. A staff gage was installed at that time and monitored during a tidal period to estimate maximum and minimum water depths. A planting plan was created based on maximum water levels and land ownership. Only the portion of the site owned by the City of Philadelphia was considered for planting. Grazing by Canadian geese was considered a barrier to a successful planting and goose exclusion fence was installed in 16ft grids in an attempt to overcome this issue.

PWD was awarded a grant from National Fish and Wildlife Foundation through the Delaware Estuary Watershed Grants Program for a sum of $21,000. The grant funded the purchase of vegetation native to the Philadelphia area as well as goose exclusion fence and other necessary supplies.

The project area was planted by PWD staff in May and June 2008. Vegetation chosen for the site includes: spatterdock (Nuphar advena/lutea), pickerelweed (Pontederia cordata), duck potato (Sagittaria latifolia), and arrow arum (Peltandra virginica). Monitoring of the area will be carried out twice a month through August 2008 and then will be reduced to once a month, during the growing season, through 2011.

During the initial monitoring period, it became evident that grazing was still a major factor influencing the early growth and establishment of the selected vegetation. A compounding stressor to plant persistence was the height of tide in the area. The plants chosen for the site were not able to thrive in the extremes of water cover in the planting area. Some species (e.g., , Spatterdock) demonstrated a weak growth form that resulted in leggy open foliage as opposed to the tight clumping growth seen in lower tidal portions of the Schuylkill and Delaware Rivers. Foliage that did not suffer from stunted growth was heavily grazed by waterfowl and perhaps fish and reptiles. This grazing occurred despite the installation of a protective fence. Another significant impediment to the establishment of an emergent plant community was the presence of flotsam carried in by the tide and during periods of high flow. This material, some of it quite large, destroyed both the protective fencing and the associated vegetation. It is noteworthy that some of the fenced areas did in fact thrive after a top cover of fishing line and string were installed over the plants. This top cover minimized the impacts from birds and assisted with the re-establishment of certain plant species prior to winter die-off.

The second phase of the suitability study was contingent upon the relative success of any remaining emergent vegetation becoming established after the first growing season. Unfortunately, the entire planting area was obliterated by flotsam that had accumulated during the winter period. The planting grids were essentially scoured away by large debris. Only a few remnant posts were left in place. All of the fence material was eliminated and a majority of the posts that held the fence were either missing or driven deeply into the substrate. Visual inspections revealed that none of the plantings persisted through the second season.

It is apparent that the persistence and stability of submersed and emergent plant communities within the tidal reaches of the Schuylkill River is highly predicated on the establishment of a stable and well-defined system of protective measures that can attenuate tidal influences, minimize wave action and deflect large heavy objects. The current study reinforces this theory that without these measures, establishment of an intertidal wetland community is not feasible.

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

The PWD is investigating the option of a project to create fish passage on the Cobbs Creek. The purpose of the Cobbs Creek fish passage restoration project would be to investigate, select, design, and construct the best alternative to reestablish fish passage on Cobbs Creek. Two small dams represent opportunities to improve fish passage on Cobbs Creek. The lower dam, Woodland Dam, located close to the Cobbs Creek Parkway and Woodland Avenue, is the first impediment to fish passage on Cobbs Creek. It is a low concrete structure below which the creek is tidal. The upper dam, Millbourne Dam, situated on Cobbs Creek near 65th and Race Streets, is a rock structure. Both dams are owned by the City of Philadelphia's Fairmount Park. In August 2009, PWD entered into a design agreement with USACE to develop a fish passage solution at the Woodland Dam. During September, 2009, PWD conducted a fish assessment of the area below and above the Woodland Dam to determine the Dam's impact on fish passage. PWD and USACE also worked with the PA Historical and Museum Commission (PHMC) and PADEP to determine what action would be needed to permit modification to the Woodland Avenue Dam. In April, 2010, a Phase 1 Archeological Survey was completed and submitted to PHMC in June, 2010.

PWD and USACE worked together during the remainder of 2010 to develop an acceptable fish passage solution, while maintaining the historic integrity of the site to the greatest degree possible. During this time, the project team recognized concerns with the fate of the streambed and stream banks requiring the need for additional study. In March, 2011, a topographic survey of the 2,100 feet reach was commissioned. The survey was completed in June, 2011. Over the coming year, PWD and USACE will continue to work toward a design solution that will maximize fish passage, while maintaining a stable, healthy stream channel and corridor upstream of Woodland Dam. To accomplish this task, USACE will produce a comprehensive HECRAS model of the Woodland Dam reach. This modeling will allow for more detailed design to move forward in the coming year.

Fairmount Fish Ladder

The Fairmount Dam fishway is situated within the Philadelphia City limits on Fairmount Park property. Completed in 1979, the fish ladder was constructed on the western side of the Fairmount Dam. The fish ladder has been maintained largely by the voluntary efforts of the Friends of the Fairmount Fish Ladder. Effects of time and natural forces damaged the fish ladder and the degradations severely limited the ladder's efficiency at passing migratory fish species.

In 2002, PWD partnered with the Philadelphia District, U.S. Army Corps of Engineers, to improve and revitalize the Fairmount Dam Fishway, pursuant to Section 1135 of the Water Resources Development Act of 1986. During 2003, PWD entered into an agreement with Alden Research Laboratories to model the current hydrologic conditions within the fishway and provide model alternatives based on expertise from the United States Fish and Wildlife Service. Between 2003 and 2005, scientists and engineers from USACE completed final designs for the fishway restoration project, including the creation of an outdoor educational area adjacent to the fishway.

In March 2008, ABC Construction began staging for the preliminary construction phase of the project and on May 18th 2009, PWD and partners on the project celebrated the completion of this restoration project. Structural modifications, increased attraction flow, and real-time monitoring capabilities have been incorporated into the new design. Moreover, an intensive biomonitoring strategy and educational outreach program have been implemented to estimate populations, assess fish passage efficiency by migratory and resident species, and to increase public involvement and awareness.

In September 2009, PWD and U.S. Army Corps of Engineers entered a joint agreement to modify the existing entrance channel gate structure in the tidal portion of the Schuylkill

River. Modifications include the re-design and fabrication of the gate, upgrades to the existing actuator and installation of the structure within the fishway exit channel. These modifications were performed to increase fish passage efficiency while also addressing various operation and maintenance issues.

In October 2010, U.S. Army Corp of Engineers completed the aforementioned modifications. During the 2011 monitoring year (April 1st-July 1st), the Fairmount Fishway operated at full capacity without any stoppages due to operational failures. Fish passage data is currently being reviewed and documented.

PWD Sanitary Line Natural Rock Ramp Fishway

After Frankford and Rhawn St. dam remnants were removed in 2006, the downstream-most obstruction to anadromous fish passage in Pennypack Creek Watershed was a PWD sanitary sewer line approximately 450m upstream of the former Frankford Ave. dam. Because this is an active sewer line that would be expensive to relocate, a rock ramp fishway was constructed in 2007 to raise the water surface elevation and provide fish passage at this site.

PWD has completed phase 1 of the physical monitoring activities planned for the rock ramp. A stream gage has been installed to record stream stage which will be correlated to the nearby Rhawn St. USGS gage station. A detailed post-construction survey of the rock ramp is underway in order to support a River 2D hydraulic model of the rock ramp. Preliminary work has shown that a very high spatial resolution of survey points is required to accurately model the effects of the individual boulders in the rock arches with River 2D, so additional surveys and alternative modeling approaches are being evaluated. PWD hopes to estimate velocities within the rock ramp at varying flow conditions and compare physical conditions to fish swimming capabilities.

PWD has also conducted rapid, qualitative fish surveys in the tidal Pennypack Creek by boat and tote barge electrofishing since 2006. 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. The future of shad restoration in Pennypack Creek remains uncertain. PFBC did not stock Pennypack Creek with Hickory shad fry in 2010, but due to an increase in the amount of fry available did stock Pennypack Creek with 1.5M hickory shad fry in May 2011.

It is possible that Hickory shad stocked in Pennypack Creek have failed to "imprint" on Pennypack Creek and have joined Delaware River Runs, though thus far no otolith-tagged fish released in Pennypack Creek have been collected from either the Delaware River or major tributaries where collection and subsequent tag verification is performed by PFBC. It is also possible that Hickory shad fry are not surviving to maturity. Hickory shad are stocked at a much earlier phase of development than American shad and thus may be more susceptible to mortality, whether due to predation, lack of appropriate food, poor water quality, or physical habitat factors.

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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

The Philadelphia Water Department continues to support the Environment, Stewardship & Education Division of the Philadelphia Parks and Recreation (formally Fairmount Park Commission), which undertakes a broad range of environmental restoration activities throughout the park system. These activities occur primarily on the 5,600 acres of natural lands in the system's seven largest watershed and estuary parks. These are Poquessing Creek, Pennypack, Tacony Creek, Wissahickon Valley, Fairmount (East/West), Cobbs Creek and Franklin Delano Roosevelt parks.

The restoration activities include:

- Controlling and removing exotic invasive plants and replacing them with species native to Philadelphia County.
- Increasing the density and diversity of native plants in riparian zones, forests and other areas.
- Converting mown lawn to meadows where the lawn is not currently used for active recreation.
- Managing meadows, including periodic mowing to control tree growth.
- Constructing new and restoring/expanding existing wetlands.
- Removing or modifying existing dams.
- Restoring eroded/degraded stream channels and stabilizing streambanks using bioengineering techniques.
- Repairing and stabilizing erosion gullies on forested slopes.
- Constructing berms, diversions, grassed waterways, infiltration trenches and filter strips to control stormflow from impervious services and mown areas.
- Controlling access to reduce trash dumping and damage by vehicles.

Riparian Buffer component of Stream Restorations

Riparian buffer enhancement will be included 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, the 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 135 for more information on stream restoration projects.

Please refer to **SECTION III.C.2.4 WETLAND ENHANCEMENT AND CONSTRUCTION** on page 139 for more information on how riparian buffer projects will be included in the Watershed Mitigation Registry.

WRT projects

Please refer to **SECTION II.F.2 "CONTINUE TO FUND AND OPERATE THE WATERWAYS RESTORATION TEAM"**on page 39 for information on this topic.

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)

Darby Creek RCP

A River Conservation Plan was completed by the Darby Creek Valley Association (DCVA) for the Darby Creek watershed drainage area in 2005.

Tacony-Frankford RCP

The Tacony-Frankford River Conservation Plan (RCP) is a holistic plan to improve the Tacony-Frankford watershed. It is developed through a collaborative process of local organizations and residents, and addresses various types of projects that will make the watershed a better place to live. It addresses history, water quality, culture, art, parks, trails, youth education, municipal education, and more.

The goal is to create a grassroots driven watershed conservation plan. The plan reflects the character of the watershed and the issues and concerns of the residents of the watershed. The planning process also creates or enhances partnership possibilities among plan participants.

The RCP was completed in July of 2004.

Pennypack RCP

The Pennypack Partnership developed a request for proposals for a consultant to lead the data collection and public outreach components of the plan, under the guidance of the RCP team. The consultant F.X. Browne, Inc. was selected to oversee both the data collection and public outreach components of the RCP and began this work in the Fall

2003. In January 2004, the first RCP Steering Committee took place and a public outreach schedule and suggested public workshops were discussed and planned for the spring.

The RCP Plan was completed in December 2005. Work to implement some of its recommendations will continue into the future and will act as a platform for the development of a watershed management plan.

Poquessing RCP

The final Poquessing Creek Watershed River Conservation Plan (RCP) was completed in July 2007. The final RCP report was submitted to the Department of Conservation and Natural Resources in the winter of 2007 to be considered for the Pennsylvania Rivers Registry.

Delaware Direct RCP

In the spring of 2007, CH2M Hill (formerly Cahill Associates), along with the Pennsylvania Horticultural Society, were hired by Philadelphia Water Department to lead the Delaware Direct RCP. By the end of June 2007, the RCP Team (PWD and consultants) determined that a unique RCP strategy would be desirable for this watershed due to the number of planning efforts currently in place and the complexity of issues in and along Philadelphia's waterfront. As a result, the RCP Team modified the scope of the RCP in order for it to include more of an emphasis on the implementation of the Philadelphia GreenPlan recommendations. The data collection and public participation commenced in the fall of 2007. The final report was submitted to the Department of Conservation and Natural Resources in the summer, 2011. The report is also available on-line: http://www.phillywatersheds.org/your_watershed/delaware/delaware_RCP.

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

Please reference **SECTION II.G.2 "CONTINUE TO MAINTAIN WATERSHED MANAGEMENT AND SOURCE WATER PROTECTION PARTNERSHIP WEBSITES"**on page 59 and **SECTION II.H.2 "EXPAND THE INTERNET-BASED NOTIFICATION SYSTEM (RIVER CAST) TO THE TIDAL SECTION OF THE LOWER SCHUYLKILL RIVER"** on page 79 for additional information on PWD's Watershed Information Centers.

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. One system, Rivercast, supports the identification and analysis of water quality events to support water use status decisions (swimming, triathlons, rowing, etc.) and makes this information available in real time to the public. The other system, Early Warning

System, is used to monitor water quality and notify water systems 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 60 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, the PWD has developed another internet-based notification system called CSOcast, 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.

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 79 for information pertaining to this topic.

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

CSO Outfall Signage

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 that it would be hazardous to their health to contact the water during such events. It also requests that the Water Department is informed of any overflows during dry weather and provides an emergency contact number.

The CSO signage project was a pilot project aimed at determining if outfall signage was a feasible way to accomplish public notification of combined sewer overflows. The PWD, in conjunction with the Fairmount Park Commission, installed 13 signs at CSO outfalls throughout the city. Locations for placement of these signs were selected based on factors such as high visibility, known recreational areas, and volume of the combined sewer overflow. Installation of the CSO signage was done in summer 2007 and a follow-up survey of the signage sites was completed in October 2007. During this survey, each of the CSO signage sites was visited and photos were taken to confirm the status of the signs that were installed. Survey of the sites determined that several of the signs were removed or vandalized. Of the 13 signs that were installed, 5 were vandalized or removed during the short amount of time between installation and the survey.

Although signage is seen as a simple, low-cost, visual way to raise awareness of combined sewer outfalls, this pilot project has highlighted the difficulties in using signage as a public notification system in Philadelphia due to the poor durability of the signs in the field.

In 2008, a billstuffer was included in all PWD bills on the CSO Signage Public Notification project as well as answering additional questions such as '*What is a Combined Sewer Overflow (CSO)?*', '*What is the goal of the Signage Program?*', '*Can I swim in the water near a CSO?*', '*Is it safe for my dog to drink the water near a CSO?*', and '*Can I eat the fish?*'.

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 when the public is reporting a problem at an outfall since they are able to accurately identify the outfall. This helps to alleviate communication problems between the public and the PWD responders.

Tookany/Tacoy-Frankford Watershed Signage

The PWD and the Tookany/Tacony-Frankford Watershed Partnership have installed signs at bridge crossings throughout the Tookany/Tacony-Frankford Watershed to help residents and visitors learn the names of local streams and rivers in their neighborhood, raise awareness of local watersheds, connect residents and visitors with local waterways, and encourage them to protect water resources. A total of 10 signs have been placed on state-owned roads - one in either direction - in 5 locations throughout the watershed: Roosevelt Boulevard between F and Bingham Streets, Adams Avenue between Newtown Avenue and Crescentville Road, Whitaker Avenue between Torresdale and Hunting Park Avenues, and Torresdale Avenue between Hunting Park and Frankford Avenues. The Tookany/Tacony-Frankford Watershed drains 29 square miles in Philadelphia and Montgomery counties. The watershed has a diverse population that includes portions of the inner city as well as suburban communities.

Green Stormwater Infrastructure and Restoration Locations Signage

Interpretive signage planning for several BMP projects will be undertaken as part of a Request For Proposal (RFP) which was completed June 2011 and posted online July 2011. The City of Philadelphia (City) acting through its Water Department (PWD or Department) is seeking proposals, through this RFP, from qualified contractor firms to provide PWD with a dynamic and flexible environmental and interpretive signage system which conveys a strong sense of the Green City, Clean Waters vision and its programs, while engaging the Philadelphia community. The signage system will be based on Fairmount Park's "Signage & Interpretive System Design Guidelines Manual." The signage system will identify, educate and interpret green stormwater infrastructure projects, ecological restoration projects and other projects led by PWD and partners involved in the Green City, Clean Waters plan. In addition to creating the PWD signage system design, an accompanying guidance manual will be developed for both PWD and Philadelphia Parks & Recreation and will reflect new signage designs developed for

PWD and edits to the previous manual version based on comments specified by PWD and Philadelphia Parks & Recreation staff. Finally, the selected applicant will design, fabricate, and install signage for selected PWD projects. The contract period would end June 2012.

Interpretive signage for the Columbus Square stormwater planter BMP site was completed and installed. A total of four signs were installed, one large interpretive sign and three small interpretive signs. Signs for the Bodine High School stormwater planters and the Womrath Park rain garden project have still been in the design and review process as of June 2011. Final design and installation is projected for FY 2012.

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

Please refer to **SECTION II.G.3 – "CONTINUE TO PROVIDE ANNUAL INFORMATION TO CITY RESIDENTS ABOUT PROGRAMS VIA TRADITIONAL PWD PUBLICATIONS"** on page 67 for information on PWD's support of existing educational centers including the Clean Water Theatre and other public outreach tools.

Please refer to **SECTION II.G.4 "CONTINUE TO SUPPORT THE FAIRMOUNT WATER WORKS INTERPRETIVE CENTER"** on page 75 for more information.

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

Recognizing the adverse effects of excessive stormwater runoff resulting from development, the Pennsylvania General Assembly approved the Stormwater Management Act, P.L. 864, No. 167 on October 4, 1978. 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 Department of Environmental Protection (DEP), municipalities and counties, and provides for enforcement and appropriations. All counties must, in consultation with its municipalities, prepare and adopt a stormwater management plan for each of its designated watersheds. Within six months following adoption and approval of a watershed stormwater plan, each municipality is required to adopt or amend stormwater ordinances as laid out in the plan

The City of Philadelphia is committed to supporting the development of Act 167 Stormwater Management 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,
– Delaware River,
– Pennypack Creek,
– Poquessing Creek,
– Schuylkill River,
– Tacony/Frankford Creek, and
– Wissahickon Creek.

The City of Philadelphia signed a Phase 1 Agreement with the DEP 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 over the coming 5 years.

Darby-Cobbs Creek

An Act 167 Stormwater Management Plan was completed for the Darby-Cobbs Watershed in January 2005, led by Delaware County Planning Department with Borton Lawson Engineering as technical consultant. This completed plan can be viewed at the Delaware County Planning Department's website at: www.co.delaware.pa.us/planning/watersheditems

The Darby-Cobbs watershed lies within 26 municipalities in Delaware County, 2 municipalities in Chester County, 2 municipalities in Montgomery County, and 1 municipality in Philadelphia County as follows:

Table III.C.3-1 Municipalities within Darby-Cobbs Watersheds

Delaware County	**Delaware County (cont.)**	**Chester County**
Aldan Borough	Ridley Park Borough	Easttown Township
Morton Borough	Folcroft Borough	Tredyffrin Township
Clifton Heights Borough	Rutledge Borough	**Montgomery County**
Newtown Township	Glenolden Borough	Lower Merion Township
Collingdale Borough	Sharon Hill Borough	Narberth Borough
Norwood Borough	Haverford Township	**Philadelphia County**
Colwyn Borough	Springfield Township	City of Philadelphia
Prospect Park Borough	Lansdowne Borough	
Darby Borough	Tinicum Township	
Radnor Township	Marple Township	
Darby Township	Upper Darby Township	
Ridley Township	Millbourne Borough	
East Lansdowne Borough	Yeadon Borough	

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; Borton Lawson Engineering was hired as technical consultant. The main objective of this stormwater management plan is to control stormwater runoff on a watershed-wide basis rather than on a site-by-site basis, taking into account how development and land cover in one part of the watershed will affect stormwater runoff in all other parts of the watershed. This plan was completed March 2008 and is currently under evaluation by PADEP and municipal partners. To view the entire TTF Act 167 Stormwater Management Plan, please visit: www.phillywatersheds.org

The Tookany/Tacony-Frankford Watershed encompasses a total area of approximately 32.96 square miles and includes the following major tributaries: Jenkintown Creek, Rock Creek, Mill Run, and Baeder Creek.

Table III.C.3-2 Municipalities within Tookany/Tacony-Frankford Watersheds

Abington Township	Rockledge Borough
Cheltenham Township	Springfield Township
Jenkintown Borough	City of Philadelphia

Pennypack Creek

The Pennypack Creek Watershed is located in the southeastern corner of Pennsylvania with approximately 56.3 square miles of drainage area.

Table III.C.3-3 Municipalities within Pennypack Watersheds

Montgomery County	Bucks County
Abington Township	Upper Southampton Township
Bryn Athyn Borough	Warminster Township
Hatboro Borough	
Horsham Township	**Philadelphia County**
Jenkintown Borough	City of Philadelphia
Lower Moreland Township	
Rockledge Borough	
Upper Dublin Township	
Upper Moreland Township	

In the fall of 2008, PWD initiated an Act 167 Stormwater Management Plan for this watershed. PWD acted as municipal lead for plan development, and has partnered with the Montgomery County Planning Commission and Bucks County Planning Commission in order to complete the plan. The stakeholder Watershed Planning Advisory Committee (WPAC) guided the process, which wrapped up in June, 2011. The draft Pennypack Creek Act 167 plan is available for download at: http://www.temple.edu/ambler/csc/projects/projects_act167.htm

Poquessing Creek

The Poquessing Creek Watershed is located in Pennsylvania, with portions of its drainage area in Philadelphia, Montgomery and Bucks counties. The watershed encompasses approximately 21.5 square miles of drainage area. Its designated uses are warm water fishery, migratory fishes, trout stock fishery and as a tributary to the Delaware River, the creek also serves as a source of drinking water.

Table III.C.3-4 Municipalities within Poquessing Watersheds

Montgomery County	**Bucks County**
Lower Moreland Township	Bensalem Township
	Lower Southampton Township
Philadelphia County	
City of Philadelphia	

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 Watershed Planning Advisory Committee (WPAC) has been convened in order to help guide the process, which is expected to be wrapped up in the spring of 2012.

Wissahickon Creek

Wissahickon Creek begins in Montgomery Township and flows for approximately 27 miles where it meets with the Schuylkill River at the end of Lincoln Drive. The Wissahickon Creek Watershed encompasses an area of 64 square miles, which includes 15 municipalities in Montgomery County and the City of Philadelphia.

Table III.C.3-5 Municipalities within Wissahickon Watersheds

Montgomery County	**Philadelphia County**
Abington Township	City of Philadelphia
Ambler Borough	
Cheltenham Township	
Horsham Township	
Lansdale Borough	
Lower Gwynedd Township	
Montgomery Township	
North Wales Borough	
Springfield Township	
Upper Dublin Township	
Upper Gwynedd Township	
Upper Moreland Township	
Whitemarsh Township	
Whitpain Township	
Worcester Township	

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 Watershed Planning Advisory Committee (WPAC) will be convened in order to help guide the process, which is expected to be wrapped up in late 2012/2013.

Schuylkill River
The portion of the Schuylkill River Watershed within the City of Philadelphia will be covered by the City of Philadelphia county-wide Act 167 and is currently covered by the City of Philadelphia Stormwater Regulations.

Delaware River
The portion of the Delaware River Watershed within the City of Philadelphia will be covered by the City of Philadelphia county-wide Act 167 and is currently covered by the City of Philadelphia Stormwater Regulations.

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

PWD employs a full-time state certified Sewage Enforcement Officer (Eric Ponert - Cert. No. 03590) who continues to require/review "Sewage Facilities Planning Module Application Mailers" for new land developments and modifications to existing land developments within Philadelphia and, in conjunction with PWD's Office of Watersheds, Design, and Planning and Research and Collectors Departments, reviews downstream sewage conveyance and treatment facilities. These reviews are conducted by PWD to ensure that adequate capacity exists within the sewage systems to accommodate flow from new land developments within Philadelphia and tributary municipalities. PWD maintains a database and hard-copy files which include all submitted/reviewed "Sewage Facilities Planning Module Application Mailers" within Philadelphia and requests for capacity certification from tributary municipalities.

During the FY2011, PWD reviewed 524 "Sewage Facilities Planning Module Application Mailers" for projects requiring building permits within Philadelphia County. During the same period, PWD issued 47 sanitary sewer capacity certifications for projects in tributary municipalities.

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 documenting the Department's CSO discharges during the specified time periods. This report is due 45 days after the end of the 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, in which quarterly reports are due 28 days after the end of each quarter, by January 28, April 28, July 28, and October 28.

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 F and other information provide within this annual report represent the average annual CSO overflow statistics for period July 1 2010 – June 30 2011 as required in the NPDES Permit. Please refer to **TABLE 1 IN APPENDIX G – NPDES – FY2011 CSO STATUS REPORT** on page 2 for a listing of all CSO permitted outfalls. The tables has 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 G – NPDES – FY2011 CSO STATUS REPORT** on page 9 for the annual summary of the frequency and volumen of CSO discharges during FY2011.

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

Please refer to **TABLE 3 IN APPENDIX G – NPDES – FY2011 CSO STATUS REPORT** on page 13 for an updatesd CSO frequency and volume for a typical hyrologic 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 to demonstrate improvements 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 G – NPDES – FY2011 CSO STATUS REPORT** on pages 18-29 for daily and monthly rainfall totals for FY2011.

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

Please refer to **SECTION II.A.3.1 "CSO REGULATOR INSPECTION & MAINTENANCE PROGRAM"** on page 17 for information on this section. Also refer to page 2 of **APPENDIX A – FY2011 FLOW CONTROLS ANNUAL REPORT** 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 **SECTION II.A.3.1 "CSO REGULATOR INSPECTION & MAINTENANCE PROGRAM"** on page 17 for information on this section. Also refer to page 3 of **APPENDIX A – FY2011 FLOW CONTROLS ANNUAL REPORT** for the total number of regulators inspected 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 10 of **APPENDIX A – FY2011 FLOW CONTROLS ANNUAL REPORT** 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 F – NPDES – FY2011 CSO STATUS REPORT** on page 9 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 known chronic discharges are Main and Shurs and PC-30. For information on corrective actions, 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 *96* and **SECTION III.B.2.1.1 "INFLOW/INFILTRATION (I/I) CONTROLS- PC-30 RELIEF SEWER"** on page *103*. Please refer to **TABLE 16 IN APPENDIX G – NPDES – FY2011 CSO STATUS REPORT** on page 31 for the list of discharges that occur 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 OF THIS REPORT 'IMPLEMENTATION OF THE NINE MINIMUM CONTROLS (NMCS)'** on page 14**.**

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 82 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 as described in earlier Integrated Watershed Management Plans was a laudable goal; this watershed-focused approach has proven to be infeasible from a data acquisition standpoint, due to the additional time required to collect continuous and wet weather targeted water quality data. Furthermore, a program which focuses on a single watershed at a time is hard to justify given the needs of monitoring stormwater BMPs implemented throughout the City under the CSO Long Term Control Plan and various Integrated Watershed Management Plans.

The Rotating Basin Approach has been replaced with a "Comprehensive Watershed Monitoring Program", a monitoring strategy developed by the Philadelphia Water Department to comply with both the City's stormwater and CSO permit requirements and to assist with the Sourcewater Protection Program's objectives. This approach outlines a five-year plan (*i.e.*, 2010-2015) including time-lines, goals and objectives for the monitoring program, changes and/or additions to the current strategy and budgetary considerations. The Philadelphia Water Department will continue to work with the Southeast Regional Office of the Department of Environmental Protection to finalize this monitoring strategy.

Please refer the SW portion of the Annual Report **SECTION F.2.STEP 1.B – PRELIMINARY PHYSICAL, CHEMICAL AND BIOLOGICAL QUALITY ASSESSMENT** on page 186 for information about Comprehensive Watershed Monitoring Program.

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, many of them in place prior to the EPA Stormwater Regulation. The ordinances and regulations may be found at www.Phila.gov.

This Annual Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP), 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, 2010 to June 30, 2011.

Section C Effluent Limitations

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

The City has developed and implemented a program designed to achieve the first goal of the sediment TMDL effort which requires the City "to establish baseline data on the City's contribution of sediment loading and flow variations". The City conducted a feasibility study to determine 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 initiated in October 2005 which includes an evaluation of the outfalls and tributaries that have the greatest potential for improvement through implementation of BMPs and/or other methods.

As a result of the study, the City has designed and implemented a monitoring plan that includes modeling results and monitoring for Total Suspended Solids (TSS) and flow at selected MS4 outfalls and at the confluence of selected tributaries to the Wissahickon Creek during various flow events (low flow, normal flow, and storm flow). The following provides a brief summary of the major elements, actions, and findings of the sediment and stream restoration feasibility study. A technical report summarizing two years of the sediment study was produced in February 2009, entitled Wissahickon Creek Watershed: TMDL Sediment Monitoring Report was submitted in the 2009 annual report and will be available on the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

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

<u>Summary of Sediment and Stream Restoration Feasibility Study</u>

Study Objectives

- To identify stream reaches with the most degradation and the greatest potential for restoration
- To estimate sediment loads originating from streambank erosion.
- To establish stage-discharge and discharge-TSS rating curves for tributaries
- To provide an objective means of ranking the stream reaches for restoration

Study Approach

The TMDL is based on models used to estimate Total Suspended Solids (TSS) originating from stream bank erosion and stormwater runoff. PWD developed an approach based on field data and modeling, with conclusions tested using each of the following approaches:

- SWMM modeling was performed on three tributaries (Wises Mill, Cathedral and Bells Mill) to estimate runoff loads and flows from outfalls and tributaries. SWMM models were utilized to determine bankfull discharge as well as verify flood flow and flood hazard conditions.

- Stream assessment techniques (BEHI scores) and Rosgen derived stream bank erosion rates to estimate in-stream TSS load (can be applied to entire watershed).

- Bank pin measurements to verify or improve BEHI score approach (reality check on BEHI based estimates).

- Estimate of total volume of soil eroded from pre-development conditions to current stream profile. This was used to estimate time to reach current stream profile using estimated erosion rates from BEHI (an independent reality check on the estimated erosion rate using an entirely different approach).

Estimated Outfall Loadings and Runoff
Methods used to develop stormwater outfall flows and loads are described in detail in the Wissahickon Creek Watershed Comprehensive Characterization Report (WCWCCR). Drainage area and estimated mean annual runoff volume for each outfall, estimated mean annual pollutant loads for each outfall and a summary of the total number of outfalls per tributary are reported in tabular form.

Please refer to the **ADDITIONAL DOCUMENTS SECTION ON THE SUPPLEMENTAL CD** for more details on the Feasibility Study.

In-Stream Loading Assessment Techniques
There are two elements to the monitoring program designed to assess in-stream loading of TSS. The first estimates the sediment load originating from stream banks. The second estimates the total sediment load being carried by the stream. PWD employed the Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) as defined by Rosgen (1996) to predict erosion rates and classify the erosion potential of the tributaries. Three hundred and sixty eight reaches in 12 tributaries have been assessed using BEHI and NBS criteria. Reaches were assessed based on visual inspection of obvious signs of erosion. BEHI and NBS scores were grouped as very low, low, moderate, high, very high or extreme. Reaches not assessed with BEHI and NBS criteria were assessed with modified BEHI criteria. Modified visual assessments were meant to be rapid assessments and relied on a combination of bank angle, weighted root density, surface protection, and the best professional judgment of the PWD staff to categorize a bank as having very low, low, moderate, high, very high, or extreme erosion potential.

A combination of the assessment types was used to predict the sediment load originating from streambank erosion. Predictions were based on measured streambank erosion rates in a reference stream in Colorado (Rosgen, 1996). The total sediment load predicted for 12 Wissahickon tributaries within Philadelphia County was 4.2 millions pounds per year.

Bank Profile Measurements

Bank pins were installed in Monoshone, Kitchens Lane, Gorgas Lane, Cresheim, Valley Green, Hartwell, Wises Mill, Cathedral Run, Rex Ave, Thomas Mill, Bells Mill, and Hillcrest in an effort to measure streambank erosion at these sites. A total of 82 bank pin sites were chosen to reflect varying BEHI and NBS scores in order to validate and calibrate the prediction model. Twenty-two bank pin sites were installed during the fall of 2005, and 60 bank pin sites were installed during the summer of 2006. A detailed explanation of how to install and analyze bank pin data can found in the Wissahickon Creek Watershed: TMDL Sediment Monitoring Report located in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

Bank profiles at bank pin sites were measured annually to determine erosion rates. Erosion rates were calculated by entering the bank profile measurements into RIVERMorph 4.0 (RIVERMorph, LLC). RIVERMorph's 'Banks' module was used to estimate the lateral erosion rate for all of the bank pin locations. The estimated sediment load was then calculated (**EQUATION 1**).

Bank Erosion (lb/yr) = 96.3 (BLH) *where*:

Sediment Density = 96.3 lb/ft^3 (Rosgen, 1996)
B = Average Lateral Erosion Rate (ft/yr)
L = Bank Length (ft)
H = Bank Height (ft)

Erosion rates for banks that were not represented by bank pin location were determined by applying the average lateral erosion rate measured at bank pin locations, as grouped by BEHI class. The calculations used to determine the extrapolated erosion estimates are discussed in detail in Section 2.6 of the Wissahickon Creek Watershed: TMDL Sediment Monitoring Report located in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**. Using this method, a total sediment load of 2.1 million pounds of sediment per year is estimated to originate from streambank erosion.

Stage Discharge and Sediment Discharge Rating Curves

In order to estimate the total suspended sediment load in the stream, a stage-discharge and a sediment-discharge rating curve will be generated. Stage data will be used in conjunction with the rating curves to calculate an estimated sediment load per year.

Stage data from Bells Mill, Cathedral Run, Wises Mill, Monoshone, Gorgas Lane, Kitchens Lane, and Cresheim tributaries were recorded near the Wissahickon confluence downstream of all stormwater outfalls. Stage was measured every six minutes by either an ultrasonic down-looking water level sensor or a pressure transducer and recorded on a Sigma620. PWD staff periodically downloaded stage data and performed quality assurance. Any data determined to be incorrect was removed and saved in another location.

Stage recording devices were installed in Bells Mill, Cathedral Run, Wises Mill, and Monoshone from summer 2005 to summer 2007. Stage recording devices were also installed in Gorgas Lane Run, Kitchens Lane Run and Cresheim Creek from summer 2007 to summer 2008. Stage-discharge rating curves were established in the Cathedral, Wises Mill and Bells Mill tributaries following a modified version of the USGS protocol (Buchanan and Somers 1969). These three curves were evaluated and it was determined that the stage-discharge curves did not provide any additional information for analysis in the sediment study.

In order to estimate suspended sediment loading, automated water collection devices (ISCO model no. 6712) were used to collect water samples during wet weather events in the Wissahickon Creek tributaries. In the attempt to characterize an entire storm event, automated samplers were triggered by a 0.2 ft elevation change in stream height and collected samples every 20 minutes for the first hour. Following this step, samples were then collected every 2-4 hours until discharge returned to base flow conditions. Sediment-discharge rating curves were established in the Cathedral, Wises Mill and Bells Mill tributaries following a modified version of the USGS protocol (Buchanan and Somers 1969). These three curves were evaluated and it was determined that the sediment-discharge curves did not provide any additional information for analysis in the sediment study.

Tributary Restoration Potential Ranking

Any stream channel and corridor restoration plan for the Wissahickon requires a ranking of tributaries. EVAMIX has been chosen to rank the restoration potential of tributaries and stream reaches. EVAMIX is a matrix-based, multi-criteria evaluation program that makes use of both quantitative and qualitative criteria within the same evaluation; regardless of the units of measure. The algorithm behind EVAMIX is unique in that it maintains the essential characteristics of quantitative and qualitative criteria, yet is designed to eventually combine the results into a single appraisal score. This critical feature gives the program much greater flexibility than most other matrix-based evaluation programs, and allows the evaluation team to make use of all data available to them in its original form.

Methods used to develop tributary restoration potential ranking are described in detail in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**. EVAMIX was created as an initial ranking tool to compare the different tributaries. The sediment study has been further enhanced with the calculated sediment load estimates for each tributary to more accurately rank the tributaries. This information will be utilized in the development of the Wissahickon Creek Integrated Watershed Management Plan's (WCIWMP) implementation commitment.

Sediment Loading and Erosion Results

After the completion of the August 2008 bank pin readings, the sediment load and erosion estimates were calculated and produced in the Wissahickon Creek Watershed: TMDL Sediment Monitoring Report which is located in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

D.ii. Wissahickon Sediment TMDL Monitoring plan implementation

Wissahickon Sediment TMDL Monitoring plan implementation and outline submission

Future Sampling

In efforts to comply with the Wissahickon Creek Sediment TMDL and the continuing goal of reducing sediment load from tributaries within City boundaries, PWD is in the process of developing a long-term implementation and monitoring strategy.

Outlined within this report is an implementation strategy that will carry forth through the end of this Stormwater Permit cycle. Subsequent Stormwater Permits will reference the WCIWMP and Implementation Plans for up-to-date implementation and monitoring strategies.

PWD is working toward achieving instream erosion load reductions using stream restoration approaches. PWD has some initial small-scale restoration projects that have recently been completed in the Wissahickon Watershed by the PWD's Waterways Restoration Team (WRT). We are also working on developing stream bank restoration designs for two tributaries to Wissahickon Creek, Bells Mill and Wises Mill.

Please refer the CSO portion of the Annual Report **III.C.2.3 – STREAM HABITAT RESTORATION** on page 135 for information about these stream bank restoration designs.

Table D-4 Small-scale Restoration Projects Completed in Wissahickon by WRT

Project	Watershed	Description
Wises Mill Run	Wissahickon Creek	Lower segment; interim stabilization
Gorgas Run	Wissahickon Creek	Interim stabilization; infrastructure protection with boulders
Rex Avenue Restoration	Wissahickon Creek	Stabilization and habitat creation along the west bank of the Wissahickon Creek mainstem.
Carpenters Woods Outfalls	Wissahickon Creek	Stabilization of stormwater outfalls including stream restoration using NSCD principles.

PWD is also seeking to achieve overland runoff loading reductions through the use of stormwater treatment wetlands. PWD anticipates installing stormwater treatment wetlands to treat overland runoff and reduce sediment loadings to the creek. Treatment wetlands can be constructed adjacent to waterways to receive excess flows during large storm events, and pocket wetlands can be built to receive stormwater flows from adjacent sub-watershed areas. In addition, wetland habitats can be designed to accommodate diverse habitats and increase the healthy living resources of the Wissahickon Creek Watershed. Two proposed stormwater wetland creation projects in the Wissahickon Watershed include one on Wise's Mill and another on Cathedral Run.

Please refer the CSO portion of the Annual Report **SECTION III.C.2.4 – WETLAND ENHANCEMENT AND CONSTRUCTION** on page 139 for information about these stream bank restoration designs.

In addition, PWD has many proposed, ongoing, or completed SW BMP projects in the watershed to reduce stormwater runoff. These projects are listed in **SECTION III.C.1.3 – IMPLEMENTATION OF STORMWATER BMPS AND LID** on page 128**.**

Highlights of some recently completed stormwater management demonstration projects in the Wissahickon include:

- Allens Lane Art Center Porous Basketball Court
- Courtesy Stables Runoff Treatment Project
- Fox Chase Farms Riparian Buffer Project
- Monastery Stables Stormwater Diversion & Detention Project
- Saylor Grove Stormwater Treatment Wetland
- Springside School Stormwater Improvements
- W.B. Saul High School

And finally, implementation of the City's 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. Of particular interest are green approaches that encourage the return of rainfall back to the hydrologic cycle through evapotranspiration or distributed infiltration. Implementation of the stormwater management regulations present the opportunity to get privately owned properties within the Wissahickon Creek Watershed to assist in achievement of the City's TMDL commitment. More information on stormwater management practices implemented by private development can be found in **SECTION F.8.B.II EXISTING PRIVATELY OWNED STRUCTURAL CONTROLS** on page 259.

PWD is in the process of developing a sediment TMDL implementation strategy. PWD will submit this document for review by the PADEP upon completion. The goal of PWD's implementation approach is to take a multi-faceted approach to reducing the amount of sediment in the Wissahickon, both from overland runoff and from instream erosion sources. PWD would use this implementation plan to commit to sediment load reductions through implementation measures including stream restoration, land based projects and implementation of the Stormwater Regulations, with the use of adaptive management to achieve them.

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

Submit a Pollutant Minimization Plan for PCBs

The City has polychlorinated biphenyl (PCB) Pollutant Minimization Plans in effect under each of the three Water Pollution Control Plants individual NPDES permits which set forth a more stringent plan than is requested within the City's MS4 NPDES Permit. For additional information on the City's PCB PMP, see the City's NPDES permits for each of its three wastewater treatment plants:

NEWPCP	PA0026689
SEWPCP	PA0026662
SWWPCP	PA0026671

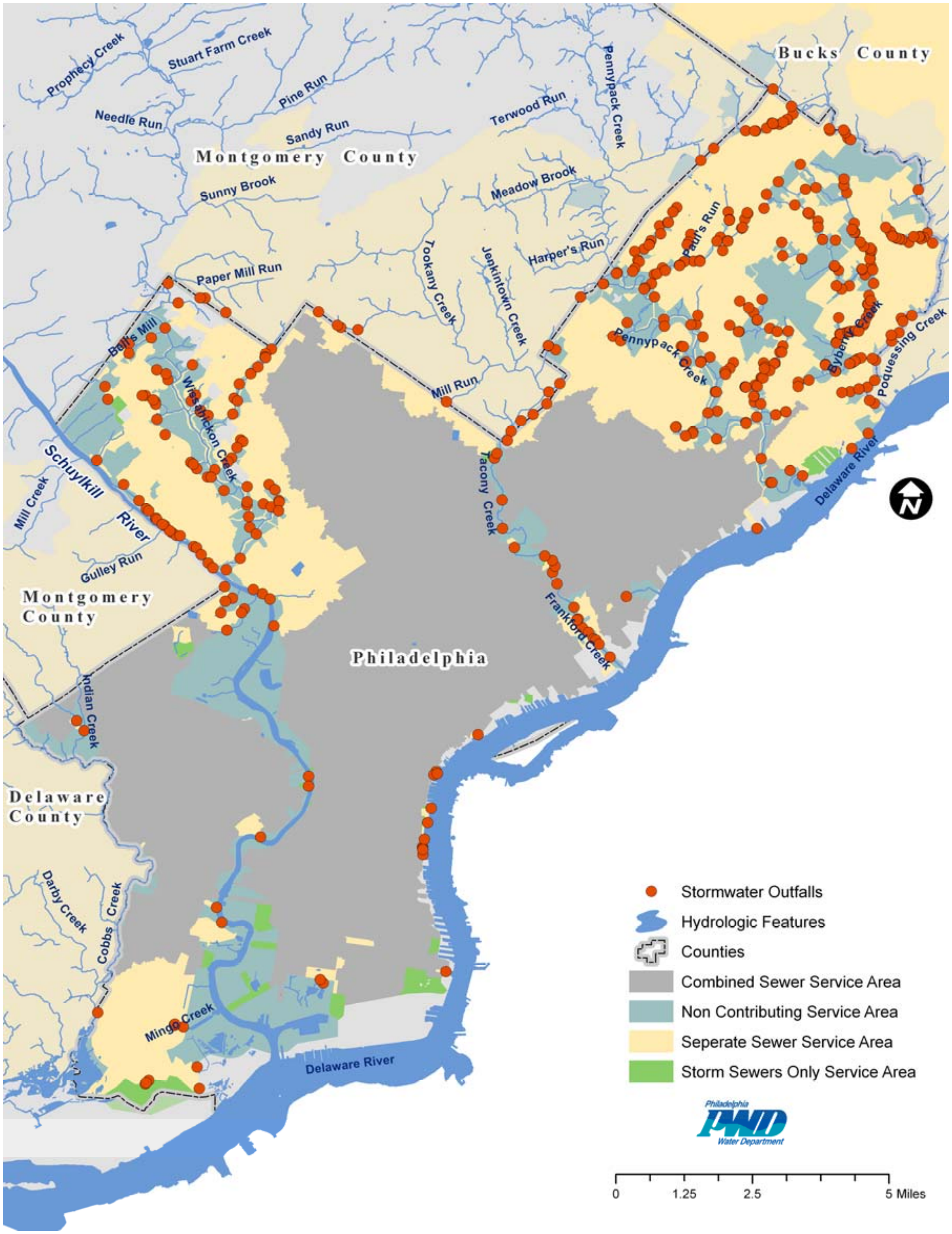
E.1 City PMP Contact Information:

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-1**.

Figure E-1 MS4 with all SW outfalls



E.3 / E.4 Known Locations of PCB Releases/Containments

Within the City's MS4 service area, there are no known materials, equipment, processes, soil areas or facilities that are known to be releasing, directly or indirectly. To that effect, there are also no known PCB sources within its MS4 system that the City believes may require some degree of control to reduce its discharge. However the City has compiled a list of known locations where PCB material, equipment, processes, soil area, or facilities are or have been located (**APPENDIX G – SUSPECTED PCB SOURCES AND INSPECTIONS)**. This list has been compiled from 2 lists discussed below:

Description of "Devices" List

This list is a compilation of information obtained from USEPA, PADEP, DRBC, Partnership for the Delaware Estuary, the Philadelphia Fire Department, the Philadelphia Department of Public Health and PECO, along with PWD's inventory of PCB-containing equipment. The sites listed are those within PWD's MS4 service area and at which PCB-containing devices may exist. In accordance with PWD's PCB Pollutant Minimization Plan (PCB PMP) which was submitted to DRBC on September 30, 2005, PWD's Industrial Waste Unit (IWU) will visit the listed sites over a five-year period to determine the status of each site's PCB-containing devices. IWU will characterize that status using a list of forty (40) descriptors to determine the site's potential as a possible source of PCBs. Appropriate corrective steps will be taken for any site found to be releasing or having the potential to release PCBs.

Description of "Health Dept." List

This list contains sites at which the Philadelphia Department of Public Health has some record of a past PCB release. In accordance with PWD's PCB PMP mentioned above, IWU will visit the listed sites over a two-year period to determine the status of each and will recommend additional risk reduction measures where appropriate.

E.5 In- stream PCB sampling

The City collected and analyzed twelve (n=12) in-stream samples for PCBs during the spring of 2009.

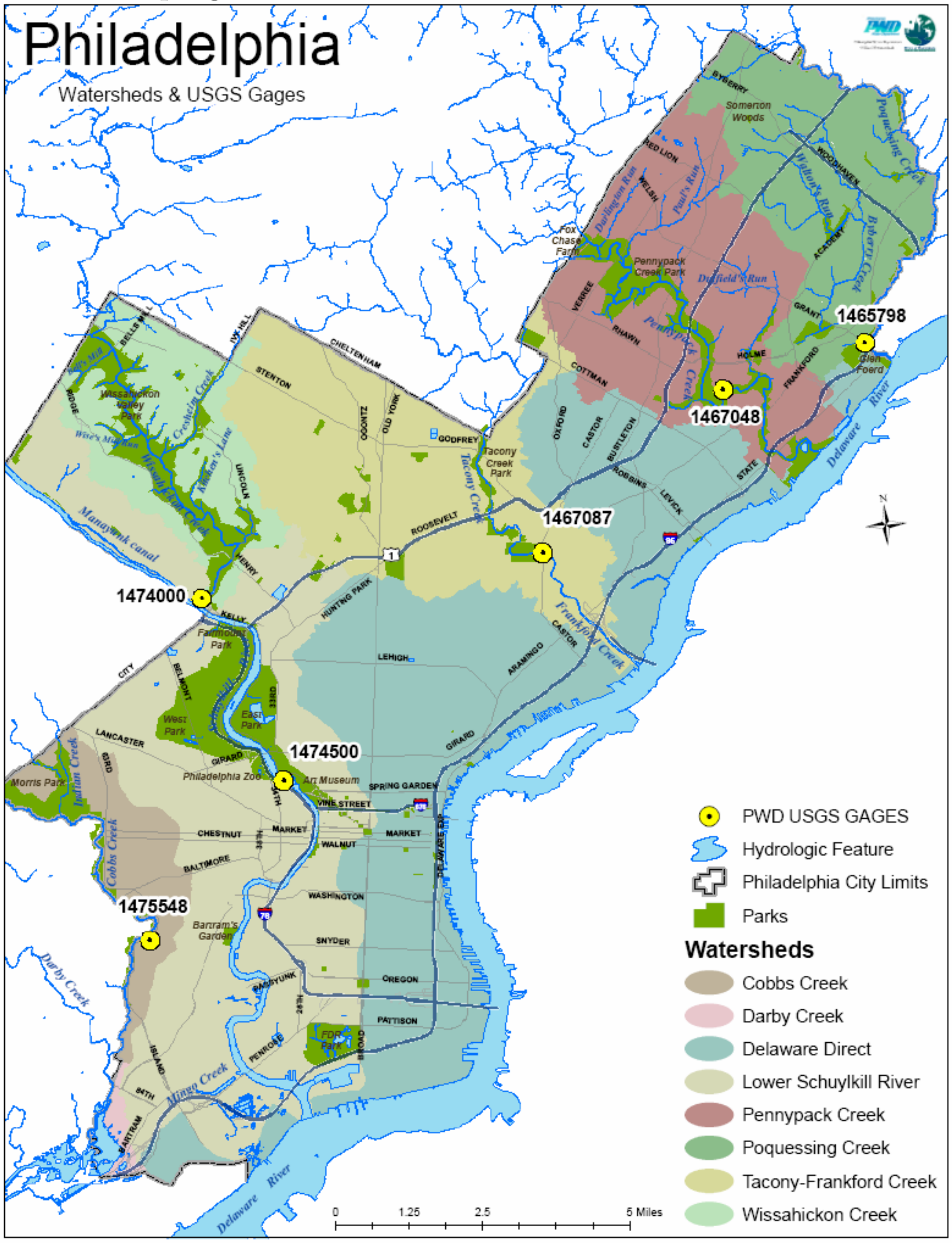
PCB Sampling Locations

Six monitoring locations were selected for sampling, and are listed in **TABLE E-1**. Each sampling site was stationed at the furthest downstream USGS gage station in each of the City's six watersheds (**FIGURE E-2**).

Table E-1 PWD PCB Monitoring Locations

Watershed	PWD USGS Gages	Field ID
Cobbs Creek	1475548	COBB 355
Pennypack Creek	1467048	PENN 175
Poquessing Creek	1465798	POQU 150
Lower Schuylkill River	1474500	SCHU 154
Tacony-Frankford Creek	1467087	TACO 250
Wissahickon Creek	1474000	WISS 135

Figure E-2 PCB Sampling Locations



PCB Sampling Period

During the reporting period, in-stream samples were collected at the predetermined locations during dry weather conditions and immediately following a significant wet-weather event. A wet weather event was defined as any precipitation event greater than 0.5 inches of rainfall in a 24-hour period. Dry- weather and wet-weather samples were collected on April 28th and May 7th, 2009, respectively (n=12 samples). In addition to the twelve samples collected, two additional trip blank samples were collected during both dry and wet conditions (n=4).

PCB Sampling Technique 1668A

To determine surface water concentrations of PCBs, PWD will be using the standard operating procedures and analysis techniques outlined by the United States Environmental Protection Agency's (USEPA) Method 1668A. This congener-specific method is used to determine the twelve PCBs designated as toxic by the World Health Organization plus the remaining 197 chlorinated biphenyl congeners. Method 1668A allows estimation of homolog totals by level of chlorination and estimation of total PCBs.

PCB Sampling Analysis

In-stream samples and trip blank samples were sent to AXYS Analytical, LTD. (Sidyney, Canada) for PCB analysis. To determine surface water concentrations of polychlorinated biphenyls (PCBs), AXYS Analytic, LTD used the standard operating procedures and analysis techniques outlined by the United States Environmental Protection Agency's (USEPA) Method 1668A. This congener-specific method was used to determine the twelve PCBs designated as toxic by the World Health Organization (WHO) plus the remaining 197 chlorinated biphenyl congeners (CBs). Moreover, this method allowed estimation of homolog totals by level of chlorination (LOC) and estimation of total CBs in a sample by summation of the concentrations of the CB congeners and congener groups.

Analytical Results

On July 23rd, 2009, PWD's Office of Watersheds received all data from AXYS Analytical, LTD. pertaining to the in-stream PCB samples and will be included on the CD attached to this report. **TABLE E-2** shows the total PCB results by sample location and date. Results are developed in terms of non-detects for congeners expressed as zero, and in terms of non-detects for congeners expressed and one half of the estimated method detection limit[1]. **TABLE E-3** shows the results for the Penta homolog.

Table E-2 Total PCBs Sample Results

Field ID	Sample Date	Dry/Wet	TOTAL PCBs (pg/L)	
			U=0	U=EDL/2
COBB 355	April 28, 2009	DRY	1,604	1,617
COBB 355	May 7, 2009	WET	8,884	8,892
WISS 135	April 28, 2009	DRY	1,067	1,084
WISS 135	May 7, 2009	WET	12,676	12,693
SCHU 154	April 28, 2009	DRY	1,400	1,419
SCHU 154	May 7, 2009	WET	10,768	10,775
POQU 150	April 28, 2009	DRY	743	756
POQU 150	May 7, 2009	WET	4,605	4,615
PENN 175	April 28, 2009	DRY	935	950
PENN 175	May 7, 2009	WET	36,352	36,364
TACO 250	April 28, 2009	DRY	2,739	2,750
TACO 250	May 7, 2009	WET	3,861	3,870

Table E-3 Penta Homalog Results

	Wet Weather		Dry Weather	
	Conc_Found	Conc_Found	Conc_Found	Conc_Found
Tributary	U=0	U=EDL/2	U=0	U=EDL/2
COBB355	2.094	2.095	0.176	0.181
WISS135	3.185	3.186	0.182	0.185
SCHU 154	2.891	2.892	0.273	0.278
POQU 150	1.208	1.210	0.152	0.155
PENN 175	16.593	16.595	0.228	0.230
TACO 250	0.929	0.930	0.329	0.331

E.6 Develop Report on Control of PCB Discharges

The City has created a document that reports all the suspected PCB sources within the MS4 system that requires some control measure to reduce its discharge of PCBs. This report and plan of action is described within the PCB PMP, can be located in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD.**

E.7 Work with DRBC to Create PMP Template

As the City moves forward in implementing the PCB PMP, it looks forward to continuing to enlist the cooperation of stakeholders throughout the Delaware Estuary in developing a template for other MS4 systems. PWD's PCB PMP was also submitted to the DRBC on September 30, 2005.

E.8 Annually Document PCB PMP Compliance

During FY 2011, PWD IWU performed 94 site inspections of potential PCB sources. A list and a map of potential sources of PCB and when they were inspected can be found in **APPENDIX G – SUSPECTED PCB SOURCES AND INSPECTIONS**. The five year PCB PMP expired in March of 2011, only a Phase 1 sewershed trackdown for SWWPCP is outstanding. This task is on hold until a qualifying rain event occurs in order to perform the trackdown in the prescribed manner as written in the PCB PMP. IWU has inspected all suspected PCB site as proposed in the PMP, finding that most of the sites either were duplicates of others or any PCB related equipment were either completely removed or the property had their own PCB management plans. Additional information on PCB sources including a description of known sources is provided in the PWD PCB PMP, can be located in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD.**

Section F Stormwater Management Program

F.1. Source Identification

Presented is a description of the City of Philadelphia municipal separate storm sewer system (MS4) including the sewershed, combined sewer system sewershed, non-contributing areas, and watershed boundaries. The following tables presents a summary of the Philadelphia infrastructure and MS4 system, including; stormwater outfalls, lengths of sanitary sewer, and lengths of stormwater sewer within Philadelphia and contributing neighboring townships. These areas are depicted in **FIGURE F-1** on the following page.

Table F-1 Infrastructure Area of Philadelphia

Watershed	Square Miles of Philadelphia Infrastructure				
	MS4 Area	Combined Area	Un-Sewered Area	Stormwater Only Area	Non-Contributing Area
Darby-Cobbs	-	4.2	-	-	1.2
Delaware Direct	2.6	26.0	-	0.5	3.6
Pennypack	12.1	0.5	-	0.2	4.5
Poquessing	9.6	-	-	-	3.6
Schuylkill	8.9	17.5	-	0.6	9.1
Tacony	2.4	15.3	-	-	1.2
Wissahickon	6.1	-	1.1	-	3.2
Total	41.8	63.4	1.1	1.4	26.4

Table F-2 Description of MS4 Infrastructure

Watershed	Miles of Pipe			MS4 Outfalls	
	Stormwater	Sanitary	Total MS4	PWD Owned	Other
Darby-Cobbs	0.5	0.4	0.9	3	-
Delaware Direct	71.8	42.1	113.9	18	122
Pennypack	225.2	231.2	456.3	130	14
Poquessing	148.4	159.7	308.1	141	19
Schuylkill	152.9	151.9	304.8	45	47
Tacony	54.0	56.3	110.2	34	1
Wissahickon	88.4	108.1	196.4	63	2
Total	741.1	749.7	1490.6	434	205

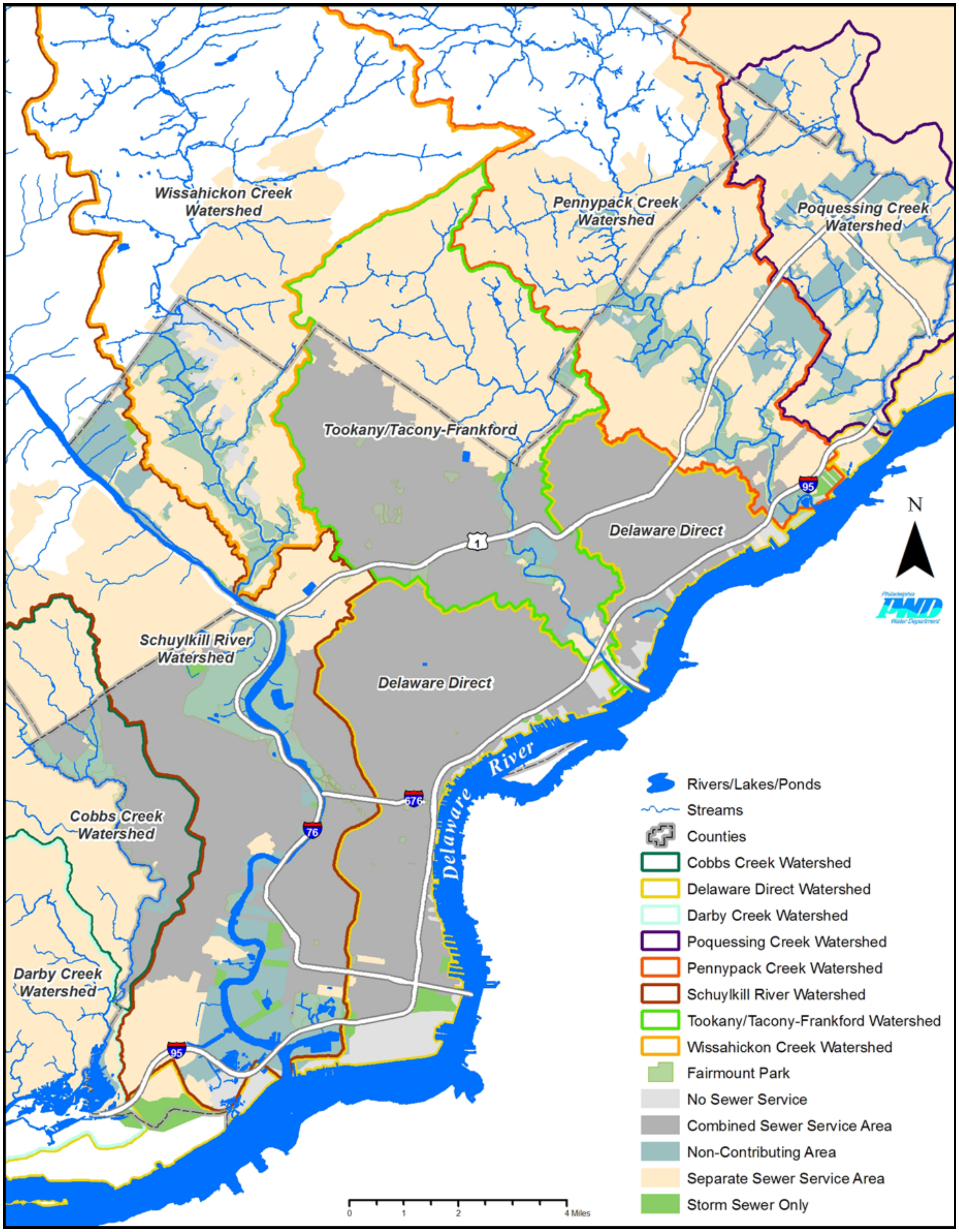


Figure F-1 Philadelphia Infrastructure System Areas

Table F-2 GIS Data Feature Classes within Geodatabase named - FY11_GISlayers.mdb

• DVRPC_luphi05	• PermittedDischargersFY11
• FY11_ES	• Philadelphia_2010_CensusBlocks
• FY11_TA_Approved_Sites	• Philadelphia_Detention_Basins
• FY11_Sanitary_Migration_Events	• Philadelphia_Imperviousness
• IWU_Spills_FY11	• Philadelphia_Sewersheds
• Known_Historical_PCB_Locations_2011	• PWD_GreenInfrastructure_Projects_2011
• Major_Watersheds_2011	• PWD_Monitoring_2011
• OWS_GISDATA_OWS_Hydro_Line	• Stormwater_Outfalls_442
• OWS_GISDATA_OWS_Hydro_Poly	• Wissahickon_Point_Source

GIS Data Layers will be submitted within a GeoDatabase on **SUPPLEMENTAL CD.** The GIS Data Feature class filenames within the the Geodatabase: FY11_GISlayers.mdb are provided in **TABLE F-3.** Descriptions of the GIS layers referenced above are given below:

DVRPC_luphi05

This layer presents land use delineated from aerial photography captured in 2005 within Philadelphia County. The source of this data is the Delaware Valley Regional Planning Commission. Metadata contained within this file further explains the source and processing of this data.

FY11_ES

This layer presents the locations of erosion and sedimentation inspections carried out at construction sites within Philadelphia in FY 2011. The contents of this layer are discussed in **SECTION F.5 – STORMWATER MANAGEMENT ON CONSTUCTION ACTIVITIES** on page 237.

FY11_TA_Approved_Sites

This layer presents the locations of projects issued post construction stormwater management technical approvals by the Philadelphia Water Department in FY 2011. The contents of this layer are discussed in **SECTION F.5.B - POST CONSTRUCTION STORMWATER MANAGEMENT** on page 242.

FY11_IWU_Spills

This layer presents the locations of spills documented by PWD Industrial Waste Unit within Philadelphia in FY 2011. The contents of this layer are discussed in **SECTION F.7 – POLLUTANT MIGRATION/INFILTRATION** on page 251.

FY11_Sanitary_Migration_Events

This layer presents the locations of Sewage Pollution Incidents documented by PWD within Philadelphia in FY 2011.The contents of this layer are discussed in **SECTION F.8.G.III – INVESTIGATE, REMEDIATE, AND REPORT SANITARY INFILTRATION** on page 267.

Known_Historical_PCB_Locations_2011
This layer presents the location of all known and historical polychlorinated biphenyl (PCB) locations within Philadelphia. The contents of this layer are discussed in **SECTION E – POLLUTANT MINIMIZATION PLAN FOR PCBS** on page 174.

Major_Watersheds_2011
This layer presents the delineation of the Philadelphia County and surrounding counties boundaries of the Darby-Cobbs, Delaware-Direct, Pennypack, Poquessing, Schuylkill, Tacony-Frankford, and Wissahickon watersheds.

OWS_GISDATA_OWS_Hydro_Line
This layer presents the boundaries of Philadelphia County and surrounding watershed hydrology in a polyline based shapefile.

OWS_GISDATA_OWS_Hydro_Poly
This layer presents the boundaries of Philadelphia County and surrounding watershed hydrology in a polygon based shapefile.

PermittedDischargersFY11
This layer presents the location within Philadelphia of all permitted Dischargers FY11. The contents of this layer are discussed in **SECTION F.2.STEP 1.C** on page 200**.**

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

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

Philadelphia_Population_2010_CensusBlocks
This layer presents the results of the 2010 Census in Philadelphia County.

Philadelphia Sewersheds
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.

PWD_GreenInfrastructure_Projects_FY11
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.

PWD_Monitoring_2011

This layer presents the locations of the 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 186.

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-4**. 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-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

The City has conducted extensive mapping of information relevant to stormwater management planning. Previously discussed in **SECTION F.1 – SOURCE IDENIFICATION** of this document on page 181, 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 accompanying CD.

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

<u>Comprehensive Watershed Monitoring Program</u>

The City of Philadelphia recognizes the potential impacts of discharges from stormwater, CSO and other discharges and conditions that affect drinking water and other designated uses of our waterways.

Comprehensive assessment of our waterways is integral to planning for the long-term health and sustainability of our water systems. The Philadelphia Water Department (PWD) considers such assessments as essential to raising awareness in Southeastern Pennsylvania as to the impact that land development activities are having on waterbody health. 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.

Specifically, biological monitoring is a useful means of detecting impacts to the aquatic ecosystems necessary for sustainable fisheries and other designated uses. Biological communities respond to wide variety of chemical, physical and biological factors in the environment and can reveal natural and anthropogenic stressors. In this respect, resident biota in a water body act as natural monitors of environmental quality and can reveal the effects of episodic and cumulative pollution and habitat alteration.

Bio-assessments, however, must be integrated with appropriate chemical and physical measures, land use characterizations, and pollutant source information necessary to establish linkages between stressors and environmental quality. These linkages can then be used to create decision-making frameworks for selecting restoration techniques that are appropriately balanced between in-stream restoration, land-based management practices, and new water and sewer infrastructure.

From 1999 to 2011, 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 (CCR) and used to plan improvements to watersheds in the Southeast Region of Pennsylvania.

Background

The Philadelphia Water Department has carried out extensive sampling and monitoring programs to characterize conditions in seven local watersheds **(FIGURE F.2.STEP 1.B-1),** both within the county boundaries and outside counties/municipalities. The program is designed to document the condition of aquatic resources and to provide information for the planning process needed to meet regulatory requirements of EPA and PADEP. The program includes hydrologic, water quality, biological, habitat, and fluvial geomorphological aspects. The Office of Watersheds is well suited to manage the program because it merges the goals of the city's stormwater, combined sewer overflow, and source water protection programs into a single unit dedicated to watershed-wide characterization and planning.

Under the provisions of the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) requires permits for point sources that discharge to waters of the United States. In the six watersheds entering Philadelphia, stormwater outfalls and wet weather sewer overflow points discharging to surface waters are classified as point sources and are regulated by NPDES.

EPA's Combined Sewer Overflow Control Policy, published in 1993, provides the national framework for regulation of CSOs under NPDES. The Policy guides municipalities, state and federal permitting agencies in meeting the pollution control goals of the CWA in as flexible and cost-effective a manner as possible. As part of the program, communities serviced by combined sewer systems are required to develop long-term CSO control plans (LTCPs) that will result in full compliance with the CWA in the long term, including attainment of water quality standards. PWD completed its LTCP in 1997 and is currently implementing its provisions. The strong focus of the National CSO Policy on meeting water quality standards is a main driver behind PWD's water quality sampling and monitoring program.

Regulation of stormwater outfalls under the NPDES program requires operators of medium and large municipal stormwater systems or MS4s to obtain a permit for discharges and to develop a stormwater management plan to minimize pollution loads in runoff over the long term. Partially in administration of this program, PA DEP assigns designated uses to water bodies in the state and performs ongoing assessments of the condition of the water bodies to determine whether the uses are met and to document any improvement or degradation. These assessments are performed primarily with biological indicators based on the EPA's Rapid Bio-assessment Protocols (RBPs) and physical habitat assessments.

PWD's Office of Watersheds (OOW) and Bureau of Laboratory Services (BLS) are responsible for characterization and analysis of existing conditions in local watersheds to provide a basis for long-term watershed planning and management. The extensive sampling and monitoring program described in this section is designed to provide the data needed for the long-term planning process.

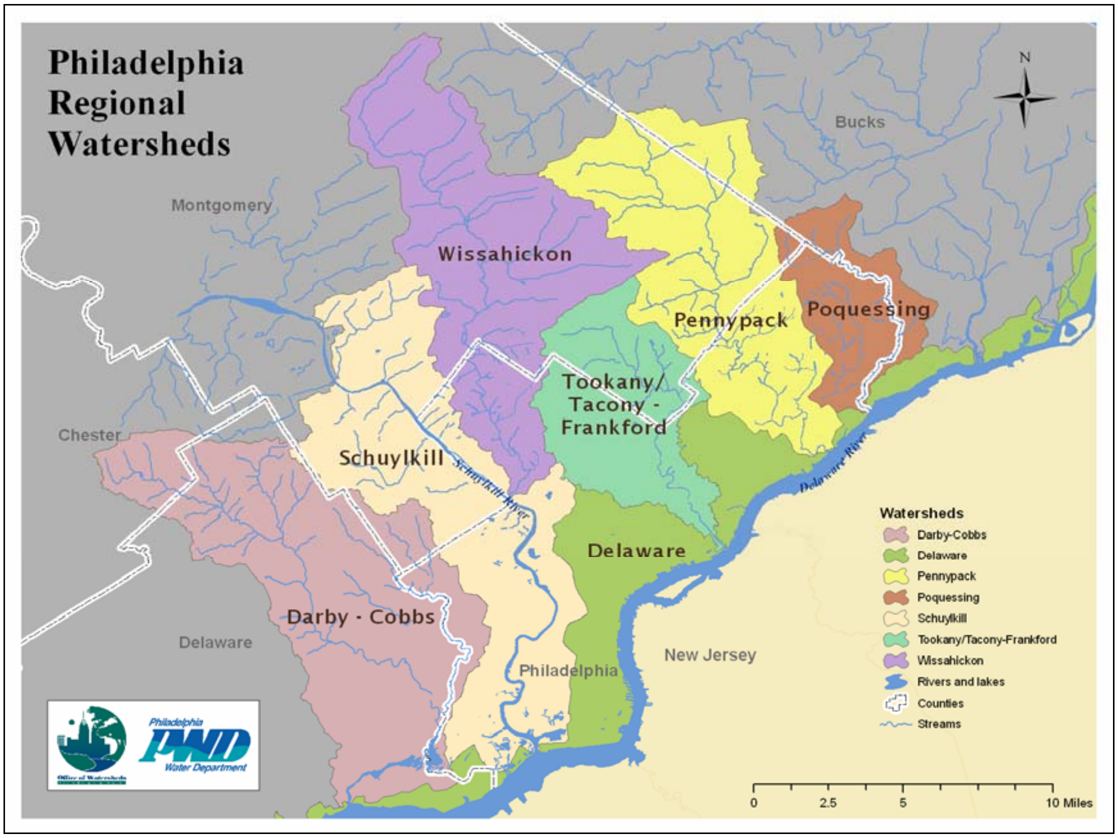


Figure F.2 Step1.b-1 Philadelphia Regional Watersheds

Water Quality Sampling and Monitoring

Guiding Principles of Urban Water Chemistry Assessment

PWD water chemistry assessment activities are guided by recognition of the fact that water quality changes dramatically during wet weather. Water quality assessment procedures must advance our understanding of wet weather effects on stream water quality as well as our stormwater and sewer infrastructure. 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.

Discrete Water Chemistry Assessment

During the 2002-2007 assessment cycles, a series of four weekly surface water grab samples were manually collected during winter, spring and summer at several locations in each watershed (n=12 sampling events at each location). These samples were termed "discrete interval" samples as the sampling was conducted on a weekly basis regardless of weather conditions. This sampling program represented the finest watershed-wide spatial resolution of all of PWD's water quality monitoring activities. Parameters (**TABLE F.2.STEP 1.B-1**) were chosen because state water quality criteria apply to them or because they are known or suspected to be important in urban watersheds. These discrete interval water chemistry assessment data represent the most complete modern water chemistry grab sample dataset for the majority of Philadelphia's watersheds.

In 2006, PADEP published a review of statistical techniques and provided guidelines for water chemistry statistical analysis when the goal is determining whether a site is meeting its designated use or not (PADEP 2006). This document described attainment and non-attainment of water quality criteria as mutually exclusive cases, and presented a statistical framework for evaluation of the hypothesis that a stream is or is not attaining its designated use. PWD made slight modifications to the 2008 sampling regime in order to better comply with these guidelines by ensuring that a minimum of 8 samples be collected in dry weather, baseflow conditions at each monitoring station, allowing both dry weather and wet weather conditions to be evaluated with the state-recommended statistical methods. Pennypack and Poquessing-Byberry Creek watershed data were collected according to these guidelines.

Now that all CCRs have been completed (Poquessing-Byberry Creek Watershed CCR completed September 2010) there is reduced demand for intensive watershed-wide chemistry assessment until it is necessary to revisit and collect more data from these monitoring locations for updating indicator status for Watershed Management Plans (**SECTION III.C.3.7- BASIN-SPECIFIC STORMWATER MANAGEMENT PLANS**). However, PWD will continue to maintain quarterly dry weather baseflow water chemistry assessment at sites in the PWD USGS gage network for a limited number of bacteria and nutrient-related parameters. These data will be useful as a long-term record of water quality changes in the region.

Integrated Watershed Management Plans (IWMP) for the Cobbs and Tookany/Tacony-Frankford Creek Watersheds were completed in 2004 and 2005. Watershed 5-Year Implementation Plans (IP) were completed for both watersheds in 2006. IWMPs initially recommended a five year interval for watershed-scale re-assessments and indicator status updates, but that interval was determined to be too aggressive. The initial re-assessment monitoring interval recommendation was changed to ten years, in recognition of the fact that watershed-wide assessments are best suited to characterize coarse-scale water quality and biological community health.

Table F.2.Step1.b-1: Chemical Analytes Collected During Chemical Monitoring Programs

Parameter	**Units**	**Discrete Grab**	**Wet Weather Targeted**	**USGS Quarterly Grab**	**Continuous *in situ* & USGS gages**
Alkalinity	mg/L	X			
Aluminum	mg/L	X	X		
Dissolved Aluminum	mg/L	X			
Ammonia	mg/L as N	X	X	X	
Arsenic	mg/L	X	X		
Dissolved Arsenic	mg/L	X			
BOD5	mg/L	X	X		
Cadmium	mg/L	X	X		
Dissolved Cadmium	mg/L	X			
Calcium	mg/L	X	X		
Chromium	mg/L	X	X		
Dissolved Chromium	mg/L	X			
Specific Conductance	μS/cm	X		X	X
Copper	mg/L	X	X		
Dissolved Copper	mg/L	X			
E. coli	CFU/100mL	X	X	X	
Enterococci	CFU/100mL			X	
Fecal Coliform	CFU/100mL	X	X	X	
Hardness	mg/L $CaCO_3$	X	X		
Iron	mg/L	X	X		
Dissolved Iron	mg/L	X			
Lead	mg/L	X	X		
Dissolved Lead	mg/L	X			
Magnesium	mg/L	X			
Manganese	mg/L	X	X		
Dissolved Manganese	mg/L	X			
Nitrate	mg/L	X	X	X	
Nitrite	mg/L	X	X		
Orthophosphate	mg/L	X	X	X	
Dissolved Oxygen	mg/L	X		X	X
pH	pH units	X		X	X
Total Phosphorus	mg/L	X	X		
Sodium	mg/L	X			
Suspended Solids	mg/L	X	X	X	
Total Solids	mg/L	X	X		
Temperature	°C	X		X	X
TKN	mg/L	X	X		
Turbidity	NTU	X	X	X	X
Zinc	mg/L	X	X		
Dissolved Zinc	mg/L	X			

Allowing ten years before re-assessment will potentially allow for a greater number of IWMP and CSO LTCP projects to be completed, and allow 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. Results from grab samples collected quarterly September 2010-June 2011 at all USGS gages in the PWD/USGS Coopeerative water Quality Monitoring Program are presented in **APPENDIX H – PWD QUARTERLY DRY WEATHER WATER QUALITY MONITORING PROGRAM**. . Results from quarterly dry weather grab sampling thus far are generally similar to data collected during the Comprehensive Characterization Report 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.

The proposed strategy for watershed assessments 2010-2015 includes resuming watershed-scale bioassessment activities at several stations within targeted watersheds . This program will resume in Cobbs Creek Watershed in 2012. (**TABLE F.2.STEP 1.B -3 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.

Continuous Water Quality Assessment

In addition to discrete chemical sampling, PWD incorporated *in situ* continuous water quality monitoring at strategic locations within each watershed as part of the 1999-2009 comprehensive monitoring strategy. Using submerged instruments (YSI 6600, 6600 EDS and 600 XLM Sonde), dissolved oxygen, temperature, pH, conductivity, depth (stage) and turbidity were logged at 15-minute intervals. The instruments were deployed for approximately two weeks, retrieved and replaced with fresh calibrated instruments in order to produce nearly seamless temporal data. Continuous water quality monitoring has been completed for Darby-Cobbs, Tookany/Tacony-Frankford, Wissahickon, Pennypack, and Poquessing-Byberry Watersheds.

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 July 1, 2010 – June 30, 2011 are presented in **APPENDIX I – PWD/USGS COOPERATIVE WATER QUALITY MONITORING PROGRAM ANNUAL SUMMARY**. Results from Citywide continuous monitoring thus far are generally similar to data collected during the

Comprehensive Characterization Report 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

The third water quality component of PWD's comprehensive monitoring strategy 1999-2009 was collecting water samples during wet weather flows. Automated samplers (Isco, Inc. models 6712, 6700) were deployed throughout the targeted watersheds and used to collect samples during runoff-producing rain events. This automated system obviated the need for staff to manually collect samples, thereby greatly increasing sampling efficiency. Automated samplers were programmed to commence sampling with a small (~0.1ft.) increase in stage. Once sampling was initiated, a computer-controlled peristaltic pump and distribution system collected grab samples at 30 min. to 1 hr. intervals, the actual interval being adjusted on a site by site basis according to "flashiness". Adjustment of rising-limb hydrograph sampling interval allows optimum characterization of water quality responses to stormwater runoff and wet weather sewer overflows. Due to sample volume restrictions, fewer chemical analyses were performed on samples collected in wet weather (**TABLE F.2.STEP 1.B -1**).

The primary use of automated samplers in the 2010-2015 period is assessment of stormwater BMP performance. Automated samplers have been successfully deployed at the Saylor Grove Stormwater Treatment Wetland, and it is expected that as additional stormwater BMPs are constructed, automated samplers will be the primary means of evaluating water quality performance. As an added advantage, data which are logged from the pressure transducer that is used to initiate sampling provide the input for the water quantity/hydrologic performance evaluation.

PWD is constructing two large bioretention facilities in the Wissahickon Creek Watershed at Wise's Mill Run and Cathedral Run. Beginning in spring 2012, automated samplers will be used to collect samples from the influent and effluent until a sufficient number of storm events have been captured to evaluate stormwater treatment wetland performance. If this research shows a reasonable level of consistency, there may be a reduced need to monitor additional stormwater BMPs with such a complicated and expensive monitoring system.

Biological Monitoring

PWD integrated biological assessments into the monitoring strategy for the IWMPs as a means of characterizing health of biological communities, identifying potential physical impairments or chemical stressors, and as a "baseline" for measuring the effects of future restoration projects. The biological monitoring protocols employed by PWD are based on methods developed by the United States Environmental Protection Agency (Barbour *et al*. 1999) and the Pennsylvania Department of Environmental Protection.

These procedures are as follows:

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

Macroinvertebrate Assessments

In 2007, PADEP shared a new set of protocols for Benthic Macroinvertebrate Assessments, with significant changes to field sampling, laboratory, and data analysis techniques (PADEP 2007). PWD adopted these Instream Comprehensive Evaluation (ICE) sampling and data analysis techniques for 2007 and 2008 monitoring activities in Pennypack Creek and Poquessing-Byberry Creek Watersheds. With the ICE method, sample results are compared to an Index of Biotic Integrity (IBI) for Wadeable Freestone Riffle-Run Streams that is intended to be used statewide, without regard for regional or climatic influences. The IBI is sensitive to effects of season and drainage area, as index scores generally tend to decline in larger streams and during the warmer months. In both cases, these effects are more pronounced at high quality sites.

The ICE method requires a sample size of 200±20% individuals, while macroinvertebrate samples processed by PWD 1999-2006 were subsampled with minimum 100 individual sample size. Due to this discrepancy, re-sampling or other normalization procedures may need to be used with the data collected according to the new DEP Assessment protocol to maintain compatibility with pre-established IWMP indicators for Indicator Status Update reports. Preliminary work with ICE metrics shows streams used by PWD as reference sites (*e.g.*, French Creek and tributaries to French Creek) are narrowly meeting their aquatic life designated use or in some cases classified as "impaired" under the new assessment method. Comprehensive assessments of the Pennypack and Poquessing-Byberry Watershed included separate metrics compared to the PADEP ICE protocol as well as the reference site-based metric comparison used during the original baseline assessments and Integrated Watershed Management Plans (PWD 2009, PWD 2010).

Integrated Watershed Management Plans (IWMP) for the Cobbs and Tookany/Tacony-Frankford Creek Watersheds were completed in 2004 and 2005. Watershed Management Implementation Plans were completed for both watersheds in 2006. IWMPs initially recommended a five year interval for re-assessments and Indicator Status Updates, but that interval was determined to be too aggressive, at least for the initial Indicator Status Updates. The initial re-assessment monitoring interval recommendation was changed to ten years, in recognition of the fact that watershed-scale assessments are best suited to characterize larger-scale water quality and biological community health.

Allowing ten years before re-assessment will potentially allow for a greater number of IWMP and CSO LTCP projects to be completed. Re-assessment and subsequent

Indicator Status Reports should complement the "adaptive management approach", and allow for the locations and methods of assessment to be changed, depending upon the number of projects implemented and their spatial distribution.

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's Comprehensive assessment program, the possibility arises that larger scale patterns 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.

As described in the PWD Comprehensive Monitoring Program: Proposed Monitoring Strategy 2010-2015, PWD's approach 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 consistent locations over time. This plan is based on a similar monitoring program which USGS has implemented in Chester County (Reif 2002, Reif 2004). The plan also 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.

Benthic macroinvertebrates were collected from 9 USGS gage stations and 16 randomly selected stations in the Philadelphia region in April 2010. Targeted watershed assessments will resume in Cobbs Creek Watershed in 2012. (**TABLE F.3.STEP 1.B -1 PROPOSED BENTHIC INVERTEBRATE MONITORING TIMELINE 2010-2015)**.

Table F.2.Step1.b-2 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

Fish Assessments

From 1999 through 2009 PWD, sampled fish communities in wadeable segments of each of Philadelphia's watersheds using USEPA Rapid Bioassessment V Methods (RBP V). Results of these samples are presented in the Darby-Cobbs, Tookany-Tacony/Frankford, Wissahickon, and Pennypack Creek Watershed Comprehensive Characterization Reports (CCR) (PWD 2003, 2005, 2007, 2009). The Poquessing Creek Watershed CCR was completed in September 2010. PWD also has conducted additional non-quantitative fish assessments in tidal areas of the Delaware and Schuylkill Rivers, as well as quantitative monitoring of fish utilization of the Fairmount Fishway. The latter program is discussed in more detail in **SECTION III.C.2.5 – FISH PASSAGE PROJECTS** on Page 146.

Consistent with the rationale of an extended interval for macroinvertebrate re-assessments, as described above, fish re-assessments will also be conducted within targeted watersheds on approximately a ten year interval. Targeted watershed assessments will resume in Cobbs Creek Watershed in 2012. (**TABLE F.4.STEP 1.B -3 PROPOSED FISH MONITORING TIMELINE 2010-2015)**.

Other projects where RBP fish surveys may be helpful in assessing BMP performance include streambank restoration projects along Tacony and Cobbs Creeks as well as fish habitat and passage improvements in Pennypack Creek. Fish assessments are generally not appropriate for monitoring of very small, and particularly of small high gradient, stream segments, so the primary means of evaluating biological health and success of stream restoration projects in small streams is macroinvertebrate assessment.

Table F.2.Step1.b-3 Proposed Fish Monitoring Timeline 2010-2015

Period	Monitoring Activity (number of samples*)
2012	Cobbs Creek Watershed Assessment (4)
2013	Tookany/Tacony Creek Watershed Assessment (7)
2015	Wissahickon Creek Watershed Assessment (10)

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

Algae Assessments

From 2002 through 2009, PWD collected algal periphyton samples from a small number of sites in selected watersheds using components of USEPA Rapid Bioassessment Protocol 6.1 (laboratory-based approach). Algal periphyton are collected from natural substrates and biomass is estimated based on quantitative chlorophyll-a and total chlorophyll analysis. Periphyton sampling is performed primarily to address the question of whether anthropogenic nutrient sources are causing eutrophication, which may result in violations of water quality criteria for dissolved oxygen, pH, and have adverse effects on aquatic food webs. Large concentrations of chlorophyll indicate excessively dense algal growth, which may help explain observed aquatic life impairments.

Beginning in 2005, PWD began providing samples of algal periphyton 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 intercellular nutrient (C,N,P) concentrations of algal periphyton. Algal taxonomic data are analyzed for standard measures of community structure and also compared to autecological information and indices developed through USGS National Water Quality Assessments (Porter 2008).

Scouring and subsequent accretion of biofilms has a profound impact on water quality in Philadelphia area streams. During June 2011, PWD collected pre- and post-storm algae data from Tacony Creek Watershed in an attempt to parameterize these effects for inclusion in water quality models. Work over the next two years will focus on Tacony and Cobbs Creeks, including research into the physical phenomena that underly the scouring portion of this relationship (*e.g.*, shear stress & particle size distribution) as well as a method for generalizing conclusions from a limited number of sampling locations to the area of interest for the water quality models.

Physical Monitoring

Habitat Assessments

Habitat assessments are conducted at each benthic macroinvertebrate monitoring site based PADEP ICE protocols. PWD adopted these new sampling techniques for 2008 monitoring activities in Poquessing-Byberry Creek Watershed which are presented in the Poquessing Creek Watershed CCR. Normalization procedures may be used with the data collected according to the new PADEP ICE Assessment protocol to maintain compatibility with pre-established IWMP indicators for Indicator Status Update reports.

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-Byberry Watershed Comprehensive Characterization Report 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 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 Comprehensive Characterization Report 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

To date, FGM analysis has been conducted on the Darby-Cobbs, Tookany/Tacony-Frankford Wissahickon, Pennypack and Poquessing-Byberry 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.

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).

A river mile-based naming convention has been created for sampling and monitoring sites in the regional watersheds. The naming convention includes a two letter prefix denoting major watershed, one or more optional letters denoting a tributary stream, and a series of digits to represent the distance from the mouth of the stream in hundredths of a mile. For example, site DCC110:

"DC" stands for the Darby-Cobbs watershed.

"C" stands for Cobbs Creek.

"110" places the site 1.10 miles upstream of the mouth of Cobbs Creek, where it flows into Darby Creek.

TABLE F.2.STEP 1.B-3 explains the current number of assessment sites in each watershed relative to the various monitoring programs.

Table F.2.Step 1.b-3 Number of Monitoring Locations Relative to the Monitoring Program

	Monitoring Program								
	Biological			Chemical			Physical		
Watershed	RBP III	RBP V	Algae	Discrete	Continuous	Wet Weather	Habitat	HSI Index	FGM
Darby-Cobbs	17	9	0	9	5	5	17	9	95
Tacony-Frankford	12	7	4	9	8	6	12	7	102
Wissahickon	32	10	5	10	6	8	32	10	230
Pennypack	20	11	4	13	4	4	20	11	130
Poquessing	13	7	4	7	3	3	13	N/A	160
Tidal Schuylkill	N/A	4	N/A	4	2	2	N/A	N/A	N/A

N/A Not Applicable

Monitoring Time Line 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), comprehensive characterization reports (CCRs) were typically accomplished on a two-year timeline. PWD plans to conduct monitoring activities in Cobbs Creek Watershed 2012-2013; Tookany-Tacony/Frankford Watershed in 2013-2014; and Wissahickon Creek Watershed in 2014 – 2016 (**TABLE F.2.STEP 1.B-5).**

Table F.2.Step1.b-4 Overview of PWD Proposed Watershed Monitoring Activities 2010-2015

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

Table F.2.Step1.b-6 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																												

Goals and Measures of Success

The proposed watershed monitoring strategy is an integrated approach which will improve the evaluations of non-point source pollution controls and the combined effectiveness of current point and non-point source controls. Similarly, biological attributes can be used to measure site-specific ecosystem responses to remediation or mitigations directed at reducing non-point source pollution impacts. Through the monitoring programs described in this permit cycle, PWD will be able to measure the relative success of remediation and restoration programs occurring within the Philadelphia regional watersheds. As a major stakeholder in the watersheds, PWD will also be able to provide insight and direction for smaller communities within the watersheds and parties involved in the watershed approach.

Reporting

PWD published the Poquessing Creek Watershed Comprehensive Characterization Report in September 2010. Results of continuous and quarterly grab sampling water chemistry analysis conducted in partnership with the USGS are presented in Appendices **APPENDIX I – PWD/USGS COOPERATIVE WATER QUALITY MONITORING PROGRAM ANNUAL SUMMARY** and **H – PWD QUARTERLY DRY WEATHER WATER QUALITY MONITORING PROGRAM** , respectively.

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

There are 153 NPDES permitted dischargers in Philadelphia, as shown in **APPENDIX K – 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.

In the past, the list of permitted dischargers was downloaded from the EPA envirofacts Permit Compliance System (PCS) website. Pennsylvania has switched to the modernized ICIS-NPDES and stopped updating records in PCS.

The City is also actively involved in developing annual and seasonal estimates of non-point source pollutants. The results of this analysis are described in the hydrologic models in **SECTION F.2.STEP 2.C/D/E WATERSHED, WATER BODY MODELING AND LOAD ESTIMATES** on page 207.

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

<u>Wissahickon Creek Watershed</u>

A Comprehensive Characterization Report was completed for the Wissahickon Creek Watershed in February 2007 which included analysis of data collected over the 2005-2006 monitoring period and presented a characterization of problems within this watershed area. The comprehensive characterization report is currently available to the public through the internet at the following address: http://www.phillywatersheds.org/doc/Wissahickon_CCR.pdf.

Pennypack Creek Watershed

A Comprehensive Characterization Report was completed for the Pennypack Creek Watershed in June 2009 which included analysis of data collected over the 2007-2008 monitoring period and presented a characterization of problems within this watershed area. The comprehensive characterization report is currently available to the public through the internet at the following address: http://www.phillywatersheds.org/doc/Pennypack_CCR_Entire.pdf.

Poquessing Creek Watershed

PWD completed a Comprehensive Characterization Report (CCR) for the Poquessing-Byberry Watershed in September 2010. One hard copy and an electronic copy of the Poquessing-Byberry Watershed CCR will be submitted to the Department along with this annual report. This report will serve as the technical framework for the Poquessing Creek Integrated Watershed Management Plan (PCIWMP). The technical report will also provide state and federal agencies and local officials with a succinct problem statement, outlining the biological, physical and chemical integrity of the system and the potential sources of impairment. The Poquessing CCR is disseminated to the public through the internet at the following address: http://www.phillywatersheds.org/doc/Poquessing_CCR.pdf

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

F.2.Step 2.a. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Monitoring and Sampling

Current activities of the PWD center on analyzing and summarizing data collected from the Delaware Estuary to support water quality modeling efforts. To meet the regulatory requirements and long-term goals of its stormwater program and drinking water source protection program, PWD has embraced a comprehensive watershed characterization, planning, and management program for Philadelphia's watersheds. 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. It also protects the region's drinking water supplies, fishing and other recreational activities, while preserving sensitive natural resources such as parks and streams. PWD has helped form watershed partnerships with surrounding urban and suburban communities to explore regional cooperation based on an understanding of the impact of land use and human activities on water quality.

Coordination of these different programs has been greatly facilitated by PWD's creation of the Office of Watersheds (OOW), which is composed of staff from PWD's planning and research, CSO, collector systems, laboratory services, and other key functional groups. One of OOW's responsibilities is to characterize existing conditions in local watersheds to provide a basis for long-term watershed planning and management. The focus of OOW's monitoring activities during FY 2011 and FY 2012 is the Delaware River Watershed.

OOW is developing a series of Integrated Watershed Management Plans (IWMPs)for each of the City's watersheds. Cobbs Creek was the first watershed for which a Comprehensive Characterization Report and IWMP were completed; the Tookany/Tacony-Frankford Watershed Partnership was second to complete an IWMP and CCR. The WCWCCR, completed in February 2007, was third in this series of technical documents, and the Pennypack and Poquessing Creek watershed CCRs were completed in June 2009 and September 2010, respectively. While IWMPs have not yet been completed for the Wissahickon, Pennypack or Poquessing Creek Watersheds yet, these Comprehensive Characterization Reports will complement IWMPs by characterizing a watershed's land use, geology, soils, topography, demographics, meteorology, hydrology, water quality, ecology, fluvial geomorphology, and pollutant loads. These reports are intended as a single compilation of background and technical documents that can be periodically updated as additional field work or data analyses are completed.

Water Quality Sampling and Monitoring

In order to comply with the State-regulated stormwater permit obligations, PWD worked with USGS to record continuous water quality data at 11 gage stations in the Philadelphia region from July 2010 through November 2010 and March 2011 through June 2011. Water quality grab samples were also collected quarterly at all USGS gage stations in September and December 2010, March and June 2011. Water quality sampling was conducted via boat monthly at seven locations in the Delaware Estuary, beginning in June 2011. Wet weather water quality sampling for sediment TMDL and BMP monitoring continued in Wissahickon Creek Watershed. The sampling and monitoring sites are presented in **APPENDIX K - MONITORING LOCATIONS**. A list of the parameters sampled during the discrete, continuous, and wet weather sampling can be found in **TABLE F.2.STEP.2.A-1**. 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 11 USGS gage stations. This program marks a transition from focusing on one specific watershed per monitoring season to a broader regional water quality assessment approach. 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 dry weather problems are primarily related to bacteria and nutrients. Results of samples collected to date are presented in **APPENDIX H - PWD QUARTERLY DRY WEATHER WATER QUALITY MONITORING PROGRAM.**

Grab samples were also collected from seven locations in the Delaware Estuary in the vicinity of Philadelphia by boat in June 2011. Samples are collected precisely at low tide to ensure that water samples adequately represent spatial variability in water quality that may be present. PWD plans to continue sampling these seven locations on a monthly basis for at least two years. The initial round of samples was collected aboard PWD's small electrofishing boat, which proved to be very dangerous. USEPA Region 3 Office of Monitoring and Assessment kindly offered sampling assistance in July 2011 and subsequent samples have been collected with a much larger and safer EPA vessel. PWD greatly appreciates this sampling assistance provided by USEPA.

Continuous Water Quality Assessment

Physicochemical properties of surface waters are known to change over a variety of temporal scales, with broad implications for aquatic life. Several important, state-regulated parameters (*e.g.*, dissolved oxygen, temperature, and pH) may change considerably over a short time interval, and therefore cannot be measured reliably or efficiently with grab samples. 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 eleven USGS gage stations. This program marks a transition from focusing on one specific watershed per monitoring season to a broader regional water quality assessment approach. Each USGS/PWD cooperative monitoring gage site (site map reference) 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/. FY2011 monitoring results are presented in **APPENDIX I - PWD-USGS COOPERATIVE WATER QUALITY MONITORING PROGRAM ANNUAL SUMMARY.**

In addition to monitoring water quality continuously 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 June-November 2010. Tidal sondes were deployed again in June 2011, with the intention of collecting data through November 2011.

Wet Weather Event Sampling

Automated samplers (Isco, Inc.) were used to collect samples from the Stormwater treatment wetland at Saylor Grove in the Monoshone Creek Watershed (tributary to Wissahickon Creek). These data will allow characterization of water quality responses to stormwater runoff. PWD is in the process of analyzing Saylor Grove wet weather water quality data collected from 2006-2011, and plans to complete a water quality update to the Saylor Grove Stormwater Treatment Wetland Operation, Maintenance, and Monitoring Report in 2012. Once this report is completed, PWD will shift stormwater

BMP water quality monitoring efforts to two new bioretention facilities (also located within the Wissahickon Creek Watershed) at Cathedral Rd. and Wise's Mill.

Automated samplers are equipped with vented in-stream pressure transducers that allowed sampling to commence beginning with an increase in stage. Once sampling was initiated, a computer-controlled peristaltic pump and distribution system collected the first 4 grab samples at 40 minute intervals and the remaining samples at one-hour intervals.

Biological Assessments

Macroinvertebrate Assessments

PWD completed the Poquessing Creek Watershed Comprehensive Characterization Report in 2010, the last of five comprehensive assessments of Philadelphia's watersheds. With these assessments complete, PWD has made a change to the monitoring strategy based on a monitoring program that USGS has implemented in Chester County. With this new strategy, which is intended to increase the geographic distribution of sampling locations sampled in a given year, nine (n=9) USGS gages will be sampled every year, along with randomly selected sites from PWD's watershed sampling efforts 1999-2008. During April 2011, PWD conducted Rapid Bioassessment Protocols (RBP III) at 25 (n=25) locations within Philadelphia area watersheds. Sampling was conducted at 9 USGS gages in the PWD/USGS Cooperative Monitoring program and 16 randomly selected sites. In 2012, PWD plans to sample 9 USGS gages, 6 sites in Cobbs Creek Watershed, and 10 randomly chosen sites.

Fish Assessments

Between 6/1/08 and 6/23/08, PWD biologists conducted fish assessments at six (n=6) locations within Poquessing-Byberry Creek Watershed (**APPENDIX K**). PWD also collected fish samples from Cobbs Creek at Marshall Rd for post construction monitoring of stream restoration activities and Tacony Creek at Whitaker Avenue for documentation of baseline pre-construction conditions. All surveys were conducted using electrofishing gear as described in EPA RBP V (Barbour, et al. 1999). PWD plans to conduct fish assessments of Cobbs Creek Watershed in June 2012.

Algae Assessments

Periphyton communities were sampled from three (n=3) sites in Poquessing Creek Watershed, chiefly to assess the role of periphyton regulating stream metabolism. Results were presented in the 2010 Poquessing Creek Watershed Comprehensive Characterization Report. Algae assessments were conducted June-September 2011 at two locations in Tookany-Tacony/Frankford Watershed in order to gather more data about the relationship between scouring stream flows, algae densities and dissolved oxygen. Further research is planned for Tookany-Tacony/Frankford Watershed and Cobbs Creek Watershed in 2012. PWD's algae monitoring continues to be enhanced by a partnership with the Academy of Natural Sciences of Philadelphia (ANS). PWD's Bureau of Laboratory Services performs chlorophyll-a analysis for biomass estimates, while the ANS laboratory analyzes intracellular nutrient ratios (C:N:P) and taxonomic composition of algal periphyton and suspended algae samples.

Physical Assessments

Habitat Assessments

Habitat assessments are conducted along with benthic macroinvertebrate monitoring and thus the habitat assessment strategy has been modified as described under the heading **BIOLOGICAL ASSESSMENTS - MACROINVERTEBRATE ASSESSMENTS,** above on page 204 Immediately following benthic macroinvertebrate sampling procedures, habitat assessments were completed at 12 (n=12) sites in Poquessing Creek Watershed as well as Cobbs Creek at Marshall Rd. and Tacony Creek at Whitaker Ave. (**APPENDIX K**). PWD assesses stream physical habitat condition using PADEP Instream comprehensive Evaluation (ICE) protocols.

Physical Habitat Survey and Integrated Flow Modeling

PWD performed very detailed physical survey of sites (n=6) where fish were collected in Poquessing Creek Watershed in 2008 and used a depth-averaged finite element flow model (River 2D) to assess habitat conditions under baseflow conditions for the Poquessing Creek watershed Comprehensive Characterization Report in 2010. Physical surveys were also conducted in segments of Tacony Creek prior to stream restoration work, with the intention of assessing physical conditions before and after stream restoration. Additional research is needed in order to parameterize physical Habitat Suitability Models for various aquatic life groups of concern.

Fluvial Geomorphologic (FGM) / Infrastructure Analysis

In FY 2008, infrastructure assessments were completed in the entire Pennypack and Poquessing Creek watershed, modeled after the effort completed in FY 2006-2007 in the Wissahickon Creek watershed. In order to document infrastructure throughout the basin, PWD staff walked along stream segments with GPS, digital photography, and portable computer equipment, compiling an inventory of every infrastructure feature encountered. These features included bridges, culverts, dams, stormwater outfalls and drain pipes greater than 8” in diameter, sewers, pipe crossings, confluences, manholes, and areas where one or more of the stream banks were artificially channelized. The end product of this effort is a complete GIS coverage with associated digital photographs of each feature.

Wissahickon Creek Watershed

FGM assessment work on the Wissahickon was furthered through the QA/QC of field data moving towards the compilation of the final report. Unfortunately, the final report’s compilation was delayed by errors in bankfull identification by PWD’s field team. This necessitated the re-surveying of bankfull at each of the 213 cross-sections established within the Wissahickon Creek Watershed. This process took place from November, 2007 through April, 2008. Because of the large amount of data associated with project, PWD has decided to present and discuss this data on a subwatershed scale. To create a template for future reports, the Trewellyn Creek watershed was used. In FY 2010, PWD completed a final report for the Lower Wissahickon watershed, which was submitted as part of the FY 2010 annual report and represents PWD’s final product with respect to this effort. . This document can be found in the **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD.**

Pennypack Creek Watershed
FGM assessment work on the Pennypack was furthered through the QA/QC of field data moving towards the compilation of the final report. Unfortunately, the final report's compilation was delayed by errors in bankfull identification by PWD's field team. This necessitated the re-surveying of bankfull at each of the 128 cross-sections established within the Pennypack Creek Watershed. This process took place from April, 2008 through June, 2008.

Although PWD planned to complete this report during FY 2011, some delays occurred during the compilation and editing process. This report will be completed during FY 2012 and be submitted as part of next year's annual report.

Poquessing Creek Watershed
PWD plans to eventually compile this data in a report on the Philadelphia portion of the Poquessing watershed once the Pennypack report has been completed. This work will continue through FY 2012. Presently, the completion date for this report has not been determined.

Monitoring Time Line Strategy

As discussed in **SECTION 2: STEP 1 (PART B)** of the City's Stormwater Permit, PWD completed The Poquessing Creek Watershed Comprehensive Characterization Report in 2010. Completion of the Poquessing Creek watershed Characterization report marks the end of a decade-long research effort to characterize conditions in Philadelphia's streams. Various planning initiatives have been based upon these technical documents and many pilot –scale BMP projects have been constructed and are being actively monitored.

As described in PWD's "Comprehensive Watershed Monitoring Program: Proposed Strategy 2010-2015", the scale of watershed stressors is so expansive and individual BMP projects so limited in size, 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.

Reporting

PWD completed a Comprehensive Characterization Report (CCR) for the Poquessing-Byberry Watershed in September 2010. One copy of the Poquessing-Byberry Watershed CCR was submitted to the Department along with a data CD containing the full report and additional plots of River 2D habitat modeling results. The technical report will also provide state and federal agencies and local officials with a succinct problem statement, outlining the biological, physical and chemical integrity of the system and the potential sources of impairment. The Poquessing CCR is disseminated to the public through the internet at the following address: http://www.phillywatersheds.org/doc/Poquessing_CCR.pdf

F.2.Step 2.b. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Quality Assurance/Quality Control (QA/QC) and Data Evaluation

OOW and the Bureau of Laboratory Services (BLS) have planned and carried out an extensive sampling and monitoring program to characterize conditions in Pennypack and Poquessing-Byberry Creek Watershed. The program includes hydrologic, water quality, biological, habitat, and fluvial geomorphological components. Again, because the OOW has merged the goals of the city's stormwater, combined sewer overflow, and source water protection programs into a single unit dedicated to watershed-wide characterization and planning, it is uniquely suited to administer this program.

Sampling and monitoring follow the Quality Assurance Project Plan (QAPP) and Standard Operating Protocols (SOPs) as prepared by BLS. These documents cover the elements of quality assurance, including field and laboratory procedures, chain of custody, holding times, collection of blanks and duplicates, and health and safety. They are intended to help the program achieve a level of quality assurance and control that is acceptable to regulatory agencies. More information regarding Standard Operating Procedures (SOPs) for chemical and biological assessments is available from BLS.

Water Quality Criteria for Poquessing Creek Watershed

An analysis was conducted on the water quality data collected in the Poquessing Creek watershed in 2008 and 2009. Using the data collected from discrete wet and dry weather sampling, comparisons have been made to PADEP water quality standards. National water quality standards and reference values were used where state water quality standards were not available. The water quality standards or reference values and their sources are listed in **TABLE 1 IN APPENDIX K.** These data are presented in **SECTION 4** of the Poquessing-Byberry Watershed Comprehensive Characterization Report (CCR).

F.2.Step 2.c. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Watershed Modeling

F.2.Step 2.d. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Estimate of Loadings from the City's MS4 System

F.2.Step 2.e. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Water Body Modeling

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. Designed to meet the goals and objectives of numerous, water resources related regulations and programs, the method recommends the use of adaptive management approaches to implement recommendations on a watershed-wide basis. Its focus is on attaining priority environmental goals in a phased approach, making use of the consolidated goals of the numerous existing programs that directly or indirectly require watershed planning. Central to the approach is development of IWMPs for each of the watersheds that drains to the City of Philadelphia.

The IWMP approach has four major elements, each with multiple tasks specific to the planning efforts within the watershed.

- Data collection, organization and analysis
- Systems description
- Problem identification and development of plan objectives
- Strategies, policies and approaches

Data Collection, Organization and Analysis

The collection and organization of existing data on surface water hydrology and quality, pollutant loads, wastewater collection and treatment, stormwater control, land use, stream habitat and biological conditions, and historic and cultural resources is a critical step in the watershed characterization process. In addition, existing rules, regulations, and guidelines pertaining to watershed management at federal, state, basin commission, county, and municipal levels are examined for coherence and completeness in facilitating the achievement of watershed planning goals.

Data are collected by many agencies and organizations in various forms, ranging from reports to databases and Geographic Information System (GIS) files. Field data collection efforts were undertaken throughout the study, and expanded as data gaps were identified.

Systems Description

The planning approach for an urban stream must focus on the relationship between the natural watershed systems (both groundwater and surface water) and the constructed systems related to land use that influence the hydrologic cycle, such as water supply, wastewater collection and treatment, and stormwater collection. A critical step in the planning process is to examine this relationship in all its complexity.

PWD's extensive physical, chemical and biological monitoring program is initiated for roughly one year in each watershed. A compendium document is produced following the analysis of all collected data; this document titled the Comprehensive Characterization Report (CCR) is shared with watershed partners for comments and feedback. These CCR documents are made available on PWD's Watershed Information Center website at www.PhillyWatersheds.org. The CCR assessment serves to document the watershed baseline prior to implementation of any plan recommendations, allowing for the measure of progress as implementation takes place upon completion of the plan.

Problem Identification and Development of Plan Objectives

Existing problems and issues of water quality, stream habitat, and streamflow related to the urbanization of the watershed can be identified through analyses of:

- Prior studies and assessments
- Existing data
- New field data
- Stakeholder input

Problems and issues identified through data analysis must be compared with those brought forward by stakeholders. An initial list of problems and issues then are transformed into a preliminary set of goals and objectives. These goals and objectives may reveal data gaps and may require additional data collection and analysis. Ultimately, with stakeholder collaboration, a final list of goals and objectives is established that reflects the conditions of the watershed. These goals and objectives are prioritized by the stakeholders based on the results of the data analysis.

Strategies, Policies and Approaches

Once a list of planning objectives is selected based on the sound scientific analysis and consensus among stakeholders, effective sets of management alternatives are developed to meet the agreed upon objectives. These alternatives are made up of a combination of implementation options that may include suggested municipal actions, recommendations on water supply and wastewater collection system improvements, potential measures to protect water quality from point sources, best management practices for stormwater control, measures to control sanitary sewer overflows, changes to land use and zoning, stream channel and stream bank restoration measures, etc.

An Integrated Watershed Management Plan will provide a list of implementation options that have been deemed appropriate for the given watershed area. Recommended implementation options these will be presented as a watershed-wide set of "guidelines" for implementation over the 20-year horizon. The City of Philadelphia will commit to implementing packages of these recommended options in the way of 4 sequential 5-year Implementation Plans for each watershed.

Wissahickon Watershed

A detailed hydrologic model has been developed for the Wissahickon watershed using EPA's Stormwater Management Model (SWMM). The outputs of this model can be found in the Wissahickon Creek Watershed Comprehensive Characterization Report (WCWCCR) online at http://www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports. Pollutant loads for all storm water outfalls in this watershed were estimated using NetSTORM (computer program for precipitation data assessment and rapid long-term urban runoff simulation), result of this model can be found in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

Pennypack Watershed
The modeling of stormwater volumes within the Pennypack Creek watershed is currently at the data analysis stage. Cross-section data from the Pennypack Creek was collected in the summer and fall of 2007. Modeling was initiated in spring 2008 and results are presented in the Pennypack Creek Watershed Comprehensive Characterization Report (PCWCCR) and are available online at http://www.PhillyWatersheds.org. Pollutant loads for all storm water outfalls in this watershed were estimated using NetSTORM (computer program for precipitation data assessment and rapid long-term urban runoff simulation), result of this model can be found in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

Poquessing Watershed
A loading analysis of the Poquessing Creek watershed was included as a part of the data collection and analysis process central to the development of the Poquessing Creek Comprehensive Characterization Report. Pollutant loads for all storm water outfalls in this watershed were estimated using NetSTORM (computer program for precipitation data assessment and rapid long-term urban runoff simulation), results of this model can be found in Poquessing Creek Comprehensive Characterization Report which was completed in September of 2010 and is available online at http://www.PhillyWatersheds.org.

F.2.Step 2.f. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Problem Definition and Water Quality Goal Setting

Problem Definition
Wissahickon Creek Watershed
As described in the FY08 Annual Report, the extensive monitoring program initiated by PWD in the Wissahickon Creek Watershed between 2005 and 2006 culminated with the production of the WCWCCR, which highlighted a multitude of water quality related issues within the watershed drainage. As stated in the WCWCCR, "problems faced by the Wissahickon Creek Watershed stem from many sources; primarily, the creek suffers from physical disturbance due to urbanization and excess nutrient input from municipal wastewater treatment plants." These effects are evident in the comprehensive assessment of the aquatic habitat, biological communities and water chemistry documented in this report. Please review the entire report at the following address: http://www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports

At the completion of the data gathering and analysis process conducted for development of the WCWCCR, PWD began to assess additional data needs to better understand problems that exist in the Montgomery County portion of the watershed. Significant data gaps emerged necessary for understanding the needs specific to the upstream portion of the watershed, including flooding, inconsistencies in ordinances and water quality impairments. Additionally complicating the watershed-wide collaborative planning process is the status of the Wissahickon TMDL for nutrients – currently under review and potential revision. This made it difficult to bring the permitted dischargers on board with supporting the planning process as they still did not know what would be required of them in the future. It was beyond PWD's scope and available staff resources to develop comprehensive assessments of the Montgomery County specific issues, and without commitment from the upstream municipalities to assist in data collection and analysis and ultimately to implementation of recommendations, PWD was unable to commit to this undertaking.

PWD has elected to move forward with developing an implementation commitment to address the City's obligations related to the Wissahickon TMDL for Siltation. Over the coming years, many ongoing initiatives in the upstream portion of the watershed be completed, each of which producing data that could help to fill some of these data gaps in order to identify problems and their sources for this portion of the watershed. PWD will continue to convene the WWP over the coming years in hopes that as data gaps are filled, the WWP will take the lead in developing a complementary implementation approach for the upstream portion of the watershed.

Pennypack Creek Watershed

An extensive monitoring program was initiated by PWD in the Pennypack Creek Watershed between 2007 and 2008 which has culminated in the production of the Pennypack Creek Watershed Comprehensive Characterization Report PCWCCR (spring 2009). The PCWCCR highlighted a multitude of water quality related issues within the watershed drainage. As stated in the PCWCCR, "The watershed suffers from physical disturbance due to urbanization and excess nutrient input from municipal wastewater and stormwater runoff. These effects are evident in the comprehensive assessment of aquatic habitat, water quality, and biological communities documented in this report. Healthy aquatic ecosystems cannot thrive in physically unstable habitats or when streamflow is dominated by treated municipal wastewater that does not maintain healthy stream chemistry." This report forms a technical basis for the forthcoming Pennypack Creek Integrated Watershed Management Plan (PCIWMP), a plan for restoration and enhancement of the creek and its watershed.

Please review the entire report at the following address: http://www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports

Poquessing Creek Watershed

An extensive monitoring program was initiated by PWD in the Poquessing Creek Watershed between 2008 and 2009 which has culminated in the production of the Poquessing Creek Watershed Comprehensive Characterization Report PCWCCR (Fall 2010). The PCWCCR highlighted a multitude of water quality related issues within the watershed drainage. As stated in the PCWCCR, "The watershed suffers from physical disturbance due to urbanization and stormwater runoff. These effects are evident in the comprehensive assessment of aquatic habitat, water quality, and biological communities documented in this report. Healthy aquatic ecosystems cannot thrive in physically unstable habitats or when streamflow is dominated by treated municipal wastewater that does not maintain healthy stream chemistry." This report forms a technical basis for the forthcoming Poquessing Creek Integrated Watershed Management Plan (PCIWMP), a plan for restoration and enhancement of the creek and its watershed.

Please review the entire report at the following address: http://www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports

F.2.Step 2.g. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Technology Evaluation

An integral component of developing the Watershed Management Plans is implementing appropriate stormwater management options in response to the key stormwater issues identified under Step 1 of the NPDES permit. The overall goal for mitigating stormwater is to improve the quality of runoff and decrease the quantity and rate of runoff as it reaches the receiving water bodies through the MS4. There are numerous approaches to achieving these stormwater runoff improvements. The City is responsible for ensuring that any technology that is implemented to address stormwater issues is also evaluated for its effectiveness. What has become increasingly evident over the past year is the contribution of private development in addressing stormwater runoff problems. A discussion of the programs, technology and approaches implemented to date are included specifically within this section and also as part of the Best Management Practices narrative located in **SECTION F.8 – BEST MANAGEMENT PRACTICES** on page 257**.**

PWD is committed to a balanced "land-water-infrastructure" approach to achieve its watershed management goals. This method includes infrastructure-based approaches where appropriate, but relies on a range of land-based stormwater management techniques and physical reconstruction of aquatic habitats where appropriate.

Below is a list of the land-based options (source controls) that are being considered for implementation and the associated category that each option is in.

- Flow reduction: Catch basin modifications
- Flow reduction: Sump pump disconnect
- Flow reduction: Catch basin and storm inlet maintenance
- Flow reduction: Illicit connection control
- Flow reduction: Roof leader disconnect program
- Flow reduction: Street storage (catch basin inlet control)
- Flow reduction: Offload groundwater pumpage
- Flow reduction: Stream diversion
- Flow reduction: Groundwater infiltration reduction
- Flow reduction: Reduction of contractual flow

- Low impact development/ re-development/retrofit: Require existing resources inventory, sketch plan, initial meeting
- Low impact development/ re-development/retrofit: Require integrated site design
- Low impact development/ re-development/retrofit: Require post-construction stormwater management
- Low impact development/ re-development/retrofit: Post-construction inspection and enforcement
- Low impact development/ re-development/retrofit: Demonstration Projects on Public Lands
- Low impact development/ re-development/retrofit: Large-Scale Implementation on Public Lands
- Low impact development/ re-development/retrofit: Street Trees and Street Greening
- Low impact development/ re-development/retrofit: Revise Stormwater Rate Structure
- Low impact development/ re-development/retrofit: Stormwater Management Incentives for Retrofit
- Public education: Water Efficiency
- Public education: Catch Basin Stenciling
- Public education: Community Cleanup and Volunteer Programs
- Public education: Pet Waste Education
- Public education: Public Notification and Signage
- Public education: Litter and Dumping Education
- Public education: School-Based Education
- Good housekeeping: Loading, Unloading, and Storage of Materials
- Good housekeeping: Spill Prevention and Response
- Good housekeeping: Street Sweeping Programs
- Good housekeeping: Vehicle & Equipment Management
- Good housekeeping: Private Scrapyard Inspection and Enforcement
- Good housekeeping: Employee training
- Good housekeeping: Record keeping and reporting
- Good housekeeping: Flow diversion and exposure minimization structures
- Good housekeeping: Responsible landscaping practices on public lands
- Good housekeeping: Responsible bridge and roadway maintenance

- Pollution prevention: Require industrial pretreatment
- Pollution prevention: On-lot disposal (septic system) management
- Pollution prevention: Household hazardous waste collection
- Pollution prevention: Oil/water separator/WQ inlets
- Pollution prevention: Industrial stormwater pollution prevention
- Pollution prevention: Litter and illegal dumping enforcement
- Pollution prevention: Require construction-phase stormwater/E&S controls

Many of the water-based options focus on improving aquatic habitats including water quality. Below is a list of the water-based options that are being considered for implementation and the associated category that each option is in.

- Instream: Dam modification/removal
- Instream: Daylight orphaned storm sewers
- Instream: Stream cleanup and maintenance
- Instream: Channel stabilization and habitat restoration
- Instream: Channel realignment and relocation
- Instream: Plunge pool removal
- Instream: Improvement of fish passage
- Instream: Instream aeration
- Instream: Sidestream aeration
- Riparian: Constructed wetlands along stream corridors
- Riparian: Wetland restoration along tidal rivers
- Riparian: Enhance stream corridor recreational and cultural resources
- Riparian: Wetland improvement
- Riparian: Invasive species management
- Riparian: Reforestation

Below is a list of the infrastructure-based options that are being considered for implementation and the associated category that each option is in.

- Nine Minimum Controls: Nine Minimum Controls
- Operation and Maintenance: Inspection and Cleaning of Combined Sewers
- Operation and Maintenance: Combined Sewer Rehabilitation
- Operation and Maintenance: Regulator/Pump Station Inspection/Maintenance/Repairs

- Operation and Maintenance: Outfall Maintenance Program
- Operation and Maintenance: House Lateral Repairs
- Sewer Separation: Permitted Discharge to Receiving Water for Waterfront Properties
- Sewer Separation: Separation of Sanitary Sewage and Stormwater on Development Sites
- Sewer Separation: Separate Street Runoff from Combined System
- Sewer Separation: Complete Separation into Sanitary and Storm Sewer Systems
- Sewer Separation: Permitted Discharge to Receiving Water for Waterfront Interstate Highways
- Outfall Consolidation/Elimination: Outfall and Regulator Consolidation
- Storage: Instream Storage Technologies
- Storage: In-Line Storage in Interceptor or Trunk Sewer
- Storage: Earthen Basins
- Storage: Offline Covered Storage Basins
- Storage: Offline Open Storage Basins
- Storage/Transmission: Deep Tunnels
- Storage/Transmission: Real Time Control
- Transmission: Parallel Interceptors
- Transmission: Remove Flow Bottlenecks
- Transmission: Diversion of Trunk Flow Directly to WPCP
- Treatment at Discharge Point: Vortex Separators
- Treatment at Discharge Point: Swirl Concentrators

Household Hazardous Waste Collections

During FY 2011, the City of Philadelphia held 7 Household Hazardous Waste 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 8 fiscal years is provided below in **TABLE F.2.STEP 2.G-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.2.Step 2.g-1 Household Hazardous Waste Collection Statistics (FY 2004 - 2011)

HHW Program Collection Summary		# of Attendees	Quantity Accepted (lbs)		
			HHW	Computers	Total
FY 2004 Total		3,365	284,696	47,593	284,696
FY 2005 Total		3,740	280,722	30,793	315,255
FY 2006 Total		3,866	306,707	67,319	374,026
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 2011 Collection Event Details		**# of Attendees**	**Quantity Accepted (lbs)**		
Location	**Date**		**HHW**	**Computers**	**Total**
State Road and Ashburner (Thurs.)	7/22/10	727	52,320	22,164	74,484
22nd & York	9/25/10	434	31,279	9,051	40,330
63rd Street	10/23/10	281	20,207	3,080	23,287
Delaware and Wheatsheaf	11/06/10	551	39,641	9,317	48,958
State Road and Ashburner (HHW)	4/09/11	785	45,716	9,631	55,347
1st Highway Yard 4800 Parkside Ave	5/14/11	276	19,837	5,019	24,856
Domino And Umbria	6/11/11	750	47,337	5,462	52,799
Computers at Drop-off Sites	Year-wide			274,457	274,757
Total		**3,803**	**338,181**	**338,181**	**590,518**

Infrared Analysis

In January 2010, a thermal imaging survey funded by PWD took place on the rivers and creeks throughout Philadelphia and the neighboring communities into which these waterways extend. The purpose of this survey was to quickly and efficiently locate potential sources of liquid contamination which would later be field-verified and addressed as necessary. A similar survey took place in 2004 and 2006.

The 2010 thermal imaging survey was completed on January 16th by Hot/Shot Infrared Inspections Inc. The survey covered the watersheds of Poquessing Creek, Pennypack Creek, Tookany/Tacony-Frankford Creek, Wissahickon Creek, Cobbs Creek, the Lower Schuylkill River, and the lower Delaware River for a total of 524 river miles. Aerial infrared photos, taken by helicopter, were analyzed to locate areas where thermal anomalies or hotspots exist. These thermal anomalies are indicative of potential liquid contamination of surface water and may be caused by leaking sewer lines, septic fields, storm sewers, unidentified surface or subsurface outfalls in the form of pipes or drains, or any other detectable source of liquid that may be of interest. The anomalies may also be natural sources of liquid discharge such as groundwater seeps.

The deliverables from the survey consisted of the raw IR video imagery, digital captures of the IR images of suspected anomalies, a Google Earth map showing the location of each anomaly, a text file of geo-coordinates and anomaly number for each anomaly noted on the maps, and a short report describing the conditions of the flight. This information allows field crews to easily locate and investigate the exact nature of each thermal anomaly so that appropriate decisions can be made regarding remediation of surface water contamination problems.

TABLE F.2.STEP2.G-2 below contains the breakdown of each municipality with the number of anomalies attributed to each. Due to the inaccuracy inherent in the data collection method, PWD was unable to make jurisdictional determinations of the location of each feature, so a ~500ft. spatial buffer was applied to each municipal boundary and all features within this boundary were supplied to the municipality or interested party. This function of applying a spatial buffer refined the original data which updated the number of anomalies in Philadelphia and surrounding communities to 99 and 329, respectively. All 29 surrounding communities which were identified to have at least one anomaly are considered a Phase II MS4. The results of the Thermal Imaging study conducted in January 2010 were shared with other municipalities located outside the City of Philadelphia. The Philadelphia Water Department sent letters notifying each municipality about the thermal imaging study and any found thermal anomalies in June 2010. Individual data distribution DVDs containing thermal anomaly information and other useful geospatial information were compiled for each municipality based on geographic area of interest.

Table F.2.Step 2.g-2 Located Anomalies from Infrared Analysis

Municipality	Anomalies	Municipality	Anomalies
Abington	49	Radnor	3
Ambler	6	Ridley	1
Bensalem	2	Springfield	8
Bryn Athyn	6	Tinicum	8
Cheltenham	2	Tredyffrin	6
Eddystone	1	Upper Darby	4
Hatboro	5	Upper Dublin	28
Haverford	6	Upper Gwynedd	10
Horsham	25	Upper Merion	9
Lansdale	1	Upper Moreland	22
Lower Gwynedd	42	Upper Southampton	6
Lower Merion	5	Warminster	12
Lower Moreland	13	Whitemarsh	20
Montgomery	2	Whitpain	23
Philadelphia	99	Yeadon	4

Floatables Controls

Please refer the CSO portion of the Annual Report **SECTION II.F – CONTROL OF SOLID AND FLOATABLE MATERIALS IN CSOS (NMC6) ON** page 45 for information about this topic.

F.2.Step 2.h. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Economic Assessment and Funding Requirements

As watershed management plans are completed for the Wissahickon, Pennypack and Poquessing watersheds each report will include an assessment of implementation funding needs over the 20 year implementation horizon as well as the PWD implementation funding commitment for each watershed. The assessment will also detail funding requirements including identification of known and potential funding sources necessary for successful plan implementation. As watershed plans are completed, the funding commitments made by PWD will be detailed in subsequent annual reports.

The initial funding commitments to the Cobbs and TTF were $16M and $18M respectively. The commitment was made in the implementation plan (IP) associated with the completed IWMPs. However, these IPs will now be updated to reflect commitments made by the CSO Long Term Control Plan Update.

Additionally, in 2009, the Philadelphia Water Department was awarded a $30 million loan to be used for the design and construction of green stormwater infrastructure and stream restoration. This loan afforded PWD the opportunity to begin to ramp up the process of implementing green stormwater infrastructure implementation throughout the City. To date, PWD have seen 5 projects constructed, another 11 projects with designs completed, another 60 projects currently in design with a final 14 projects currently in baseplan/survey (see **TABLE 5** in **APPENDIX E- PWD GREEN STORMWATER INFRASTRUCTURE PROJECT LIST** for a listing of PennVest Projects by Phase).

F.2.Step 2.i. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Public involvement

Public involvement, including education and outreach, is detailed in **SECTION F.2.STEP 3 INTEGRATED STORMWATER MANAGEMENT PLANS** on page 218 and **CSO SECTION II.G POLLUTION PREVENTION** on page 49**.**

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

F.2.Step 3. i Pennypack, Poquessing, Wissahickon - Watershed Plan Implementation and Performance Monitoring

Please refer the CSO portion of the Annual Report **SECTION III.C – WATERSHED – BASED MANAGEMENT** on page 105 for information about watershed plan implementation and performance monitoring.

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, the City 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 226.

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

Please refer the CSO portion of the Annual Report **SECTION II.F – CONTROL OF SOLID AND FLOATABLE MATERIALS** on page 38 for information about debris removal from waterways impacted by storm water discharges.

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

In the spring of 2003, the City conducted CCTV sewer exams of both the storm and sanitary systems under Lincoln Drive. Given the high vehicle volume on this major artery for the City, this was a very difficult and time-consuming effort as all exams had to be done during weekends. A leak from the sanitary interceptor under Lincoln Drive, in the vicinity of Johnson Street, into the storm system was detected. The CCTV examinations showed that the integrity of the sanitary sewer was generally in excellent condition except for one area where bricks appeared to be missing in the vicinity of where the infiltration into the storm system was noted.

The City decided to move forward with a lining contract to address this situation. The contract provided for the lining of 3,160 feet of 2’-6” brick interceptor sewer under Lincoln Drive from Washington Lane (Paper Street only) to Arbutus Street. This scope included the entire length of sanitary sewer that is not physically lower in depth than the storm sewer system. The contract was bid, awarded, and completed in Fiscal Year 2004.

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 Pennsylvania Department of Environmental Protection. All 434 of 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.

Please reference **SECTION F.3 - DETECTION, INVESTIGATION, AND ABATEMENT OF ILLICIT CONNECTIONS AND IMPROPER DISPOSAL** on page 226 for a more detailed discussion of this subject.

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.

The City also investigates all potential reports of an illicit discharge from the stormwater system through either the Industrial Waste Unit or the Sewer Maintenance Unit.

Please reference **SECTION F.3 - DETECTION, INVESTIGATION, AND ABATEMENT OF ILLICIT CONNECTIONS AND IMPROPER DISPOSAL** on page 226 for a more detailed discussion of this subject

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

Investigation will continue within each particular outfall area (sewershed) until the City believes that the outfall area 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 FY11, 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 226 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

Please refer the CSO portion of the Annual Report **SECTION III.C.3.7 - BASIN-SPECIFIC STORMWATER MANAGEMENT PLANS (ACT 167)** on page 154 for information about stormwater management plans.

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

Please refer the CSO portion of the Annual Report **SECTION III.C.2.3 – STREAM HABITAT RESTORATIION** on page 138 for information the Natural Stream Channel Design.

F.2.Step 3.b.iii. Assess the effectiveness of the NSCD restoration approach

As each of PWD's NSCD projects are constructed, PWD realizes the importance of extensive monitoring and O&M that accompanies such projects. It is very rare that such projects do not require additional "tweaking" or maintenance. In addition, 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 will conduct post implementation monitoring at each site that will include the measurement of relevant biological, habitat, and physical parameters to be used in comparison to pre-construction conditions.

<u>NSCD Physical Monitoring</u>

The physical monitoring component of PWD's NSCD monitoring program will be modeled after those methods specifically described in River Assessment and Monitoring or RAM (Rosgen, 2008). The RAM manual provides the framework for a comprehensive monitoring protocol that allows for a replicable dataset to be created allowing for independent valuation of a project's performance over time.

Specifically, the method will include the following data collection efforts:

- Establishment & Survey of permanent cross-sections at riffles, runs, pools, and glides
- Survey of Longitudinal profile along the entire project reach
- Individual pebble counts at riffles, runs, pools, glides
- Bar Sample/Pavement-Sub Pavement sampling
- BEHI/NBS Assessment
- Establishment of and occupation of permanent photo points

This dataset will allow for further data analysis and the completion of an annual monitoring report that will include:

- Narrative Report
- Sketch Map
- Stream Classification
- River reach summary and dimensionless ratios
- Velocity computation form
- Cross-section data & graphs
- Longitudinal profile data and graph
- Pebble Count data and graph
- Stream Stability Indices
- BEHI & NBS worksheets and Stream Erosion Predictions
- Bar Sample data and graph
- Stream Sediment Competency Assessment
- Photos from established photo points

<u>NSCD Biological/Habitat Monitoring</u>

The Biological and Habitat monitoring component of PWD's NSCD monitoring program will be modeled after components of the PADEP Instream Comprehensive Evaluation (ICE) found in Appendix A of the 2006 PADEP Bureau of Water Standards and Facility Regulation Instream Comprehensive Evaluation Surveys. Specifically, PWD will perform qualitative habitat assessments and collect benthic macroinvertebrates according to the "wadeable freestone" and "riffle run" protocols (Appendices A, B, H, of the aforementioned document). Monitoring will be conducted in early spring at five year intervals following project construction. At sites that support native fish communities or propagation and passage of migratory fish, PWD will periodically sample fish populations and fish habitat at the discretion of the PA Fish and Boat Commission.

In addition to the benthic macroinvertebrate metrics described in PADEP 2006 Appendix H, PWD will collect benthic macroinvertebrates from regional reference sites representative of the best attainable biological condition in order to continue with the assessment methods and address indicators established in Integrated Watershed Management Plans. For more imformation on implemented NSCD, please refer the CSO portion of the Annual Report **SECTION III.C.2.3 – STREAM HABITAT RESTORATIION** on page 138.

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 it's partners implemented many BMP projects throughout the City, for a full listing of both completed & current BMP projects, please refer to the CSO portion of the Annual report **SECTION III.C.1.3 – IMPLEMENTATION OF BMPS AND LID** on page 133.

In addition to the implementation of the NSCD projects discussed above, the City also understands the need to address wet weather water quality and quantity issues prior to the flow entering its rivers and streams. In such, the City has implemented various BMP projects in which PWD has partnered with groups in each watershed.

Monitor three demonstration BMPs

Saylor Grove Stormwater Treatment Wetland

In addition to implementing various types of BMP as described above, the City is interested in observing overall BMP performance by monitoring the efficacy of different kinds of BMPs. Thus far the operation of the Saylor Grove Wetland has been a success. The wetland was designed to treat a portion of the 70 million gallons of urban stormwater generated in the storm sewershed per year before it is discharged into the Monoshone Creek. During the FY 2009 reporting period, PWD resurveyed the Saylor Grove to determine the amount of sedimentation taking place within the facility. Approximately 22,000 cubic feet of material was accumulated within the facility over its first two and a half years of performance. In addition, some invasive species have colonized within the facility. During the FY 2010 reporting period, PWD dredged portions of the stormwater wetland, removing more than 150 tons of sediment. Invasive species management was also conducted in partnership with the Fairmount Park. PWD also continued water level monitoring in support of calibrating the H&H model for the facility. A complete monitoring report documenting PWD's monitoring at Saylor Grove was provided in the FY2010 CSO/SW NPDES Annual Report and can also be found in **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD.**

In FY 2011, PWD completed all necessary water level monitoring and finalized calibration of the H&H model. This model allows PWD to assess the stormwater management performance of Saylor Grove using actual rainfall data. In FY 2012, PWD will aim to complete its comprehensive monitoring at Saylor Grove, culminating in a comprehensive monitoring report documenting the physical, biological, and chemical performance of the facility.

Marshall Road Stream Restoration

During the FY 2009 monitoring period, PWD implemented its full NSCD Physical/Biological/Habitat monitoring protocol to comprehensively assess the performance of this natural stream channel design project. This effort, conducted in June, 2009, is summarized in a comprehensive monitoring report which is available upon request. During FY 2010, annual monitoring was conducted. This included quarterly photo monitoring at designated photo points, as well as comprehensive physical monitoring of the restoration site, which was performed in April, 2010. The FY2010 Marshall Road Monitoring Report was provided in the FY2010 CSO/SW NPDES Annual Report and can also be found in **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD.**

During FY 2011, PWD continued collecting monitoring data and implementing the Physical/Biological/Habitat monitoring protocol. PWD also began efforts to complete a detailed two-dimensional hydrodynamic model to assess the available aquatic habitat available in the Marshall Road reach. To date, a detailed topographic survey was conducted in combination with a detailed substrate assessment. In FY 2012, this effort, as well as all other monitoring efforts at Marshall Road, will be presented in an updated comprehensive monitoring report that will be written during the FY 2012 reporting period.

Columbus Square Streetscape

PWD has continuously monitored the Columbus Square sidewalk planters using pressure transducers installed in the control structure. Continuous monitoring allows for the observation of stormwater volumes and infiltration rates within the stone storage bed before, during and after storm events. Since the installation, one wet weather event was registered on the installed device. In order to properly determine the stormwater function of Columbus Square, long-term monitoring will continue at the site to provide future data during both natural and targeted monitoring events.

Under the COA, PWD will develop a Comprehensive Monitoring Plan that will include performance monitoring and field protocols for monitoring green stormwater infrastructure sites. The current monitoring activities at Columbus Square will supplement the development and compilation of the Monitoring Plan during the early implementation phase of monitoring and assessment and will provide key protocol and programmatic development for green stormwater infrastructure.

Other BMPs
Through a PWD maintenance contract, visual monitoring and inspections have been conducted at the following nine stormwater management sites:

- 47th and Grays Ferry
- Clark Park
- Cliveden
- Jefferson Square
- Waterview Recreation
- West Mill Creek
- Liberty Lands
- Herron Playground
- Columbus Square

The inspections and monitoring of these sites included routine visits to evaluate the condition of the stormwater management practices on each sites, identifying issues required for routine or flow-up maintenance activities.

With the development of the Comprehensive Monitoring Plan, PWD will seek to enhance the type of monitoring at constructed sites to provide valuable information about the functionality of the practices utilized.

PWD has also worked with community and institutional partners on monitoring of two additional BMPs. The monitoring at these sites has been focused on the water quality provided by vegetated stormwater management systems. The sites include a rain garden and cistern installation at Liberty Lands Park, which is being monitored by the Northern Liberties Neighborhood Association (NLNA) and a rain garden located in a traffic triangle at 47th St. and Gray's Ferry Ave, which is being monitored by graduate students at Drexel University.

At Liberty Lands Park runoff from the adjacent street and sidewalk is diverted into a rain garden where water filters through the soil before it fills a 6,000 gal cistern that was installed by NLNA. Since the water is used to irrigate the park, there is some small potential for human contact. With this in mind, NLNA has had the water tested for certain contaminents such as heavy metals, total coliform and e. coli. The results of this testing was provided in the FY2010 CSO/SW NPDES Annual Report and can also be found in **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD.**

A traffic triangle at 47th St and Gray's Ferry Ave was converted into a rain garden that treats runoff from the adjacent streets and sidewalks in 2007. In the summer of 2009, the site was used by graduate students at Drexel University to study the affects of concentrated infiltration on groundwater recharge quality. Water. In the Summer of 2009, samples were taken at the surface, at approximately 1 foot beneath the surface and at approximately 2 feet beneath the surface during storm events. Because of inadequate number storm events, this research is ongoing.

Work with Partners

Program Support (Planning, Outreach & Reporting) - Continue to Support Watershed Partnerships

Please refer the CSO portion of the Annual Report **SECTION III.C.1– ESTABLISHMENT OF WATERSHED STAKEHOLDER PARTNERSHIP** on page 107 for information working with partners.

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

The City of Philadelphia's Defective Lateral Detection and Abatement Program was developed under the City's initial Municipal Separate Storm Sewer System (MS4) permit signed in 1995 and further refined under a Consent Order & Agreement (COA), reached with the Pennsylvania Department of Environmental Protection (PADEP) on June 30, 1998. On March 18, 2004, the COA was officially terminated. However, the City has remained faithful to the terms of that agreement and many of the COA requirements have now been incorporated into the City's new MS4 permit. As in previous years, during FY 10, the results of dry weather outfall and subsystem sampling were used to evaluate priorities for the Defective Lateral Detection and Abatement Program. A copy of the Defective Lateral Group's Annual Report will be included as **APPENDIX M – FY2011 DEFECTIVE LATERALS ANNUAL REPORT.**

Staffing

As in prior years, the City maintains up to 4 crews dedicated to the identification and abatement of defective connections. Additional resources such as CCTV truck and crews are regularly assigned as needed to assist the program.

Funding

In addition to the staff resources dedicated to the identification and abatement of defective connections, the City funds abatement of owner-occupied, residential cross connections through the Cross Connection Repair Program. Funding for cross connection abatement and other customer assistance programs is budgeted at $2.5 million annually. During the reporting period, 83 abatements were completed under the program, at an average cost of $6,361.26, for a total cost of $527,984.50.

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, PWD verified 4,250 proper connections in FY2011. This number includes the 83 that were indentifed and abated in FY2011. In addition, PWD reviewed 800 new construction connections in the 2010 calendar year and thus far in calendar year 2011, PWD has reviewed 409 new construction connections. These numbers are include connections that occur in our storm, sanitary &/or combined sewer. Also a single project/permit could 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

The City maintains a stormwater outfall monitoring system in compliance with the MS4 permit issued by the Pennsylvania Department of Environmental Protection. All 434 of 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. The Defective Connections group is currently using the priority list generated 3/31/05. This priority list can be found in **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**. In addition, outfalls identified as priority outfalls under the MS4 permit are sampled quarterly.

The City also investigates all potential reports of an illicit discharge from the stormwater system through either the Industrial Waste Unit or the Sewer Maintenance Unit. The City investigates and reports all discovered illicit discharges to receiving waters. During FY 2011, the City investigated at least 12 reported sewage discharges.

In addition to programs above, the City also has initiated a monitoring and modeling effort within the separate sanitary sewer areas to target specific areas where infiltration and/or ex-filtration may be likely. In the summer of 1999, the City initiated a portable flow-monitoring program to augment monitoring data that was collected by an existing network of permanent monitoring sites at fixed locations. Under this program, fifteen (15) American Sigma 920 portable flow monitors were purchased. These monitors have multiple sensors that use a combination of pressure transducer and ultrasonic technologies for measuring depths and Acoustic-Doppler technology for velocity measurement. Additionally, a consultant, Camp Dresser & McKee, was chosen to assist the City in the startup of this program. Data from this program is routinely analyzed and compared to data provided from the City's extensive Stormwater Management Model (SWMM) hydraulic model.

One of the goals of the monitoring program was for the City's in-house instrument technicians to receive training and experience in the proper setup, use, maintenance, and trouble-shooting of flow monitoring equipment. Beginning with the third round of deployments in October 2000, the City's personnel began running this program completely in-house.

Another initiative started by the City is a very large undertaking to evaluate and enhance our existing sewer assessment program. The City awarded a contract for $5.7 Million over two years to the engineering firm of Hazen & Sawyer Environmental Engineers & Scientists to inspect approximately 200 miles of sewers in 9 pilot areas using CCTV equipment. Four of these areas (Manayunk, Rhawnhurst, Oak Lane, and Bustleton) are in separate storm and sewer system areas. Additionally, the consultant provided training to the City's in-house sewer inspection personnel on the standard NASSCO rating system. This consultant's work was completed in FY 2006 and the City is now running the entire program in-house.

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

During FY 2011 the Defective Connections Abatement staff, performed 4,250 tests. Of these tests, 4,240 were new connections tested and the remaining were revisited because of the need for additional testing. Of the confirmed connections, 69 (1.6 %) were found defective. The total cost for the 82 abatements performed in FY 11, both residential and commercial, was $527,984.53. 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	2010-3	2010-4	2011-1	2011-2	FY '11 Total
Date Coverage	Jul10-Sep10	Oct10-Dec10	Jan11-Mar11	Apr11-Jun11	
Completed Tests *	1,008	862	1,091	1,289	4,250
Confirmed Connections	993	843	1,067	1,268	4,171
Cross Connection Identified	15	14	24	16	69
% of Defective Connections	1.5%	1.6%	2.1%	1.2%	1.6%
Abatements **	14	29	17	24	47
Average # of days to abate	16	19	39	17	22.1

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

Outfall Investigations

During FY 2011, 79 outfalls were inspected and 39 were sampled due to observed dry-weather flow under the Permit Inspection Program. In addition, 43 outfalls were inspected and 43 sampled due to observed dry-weather flow under the Priority Outfall quarterly sampling program during FY 2011. These samples are used to evaluate priorities for the Defective Lateral Detection and Abatement Program. A summary table of the progress of the Defective Lateral Detection and Abatement Program from FY 05-FY 11 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 N – DEFECTIVE LATERAL QUARTERLY REPORTS.**

Table F.3.b.ii-2: 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
Total	596	356	392	359

Table F.3.bii-3 Summary of Defective Lateral Detection and Abatement Program FY 2005-FY 2011

	# Cross Connections Abated		Total Cost of Abatements
	Residential	Commercial	
FY 2005	48	5	$169,955
FY 2006	66	3	$333,094
FY 2007	78	0	$388,844
FY 2008	45	8	$ 187,539
FY 2009	88	13	$395,249
FY 2010	42	5	$280,970
FY 2011	74	9	$527,984.50
Total	441	43	$ 2,283,635.50

In the past seven reporting periods, PWD has abated 441 cross connections at a cost of $2,283,635.50.

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

In this priority outfall area, as of June 30, 2011, 2,829 properties have had complete tests as defined by the MS4 permit. Of these properties, 132 (4.7%) have been found to have defective laterals and all of these have been abated.

Additionally, at the end of Fiscal Year 2002, six (6) dry weather diversion devices were installed to intercept contaminated flow within the storm system from five identified areas and redirect the flow into the sanitary system. These devises are inspected regularly by the City's Collector System Flow Control Unit. Two (2) additional dry weather diversion devices were installed in July 2010. The locations of these devices, the number of inspections, blockages, and discharges found in FY 2011 are listed below:

Table F.3.b.ii-4 Dry Weather Diversion Device Installation Locations

Location	ID#	Inspections	Blockages	Discharges
Plymouth Street, West of Pittville Ave.	CFD-01	46	6	0
Pittville Avenue, South of Plymouth St.	CFD-02	43	21	0
Elston Street, West of Bouvier Street	CFD-03	38	12	0
Ashley Street, West of Bouvier Street	CFD-04	41	4	0
Cheltenham Ave, East of N. 19 Street	CFD-05	36	8	0
Verbena Street, South of Cheltenham Ave.	CFD-06	34	0	0
IFO 600 W Cheltenham Ave.	CFD-07	246	25	0
IFO 6819 N 07th Street	CFD-08	243	8	0

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

Table F.3.b.ii-5 T-088-01 Quarterly Fecal Coliform Sampling

Date	Outfall (Fecal Colonies per 100 ml)
9/16/10	830
12/21/10	280
3/8/11	250
4/26/11	721

As part of the City's efforts to improve conditions at this outfall, stream embankment repairs and elimination of the pooling area on the outfall apron were proposed. Design work for these improvements was completed and the project was bid in Fiscal Year 2003. Construction was completed in Fiscal Year 2005.

W-060-01 (Monastery Avenue)

In this priority outfall area, as of June 30, 2011, 611 properties have had complete tests as defined by the MS4 permit. 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 devises 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 11 are listed below:

Table F.3.b.ii-6 W-06-01 Inspections

Location	ID#	Inspections	Blockages	Discharges
Jannette Street, West of Monastery Ave.	MFD-01	29	1	0
Green Lane, North of Lawnton Street	MFD-02	28	0	0

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

Table F.3.b.ii-7 W-06-01 Quarterly Fecal Coliform Sampling

Date	Outfall (Fecal Colonies per 100 ml)
9/20/10	200
*	*No coliform sampling occurred in Q4 of 2010
3/15/11	100
5/3/11	>6000

Monoshone Creek Outfalls

Of the seven stormwater outfalls that discharge to the Monoshone Creek, the focus of the City's efforts is primarily just one outfall, W-068-05. This outfall is the largest in the watershed and essentially constitutes the headwaters of the creek since the historic creek has been encapsulated into this storm system and daylights at this outfall. This outfall is also the source of the majority of the fecal contamination in the creek. For this priority outfall, as of June 30, 2011, 2,743 properties have had complete tests as defined by the

MS4 permit. Of these properties, 93 (3.4%) have been found to have defective laterals and all have been abated.

The City was also concerned about the erosion that had been occurring to the channelized section of Monoshone Creek at the W-068-05 outfall. The erosion had created a large pool at the outfall that the City believed exasperated the nuisance odors experienced and created an unsafe condition for small children that might wade in the creek. After discussion with the local community group, the Friends of the Monoshone, the City decided to make repairs to the channelized section to remove the pool and shore up the retaining walls. This work was designed as part of the sewer-lining contract above and performed at the same time.

Since that time, periodic follow up examinations of the storm system during dry weather periods have been conducted by the Industrial Waste Unit in attempts to locate additional isolated areas where fecal contamination may be occurring.

Additionally, the City of Philadelphia completed construction of a 1-acre stormwater treatment wetland this past year at outfall W-060-10. This wetland treats the dry weather flow fed by springs in this outfall as well as the wet weather runoff from the outfall's 156-acre drainage area. During and following the construction of this wetland, the City has been continuing to investigate dry weather contaminations within this outfall area.

Fecal coliform sampling at these outfalls continues quarterly. A listing of the results for the W-068-05 outfall samples in FY 11 are listed below:

Table F.3.b.ii-8 W-068-05 Quarterly Fecal Coliform Sampling

Date	Outfall (Fecal Colonies per 100 ml)
9/20/10	4800
*	* No coliform sampling occurred in Q4 of 2010
3/15/11	220
5/3/11	2900

Monoshone Study

In FY 2006, PWD conducted and completed an analysis of the 82 defective lateral abatements and sewer relining work performed in the sewershed of outfall W-068-04/05 which discharges to the Monoshone Creek in the Wissahickon Creek watershed. The purpose of this analysis was to determine the water quality improvements achieved as a result of this work and to compare this improvement with the additional water quality benefits anticipated from the Saylor Grove Stormwater Wetland BMP, also located in the Monoshone. 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 can be found in **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

Additionally in May of 2009, PWD began publishing a quarterly water quality update for the Monoshone Watershed to share to the public and local environmental or local environmental organizations such as the Senior Environment Corps (SEC) and Chestnut Hill College (CHC). To date PWD has issued 5 Monoshone Watershed - Quarterly Water Quality Updates, copies of reports will be included in **APPENDIX N – MONOSHONE WATERSHED – QUARTERLY WATER QUALITY UPDATES**.

End of Pipe Anti-microbial Pilot Study

In FY 2006, PWD purchased anti-microbial filtration fabric for installation in Monoshone Creek outfall W-068-05 to evaluate the effectiveness of this technology in reducing fecal coliform contributions to the Monoshone Creek from outfalls with defective laterals. The filtration fabric is surface bonded with an anti-microbial agent which kills bacteria upon contact. PWD completed an initial installation of a limited quantity of this product at the end of outfall W-068-05 in FY 2006 and collected water quality samples of the dry weather outfall flow upstream and downstream of the filtration fabric to assess product performance. The initial deployment failed to demonstrate product effectiveness in reducing fecal coliform and E. coli concentrations as was anticipated. After consulting with the manufacturer, it was decided that due the high volume of water consistently present in this outfall, more of this product should be utilized than was initially deployed. In FY 2007, more filtration fabric was deployed using a new configuration recommended by the manufacturer and sampling resumed. Final sampling and evaluation of this product was completed in FY 2008.

Following sampling conducted in FY 08, PWD has decided to discontinue the pilot study of anti-microbial fabric. Sampling conducted during FY 07 and FY 08 did not identify a reduction in fecal coliform and E. coli concentrations at W-068-05 due to the anti-microbial properties of the filtration fabric. Upon review of the data and consultation with the manufacturer, the technology was determined to be unsuitable for the intended use at W-068-05.

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. These outfalls and the results of fecal sampling are listed below:

Table F.3.b.ii-9 Manayunk Canal Outfall Fecal Sampling Results

Outfall	Outfall Fecal Colonies per 100 mL			
	9/15/10	11/30/10	3/14/11	6/6/11
S-058-01	260	<100	18	190
S-059-01	4200	6,300	25,000	1,700
S-059-02	>20,000	40,000	360	116,000
S-059-03	3,500	1,200	820	430
S-059-04	>20,000	7,000	540	20,000
S-059-05	4,700	1,300	<10	3,100
S-059-09	3,100	1,200	56,000	56,000

In these 7 outfalls, as of June 30, 2011, 2,444 properties have had complete tests as defined by the MS4 permit. Of these properties, 59 have been found to have defective laterals and subsequently abated.

P-090-02 (Sandy Run)

The City 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 devise is inspected regularly by the City's Collector System Flow Control Unit and continues to function properly. The number of inspections in Fiscal Year 2011 was 32. There were 0 blockage and 0 discharges reported in conjunction with these inspections.

SAP Request

In FY 2011, the PWD Sewer Maintenance Unit received 62 defective lateral related requests for a SAP, and all 62 SAP were completed. Please refer to **SECTION II.A.2 "IMPLEMENT A COMPREHENSIVE SEWER ASSESSMENT PROGRAM (SAP)"** on page 15 for more information on this program.

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 FY2011.

F.3.c. Definitions used in this section

F.3.d. Abatements

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

Cross connections that are identified by the investigation program described above are referred to the City's Plumbing Repair Programs (PRP) unit for abatement. The PRP unit handles all correspondence and communications with the property owner. 69 Notices of Defect were issued to the property owners in FY2011. In additional 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 point we are unaware of an exact number of how much correspondence was made from these other customer communications.

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

Abatement of Residential Cross Connections

The City maintains a Defective Lateral and Abatement Program in compliance with the MS4 permit issued by the Pennsylvania Department of Environmental Protection. The City requires abatement of all residential defective connections upon discovery. An annual funding allotment of $2.5 Million is available through customer assistance programs in the form of City-funded cross connection abatements and HELP loans. Information on the assistance programs accompanies the homeowner's notification of defect. The City also publicizes the assistance programs through bill stuffers to ratepayers, and through public education events. The City also maintains the legal authority to take administrative action to cease the pollution condition. During the FY 2011 reporting period, the City funded abatement of 74 residential cross connections at an average cost of $6,704.06, for a total cost of $496,100.50.

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

Abatement of Commercial and Industrial Cross Connections

The City maintains a Defective Lateral and Abatement Program in compliance with the MS4 permit issued by the Pennsylvania Department of Environmental Protection. The City 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 2011 reporting period, the City funded abatement of 9 commercial cross connections at an average cost of $3542.67, for a total cost of $31,884.00.

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

When the City goes out to a property to perform a dye test, in which a cross connection result is found, this information (location, date, and site description) will be entered into an electronic database which will generate reports and letters to notify the property owner, Notice of Defect. If the defect is an external connection (internal connection must repaired at the property owner's expense and inspected within the 120 days of notice) then the Plumbing repair unit will be notified within a week of Notice of Defect and will schedule the property for repair. The electronic database is used to keep track of the case specification, the cost for the repair, who and when the repair was done to ensure that all defects are abated within the 120 day timeframe. During FY2011 there were approximately 3 properties that exceeded the 120 day requirement. Currently these 3 properties have been deprived of water due to the owners' lack of co-operation with regards to abating these cross-connections.

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

Following a completed cross connection abatement, a subsequent test must be performed in order to confirm that that cross connection has been properly mitigated. If the abatement is conducted by PWD personnel, the confirmation dye test is normally performed by an experienced PWD inspector immediately following abatement completion (that same day). If the abatement is conducted by a private company, property owner must contact PWD after abatement was performed such that a PWD inspector can perform confirmation testing. All abatements conducted during FY2011 had confirmation testing showing abatement were installed properly.

F.3.e. Defective Connection Program Reporting

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

Results of the Defective Lateral Connection Program are submitted four times a year to Andrew Sinclair at 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 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 FY2011, **APPENDIX N – DEFECTIVE LATERAL QUARTERLY REPORTS** contains all these reports.

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

The following information is included in the quarterly report: Details of significant work performed during the previous quarter on all MS4 outfalls, including the following: Summary information about source investigation efforts through dye testing, inspections, field screening, etc. This should include a numerical summary of properties determined to be properly connected, and properties with defects, as determined during the reporting period. The outfall areas in which work was conducted during the reporting period should be identified; Summary information, including a numerical summary of source corrections (abatements) achieved through homeowner notification, enforcement, or City sponsored construction; For those outfalls (sewersheds) that have been identified as "priority" outfalls, include a progress assessment and other comments as appropriate; Results of all outfall sampling and inspections performed during the reporting period; A summary of all sewer chokes, or other problems not related to defective laterals, that resulted in the discharge of sanitary sewage directly or indirectly to a stream; A discussion of the City's goals for the upcoming quarter.

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 J – 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. The Philadelphia Fire Department (PFD) personnel inspects SARA facility to ensure that information mention within their Tier II report are accurate which includes a visual on-site inspection, verifying the facility has a PPC plan and reviewing any other information contain within the Tier II report. This PFD personnel inspects approximately 100 facilities each year depending on staffing and the number of SARA Tier II reports that are submitted. As of September 2011, approximately 85 facilites have been inspected in calendar year 2011

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

The City has updated its Industrial Waste Inspection Forms to include a stormwater management component that will used during inspections which take place during enforcement activities as part of its Pretreatment program. The updated form was faxed to Jennifer Fields, Regional Manager, PADEP on March 29th, 2006. A copy of the Industrial Waste Inspection Forms be found in **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD**.

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

F.5. MONITOR AND CONTROL STORM WATER FROM CONSTRUCTION ACTIVITIES

As a result of extensive efforts throughout Pennsylvania to improve and protect overall watershed health the relative condition of streams and rivers has been investigated and classified. Each stream has been identified by the State as whether or not it is attaining its designated use as a swimmable, fishable waterbody. Furthermore, those streams listed as not attaining their designated use were assessed as to which primary pollutants were attributed to the impairments. The majority of stream miles throughout Philadelphia are listed as impaired due to urban runoff. Uncontrolled and untreated urban runoff presents an ongoing negative impact to the receiving streams as a result of increased impervious areas providing a greater rate and volume of runoff reaching the surface waters through the municipal separate storm sewer system.

PWD and watershed partners located within the Darby-Cobbs Creek watershed collaborated under the Act 167 Watershed Management Planning effort led by Delaware County Planning Commission and developed a comprehensive document inclusive of a stormwater Ordinance. The stormwater Ordinance expanded upon the State model Ordinance by addressing issues identified with respect to the Watershed. PWD committed to enacting the Darby-Cobbs Creek Watershed Management Plan by signing a resolution in August, 2005 followed by adoption of the Stormwater Regulations that became effective as of January 1st 2006. A copy of the resolution along with excerpts of Ordinance and Regulation language were delivered to the State in compliance with the NPDES permit on December 23rd, 2006.

Stormwater runoff is a concern both during construction and after construction. Active construction sites are the primary contributor of sediment to our waterways. 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 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 Fiscal Year 2011 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 Fiscal Year 2011 activities include the following:

- Enforced stormwater Regulations that are in compliance with the State Model Stormwater Ordinance

- Collaborated with multiple city departments to reduce barriers to low impact development

- Increased the erosion and sedimentation control inspection program

- Reviewed Stormwater Management Plans (E & S and post-construction stormwater management) for compliance with the Regulations

- Coordinated reviews with PADEP on NPDES permit applications

- Held weekly open walk-in meetings which provide the development community with an opportunity to discuss stormwater management designs and ask stormwater policy questions, among other items.

- Updated Fact sheets and pamphlets on topics related to the changes in stormwater policies.

- Maintained and improved a website for receiving PWD project submittals online

- Engaged in discussions with large multi-parcel land owners, such as the local Universities, regarding stormwater master planning ideas such as the installation of centralized stormwater management facilities on private land.

- Scheduled and held monthly coordination meetings with the University of Pennsylvania to discuss development projects planned for the campus as well as identify ways to strengthen and streamline the Stormwater Plan Review process for the University and the overall development community.

- Coordinate with the PWD Green Infrastructure Unit to identify opportunities for green street implementation in conjunction with private development construction.

- Updated the Stormwater Management Guidance Manual to provide clarification on an existing section for the development community.

The following discussion specifically documents progress made so far in terms of stormwater runoff from construction activities including the collaborative between City Departments as well as between the City and State agencies. A summary of all plan review activities in FY 2011 is presented in **TABLE F.5-1** at the conclusion of this section

Table F.5-1 Summary of Plan Review Activities throughout FY 2011

	Jul. '10	Aug. '10	Sep. '10	Oct. '10	Nov. '10	Dec. '10	Jan. '11	Feb. '11	Mar. '11	Apr. '11	May. '11	Jun. '11	FY 11 Total
Conceptual Review Stage													
Approvals	15	12	8	15	6	5	9	8	13	11	9	10	121
Rejections	34	40	25	40	22	50	22	28	31	38	32	36	398
Reviews	49	52	33	55	28	55	31	36	44	49	41	46	519
New Project Submittals	22	19	23	21	17	28	9	25	15	23	21	14	237
Average Review Time (days)	2.6	3.4	5.4	4.2	4.1	3.6	3.3	4.9	4.7	5.6	5.8	6.3	4.4
Post Construction Stormwater Management Plan Review Stage													
Administrative Screenings	13	4	14	12	19	9	12	9	11	13	16	18	150
Technical Approvals Issued	2	8	3	4	10	8	4	4	4	7	4	6	64
Rejections	25	21	24	25	26	23	25	27	29	29	38	27	319
Full Technical Reviews	30	30	31	30	36	33	30	32	36	40	49	34	411
New Project Submittals Received	8	4	9	8	13	3	9	6	9	5	7	11	92
Average Number of Reviews per Approval	4.0	3.8	4.3	3.3	3.6	5.0	4.3	4.0	4.5	3.6	4.3	3.7	4.0
Average Approval Time (days)	59	142	48	38	150	231	122	86	88	82	158	97	123
Acres of Earth Disturbance Approved	1.1	10.8	1.6	4.6	24.4	13.8	15.1	9.5	8.4	25.1	12.1	141.4	267.9
Acres of Green Roofs Approved	0.0	0.2	0.0	0.1	0.1	0.0	0.2	0.2	0.0	0.0	0.0	0.1	1.0
Acres of Porous Pavement Approved	0.0	0.1	0.0	0.1	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.6
Erosion and Sedimentation Inspections													
New Sites Inspected	4	5	1	6	3	4	6	8	12	7	10	11	74
Complaint Inspections	1	1	0	0	0	1	1	2	3	2	0	0	11
Total Inspections	128	84	93	48	45	46	36	46	78	76	86	98	625
Inspections at Project Sites with MS4 Sewers	50	28	33	4	10	9	7	10	18	20	22	32	143
Inspections at Project Sites with Combined Sewer	53	41	43	33	28	27	25	28	47	44	48	55	376
DEP Reviews													
New Coordinated Reviews	7	5	4	13	8	6	9	5	3	7	3	3	73
Erosion and Sedimentation Plan Review													
Defer to DEP	0	3	1	7	0	2	1	1	1	3	0	0	19
Approved	3	4	3	4	2	6	1	0	1	2	4	4	34
Rejected	13	9	13	13	10	9	7	7	5	11	11	13	121
Not Applicable	4	4	4	9	6	11	4	7	8	4	8	10	79

Please note: In FY09, PWD changed the Technical Screening to more of an administrative check to better mirror the DEP's administrative check. PWD Screenings are no longer included in the Technical Review count.

F.5.a. Construction Site Runoff Control

PWD reviews Erosion and Sedimentation (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 2011.

During each site visit the inspector communicates with the construction manager and requests to see a copy of the on-site E&S Plan. Photographs are taken documenting site conditions and included as part of the inspection report. The City inspection report form is adapted directly from the PADEP form. Copies of the inspection report detailing out-of-compliance items are distributed to the site manager and maintained as part of an electronic project file. Failure to adhere to the recommendations of the inspection reports can result in a 7 Day Notice and ultimately a Stop Work Order. A 7 Day Notice gives the construction manager seven days to correct an E&S problem on site. If the problem is not correct in seven days, PWD will issue a Stop Work Order which forces all construction activities to cease until the E&S problem has been corrected.

E&S Inspections were conducted as part of an established inspection regimen and as scheduled meetings, meeting follow-ups, responses to complaints and coordinated visits with the PADEP designated engineer. Based upon the FY 2011 inspections, the major compliance issues continue to include improper use of silt fences, inadequate or lack of inlet protection, contractor not following the on site 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**.

As the E&S Control program moves forward, scheduled inspections and responses to complaints will be addressed separately. Plan reviews will continue for projects between 15,000 square feet and one acre of earth disturbance. Coordinated site visits between PWD and PADEP will continue throughout the permit cycle as needed and documented accordingly.

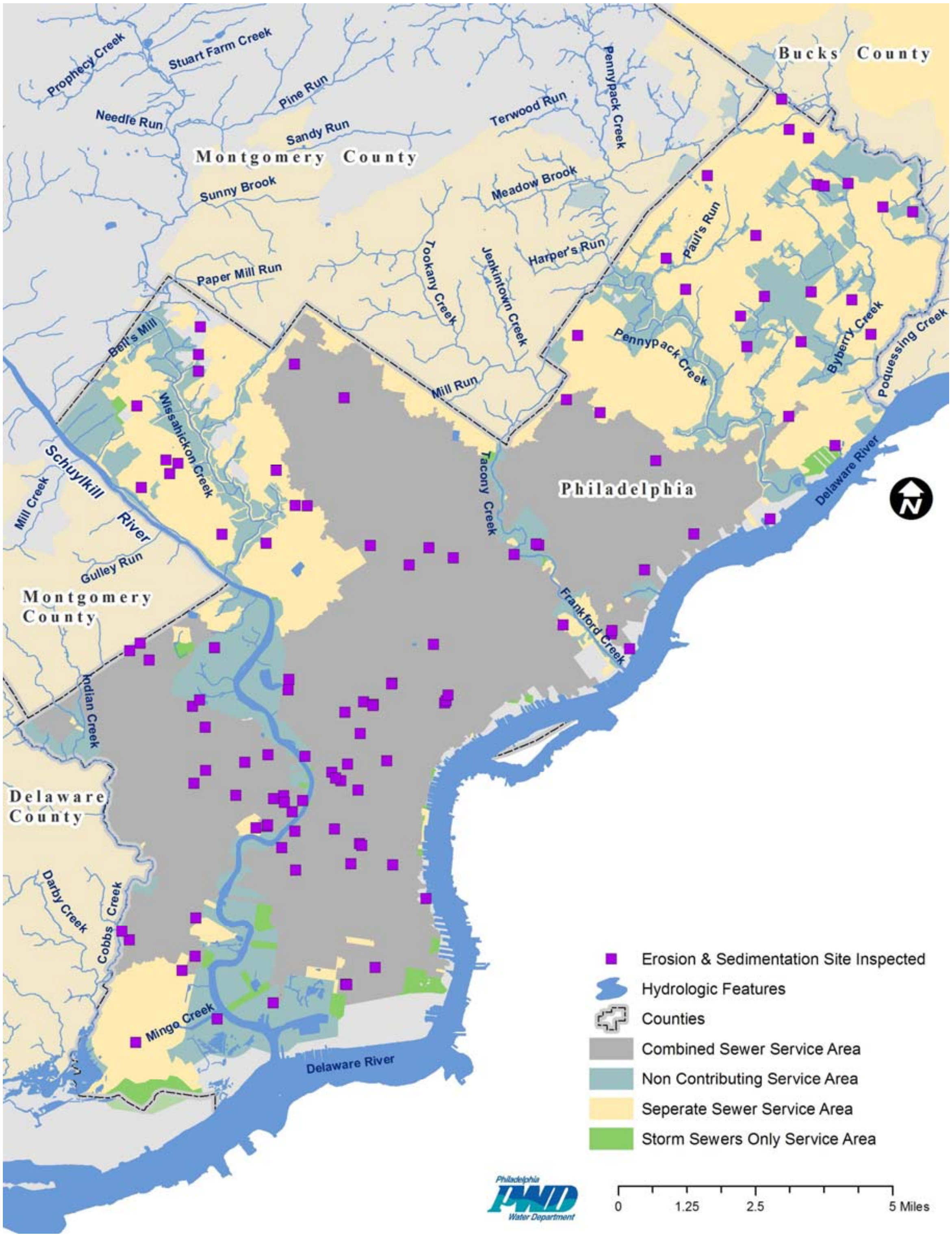


Figure F.5.a-1 Erosion and Sedimentation Site Inspections

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

The adoption of City wide Stormwater Regulations as of January 1st 2006 enabled Philadelphia to review plans for both new and redevelopment sites ensuring that water quality and quantity are part of the management plan. The Regulations focus on the Post-Construction Stormwater Management Plan (PCSMP), which addresses more than the typical peak rate controls previously required. The role of stormwater management has been expanded to address smaller more frequent storms in terms of water quality volume and channel protection for all development projects throughout the City. The Philadelphia Stormwater Regulations are available online at http://www.phila.gov/water/pdfs/pwd_regulations6.pdf.

The Stormwater Regulations have been enacted to address the following technical components:
Water quality: The 1st inch of precipitation over directly connected impervious cover must be recharged. Where recharge is not feasible or limited then any remaining volume is required to be subjected to an acceptable water quality practice.
Channel Protection: The 1-year, 24-hour storm must be detained and slowly released over a minimum of 24-hours and maximum of 72-hours.
Flood Control: Watersheds that have been part of an Act 167 planning effort are to follow the model results for flood management districts. In Philadelphia, Darby and Cobbs creeks watershed are subject to specified management districts. Projects outside of Darby-Cobbs watershed are currently treated as either a district controlling post-development peaks to pre-development peaks or are considered appropriate for direct discharge.
Non-structural Site Design: Projects are required to maximize the site potential for stormwater management through appropriate placement and integration of stormwater management practices.

In addition to the technical criteria, stormwater management requirements are clearly identified as applying to both new development and redevelopment projects. PWD in collaboration with other City departments recognized the need to appropriately insert PWD into the development process in order to inform the development community of the stormwater requirements before extensive investment into the design has been expended. Under this premise PWD divided the Stormwater Plan review into two components: the first being a conceptual review tied to the zoning permit; the second being the full technical plan review requiring approval prior to the building permit.

Any project exceeding one acre of earth disturbance is required to obtain a PADEP NPDES General Permit for control of stormwater runoff during construction activities. The City may not release the building permit until the NPDES permit has been issued. As a result, a large collaborative effort has been initiated between PWD and PADEP in coordinating plan reviews between departments.

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. Of particular interest are green approaches that encourage the return of rainfall back to the hydrologic cycle through evapotranspiration or distributed infiltration. As of Fiscal Year 2011 Annual Report, PWD's records indicate that projects are proposing use of pervious paving for a total of 32.9 acres and installation of green roofs at a total of 16.6 acres. As PWD works on improving the plan review process to provide greater incentives for incorporating green approaches for managing stormwater the number of green roofs and area of porous paving will see great increases throughout the permit cycle.

Quantifying the impact of the Regulations in terms of total acres developed, area removed from contributing to the combined sewer system, volume of water quality managed, volume of stormwater infiltrated, increase in management approaches (i.e. structural basins, green roofs, porous paving, rain gardens) will be incorporated into reports in upcoming years.

F.5.c. Applications/Permits

Conceptual plans are submitted online and must receive approval prior to obtaining a Zoning permit from Licenses and Inspections. The conceptual plan review phase enables PWD to clearly inform the applicant of stormwater management requirements applicable to their specific project. During FY 2011, 255 unique projects were submitted to PWD for conceptual review through the program's website.

Once conceptual approval has been received then the project can submit a full technical plan set addressing the stormwater regulations and other City plan requirements. PWD approved 92 full technical plans during FY 2011. 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 the year 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	32
Non-Contributing Area	10
Separate Sewer Area	22
Storm Only Area	0
Total	64

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

Drainage Watershed	Number of Locations
Delaware River	22
Poquessing Creek	4
Pennypack Creek	3
Schuylkill River	19
Tacony/Frankford Creek	7
Wissahickon Creek	9
Total	64

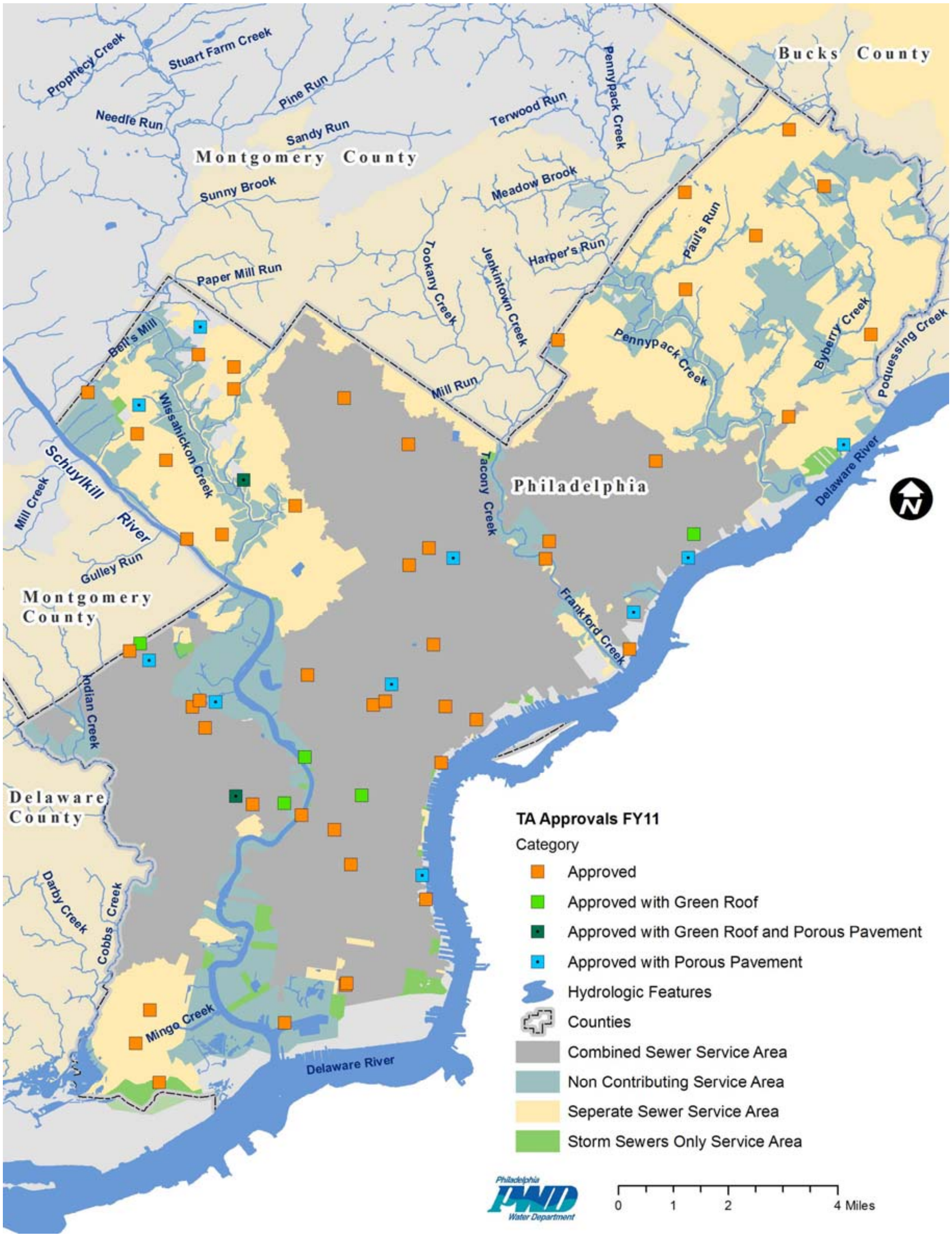


Figure F.5.c-1 Locations of Approved Post-Construction Stormwater Management Plans

F.5.d. Inspections

A total of 155 E&S Control Plans were reviewed during this reporting cycle. Inspectors conducted 625 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	65
Non-Contributing Area	15
Separate Sewer Area	34
Storm Only Area	0
Total Locations	114

F.5.e. Monitoring/Enforcement

In FY11, PWD issued a total of nine 7-Day Notices for E&S violations on four construction sites. A total of three sites was issued a 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. The City receives notifications through Act 14, Municipal Notification, by applicants applying for a permit to discharge stormwater from construction activities. The notifications are reviewed and recorded as part of the data collection process for a known development proposal.

Not only does PWD receive notifications but also coordinates review of NPDES application plan sets and calculations. Since a post-construction stormwater management plan must be submitted to both the state and the municipality for sites disturbing over one acre of earth, the City recognizes the importance of ensuring both municipal and state engineers are reviewing the same plans and are aware of each others technical requirements.

On November 19, 2010, the PADEP released amendments to Title 25 Pa. Code Chapter 102 Regulations. As a result of this update, increased importance was placed on the inspection and long-term operation and maintenance of stormwater best management practices (BMPs). Preconstruction meetings, with responsible individuals in attendance, are now required prior to earth moving activities. A licensed professional must be onsite and responsible during critical stages of BMP construction. Furthermore, a final certification is required from the licensed professional verifying that the installed BMPs are in accordance with the approved plans. Record drawings must accompany the final certification. It is the responsibility of the conservation district to inspect the BMPs. Since Philadelphia acts as a City and Municipality, the PWD will maintain the responsibility of BMP inspection.

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

PWD released the Stormwater Management Guidance Manual (Manual) in concert with the Stormwater Regulations going into effect as of the first of January 1st 2006. The Manual was created with a focus on urban stormwater management and includes Stormwater Management Practice details, development processes in the City, calculation worksheets and supporting reference material.

The Manual is intended to be a dynamic document allowing updates as needed with the most recent version available for electronic download at http://phillyriverinfo.org/Programs/SubprogramMain.aspx?Id=StormwaterManual. The Manual provides guidance for the entire site design process, beginning with initial site design considerations, through the post-construction stormwater management plan submittal elements, and ultimately the acquisition of stormwater plan approval. Tools are provided to assist in completion and submittal of a stormwater management plan consistent with the intent of the City. They include flowcharts to guide the developer through the process, worksheets to assist with calculations, and checklists to ensure the plan is complete. The tools work together to address stormwater management on the development site from concept to completion.

In April 2011, the Manual was revised to provide additional clarification regarding what is and is not an earth disturbance activity. The clarification was made in response to the high volume of questions PWD received related to the earth disturbance definition. With this revision, PWD notified the development community and provided a fact sheet clearly explaining the changes. The updated Manual and fact sheet were immediately made available for download on the Plan Review website.

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

The Philadelphia Water Department (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 Office of Watersheds (OOW), 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. In a broad effort to enhance the health of the Philadelphia region's waterways, OOW appropriates human and financial resources toward programs that aim to reduce the impact of point and non-point source pollution, including contaminated runoff. The main programs within OOW, in addition to the Stormwater Management Program (SMP), that work together to improve regional ecological health, water quality, and sustainability are: the Delaware Valley Early Warning System (EWS), Schuylkill Action Network (SAN), Combined Sewer Overflow (CSO) Management Program, Watershed Planning, Source Water Protection Program, and Wetlands Mitigation Registry. The SMP and OOW programs work in tandem when producing watershed plans, submitting annual permit compliance reports, demonstrating best management practices, and organizing public education and outreach events. Following is a description of the Delaware Valley EWS, Schuylkill Action Network, CSO Management Program, Source Water Protection Program, and the Watershed Mitigation Registry. The achievements and future direction and goals for each program are highlighted in the below descriptions. The Watershed Planning Program is presently explained in detail throughout CSO **SECTION III.C.1** on page 107 of this report.

Source Water Protection Program

Philadelphia Water Department's Source Water Protection Program embodies the department's multi-barrier approach to ensuring the safety and quality of Philadelphia's drinking water, whose source consists of the Schuylkill and Delaware Rivers. Philadelphia's Source Water Program staff work closely with the department's treatment plant managers and operators to anticipate and respond to emergencies and challenges to conventional treatment techniques. Program staff have a thorough understanding of Philadelphia's water supply including ambient water quality conditions, major sources of actual and potential contamination, water availability, flow patterns and management policies, and tidal and reservoir impacts. The program's multi-barrier approach to protecting source waters includes the following components: gauging the impact of future influences, such as climate change, natural gas extraction, and carbon sequestration, on the water supply system; establishing short-term and long-term water quality and quantity standards for Philadelphia's source waters; employing research, regional partnerships, outreach and education, lobbying, advanced technologies, on-the-ground implementation, monitoring and other tools to achieve these standards; and, assessing alternatives to current sources and/or treatment measures when standards cannot be met using available source water protection techniques or current conventional treatment technology.

The success of the Source Water Protection Program's organized and comprehensive approach is evident in the integrity of the Delaware and Schuylkill Rivers as drinking water supplies. The Source Water Protection Program began in 1998 with the responsibility of completing Source Water Assessments for 52 drinking water intakes in the Schuylkill and Delaware Rivers. This effort resulted in the identification of the primary sources of contamination in the rivers that serve as PWD's drinking water sources. Between 2003 and 2007, Source Water Protection Plans were completed for the Delaware and Schuylkill Rivers to identify strategies for addressing the water quality and quantity concerns outlined in the Source Water Assessments. The Schuylkill and Delaware River Source Water Assessments and Protection Plans can be found online at www.phillywatersheds.org.

The Source Water Assessments and Protection Plans are fundamental elements of PWD's Source water Protection Program, however, the program itself encompasses a much wider range of projects related to research, on-the-ground implementation, partnership workgroups, and in-city initiatives. Since inception, the Source Water Protection Program has implemented numerous local and watershed-wide BMPs, developed partnerships to address regional water quality and quantity concerns, created an advanced water quality early warning system to support drinking water treatment operations along with an associated system for recreational water quality advisories, and conducted research, monitoring, and analyses for a broad range of issues related to drinking water treatment support and regulatory compliance. PWD's partnerships have proved imperative to implementation of source water protection projects that are located beyond Philadelphia's jurisdictional boundaries. The largest, and perhaps most influential of these partnerships is the Schuylkill Action Network (SAN). SAN is a regional partnership that addresses source water quality challenges by working with state agencies, local watershed organizations, businesses, academics, water suppliers, local and state governments, regional agencies, and federal government to transcend regulatory and jurisdictional boundaries in the strategic implementation of protection measures. In 2005, the EPA awarded PWD a $1.15 million Schuylkill Watershed Initiative Grant (SWIG) which was largely used to implement SAN restoration projects in the areas of agriculture, abandoned mine drainage, and stormwater.

Schuylkill Action Network

Please refer the CSO portion of the Annual Report **SECTION II.G.2.3 – SCHUYLKILL ACTION NETWORK** on page 60 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 62 for information about this topic.

RiverCast
Please refer the CSO portion of the Annual Report **SECTION II.G.2.2 – RIVERCAST** on page 60 for information about RiverCast

Combined Sewer Overflow Management Program
The Combined Sewer Overflow Management Program, CSOMP, within the Office of Watersheds at the Philadelphia Water Department 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 13 in the CSO section of this document for additional information regarding the CSOMP.

Watershed Mitigation Registry
Please refer the CSO portion of the Annual Report **SECTION III. C.2.4 – WETLAND ENHANCEMENT AND CONSTUCTION** on page 142 for information about the Watershed Mitigation Registry

F.7. MISCELLANEOUS PROGRAMS AND ACTIVITIES

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

The Industrial Waste Unit (IWU) within the Philadelphia Water Department (PWD) responds to all citizen complaints of liquid, solid, or gaseous pollutants within Philadelphia. The IWU coordinates with neighboring communities in the event that a pollutant may drain into the Philadelphia MS4 system. The IWU unit uses a variety of pollution sensing, testing, and removal techniques to mitigate the impacts of spills to the MS4 system, combined system, and receiving waters. Presented in **TABLE F.7.A-1** below is a list of all pollutant migration events in FY 2011. The locations of all events are presented on the following page in **FIGURE F.7.A-1**.

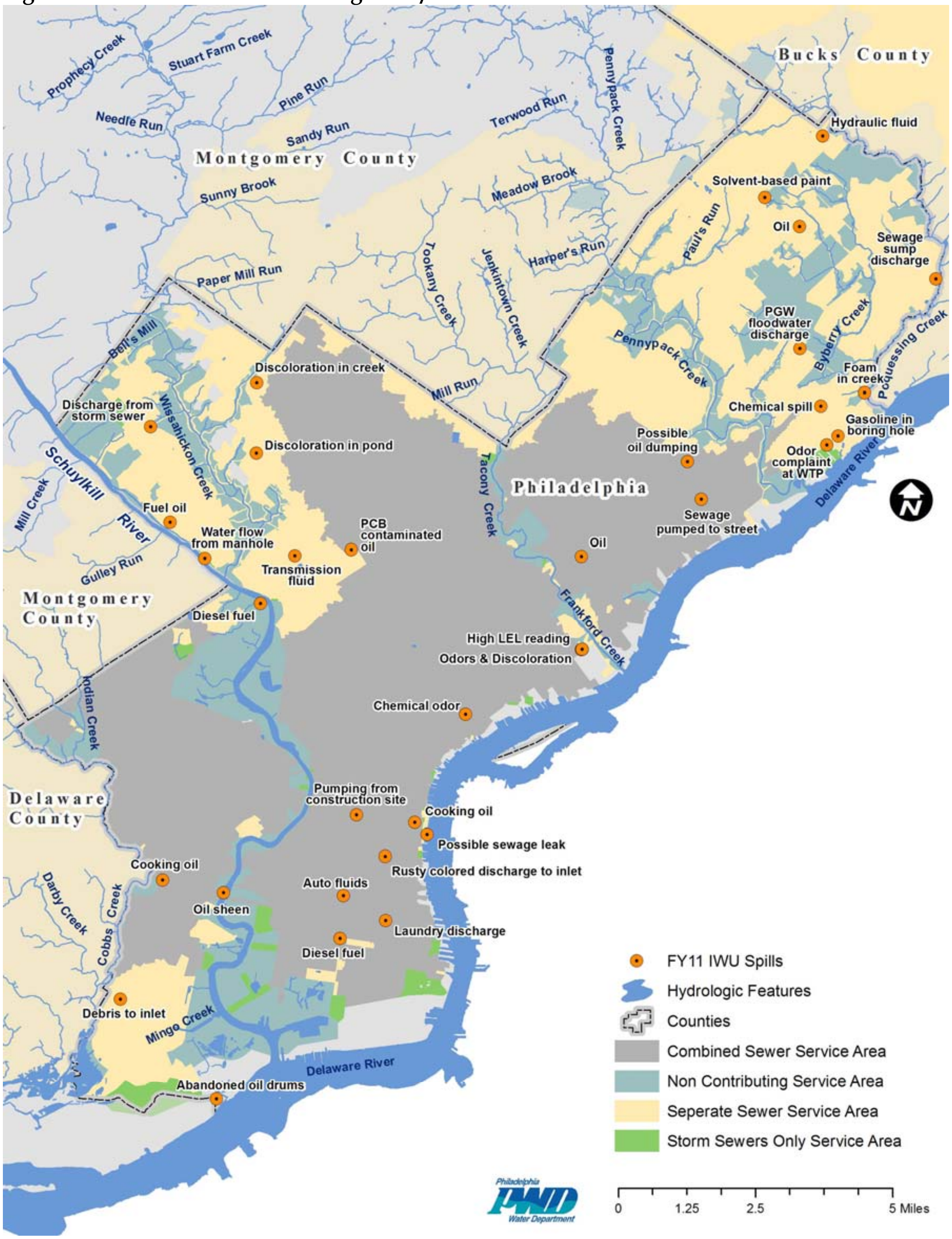
PWD's Industrial Waste Unit (IWU) attempts to track the source of the pollutant; if source is traced to a person, company or property, IWU sends the responsible party a letter notifying them of their inappropriate behavior. If event from responsible party becomes habitual, IWU may issue a Notice of Violation and a monetary fine. In some cases, PWD notifies the DEP of an event that occurs. In addition bill stuffers are included with water bill, Newsletters are distributed biannually to educate property owners and prevent future event from occurring.

Table F.7.a-1 Pollutant Migration/Infiltration to the MS4 System

Date	Location	Pollutant	Sewershed Drainage
07/06/10	Sunoco sewer.	Oil	Non-contributing
07/09/10	1800 block of S. Rosewood St.	Auto fluids	Combined
08/02/10	Northeast Ave.	Solvent-based paint	Non-contributing
08/03/10	car accident	Oil	N/A
08/06/10	3596 Fox St.	Transmission fluid	Combined
08/17/10	3900 Richmond St	Green discoloration	Non-contributing
08/17/10	11311 Roosevelt Blvd.	Oil	Non-contributing
08/19/10	backhoe	Hydraulic fluid	N/A.
08/23/10	2nd St and Walnut St	Cooking oil	Combined
09/01/10	N. Sydenham St	Sewer odors	Combined
09/05/10	E. Abbottsford Ave.	Toilet cleaner leak	Combined
09/17/10	20th St	Food grease / sewage	Combined
09/18/10	6819 Greene St.	Purple discoloration in pond	Separate
09/23/10	3900 Richmond St	Pink discoloration	Non-contributing
09/29/10	Penn's Landing Pier	Possible sewage leak	Non-contributing
09/29/10	State Rd. and Linden Ave.	Gasoline in boring hole	Separate
10/01/10	3895 Richmond St	Cumene odors	Non-contributing
10/12/10	local company	Cumene spill	N/A
10/18/10	1600 block of Meadow St.	Oil	Combined
10/18/10	dump truck	Hydraulic fluid	N/A
11/09/10	gas station	Green liquid spill	N/A
11/10/10	Broad St and Oregon Ave	Diesel fuel	Combined
11/18/10	I-95	Fuel oil	Combined

Date	Location	Pollutant	Sewershed Drainage
11/24/10	SEPTA rail bridge	Lead paint chips	N/A
12/01/10	Academy Rd and Grant Ave	PGW floodwater discharge	Separate
12/09/10	80th St and Lindbergh Blvd	Possible debris to inlet	Separate
12/21/10	3900 Richmond St	Green discoloration in final tanks and river	Non-contributing
01/03/11	auto repair	Report of oil dumping	N/A
01/08/11	Schuylkill river between 53rd and 56th	Report of oil sheen	Non-contributing
01/24/11	500 Jackson St	Report of laundry discharge	Combined
01/27/11	9001 State Rd	Odor complaint at WTP	Separate
01/31/11	Arendell St and Jackson St	Complaint of chemical spill	Separate
02/01/11	Wayne Junction Septa yard	PCB contaminated oil	Combined
02/16/11	Fletcher St and Belgrade St	Chemical odor in catch basin	Combined
02/23/11	3900 Richmond St	Chemical odors	Non-contributing
02/24/11	Creek at 7500 Germantown Ave	Green discoloration in creek	Non-contributing
03/08/11	3900 Richmond St	Solvent odors	Non-contributing
03/15/11	Walnut St	Pumping from construction site	Combined
03/22/11	Fort Mifflin Rd. at Eagle Creek	Abandoned oil drums	Non-contributing
03/25/11	Poquessing Creek at Sevenson Ln.	Foam in creek	Non-contributing
03/30/11	Metal recycler in Delaware Direct sewershed	New storm sewer	Combined
04/01/11	Henry Ave and Wise Mill Rd	Brown discharge from storm sewer	Separate
04/05/11	3901 Main St	Water flow from manhole	Separate
04/24/11	3900 Richmond St	High LEL reading	Non-contributing
04/28/11	15152 Ina Dr.	Hydraulic fluid	Separate
04/28/11	Fire	Gasoline spill to sewer	N/A
04/28/11	Sanitary sewer	Pipe leaking oil	Separate
05/09/11	60th St and Chester Ave	Cooking oil	Combined
05/13/11	700 block of Christian St	Rusty colored discharge to inlet	Combined
05/18/11	Green Ln and Saint Davids St.	Fuel oil	Separate
05/25/11	I-76 EB off ramp to RT 1 NB	Diesel fuel	Non-contributing
05/29/11	Franklin Mills Mall	Sewage sump discharge	Non-contributing
06/06/11	7039 Gillespie St	Sewage pumped to street	Combined
06/10/11	3230 Cottman Ave	Possible oil dumping	Combined

Figure F.7.a-1 FY 2010 Pollutant Migration/Infiltration Event Locations



F.7.b. Public Education and Awareness

Please refer the CSO portion of the Annual Report **SECTION II.G – POLLUTION PREVENTION** on page 49 for information about this topic.

F.7.b.i. Public Education Literature

Please refer the CSO portion of the Annual Report **SECTION II.G – POLLUTION PREVENTION** on page 49 for information about this topic.

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

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

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

The Vector Control unit of the Philadelphia Health Department uses larvicides, Bacillus Sphaericus (brand name Vectolex) and Methoprene (brand name Altosid), to prevent mosquito breeding. The larvicides are approved for use in the stormwater catch basins and are applied as such. The Integrated Pest Management 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 Integrated Pest Management protocol is adhered to with the use of these larvicides as no oils or organo-phosphate products are used.

All of the Vector Control field 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

Golf courses comprise a major land use within the Schuylkill River watershed. Golf course management techniques, particularly with regard to pesticide application, turf management, and water use significantly impact the quality and quantity of runoff leaving a golf course and entering nearby streams and rivers. To address this concern, the PWD holds an annual Golf Course Certification workshop through the Audubon Cooperative Sanctuary Program (ACSP). The ACSP is a voluntary education and certification program whose purpose it is to educate, provide conservation assistance to and positively recognize golf course managers for improving environmental management practices and conservation efforts as they pertain to outreach and education, wildlife and habitat management, chemical use reduction and safety, water conservation, and water quality management. The annual workshop introduces golf course managers to the certification program and provides detailed information on key components of the certification process and important principles of environmentally responsible management. To date, PWD has held five annual workshops in different parts of the Schuylkill River watershed. The 5th annual workshop was held at Bala Golf Course in Philadelphia in the April 2008. Twenty golf courses from around the region sent representatives to participate in workshop.

In FY11, Audubon International conducted eight site visits, six golf courses and two large parcel properties, from 7/1/2011 to 7/22/2011. There are 9 membership renewals, 6 cemeteries and 3 golf courses. They are continuing site visits and hope to have more organizations join the Audubon or renew their already existing memberships.

The City's Department of Health provides educational materials to any organization, company or individual that requests it. Normally, it is private exterminators, especially companies that handle pest control work for City facilities. Most City buildings contract out for pest control work through the individual Departments. Health Department Sanitarians (Inspectors) usually provide this information.

F.7.d. Snow Management Plan

The City of Philadelphia, like many other northeastern cities in the US, often 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. A copy of the current plan was provided in the 2009 CSO/SW Annual Report and will also be included in the **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD**. The Streets Department has not finished updating their snow management plan, the City will provide a copy when it becomes available.

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

PWD performed inspections on three (3) facilities during the month of August 2010 that were suspected to be locations that waste is transferred to in the MS4 area. The three facilities were located in the Northeast at State Rd & Ashburner St, the Northwest at Domino Ln & Umbria St., & the Southwest on 63rd St (NW of Passyunk Ave.)

Two of the facilities (Northeast & Southwest) are not truly waste, storage, or disposal facilities, they are used to store and service Trash Trucks, salt piles are also kept here for winter applications. For the most part, the facilities were clean and did not pose a potential for pollution beyond normal parking areas for large vehicles. At the Southwest facility there is catch basin directly in front of the Salt Storage and also a catch basin directly in front of an oil storage tank. During inspection it also appeared that one of the Biodiesel Fuel Pumps was leaking.

The Domino Lane (Northwest) site is the only waste transfer station left in the city that is city owned. The majority of the yard is serviced by area drains that are connected to the sanitary sewer. The process areas do not drain to the Storm Sewer. There is a lower parking area that is serviced by an area drain and a pair of trench drains. All of these are connected to a storm sewer. The lower area serviced by these drains is the main parking area for the trash trucks and other Streets vehicles for the yard. A fuel cell on a vehicle was discovered on this inspection that would likely go to the storm sewer, similar to any other parking lot for trucks. One area of concern is the fuel pumps on this yard. They are a 24 hour operation and are serviced by an area drain that leads to the Sanitary Sewer. In the event of a spill, the pumps can be shut down by an electrical cut off. Since the pumps are a 24 hour operation and the yard is only an 8 hour operation there are 16 hours when the site is monitored by "injured on duty" employees. These employees are told how to shut down the pumps if there is a leak or similar failure. There is no Fleet garage on the site.

None of the facilities had any prepared spill contingency plans.

Following these inspections, the Inspection form used by IWU was altered so it fits this inspection effort more appropriately. In addition PWD will look into inspecting yard that PWD does not own or manage since these areas have greatest potential for pollution to exist.

F.8. BEST MANAGEMENT PRACTICES (BMPs)

The City is charged with implementing a wide range of BMPs for improving the quality, quantity and rate of stormwater runoff entering the MS4. . Within **SECTION F.8**, each of the Permit specified BMPs is documented with regard to their scope, level of implementation and project updates for this Annual Report year. The City will continue to evaluate the effectiveness of each BMP as it is implemented. In addition to the required list of BMPs, the City is also including discussions of BMPs implemented outside of the MS4 areas. It is in the best interest of the City to evaluate all BMPs and use that information to improve and enhance all City Program goals regardless of whether they are required by regulation. When applicable, the BMP will provide previous year data collected along with a discussion of the overall effectiveness.

F.8.a. Storm Sewer Discharge Ordinance

In May of 2005 the City signed a resolution for the Darby and Cobbs Creeks Watershed Stormwater Management Plan as part of the Stormwater Management Act 167 planning effort. Under the Watershed Plan a detailed stormwater ordinance was developed that exceeded requirements set forth by the State Model Stormwater Ordinance under the National Pollution Discharge Elimination System (NPDES) Phase II requirements. Philadelphia recognized the importance of implementing city-wide policy that uniformly addresses stormwater management and adopted Stormwater Regulations on September 5th 2005 that was effective on January 1st, 2006. The authority to adopt stormwater regulations is found within Title 14 Zoning and Planning Code under §14-1603.1 Stormwater Management Controls as referred to in the Storm Water Management Control Plans (6.)(c.)(1.) section.

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

The Storm Sewer Discharge Ordinance was submitted during the first year of the permit and there are several methods in place to ensure compliance with Philadelphia's storm sewer discharge policies. To begin with integration into the already existing development process for Philadelphia was a critical component for complying with stormwater policy. Key staff members have been consistently serving on the Water Departments development review committee to represent stormwater requirements from a technical perspective. Follow up associated with the committee meeting includes communication with engineers, review of submitted plans and ultimate approval or disapproval of stormwater management plans. Outside of the Water Department, discussions with Licenses and Inspections (L & I) along with City Planning have allowed the addition of water department approvals, which include stormwater issues, being required before critical steps of the development process.

Inspections and enforcement actions provide an additional component to ensuring compliance. The Industrial Waste Unit continues to be the lead organization for inspecting and enforcing pollution discharges to the separate storm sewer system. As we move into the New Year extensive efforts to coordinate with industrial waste staff will assist in addressing a portion of our compliance needs. Also, an Erosion and Sedimentation Inspector is in place at the Water Department who is actively reviewing plans, visiting sites and preparing inspection reports. For sites that remain out of compliance after several notifications and enforcement actions through L & I the City will turn to the State for more stringent penalties and enforcement actions. The coordinated plan review efforts between the Water Department and Southeast Regional Office of the Pennsylvania Department of Environmental Protection in terms of erosion and sedimentation control plans and post-construction stormwater management plans is another avenue where compliance is being strengthened.

In support of the policy change the Water Department 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. Part of this website includes notifications of upcoming workshops and stormwater update sessions which aim to update the development community on stormwater standards for plan submittals. The workshop venue has provided opportunity to inform the engineers, architects, developers, owners and so forth, about additional technical criteria that will be required as well as present approaches to meeting the technical requirements

F.8.b. Commercial and Residential Source Controls

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

In FY 2000, a needs-analysis was completed for the dredging of the Mingo Creek basins. Survey drawings showing the plan and elevation views of the Surge Basin, indicate minimal material deposited in the bed of the basin. In fact there was an indication of basin bed erosion. Based on these findings, dredging of the basin was not recommended. However, additional field investigations reveal pockets of deposition in the basin, suggesting the need for additional study. In June 2001 the basins were dewatered so that visual observations could be made and photos taken of existing conditions.

PWD is considering a study to assess the feasibility of retrofitting the basin to improve water quality. The study identified that better methods are needed to determine actual sediment depths within the basins, and research of suitable vegetation survivability in the basin's typical flow regime. PWD investigated a methodology to collect a bathymetric profile of the basin topology in FY 2003.

PWD's generation of a comprehensive model of the contributing MS4 to the Mingo Creek Surge Basin has been temporarily interrupted due to the loss of critical personnel. Generation of this model is planned to resume upon replenishment of staffing, since further understanding of this system's flow regime, potential restrictive characteristics, and conveyance infrastructure longevity, are critical components in identifying possible maintenance and system enhancement locations.

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. As part of this committee, PWD is involved in early stage planning of stormwater quality management and stormwater conveyance system capacity enhancements associated within the airport restructuring projects.

During August of 2009, the Basin was dewatered to inspect the sediment levels. The basin sediment appears to have not changed since previous inspections; therefore no further accumulation has been occurring. Photos from this inspection can be found in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

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

Existing Stormwater Structural Controls

In 2009, PWD inspected 172 privately owned existing stormwater structural controls. The inspections were conducted over the course of 6 months and included infrastructure verification, photographic documentation and inspection report creation. The stormwater structural controls were classified into groups determined by the amount of maintenance work needed to bring the practice back to optimal functionality in accordance with the Stormwater Ordinance. The stormwater controls were classified as fitting into one of three categories:

1. *No work needed* - Stormwater structure is well maintained. No additional maintenance activities are required.

2. *Minor work needed* - Stormwater structure requires minor maintenance activities related to cleaning infrastructure, clearing vegetation and removing accumulated sediment. Anticipate a low level of time and money expenditures to bring the structure back to proper functioning condition.

3. *Major work needed* - Stormwater structure requires structural changes and/or repairs. Anticipate a significant investment of time and money to restore the structure to proper functioning condition.

Of the 134 privately owned stormwater structural controls that were assessed, 68% were good condition, 25% needed minor work and 8% were in poor condition. In 2010, letters were sent to the majority of property owners notifying them of the inspection results and identifying any key maintenance issues to be addressed. PWD has remained responsive to property owners seeking to perform necessary corrective actions to improve system performance. The privately owned existing stormwater structural controls will continue to be inspected no less than once every five years.

New Stormwater Structural Controls

Development projects designing and constructing new stormwater structural controls to meet the Regulations are required to submit an O & M Agreement. The O & M Agreement is to be recorded against the property preserving the location of stormwater management systems with the land. After implementing the Regulations in 2006 and completing two years of development plan review, PWD reassessed the business process associated with the O & M Agreements. It was determined that the Agreements were not recordable documents since the form did not comply with the document format accepted by the Philadelphia Department of Records. PWD revised the O & M Agreement and has been successfully recording the documents to date. Since the Regulations were enacted, over 170 projects have had O&M Agreements recorded as part of the deed.

PWD refers to the O & M Agreement and approved post construction stormwater management (PCSM) Plan when performing inspections both during construction and once the site is completely stabilized. PWD recognizes the importance of inspecting the construction of stormwater management practices in order to ensure the approved PCSM Plan is being properly implemented. PWD requires a pre-construction meeting prior to commencement of earth moving activities. During the pre-construction meeting both the Erosion and Sedimentation (E & S) Control Plan and the PCSM Plan are discussed. The inspector covers the need to schedule an inspection of the stormwater structural controls during critical stages of construction. Coordination of site E & S controls in relation to the PCSM Plan is a key factor contributing to the long term O & M of stormwater structural controls.

Part of the inspection program growth during FY2011 included conducting inspections of stormwater structural controls during construction. Critical stages of construction were identified depending on the stormwater practice proposed for the site. PWD technical plan review staff conducted site visits for 132 active projects, totaling 225 inspections of stormwater structural controls. Technical plan review staff were on-site to verify construction according to the approved plan or to discuss necessary corrective actions for the project. Implementation of inspections of stormwater structural control construction has provided valuable input to the inspection program. For example, critical stages of subsurface system construction have been identified as the highest priority type of inspection.

During FY2011, PWD assigned two 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 over 200 inspections on over 100 more sites compared to 28 inspections on 20 sites respectively in FY2010. Stormwater management practice inspections for private development should increase even more in the upcoming fiscal year as PWD plans to hire an additional full time inspector and better streamline the process to further increase efficiency.

Development projects approved under the Regulations by PWD have been installed for less than 5 years, even under the oldest project scenario. Therefore, inspections for O & M activities are part of the inspection program framework and will be conducted under upcoming annual reporting years. Inspections of the new stormwater structural controls will be performed at least once every 5 years.

F.8.b.iii. Structural controls impact

The City maintains all city-owned structural controls, which presently consists of the Mingo Creek Surge Basin. Maintenance consists primarily of scheduled preventative maintenance of the pumping station to support its intended purpose of flood control. More detailed information about the Mingo Creek Surge Basin can be found in **SECTION F.8.B.I MINGO CREEK SURGE BASIN** on page 258.

In 2009, PWD inspected 172 privately owned existing stormwater structural controls. The inspections were conducted over the course of 6 months and included infrastructure verification, photographic documentation and inspection report creation. The stormwater structural controls were classified into groups determined by the amount of maintenance work needed to bring the practice back to optimal functionality in accordance with the Stormwater Ordinance. For more information on these inspections please refer to **SECTION F.8.B.II. EXISTING PRIVATELY OWNED STRUCTURAL CONTROLS** on page 259.

F.8.c. Development plans review

PWD and the City Planning Commission provide review of drainage plans for new development. The drainage plans addresses 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 237 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. Details of the snow response can be found in the Streets Department document entitled "Snow and Ice Operations Plan." A copy of the current plan can be found in the **ADDITIONAL DOCUMENTS FOLDER IN THE SUPPLEMENTAL CD**. The Streets Department has not finished updating their snow management plan, the City will provide a copy when it becomes available.

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

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

During FY 2011, the Streets Department continued its street cleaning programs that target street debris and litter. With its fleet of mechanical sweepers, the department provides daily street cleaning in Center City, and on major arteries and commercial corridors throughout the city. In FY 2011, a total 19,757 miles were cleaned. Budget cuts curtailed mechanical cleaning in FY10, as a pilot program targeting specific residential areas was suspended. Also greatly affecting FY11 cleaning miles was the severe winter weather and heavy snowfall. The department continues to provide the same level of mechanical cleaning service in Center City and on major arterials commercial corridors.

In addition to the Streets Department's street cleaning effort, the University City District (UCD) conducts sidewalk cleaning. The 27 men and women of the Public Space Maintenance (PSM) team work seven days a week, 8 a.m. to 4:30 p.m. sweeping sidewalks and removing graffiti. Heavily-trafficked commercial streets and areas adjacent to university campuses receive daily sweeping with pans and brooms and mechanical cleaning. Other areas with a high density of rental properties are cleaned at least twice weekly with machines (some areas are cleaned daily). In total, approximately 160 square blocks are maintained.

In the spring, PSM staff conducts a war against weeds, clearing excessive weeds from sidewalks and tree wells. In the fall, Student Move-In and leaf collection create especially intense work periods. PSM workers also assist with special events such as providing power, water, and cleaning for the Clark Park Farmers' Market. The UCD maintenance shop is located at 4056 Powelton Avenue. For more information on PSM's programs, please visit: http://www.universitycity.org/ucd_programs/public_space.

The Center City District (CCD) conducts sidewalk cleaning. The CCD deploys over 100 uniformed workers who manually sweep downtown sidewalks and operate specialized equipment on two overlapping shifts, seven days a week, providing up to 14 hours of services per day. Mechanical sidewalk sweepers are deployed every morning so that Center City starts clean every day.
Throughout the day, CCD's uniformed cleaners manually sweep all sidewalks at least three times. The "pan and broom brigade" also sweeps sidewalks in prime entertainment and dining areas in the evenings during the warm weather months. All 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.

<u>Public awareness of litter</u>

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 2010 Clean Block season, 10,145 blocks were cleaned by 74,459 volunteers. 985 tons of trash were collected and removed. Also in 2011, on April 9, the city held its fourth annual Philly Spring Cleaning day, a citywide anti-litter event partnering various city agencies and neighborhood community groups.

The Streets Department announced in March 2010, UnLitter Us, the first sustained public service campaign to rid the City of litter. The message is carried through block-by-block community programs, social networking programs such as facebook and twitter, PSAs from spoken artists, rhythmically talking about the beauty of a clean city, and urging people to use a trash can. For information on the UnLitter program visit: http://www.philadelphiastreets.com/unlitter-us-programs.aspx.

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

Please refer 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 38 for information about this topic.

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 the said penalties are displayed city-wide in any 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/.

Dog Waste Control Program

In FY 2011, a new program to address dog waste in targeted neighborhoods was created. 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. Many articulated that they clean up in public areas as a common courtesy, but were unaware that the dog waste in their yards could be a potential source of stormwater runoff pollution. After that pilot program, a similar need was identified in Philadelphia. 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. The refills are available at most local pet shops. The educational tip card that is being distributed with the units not only explains the effects of dog waste on local waterways, but also provides a list of other daily actions that can be modified slightly to reduce stormwater runoff pollution. This program is beneficial in educating dog-owners on other sources of stormwater runoff pollution and how these non-point source pollutants affect the local waterways and the Delaware Estuary.

A new dog waste reduction outreach and media campaign program was started in 2010. 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. One dog was chosen from each of two source water protection neighborhoods, Manayunk and East Falls. The outreach campaign consisted of online submission and voting with educational information on the importance of picking up after your dog mixed in throughout. Information on submitting your dog to be "Philly Water's Best Friend" was made available, along with Bags on Board and educational information, at dog-related and interested/participating businesses (i.e. pet shops, groomer, veterinarians, doggie daycares, etc.) in the source water neighborhoods. Each winning Spokesdog (one from each neighborhood) was selected at a public event in each neighborhood on May 7, 2011. This competition was irresistible to the media. 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, Philadelphia's Office of Watersheds website, which hosted the Spokesdog Competition information, registration and online voting, received over 12,000 hits. For more information see http://www.phillywatersheds.org/spokesdog.

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

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

All buildings within or close to the 100 Year Flood Plain area which requires a Zoning Permit or a Building Permit or both should be reviewed to determine if Floodplain Regulations applies. The City's Licensees and Inspection 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. Only one application was sent to the Zoning Board of Adjustment for a Flood Plain Variance which was not approved and 40 permit inspections have been done in 2009. The inspections on permits issued in 2010 and 2011 are still continuing as work progresses.

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

Our evaluation of structural drainage controls were discussed in further detail in **SECTION F.8.B.II** under existing privately owned structural controls on page 259, PWD developed a replicable approach for generating an inventory of existing stormwater management facilities within a watershed and then prioritizing the facilities for retrofit with structural and nonstructural stormwater best management practices aimed at enhancing groundwater recharge and water quality treatment of stormwater runoff and implemented it in the Wissahickon Creek Watershed. In the future we may evaluate the feasibility of retrofitting existing devices for pollutant removal in other watersheds to achieve our Green City, Clean Waters goal.

Work is also being done on sections of the city that have chronic flooding to eliminate or reduce these occurrences, please refer the CSO portion of the Annual Report **Section II. B.3.3 – STORM FLOOD RELIEF** on page 21 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 the CSO portion of the Annual Report **SECTION III. C.2.3 – STREAM HABITAT RESOTRATION** on page 135 for information pertaining to streambank restoration.

Please refer the CSO portion of the Annual Report **SECTION III.C.2.4 – WETLAND ENHANCEMENT AND CONSTRUCTION** on page 139 for information pertaining to wetland enhancement.

F.8.g. Sanitary Infiltration Controls

F.8.g.i. Limit sanitary infiltration

As part of our Cross Connection Repair Program, PWD has conducted 1,119 abatements to correct cross connection in sewer laterals since 1994, 83 abatements were completed in FY2011 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 about 42.7 million gallons of contaminated flow from entering our waterways during FY2011. Please refer to **SECTION F.3 – DETECTION, INVESTIGATION AND ABATEMENT OF ILLICIT DISCHARGES** on page 226 for more information on our Cross Connection Repair Program.

In addition as part of PWD's Sewer Maintenance Program, we routinely conduct sewer relinings on both our 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 achievement of Target A (Improvement of water quality and aesthetics in dry weather), a large relining project began on the entire length of interceptor within Philadelphia in the Tacony-Frankford and Cobbs Watersheds. Also efforts are underway to coordinate sewer relining with Cheltenham Township so the entire sewershed gets relined. Please refer to **CSO SECTION III.B.2.1.1 – INTERCEPTOR RELINING** on page 100 for more information on our interceptor relining project.

A storage tank is being constructed at relief sewer point R20 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.1.11– CONSTRUCTION AND IMPLEMENTATION OF THE MAIN AND SHURS OFF-LINE STORAGE PROJECT** on page 96 for more information the Main and Shurs Off-line Storage Project and efforts to reduce inflow and infiltration at R-20.

PWD is in the process of constructing a parallel relief sewer to 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. This project should be completed in 2011.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 130 for more information the PC-30 Relief Sewer.

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

The On-lot Sewage Disposal System program allows for the supervision of the design and installation of new systems to prevent sewage from being discharged onto the ground and also entails the identification, evaluation and recommendation of remedial actions which are available to homeowners with malfunctioning systems. This program also enables permitting and monitoring of storage tanks and portable toilets.

Educational materials emphasizing water conservation and On-Lot Sewage Disposal System maintenance requirements are provided with each permit application to inform the homeowner of the importance of preventing a malfunction. A liaison is maintained with the PA DEP, Philadelphia Water Department and City Planning Commission concerning the prevalence of malfunctions within certain geographical areas in the City. An extension of the municipal sewerage system is recommended to the Philadelphia Water Department for those areas where homes are experiencing malfunctions and no practical means are available for their correction.

Activities:

- Review plans, observe tests, issue permits and observe the installation of all new On-Lot Sewage Disposal Systems to assure their conformance with PA Acts 537 and 149 and the PA DEP regulations.
- Respond to complaints or reports of malfunctioning On-Lot Sewage Disposal Systems within 24 hours of receipt of this notice.
- Evaluate malfunctioning On-Lot Sewage Disposal Systems and provide a notification to the homeowner, which includes recommendations on abatement actions.
- Where appropriate, initiate enforcement action when non-compliance persists, by issuing notices, conducting administrative hearings or conferences, or requesting court action.
- Provide the training opportunities needed to maintain PA DEP certification as a Sewage Enforcement Officer for each employee actively engaged in the On-Lot Sewage Disposal System permitting program.
- Conduct evaluation of On-Lot Systems in selected geographic areas to determine the necessity for extensions of the Philadelphia sewer system.

Achieved:

- During the 2011 fiscal year, from 7/1/10 to 6/30/11, 14 applications were received for the installation of on-lot sewage disposal systems and 14 permits were issued.
- Staff members routinely attend training mandated by the PA DEP to maintain their Sewage Enforcement Officer certification.

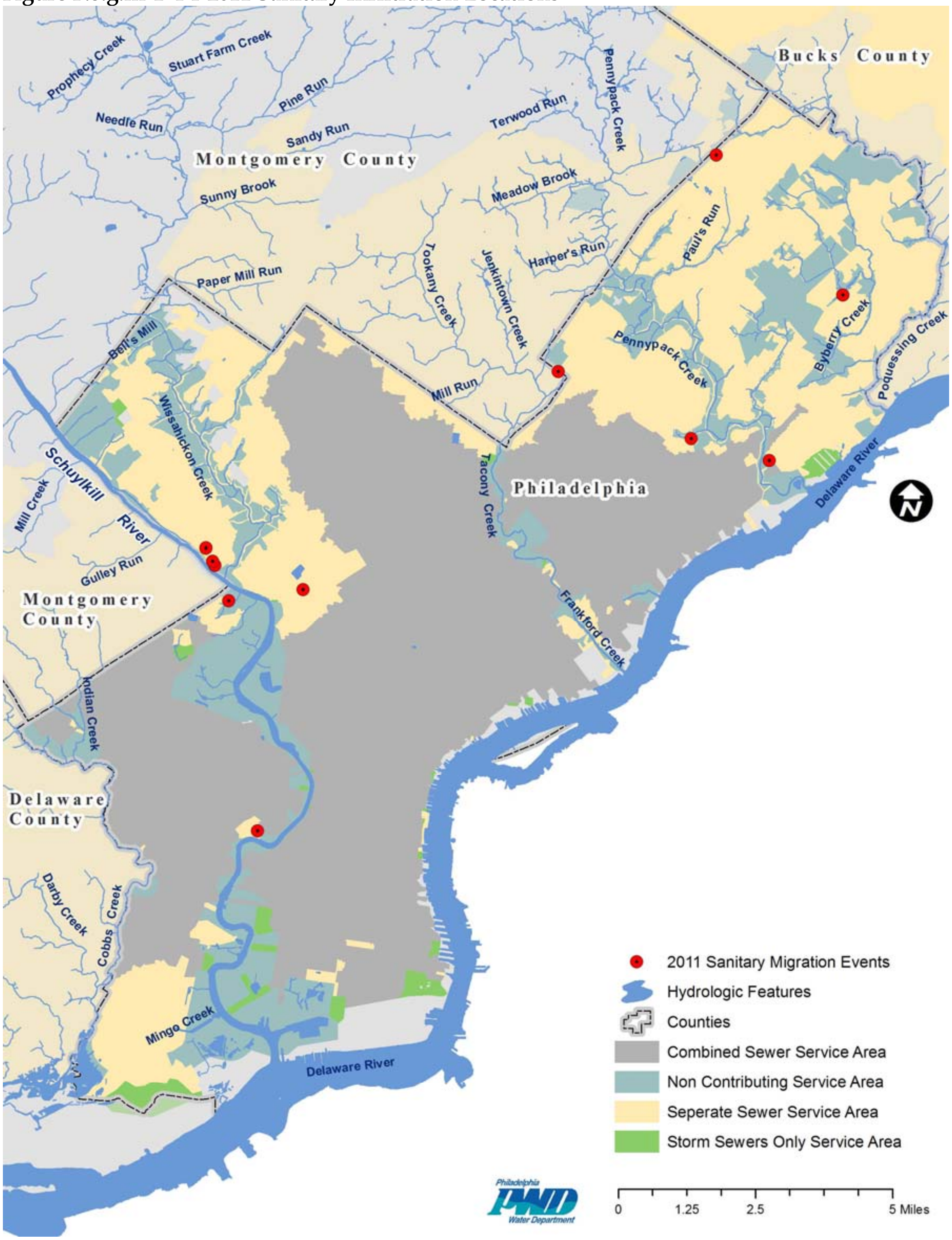
F.8.g.iii. Investigate, remediate, and report sanitary infiltration

The Industrial Waste Unit (IWU) within the Philadelphia Water Department (PWD) responds to all citizen complaints of liquid, solid, or gaseous pollutants within Philadelphia. The Collector Systems maintains and manages a database called the Sewage Pollution Incident & Location Log (SPILL) which reports information about unintentional sanitary discharges which includes date reported, problem location, spill type, description, and abatement date. 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 2011.

Table F.8.g.iii-1 FY 2011 Sanitary Infiltration Events

Report Date	Reported By	Problem Location	Type Spill	Spill Destination	Affected Outfall	Discharge (GPM)	Abatement Date
6/21/11 2:30 PM	PLUMBER	3900 TERRACE ST	CHOKED SEWER	OUTFALL TO STREAM	S-051-08	0.02	6/21/11 5:30 PM
6/6/11 10:40 AM	CITIZEN	10900 ACADEMY RD	CHOKED SEWER	OVER LAND TO STREAM	Q-110-06	0.01	6/7/11 10:30 AM
5/15/11 11:30 AM	ED SCHOFFELD	RYAN AVE & SANDYFORD RD	CHOKED SEWER	OVER LAND TO STREAM	P-091-02	0.22	5/15/11 2:30 PM
3/17/11 9:50 AM	SYLVIA SPREWELL	UNIVERSITY AVE & CIVIC CENTER BLVD	CHOKED SEWER	OVER LAND TO STREAM	S-024-01	0.08	3/17/11 10:30 AM
2/18/11 1:30 PM	TAMIKA WARREN	HENRY AVE & ROBERTS AVE	CHOKED SEWER	OVER LAND TO STREAM	S-046-06	1	2/18/11 11:30 PM
11/3/10 2:30 PM	WILLIAM STEEWART	COTTMAN AVE & CENTRAL AVE	CHOKED SEWER	SOIL PONDING	T-089-04	3	11/3/10 8:30 PM
11/2/10 12:30 PM	LOWER MORELAND MAINTENCE CREW	RENNARD ST. & RENNARD PL.	CHOKED SEWER	OUTFALL TO STREAM	P-116-01	2	11/2/10 5:30 PM
9/17/10 11:30 AM	EXAM CREW 664	DITMAN ST & SOLLY AVE	CHOKED SEWER	OUTFALL TO STREAM	P-083-04	1	9/17/10 1:30 PM
9/9/10 12:30 PM	JAMES CARSON	WEST OF NEILL DRIVE PUMPING STATION	DEFECTIVE SEWER PIPE	OVER LAND TO STREAM	S-046-05	30	9/10/10 4:00 AM
9/8/10 3:00 PM	CITIZEN	5100 ROCHELLE AVE	CHOKED SEWER	OUTFALL TO STREAM	S-052-05	15	9/8/10 5:30 PM
8/19/10 8:00 AM	PWD EMPLOYEE	RIDGE AVE & ROCHELLE AVE	CHOKED SEWER	SOIL PONDING	S-052-05	10	8/19/10 7:00 PM
8/7/10 3:10 PM	FOUL ODER COMPLAINT	ACADEMY RD & AMITY RD	CHOKED SEWER	OVER LAND TO STREAM	Q-110-06	2.07	8/7/10 8:00 PM

Figure F.8.g.iii-1 FY 2011 Sanitary Infiltration Locations



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 by the Industrial Waste Unit, whose personnel are charged with response to such events. 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 the Philadelphia Water Department's structures and treatment processes, IWU personnel 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. IWU responds to all incidents that occur within the city limits that can impact the sewer system. This includes both the sanitary sewer system and the storm sewer system. They supervise cleanup activities and assess environmental impact. The inspectors also investigate various other types of complaints. Please refer to **SECTIONS F.7.A AND F.8.J** for information regarding the nature of IWU responses during FY 2011.

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

The City vigorously 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 24 Hour/Day, 7 Day/Week Municipal Dispatcher to handle reports from the public. The direct numbers for the Dispatcher are (215) 686-4514 or (215) 686-4515. In addition, a customer service hotline 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's customer service division received 19,513 calls during FY2011. Currently PWD does not track phone calls specifically related to illicit discharges and improper disposals, our customer service division tracks much broader topics including emergency PWD call (i.e. water main breaks) and non emergency calls. During calendar year 2010, PWD received 98,231 emergency calls and 11,914 non- emergency calls. Any calls related to illicit discharges and improper disposals will be forward to our Industrial Waste Unit or Sewer Maintenance Group, in FY2011 PWD responded to 19 illicit discharges / improper disposals related events

Philly 311
In addition the numbers listed above, Philly311 was created to help eliminate the need to sort through the 500 phone numbers and hotlines available to contact the City government. Call 3-1-1 and a customer service specialist will connect you to the information and services you need. For more information on uses of Philly 311 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. For more information on the FY11 HHW event please refer to **SECTION F.2.STEP 2.G** on page 215 or visit the Streets Department's website at http://www.philadelphiastreets.com/hazardous-waste.aspx.

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

Philadelphia resident's received brochures in their water bills throughout February and March (2010), inviting them to voluntarily participate in Storm Drain Marking to help educate the public about reducing stormwater runoff pollution. Over 350 volunteer groups registered to participate this year for an estimated total of over 11,000 storm drains marked. Supplies and additional educational materials were distributed in April (2010). Volunteers completed their projects and returned Final Reports to get their "Yo! No Dumping, Drains to River" t-shirts. The t-shirts are an extra thank you to the volunteers and also are wearable advertisements for Philadelphia Water Department, Storm Drain Marking Project and stormwater runoff pollution prevention.

In the spring of even years (2008 & 2010), the Philadelphia Water Department distributes an educational bill stuffer which solicits volunteers to mark storm drains. A bill stuffer is mailed to every resident in the City of Philadelphia (roughly 470,000 households). We hope that during this event all 76,043 stormwater inlets get labeled at least every two years but since these are conducted on a voluntary basis we are unsure on whether this is all inlets are actually done. The storm drain marking materials are always available for groups that request them. For example, 103 packets (15 markers per packet) were requested in FY09. Therefore 1,545 storm drain markers were distributed to volunteers upon request. Prior to 2008, PWD did not distribute the storm marking information in the bill stuffer. At that point, PWD had mailed a brochure to organizations and schools in Philadelphia to solicit volunteers. There was such a positive response (tremendous number of volunteers and requests for supplies) to the bill stuffer storm drain marking kits that PWD can only afford to do it every other year to stay within the education and outreach budget.

Because of such a positive response (tremendous number of volunteers and requests for supplies) to the bill stuffer advertising of storm drain marking supplies, PWD can only afford to do a big push for volunteers every other year (even years) to stay within the education and outreach budget. Over 30 storm drain marking kits were distributed in the spring of 2011, involving at least 60 volunteers. These kits were enough supplies to mark 450 storm drains. Upon receipt of project Final Reports, volunteers were given "Yo! No Dumping, Drains to River" t-shirts. The t-shirts are an extra thank you to the volunteers and also are wearable advertisements for Philadelphia Water Department, Storm Drain Marking Project and stormwater runoff pollution prevention.

Section G Assessment of Controls

Annually estimate pollutant loadings & reductions from stormwater management plan

The City of Philadelphia has implemented multiple best management practices (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.

In addition, information pertaining to pollutant loads for all storm water outfalls are also discussed in the annual report in **SECTION F.2.STEP 2C, D, E: WATERSHED & WATER BODY MODELING, ESTIMATE OF LOADINGS FROM THE CITY'S MS4 SYSTEM** on page 207 and results of the model runs were also provided in the supplemental CD.

Section H Fiscal Resources

H.1 Maintain adequate program funding

The Stormwater Management Program is funded from the City's Water Fund, supported by revenue from water and sewer rates. The Water and Wastewater Funds are required under the General Ordinance to be held separate and apart from all other funds and accounts of the City. The Fiscal Agent and the funds and accounts therein shall not be commingled with, loaned or transferred among themselves or to any other City funds or accounts except as expressly permitted by the General Ordinance. During the reporting period, the City provided fiscal resources needed to support operation and maintenance of the Stormwater Management Program as outlined in **TABLE H-1** below. The table presents fiscal year budgets for both the reporting year as well as the upcoming fiscal year.

Table H-1 Fiscal Resources

Program	FY 2011 Budget	FY 2012 Budget
Office of Watersheds	$10.517 Million	$11.523 Million
Collector Systems Support	$0.653 Million	$0.698 Million
Sewer Maintenance and Flow Control	$23.611 Million	$24.632 Million
Inlet Cleaning	$4.452 Million	$4.476 Million
Abatement of Nuisances	$7.187 Million	$7.630 Million
Sewer Reconstruction	$22.5 Million	$23.5 Million
Public Affairs and Education	$5.467 Million	$6.411 Million
Total	$74.387 Million	$78.870 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-
FY 2011 FLOW CONTROL ANNUAL REPORT

PWD FLOW CONTROL UNIT

COMBINED SEWER OVERFLOW MAINTENANCE

FISCAL YEAR 2011

PART 1 **PHILADELPHIA WATER DEPARTMENT** **Section 1**

CSO DRY WEATHER STATUS **WASTE AND STORM WATER COLLECTION**

REPORT **FLOW CONTROL UNIT**

COLLECTOR	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Totals
UPPER PENNYPACK - 5 UNITS													
INSPECTIONS	8	11	11	16	11	16	13	14	15	11	11	11	148
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	0	0	0	1	0	0	0	0	0	1	3
UPPER DELAWARE LOW LEVEL - 12 UNITS													
INSPECTIONS	37	40	40	46	35	41	33	37	37	27	26	25	424
DISCHARGES	2	0	0	0	0	0	0	0	0	0	0	0	2
BLOCKS CLEARED	5	5	4	6	4	2	0	1	3	0	6	4	40
LOWER FRANKFORD CREEK - 6 UNITS													
INSPECTIONS	6	12	12	12	16	17	12	18	18	13	12	8	156
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	0	1	0	0	0	2	4	3	2	2	14
LOWER FRANKFORD LOW LEVEL - 10 UNITS													
INSPECTIONS	17	13	13	24	15	31	20	23	24	23	23	16	242
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	0	0	0	1	0	0	0	0	0	0	1
FRANKFORD HIGH LEVEL - 14 UNITS													
INSPECTIONS	30	30	30	41	14	58	32	18	29	25	34	39	380
DISCHARGES	4	1	0	0	0	2	0	0	0	1	0	0	8
BLOCKS CLEARED	0	0	0	0	0	0	0	0	0	0	0	0	0
SOMERSET - 9 UNITS													
INSPECTIONS	22	27	27	27	27	15	18	26	31	33	29	26	308
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	7	2	0	1	0	1	0	1	6	3	4	0	25
LOWER DELAWARE LOW LEVEL - 33 UNITS													
INSPECTIONS	76	73	73	103	82	107	87	67	117	76	79	90	1030
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	7	5	1	3	1	2	0	3	12	10	5	6	55
CENTRAL SCHUYLKILL EAST - 18 UNITS													
INSPECTIONS	58	66	66	89	59	48	65	64	66	42	68	65	756
DISCHARGES	0	1	0	0	0	0	0	0	0	0	0	0	1
BLOCKS CLEARED	6	5	4	1	0	8	3	0	5	2	2	2	38
LOWER SCHUYLKILL EAST - 9 UNITS													
INSPECTIONS	17	21	21	30	26	17	24	30	28	20	17	21	272
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	1	0	0	0	0	0	1	0	1	1	5
CENTRAL SCHUYLKILL WEST - 9 UNITS													
INSPECTIONS	13	32	32	41	33	23	17	18	29	17	27	25	307
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	1	2	0	1	0	1	0	0	1	0	1	7
SOUTHWEST MAIN GRAVITY - 10 UNITS													
INSPECTIONS	26	44	44	46	35	57	33	29	36	28	33	25	436
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	2	2	2	2	3	0	0	0	1	0	0	13
LOWER SCHUYLKILL WEST - 4 UNITS													
INSPECTIONS	18	12	12	25	21	11	12	20	19	10	8	9	177
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	3	0	0	2	2	0	0	0	0	0	0	0	7
COBBS CREEK HIGH LEVEL - 23 UNITS													
INSPECTIONS	50	43	43	73	57	60	69	53	69	77	79	73	746
DISCHARGES	1	1	0	0	0	0	0	0	0	0	0	0	2
BLOCKS CLEARED	4	0	6	2	1	1	0	0	0	0	0	2	16
COBBS CREEK LOW LEVEL - 13 UNITS													
INSPECTIONS	15	14	14	36	29	28	22	12	27	42	43	35	317
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	1	1
BLOCKS CLEARED	0	0	1	2	0	0	0	0	0	2	1	1	7
RELIEF SEWERS - 26 UNITS													
INSPECTIONS	28	28	28	33	46	32	34	45	74	38	40	43	469
DISCHARGES	0	0	0	0	0	0	0	0	1	0	0	0	1
BLOCKS CLEARED	0	0	0	0	0	0	0	0	0	1	0	0	1
TOTALS / MONTH for 201 REGULATOR UNITS													Totals
TOTAL INSPECTIONS	421	466	466	642	506	561	491	474	619	482	529	511	6168
TOTAL DISCHARGES	7	3	0	0	0	2	0	0	1	1	0	1	15
TOTAL BLOCKS CLEARED	35	20	21	20	11	19	4	7	31	23	21	20	232
AVER. # of INSP. / BC	12	23	22	32	46	30	123	68	20	21	25	26	37
DISC / 100 INSPECTIONS	1.7	0.6	0.0	0.0	0.0	0.4	0.0	0.0	0.2	0.2	0.0	0.2	0.2

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
UPPER PENNYPACK 5 NEWPC UNITS															
P01	2	2	2	3	2	3	3	3	3	2	2	2	29	2.4	12.6
P02	2	2	2	3	2	3	3	2	3	2	2	2	28	2.3	13.0
P03	1	2	2	3	2	3	4	3	3	2	2	2	29	2.4	12.6
P04	2	3	3	4	3	4	2	4	3	3	3	3	37	3.1	9.9
P05	1	2	2	3	2	3	1	2	3	2	2	2	25	2.1	14.6
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS															
D02	14	9	9	7	3	5	3	4	3	2	3	2	64	5.3	5.7
D03	2	3	3	5	2	3	5	3	3	2	2	2	35	2.9	10.4
D04	3	4	4	4	2	5	5	4	4	3	3	3	44	3.7	8.3
D05	2	3	3	4	2	3	2	2	3	3	2	2	31	2.6	11.8
D06	3	3	3	3	2	3	3	3	3	2	2	2	32	2.7	11.4
D07	2	3	3	4	2	3	2	3	3	3	2	2	32	2.7	11.4
D08	2	3	3	3	2	3	2	3	3	2	2	2	30	2.5	12.2
D09	2	4	4	3	2	3	2	3	3	2	2	2	32	2.7	11.4
D11	2	3	3	3	2	3	2	3	3	2	2	2	30	2.5	12.2
D12	2	1	1	3	2	3	3	3	3	2	2	2	27	2.3	13.5
D13	2	1	1	3	2	3	2	3	3	2	2	2	26	2.2	14.0
D15	1	3	3	4	12	4	2	3	3	2	2	2	41	3.4	8.9
LOWER FRANKFORD CREEK 6 NEWPC UNITS															
F13	1	2	2	2	3	3	2	3	3	2	2	2	27	2.3	13.5
F14	1	2	2	2	3	3	2	3	3	2	2	1	26	2.2	14.0
F21	1	2	2	2	2	2	2	3	3	2	2	1	24	2.0	15.2
F23	1	2	2	2	3	3	2	4	3	2	2	1	27	2.3	13.5
F24	1	2	2	2	3	3	2	3	3	3	2	1	27	2.3	13.5
F25	1	2	2	2	2	3	2	2	3	2	2	2	25	2.1	14.6
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS															
F03	1	1	1	2	3	3	2	3	3	2	2	2	25	2.1	14.6
F04	1	1	1	2	3	4	2	2	2	2	2	2	24	2.0	15.2
F05	1	1	1	2	2	3	2	2	2	2	2	2	22	1.8	16.6
F06	1	1	1	4	1	4	2	3	3	2	3	2	27	2.3	13.5
F07	2	1	1	2	1	3	2	2	2	2	2	1	21	1.8	17.4
F08	2	1	1	2	1	2	2	2	2	2	2	1	20	1.7	18.2
F09	4	2	2	3	1	4	2	3	3	3	3	2	32	2.7	11.4
F10	3	2	2	2	1	2	2	2	2	3	2	1	24	2.0	15.2
F11	1	1	1	2	1	2	2	2	2	2	2	1	19	1.6	19.2
F12	1	2	2	3	1	4	2	2	3	3	3	2	28	2.3	13.0
FRANKFORD HIGH LEVEL 14 NEWPC UNITS															
T01	1	1	1	3	1	3	3	1	2	2	2	2	22	1.8	16.6
T03	2	2	2	3	1	3	2	2	3	3	2	3	28	2.3	13.0
T04	1	3	3	4	1	3	4	1	2	2	5	3	32	2.7	11.4
T05	1	1	1	3	1	2	4	1	2	2	2	2	22	1.8	16.6
T06	1	1	1	3	1	2	4	1	2	2	2	3	23	1.9	15.9
T07	1	2	2	3	1	1	2	1	2	2	2	3	22	1.8	16.6
T08	2	9	9	3	1	1	1	1	2	1	3	3	36	3.0	10.1
T09	3	1	1	3	1	1	2	1	2	1	3	3	22	1.8	16.6
T10	3	2	2	3	1	2	1	2	2	1	3	4	26	2.2	14.0
T11	2	2	2	2	1	2	1	2	2	5	2	2	25	2.1	14.6
T12	4	2	2	3	1	6	2	2	2	1	2	3	30	2.5	12.2
T13	7	2	2	4	1	30	1	1	2	1	2	4	57	4.8	6.4
T14	1	1	1	2	1	1	2	1	2	1	2	2	17	1.4	21.5
T15	1	1	1	2	1	1	3	1	2	1	2	2	18	1.5	20.3

10 TOTAL DISCHARGES FOR NE & SE DISTRICTS
0.8 AVERAGE DISCHARGES PER MONTH
13.2 AVER. DAYS BEFORE RETURNING TO SITE
3.7 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	3	4	4	5	4	2	2	3	4	3	3	3	40	3.3	9.1
D18	2	3	3	2	2	2	2	3	5	3	3	3	33	2.8	11.1
D19	3	4	4	3	3	2	2	3	4	4	3	3	38	3.2	9.6
D20	6	4	4	7	4	3	2	4	5	9	5	3	56	4.7	6.5
D21	2	3	3	2	2	1	2	3	3	2	3	3	29	2.4	12.6
D22	2	3	3	2	3	1	2	3	3	3	5	3	33	2.8	11.1
D23	2	2	2	2	4	1	2	2	3	4	3	3	30	2.5	12.2
D24	1	2	2	2	3	1	2	2	2	2	3	3	25	2.1	14.6
D25	1	2	2	2	2	2	2	3	2	3	1	2	24	2.0	15.2
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS															
D37	4	3	3	5	2	5	5	5	3	2	6	3	46	3.8	7.9
D38	1	2	2	7	5	3	5	3	5	2	5	3	43	3.6	8.5
D39	2	3	3	9	4	3	4	2	3	2	3	4	42	3.5	8.7
D40	2	2	2	3	4	3	3	2	4	2	3	4	34	2.8	10.7
D41	2	3	3	2	1	3	3	3	4	2	3	3	32	2.7	11.4
D42	1	2	2	2	1	2	3	2	2	3	3	3	26	2.2	14.0
D43	1	2	2	2	2	2	4	2	2	2	3	3	27	2.3	13.5
D44	2	3	3	3	2	2	6	2	3	3	2	3	34	2.8	10.7
D45	2	2	2	2	2	4	4	3	5	2	3	4	35	2.9	10.4
D46	2	2	2	1	4	4	3	3	3	3	2	3	32	2.7	11.4
D47	2	3	3	1	2	4	3	3	4	2	2	3	32	2.7	11.4
D48	8	5	5	7	3	8	3	2	6	3	2	4	56	4.7	6.5
D49	3	4	4	4	2	4	3	2	4	3	2	5	40	3.3	9.1
D50	2	2	2	1	2	4	3	2	4	3	2	3	30	2.5	12.2
D51		1	1	2	2	4	2	2	3	2	2	3	24	2.2	15.2
D52	2	2	2	2	2	4	2	2	3	3	2	2	28	2.3	13.0
D53	3	2	2	1	2	4	2	2	3	2	2	2	27	2.3	13.5
D54	4	3	3	1	2	4	2	2	3	2	2	2	30	2.5	12.2
D58	3	3	3	2	3	5	2	3	6	3	3	3	39	3.3	9.4
D61	2	2	2	1	2	3	1	2	3	2	2	2	24	2.0	15.2
D62	2	2	2	2	2	3	3	2	4	2	2	2	28	2.3	13.0
D63	2	3	3	6	4	5	1	1	5	3	2	4	39	3.3	9.4
D64	2	2	2	2	2	3	1	1	3	2	2	2	24	2.0	15.2
D65	2	2	2	1	2	3	3	1	4	2	2	2	26	2.2	14.0
D66	2	2	2	2	3	3	3	1	4	2	3	2	29	2.4	12.6
D67	2	2	2	2	3	2	4	3	6	3	3	4	36	3.0	10.1
D68	6	4	4	7	2	2	2	1	3	2	2	2	37	3.1	9.9
D69	4	1	1	8	3	2	2	1	3	2	2	2	31	2.6	11.8
D70	1	1	1	9	5	2	2	1	4	2	2	2	32	2.7	11.4
D71	1	1	1	2	2	3	1	2	3	2	2	2	22	1.8	16.6
D72	3	1	1	3	3	2	1	2	3	4	2	2	27	2.3	13.5
D73	1	1	1	1	2	2	1	2	2	2	1	2	18	1.5	20.3
TOTAL	196	206	206	269	200	285	215	203	271	208	214	215	2688		
I/D/C	3.2	3.4	3.4	4.4	3.3	4.7	3.5	3.3	4.5	3.4	3.5	3.5			
UP	8	11	11	16	11	16	13	14	15	11	11	11	148	2.5	12.5
UDLL	37	40	40	46	35	41	33	37	37	27	26	25	424	2.9	10.9
LFC	6	12	12	12	16	17	12	18	18	13	12	8	156	2.2	14.1
LFLL	17	13	13	24	15	31	20	23	24	23	23	16	242	2.0	15.4
FHL	30	30	30	41	14	58	32	18	29	25	34	39	380	2.3	14.7
SLL	22	27	27	27	27	15	18	26	31	33	29	26	308	2.9	11.3
LDLL	76	73	73	103	82	107	87	67	117	76	79	90	1030	2.7	12.0

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	2												2
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													0
T05													0
T06													0
T07													0
T08		1											1
T09	1												1
T10													0
T11										1			1
T12													0
T13	3					2							5
T14													0
T15													0

													TOTAL
UP	0	0	0	0	0	0	0	0	0	0	0	0	0
UDLL	2	0	0	0	0	0	0	0	0	0	0	0	2
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	4	1	0	0	0	2	0	0	0	1	0	0	8
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
	6	1	0	0	0	2	0	0	0	1	0	0	10

NO OF UNITS IN DISTRICT BLOCKED													TOTAL
UP	0	0	0	0	0	0	0	0	0	0	0	0	0
UDLL	1	0	0	0	0	0	0	0	0	0	0	0	1
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	1	0	0	0	1	0	0	0	1	0	0	5
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													0
P02													0
P03	1					1						1	3
P04													0
P05													0
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS													
D02	2			1									3
D03	1		1	1		1					1		5
D04	1	1		1				1	2		1	2	9
D05													0
D06	1	1	1	1								1	5
D07													0
D08		1	1			1							3
D09													0
D11		1		1							1	1	4
D12											1		1
D13													0
D15		1	1	1	4				1		2		10
LOWER FRANKFORD CREEK 6 NEWPC UNITS													
F13													0
F14								2	1		2		5
F21										1			1
F23				1					2	1		1	5
F24									1	1			2
F25												1	1
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS													
F03													0
F04													0
F05													0
F06													0
F07													0
F08													0
F09						1							1
F10													0
F11													0
F12													0
FRANKFORD HIGH LEVEL 14 NEWPC UNITS													
T01													0
T03													0
T04													0
T05													0
T06													0
T07													0
T08													0
T09													0
T10													0
T11													0
T12													0
T13													0
T14													0
T15													0

11.5 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	1	1											2
D18									1				1
D19	3								2	1	1		7
D20	3	1		1		1			2	2	1		11
D21													0
D22								1					1
D23									1		1		2
D24											1		1
D25													0
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS													
D37	1							2	1		1		5
D38		1		1									2
D39													0
D40	1								2		1	1	5
D41						1				1		1	3
D42											1		1
D43													0
D44													0
D45													0
D46										3			3
D47	1	1								1	1		4
D48	2	1	1	1		1			1	1		1	9
D49	1	1							2	1		1	6
D50					1								1
D51													0
D52								1					1
D53													0
D54													0
D58												1	1
D61													0
D62		1							1				2
D63										1		1	2
D64													0
D65													0
D66													0
D67									1	1			2
D68									2		1		3
D69	1												1
D70									1				1
D71													0
D72				1					1	1			3
D73													0
D75													0
													TOTAL
	20	12	5	11	5	7	0	7	25	16	17	13	138

UP	1	0	0	0	0	1	0	0	0	0	0	1	3
UDLL	5	5	4	6	4	2	0	1	3	0	6	4	40
LFC	0	0	0	1	0	0	0	2	4	3	2	2	14
LFLL	0	0	0	0	0	1	0	0	0	0	0	0	1
FHL	0	0	0	0	0	0	0	0	0	0	0	0	0
SLL	7	2	0	1	0	1	0	1	6	3	4	0	25
LDLL	7	5	1	3	1	2	0	3	12	10	5	6	55

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
CENTRAL SCHUYLKILL EAST SIDE 18 SWWPC UNITS															
S05	3	7	7	7	3	3	4	4	4	2	4	4	52	4.3	7.0
S06	3	4	4	7	4	3	4	4	5	2	6	5	51	4.3	7.2
S07	3	4	4	7	4	3	7	4	5	6	4	5	56	4.7	6.5
S08	3	5	5	6	3	3	4	4	6	6	4	6	55	4.6	6.6
S09	3	4	4	5	3	3	4	3	3	2	4	3	41	3.4	8.9
S10	3	4	4	4	3	2	4	3	3	2	4	3	39	3.3	9.4
S12	4	5	5	6	3	3	4	4	4	3	4	4	49	4.1	7.4
S12A	4	4	4	6	4	3	4	4	4	3	4	4	48	4.0	7.6
S13	4	4	4	6	4	3	4	4	4	3	4	4	48	4.0	7.6
S15	4	4	4	6	4	3	3	4	5	3	4	3	47	3.9	7.8
S16	3	3	3	4	3	2	3	3	3	1	3	3	34	2.8	10.7
S17	3	3	3	3	3	2	3	3	3	1	3	3	33	2.8	11.1
S18	3	2	2	4	3	2	3	3	3	1	3	3	32	2.7	11.4
S19	4	4	4	4	5	3	2	4	4	2	4	4	44	3.7	8.3
S21	4	3	3	4	3	3	3	5	4	2	4	4	42	3.5	8.7
S23	3	2	2	4	3	3	5	3	2	1	3	3	34	2.8	10.7
S25	3	2	2	3	2	2	2	3	2	1	3	2	27	2.3	13.5
S26	1	2	2	3	2	2	2	2	2	1	3	2	24	2.0	15.2
LOWER SCHUYLKILL EAST SIDE 9 SWWPC UNITS															
S31	3	3	3	6	4	2	3	5	4	2	2	2	39	3.3	9.4
S35	3	3	3	6	4	2	3	4	3	2	2	2	37	3.1	9.9
S36	1	1	1	1	1	1	1	1	1	1	1	2	13	1.1	28.1
S36A	2	3	3	4	4	2	3	5	3	3	2	2	36	3.0	10.1
S37	1	1	1	1	1	1	1	1	1	1	1	2	13	1.1	28.1
S42	2	3	3	5	3	4	4	5	9	5	5	5	53	4.4	6.9
S42A	2	3	3	5	5	2	4	4	4	3	2	2	39	3.3	9.4
S44	1	1	1	1	1	1	1	1	1	1	1	2	13	1.1	28.1
S46	2	3	3	1	3	2	4	4	2	2	1	2	29	2.4	12.6
CENTRAL SCHUYLKILL WEST 9 SWWPC UNITS															
S01	2	2	2	4	5	3	2	1	3	1	3	2	30	2.5	12.2
S02	2	3	3	4	4	3	2	1	3	1	3	2	31	2.6	11.8
S03	1	3	3	4	3	3	2	1	3	1	3	2	29	2.4	12.6
S04	1	4	4	3	3	2	2	1	4	1	3	2	30	2.5	12.2
S11	1	4	4	3	2	1	2	2	3	1	3	3	29	2.4	12.6
S14	1	4	4	2	3	1	2	2	3	1	3	3	29	2.4	12.6
S20	1	4	4	7	3	2	1	2	4	4	3	3	38	3.2	9.6
S22	2	4	4	7	5	4	2	4	3	5	3	4	47	3.9	7.8
S24	2	4	4	7	5	4	2	4	3	2	3	4	44	3.7	8.3
SOUTHWEST MAIN GRAVITY 10 SWWPC UNITS															
S27	1	4	4	5	1	4	2	2	2	3	3	2	33	2.8	11.1
S28	1	4	4	5	2	4	2	2	2	3	3	2	34	2.8	10.7
S30	1	4	4	4	1	4	2	3	3	2	3	2	33	2.8	11.1
S34	1	4	4	3	3	4	3	3	3	2	3	2	35	2.9	10.4
S39		4	4	3	3	4	3	3	3	1	3	2	33	3.0	11.1
S40	2	3	3	4	4	4	3	3	4	2	3	2	37	3.1	9.9
S43	3	4	4	4	4	3	4	4	4	2	3	2	41	3.4	8.9
S47	2	4	4	4	4	3	4	3	4	2	3	2	39	3.3	9.4
S50	9	7	7	8	7	20	6	3	6	6	6	6	91	7.6	4.0
S51	6	6	6	6	6	7	4	3	5	5	3	3	60	5.0	6.1
LOWER SCHUYLKILL WEST SIDE 4 SWWPC UNITS															
S32	7	3	3	7	5	3	3	5	5	3	2	3	49	4.1	7.4
S33	4	3	3	6	6	4	3	5	5	2	2	2	45	3.8	8.1
S38	3	3	3	7	5	2	3	5	5	2	2	2	42	3.5	8.7
S45	4	3	3	5	5	2	3	5	4	3	2	2	41	3.4	8.9

4 TOTAL DISCHARGES IN SW DISTRICT

0.3 AVERAGE DISCHARGES PER MONTH

11.5 AVER. DAYS BEFORE RETURNING TO SITE

2.7 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	2	2	2	3	2	3	5	3	3	3	3	3	34	2.8	10.7
C02	2	2	2	3	2	3	4	3	2	3	3	3	32	2.7	11.4
C04	2	2	2	3	2	3	4	3	3	4	3	3	34	2.8	10.7
C04A	2	2	2	3	2	3	3	3	3	3	3	3	32	2.7	11.4
C05	2	2	2	3	2	3	2	3	3	3	3	3	31	2.6	11.8
C06	3	2	2	4	3	4	3	3	3	4	4	4	39	3.3	9.4
C07	3	2	2	4	3	4	2	3	3	5	4	4	39	3.3	9.4
C09	3	1	1	3	4	4	2	3	3	3	4	4	35	2.9	10.4
C10	2	1	1	4	3	1	2	3	2	3	3	3	28	2.3	13.0
C11	2	1	1	3	2	1	2	3	3	4	3	3	28	2.3	13.0
C12	2	1	1	3	3	1	2	3	3	3	3	3	28	2.3	13.0
C13	3	2	2	4	2	1	2	2	3	3	3	3	30	2.5	12.2
C14	5	1	1	3	2	2	2	1	2	4	3	4	30	2.5	12.2
C15	1	1	1	3	2	2	2	1	2	3	3	3	24	2.0	15.2
C16	1	6	6	3	3	2	2	1	2	3	3	3	35	2.9	10.4
C17	1	1	1	3	2	2	2	1	1	3	3	3	23	1.9	15.9
C31	2	2	2	3	3	3	4	2	4	4	4	3	36	3.0	10.1
C32	2	2	2	3	2	3	4	2	4	3	4	3	34	2.8	10.7
C33	2	2	2	3	3	3	3	2	4	3	4	3	34	2.8	10.7
C34	2	2	2	3	2	3	5	2	4	4	4	3	36	3.0	10.1
C35	2	2	2	3	2	3	4	2	4	3	4	3	34	2.8	10.7
C36	2	2	2	3	4	3	4	2	4	3	4	3	36	3.0	10.1
C37	2	2	2	3	2	3	4	2	4	3	4	3	34	2.8	10.7
COBBS CREEK LOW LEVEL 13 SWWPC UNITS															
C18	1	1	1	3	2	3	2	1	2	3	3	3	25	2.1	14.6
C19	1	1	1	3	2	2	2	1	2	3	3	4	25	2.1	14.6
C20	1	1	1	3	2	3	2	1	2	3	3	3	25	2.1	14.6
C21	1	1	1	3	2	2	2	1	2	3	3	3	24	2.0	15.2
C22	1	1	1	3	2	2	3	1	2	3	3	3	25	2.1	14.6
C23	1	1	1	3	4	2	1	1	2	3	3	2	24	2.0	15.2
C24	1	1	1	3	2	2	2	1	2	4	7	4	30	2.5	12.2
C25	2	2	2	2	3	3	2	2	3	4	3	3	31	2.6	11.8
C26	2	1	1	3	2	2	2	1	2	3	3	2	24	2.0	15.2
C27	1	1	1	3	2	2	1	1	2	3	3	2	22	1.8	16.6
C28A	1	1	1	3	2	2	1	1	2	3	3	2	22	1.8	16.6
C29	1	1	1	2	2	2	1		2	3	3	2	20	1.8	18.2
C30	1	1	1	2	2	1	1		2	4	3	2	20	1.8	18.2
TOTAL	197	232	232	340	260	244	242	226	274	236	275	253	3011		
I/D/C	2.2	2.5	2.5	3.7	2.8	2.7	2.7	2.5	3.0	2.6	3.0	2.8			
CSES	58	66	66	89	59	48	65	64	66	42	68	65	756	3.5	9.2
LSES	17	21	21	30	26	17	24	30	28	20	17	21	272	2.5	15.8
CSW	13	32	32	41	33	23	17	18	29	17	27	25	307	2.8	11.1
SWMG	26	44	44	46	35	57	33	29	36	28	33	25	436	3.7	9.3
LSW	18	12	12	25	21	11	12	20	19	10	8	9	177	3.7	8.3
CCHL	50	43	43	73	57	60	69	53	69	77	79	73	746	2.7	11.5
CCLL	15	14	14	36	29	28	22	12	27	42	43	35	317	2.1	15.2

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
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													0
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	1												1
C15													0
C16		1											1
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												1	1
C25													0
C26													0
C27													0
C28A													0
C29													0
C30													0
													TOTAL DISC
	1	2	0	0	0	0	0	0	0	0	0	1	4

	NO OF UNITS IN DISTRICT BLOCKED												TOTAL
CSE	0	1	0	0	0	0	0	0	0	0	0	0	1
LSE	0	0	0	0	0	0	0	0	0	0	0	0	0
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	1	1	0	0	0	0	0	0	0	0	0	0	2
CCLL	0	0	0	0	0	0	0	0	0	0	0	1	1

	NO OF DISCHARGES IN DISTRICT												TOTAL
CSE	0	1	0	0	0	0	0	0	0	0	0	0	1
LSE	0	0	0	0	0	0	0	0	0	0	0	0	0
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	1	1	0	0	0	0	0	0	0	0	0	0	2
CCLL	0	0	0	0	0	0	0	0	0	0	0	1	1

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

7.75 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													0
C02													0
C04	1		1										2
C04A													0
C05			1										1
C06													0
C07			1										1
C09													0
C10				1									1
C11			1										1
C12													0
C13				1									1
C14	2					1						1	4
C15			1										1
C16												1	1
C17													0
C31			1										1
C32													0
C33	1												1
C34													0
C35													0
C36					1								1
C37													0
COBBS CREEK LOW LEVEL 13 SWWPC UNITS													
C18													0
C19				1						1			2
C20				1									1
C21													0
C22													0
C23													0
C24											1		1
C25										1		1	2
C26													0
C27			1										1
C28A													0
C29													0
C30													0
													TOTAL
	15	8	16	9	6	12	4	0	6	6	4	7	93
CSE	6	5	4	1	0	8	3	0	5	2	2	2	38
LSE	1	0	1	0	0	0	0	0	1	0	1	1	5
CSW	0	1	2	0	1	0	1	0	0	1	0	1	7
SWG	1	2	2	2	2	3	0	0	0	1	0	0	13
LSW	3	0	0	2	2	0	0	0	0	0	0	0	7
CCHL	4	0	6	2	1	1	0	0	0	0	0	2	16
CCLL	0	0	1	2	0	0	0	0	0	2	1	1	7

RELIEF SEWER MONTHLY INSPECTION

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
THOMAS RUN RELIEF SEWER													
R01	1	1	1	1	2	2	2	1	6	1	2	2	22
R02	1	1	1	1	2	2	2	1	3	1	2	2	19
R03	1	1	1	1	2	2	2	1	3	1	1	2	18
R04	1	1	1	1	2	1	2	1	5	1	1	2	19
R05	1	1	1	1	2	1	2	1	3	1	1	2	17
R06	2	1	1	1	2	1	2	1	3	1	1	2	18
MAIN RELIEF SEWER													
R07	1	1	1	2	3	2	2	4	3	2	1	2	24
R08	1	1	1	1	3	1	1	3	3	2	1	2	20
R09	1	1	1	1	2	1	1	3	3	2	1	2	19
R10	1	1	1	1	2	2	1	2	2	1	1	2	17
R11	1	1	1	1	1	2	1	1	2	1	1	2	15
R11A	1	1	1	1	1	2	1	1	2	1	1	2	15
R12	1	1	1	1	2	1	1		2	1	1	2	14
WAKLING RELIEF SEWER													
R13	1	2	2	2	2	1	1	3	3	2	2	1	22
R14	1	2	2	2	2	1	1	3	3	2	2	1	22
ROCK RUN STORM FLOOD RELIEF SEWER													
R15	2	1	1	2	2	1	2	2	7	3	5	1	29
OREGON AVE RELIEF SEWER													
R16		1	1		1	1	1	1	2	2	2	2	14
R17	1	1	1		1	1	1		2	1	2	2	13
FRANKFORD HIGH LEVEL RELIEF SEWER													
R18	3	1	1	2	2	1	1	4	3	2	2	1	23
32ND ST RELIEF SEWER													
R19	1	1	1	2	1	1	2	2	3	2	2	1	19
MAIN STREET RELIEF SEWER													
R20	1	2	2	3	2	1	1	3	3	2	2	1	23
SOMERSET SYSTEM DIVERSION CHAMBER													
R21													0
TEMPORARY REGULATOR CHAMBER													
R22													
R23	1	1	1	2	2	1	1	3	3	2	2	1	20
ARCH ST RELIEF SEWER													
R24	1	1	1	1	1	1	1	1	2	1	1	3	15
16TH & SNYDER													
R25	1	1	1	1	2	1	1	1	1	1	1	2	14
GRANT & STATE RD. RELIEF													
R26	1	1	1	2	2	1	1	2	2	2	2	1	18
TOTAL	28	28	28	33	46	32	34	45	74	38	40	43	469
AVER	1.0	1.0	1.0	1.2	1.7	1.2	1.3	1.7	2.7	1.4	1.5	1.6	1.4

RELIEF SEWER MONTHLY DISCHARGE

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
THOMAS RUN RELIEF SEWER													
R01									1				1
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	1	0	0	0	1
UNITS	0	0	0	0	0	0	0	0	1	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													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	1	0	0	1
AVER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FY2011 CSO Dry Weather Discharges

Discharge Observed		Discharge Stopped		Last Inspection						
DateDO	TimeDO	DateDS	TimeDS	DateLI	TimeLI	SiteID	Collector	TypeUnit	Location	Comment
07/14/10	02:10 PM	07/14/10	02:40 PM	06/28/10	02:00 PM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	DEBRIS AND GRIT IN SLOT.
07/14/10	09:30 AM	07/14/10	01:00 PM	06/16/10	10:50 AM	C-14	CCHL	SLOT	Baltimore Ave. & Cobbs Creek	GRIT & DEBRIS BLOCKING SLOT AND DWO OUTLET.
07/15/10	08:50 AM	07/15/10	10:20 AM	07/14/10	02:10 PM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	TREE BRANCHES AND DEBRIS BLOCKAGE IN DWO PIPE.
07/16/10	08:40 AM	07/16/10	09:40 AM	07/15/10	08:50 AM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	SLOT BLOCKED WITH WOOD, ROCKS AND DEBRIS.
07/20/10	12:00 PM	07/20/10	12:40 PM	06/28/10	10:20 AM	T-09	FHL	SLOT	Roosevelt Blvd. W of Tacony Creek	GRIT IN SLOT.
07/26/10	11:40 AM	07/26/10	02:00 PM	07/22/10	01:00 PM	D-02	UDLL	CC-S	Cottman St. SE of Milnor St.	BRICKS AND DEBRIS BLOCKING REGULATOR INLET.
07/27/10	08:30 AM	07/27/10	01:30 PM	07/26/10	11:40 AM	D-02	UDLL	CC-S	Cottman St. SE of Milnor St.	BRICKS AND DEBRIS IN REGULATOR INLET.
08/05/10	08:30 AM	08/05/10	02:00 PM	08/04/10	02:30 PM	T-08	FHL	M-SG	Ashdale St. W of Tacony Creek	SLUICE GATE OPERATION WAS TESTED AND GATE LOWERED 30% AND DEBRIS LODGED GATE OPENING
08/06/10	12:50 PM	08/06/10	03:20 PM	08/05/10	09:30 AM	S-05	CSES	B & B	24th St. 155 S of Park Towne Place	REGULAOR FLOAT GUIDE RODS COLLASPED CAUSING SHUTTER GATE TO CLOSE FULLY
08/16/10	11:30 AM	08/16/10	01:10 PM	07/19/10	11:50 AM	C-16	CCHL	SLOT	Thomas Ave. & Cobbs Creek	GRIT AND DEBRIS BLOCKING SLOT.
12/03/10	02:10 PM	12/03/10	03:00 PM	11/15/10	11:40 AM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	DEBRIS CAUGHT ON SENSOR WIRE HANGING IN SLOT.
12/15/10	01:50 PM	12/15/10	02:50 PM	12/14/10	09:30 AM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	CONTRACTOR LINING INTERCEPTOR SHUT DOWN PUMPS AT T-13 TO CHANGE PUMP OIL CAUSING OVERFLOW THROUGH SWO
03/05/11	12:00 PM	03/05/11	02:50 PM	02/07/11	11:10 AM	R-01		DAM	56th St. & Locust St.	BAG OF TRASH AND DEBRIS IN TRUNK SIDE OPENING.
04/19/11	11:20 AM	04/19/11	12:50 PM	04/13/11	01:00 PM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	UNIT BLOCKED WITH DEBRIS.
06/13/11	02:30 PM	06/13/11	03:40 PM	06/07/11	11:30 AM	C-24	CCLL	SLOT	Greenway Ave. & Cobbs Creek Parkway	REGULATOR BLOCKED WITH GRIT

Collector System - Flow Control Unit - Miscellaneous Major Maintenance - FY 2011

SOMERSET GRIT CHAMBER - GRIT REMOVAL REMOVAL

DATE	TONS
9/29/2010	scale closed/EST 50
1/11/2011	scale closed/EST 50
4/18/2011	scale closed/EST 50

CSO B&B REGULATOR PREVENTATIVE MAINTENANCE

SITE	DATE
D-47	8/30/2010
D-48	8/30/2010
F-13	8/30/2010
D-41	8/31/2010
D-49	8/31/2010
F-14	8/31/2010
S-50	9/14/2010
D-58	9/15/2010
D-51	9/20/2010
D-61	9/22/2010
D-62	10/9/2010
D-46	10/28/2010
D-69	11/15/2010
S-1	11/20/2010
S-2	11/20/2010
D-66	11/29/2010
D-67	11/29/2010
D-72	11/29/2010
D-73	11/29/2010
D-63	12/4/2010
D-71	12/4/2010
S-50	12/4/2010
D-37	5/7/2011
S-50	5/14/2011

CSO TIDE GATE PREVENTATIVE MAINTENANCE

SITE	DATE
D-17	9/14/2010
D-18	9/15/2010
D-20	9/24/2010
D-24	9/29/2010
D-39	10/15/2010
D-40	10/15/2010
D-42	10/26/2010
D-43	10/26/2010
S-5	10/28/2010
D-46	10/28/2010
S-33	11/27/2010
S-6	11/29/2010
S-7	11/29/2010
D-43	11/29/2010
D-40	11/29/2010
S-50	12/4/2010
D-58	4/2/2011
S-50	5/7/2011

COMPUTER CONTROL CHAMBER PREVENTATIVE MAINTENANCE

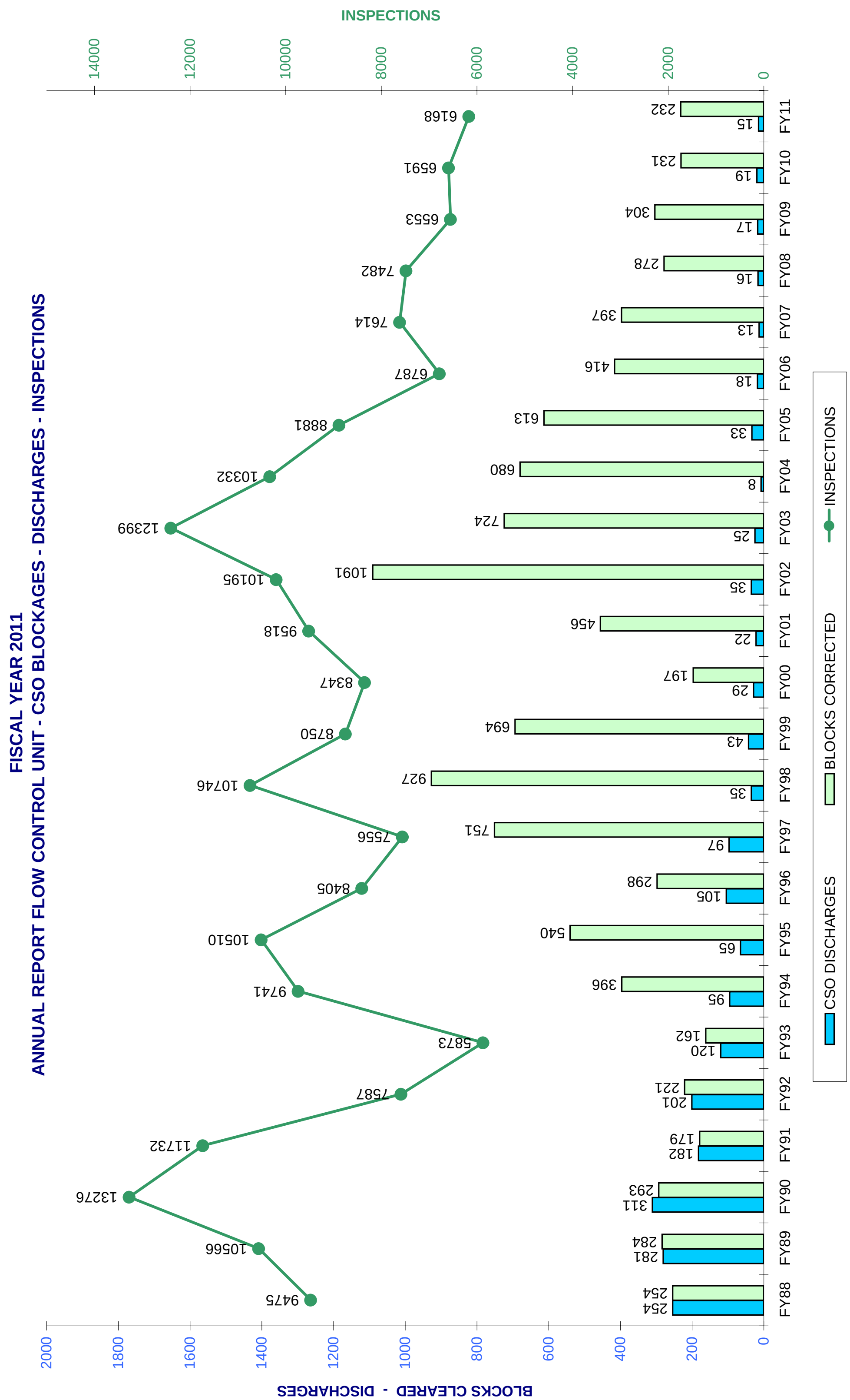
SITE	DATE
D-15	7/21/2010
D-5	7/22/2010
D-3	7/29/2010
D-11	7/29/2010
D-9	7/30/2010
F-25	7/30/2010
D-2	8/4/2010
D-3	9/10/2010
D-15	9/13/2010
D-9	9/15/2010
D-11	9/15/2010
D-2	9/16/2010
F-25	9/20/2010
D-5	9/21/2010
D-7	9/22/2010
D-7	10/21/2010
D-11	10/21/2010
D-9	10/27/2010
D-3	10/28/2010
D-3	11/2/2010
D-2	11/5/2010
D-5	11/5/2010
D-15	11/9/2010
D-7	11/17/2010
D-9	11/18/2010
D-11	11/18/2010
F-25	11/19/2010
D-7	12/6/2010
D-9	12/6/2010
D-5	12/7/2010
D-11	12/7/2010
D-15	12/10/2010
F-25	12/10/2010
D-2	12/13/2010
D-3	12/13/2010
D-15	1/11/2011
D-5	1/13/2011
D-9	1/13/2011
D-2	1/14/2011
D-3	1/14/2011
D-11	1/19/2011
F-25	1/19/2011
D-7	1/20/2011
D-2	2/15/2011
D-3	2/15/2011
D-5	2/16/2011
D-9	2/16/2011
D-7	2/17/2011
D-11	2/17/2011
D-15	2/18/2011
F-25	2/18/2011
D-2	3/23/2011
D-3	3/23/2011
D-5	3/24/2011
D-9	3/24/2011
D-11	3/25/2011
D-15	3/29/2011
F-25	3/29/2011
D-7	3/30/2011
F-25	4/12/2011
D-11	5/4/2011
D-15	5/4/2011
D-2	5/9/2011
D-3	5/9/2011
D-5	5/10/2011
D-7	5/10/2011
D-9	5/11/2011
F-25	5/12/2011
D-7	5/15/2011
D-9	6/6/2011
D-11	6/7/2011
D-2	6/8/2011
D-3	6/13/2011
D-15	6/14/2011
F-25	6/14/2011
D-5	6/15/2011
D-7	7/28/2011

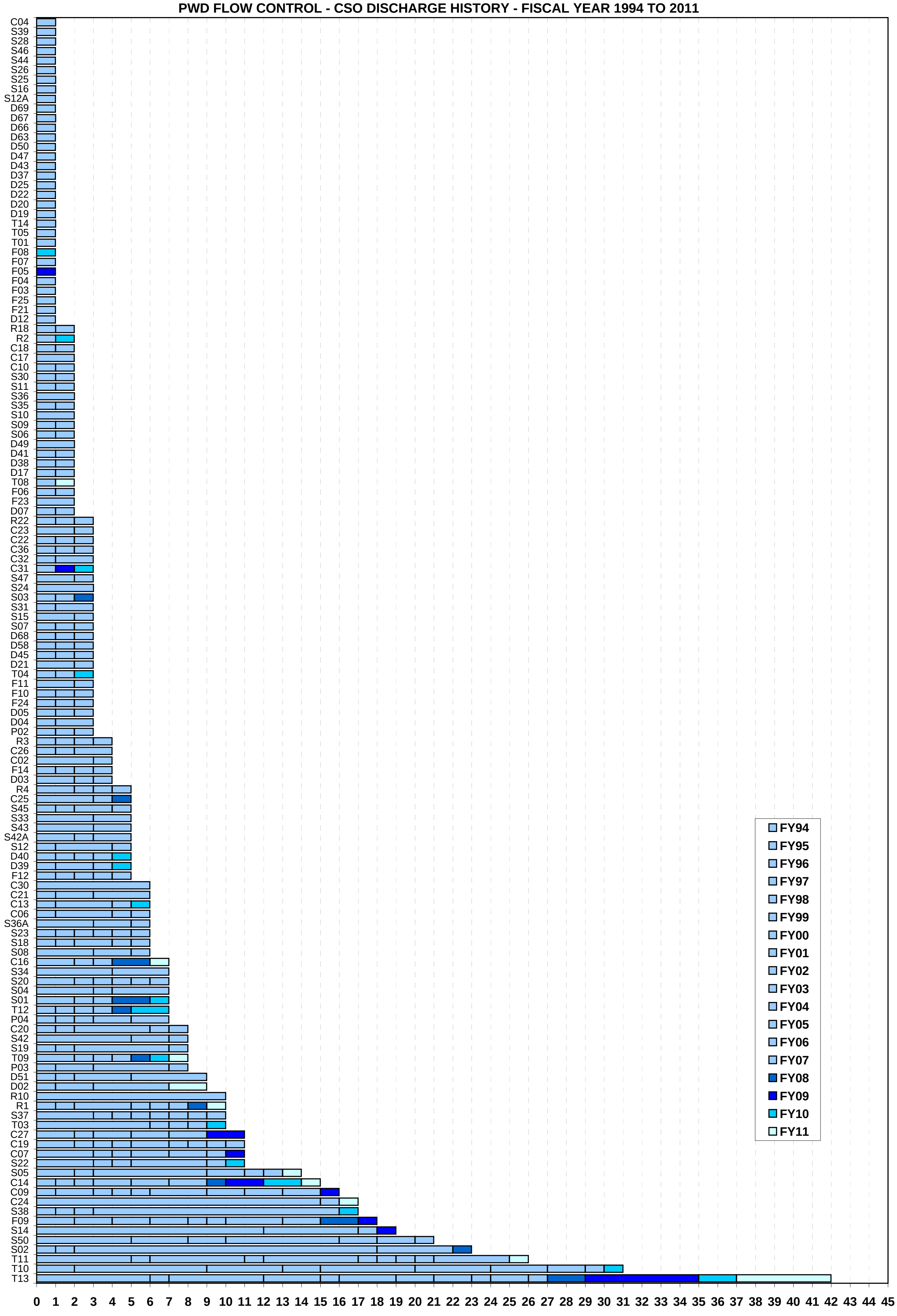
CSO OUTFALL - DEBRIS GRILL PREVENTATIVE MAINTENANCE

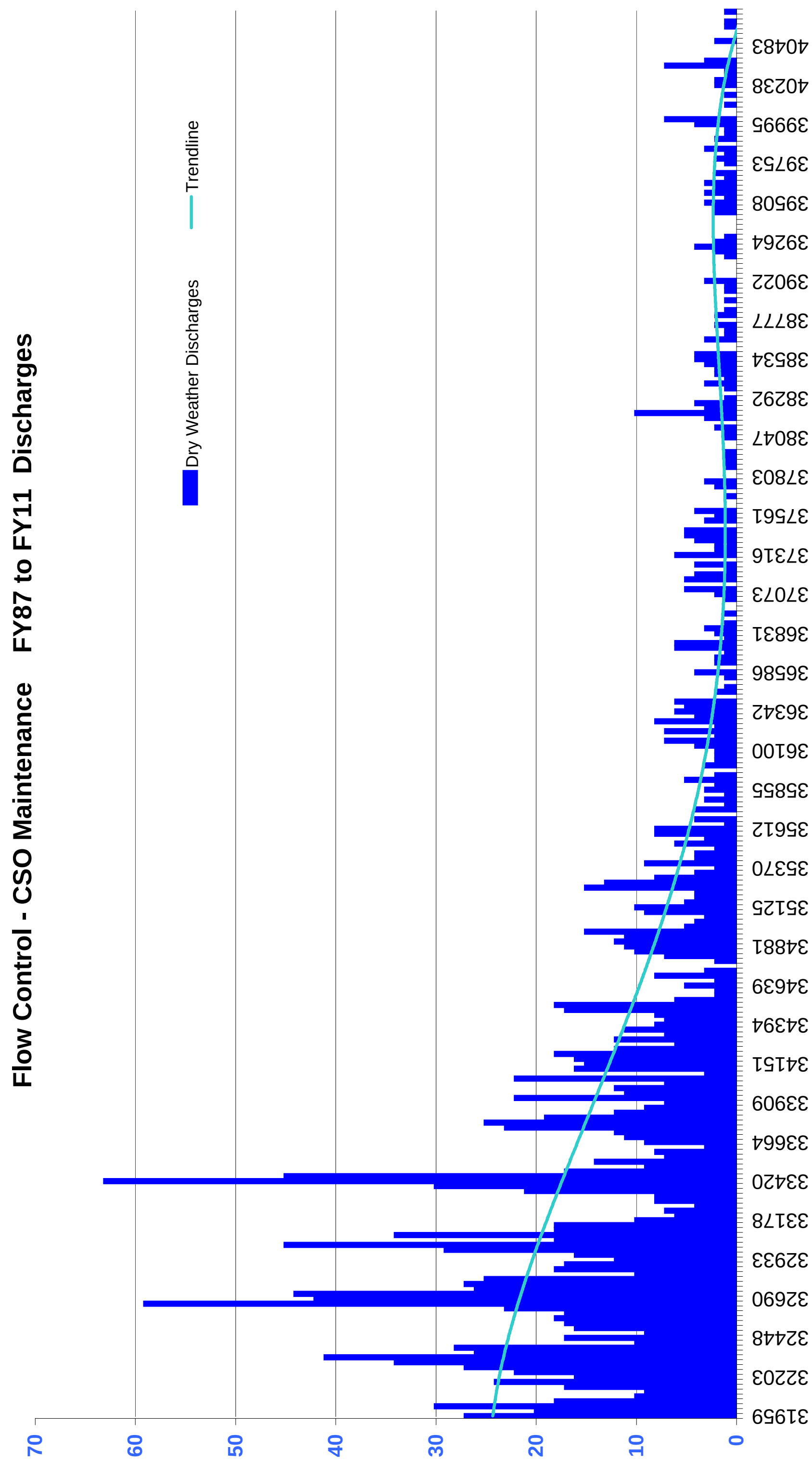
SITE	DATE
F-05	7/16/2010
Sandy Run	8/2/2010
Sandy Run	8/2/2010
F-05	8/10/2010
T-08	8/16/2010
Sandy Run	8/30/2010
Sandy Run	9/7/2010
T-08	9/15/2010
Sandy Run	9/30/2010
Sandy Run	10/4/2010
T-08	10/7/2010
T-08	11/15/2010
Sandy Run	11/17/2010
Sandy Run	12/20/2010
Sandy Run	2/14/2011
Sandy Run	4/11/2011
T-08	4/14/2011
F-05	4/17/2011
T-08	6/21/2011
F-05	8/9/2011

T-04 DEBRIS NET FLOATABLES REMOVAL

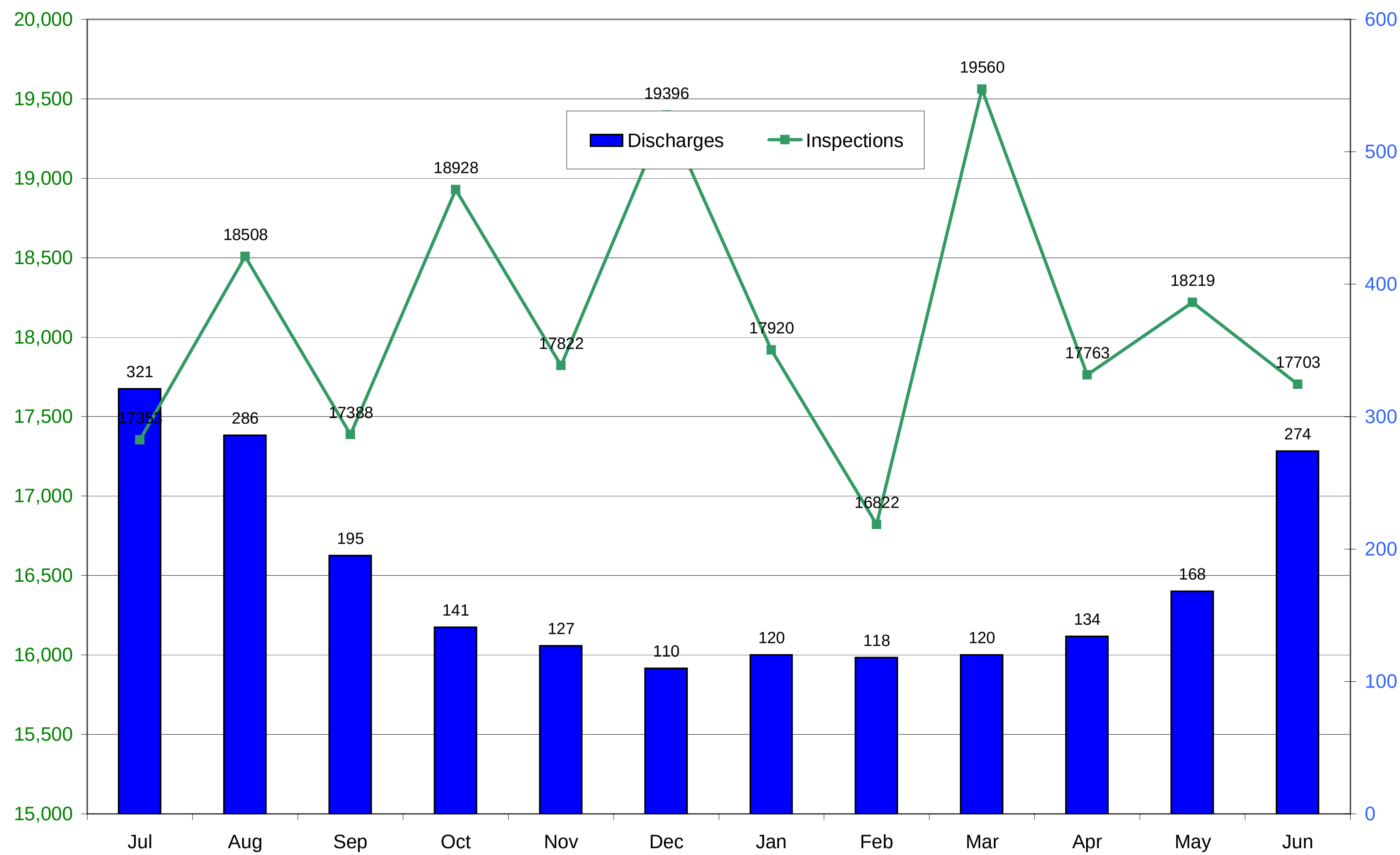
DATE	TOTAL WEIGHT
6/16/2010	150
8/6/2010	110
6/10/2011	230


FISCAL YEAR 2011
ANNUAL REPORT FLOW CONTROL UNIT - CSO BLOCKAGES - DISCHARGES - INSPECTIONS
BLOCKS CLEARED - DISCHARGES
INSPECTIONS
CSO DISCHARGES
BLOCKS CORRECTED
INSPECTIONS
0
200
400
600
800
1000
1200
1400
1600
1800
2000
0
2000
4000
6000
8000
10000
12000
14000
FY88 254 254 9475
FY89 281 284 10566
FY90 311 293 13276
FY91 182 179 11732
FY92 201 221 7587
FY93 120 162 5873
FY94 95 396 9741
FY95 65 540 10510
FY96 105 298 8405
FY97 97 751 7556
FY98 35 927 10746
FY99 43 694 8750
FY00 29 197 8347
FY01 22 456 9518
FY02 35 1091 10195
FY03 25 724 12399
FY04 8 680 10332
FY05 33 613 8881
FY06 18 416 6787
FY07 13 397 7614
FY08 16 278 7482
FY09 17 304 6553
FY10 19 231 6591
FY11 15 232 6168


PWD FLOW CONTROL - CSO DISCHARGE HISTORY - FISCAL YEAR 1994 TO 2011
C04
S39
S28
S46
S44
S26
S25
S16
S12A
D69
D67
D66
D63
D50
D47
D43
D37
D25
D22
D20
D19
T14
T05
T01
F08
F07
F05
F04
F03
F25
F21
D12
R18
R2
C18
C17
C10
S30
S11
S36
S35
S10
S09
S06
D49
D41
D38
D17
T08
F06
F23
D07
R22
C23
C22
C36
C32
C31
S47
S24
S03
S31
S15
S07
D68
D58
D45
D21
T04
F11
F10
F24
D05
D04
P02
R3
C26
C02
F14
D03
R4
C25
S45
S33
S43
S42A
S12
D40
D39
F12
C30
C21
C13
C06
S36A
S23
S18
S08
C16
S34
S20
S04
S01
T12
P04
C20
S42
S19
T09
P03
D51
D02
R10
R1
S37
T03
C27
C19
C07
S22
S05
C14
C09
C24
S38
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
Dry Weather Discharges
FY94
FY95
FY96
FY97
FY98
FY99
FY00
FY01
FY02
FY03
FY04
FY05
FY06
FY07
FY08
FY09
FY10
FY11


Flow Control - CSO Maintenance FY87 to FY11 Discharges
Dry Weather Discharges
Trendline
0
10
20
30
40
50
60
70
31959
32203
32448
32690
32933
33178
33420
33664
33909
34151
34394
34639
34881
35125
35370
35612
35855
36100
36342
36586
36831
37073
37316
37561
37803
38047
38292
38534
38777
39022
39264
39508
39753
39995
40238
40483

Flow Control - CSO Maintenance FY87 to FY11 Inspections / Discharges By Month



APPENDIX B –
FLOW MONITORING

Page

Table 1 - Listing of Monitored Outlying Community Connections

Site ID	Connection Type	Township	Location	Address
MA1	STD	Abington	Buckly Drive & Pine Rd	9650 Pine Rd.
MA2	MTR	Abington	Pine Road & Pennypack Creek	8700 Pine Rd
MA3	STD	Abington	Shady Lane & Pine Road	8400 Pine Rd.
MA4	STD	Abington	Pine Road & Lee Lynn La.	9200 Pine Rd.
MAx1	STD	Abington	Strahle & Rockwell	
MB1	MTR	Bucks Co.	Totem Rd. & Neshaminy Cr.	
MBE1	MTR	Bensalem	Byberry Grounds	16000 Carter Rd
MBE2	MTR	Bensalem	Dunks Ferry Road	1400 Worthington
MBE3	MTR	Bensalem	Emerson & Evelyn	Emerson
MBE4	MTR	Bensalem	Red Lion & Frankford	490 Bristol Rd.
MBE5	MTR	Bensalem	Grant & James	5050 Grant Av
MBE6	MTR	Bensalem	Gravel Pike @ Poquessing Creek	4800 Byberry Rd
MBE7	MTR	Bensalem	Townsend Road @ Poquessing Creek	13000 Townsend Rd
MBE8	MTR	Bensalem	Bensalem Shopping Ctr.	
MBE9	MTR	Bensalem	Elmwood Apartments	
MBE10	MTR	Bensalem	Colonial Ave	
MBE11	MTR	Bensalem	Betz Laboratories	
MBE12	MTR	Bensalem	Creekside Apartments North	
MBE13	MTR	Bensalem	Rt 1 West Side of Highway	
MBE14	MTR	Bensalem	Old Lincoln Hwy & Old Trevose Rd	
MBE15	MTR	Bensalem	Knights Rd & Poquessinng Creek	
MBE16	MTR	Bensalem	Creekside Apartments South	
MC1	MTR	Cheltenham	Bouvier & Cheltenham	1900 Cheltenham Av
MC2	MTR	Cheltenham	Tookany Creek & Cheltenham	194 E Cheltenham Av
MC3	MTR	Abington	Fillmore & Shelmire (Abington flow)	7400 Fillmore
MCx1	STD	Cheltenham	Cottman (Out)	
MCx2	STD	Cheltenham	County Line & Franklin (Out)	
MCx3	STD	Cheltenham	County Line & Washington (Out)	Washington & Hasbrook
MCx4	STD	Cheltenham	Kerper (Out)	Unruh & Hasbrook
MCx5	STD	Cheltenham	Passmore (Out)	
MCx6	STD	Cheltenham	Devereaux (Out)	
MCx7	STD	Cheltenham	Comly (Out)	
MD1	MTR	Delaware Co.	DELCORA	SWWPC Plant
ML1	MTR	Lower Merion	51st Street & City Line	2490 N 51St St
ML2	STD	Lower Merion	59th Street & City Line	5868 City Line
ML3	MTR	Lower Merion	63rd Street & City Line	2139 N 63Rd St
ML4	MTR	Lower Merion	66th Street & City Line	6600 City Line Av
ML5	MTR	Lower Merion	73rd Street & City Line	7268 City Line Av

Site ID	Connection Type	Township	Location	Address
ML6	MTR	Lower Merion	Conshohocken & City Line	4900 City Line
ML7	MTR	Lower Merion	Presidential & City Line	3499 City Line
MLM1	MTR	Lower Moreland	Philmont & Byberry	Woodhaven
MLM2	MTR	Lower Moreland	Lower Moreland PS @ Welsh & Huntington Pk	
MLM3	STD	Lower Moreland	Ramage Run & City Boundry	
MLM4	STD	Lower Moreland	Moreland Rd. & Pine Rd.	
MLM5	STD	Lower Moreland	Jonathan place	
MLM6	Unknown	Lower Moreland	Pine & Radburn Rd	
MLM7	Unknown	Lower Moreland	Welsh Road and City Line	
MS1	STD	Springfield	Thomas & Northwestern	198 W. Northwestern
MS2	MTR	Springfield	Northwestern & Wissahickon Cr.	9404 Northwestern
MS3	MTR	Springfield	Erdenheim & Stenton	Erdenheim & Stenton
MS4	STD	Springfield	Mermaid La. & Stenton	7700 Stenton
MS5	STD	Springfield	Winston & Stenton	8200 Stenton
MS6	MTR	Springfield	Woodbrook & Stenton	7601 Stenton Av
MS7	Unknown	Springfield	Willow Grove & Stenton	
MS8	STD	Springfield	Ridge Ave Connections	Ridge & Northwestern
MSH1	MTR	Southhampton	Trevose Rd. & Poquessing Creek E side	Trevose Rd & Stream Ridge Ln.
MSH2	STD	Southhampton	Lukens St. & Trevose Rd.	Trevose Rd & Lukens St.
MSHX_1	STD	Southhampton	Overhill Ave & County Line Rd (Out)	
MSHX_2	STD	Southhampton	County Line & Trevose Rd. (Out)	
MUD1-N	MTR	Upper Darby	60Th & Cobbs Creek	6001 S. Cobbs Creek Pky.
MUD1-S	MTR	Upper Darby	60Th & Cobbs Creek	6001 S. Cobbs Creek Pky.
MUD1-O	MTR	Upper Darby	60Th & Cobbs Creek Overflow	6001 S. Cobbs Creek Pky.
MP796	MTR	PIDC - PNBC	Phila. Naval Business Ctr. @ PS 796	4801 S. 13Th Street

*STD – temporary flow monitor

**MTR – Permanent monitor

Table 2 - Listing of Combined Sewer Monitors

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C01	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C01	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C02	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C02	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C04	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C04	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C04A	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C04A	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C05	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C05	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C06	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C06	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C07	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C07	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C09	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C09	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C10	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C10	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C11	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C11	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C12	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C12	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C13	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C13	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C14	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C14	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C15	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C15	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C16	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C16	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C17	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C17	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C18	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C18	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C19	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C19	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C20	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C20	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C21	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C21	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C22	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C22	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C23	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C23	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C24	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C24	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C25	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C25	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C26	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C27	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C27	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C28A	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C28A	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C29	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C29	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C30	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C30	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C31	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C31	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C32	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C32	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C33	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C33	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C34	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C34	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C35	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C35	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C36	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C36	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C37	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C37	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
D02	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D02	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D02	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D02	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D02	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D03	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D03	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D03	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D03	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D03	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D04	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D04	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D04	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D04	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D04	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D05	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D05	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D05	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D05	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D05	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D06	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D06	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D06	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D07	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D07	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D07	Upper Delaware Low Level	Delaware River	SWO GATE POSITION 1	POSITION
D07	Upper Delaware Low Level	Delaware River	SWO GATE POSITION 2	POSITION
D07	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D07	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL

Site Name	**Interceptor**	**Waterbody**	**Measurement Name**	**Measurement Type**
D08	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D08	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D09	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D09	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D09	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D09	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D09	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D11	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D11	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D11	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D11	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D11	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D12	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D12	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D13	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D13	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D15	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D15	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D15	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D15	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D15	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D17	Somerset	Delaware River	SWO LEVEL	LEVEL
D17	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D18	Somerset	Delaware River	SWO LEVEL	LEVEL
D18	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D19	Somerset	Delaware River	SWO LEVEL	LEVEL
D19	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D20	Somerset	Delaware River	SWO LEVEL	LEVEL
D20	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D21	Somerset	Delaware River	SWO LEVEL	LEVEL
D21	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D22	Somerset	Delaware River	SWO LEVEL	LEVEL
D22	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D23	Somerset	Delaware River	SWO LEVEL	LEVEL
D23	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D24	Somerset	Delaware River	SWO LEVEL	LEVEL
D24	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D25	Somerset	Delaware River	SWO LEVEL	LEVEL
D25	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D37	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D37	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D38	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D38	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D39	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D39	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D40	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D40	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D41	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D41	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D42	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D42	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D43	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D43	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D44	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D44	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D45	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D45	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D46	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D46	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D47	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D47	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D48	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D48	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D49	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D49	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D50	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D50	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D51	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D51	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D51A	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D52	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D52	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D53	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D53	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D54	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D54	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D58	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D58	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D61	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D61	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D62	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D62	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D63	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D63	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D64	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D64	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D65	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D65	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D66	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D66	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D67	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D67	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D68	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D68	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D69	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D69	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D70	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D70	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D71	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D71	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D72	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D72	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D73	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D73	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
F03	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F03	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F04	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F04	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F05	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F05	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F06	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F06	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F07	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F07	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F08	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F08	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F09	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F09	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F10	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F10	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
F11	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F11	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F12	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F12	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F13	Lower Frankford Creek	Frankford Creek	DWO LEVEL	LEVEL
F13	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F13	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F14	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F14	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F21	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F21	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F23	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F23	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F24	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F24	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F25	Lower Frankford Creek	Frankford Creek	DWO GATE POSITION	POSITION
F25	Lower Frankford Creek	Frankford Creek	SWO GATE POSITION 1	POSITION
F25	Lower Frankford Creek	Frankford Creek	SWO GATE POSITION 2	POSITION
F25	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F25	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
P01	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P01	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P02	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P02	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P03	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P03	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P04	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P04	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P05	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P05	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
R01	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R01	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R01A	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R01A	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R02	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R02	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R03	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R03	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R04	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R04	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
R05	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R05	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R06	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R06	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R07	Main Relief Sewer	Schuylkill River	SWO LEVEL	LEVEL
R07	Main Relief Sewer	Schuylkill River	TRUNK LEVEL	LEVEL
R08	Main Relief Sewer	Schuylkill River	SWO LEVEL	LEVEL
R08	Main Relief Sewer	Schuylkill River	TRUNK LEVEL	LEVEL
R09	Main Relief Sewer	Schuylkill River	SWO LEVEL	LEVEL
R09	Main Relief Sewer	Schuylkill River	TRUNK LEVEL	LEVEL
R10	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R10	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R11	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R11	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R11A	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R11A	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R12	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R12	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R13	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R13	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R13A	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
R13A	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R14	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R14	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R15	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
R15	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
R16	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R16	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R17	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R17	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R18	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
R18	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
R19	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R19	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R20	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R20	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R24	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R25	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R25	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S01	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S01	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S02	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S02	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S03	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S03	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S04	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S04	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S05	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S05	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S06	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S06	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S07	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S07	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S08	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S08	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S09	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S09	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S10	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S10	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S11	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S11	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S12	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S12	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S12A	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S12A	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S13	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S13	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S14	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S14	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S15	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S15	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S16	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S16	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S17	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S17	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S18	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S18	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S19	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S19	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S20	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S20	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S21	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S21	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S22	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S22	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S23	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S23	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S24	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S24	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S25	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S25	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S26	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S26	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S27	Central Schuylkill East Side	Schuylkill River	DWO LEVEL	LEVEL
S27	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S27	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S28	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S28	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S30	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S30	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
S31	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S31	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S32	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S32	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S33	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S33	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S34	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S34	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S35	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S35	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S36	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S36	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S36A	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S36A	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S37	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S37	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S38	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S38	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S39	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S39	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S40	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S40	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S42	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S42	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S42A	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S42A	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S43	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S43	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S44	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S44	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S45	Lower Schuylkill West Side	Schuylkill River	DWO LEVEL	LEVEL
S45	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S45	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S46	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S46	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S47	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S47	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S50	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S50	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
S51	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S51	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
T01	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
T01	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T03	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T03	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T04	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T04	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T05	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T05	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T06	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T06	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T07	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T07	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T08	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T08	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T09	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T09	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T10	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T10	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T11	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T11	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T12	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
T12	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T13	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T13	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T14	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T14	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T15	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T15	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL

Table 3 - Listing of all Rain Gages (6/1/2010-7/1/2011)

Rain Gage Network		
Rain Gage	**Location**	**Percent Working**
RG_01	70th and Essington Ave	95.5%
RG_02	66th and Regent St	87.7%
RG_03	Fox Chase Rd. and Castor Ave	97.4%
RG_04	State Rd and Pennypack St	98.6%
RG_05	3rd and Mifflin St	93.9%
RG_06	Cardinal Ave and City Line Ave	92.8%
RG_07	G St. and E Annsbury St	99.7%
RG_08	N Water St. and E Clarkson Ave	98.5%
RG_09	54th and Lancaster Ave	97.0%
RG_10	Pine Rd and Susquehanna Rd	99.7%
RG_11	Rising Sun Ave and Lardner St	99.6%
RG_12	Pattison Ave and Columbus Blvd	99.2%
RG_13	Glendale Ave and Algon Ave	90.0%
RG_14	Delaware Ave and Lewis St	99.4%
RG_15	E Montgomery Ave and Thompson St	99.6%
RG_16	19th and Wood St	99.6%
RG_17	Saul St. and Benner St	95.4%
RG_18	Fox St. and Roosevelt Blvd	95.9%
RG_19	Chew Ave and Sharpnack St	95.9%
RG_20	Woodhaven Rd and Knights Rd	83.1%
RG_21	Shawmont Ave and Eva St	97.6%
RG_22	N 67th and Callowhill St	97.7%
RG_23	Penrose Ave and Mingo Ave	96.1%
RG_24	Lockart Rd and Lockart Ln	90.1%

Table 4 - Listing of Waste Water Pumping Station Monitoring Locations

Waste Water Stations	Location	Address	Owner
BANK STREET	Bank St. & Elbow Lane	15 S BANK ST.	PWD
BELFRY DRIVE	Belfry Dr. & Steeple Dr.	751 S MANATAWNA ST.	PWD
CSPS	University Ave. & 34th St. Bridge	600 UNIVERSITY AVE.	PWD
FORD ROAD	Ford Rd. across from West Park Hospital	3800 FORD AVE.	PWD
HOG ISLAND	Hog Island Rd. east of Airport control tower	#3 HOG ISLAND RD.	PWD
LINDEN AVENUE	Linden Ave. & Milnor St.	5200 LINDEN AVE.	PWD
LOCKART ROAD	Lockart St. & Lockart Lane @ drainage right of way	10778 LOCKART RD.	PWD
MILNOR STREET	Milnor St. between Grant Ave. & Eden St.	9647 MILNOR ST.	PWD
NEILL DRIVE	Fairmount Park at Neil Drive & Falls Road	4000 NEILL DR.	PWD
PNBC 796 MAIN	Philadelphia Naval Business Center	4801 S. 13th Street	PIDC
PNBC 542	Philadelphia Naval Business Center	1601 Langley Street	PIDC
PNBC 120	Philadelphia Naval Business Center	1700 Langley Street	PIDC
PNBC 603	Philadelphia Naval Business Center	2000 Langley Ave.	PIDC
PNBC 648	Philadelphia Naval Business Center		
POLICE ACADEMY	8501 State Rd. in the Police Academy grounds	8501 STATE RD.	Police Dept
RENNARD STREET	Philmont Shopping Center grounds	11064 RENNARD ST.	PWD
SPRING LANE	Spring Lane Meadows IFO 9017 Buttonwood Pl.	9021 Buttonwood Pl. 19128	PWD
42ND STREET	42nd St & 43rd Street	761 S. 43RD Street	PWD

Table 5 - Listing of Storm Water Pumping Stations Monitoring Locations

Storm Water Stations	Location	Address	Owner
BROAD & BLVD.	Underpass at Roosevelt Blvd. & Broad St.	4251 N. BROAD ST.	Penn Dot
MINGO CREEK	Schuylkill River under the Platt Bridge	7000 PENROSE AVE.	PWD
26TH AND VARE	Underpass at Vare & 26th St.	26TH AND VARE AVE.	Penn Dot

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

Site Name	Start	End	Maintained By	Project
USE_0365	4/30/2010	8/23/2010	CSL	I/I
USE_0500	8/11/2010	8/23/2010	CSL	I/I
T14-026945	4/30/2010	11/2/2010	CSL	Design
T14-000345	9/29/2010	1/15/2011	CSL	Design-SFR Germantown
S05-004405	7/8/2010	3/9/2011	CSL	CSO model calibration
S25-000015	5/14/2010	9/7/2010	CSL	CSO model calibration
S30-000010	8/26/2010	2/10/2011	CSL	CSO model calibration
S44-000510	8/26/2010	9/7/2010	CSL	CSO model calibration
S50-000105	7/8/2010	7/15/2010	CSL	CSO model calibration
S50-011530	8/6/2010	10/11/2010	CSL	CSO model calibration
T06-000075	5/14/2014	5/19/2011	CSL	CSO model calibration
P105-06-S0035	6/11/2010	6/14/2011	CSL	I/I
W060-11-S0015	7/9/2010	7/14/2011	CSL	I/I
W067-13-S0010	7/9/2010	7/14/2011	CSL	I/I
D05-001187	7/7/2010	7/8/2011	CSL	CSO model calibration
D25-000150	7/7/2010	7/8/2011	CSL	CSO model calibration
P109-05-S0015	7/9/2010	7/12/2011	CSL	CSO model calibration
W077-02-S0060	1/8/2010	1/8/2011	CSL	I/I
C37-000010	12/30/2009	1/1/2011	CSL	CSO model calibration
IALL-B0810	1/6/2010	1/6/2011	CSL	I/I
MAX_1	5/11/2010	8/17/2010	CSL	outlying community connection
F11-000130	5/14/2010	5/19/2011	CSL	CSO model calibration
C05-000010	8/26/2010	5/26/2011	CSL	CSO model calibration
WLL-0028	8/11/2010	Present	CSL	I/I
S20-000070	9/8/2010	Present	CSL	CSO model calibration
P108-17-S0010	9/23/2010	Present	CSL	I/I
WLL-0028	8/11/2010	Present	CSL	I/I
S20-000070	9/8/2010	Present	CSL	CSO model calibration
P108-17-S0010	9/23/2010	Present	CSL	I/I
T03-000010	10/15/2010	Present	CSL	CSO model calibration
W086-03-S0015	11/8/2010	Present	CSL	I/I
THL-B0375	11/8/2010	Present	CSL	I/I
P104-09-S0025	12/10/2010	Present	CSL	I/I
S36A-000045	12/6/2010	Present	CSL	SFR
PP-B0770	12/9/2010	Present	CSL	I/I
S44-000015	12/6/2010	Present	CSL	SFR

Site Name	Start	End	Maintained By	Project
Q102-05-S0063	1/1/2011	Present	CSL	Pumping
T14-013940	2/18/2011	Present	CSL	Design-SFR Germantown
T14-014030	2/18/2011	Present	CSL	Design-SFR Germantown
F04-000180	3/1/2011	Present	CSL	CSO model calibration
S05-000012	3/18/2011	Present	CSL	CSO model calibration
C31-000035	5/20/2011	Present	CSL	CSO model calibration
T14-023480	5/26/2011	Present	CSL	CSO model calibration
T14-029300	6/15/2011	Present	CSL	CSO model calibration
D66-001590	6/10/2011	Present	CSL	CSO model calibration
D22-000115	6/13/2011	Present	CSL	CSO model calibration
S38-000247	6/13/2011	Present	CSL	CSO model calibration
T08-000285	6/22/2011	Present	CSL	CSO model calibration
T08-000420	6/22/2011	Present	CSL	CSO model calibration
T08-000270	6/24/2011	Present	CSL	CSO model calibration
S50-001600	6/24/2011	Present	CSL	CSO model calibration
D67-SW010	1/6/2011	Present	CSL	Design Support
D67-000010	1/6/2011	Present	CSL	Design Support
D65-SW010	1/1/2011	Present	CSL	Design Support
D65-000010	1/1/2011	Present	CSL	Design Support
T14-00490	2/1/2011	Present	CSL	Design Support

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	85.08	54.989	37			
Bucks Total				85.08	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	13.411
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	2.9
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				35	22.621	17

APPENDIX C-
ANNUAL REPORTING FOR COA AND WQBEL OBLIGATIONS

Page

Annual Reporting for COA and WQBEL Obligations

The Consent Order and Agreement (COA) signed on June 1st 2011 establishes a regulatory framework within which Philadelphia's *Green City, Clean Waters* program will be implemented to maintain compliance with the Federal Clean Water Act (33 U.S.C. §1251 et seq.), Pennsylvania Clean Streams Law (P.L 1987, Act 394 of 1937, as amended (35 P.S. 691.1 et seq.)) and the Philadelphia Water Department (PWD)'s National Pollution Discharge Elimination System (NPDES) permit. The regulatory framework includes the Water Quality Based Effluent Limits which dictate the performance standards associated with each program metric and a series of Deliverables the City of Philadelphia will develop during the first five years of implementation.

Water Quality Based Effluent Limit Performance Standards

The City of Philadelphia's Combined Sewer Overflow (CSO) Long Term Control Plan Update is based on the National CSO Policy for a presumption approach 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 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 contains the quantitative expressions of the CSO Program implementation targets in the form of the WQBEL which will be achieved by specific interim dates, or by the end of the Program. The following metrics are included in the WQBEL performance standards:

NE / SW / SE WPCP upgrade: Design

PWD operates three Water Pollution Control Plants (WPCPs): the Northeast, Southwest and Southeast WPCP. Upgrades to increase the capacity of secondary treatment at each of the City's WPCPs are cost-effective traditional improvements that will greatly reduce the affect of CSOs. The milestone value associated with these metrics will be entered into the table on June 1st 2013 when the Facility Concept Plan for each WPCP is submitted to the PA DEP. This will determine the percent design that is required in years 5, 10, and 15.

NE / SW / SE WPCP upgrade: Construction

The milestone value associated with these metrics will also be entered into the table on June 1st 2013 when the Facility Concept Plan for each WPCP is submitted to the PA DEP. This will determine the percent constructed that is required in years 10, and 15, and 20.

Miles of Interceptor Lined

Interceptor lining will take place along both the Cobbs Creek and Tacony Creek. The miles of interceptor will be tracked to report progress toward completion.

Overflow Reduction Volume

Overflow volume is a traditional CSO performance metric. The Reduction Volume is 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 1st 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.

Equivalent Mass Capture (TSS, BOD, Fecal Coliform)

Equivalent Mass Capture for Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), and the bacteria *fecal coliform* is a measure of the reduction of these pollutants that is equal to what would be removed by the capture of 85% by volume of the combined sewage collected in the Combined Sewer System (CSS). These metrics will be documented using outputs of the hydraulic and hydrologic models based on the precipitation time series representing the typical year as presented in the LTCPU.

Total Greened Acres

A Greened Acre is an acre of impervious cover that is retrofitted to utilize green stormwater infrastructure which manages stormwater using source controls such as infiltration, evaporation, transpiration, decentralized storage, alternative stormwater routing, reuse and others.

GA = IC * Wd

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 stored in the facility (inches). Green stormwater infrastructure designs will be aimed at controlling at least 1.0 inch of runoff, and up to 1.5 inches of runoff, unless otherwise deemed feasible by engineering design.

One Greened Acre is equivalent to one inch of managed stormwater from one acre of drainage area or 27,158 gallons of managed stormwater.

Table 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	TBD June 2013	TBD June 2013	TBD June 2013	100%	100%

NE / SW / SE WPCP upgrade: Construction	percent complete	0	TBD June 2013	TBD June 2013	TBD June 2013	100%	100%
Miles of interceptor lined	miles	0	2	6	14.5	14.5	14.5
Overflow Reduction Volume	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	Greened Acres	0	744	2,148	3,812	6,424	9,564

The performance standard metrics are based on an adaptive approach. The program allows the PWD to select projects to test new types of green stormwater infrastructure, while continually working towards the water quality targets.

First Five-year Deliverables to DEP

Paragraph 3a of the COA between the Pennsylvania Department of Environmental Protection (PA DEP) and the City of Philadelphia requires the submission of a number of deliverables, each described in Appendix G of the COA. Each deliverable will supplement the City of Philadelphia's CSO Long Term Control Plan Update and help lay a strong foundation for the program.

The forthcoming Implementation and Adaptive Management Plan (IAMP) – Due December 1, 2011 will address the approach PWD will take to ensure timely delivery of these items. Table 2 lists the Deliverable and the date by which it will be submitted to the PA DEP.

Table 2: COA Deliverables

Deliverable Name	Deliverable Date
Implementation and Adaptive Management Plan	December 1, 2011
Green Infrastructure Maintenance Manual Development Process Plan	June 1, 2012
Comprehensive Monitoring Plan	December 1, 2012
Facility Concept Plan for NE WPCP	June 1, 2013
Facility Concept Plan for SE WPCP	June 1, 2013

Facility Concept Plan for SW WPCP	June 1, 2013
Updated Nine Minimum Controls Report	June 1, 2013
Tributary Water Quality Model – Bacteria	June 1, 2013
Tributary Water Quality Model - Dissolved Oxygen	June 1, 2014
Green Infrastructure Maintenance Manual - First Edition	June 1, 2014
Tidal Waters Water Quality Model - Bacteria	June 1, 2015
Tidal Waters Water Quality Model - Dissolved Oxygen	June 1, 2015

REPORTING IMPLEMENTATION PROGRESS

CSO and Stormwater NPDES Annual Reports documenting permit compliance are submitted annually to the PA DEP on September 30th. Annual Reports will contain program updates describing progress towards the five-year WQBEL Performance Standards as well as updates on the programmatic development and policy streamlining components described in the Implementation Plan. The WQBEL requires the ability to track ownership and maintenance responsibilities of green infrastructure. PWD is developing a project tracking system that will integrate existing internal databases to calculate and report metrics such as Greened Acres.

In accordance with Paragraph 3d of the COA, written progress on the implementation of CSO Controls will be provided in Annual Reports on September 30th of each year. The Annual Reports will include:

- Information regarding the City's implementation of the Nine Minimum Controls from the National CSO Policy
- Progress on capital projects described in the 1997 Long Term Control Plan
- CSO program elements discussed in the approved LTCPU

Beginning with the 2012 annual reporting year, WQBEL metrics will be reported annually in a new section of the PWD CSO and Stormwater NPDES Annual Reports.

PWD's Project Tracking System reporting format will provide details such as illustrated in Table 3 below.

Table 3 - LTCPU Project Tracking Metrics and Sample Reporting Format

LTCPU Project Tracking Metrics						
Project Name	Watershed	SMP Type	Greened Acres	Storage Volume (cf)	Impervious Area Managed (sf)	New Trees
Project 1		*SMP*				
		SMP				
Project 2		*SMP*				
Project 3		*SMP*				
		SMP				
…		…				

APPENDIX D – WATERSHED PUBLIC EDUCATION AND OUTREACH EVENTS & ACTIVITIES

Page

Press Releases

July 2010 - The Fairmount Water Works Interpretive Center's Schuylkill Soundings Presents: Models of Ecological Restoration in Philadelphia

August 9, 2010 - Philadelphia Water Department's Water Pollution Control Plants Receive Top Honors; Facilities Recognized for Environmental Excellence in Wastewater Treatment

August 9, 2010 - Howard Neukrug Tapped to Head New Division of Water Department; City Focused on Implementation of Innovative Green City--Clean Waters Program

August 20, 2010 - An Ecological Transformation of Epic Proportions! Historian Adam Levine Uncovers the Wonders of Philadelphia's Past

September 2, 2010 – Join the Philadelphia Water Department for our 7th Annual Fishing Fest

September 8, 2010 – The Fairmount Water Works Interpretive Center's Schuylkill Soundings Presents: Green Cities, Clean Water – One Year Later

September 8, 2010 - Coast Into the Last Days of Summer on the Delaware River

September 22, 2010 - Pennsylvania DEP Issues Statewide Drought Watches and Warnings Water Department Outlines Water Conservation Measures

September 27, 2010 - Tour of restored segment of Tacony Creek

September 30, 2010 - Tips to Minimize Property Damage from Heavy Storms

September 30, 2010 - Only Rain Belongs Down the Drain

October 6, 2010 - Discover and Learn About the Green Areas in Philadelphia; The Fairmount Water Works Presents: "Fall Foliage and Schuylkill Plant Press"

November 4, 2010 - Homes in Philadelphia Getting "Extreme Green Makeover" First "Green Homes" Blocks Will Serve as City's Model

November 18, 2010 - New Designs for Green Passageway Along Delaware and Schuylkill River Waterfronts to Benefit the City

November 22, 2010 - Schuylkill Soundings Presents: Marcellus Shale and Gas Drilling in Pennsylvania; Water Department Communicates With Partners to Ensure Drinking Water Safety

December 20, 2010 - It Is Time to Upgrade the Battery on Your Automatic Meter Reader (AMR) Philadelphia Water Department Will Be Working With Itron to Make This Change

April 11, 2011 - Source Water Monitoring for Radiological Elements

May 31, 2011 - PWD and PADEP Sign Historic Agreement to Officially Launch Green City, Clean Waters

Table 1- Tookany/Tacony - Frankford Watershed Event Log

Event Date	Event Name	Event Date	Event Name
7/6/10	Artology Lesson: History of Phila Water Management	03/22/11	Intro to Watersheds Lesson at Feltonville Intermediate
7/9/10	Neighborhood Cleanup	03/23/11	Guest Speaker - Friends of Cresheim Trail
7/12/10	Artology Lesson: Urban Stormwater Management	03/24/11	Invasive Plant Removal
7/12/10	Project FLOW Lesson: Stormwater BMP's	03/25/11	Intro to Watersheds with Rowen Elementary
7/16/10	Artology Art Garden Party	3/30/11	Watershed Lesson with Gaudenzia
7/26/10	Project FLOW: Watershed Van Tour	03/31/11	Watersheds lesson at Arcadia University
7/27/10	Artology Lesson: Intro to Watersheds	04/2/11	Philly Spring Cleanup (Two Locations)
7/29/10	Tabling at Rev. Williams Movie Night	04/3/11	Awbury Neighborhood Cleanup
7/31/10	OARC Block Party	04/5/11	GCC Watershed Presentation and Announcement of EPA Award
8/2/10	Rain Garden Weeding with Project Flow	04/5/11	Watershed Lesson at GFS
8/5/10	Community Meeting at Awbury View Apartments	04/6/11	Earth Force Training at Green Tree Part 2
8/19/10	STEM Challenge Recording	04/7/11	HS Park Clean-Up
8/27/10	Kids Activities at Awbury View Apartments	04/11/11	TTF Overview Presentation at 25th PDAC
8/28/10	Sedgwick Street Block Initiative	04/12/11	Roots 2 Reentry: Group 2: Lesson 2
8/31/10	Awbury View Clean-Up	04/13/11	Award Recipient - EPA Environmental Achievement Award
9/11/10	Coast Day	04/15/11	Roots 2 Reentry: Group 1: Lesson 2/3
9/16/10	Vacant Lot Revitalization Community Meeting	4/16/11	Wingohocking Tree Tenders Spring Planting
9/25/10	OARC Urban Energy Conservation Block Initiative	04/19/11	Vernon Park Improvement Efforts First Stakeholder Meeting
9/30/10	Senior Environment Day	04/20/11	Roots 2 Reentry: Group 2: Lesson 3
10/5/10	Vacant Lot Planting	04/21/11	Roots 2 Reentry: Group 1: Lesson 3/4
10/6/10	Maritime Charter School Watershed Lessons	04/29/11	Roots 2 Reentry: Group 2: Lesson 4
10/9/10	Northwest Farm Fest	04/30/11	Messages In Motion Session 1
10/15/10	Philadelphia Mennonite High School Watershed Lesson	04/30/11	Stream Clean Up and Invasive Removal at Cedarbrook
10/15/10	Third Thursday Screening and Discussion Club	05/03/11	Presentation at the CTGT Meeting
10/23/10	International Coastal Cleanup	05/04/11	Second Vernon Park Improvement Effort Stakeholders' Meeting

10/27/10	Chew and Chelten Ave Business Association Community Workshop	05/4/11	Roots 2 Reentry: Group 3: Lesson 1
10/30/10	Tulip Planting	05/05/11	Roots 2 Reentry: Group 2: Lesson 5
10/30/10	Historic Watershed Talk	05/07/11	Messages In Motion: Session 2
11/3/10	Awbury View Tree Meeting	05/09/11	Pennell Elementary School Watershed Lessons Day One
11/3/10	Bethesda Cleanup	05/10/11	Greater Germantown Business Association (GGBA) Presentation
11/3/10	DePaul School Invasive Clearing	05/11/11	Pennell Elementary School Watershed Lessons Day Two
11/18/10	Third Thursday Screening and Discussion Club	05/11/11	Earth Force Training at Green Tree Part 3
11/30/10	Wingohocking Tree Tenders Fall Planting	05/12/11	Roots 2 Reentry: Lesson 1
12/1/10	Phase 1: Awbury View Apts Planting	05/12/11	Roots 2 Reentry: Lesson 2
12/3/10	Guest Lecture for Cedarbrook Environmental Club	05/13/11	Roots 2 Reentry: Group 3: Lesson 2
12/3/10	Swain Lecture at Elkins Park Elementary	05/14/11	Messages In Motion: Session 3
12/3/10	Swain Lecture at Arcadia	05/14/11	Cheltenham Earth Day Festival
12/4-5/10	Ethical Electronics Recycling Drive	05/16/11	Roots 2 Reentry: Group 3: Lesson 3
01/06/11	Tulip Planting	05/18/11	Third Vernon Park Improvement Effort Stakeholders' Meeting
1/19-20/11	Earth Force Training at Maritime	05/19/11	Roots 2 Reentry: Group 3: Lesson 2
2/2/11	Earth Force Launch w/ Maritime Watersheds Class	05/21/11	Messages In Motion: Session 4
02/16/11	Tacony Creek Restoration Tour	05/21/11	Historic Germantown Cleanup
02/17/11	Introduction of TTF	05/25/11	Vernon Park Cleanup with the CBNC
02/24/11	Storm Water Management Tour	05/26/11	Roots 2 Reentry: Group 3: Lesson 3
03/2/11	Roots 2 Reentry: Lesson 1	05/01/11	Roots 2 Reentry: Lesson 5
03/3/11	Storm Drain Marking in Cheltenham	06/02/11	Roots 2 Reentry Lesson 4
03/4/11	Curly the Catfish with Rowen Elementary	06/07/11	Storm Drain Marking and Tacony Creek Park Tour
03/9/11	Earth Force Training at Green Tree Part 1	06/07/11	Vernon Park Improvement Presentation at the CTGT Meeting
03/10/11	Watersheds lesson at Arcadia University	06/08/11	Vernon Park Cleanup with the CBNC
03/13/11	Award Recipient - Transition Town Cheltenham	06/13/11	Juniata Golf Club Stream Cleanup
03/18/11	Guest Speaker - Schuylkill Project Steering Committee		

APPENDIX E – PWD BMP/ GREEN STORMWATER INFRASTRUCTURE PROJECT LIST

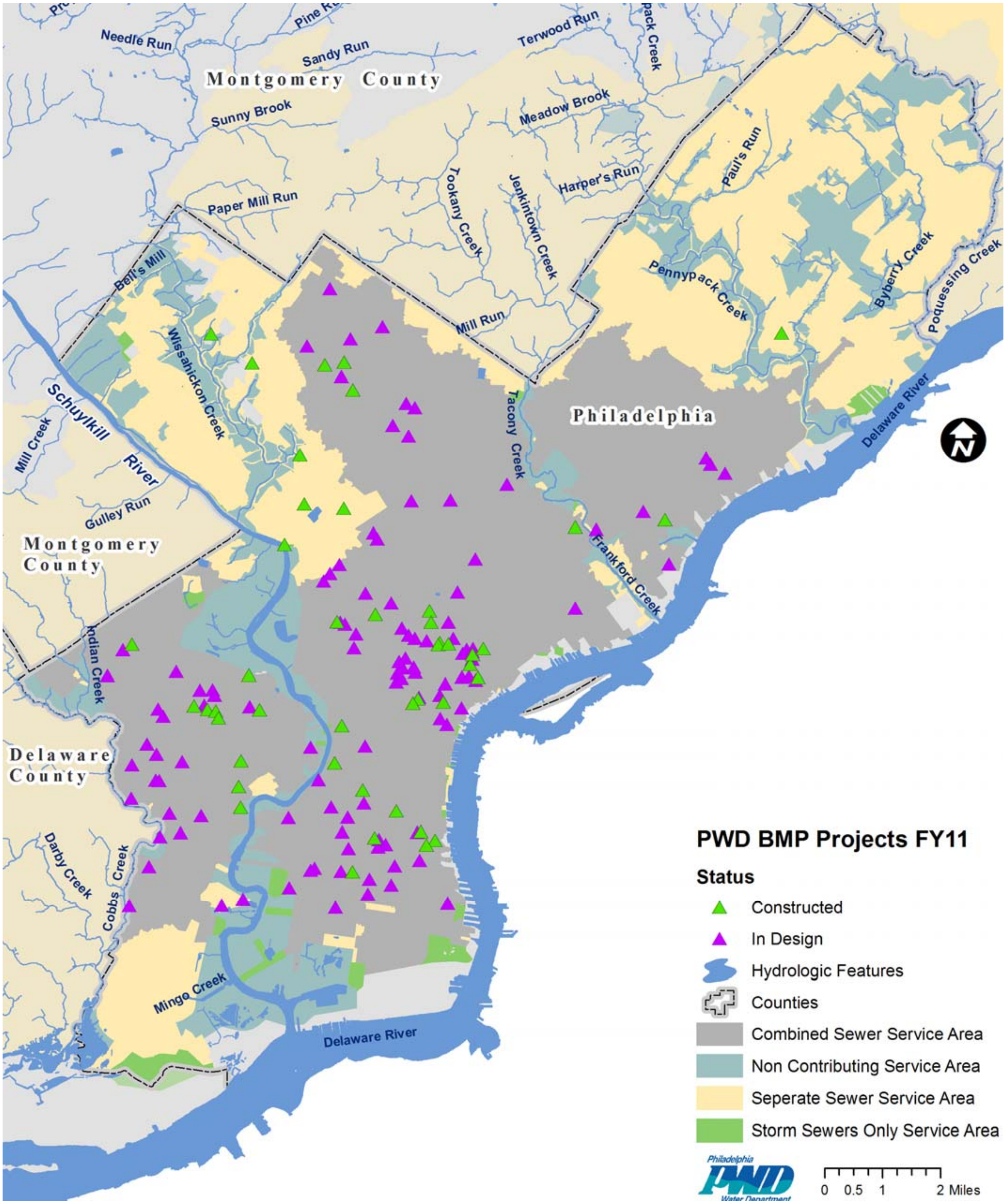


Figure 1 - FY2011 BMP Project Status Map

Table 1 - PWD Completed Stormwater BMP Projects

Project Name	Watershed	Sewer Type
16th St between Passyunk Ave and Jackson St	Schuylkill	Combined
47th & Grays Ferry Rain Garden	Schuylkill	Combined
Allens Lane Art Center Porous Basketball Court	Wissahickon	Separate
Awbury Arboretum Bioswale	TTF	Combined
Blackwell Homes	Schuylkill	Combined
Bureau of Laboratory Services	TTF	Combined
Clark Park Basketball Court Project	Schuylkill	Combined
Cliveden Park Stormwater Project	TTF	Combined
Columbus Square Stormwater Planters	Delaware	Combined
East Falls Parking Lot Bio-Retention	Schuylkill	Separate
Greenfield Elementary School	Schuylkill	Combined
Hartranft School	Delaware	Combined
Herron Playground Porous Basketball Court	Delaware	Combined
Independence Charter School	Delaware	Combined
Jefferson Square Raingarden	Delaware	Combined
Lancaster Ave from N 58th St to N 63rd St	Schuylkill	Combined
Liberty Lands Stormwater Project	Delaware	Combined
Mill Creek Playground Porous Basketball Court	Schuylkill	Combined
Palmer St from Frankford Ave to Blair St	Delaware	Combined
Penn Alexander School	Schuylkill	Combined
Pennypack Park Wetland & Pervious Parking Lot	Pennypack	Separate
Police Forensic Center	Delaware	Combined
Queen Lane from Henry St to Fox St	Schuylkill	Separate
Saylor Grove Stormwater Treatment Wetland	Wissahickon	Separate
Shissler Playground	Delaware	Combined
School of the Future	Schuylkill	Combined
Sepviva St from Susquehanna Ave to Dauphin St	Delaware	Combined
Springside School Stormwater Improvements	Wissahickon	Separate
Union Hill Tree Trench	Schuylkill	Combined
Vacant Land - 2301 Gratz Street	Delaware	Combined
Vacant Land - 3rd and Norris Streets	Delaware	Combined
Vacant Land - 5th and Norris Streets	Delaware	Combined
Vacant Land - 7th St and Germantown Ave	Delaware	Combined
Waterview Recreation Center	TTF	Combined
West Mill Creek Farm Swales	Schuylkill	Combined
West Mill Infiltration Tree Trench	Schuylkill	Combined
Wissahickon Charter School Rain Garden	Schuylkill	Separate

Table 2 - PWD Stormwater BMP Projects in Construction

Project Name	Watershed	Sewer Type
Blair St from Hewson to Palmer	Delaware	Combined
Belfield Ave from Chew Ave to Walnut Ln	TTF	Combined
Benjamin Franklin Parkway from 21st St to 23rd St	Schuylkill	Combined
Hewson St from Blair St to Trenton Ave	Delaware	Combined
Montgomery from Frankford Ave to Blair St	Delaware	Combined
Percy St from Catharine St to Christian St	Delaware	Combined
PHS Tree Trench - Reese St	Delaware	Combined
PHS Tree Trench- Earl St	Delaware	Combined
PHS Tree Trench - Front St	Delaware	Combined
PHS Tree Trench - Ninth St	Delaware	Combined

Table 3 - PWD Stormwater BMP Projects in Projects Control (Design Complete)

Project Name	Watershed	Sewer Type
10th St from Wilder to Reed	Delaware	Combined
12th St and Reed St	Delaware	Combined
12th St from Dickinson St to Tasker St	Delaware	Combined
21st St from Venango to Pacific	Delaware	Combined
58th St Connector	Schuylkill	Combined
Belgrade St and Marlborough St	Delaware	Combined
Dendy Recreation Center	Delaware	Combined
Diamond St from 25th St to Stillman St	Delaware	Combined
Madison Memorial Park	Delaware	Combined
Passyunk Ave from Dickinson to Reed	Delaware	Combined
Passyunk Ave Bumpouts - Phase 1 - 63rd St	Schuylkill	Combined
Passyunk Ave Bumpouts - Phase 1 - 61st St	Schuylkill	Combined
Passyunk Ave Bumpouts - Phase 1 - 28th St	Schuylkill	Combined
Poplar St from 8th St to Franklin St	Delaware	Combined
Wakisha Charter School	Delaware	Combined
Welsh School	Delaware	Combined

Table 4 - PWD Stormwater BMP Projects in Design

Project Name	Watershed	Sewer Type
27th St from Indiana to Toronto	Schuylkill	Combined
29th and Cambria PWD Facility Employee Parking Lot	Schuylkill	Combined
29th and Chalmers Playground	Delaware	Combined
A.S. Jenks School	Delaware	Combined
Alder St from Norris St to Diamond St	Delaware	Combined
Andrew Hamilton School	Cobbs-Darby	Combined
Anna B. Day School	TTF	Combined
Baltimore Ave Island from S 60th St to Wharton St	Cobbs-Darby	Combined
Barry Playground	Schuylkill	Combined
Barton School	TTF	Combined
Belmont School	Schuylkill	Combined
Benjamin Franklin Pkwy from 16th St to 19th St	Schuylkill	Combined
Blue Bell Inn Triangle	Cobbs-Darby	Combined
Bodine High School	Delaware	Combined
Bridesburg Recreation Center and Bridesburg School	Delaware	Combined
Bryant Elementary School	Cobbs-Darby	Combined
Carmella Playground/Warren G Harding School/White Hall Commons	Delaware	Combined
Cassidy Elementary School	Cobbs-Darby	Combined
Cecil B Moore Recreation Center	Delaware	Combined
Chew Playground	Schuylkill	Combined
Christy Recreation Center	Cobbs-Darby	Combined
Congreso de Latinos Unidos	Delaware	Combined
Daroff School	Schuylkill	Combined
Dick Elementary School	Delaware	Combined
Dickinson Square	Delaware	Combined
Donald Finnegan Playground	Schuylkill	Combined
Dorsey Playground	Delaware	Combined
Durham Park	Schuylkill	Combined
E.H. Vare Middle School	Schuylkill	Combined
Epiphany of Our Lord School	Delaware	Combined
Francis Scott Key School	Delaware	Combined
Franklin St from Diamond St to Berks St	Delaware	Combined
Frederick Douglass Elementary School	Delaware	Combined
Germantown Ave SFR - Phase 4	Delaware	Combined
Germantown Ave SFR - Phase 6	Delaware	Combined
Harpers Hollow Park	TTF	Combined
HM Stanton School	Delaware	Combined
Hunting Park from Old York Rd to Roosevelt Blvd	TTF	Combined
James Rhoads School	Schuylkill	Combined
John F Kennedy Blvd from 30th St to 32nd St	Schuylkill	Combined
Julian Abele Park	Schuylkill	Combined
Kemble Park	TTF	Combined

Project Name	Watershed	Sewer Type
Kenderton Field	Delaware	Combined
Little Sisters of the Poor	Schuylkill	Combined
Livingston St and Tilton St	Delaware	Combined
Longstreth School	Cobbs-Darby	Combined
Magnolia Cemetary	Delaware	Combined
Marshall St from Hunting Park Ave to Cayuga St	TTF	Combined
McCreesh Playground / Catharine Elementary School	Cobbs-Darby	Combined
MLK Recreation Center	Delaware	Combined
Morris Leeds Middle School	TTF	Combined
Old Cathedral Cemetary	Schuylkill	Combined
Overbrook Elementary	Schuylkill	Combined
Parking Lot - 12th St, Marvine St, and Diamond St	Delaware	Combined
Philadelphia Military Academy	Delaware	Combined
Pleasant Playground	TTF	Combined
Roosevelt Playground	Delaware	Combined
Sacks Playground	Delaware	Combined
Samuel B. Huey Elementary School	Cobbs-Darby	Combined
Sayre High School	Cobbs-Darby	Combined
Shepard Recreation Center	Schuylkill	Combined
Shoemaker Middle School	Schuylkill	Combined
Simons Recreation Center	TTF	Combined
Sister Clara Muhammad School	Schuylkill	Combined
Smith Elementary School	Schuylkill	Combined
Southwark School	Delaware	Combined
Springfield Ave and Cobbs Creek Island	Cobbs-Darby	Combined
St Thomas Aquinas School	Schuylkill	Combined
Stephen Girard School	Schuylkill	Combined
Thompson St and Columbia Ave	Delaware	Combined
Towey Recreation Center	Delaware	Combined
Trenton Ave and Norris St	Delaware	Combined
Wakefield Park	TTF	Combined
Weccaccoe Ave SFR	Delaware	Combined
William Cramp School	Delaware	Combined
William Gray Youth Center	Delaware	Combined
William Harrity School	Cobbs-Darby	Combined
Wilson Park	Schuylkill	Combined
Wister Woods Park	TTF	Combined
Womrath Park	TTF	Combined
Yorktown Parks - 13th and Oxford	Delaware	Combined
Yorktown Parks - 13th and Master	Delaware	Combined
Yorktown Parks - 13th and Thompson	Delaware	Combined
Yorktown Parks - 12th and Jefferson	Delaware	Combined
Yorktown Parks - 12th and Thompson	Delaware	Combined

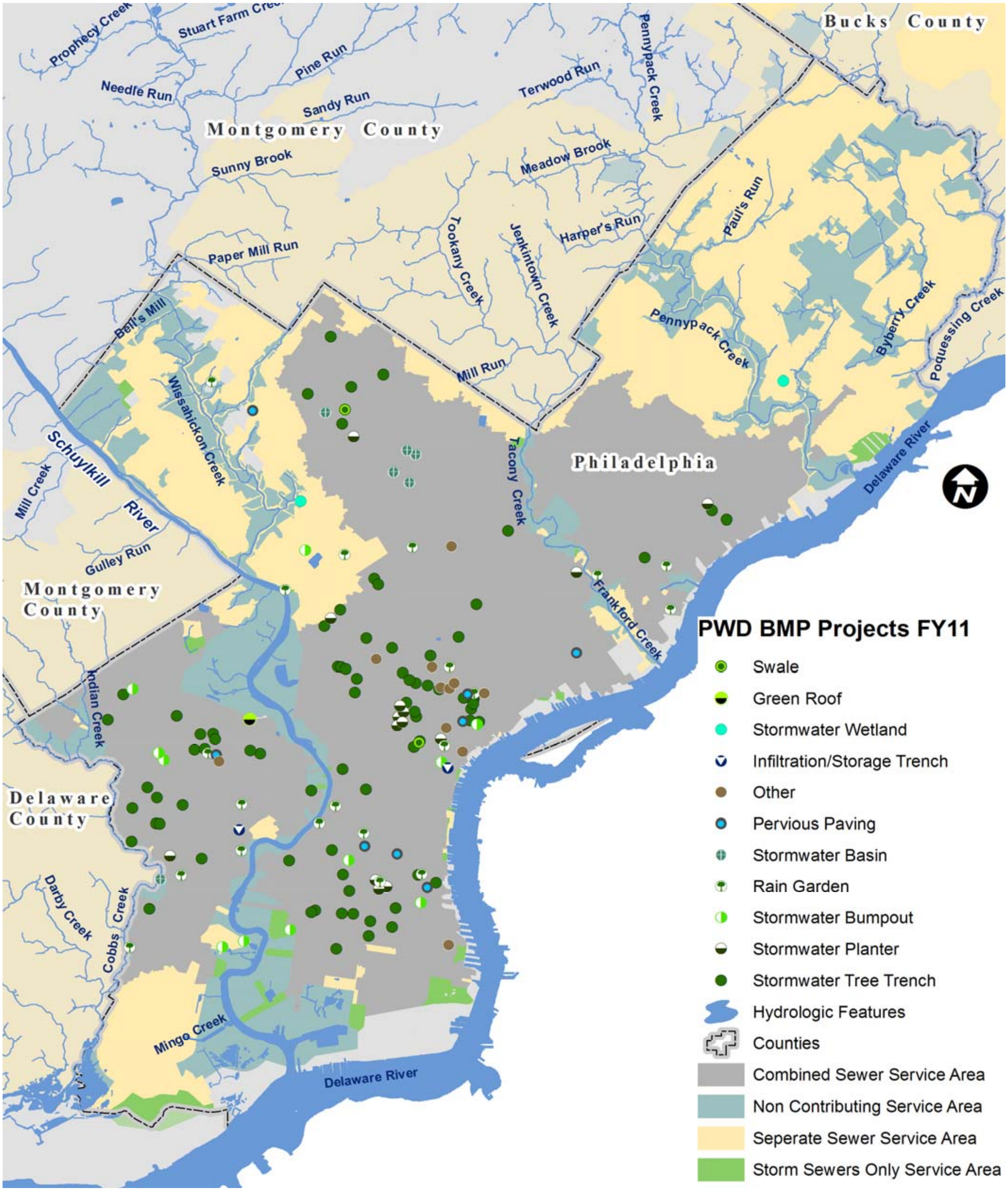


Figure 2 - PWD Green Stormwater Infrastructure Types Map

APPENDIX F –
NPDES ANNUAL CSO STATUS REPORT FY2011

Page

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
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

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
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
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

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
52	39d 59m 49s	75d 5m 3s	Duncan Street Under Delaware Exp.	Frankford Creek	Lower Frankford Low Level	F_13
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
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

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
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
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
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

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
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
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

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
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
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
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

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
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
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 7/1/10 – 6/30/2011

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
NE	D02	24	88.5	8747387
NE	D03	25	96.5	2841725
NE	D04	11	24.25	226949
NE	D05	29	157	32599587
NE	D06	7	9.5	300627
NE	D07	16	30.5	10453921
NE	D08	24	50	491785
NE	D09	2	1.5	84071
NE	D11	7	11.5	1852299
NE	D12	26	40.25	122325
NE	D13	5	5.5	190923
NE	D15	5	6.25	609377
NE	D17	25	65.75	4020860
NE	D18	26	65	3098053
NE	D19	26	81.25	2497416
NE	D20	16	25.25	1334280
NE	D21	21	45	2774246
NE	D22	38	282	16026795
NE	D23	23	26.5	127640
NE	D25	34	211	66060573
NE	F03	18	24	1590242
NE	F04	32	102	4882022
NE	F05	34	118.5	544049
NE	F06	11	11.5	311125
NE	F07	22	32.75	1192064
NE	F08	21	28.25	642677
NE	F09	32	88.75	466155
NE	F10	36	136.75	1478913
NE	F11	35	198	8293190
NE	F12	14	15.5	288935
NE	F13	27	47.75	812094
NE	F21	35	196.75	59051756
NE	F23	24	43.5	889071
NE	F24	27	39.25	407675
NE	F25	2	4.5	1556419
NE	P01	10	7.75	217846
NE	P02	28	48	1120819
NE	P03	13	12.75	185882
NE	P04	3	12.5	950697
NE	P05	10	19	2531902
NE	D_FRW	26	56.75	13647987

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
NE	T_FRRR	13	15.5	3198608
NE	F_FRFG	38	298.25	107156175
NE	T01	32	120.75	3464913
NE	T03	30	50.25	1645833
NE	T04	28	46.5	1115293
NE	T05	22	21.25	626594
NE	T06	21	28.25	4212904
NE	T07	5	3.75	102549
NE	T08	35	191.25	45117303
NE	T09	22	26.25	481793
NE	T10	34	93.25	1423011
NE	T11	29	52.25	803051
NE	T12	4	3.75	46965
NE	T13	32	74	2589872
NE	T14	30	111.25	83913463
NE	T15	29	73.25	3814205
SE	D37	30	143	12173924
SE	D38	25	90.25	12122571
SE	D39	29	118.5	16438005
SE	D40	35	149.5	924366
SE	D41	25	61.5	963935
SE	D42	9	7.25	94433
SE	D43	6	8.25	79321
SE	D44	26	67.25	3450749
SE	D45	19	51.5	20754454
SE	D46	9	11	319775
SE	D47	37	202	4844152
SE	D48	23	49	8666432
SE	D49	3	2.75	36671
SE	D50	6	6.75	148499
SE	D51	37	351.25	1656388
SE	D51A	31	103.75	886692
SE	D52	7	8	188890
SE	D53	3	4.25	1030095
SE	D54	7	9.75	3656552
SE	D58	12	12.75	402934
SE	D61	23	31.5	406954
SE	D62	11	12.75	146594
SE	D63	17	27.5	5211920
SE	D64	13	16.25	90842
SE	D65	16	26.75	3431147
SE	D66	19	43.5	3815201
SE	D67	17	34.75	1770605
SE	D73	19	61	7650387

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
SE	R08	15	23.25	6339116
SE	R09	6	27.75	91053
SE	R10	30	83.25	239666
SE	R21	1	0.5	100995
SE	D68	24	103.75	13143892
SE	D69	13	25.5	2800080
SE	D70	6	11.25	3210647
SE	D71	17	51.25	4256161
SE	D72	13	36.5	3341087
SW	C01	8	6.75	221792
SW	C02	3	3.25	31180
SW	C04A	10	11.75	1361774
SW	C05	7	7.25	310847
SW	C06	32	89.75	3302971
SW	C07	11	15.75	853503
SW	C09	19	32.25	1183875
SW	C10	8	14.25	114872
SW	C11	25	70	8420278
SW	C12	25	59.25	1524655
SW	C13	20	36	968330
SW	C14	19	47	1845068
SW	C15	11	14.25	237180
SW	C16	3	2.5	37283
SW	C17	33	135.5	22527760
SW	C18	15	27.25	1719538
SW	C19	10	7.75	509352
SW	C20	8	8.5	305383
SW	C21	10	10.75	398059
SW	C22	24	46	1297570
SW	C23	5	9.25	143713
SW	C25	14	30.75	1920340
SW	C28A	26	27.25	242528
SW	C29	31	114.5	1494807
SW	C30	18	75.25	759884
SW	C31	24	52.75	938159
SW	C32	18	24.25	884791
SW	C33	10	9.25	358831
SW	C34	7	5.25	246747
SW	C35	4	4.5	102222
SW	C36	3	3.75	96444
SW	C37	9	7	116206
SW	C_FRTR	47	273.75	13929356
SW	S_FRM	2	4	5300282
SW	R21	1	0.5	99786

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
SW	S01	27	65	7520684
SW	S01T	17	27.75	1585860
SW	S02	31	76.5	644447
SW	S03	6	3.5	49515
SW	S04	47	201.75	1560231
SW	S05	37	164	17374508
SW	S06	44	161.5	8293702
SW	S07	10	8.25	631736
SW	S08	23	32.75	95808
SW	S09	21	32.25	3028199
SW	S10	31	91.75	1402833
SW	S11	32	73.75	415068
SW	S12A	29	40	386093
SW	S13	7	4.75	150029
SW	S14	38	128.5	1280822
SW	S15	11	8.75	129602
SW	S16	40	105	652081
SW	S17	10	9.75	275571
SW	S18	29	92.75	3166517
SW	S19	12	9.25	127261
SW	S20	49	285	11534977
SW	S21	9	6.5	72367
SW	S22	24	42.25	1231714
SW	S23	33	80	735341
SW	S24	24	38	367250
SW	S25	25	49	835776
SW	S26	38	182.75	8928544
SW	S30	6	3	55552
SW	S31	30	75.5	2279319
SW	S32	9	7	130302
SW	S33	39	173	11228569
SW	S36A	36	142.25	4025513
SW	S37	34	101.5	1640791
SW	S38	19	21.5	2530233
SW	S42	22	48.5	4555478
SW	S42A	47	256.5	11622604
SW	S44	22	47.25	3962551
SW	S45	24	57	12577684
SW	S46	10	16.25	1087612
SW	S50	34	179.75	91412722
SW	C_FRA	6	5	798334

Table 3 - Overflow Summary for a Typical Year

*This analysis was preformed by the first iteration of a model conversion model. This model accounts for evaporation during any wet weather period which was not done in previous models. A typical year is a simulated year where the rainfall is average throughout the year.

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
C01	17	12.5	2.54	88.99%
C02	4	1.5	0.15	94.77%
C04	20	22.25	3.30	82.04%
C04A	12	13.5	7.19	97.11%
C05	13	13.25	2.92	86.18%
C06	56	151	41.13	55.87%
C07	21	33.75	10.64	69.39%
C09	32	51.5	12.30	77.94%
C10	15	27.25	1.16	29.95%
C11	41	101.5	99.06	66.70%
C12	39	81.25	15.43	69.94%
C13	29	52	9.16	75.85%
C14	30	62.25	20.16	70.56%
C15	17	28.5	2.15	76.58%
C16	3	1.25	0.04	98.32%
C17	52	224.75	271.46	68.74%
C18	27	50.75	19.06	78.17%
C19	20	17.25	4.96	91.13%
C20	13	16	2.42	89.61%
C21	15	20.75	3.75	87.02%
C22	35	62.5	14.90	70.37%
C23	11	19	1.47	-4.80%
C24	20	51.75	10.50	61.80%
C25	12	19.25	5.08	88.13%
C26	5	8.25	0.58	88.23%
C27	7	8.5	1.54	92.75%
C28A	20	12.25	0.55	96.25%
C29	50	150.75	15.38	44.12%
C30	28	93.75	8.17	54.45%
C31	40	74.75	11.16	65.29%
C32	31	45.75	10.78	76.32%
C33	20	17.5	3.52	86.17%
C34	12	6.5	2.07	91.47%
C35	10	5	0.45	88.97%
C36	10	6	0.65	89.56%
C37	15	10.5	0.94	87.76%
D02	35	214.25	177.95	32.71%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
D03	43	246.75	48.90	29.83%
D04	22	107.75	3.79	70.55%
D05	58	338.75	476.10	41.38%
D06	16	39.25	6.27	70.70%
D07	26	67.75	133.42	76.05%
D08	45	133.75	8.67	50.43%
D09	6	3	0.70	96.84%
D11	13	31	25.45	82.21%
D12	46	79.5	1.31	87.79%
D13	9	12.75	1.56	92.88%
D15	9	13.75	5.05	91.64%
D17	45	124.5	49.73	78.04%
D18	49	134	44.12	75.04%
D19	49	174.75	37.31	74.31%
D20	34	61.25	19.69	76.36%
D21	42	105.5	44.24	69.48%
D22	73	488	239.40	46.21%
D23	41	55	2.29	85.06%
D24	26	30.5	1.17	76.99%
D25	65	392	934.59	45.86%
D37	52	241.5	189.79	39.51%
D38	42	155.25	186.28	56.30%
D39	52	217.75	244.84	70.96%
D40	61	293.25	21.32	52.67%
D41	55	172.5	33.08	61.01%
D42	18	13.5	1.67	85.63%
D43	13	13	1.17	88.17%
D44	35	62.25	33.05	64.07%
D45	41	111	345.83	83.13%
D46	19	22.75	4.89	80.09%
D47	67	322.75	66.01	53.56%
D48	38	84.5	123.06	70.91%
D49	8	3.75	0.69	89.03%
D50	16	12.75	2.16	82.90%
D51	66	585.25	20.32	67.44%
D51A	53	179.5	13.79	81.28%
D52	19	18.25	3.14	81.54%
D53	7	5	9.04	94.03%
D54	18	21	45.84	86.08%
D58	23	33.75	7.39	78.83%
D61	38	57.75	6.58	72.01%
D62	27	28.25	2.44	76.92%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
D63	33	78	104.21	70.46%
D64	26	35.25	1.54	83.25%
D65	25	50.25	56.06	74.11%
D66	32	76.5	57.77	71.71%
D67	31	57.75	25.43	76.07%
D68	47	184.75	185.97	59.12%
D69	22	45	39.08	80.02%
D70	21	28.25	42.55	85.37%
D71	34	97.5	62.15	67.18%
D72	16	30.25	35.24	85.54%
D73	39	141.75	132.84	62.55%
F03	32	42	18.78	74.47%
F04	65	211.75	71.97	61.57%
F05	66	241.5	8.97	63.89%
F06	20	29	5.97	52.70%
F07	41	73.25	21.25	73.72%
F08	40	65.75	11.72	77.58%
F09	60	205.75	10.20	68.52%
F10	64	284.75	26.45	49.37%
F11	68	387.5	134.28	52.04%
F12	30	39.25	5.90	73.37%
F13	45	98	11.36	67.11%
F14	35	42.5	2.29	76.14%
F21	63	332	764.94	51.29%
F23	43	89.75	11.36	62.19%
F24	44	70.75	5.06	69.96%
F25	9	15.25	17.79	90.44%
P01	18	12	4.11	91.27%
P02	46	90	19.90	74.01%
P03	20	50.25	6.09	69.08%
P04	11	36	24.09	15.02%
P05	23	99.75	90.64	29.98%
R01	65	202.5	10.33	64.89%
R01A	75	400	97.24	51.87%
R02	66	196	1.28	66.84%
R03	43	60.5	0.63	85.10%
R04	81	455.25	12.67	56.10%
R05	69	237.25	3.07	71.01%
R06	45	104.5	33.39	82.43%
R07	16	8.5	12.50	97.03%
R08	25	33.25	83.82	93.45%
R09	15	68	1.87	92.34%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
R10	46	124.75	3.79	87.74%
R11	33	41	8.83	85.39%
R11A	7	3	0.09	99.34%
R12	16	11.75	7.15	98.16%
R12R	9	11.25	61.10	45.38%
R13	36	56.5	58.38	92.65%
R13A	11	5.5	3.79	99.15%
R14	44	97.75	48.76	95.10%
R15	21	31.25	47.53	94.34%
R18	68	477	1420.62	68.20%
R20	8	17.75	1.49	99.53%
R21	1	0.25	0.31	99.95%
R24	10	4	4.52	98.09%
S01	40	104	90.68	70.53%
S01T	34	54.75	21.06	87.71%
S02	49	123.5	8.38	64.19%
S03	13	5.75	0.86	92.28%
S04	70	307.25	19.63	66.11%
S05	64	269	229.01	59.48%
S06	64	209.25	96.13	60.22%
S07	15	19.25	10.03	80.97%
S08	33	49.5	1.36	81.00%
S09	34	52.75	43.11	75.14%
S10	55	155.75	18.99	67.12%
S11	55	149.5	7.48	65.61%
S12	39	54.25	1.95	34.48%
S12A	38	45	3.22	83.89%
S13	16	7.5	2.39	91.24%
S14	65	242.75	21.35	48.78%
S15	20	19	1.83	87.80%
S16	64	179	8.71	70.90%
S17	21	22.5	4.07	86.31%
S18	49	160.75	43.21	75.57%
S19	20	17.75	1.84	83.92%
S20	73	401	135.10	39.45%
S21	21	14.5	1.15	87.64%
S22	37	62.75	17.22	82.25%
S23	55	134.5	9.97	67.57%
S24	36	57.75	5.36	68.73%
S25	40	77.5	11.81	81.71%
S26	64	309.5	121.69	56.94%
S27	65	313.25	965.65	59.82%

Regulator	Frequency	SWO Duration (hrs)	Overflow Volume (MG)	Percent Capture
S28	8	3.75	0.60	96.77%
S30	8	3.5	0.66	94.07%
S31	53	125.75	31.49	72.23%
S32	15	11.25	1.42	85.68%
S33	63	265	124.51	21.34%
S34	71	368.25	122.08	48.56%
S35	5	3	0.18	95.68%
S36	27	30	2.05	64.19%
S36A	61	257	53.49	57.37%
S37	56	190	23.60	60.14%
S38	26	31	25.67	73.22%
S39	15	17	6.52	90.20%
S40	12	7.75	3.81	92.37%
S42	34	91	72.55	74.00%
S42A	69	375.5	159.39	52.78%
S43	57	271.5	70.66	42.43%
S44	41	97.75	61.29	67.48%
S45	40	82.5	144.11	74.85%
S46	23	39.25	15.50	80.06%
S47	58	408.25	80.76	5.85%
S50	59	275.5	1025.79	17.14%
S51	7	3	0.23	94.03%
T01	65	217.25	47.28	57.42%
T03	59	120.5	23.90	68.11%
T04	58	136.25	16.42	60.22%
T05	42	48.75	8.69	74.42%
T06	36	53.25	61.89	74.17%
T07	8	5.75	1.18	91.57%
T08	69	370.5	679.21	55.40%
T09	38	50.25	6.19	77.12%
T10	63	195.75	20.68	52.25%
T11	54	87.25	10.06	65.18%
T12	8	5.25	0.42	90.75%
T13	61	157.5	36.02	60.33%
T14	62	232.75	1155.82	65.93%
T15	54	131.25	46.11	60.37%

Table 4 - July 2010 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**
7/1/2010	0	0	0	0	0.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/2/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/3/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/4/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/5/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/6/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/7/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/8/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/9/2010	1.02	0.19	0	0	0.32	1.38	1.43	2.73	0.83	0.05	0.75	0.27	0.04	0.06	0.3	1.34	0.18	1.66	1.76	0.02	1.12	0.03	0	0
7/10/2010	1.06	1.31	1.03	1.32	0.68	1.65	0.66	0.69	1.9	0.81	0.63	0.55	0.79	0.75	1.77	1.23	0.63	0.81	0.81	0.45	1.22	1.64	0.64	0.53
7/11/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12/2010	0.47	0.55	0.29	0.05	0.14	0.86	0.44	0.66	0.81	0.48	0.52	0.06	0.31	0.18	0.38	0.66	0.29	0.9	0.51	0.07	1.49	0.67	0.37	0.4
7/13/2010	1.51	2.87	2.42	1.36	1.2	3.82	1.78	2.07	3.66	2.55	2.35	1.26	2.15	2.08	1.55	1.83	2.1	2.63	3.57	1.2	2.29	3.27	1.47	2.35
7/14/2010	3.62	1.54	0.48	0.78	3.55	0.8	0.52	0.58	1.2	0.69	0.53	3.49	0.44	0.94	0.82	1.06	0.57	0.64	0.36	0.87	0.48	1.59	3.82	0.4
7/15/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/16/2010	0	0	0	0.64	0	0.12	0.47	0	0.26	0	0	0	0	0	0	0	0.44	0.02	0	0	0	0.02	0	0
7/17/2010	0.14	0.13	0	0	0.25	0	0	0	0	0	0	0.17	0	0.07	0.1	0.08	0	0	0	0	0	0.03	0.31	0
7/18/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/19/2010	0.67	0.87	0.3	0.2	0.61	0.27	0.38	0.29	0.46	0.36	0.07	0.75	0.24	0.72	1.18	1.02	0.22	0.2	0.51	0.39	0.32	0.45	0.6	0.38
7/20/2010	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0
7/21/2010	0.04	0.05	0.43	0.54	0	0.25	0.39	0.53	0.25	0.47	0.37	0.05	0.51	0.14	0.22	0.22	0.29	0.11	0.45	0.32	0.43	0.13	0.06	0.32
7/22/2010	0.01	0.1	0.02	0	0.02	0	0.02	0	0	0.02	0.02	0.01	0.02	0	0.01	0.02	0.04	0	0	0.01	0.01	0	0.01	0.02
7/23/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/24/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/25/2010	0.31	0.17	0.83	0.73	0.21	0.46	0.77	1.44	0.39	0.88	1.28	0.13	0.93	0.63	0.32	0.31	1.13	0.44	1.3	0.49	1.29	0.41	0.13	0.45
7/26/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/27/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/28/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/29/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
7/30/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/31/2010	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 5 - August 2010 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**
8/1/2010	0.04	0	0.23	0.18	0.09	0.01	1.35	1.08	0.29	0.11	0.97	0.15	0.9	0.14	0.24	0.01	1.13	0.11	0.03	0.07	0	0	0.03	0.47
8/2/2010	0	0	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/3/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/4/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/5/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/6/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/7/2010	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/8/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/9/2010	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/10/2010	0	0	0	0	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/11/2010	0	0	0	0	0	0.04	0.05	0.09	0.02	0.04	0.13	0	0.03	0.08	0.03	0	0.13	0.04	0.05	0.08	0	0	0	0.08
8/12/2010	0.08	0	0.11	0.06	0	0.09	0.06	0.04	0.06	0	0.08	0.1	0	0.05	0.06	0.08	0.07	0.07	0.09	0.07	0.21	0.06	0.11	0.16
8/13/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/14/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/15/2010	0.06	0	0.01	0	0	0.03	0.03	0.01	0.02	0	0.02	0.07	0.01	0.03	0.04	0.07	0.02	0.02	0.01	0	0.01	0.03	0.09	0.01
8/16/2010	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0.01	0	0.06	0.01
8/17/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/18/2010	0.02	0	0	0	0	0	0.01	0	0.01	0	0	0.11	0	0.02	0.03	0.02	0	0	0	0	0	0.01	0.03	0
8/19/2010	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
8/20/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/21/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/22/2010	1.47	1.76	0.88	0.33	0	0	0.24	0.75	0.33	0.09	0.92	1.31	0.01	0.23	0.39	0.7	0.19	0.47	0.48	1.12	0.7	0.48	1.81	0.3
8/23/2010	0.1	0	0.02	0.44	0	0.2	0.33	0.26	0.2	0.44	0.27	0	0	0.3	0	0.12	0.34	0.25	0.25	0.12	0.16	0.31	0.01	0.36
8/24/2010	0	0	0.01	0	0	0.16	0.01	0	0.02	0	0	0	0	0	0.01	0.01	0.01	0.02	0	0	0.01	0	0	0.04
8/25/2010	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/26/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/27/2010	0	0	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/28/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/29/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/30/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/31/2010	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 6 - September 2010 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**
9/1/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/2/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/3/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/4/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/5/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/6/2010	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
9/7/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/8/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/9/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10/2010	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
9/11/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/12/2010	0.2	0	0.21	0.27	0	0.29	0.3	0.26	0.28	0.25	0.25	0.23	0	0.3	0.32	0.28	0.28	0.3	0.24	0	0.25	0.18	0.21	0
9/13/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/14/2010	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
9/15/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/16/2010	0.25	0	0.4	0.17	0.27	0.21	0.43	0.44	0.21	0.23	0.38	0.31	0	0.21	0.25	0.4	0.44	0.2	0	0	0.15	0.23	0.29	0.16
9/17/2010	0.13	0	0.25	0.12	0.18	0.12	0.1	0.24	0.13	0.27	0.26	0.15	0	0.13	0.14	0.17	0.11	0.14	0	0	0.2	0.13	0.16	0.3
9/18/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/19/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/20/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/21/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*0*	0	0	0	0
9/22/2010	0.04	0	0.55	0.28	0.06	0.05	0.13	0.14	0	0.31	0.12	0.08	0	0.1	0.05	0.04	0.2	0.08	0.09	0	0.09	0	0.17	0.11
9/23/2010	0	0	0	0	0	0.01	0.01	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0
9/24/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/25/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/26/2010	0.03	0	0	0.02	0.08	0.05	0.04	0.02	0.04	0.02	0.02	0.03	0	0.02	0.03	0.06	0.02	0.05	0.1	0	0.05	0.02	0.04	0.01
9/27/2010	0.18	0	0.11	0.33	0.17	0.18	0.2	0.13	0.15	0.25	0.21	0.15	0	0.2	0.21	0.16	0.22	0.13	0.31	0	0.13	0.16	0.19	0.31
9/28/2010	0.05	0	0.09	0.02	0.07	0.01	0.05	0.03	0.02	0.08	0.07	0.04	0	0.07	0.05	0.08	0.1	0.1	0.12	0	0.03	0	0.05	0.1
9/29/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/30/2010	2.29	0	1.06	1.35	2.02	2.74	1.83	1.43	2.23	2.07	1.91	1.94	0	1.63	2.01	2.64	1.8	2.78	4.76	0	2.41	2.02	2.39	2.01

Table 7 - October 2010 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**
10/1/2010	3.02	0	2.95	2.96	2.78	3.44	2.94	2.4	2.73	2.98	2.79	2.25	0	3.13	2.92	3.03	3.07	2.28	4.83	0	2.97	2.54	3.11	2.77
10/2/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/3/2010	0.04	0	0.04	0.03	0.05	0	0.07	0.05	0.04	0.07	0.07	0.04	0	0.06	0.07	0.05	0.06	0.06	0.07	0	0.04	0.04	0.04	0.04
10/4/2010	0.25	0	0.33	0.33	0.25	0.38	0.39	0.35	0.1	0.41	0.39	0.12	0	0.3	0.31	0.32	0.33	0.24	0.59	0	0.29	0.26	0.33	0.3
10/5/2010	0.27	0	0.33	0.22	0.29	0.29	0.24	0.23	0	0.4	0.23	0.28	0	0.24	0.25	0.24	0.22	0.19	0.56	0	0.35	0.18	0.34	0.27
10/6/2010	0.01	0	0	0	0.04	0.03	0.01	0	0.03	0	0.02	0.02	0	0	0.02	0.02	0.01	0.03	0.04	0	0.04	0.02	0.01	0
10/7/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/8/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/9/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/10/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/11/201	0.26	0	0	0	0.3	0	0	0	0.02	0	0	0.23	0	0.06	0.08	0.06	0	0	0	0	0	0.01	0.21	0
10/12/201	0	0	0.25	0.25	0.21	0.23	0.42	0.24	0.27	0.24	0.25	0.24	0.01	0.43	0.28	0.25	0.24	0.28	0.31	0.2	0.28	0.18	0.12	0.23
10/13/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/14/201	0.65	0	0.64	0.8	0.7	0.72	0.65	0.66	0.62	0.72	0.66	0.67	0	0.65	0.68	0.69	0.71	0.75	0.89	0.75	0.67	0.5	0.63	0.71
10/15/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/16/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/17/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/18/201	0	0	0.01	0.05	0	0	0.03	0.05	0.01	0	0.04	0	0.02	0.01	0	0	0.04	0.02	0.03	0	0.03	0	0	0
10/19/201	0.3	0.31	0.49	0.51	0.32	0.27	0.44	0.45	0.35	0.53	0.48	0.3	0.5	0.35	0.4	0.37	0.47	0.44	0.5	0.53	0.38	0.27	0.29	0.53
10/20/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/21/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/22/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/23/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/24/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/25/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/26/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/27/201	0.32	0.41	0.34	0.15	0.32	0.5	0.27	0.23	0.28	0.4	0.33	0.31	0.34	0.26	0.36	0.37	0.27	0.27	0.45	0.25	0.39	0.25	0.36	0.47
10/28/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/29/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/30/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/31/201	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 8 - November 2010 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**
11/1/2010	0	0	0	0.01	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0
11/2/2010	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/3/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/4/2010	1.27	1.4	1.24	1.27	1.26	0	1.27	1.14	1.07	1.39	1.29	0.84	1.26	1.11	1.31	1.34	0	1.19	1.46	1.17	1.14	1.04	1.13	1.17
11/5/2010	0	0.01	0.03	0.03	0.02	0	0.02	0.01	0	0.02	0.01	0.04	0.02	0.01	0.02	0.01	0	0.01	0.01	0.04	0	0	0.05	0.02
11/6/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/7/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/8/2010	0	0	0.04	0.05	0	0	0.02	0.02	0	0.03	0.03	0	0.04	0	0.01	0	0	0	0.01	0.04	0.01	0	0	0.04
11/9/2010	0	0.45	0	0	0	0	0	0.01	0.1	0	0.01	0	0	0.01	0	0	0	0	0	0	0	0	0	0
11/10/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/11/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/12/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/13/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/14/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/15/201	0	0	0	0.49	0	0	0	1.72	0	0.01	0	0	0.48	0	0	0.47	0	0	0.4	0	0	1.42	0	0
11/16/201	0.25	0.29	0.31	0.26	0.3	0	0.27	0.12	0.24	0.33	0.29	0.3	0.27	0.26	0.27	0.29	0	0.32	0.3	0.3	0.24	0.19	0	0.36
11/17/201	0.15	0.38	0.18	0.18	0.19	0	0.25	0.2	0.18	0.24	0.21	0.17	0.19	0.26	0.19	0.33	0	0.16	0.06	0.21	0.23	0.16	0	0.21
11/18/201	0	0	0	0	0.01	0.01	0.04	0	0.01	0	0	0	0	0.02	0.02	0.01	0	0.01	0.43	0	0.01	0	0	0.01
11/19/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/20/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/21/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/22/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/23/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/24/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/25/201	0.11	0.13	0.33	0.29	0.16	0	0.26	0.23	0.17	0.35	0.29	0.09	0.32	0.22	0.2	0.16	0.27	0.26	0.28	0.32	0.26	0.14	0	0
11/26/201	0.02	0.03	0.05	0.03	0.02	0	0.04	0.07	0.04	0.06	0.06	0.02	0.06	0.03	0.04	0.04	0.04	0.05	0.03	0.05	0.05	0.03	0	0.05
11/27/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/28/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/29/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/30/201	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 2010 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**
12/1/2010	1.33	1.28	1.39	0.69	1.37	0	1.33	0.59	1.16	1.6	1.42	1.33	1.21	1.25	1.37	1.49	1.37	1.38	1.12	1.37	1.43	1	0	1.59
12/2/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/3/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/4/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/5/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/6/2010	0	0	0.03	0	0.01	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0
12/7/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/8/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/9/2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/10/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/11/201	0	0.01	0	0.01	0.01	0	0	0.01	0	0	0.01	0	0.01	0	0	0	0.01	0	0.01	0.01	0	0	0.01	0
12/12/201	0.96	1.04	0	1	1.05	1.01	1	0.45	1.08	1.14	1.06	0.96	1.04	0.9	0.98	1.1	1.03	1.11	1.17	1.11	1.2	1.05	1.08	1.18
12/13/201	0.02	0.04	0	0.06	0.05	0.04	0.06	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.05	0.02	0.05	0.03	0.03	0.07	0.05	0.04	0.02	0.05
12/14/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/15/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/16/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/17/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/18/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/19/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/20/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/21/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/22/201	0	0	0	0	0	0	0	0	0.46	0	0	0	0.47	0	0.47	0	0	0	0	0.5	0	0	0	0
12/23/201	0	0.28	0.48	0	0.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/24/201	0	0	0	0	0	0	0	1.71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/25/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/26/201	0	0	0.21	0	0	0	0.29	0	0	0	0.18	0	0	0	0	0.12	0	0	0.16	0	0	0	0.15	0.09
12/27/201	0	0	0.02	0	0	0	0.04	0.04	0	0	0.02	0	0	0	0	0.02	0	0	0.01	0	0	0	0.07	0.26
12/28/201	0	0	0	0	0	0.01	0	0	0.01	0	0	0	0.01	0	0	0	0	0.07	0	0	0.01	0.04	0	0.08
12/29/201	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0.1	0	0	0	0	0.01	0.03
12/30/201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0	0	0.01	0	0	0
12/31/201	0	0	0	0	0	0	0	0	0	0	0.47	0	0	0	0	0	0	0.15	0	0	0	0	0.45	0.51

Table 10 - January 2011 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**
1/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0
1/2/2011	0.05	0	0.03	0.05	0.09	0.03	0.04	0.02	0.06	0.04	0.03	0.08	0.04	0.08	0.07	0.05	0.04	0.03	0.03	0.03	0.03	0.05	0.11	0.03
1/3/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/4/2011	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/6/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/7/2011	0	0.05	0.1	0.03	0.04	0.08	0.1	0.05	0.07	0.07	0.08	0.07	0.07	0.02	0.05	0.09	0.03	0.07	0.08	0	0.05	0.04	0.11	0.12
1/8/2011	0	0	0.1	0	0	0	0.09	0	0	0	0.08	0	0	0	0	0.06	0	0	0.09	0	0	0.01	0.09	0.11
1/9/2011	0	0	0	0	0.01	0	0	0	0	0.01	0	0	0.01	0	0	0	0	0.02	0	0	0	0	0	0
1/10/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/11/2011	0	0	0.05	0	0	0	0.08	0	0	0	0.04	0	0	0	0	0.16	0	0	0.07	0	0	0	0.06	0.04
1/12/2011	0	0	0.27	0	0	0	0.21	0.01	0	0	0.19	0	0	0	0	0.13	0	0	0.11	0	0	0	0.22	0.33
1/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/14/2011	0	0	0	0	0	0.01	0	0	0.01	0	0	0.01	0	0	0	0	0	0.04	0	0	0	0	0	0
1/15/2011	0	0.02	0	0.05	0.03	0	0	0.03	0.03	0	0	0.04	0.03	0.03	0.01	0	0.02	0.01	0	0	0.02	0.02	0	0
1/16/2011	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0.01	0	0	0	0	0	0	0
1/17/2011	0	0	0.04	0	0	0	0.03	0	0	0	0.03	0	0	0	0	0.02	0	0	0.04	0	0	0	0.03	0.02
1/18/2011	0.8	1.03	0.86	0.08	0.9	0.49	0.92	0.74	0.23	0	0.95	0.54	0.34	0.93	1.03	0.9	0.59	0.66	0.81	0	0.18	0.92	0.72	0.71
1/19/2011	0.04	0.04	0.02	0.02	0.04	0.03	0.02	0.03	0.07	0.31	0.03	0.04	0.21	0.02	0.03	0.09	0.03	0.25	0.02	0	0.21	0.03	0.05	0.02
1/20/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/21/2011	0	0	0.2	0	0	0.02	0.16	0	0.01	0.07	0.1	0.05	0.01	0	0	0.19	0	0.06	0.14	0.21	0.02	0	0.14	0.18
1/22/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/23/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/24/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/25/2011	0	0	0	0.01	0	0	0	0	0	0.07	0	0	0.02	0	0	0	0.01	0.01	0	0	0.02	0	0	0
1/26/2011	0.51	0.38	0.66	0.3	0.26	0.17	0.73	0.04	0.25	0.07	0.64	0.22	0.16	0.33	0.33	0.71	0.38	0.05	0.64	0.59	0.01	0.17	0.52	0.45
1/27/2011	0.17	0.22	0.58	0.12	0.2	0.3	0.6	0.27	0.18	0.15	0.51	0.1	0.17	0.2	0.17	0.68	0.16	0.14	0.26	0.92	0.14	0.12	0.54	0.65
1/28/2011	0.11	0.04	0.05	0.05	0.05	0.04	0.22	0.12	0.04	0.04	0.28	0.06	0.03	0.03	0.04	0.15	0.04	0	0.06	0.15	0.03	0.1	0.15	0.3
1/29/2011	0.05	0.03	0	0	0	0	0.03	0	0	0.01	0.03	0.01	0.01	0	0	0	0.01	0	0	0	0.01	0.09	0.03	0.09
1/30/2011	0.08	0.1	0	0.02	0.07	0.23	0.04	0.38	0.14	0.11	0.02	0.07	0.01	0.09	0.08	0	0.1	0	0	0	0.04	0.25	0.06	0.06

Table 11 - February 2011 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**
2/1/2011	0.01	0	0.03	0	0	0.01	0.03	0	0	0	0.04	0	0	0	0	0.01	0	0	0.03	0.02	0	0	0.02	0.04
2/2/2011	1.04	1.19	0.79	1.16	0.81	0.68	0.8	0.74	1.15	0.78	0.91	0.59	0	0.58	1.35	0.76	1.2	0.42	0.82	0.76	0.34	1.08	0.73	0.74
2/3/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/4/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/5/2011	0.26	0.32	0.27	0.39	0.31	0.51	0.28	0.26	0	0.86	0.3	0.15	0	0.28	0.39	0.25	0.33	0.35	0.27	0.26	0	0.31	0.26	0.28
2/6/2011	0	0	0	0.01	0	0.01	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/7/2011	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0	0.02	0.04	0.02	0	0	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.03
2/8/2011	0.02	0.03	0.03	0.04	0.04	0.02	0.03	0.03	0.03	0.04	0.03	0.03	0	0.03	0.04	0.03	0.03	0.02	0.02	0.04	0.02	0.03	0.03	0.04
2/9/2011	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
2/10/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/11/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/12/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/14/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/15/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/16/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/17/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/18/2011	0	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/19/2011	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/20/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/21/2011	0	0	0.02	0	0	0.01	0.03	0	0	0.01	0.02	0	0	0.01	0	0.02	0.01	0.01	0.04	0.01	0.01	0	0.04	0.02
2/22/2011	0.14	0.1	0.04	0.15	0	0.26	0.18	0.13	0.12	0.17	0.21	0.13	0.16	0.15	0.16	0.13	0.12	0.21	0.05	0.1	0.08	0.03	0.3	0.13
2/23/2011	0	0.07	0	0.06	0	0.01	0	0	0.08	0.06	0	0.07	0.07	0.01	0.06	0.03	0.05	0.03	0	0.02	0.07	0	0.02	0
2/24/2011	0	0.01	0.04	0.06	0.09	0.02	0.02	0.01	0.06	0.06	0.03	0.02	0.06	0.01	0.01	0.01	0.03	0.02	0.04	0.02	0.09	0.01	0.01	0.04
2/25/2011	0.97	1.04	1.03	1.01	0.99	0.97	1.02	0.65	1.05	1.14	1.03	0.97	0.96	0.92	1.05	1.13	1.13	0.98	0.88	1.1	0.93	0.98	0.97	1.14
2/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/27/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/28/2011	0.31	0.33	0.27	0.29	0.32	0.26	0.3	0.21	0.31	0.3	0.3	0.26	0.28	0.35	0.38	0.34	0.3	0.17	0.23	0.26	0.28	0.29	0.32	0.3

Table 12 - March 2011 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**
3/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/2/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/3/2011	0	0	0	0	0	0	0	0.04	0	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02
3/4/2011	0	0	0	0	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/6/2011	1.35	1.69	1.61	1.35	1.22	2.13	1.42	0.9	2.1	1.79	1.61	1.27	1.43	1.28	1.27	1.49	1.46	1.89	2.04	1.62	2.57	1.71	1.51	1.85
3/7/2011	0.05	0.06	0.09	0.08	0.09	0.06	0.08	0.07	0.06	0.08	0.08	0.05	0.06	0.08	0.08	0.07	0.08	0.02	0.08	0.08	0.09	0.05	0.06	0.08
3/8/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/9/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/10/2011	1.32	1.26	1.03	0.8	1.11	1.42	0.94	0.28	1.42	1.18	1.02	1	0.91	0.84	1.02	1.26	0.94	1.02	0	1.04	1.87	1.27	1.25	1.21
3/11/2011	0.29	0.32	0.33	0.29	0.29	0.31	0.33	0.2	0.3	0.33	0.31	0.29	0.3	0.3	0.31	0.34	0.32	0.17	0	0.33	0.32	0.29	0.34	0.33
3/12/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/14/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/15/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/16/2011	0.67	0.61	0.6	0.69	0.8	0.57	0.78	0.59	0.6	0.68	0.71	0.61	0.66	0.65	0.75	0.65	0.69	0	0.61	0.6	0.61	0.53	0.69	0.61
3/17/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/18/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/19/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/20/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/21/2011	0.43	0.42	0.46	0.44	0.45	0.39	0.41	0.15	0.41	0.48	0.45	0.42	0.44	0.39	0.44	0.45	0.45	0.35	0.4	0.45	0.43	0.37	0.46	0.46
3/22/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/23/2011	0.28	0.3	0.44	0.52	0.35	0.32	0.37	0.23	0.31	0.48	0.42	0.26	0.45	0.34	0.35	0.32	0.43	0	0.39	0.42	0.39	0.28	0.27	0.42
3/24/2011	0.02	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.02	0.01	0.04	0.03	0.03	0.01	0.03	0	0.02	0.04	0.03	0.03	0.03	0.03
3/25/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/27/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/28/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/29/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/30/2011	0	0	0	0	0	0.01	0.01	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0
3/31/2011	0.08	0.12	0.14	0.13	0.1	0.17	0.14	0.13	0.17	0.2	0.17	0.04	0.17	0.11	0.12	0.12	0.14	0.17	0.16	0.09	0.15	0.15	0.07	0.17

Table 13 - April 2011 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**
4/1/2011	0.23	0.31	0.23	0.27	0.22	0.3	0.23	0.23	0.31	0.32	0.26	0.26	0.25	0.19	0.23	0.23	0.23	0.22	0.27	0.21	0.36	0.26	0.24	0.26
4/2/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/3/2011	0.01	0.01	0	0	0.01	0.01	0.01	0	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	0.01	0	0.01	0
4/4/2011	0	0	0.01	0.01	0	0	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0.01	0	0.01	0.01	0.01	0.01	0	0.01
4/5/2011	0.27	0.33	0.28	0.25	0.39	0.25	0.3	0.28	0.25	0.22	0.31	0.29	0.26	0.3	0.3	0.33	0.36	0.12	0.19	0.32	0.28	0.19	0.27	0.2
4/6/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/7/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/8/2011	0.7	0.73	0.75	0.76	0.76	0.76	0.75	0.71	0.72	0.79	0.74	0.75	0.75	0.71	0.74	0.78	0.8	0.77	0.74	0.82	0.78	0.64	0.79	0.81
4/9/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/10/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/11/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/12/2011	0.49	0.62	0.52	0.64	0.48	0.63	0.52	0.44	0.67	0.57	0.56	0.31	0.51	0.44	0.45	0.48	0.47	0.51	0.57	0.59	0.61	0.65	0.43	0.56
4/13/2011	0.25	0.33	0.25	0.26	0.28	0.3	0.28	0.24	0.32	0.3	0.29	0.1	0.24	0.23	0.3	0.26	0.24	0.21	0.27	0.23	0.31	0.33	0.21	0.24
4/14/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/15/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/16/2011	2.77	2.69	2.7	2.23	3.15	2.89	2.7	2.69	2.78	2.77	2.67	2.93	2.51	2.98	2.63	2.92	2.91	2.86	2.61	2.61	2.8	2.73	3.11	2.65
4/17/2011	0.02	0.04	0.05	0.07	0.03	0.04	0.04	0.03	0.04	0.05	0.04	0.03	0.05	0.03	0.03	0.03	0.05	0.04	0.03	0.07	0.05	0.04	0.03	0.05
4/18/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/19/2011	0	0.02	0.03	0.02	0.01	0.04	0.03	0.02	0.04	0.04	0.04	0.01	0.03	0.02	0.02	0.02	0.02	0.05	0.05	0.01	0.07	0.02	0.02	0.04
4/20/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/21/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/22/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/23/2011	0.28	0.29	0.53	0.55	0.31	0.41	0.48	0.55	0.32	0.58	0.55	0.26	0.55	0.31	0.32	0.31	0.59	0.57	0.48	0.54	0.5	0	0.31	0.53
4/24/2011	0.08	0.15	0.19	0.24	0.08	0.11	0.17	0.16	0.17	0.16	0.19	0.12	0.15	0.14	0.15	0.17	0.21	0.12	0.11	0.16	0.12	0	0.11	0.16
4/25/2011	0.01	0	0.01	0.01	0.01	0	0	0	0	0.01	0.01	0.01	0	0	0.01	0	0.01	0.01	0	0.01	0	0	0.01	0.01
4/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/27/2011	0.4	0.38	0.29	0.03	0	0.04	0.4	0.12	0.09	0.02	0.13	0	0.25	0.1	0.32	0.77	0.45	0.05	0.01	0.13	0	0.08	0.21	0.03
4/28/2011	0.07	0.64	0.79	0.1	0.07	0.22	1	0.42	0.37	0.5	0.47	0.07	0.61	0.07	0.1	0.28	0.79	0.36	0.22	0.54	0.26	0.29	0.08	0.39
4/29/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/30/2011	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 14 - May 2011 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**
5/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/2/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/3/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/4/2011	0.5	0.51	0.66	0.7	0.64	0.5	0.58	0.5	0.5	0.57	0.56	0.6	0.56	0.65	0.63	0.57	0.68	0.38	0.45	0.74	0.54	0.42	0.59	0.46
5/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/6/2011	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
5/7/2011	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0.02	0.02
5/8/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/9/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/10/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/11/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/12/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/14/2011	0.19	0.43	0.21	0.05	0.11	0.05	0.3	0.19	0.09	0.04	0.23	0.07	0.23	0.09	0.15	0.21	0.17	0.1	0.09	0.06	0.06	0.08	0.22	0.03
5/15/2011	0.24	0.63	0.92	0.97	0.35	1.05	0.41	0.53	0.99	0.68	0.48	0.54	0.52	0.66	0.46	0.36	0.6	0.65	1.07	0.86	1.28	0.91	0.24	1.02
5/16/2011	0.01	0	0.01	0.01	0.02	0.02	0.04	0.07	0.02	0.05	0.1	0.02	0.04	0.03	0.01	0.01	0.1	0.01	0.02	0.02	0.01	0	0.02	0.02
5/17/2011	0.46	0.42	0.43	0.43	0.38	0.34	0.41	0.35	0.36	0.48	0.43	0.25	0.41	0.43	0.34	0.33	0.45	0.33	0.31	0.44	0.36	0.33	0.37	0
5/18/2011	0.23	0.26	1.14	0.79	0.38	0.29	0.29	0.28	0.36	0.98	0.33	0.21	0.39	0.29	0.16	0.41	0.43	0.21	0.34	0.39	0.23	0.25	0.19	0
5/19/2011	0.51	1.18	0.23	0.32	0.39	0.81	0.28	0.23	0.68	0.24	0.21	0.32	0.26	0.26	0.22	0.33	0.37	0.17	0.16	0.59	1.1	1.12	0.53	0
5/20/2011	0.05	0.08	0.05	0.04	0.11	0.15	0.08	0.06	0.17	0.07	0.05	0.27	0.04	0.09	0.27	0.16	0.05	0.06	0.12	0.12	0.24	0.12	0.13	0
5/21/2011	0	0.01	0.07	0.05	0	0.01	0.03	0.02	0.01	0.16	0.13	0	0.08	0.1	0	0	0.04	0.01	0	0.04	0	0.01	0	0
5/22/2011	0	0	0.03	0.02	0	0	0.01	0	0	0.03	0.02	0	0.02	0	0.01	0	0.01	0	0.02	0.02	0.01	0	0	0
5/23/2011	0.11	0.18	0.16	0.08	0.11	0.21	0.07	0.14	0.11	0.27	0.16	0.05	0.17	0.13	0.17	0.14	0.08	0.15	0.18	0.16	0.34	0.14	0.03	0
5/24/2011	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0.01	0	0
5/25/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/27/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/28/2011	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0.01	0	0	0	0	0	0.03	0	0	0	0
5/29/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/30/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
5/31/2011	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 2011 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**
6/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/2/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/3/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/4/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/6/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/7/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/8/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/9/2011	0.55	0.67	0.39	0.41	0.42	0.17	0.25	0.17	0.29	0.29	0.2	0.41	0.27	0.44	0.34	0.33	0.31	0.14	0.19	0.48	0.19	0.43	0.53	0
6/10/2011	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/11/2011	0.03	0.08	0.08	0.06	0.06	0.25	0.09	0.06	0.17	0.12	0.08	0.21	0.08	0.09	0.15	0.17	0.06	0.27	0.14	0.05	0.22	0.11	0.02	0
6/12/2011	0.24	0.21	0.44	0.29	0.24	0.34	0.31	0.33	0.26	0.43	0.37	0.19	0.43	0.28	0.3	0.3	0.35	0.42	0.47	0.42	0.54	0.23	0.2	0
6/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/14/2011	0.23	0.15	0.09	0.15	0.16	0.34	0.19	0.1	0.29	0.16	0.09	0.18	0.12	0.25	0.22	0.21	0.09	0.24	0.33	0.46	0.25	0.19	0.15	0.21
6/15/2011	0	0	0	0	0	0	0	0	0	0.01	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0
6/16/2011	0.19	0.27	0.18	0.1	0.05	0.31	0.1	0.14	0.19	0.24	0.2	0.04	0.19	0.09	0.05	0.17	0.15	0.22	0.4	0.15	0.45	0.2	0.14	0.24
6/17/2011	1.45	1.5	1.24	1.81	1.5	1.48	1.37	1.32	1.54	1.61	1.2	1.36	1.08	1.59	1.44	1.35	1.41	1.67	1.56	1.74	0.77	1.4	1.54	1.55
6/18/2011	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
6/19/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/20/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/21/2011	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0
6/22/2011	0.28	0.13	0.01	0	0.1	0.16	0.06	0.03	0.28	0.04	0.02	0.18	0.01	0.22	0.04	0.09	0	0.11	0.02	0.02	0.03	0.22	0.14	0.04
6/23/2011	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0.01	0
6/24/2011	0	0	0	0	0	0.01	0	0	0	0.01	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0
6/25/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/28/2011	0.17	0.31	0	0	0.1	0.04	0.02	0.01	0.06	0.01	0	0.1	0	0.03	0.05	0.1	0.01	0.01	0.02	0	0.04	0.08	0.09	0.01
6/29/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30/2011	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 16 - Rain Gage records by year and month for FY 2011

		Rain Gage Number																							
Year	**Month**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
2010	7	8.85	7.78	5.8	5.62	7.06	9.61	6.87	8.99	9.76	6.31	6.52	6.74	5.43	5.57	6.65	7.77	5.89	7.44	9.27	3.82	8.65	8.24	7.41	4.85
2010	8	1.79	1.76	1.26	1.01	0.1	0.62	2.08	2.23	0.95	0.68	2.39	1.74	1.05	0.85	0.8	1.01	1.89	0.98	0.92	1.46	1.1	0.89	2.14	1.43
2010	9	3.17	0	2.67	2.56	2.85	3.66	3.11	2.69	3.06	3.48	3.23	2.93	0	2.66	3.06	3.83	3.17	3.78	5.62	0	3.32	2.74	3.5	3
2010	10	0	0.72	5.38	5.3	5.26	5.86	5.46	4.66	4.45	5.75	5.26	4.46	0.87	5.49	5.37	5.4	5.42	4.56	8.27	1.73	5.44	4.25	5.44	5.32
2010	11	1.8	2.69	2.18	2.61	1.96	0.02	2.17	3.52	1.81	2.43	2.19	1.46	2.66	1.92	2.06	2.65	0.31	2	2.98	2.13	1.94	2.98	1.18	1.86
2010	12	2.31	2.65	2.13	1.76	2.97	1.2	2.72	2.84	2.75	2.79	3.21	2.33	2.79	2.2	2.87	2.75	2.46	2.91	2.5	3.09	2.7	2.13	1.79	3.79
2011	1	1.81	2.01	2.96	0.73	1.69	1.4	3.27	1.75	1.09	0.95	3.01	1.3	1.12	1.73	1.81	3.23	1.42	1.38	2.35	1.9	0.76	1.8	2.83	3.11
2011	2	2.76	3.11	2.54	3.19	2.61	2.78	2.71	2.03	2.82	3.77	2.89	2.22	1.53	2.36	3.45	2.72	3.22	2.23	2.4	2.61	1.84	2.74	2.71	2.76
2011	3	4.49	4.82	4.72	4.34	4.45	5.42	4.56	2.63	5.42	5.28	4.79	3.95	4.46	4.02	4.37	4.71	4.54	3.62	3.7	4.67	6.46	4.68	4.69	5.18
2011	4	5.58	6.54	6.63	5.44	5.8	6	6.92	5.9	6.1	6.34	6.27	5.15	6.17	5.53	5.61	6.59	7.15	5.9	5.57	6.25	6.16	5.24	5.83	5.94
2011	5	2.3	3.71	3.92	3.46	2.49	3.44	2.5	2.37	3.29	3.57	2.7	2.38	2.72	2.74	2.42	2.52	2.98	2.07	2.76	3.58	4.19	3.39	2.34	1.55
2011	6	3.14	3.33	2.43	2.83	2.63	3.1	2.39	2.16	3.08	2.92	2.16	2.68	2.19	2.99	2.59	2.72	2.38	3.08	3.18	3.32	2.49	2.86	2.85	2.06

Table 17 - SSO Statistics for Period July 1 2010 – June 30 2011

Main & Shurs (modeled)					
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	7/9/10 3:55 PM	7/9/10 7:17 PM	3:22	28805	0.215
2	7/10/10 9:42 AM	7/10/10 12:10 PM	2:27	34471	0.258
3	7/12/10 6:57 PM	7/12/10 8:12 PM	1:15	20742	0.155
4	7/13/10 7:05 AM	7/13/10 10:42 AM	3:37	237210	1.774
5	7/25/10 2:57 PM	7/25/10 3:52 PM	0:55	22726	0.170
6	10/1/10 12:40 AM	10/1/10 4:10 PM	8:20	600222	4.490
7	4/16/2011 19:50	4/16/2011 21:42	1:52	25103	0.188
8	6/17/2011 2:22	6/17/2011 2:30	0:07	18	0.0001
PC-30					
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	7/13/10 11:02 AM	7/13/10 1:07 PM	2:05	122873	0.919
2	10/1/10 3:27 AM	10/1/10 9:17 AM	5:50	506442	3.788
3	3/6/11 6:40 PM	3/6/11 10:35 PM	3:55	269537	2.016
4	4/16/2011 20:25	4/17/2011 5:52	9:27	812454	6.078
5	6/17/2011 4:32	6/17/2011 5:32	1:00	46909	0.351
Note: In previous years, these modeled estimates were confirmed with field visits. Since PWD has committed to build infrastructure to control these overflows, site visits were not conducted in FY 2011. As a result, the modeled estimates may not be as accurate as in previous years.					

APPENDIX G –
SUSPECTED PCB SOURCES INSPECTIONS

Page

Table 1 - PCB Inspection Summary

	All Records	Duplicate Records	Actual Records	Outside City	NE	SE	SW	Combined	Separate	Non-Contributing	Storm Sewer Only
FY 2006	39	0	39	0	31	0	8	7	32	0	0
FY 2007	103	6	97	1	44	19	34	52	24	10	10
FY 2008	52	2	50	0	14	9	26	41	5	3	0
FY 2009	11	0	11	0	9	3	0	8	3	0	0
FY 2010	60	9	51	0	12	17	21	43	7	0	0
FY 2011	116	20	96	5	33	18	45	68	19	3	0
Not Found	13	4	9	1	3	1	6	11	0	0	0
Blank Records	4										
Total	398	41	357	7	146	67	140	230	90	16	10

Table 2 - Potential PCB Source Inspection List

Table 2 Key
Duplicate Record
Outside the City

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned/not secure
NE-1	USEPA Megarule	2006-4	02/28/07	Arsenal Associates Business Center	5301 Tacony St.	Transformers	86	**X**				**X**		
NE-2	USEPA Megarule	2006-4	Duplicate Record	Arsenal Associates	5301 Tacony St.		87				**NA**		**NA**	
NE-3	USEPA Megarule	2010-1	02/03/10	The School District of Philadelphia	7300 Glendale Avenue	Transformers	6	x				x		
NE-4	USEPA Megarule	2110-1	Duplicate Record	The School District of Philadelphia	7300 Glendale Avenue		6							
NE-5	USEPA Megarule	2007-1	03/28/07	Community Education Partners c/o Keating Dev	4224 N. Front Street		2	X				X		
NE-6	USEPA Megarule	2007-1	Duplicate Record	Community Education Partners c/o Keating Dev	4224 N. Front Street		2							
NE-7	USEPA Megarule	2009-2	Duplicate Record	The School District of Philadelphia	1400 West Olney Avenue		4							

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-8	USEPA Megarule	2010-1	02/03/10	The School District of Philadelphia	1400 West Olney Avenue	Transformers	4	X				X		
NE-9	USEPA Megarule	2006-3	Duplicate Record	Sunoco Chemicals Frankford Plant	Cooling Tower 4		2				**NA**		**NA**	
NE-10	USEPA Megarule	2006-3	10/23/06	Sunoco Chemicals Frankford Plant	Margeret and Bermuda Sts		0 (2 removed)				**X**	**X**		
NE-11	USEPA Megarule	2006-4	01/30/07	Posel Corporation	9381 Krewstown Road	Transformer	1	**X**				**X**		
NE-12	USEPA Megarule	2006-4	01/30/07	Posel Corporation	9381 Krewstown Road	Transformer	1	**X**				**X**		
NE-13	USEPA Megarule	2010-1	02/03/10	The School District of Philadelphia	10159 Bustleton Avenue	Transformers	2	X				X		
NE-14	USEPA Megarule	2009-2	Duplicate Record	The School District of Philadelphia	10159 Bustleton Avenue		2							
NE-15	USEPA Megarule	2011-1	Duplicate Record	Peco Energy Company	Walnut & Fourth Street		2							

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned/not secure
NE-16	USEPA Megarule	2008-1	Duplicate Record	Peco Energy Company	Walnut & Fourth Street		2							
NE-17	USEPA Megarule	2009-4	10/06/09	Septa	1410 W. Loudon Street	transformer	2	x				x		
NE-18	USEPA Megarule	2009-2	Duplicate Record	The School District of Philadelphia	5701 Oxford Street 59th and Lancaster Sts.		3							
NE-19	USEPA Megarule	2010-4	12/20/10	The School District of Philadelphia	5701 Oxford Street 59th and Lancaster Sts.		3		x	x	x	x		
NE-20	USEPA Megarule	2006-3	10/23/06	Sunoco Chemicals Frankford Plant	Margeret and Bermuda Sts		0 (1 removed)				**X**	**X**		
NE-21	USEPA Megarule	2006-2	Duplicate Record	Sunco Chemicals , Frankford Plant	Cooling Tower 3		1				**NA**		**NA**	
NE-22	USEPA Megarule	2006-2	06/23/06	General Electric International, Inc. (GEII)	1040 East Erie Avenue	Transformer	2		**X**		**X**	**X**		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
NE-23	USEPA Megarule	2006-2	06/23/06	General Electric International, Inc. (GEII)	1040 East Erie Avenue	CAPACITOR S	2		X		X	X		
NE-24	USEPA Megarule	2006-2	06/23/06	National Railroad Passenger Corporation-Amtr--SEPTA	General Electric Service Shop, 1040 East Erie Ave.	Undercars for SEPTA	26	**See Note **				X		
NE-25	USEPA Megarule	2006-2	06/23/06	National Railroad Passenger Corporation-Amtr--SEPTA	General Electric Service Shop, 1040 East Erie Ave.		0 (1 removed)	**See Note **				X		
NE-26	USEPA Megarule	2006-2	Duplicate Record	Sunco Chemicals Frankford Plant	Cooling Tower 5		1				NA		NA	
NE-27	USEPA Megarule	2006-3	10/23/06	Sunoco Chemicals Frankford Plant	Margeret and Bermuda Sts		1				X	X		
NE-28	USEPA Megarule	2009-2	Duplicate Record	PECO Energy Co.	Legrande Avenue		1							
NE-29	USEPA Megarule	2009-2	Duplicate Record	PECO Energy Co.	Legrande Avenue		1							
NE-30	USEPA Megarule	2011-1	04/15/11	Peco Energy Company	900 Big Oak Road	Light & Power	1	x				x		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-31	USEPA Megarule	2009-2	Duplicate Record	Peco Energy Company	900 Big Oak Road		1							
NE-32	USEPA Megarule	2011-1	02/24/11	Peco Energy Company	2860 Trenton Avenue		1	x				x		
NE-33	USEPA Megarule	2009-2	Duplicate Record	Peco Energy Company	2860 Trenton Avenue		1							
NE-34	USEPA Megarule	2011-1	02/18/11	Peco Energy Company	Betharyes Road & 2nd St Pike 2331 Philmont Ave		1	x				x		
NE-35	USEPA Megarule	2009-2	Duplicate	Peco Energy Company	Betharyes Road & 2nd St Pike		1							
NE-36	Phila. Water Dept	2006-3	11/20/06	PHILA WATER DEPT	9001 STATE RD	CAPACITORS	6		Yes - 2006	& Removed		X		
NE-37	USEPA Megarule	2010-4	Duplicate of NE-50	The Philadelphia District of Schools	3939 N. 5th Street		2							
NE-38	USEPA Megarule	2009-2	Duplicate of NE-50	The Philadelphia District of Schools	3939 N. 5th Street		2		x	x			x	x
NE-39	Phila. Fire Dept	2006-3	10/11/06	AFTER SIX INC	G & HUNTING PARK	TRANSFORMER	1				X		Demolished	

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned /not secure
NE-40	Phila. Fire Dept	2007-2	10/01/07	BRUCE HALL FORKLIFT Wymex Beauty	3621 B ST.	TRANSFORMER	1	X				X		
NE-41	Phila. Fire Dept	2007-1	06/08/07	BUDD CO	FOX & HUNTING PK	TRANSFORMER	1		X			X		
NE-42	Phila. Fire Dept	2007-2	07/23/07	DODGE FOUNDRY	6501 STATE RD	TRANSFORMER	1		X	X	X		X	Demolished
NE-43	Phila. Fire Dept	2007-2	07/23/07	DODGE FOUNDRY	6501 STATE RD	TRANSFORMER	1		X	X	X		X	Demolished
NE-44	Phila. Fire Dept	2011-1	02/15/11	Boathouse Sport	401 E HUNTING PK	TRANSFORMER	1	x				x		
NE-45	Phila. Fire Dept	2011-1	02/28/11	MUTUAL INDUS.	707 W. GRANGE	TRANSFORMER	1	x				x		
NE-46	Phila. Fire Dept	2008-4	10/31/08	NE SHOPPING CTR	9173 ROOSEVELT BLVD	TRANSFORMER	1		x	x	x		X	
NE-47	Phila. Fire Dept	2008-4	10/31/08	NE SHOPPING CTR	9173 ROOSEVELT BLVD	TRANSFORMER	1		x	x	x		X	
NE-48	Phila. Fire Dept	2011-1	04/18/11	NORTHERN ASSOCIATES	7777 STATE RD.	TRANSFORMER	1		x	x	x		x	x
NE-49	Phila. Fire Dept	2007-1	04/27/07	PHILA PRISONS	8215 TORRESDALE	TRANSFORMER	1	X				X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-50	Phila. Fire Dept	2010-4	12/20/10	PHILA SCHOOL BOARD	5TH & LUZERNE	TRANSFORMER	1		x	x			x	x
NE-51	Phila. Fire Dept	2010-4	12/20/10	PHILA SCHOOL BOARD	B & WYOMING	TRANSFORMER	1		x	x	x	x		
NE-52	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	HEDGE & UNITY (STEARNE)	TRANSFORMER	1		x	x	x	x		
NE-53	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	KNIGHTS & CHALFONT	TRANSFORMER	1	x				x		
NE-54	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	SHARON & ALICIA	TRANSFORMER	3	x				x		
NE-55	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEVELT BLVD	TRANSFORMER	1				X	X		
NE-56	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEVELT BLVD	TRANSFORMER	1				X			Demolished
NE-57	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEVELT BLVD	TRANSFORMER	1				X			Demolished
NE-58	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEVELT BLVD	TRANSFORMER	1				X			Demolished

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
NE-59	Phila. Fire Dept	2007-2	08/15/07	S.D. RICHMAN INC	2435 WHEATSHEAF	TRANSFORMER	1	X				X		
NE-60	Phila. Fire Dept	2007-1	09/04/07	SEARS & ROEBUCK Preit	4820 LANGDON ST	TRANSFORMER	1		X	X	X		X	
NE-61	Phila. Fire Dept	2009-4	10/06/09	SEPTA	4701 GRISCOM ST	TRANSFORMER	1 0		X	X	X	X		
NE-62	Phila. Fire Dept	2009-1	03/07/09	SEPTA	8365 CASTOR AVE	TRANSFORMER	1		X	X	X	X		
NE-63	Phila. Fire Dept	2007-2	10/01/07	STORM WEATHER Wymex Beauty (TL Tan LLC)	3621 B ST	TRANSFORMER	1	X				X		
NE-65	Phila. Fire Dept	2007-2	07/19/07	TALCO METALS Specialty Engine Rebuilding	5201 UNRUH	TRANSFORMER	1	X				X		
NE-66	Phila. Fire Dept	2006-3	10/23/06	THALHEIMER BROS	5550 WHITAKER AVE	TRANSFORMER	1	X				X		
NE-67	Phila. Fire Dept	2006-3	10/23/06	THALHEIMER BROS	700 E GODFREY AVE	TRANSFORMER	1 2	X				X		

PWD	Referral	Comp	Inspection	Company	Address	Type of PCB	# of PCB	Status of PCB Equipment				Status of Facility		
#	Agency	leted	Date	Name		Equipment	Devices	In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
NE-68	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MER	0				X	X		
NE-69	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MER	0				X	X		
NE-70	Phila. Fire Dept	2011-4	03/04/11	TRIANGLE CONTAINER Menasha	601-21 E ERIE	TRANSFOR MER	1	x				x		
NE-71	Phila. Fire Dept	2008-4	10/08/08	FAIRMOUNT PARK (BANDSTAND)	OLD YORK RD. & HUNTING PARK AVE	TRANSFOR MER (PECO)	1	X				X		
NE-72	Phila. Fire Dept	2009-1	04/27/09	SEPTA	WINDRIM & GERMANTO WN	TRANSFOR MERS	10		x	x	x	x		
NE-73	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITOR S	2				X	X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-74	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITORS	2				X	X		
NE-75	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITORS	2				X	X		
NE-76	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITORS	2				X	X		
NE-77	Phila. Fire Dept	2011-1	02/15/11	Island Import International Inc	4219 TORRESDALE	TRANSFORMERS	2	x				x		
NE-78	Phila. Fire Dept			BARRIT CORP	CASTOR & SEDGELY	TRANSFORMERS	2							
NE-79	Phila. Fire Dept	2007-1	06/09/07	BUDD CO	2501 HUNTING PK	TRANSFORMERS	2		X			X		
NE-80	Phila. Fire Dept	2006-1	05/17/06	Cardinal Health: Formerly DEVON APPAREL	3001 RED LION RD	TRANSFORMERS	0				X	X		

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								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-81	Phila. Fire Dept	2011-1	03/09/11	FOX TRUST BLDG	3634 N BROAD	TRANSFORMERS	2	x				x		
NE-82	Phila. Fire Dept	2011-1	02/15/11	FRANKLIN SMELTING	CASTOR & RICHMOND	TRANSFORMERS	2						x	x
NE-83	Phila. Fire Dept	2010-4	11/28/10	JOHN F. KENNEDY MEMORIAL HOSPITAL	5600 LANGDON ST.	TRANSFORMERS	2		x	x	x		x	
NE-84	Phila. Fire Dept	2007-2	08/17/07	KAY AUTOMOTIVE Wolf Investments	1771 TOMLINSON	TRANSFORMERS	2		X	X	X	X		
NE-85	Phila. Fire Dept			SEARS & ROEBUCK	4640 ROOSEVELT BLVD	TRANSFORMERS	2							
NE-86	Phila. Fire Dept	2009-1	03/07/09	SEPTA	1823 E. LETTERLY	TRANSFORMERS	2		x	x	x	x		
NE-87	Phila. Fire Dept	2011-1	03/25/11	SEPTA	200 W WYOMING	TRANSFORMERS	2		x	x	x	x		
NE-88	Phila. Fire Dept	2009-1	04/27/09	SEPTA	4000 N BROAD	TRANSFORMERS	2		x	x	x		x	
NE-89	Phila. Fire Dept	2009-4	10/06/09	SEPTA	1823 E. LETTERLY	TRANSFORMERS	2		x	x	x	x		
NE-90	Phila. Fire Dept	2007-2	07/24/07	STERNS	7300 BUSELTON AVE	TRANSFORMERS	2		X	X	X	X		Demolished
NE-91	Phila. Fire Dept	2007-1	04/30/07	Sterqua Corp Sterling Paper	2155 E CASTOR	TRANSFORMERS	2	X				X		

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								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-92	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-93	Phila. Fire Dept	2006-1	05/18/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-94	Phila. Fire Dept	2006-1	05/19/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-95	Phila. Fire Dept	2006-1	05/20/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-96	Phila. Fire Dept	2006-1	05/21/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		

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								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-97	Phila. Fire Dept	2006-1	05/22/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-98	Phila. Fire Dept	2006-1	05/23/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-99	Phila. Fire Dept	2006-1	05/24/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-100	Phila. Fire Dept	2006-1	05/25/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMERS	0				X	X		
NE-101	Phila. Fire Dept	2006-1	05/26/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	CAPACITORS	0				X	X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-102	Phila. Fire Dept	2006-1	05/27/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	CAPACITORS	0				X	X		
NE-103	Phila. Fire Dept	2006-1	05/28/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	CAPACITORS	0				X	X		
NE-104	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITORS	26				X	X		
NE-105	Phila. Fire Dept	2007-1	05/29/07	SEARS & ROEBUCK	5540 ALGON STST	TRANSFORMER	3		X	X	X	X		
NE-106	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	TRANSFORMER	3	X				X		
NE-107	Phila. Fire Dept	2007-1	06/07/07	BUDD CO	2501 HUNTING PK	TRANSFORMER	3	??				X		

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								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
NE-108	Phila. Fire Dept	2007-2	07/26/07	COMMENWEALTH OF PA Northwest Human Services	2900 SOUTHHAMPTON	TRANSFORMER	3	X				X		
NE-109	Phila. Fire Dept	2011-1	02/24/11	PHILA ELECTRIC CO	3300 S 10th st (Near stadium)	TRANSFORMER	3	x				x		
NE-110	Phila. Fire Dept	2007-1	04/27/07	PHILA PRISONS	8001 STATE RD.	TRANSFORMER	3	X				X		
NE-111	Phila. Fire Dept	2010-4	12/20/10	PHILA SCHOOL BOARD	BROAD & OLNEY (WIDNER)	TRANSFORMER	3	x				x		
NE-112	Phila. Fire Dept	2010-4	12/20/10	PHILA SCHOOL BOARD	FRONT & DUNCANNON (OLNEY)	TRANSFORMER	3	x				x		
NE-113	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	OLD YORK RD. & ONTARIO (BETHUNE)	TRANSFORMER	3		x	x	x	x		
NE-114	Phila. Fire Dept	2007-2	08/17/07	QUEEN CASUALS Active Reality (Black red white furniture/ PBM	10175 NORTHEAST AVE	TRANSFORMER	3		X	X	X	X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Out of Service	Disconnected	Off Site	Status of Facility: Operating	Closed	Abandoned /not secure
NE-115	Phila. Fire Dept	2007-1	09/04/07	SEARS & ROEBUCK Preit	4640 ROOSEVELT BLVD	TRANSFORMER	3		X	X	X		X	
NE-116	Phila. Fire Dept	2007-1	09/04/07	SEARS & ROEBUCK Preit	4640 ROOSEVELT BLVD	TRANSFORMER	3		X	X	X		X	
NE-117	Phila. Fire Dept	2009-1	04/27/09	SEPTA	BROAD & ALLGEHENY	TRANSFORMER	3		x	x	x	x		
NE-118	Phila. Fire Dept	2009-1	03/25/11	SEPTA	BROAD & WYOMING	TRANSFORMER	3		x	x	x	x		
NE-119	Phila. Fire Dept	2006-3	10/23/06	THALHEIMER BROS.	5601 TABOR AVE.	TRANSFORMER	3	X				X		
NE-120	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMER	0				X	X		
NE-121	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACONY	CAPACITORS	4	X				X		
NE-122	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACONY	CAPACITORS	4	X				X		
NE-123	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	18 & HUNTING PARK (GRATZ)	TRANSFORMERS	4		x	x	x	x		

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								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
NE-124	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-125	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-126	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-127	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-128	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-129	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-130	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-131	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-132	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-133	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD						X	X		
NE-134	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACONY	CAPACITORS	5	X				X		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
NE-135	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITOR S	5				X	X		
NE-136	Phila. Fire Dept	2006-3	11/16/06	ANZON	2545 ARAMINGO AVE.	TRANSFOR MERS	5				X		X	
NE-137	Phila. Fire Dept	2010-2	Duplicate of NE-156	PHILA ELECTRIC CO	7735 GERMANTO WN AVE	TRANSFOR MERS	5							
NE-138	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACONY	CAPACITOR S	6	X				X		
NE-139		2006-2	Blank record								NA		NA	
NE-140	Phila. Fire Dept		04/29/11	PHILA ELECTRIC CO	3901 N DELAWARE AVE	TRANSFOR MERS	6	x				x		
NE-141	Phila. Fire Dept	2011-1	02/18/11	PHILA ELECTRIC CO	4125 LONGSHOR E ST	TRANSFOR MERS	6	x				x		
NE-142	Phila. Fire Dept	2011-1	02/24/11	PHILA ELECTRIC CO	7549 THOURON ST	TRANSFOR MERS Regulators	6 2	x				x		
NE-143	Phila. Fire Dept	2006-3	10/23/06	THALHEIMER BROS	700 E GODFREY AVE	TRANSFOR MERS	7 (5 retrofille d 2 dry)	X				X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-144	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACONY	CAPACITORS	8	X				X		
NE-145	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITORS	8				X	X		
NE-146	Phila. Fire Dept	2009-1	02/28/09	SEPTA	BROAD & GRANGE	TRANSFORMERS	8		x	x	x	x		
NE-147	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	CAPACITORS	0				X	X		
NE-148	Phila. Fire Dept	2006-3	10/23/06	ALUMINIUM FINISHING	700 E GODFREY	TRANSFORMERS	2 Replaced w/ dry (4/94)	X				X		
NE-149	Phila. Fire Dept	2007-3	07/18/07	PHILA STREETS	DELAWARE & WHEATSHEAF	RETROFILLED				X			X	
NE-150	Phila. Fire Dept	2006-3	10/13/06	VIZ MFG CO Philly Self Service	335 E PRICE	RETROFILLED					X	X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned/not secure
NE-151	Phila. Fire Dept	2010-4	11/26/10	JOHN F. KENNEDY HOSPITAL	CHELTENHAM AVE. & LANGDON ST.	TWO TRANSFORMERS				x	x	x	x	
NE-152	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	D & ALLEGHENY (ELKIN)	transformer	2		x	x	x	x		
NE-153	Exelon	2011-1	02/24/11	PECO Energy	6106 N 5th Street	Regulator		x				x		
NE-154	Exelon	2011-1	02/18/11	PECO Energy	5031 Elbridge Street	PCB Capacitors		x				x		
NE-155	Exelon	2011-1	02/24/11	PECO Energy	3440 Richmond Street	Light & Power		x				x		
NE-156	Exelon	2011-1	02/24/11	PECO Energy	7735 Gremanton Avenue	Regulator		x				x		
NE-157	Exelon	2011-1	Duplicate Record	PECO Energy	7736 Gremanton Avenue	Regulator								
NE-158	Exelon	2011-1	Duplicate Record	PECO Energy	7737 Gremanton Avenue	Regulator								
NE-159	Exelon	2011-1	Duplicate Record	PECO Energy	7738 Gremanton Avenue	Regulator								

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-160	Exelon	2011-1	Duplicate Record	PECO Energy	7739 Gremanton Avenue	Regulator								
NE-161	Exelon	2011-1	Duplicate Record	PECO Energy	7740 Gremanton Avenue	Regulator								
NE-162	Exelon	2011-1	02/18/11	PECO Energy	Pennypack Street	Cable Compartment		x				x		
NE-163	Exelon	2011-1	02/24/11	PECO Energy	1100 Ivy Hill Road	PCB Capacitors		x				x		
NE-164	Exelon	2011-1	02/24/11	PECO Energy	651 Foulkrod Street	PCB Capacitors		x				x		
NE-165	Exelon	2011-1	02/18/11	PECO Energy	7738 Tabor Road	PCB Capacitors		x				x		
NE-166	Exelon	2011-1	02/18/11	PECO Energy	4601 Rhawn Street	PCB Capacitors		x				x		
NE-167	Exelon	2011-1	04/15/11	PECO Energy	LeGrande Avenue	Light & Power		x				x		
NE-168	Phila. Fire Dept	2006-4	03/16/07	STONE CONTAINER	9820 BLUE GRASS RD	TRANSFORMER	1				X	X		
NE-169	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITOR	1				X	X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
NE-200	Phila. Fire Dept	2007-1	06/10/07	BUDD CO	2401 HUNTING PK		TRANSFORMERS -1 REMOVED NOW 4	??			X			
NE-201	Phila. Fire Dept	2007-1	04/25/07	Pioneer Leimel	2250 E ONTARIO ST	TRANSFORMER	1	X				X		
SE-1	USEPA Megarule	2009-1	10/6/2009	SEPTA	816 Sansom Street	Transformer	2	x				x		
SE-2	USEPA Megarule	2009-4	10/6/2009	SEPTA	1327 Mount Vernon Street	Transformer	3	X				X		
SE-3	USEPA Megarule		4/28/2009	The School District of Philadelphia	1700 N. 11th Street		1							
SE-4	USEPA Megarule	2009-2	Duplicate Record	The School District of Philadelphia	1700 N. 11th Street		1							
SE-5	USEPA Megarule	2009-4	10/10/2009	SEPTA	Broad & Pattison Streets	Transformers	2	X				X		
SE-6	Phila. Fire Dept	2006-3	3/14/2007	SOUTHWARK PLAZA (PHA)	1024 S. 4TH. ST.	TRAMSFORMER	1					X	X	
SE-8	Phila. Fire Dept	2006-4	3/14/2007	BROAD & LOCUST ASSOCIATES	230 S. BROAD ST.	TRANSFORMER	1				X	X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
SE-9	Phila. Fire Dept	2008-1	1/9/2008	FOUR FREEDOMS	6101 W MORRIS ST	TRANSFORMER	1	x				x		
SE-10	Phila. Fire Dept	2007-1	5/10/2007	PACKER MARINE TERMINAL	DELAWARE & PACKER	TRANSFORMER	1				**X**	**X**		
SE-11	Phila. Fire Dept		2/14/2011	PHILA ELECT CO	2646 S 13TH ST	Regulators	3	x				x		
SE-12	Phila. Fire Dept	2011-1	2/15/2011	PHILA ELECTRIC CO	456 E INDIANNA AVE	TRANSFORMER	1		x	x	**x**		**x**	
SE-13	Phila. Fire Dept	2009-2	Duplicate of SE-71	PHILA SCHOOL BOARD	11 & C. B. MOORE (WANAMAKER)	TRANSFORMER	1							
SE-14	Phila. Fire Dept	2010-2	4/26/2010	PHILA SCHOOL BOARD	8TH & MIFFLIN (BOK)	TRANSFORMER	4	X				X		
SE-15	Phila. Fire Dept	2010-2	5/25/2010	PHILA SCHOOL BOARD	B & ALLEGEHENT (STETSON)	TRANSFORMER	1	x				x		
SE-16	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	E.YORK & TRENTON (HACKETT)	TRANSFORMER	1		x	x	**x**	x		
SE-17	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	FKD & CLEMINTINE	TRANSFORMER	5		x	x	**x**	x		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SE-19	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1097 GERMANTOWN	TRANSFORMER	1				**X**		**2002**	
SE-20	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1097 GERMANTOWN	TRANSFORMER	1				**X**		**2002**	
SE-21	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1135 N 2ND	TRANSFORMER	1				**X**		**2002**	
SE-22	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	128 W. VAN HORN	TRANSFORMER	1				**X**		**2002**	
SE-23	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	145 W. WILDEY	TRANSFORMER	1				**X**		**2002**	
SE-24	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	162 W. GIRARD	TRANSFORMER	1				**X**		**2002**	
SE-25	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	188 W. GIRARD	TRANSFORMER	1				**X**		**2002**	
SE-26	Phila. Fire Dept	2011-1	2/16/2011	SCHNEIDER BROS	1317 BROWN	TRANSFORMER	1		x	x	**x**		**x**	
SE-27	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	BROAD & FAIRMOUNT	TRANSFORMER	1		x	x	**x**	x		
SE-28	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	BROAD & FAIRMOUNT	TRANSFORMER	1		x	x	**x**	x		
SE-29	Phila. Fire Dept	2009-1	4/8/2009	SEPTA	BROAD & GIRARD	TRANSFORMER	1		x	x	**x**	x		
SE-30	Phila. Fire Dept	2009-2	3/25/2011	SEPTA	BROAD & GIRARD	TRANSFORMER	1		x	x	**x**	x		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SE-31	Phila. Fire Dept	2009-4	10/6/2009	SEPTA	MC KEAN & JUNIPER	TRANSFOR MER	0		x	x	**x**	x		
SE-32	Phila. Fire Dept	2008-1	1/9/2008	ZEIGLER & SONS Wholesale Florists	6215 ARDLEIGH ST	TRANSFOR MER	1	X				X		
SE-33	Phila. Fire Dept	2011-1	2/24/2011	PHILA ELECTRIC CO	267 E JOHNSON ST	TRANSFOR MERS Regulators	11 3	x				x		
SE-34	Phila. Fire Dept	2011-1	3/9/2011	PGW	1800 N. 9TH. ST.	CAPACITOR S (6 TRANSFOR MERS REMOVED)	2	x				x		
SE-35	Phila. Fire Dept	2011-1	Dup of SE-52	METRO HOSP	201 N 8TH ST	TRANSFOR MERS	2							
SE-36	Phila. Fire Dept	2007-1	5/10/2007	PACKER MARINE TERMINAL	DELAWARE & PACKER	TRANSFOR MERS	2				**X**	**X**		
SE-37	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	2400 N. 8TH (HARTRANF T REC. CENTER)	TRANSFOR MERS	1		x	x	**x**	x		
SE-38	Phila. Fire Dept	2007-2	8/29/2007	PSFS	7TH & WALNUT	TRANSFOR MERS	2		**X**			**X**		
SE-39	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1147 N 2ND	TRANSFOR MERS	2				**X**		**2002**	

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								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
SE-40	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1157 SOPHIA	TRANSFORMERS	2				**X**		**2002**	
SE-41	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	119 EDWARD	TRANSFORMERS	2				**X**		**2002**	
SE-42	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	121 EDWARD	TRANSFORMERS	2				**X**		**2002**	
SE-43	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	8TH & RIDGE	TRANSFORMERS	2		x	x	**x**	x		
SE-44	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	BROAD & SPRING GARDEN	TRANSFORMERS	2		x	x	**x**	x		
SE-45	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKET & 13TH	TRANSFORMERS	2		x	x	**x**	x		
SE-46	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKET & 5TH	TRANSFORMERS	2		x	x	**x**	x		
SE-47	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKET & 8TH	TRANSFORMERS	2		x	x	**x**	x		
SE-48	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKET & JUNIPER	TRANSFORMERS	2		x	x	**x**	x		
SE-49	Phila. Fire Dept	2007-2	8/27/2007	SHOE CTR PHILA [Loft Condos]	436-54 N 4TH ST	TRANSFORMERS	2				**X**	**X**		
SE-50	Phila. Fire Dept	2006-3	10/30/2006	ABBOTTS DAIRIES Philadelphia Turf Club	700 PACKER AVE	TRANSFORMERS	2				**X**		**X**	

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								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SE-51	Phila. Fire Dept	2011-1	3/2/2011	JEFFERSON HOSPITAL	1020 LOCUST ST	TRANSFOR MERS	3	x				x		
SE-52	Phila. Fire Dept	2011-1	3/3/2011	Club Condominium	201 N 8TH ST	TRANSFOR MER	3	x				x		
SE-53	Phila. Fire Dept	2011-1	2/15/2011	PHILA ELECTRIC CO	2726 W. GORDON ST	TRANSFOR MER	3		x	x	x		x	
SE-54	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	8 & CUMBERLA ND (HARTRANF T)	TRANSFOR MER	3		x	x	x	x		
SE-55	Phila. Fire Dept	2009-1	Duplicate Record	SEPTA	1117 ARCH ST	TRANSFOR MER	3							
SE-56	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	BROAD & MANNING	TRANSFOR MER	3		x	x	x	x		
SE-57	Phila. Fire Dept	2009-1	4/29/2009	SEPTA	RIDGE & CALLOWHI LL	TRANSFOR MER	3		x	x	x	x		
SE-58	Phila. Fire Dept	2007-2	8/27/2007	US GOVT (GSA) [Social Security Admin. Bldg.)	300 SPRING GARDEN	TRANSFOR MERS	4				X	X		
SE-59	Phila. Fire Dept	2007-2	8/28/2007	US GOVT (GSA) [Social Security Admin. Bldg.)	300 SPRING GARDEN	TRANSFOR MERS	4				X	X		
SE-60	Phila. Fire Dept		5/3/2011	QUAKER STORAGE	901 POPLAR ST	TRANSFOR MERS	5		x	x			x	

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								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SE-61	Phila. Fire Dept	2011-1	3/2/2011	PENN MUTUAL	530 WALNUT ST.	TRANSFOR MERS	6		x	x	x	x		
SE-62	Phila. Fire Dept	2007-2	8/30/2007	US GOVT (GSA)	BROAD & WASHINGT ON	TRANSFOR MERS	9				X	X		
SE-63	Phila. Fire Dept	2011-1	3/7/2011	1401 ARCH ST. BUILDING	1401 ARCH ST.	REMOVED/ REPLACED (5)		x				x		
SE-64	Phila. Fire Dept	2007-2	8/29/2007	CURTIS CTR	601 WALNUT ST	RETROFILLE D	[2]		X			X		
SE-65	Phila. Fire Dept	2011-1	3/3/2011	KEYSTONE SHIPPING	315 CHESTNUT ST	RETROFILLE D		x				x		
SE-66	Phila. Fire Dept	2011-1	Duplicate	KEYSTONE SHIPPING	313 CHESTNUT ST	RETROFILLE D								
SE-67		2011-1	3/2/2011	PHILA GIRARD SQ	21 S. 12TH ST	RETROFILLE D	6		x	x	x	x		
SE-68	Phila. Fire Dept	2007-1	6/19/2007	PHILA STREETS (EAST CENTRAL INCINERATO R)	DELAWARE & SPRING GARDEN	RETROFILLE D					X		X	

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
SE-69	Phila. Fire Dept	2007-1	6/19/2007	PHILA STREETS (EAST CENTRAL INCINERATOR)	DELAWARE & SPRING GARDEN	RETROFILLED					X		X	
SE-70	Phila. Fire Dept	2007-1	6/19/2007	PHILA STREETS (EAST CENTRAL INCINERATOR)	DELAWARE & SPRING GARDEN	RETROFILLED					X		X	
SE-71	Phila. Fire Dept	2007-2	8/31/2007	WANAMAKERS	1300 MARKET	RETROFILLED					X	X		
SE-72	Phila. Fire Dept	2010-2	5/25/2010	PHILA SCHOOL BOARD	2800 N. 6TH ST (FAIRHILL)	transformer	2		x	x	x	x		
SE-73	Exelon		4/14/2011	PECO	1121 W. Callowhill St.	PCB Capacitors		x				x		
SW-1	USEPA Megarule	2009-1	10/6/2009	SEPTA	33rd & Market St; Subway Surface	Transformers	3	x				x		
SW-2	USEPA Megarule	2010-1	2/3/2010	The School District of Philadelphia	1400 Green Street	Transformers	2	x				x		

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								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
SW-3	USEPA Megarule	2009-2	Duplicate Record	The School District of Philadelphia	1400 Green Street		2							
SW-4	USEPA Megarule	2009-4	10/6/2009	SEPTA	2034 Ranstead Street	Transformer	3	X				X		
SW-5	USEPA Megarule	2010-2	6/18/2010	The School District of Philadelphia	6450 Ridge Avenue	Transformer	8	x				x		
SW-6	USEPA Megarule	2010-2	Duplicate of SW-5	The School District of Philadelphia	6450 Ridge Avenue		4							
SW-7	USEPA Megarule	2011-1	2/14/2011	Peco Energy Company	WesterChester Pike & Ashton Rd		1		x	x	x	x		
SW-8	USEPA Megarule	2009-2	Duplicate Record	Peco Energy Company	WesterChester Pike & Ashton Rd		1							
SW-9	USEPA Megarule	2011-1	2/14/2011	PECO Energy Co.	E. Wynnewood Road, SW/O Lancaster Pike	Transformers	2	x				x		
SW-10	USEPA Megarule	2008-1	Duplicate Record	PECO Energy Co.	E. Wynnewood Road, SW/O Lancaster Pike		1							

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								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-11	USEPA Megarule	2010-2	Duplicate of SW-82	The School District of Philadelphia	2200 N. 31st Street		2							
SW-12	USEPA Megarule	2009-2	Duplicate of SW-82	The School District of Philadelphia	2200 N. 31st Street		2							
SW-13	USEPA Megarule	2011-1	2/24/11	Peco Energy Company	2800 Christian Street		2	x				x		
SW-14	USEPA Megarule	2009-2	Duplicate Record	Peco Energy Company	2800 Christian Street		2							
SW-15	USEPA Megarule	2006-4	2/22/2007	Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLE D	3 2	X				X		
SW-16	USEPA Megarule	2006-4	2/22/2007	Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLE D	3 2	X				X		
SW-17	USEPA Megarule	2009-2	Duplicate Record	Peco Energy Company	2131 N 62nd Street		1							
SW-18	USEPA Megarule	2011-1	2/14/2011	Peco Energy Company	2131 N 62nd Street		1	x				x		
SW-19	USEPA Megarule	2011-1	2/14/2011	PECO Energy Co.	380 Long Lane		1	x				x		
SW-20	USEPA Megarule	2008-1	Duplicate Record	PECO Energy Co.	380 Long Lane		1							

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned /not secure
SW-21	USEPA Megarule	2006-4	2/20/2007	Goebelwood Ind. Inc,	100 Sycamore Ave.	Transformers	3	X				X		
SW-22	USEPA Megarule	2006-4	Duplicate Record	Goebelwood Ind. Inc,	100 Sycamore Ave.		3							
SW-23	Phila. Water Dept	2006-2	10/4/2006	PHILA WATER DEPT	7000 Penrose Ave	CAPACITOR	2	X				X		
SW-24	Phila.Water Dept	2006-2	10/24/2006	PHILA WATER DEPT	NEIL DR & WINDING RD	TRANSFORMER	1		**2004**		X	X		
SW-25	Phila. Fire Dept	2007-4	1/25/2008	PASCHALL APARTMENTS (PHA)	7212 WOODLAND AVE		1			X		X		
SW-26	Phila. Fire Dept	2011-1	1/18/2011	1500 WALNUT BLDG	15TH WALNUT ST	TRANSFORMER	1	x				x		
SW-27	Phila. Fire Dept	2006-3	10/11/2006	ADAMS MARK HOTEL	CITY & MONUMENT	TRANSFORMER	1		**2005**		X			Demolished
SW-28	Phila. Fire Dept	2006-3	10/11/2006	ADAMS MARK HOTEL	CITY & MONUMENT	TRANSFORMER	1		**2005**		X			Demolished
SW-29	Phila. Fire Dept	2006-3	10/11/2006	ADAMS MARK HOTEL	CITY & MONUMENT	TRANSFORMER	1		**2005**		X			Demolished
SW-30	Phila. Fire Dept	2006-3	10/11/2006	ADAMS MARK HOTEL	CITY & MONUMENT	TRANSFORMER	1		**2005**		X			Demolished

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								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-31	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLE D	1 2	X				X		
SW-32	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLE D	1	X				X		
SW-33	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLE D	1	X				X		
SW-34	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLE D	1	X				X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned/not secure
SW-35	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	1 2	X				X		
SW-36	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	1	X				X		
SW-37	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	1	X				X		
SW-38	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	1	X				X		
SW-39	Phila. Fire Dept	2007-4	1/22/2008	CARBONATOR RENTAL	6500 EASTWICK	TRANSFORMER	1	X				X		
SW-40	Phila. Fire Dept		11/13/2007	DREXEL UNIV	3330 MARKET ST	TRANSFORMER	0					X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned /not secure
SW-41	Phila. Fire Dept	2007-4	11/13/2007	DREXEL UNIV	3330 MARKET ST	TRANSFORMER	1		x	x	x	x		
SW-42	Phila. Fire Dept	2007-3	7/11/2007	EASTERN PENNSYLVANIA PSYCHIATRIC HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFORMER	1	X				X		
SW-43	Phila. Fire Dept	2007-4	1/18/2008	HB HESS CO Lane's Borough	226 S 16TH ST 1601 Locust St.	TRANSFORMER	1	X				X		
SW-44	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA LONGTERM PKNG	TRANSFORMER	1	x				x		
SW-45	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA SCOTT PAPER Amerimar International Plaza	TRANSFORMER	1		x	x	x	x		
SW-46	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA UAL FLT KITCH	TRANSFORMER	1		x	x	x	x		
SW-47	Phila. Fire Dept	2011-1	2/28/2011	PHILA ELECT CO (Community College of Phila)	523 N 18TH ST	TRANSFORMER	1		x	x	x		x	

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned/not secure
SW-48	Phila. Fire Dept	2011-1	2/7/2011	PHILA ELECTRIC CO	2600 HUNTING PARK AVE	Regulator	4	x				x		
SW-49	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	22ND & SUSQUEHANNA	TRANSFORMER	2	x				x		
SW-50	Phila. Fire Dept	2010-2	4/26/2010	PHILA SCHOOL BOARD	23 & CHESTNUT (GREENFIELD)	TRANSFORMER	1		x	x	x	x		
SW-51	Phila. Fire Dept	2010-2	4/26/2010	PHILA SCHOOL BOARD	32 & LEHIGH (E. ALLEN)	TRANSFORMER	1		X	X	X	X		
SW-52	Phila. Fire Dept	2010-2	Duplicate of SW5	PHILA SCHOOL BOARD	32ND & RIDGE (Straw. Mansion)	TRANSFORMER	1							
SW-53	Phila. Fire Dept	2010-4	12/20/2010	PHILA SCHOOL BOARD	58TH & WALNUT (SAYRE)	TRANSFORMER	6	x				x		
SW-54	Phila. Fire Dept	2010-4	12/20/2010	PHILA SCHOOL BOARD	67TH & ELMWOOD	TRANSFORMER	1	x				x		
SW-55	Phila. Fire Dept			PHILA SCHOOL BOARD	734 SCHYKILL AVE	TRANSFORMER	1							

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-56	Phila. Fire Dept			PHILA SCHOOL BOARD	734 SCHYKILL AVE	TRANSFOR MER	1							
SW-57	Phila. Fire Dept			PHILA SCHOOL BOARD	734 SCHYKILL AVE	TRANSFOR MER	1							
SW-58	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	HENRY & ROBERTS (RANDOLP H)	TRANSFOR MER	1		x	x	x	x		
SW-59	Phila. Fire Dept	2011-1	3/17/2011	First Allied Cord	4500 CITY AVE	TRANSFOR MER	1	x				x		
SW-60		2006-2	Blank Record											
SW-61	Phila. Fire Dept	2011-1	3/3/2011	GAP	1510 WALNUT	TRANSFOR MER	1	x				x		
SW-62	Phila. Fire Dept	2006-4	3/14/2007	RICH. I. RUBIN CO	230 S BROAD ST	TRANSFOR MER	1	X				X		
SW-63	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	37TH & SANSOM	TRANSFOR MER	1		x	x	x	x		
SW-64	Phila. Fire Dept	2007-2	7/30/2007	SPC CORP	26TH & PENROSE	TRANSFOR MER	1				X	X		
SW-65	Phila. Fire Dept	2007-2	7/30/2007	SPC CORP	26TH & PENROSE	TRANSFOR MER	1				X	X		
SW-67	Phila. Fire Dept	2006-4	12/19/2006	SUN CHEMICAL	3301 HUNTING PARK	Dry TRANSFOR MER	1	X				X		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-68	Phila. Fire Dept	2006-4	12/19/2006	SUN CHEMICAL	3301 HUNTING PARK	Dry TRANSFOR MER	1 2	X				X		
SW-69	Phila. Fire Dept	2006-3	3/14/2007	ATLANTIC BLDG	260 S BROAD ST	CAPACITOR S	16				X	X		
SW-70	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK	#4 MELLON BANK CENTER	CAPACITOR S	17				X		X	
SW-71	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	2	X				X		
SW-72	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	2	X				X		
SW-73	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	2	X				X		
SW-74	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	2	X				X		
SW-75	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	2	X				X		
SW-76	Phila. Fire Dept	2011-1	1/18/2011	1500 WALNUT BLDG	15TH WALNUT ST	TRANSFOR MERS	2	x				x		
SW-77	Phila. Fire Dept	2011-1	3/3/2011	Crowne Plaza	1800 MARKET	TRANSFOR MERS	2	x				x		
SW-78	Phila. Fire Dept	2007-4	1/22/2008	MR GOODBUYS Shoprite Store	2301 OREGON AVE	TRANSFOR MERS	2				X	X		
SW-79	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA CTRL UTIL BLDG	TRANSFOR MERS	2		x	x	x	x		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Out of Service	Disconnected	Off Site	Status of Facility: Operating	Closed	Abandoned /not secure
SW-80	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA S. APRON	TRANSFORMERS	2		x	x	x	x		
SW-81	Phila. Fire Dept	2010-2	4/26/2010	PHILA SCHOOL BOARD	24 & MASTER (VAUX)	TRANSFORMERS	2		x	x	x	x		
SW-82	Phila. Fire Dept	2010-1	2/3/2010	PHILA SCHOOL BOARD	32 & SUSQUEHANNA (STRAWBERRY MANSION)	TRANSFORMERS	2	X				X		
SW-83	Phila. Fire Dept	2010-3	11/22/2010	PHILA SCHOOL BOARD	49 & CHESTNUT (MYA PARKWAY)	TRANSFORMERS	2		x	x	x		x	
SW-84	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	36TH & SANSOM	TRANSFORMERS	2		x	x	x	x		
SW-85	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	37TH & SANSOM	TRANSFORMERS	2		x	x	x	x		
SW-86	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	BROAD & CHANCELLOR	TRANSFORMERS	2		x	x	x	x		
SW-87	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	BROAD & DAUPHIN	TRANSFORMERS	2		x	x	x	x		
SW-88	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	BROAD & MARKET	TRANSFORMERS	2		x	x	x	x		
SW-89	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	BROAD & OREGON	TRANSFORMERS	2		x	x	x	x		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-90	Phila. Fire Dept	2010-1	1/5/2010	SEPTA	BROAD & SNYDER	TRANSFOR MERS	2		X	X	X	X		
SW-91	Phila. Fire Dept			SEPTA	BROAD & TASKER	TRANSFOR MERS	2							
SW-92	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKET & 30TH	TRANSFOR MERS	2		x	x	x	x		
SW-93	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	RIDGE & FAIRMOUN T	TRANSFOR MERS	2		x	x	x	x		
SW-95	Phila. Fire Dept	2007-4	1/24/2008	WILKIE BUICK Leacoras Center & Shops	1724 N BROAD ST	TRANSFOR MERS	2				X		X	
SW-96	Phila. Fire Dept	2006-3	11/16/2006	112 N. BROAD ST.	112 N. BROAD ST.	TRANSFOR MERS DRY-TYPE	2	**NA**				X		
SW-97	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK	#4 MELLON BANK CENTER	CAPACITOR S	20				X		X	
SW-98	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK	#4 MELLON BANK CENTER	CAPACITOR S	22				X		X	
SW-99	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	3	X				X		
SW-100	Phila. Fire Dept	2006-2	8/11/2006	MELLON BANK St.Joes Dormitory	5320 CITY AVE	CAPACITOR S	3				X		X	

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment: In use	Status of PCB Equipment: Out of Service	Status of PCB Equipment: Disconnected	Status of PCB Equipment: Off Site	Status of Facility: Operating	Status of Facility: Closed	Status of Facility: Abandoned /not secure
SW-101	Phila. Fire Dept	2007-3	7/11/2007	EASTERN PENNSYLVANIA PSYCHIATRIC HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFORMER	3	X				X		
SW-102	Phila. Fire Dept	2007-4	1/24/2008	LENAS BLDG Devon Self Storage	19TH & ALLEGHENY	TRANSFORMER	3				X		X	
SW-103	Phila. Fire Dept	2009-1	Does not exist	SEPTA	33RD. & MARKET	TRANSFORMER	3							
SW-104	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKET & 15TH	TRANSFORMER	3		x	x	x	x		
SW-105	Phila. Fire Dept	2011-1	2/18/2011	SEPTA	MARKET & 25TH	TRANSFORMER	3							
SW-106	Phila. Fire Dept	2011-1	2/18/2011	SEPTA	MARKET & 31ST	TRANSFORMER	3							
SW-107	Phila. Fire Dept	2010-1	1/5/2010	SEPTA	MARKET & 44TH	TRANSFORMER	3		X	X	X	X		
SW-108	Phila. Fire Dept	2007-2	8/8/2007	THE PHILADELPHIAN	2401 PENNSYLVANIA AVE.	TRANSFORMER	3			X		X		
SW-109	Phila. Fire Dept	2007-2	8/8/2007	THE PHILADELPHIAN	2401 PENNSYLVANIA AVE.	TRANSFORMER	3							
SW-110	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA MAIN TERM	CAPACITORS	33 96	x				x		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-111	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK Ritz Carlton	Broad & Chestnut Streets	CAPACITOR S	4				X	X		
SW-112	Phila. Fire Dept	2007-4	1/22/2008	MR GOODBUYS Shoprite Store	2301 OREGON AVE	CAPACITOR S	4			X				X
SW-113	Phila. Fire Dept	2011-1	3/3/2011	H and M	1530 CHESTNUT	TRANSFOR MERS	4	x				x		
SW-114	Phila. Fire Dept	2007-3	11/23/2007	GOLDMAN PAPER	2201 E ALLEGHEN Y	TRANSFOR MERS	4				X		X	
SW-115	Phila. Fire Dept	2007-4	1/25/2008	METHODIST HOSP	2301 S BROAD	TRANSFOR MERS	4				X	X		
SW-116	Phila. Fire Dept	2007-4	1/25/2008	METHODIST HOSP	2301 S BROAD	TRANSFOR MERS	4				X	X		
SW-117	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	5	X				X		
SW-118	Phila. Fire Dept	2011-1	4/14/2011	PHILA ELECTRIC CO	1835 OXFORD STA	TRANSFOR MERS	5	x				x		
SW-119	Phila. Fire Dept	2006-4	3/14/2007	ATLANTIC BLDG	260 S BROAD ST	TRANSFOR MERS (1 NOW NON-PCB)	5	X				X		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
SW-121	Phila. Fire Dept	2007-2	7/11/2007	EASTERN PENNSYLVANIA PSYCHIATRIC HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFORMERS	6	X				X		
SW-122	Phila. Fire Dept	2007-2	7/11/2007	EASTERN PENNSYLVANIA PSYCHIATRIC HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFORMERS	6	X				X		
SW-123	Phila. Fire Dept	2007-2	7/11/2007	EASTERN PENNSYLVANIA PSYCHIATRIC HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFORMERS	6	X				X		
SW-124	Phila. Fire Dept	2007-2	7/11/2007	EASTERN PENNSYLVANIA PSYCHIATRIC HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFORMERS	6	X				X		
SW-125	Phila. Fire Dept	2011-1	2/11/2011	Lincoln Univ.	3020 MARKET	TRANSFORMERS	6	x				x		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-126	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK	#4 MELLON BANK CENTER	TRANSFOR MERS	6				X		X	
SW-127	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	17 & SPRING GARDEN (MASTERM AN)	TRANSFOR MERS	4	x				x		
SW-128	Phila. Fire Dept	2010-4	12/20/2010	PHILA SCHOOL BOARD	22ND & LEHIGH (DOBBINS)	TRANSFOR MERS	7	x				x		
SW-129	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITOR S	8	X				X		
SW-130	Phila. Fire Dept	2007-2	8/18/2007	RITTENHOUS E PLAZA	19TH & WALNUT	RETROFILLE D	[4]	X				X		
SW-131	Phila. Fire Dept	2006-3	11/16/2006	BROAD-NOBLE BLDG Commerce Bldg.	401 N BROAD ST	RETROFILLE D	3	X				X		
SW-132	Phila. Fire Dept	2011-1	3/22/2011	CHILDRENS HOSPITAL	34TH & CIVIC CTR BLVD	RETROFILLE D	2	x				x		
SW-133	Phila. Fire Dept	2011-1	Duplication of SW-132	CHILDRENS HOSPITAL	34TH & CIVIC CTR BLVD	RETROFILLE D								
SW-134	Phila. Fire Dept	2007-4	1/18/2008	KENNEDY HOUSE[Condo s]	1901 JFK BLVD	RETROFILLE D		X				X		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-135	Phila. Fire Dept	2007-4	Duplicate Record	KENNEDY HOUSE	1901 JFK BLVD	RETROFILLED								
SW-136	Phila. Fire Dept	2006-4	3/14/2007	LAND TITLE BLDG	100 S BROAD ST	RETROFILLED	4	X				X		
SW-137	Phila. Fire Dept	2007-2	7/11/2007	MELRATH GASKET	2901 HUNTING PK	RETROFILLED	0	X				X		
SW-138	Phila. Fire Dept	2007-4	1/18/2008	ONE PENN CENTER Suburban Station	1617 J.F. KENNEDY BLVD.	RETROFILLED	[3]	X				X		
SW-139	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	NEA ASPLUNDH HANGER	RETROFILLED		x				x		
SW-140	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA ATLANTIC AVIATION	RETROFILLED		x				x		
SW-141	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA BAGGAGE CLAIM	RETROFILLED		x				x		
SW-142	Phila. Fire Dept	2011-1	1/6/2011	PHILA PARKING AUTH.	PIA PARKING GARAGE C	RETROFILLED			x	x	x	x		
SW-143	Phila. Fire Dept	2011-1	1/6/2011	PHILA PARKING AUTH.	PIA PARKING GARAGE D	RETROFILLED			x	x	x	x		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-144	Phila. Fire Dept	2007-4	1/23/2008	PHILA STREETS (BARTRAM TRANSFER STATION)	51 & GRAYS	RETROFILLE D				X			X	
SW-145		2006-2	Blank Record											
SW-146	Phila. Fire Dept	2007-1	5/11/2007	PHILADELPHI A AIRPORT HILTON	4509 ISLAND AVE	RETROFILLE D			X			X		
SW-147	Phila. Fire Dept	2007-1	5/22/2007	STREETS (NORTHWEST INCINERATO R	DOMINO & UMBRIA	RETROFILLE D					X	X		
SW-148	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA TWA HANGER	RETROFILLE D #30257 CERTIFICAT ION			x	x	x	x		
SW-149	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA TERM E	RETROFILLE D #30276 & 30277 CERTIFICAT ION			x	x	x	x		
SW-150	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA PAVILION E	RETROFILLE D #30278 & 30279 CERTIFICAT ION			x	x	x	x		

PWD #	Referral Agency	Completed	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Disconnected	Off Site	Operating	Closed	Abandoned /not secure
SW-151	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA TERM D	RETROFILLED #30281 & 30281 CERTIFICATION			x	x	x	x		
SW-152	Phila. Fire Dept	2010-2	4/26/2010	PHILA SCHOOL BOARD	54 & MASTER (HESTON)	Transformers	2		X	X	X	X		
SW-153	Phila. Fire Dept	2011-1	2/24/2011	PHILA ELECT CO	1122 SEDGELY AVE	TRANSFORMER Capacitor	1	x				x		
SW-154	Phila. Fire Dept			PHILA SCHOOL BOARD	8 & LEHIGH (BILINGUAL MIDDLE MAGNET)	TRANSFORMERS	2							
SW-155	Exelon	2011-1	2/24/2011	PECO	24th & Washington Avenue	Transformer		x				x		
SW-156	Exelon	2011-1	2/24/2011	PECO	7515 Ridge Avenue	Transformer (Tap Changer)		x				x		
SW-157	Exelon	2011-1	2/18/2011	PECO	7720 N. Umbria Street	PCB Capacitors		x				x		
SW-158	Phila. Fire Dept	2006-4	12/19/2006	SUN CHEMICAL	3301 HUNTING PARK	Dry TRANSFORMER	1	X				X		

PWD #	Referral Agency	Comp leted	Inspection Date	Company Name	Address	Type of PCB Equipment	# of PCB Devices	Status of PCB Equipment				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Oper ating	Close d	Aband oned /not secure
SW-156a	Exelon	2011-1	2/24/2011	PECO	1155 S. 57th Street	Regulator		x				x		
SW-157a	Exelon		4/15/2011	PECO	2230 Township Line Road	Regulator		x				x		

APPENDIX H – PWD QUARTERLY DRY WEATHER WATER QUALITY MONITORING PROGRAM

Quarterly Dry Weather Water Quality Monitoring

Background

General

In 2011, 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 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.

PWD's 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 overall 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 positive 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:

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.

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 BMP 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 1). Site identification codes used by PWD's Bureau of Laboratory Services (BLS) are presented alongside USGS gage station numbers in Table 1. USGS stream gaging stations are ideal monitoring points as they allow discrete sample data to be coupled with continuous 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.

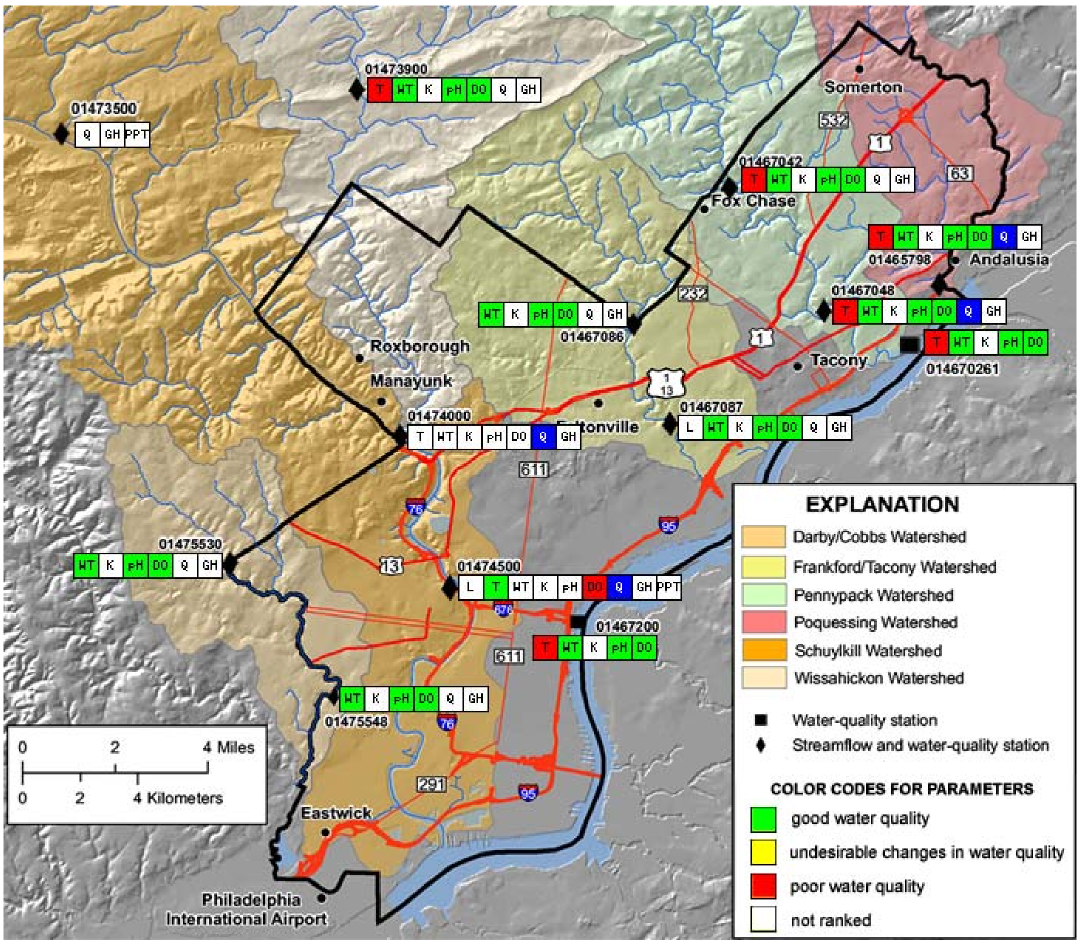

Figure 1 - Philadelphia Water Quality Gage Stations as Viewed on Cooperative USGS-PWD Website (http://pa.water.usgs.gov/pwd/).

Table 1 - Monitoring Locations in the PWD/USGS Cooperative Monitoring Program with location IDs used by PWD Bureau of Laboratory Services

Description	USGS Gage #	BLS Location ID
Cobbs Creek at US Rt. 1 (City Line Ave.)	01475530	COBB700
Cobbs Creek at Mt. Moriah cemetery	01475548	COBB355
Schuylkill River at Fairmount Dam	01474500	SCHU154
Wissahickon Creek at Ft Washington (Rt. 73)	01473900	WISS500
Wissahickon Creek at Ridge Ave.	01474000	WISS130
Tacony Creek at Castor Ave.	01467087	TACO250
Tacony Creek at Adams Ave.	01467086	TACO435
Pennypack Creek at Pine Rd.	01467042	PENN407
Pennypack Creek at Rhawn St.	01467048	PENN175
Poquessing Creek at Grant Ave.	01465798	POQU150

PWD is implementing a City-wide approach to dry weather water quality monitoring, rather than focusing on an individual watershed. Because a number of BMP projects are in the early stages of implementation across the city, water quality benefits will only be observable over a period of several years. This fact remains, regardless of whether water quality is monitored on a broad or focused scale. 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 BMP projects are completed over the coming years, the water quality data should gradually begin to reflect their positive environmental impacts.

Quarterly Monitoring - July 2009 – June 2011

Sample Collection Dates

This report summarizes results from nine sets of quarterly grab samples that were collected from July 2009 through June 2011. Samples were categorized by season (winter, spring, summer, fall) as well 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). 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.

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

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.

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 July 2009 and 0.05 mg/L for the remaining 8 quarterly samples collected to date (Figure 2). (All samples below the detection limit were assumed as half the detection limit throughout the analysis.) 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.

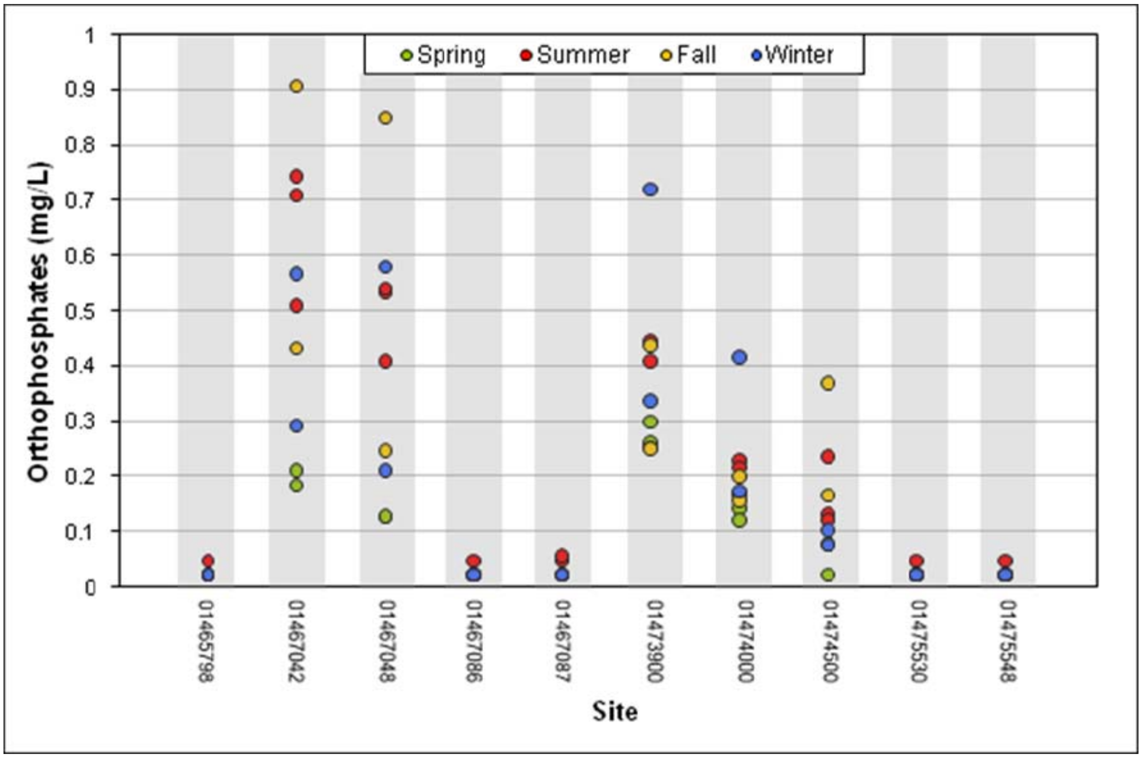

Figure 2 - Orthophosphate concentration at 10 USGS gage stations, July 2009-June 2011

Summary statistics for the orthophosphate samples, including results from application of the PADEP Chemistry Statistical Assessment protocol (PADEP, 2007), are shown in Table 3. Exceedances were evaluated relative to the USEPA (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.

Table 3 - Orthophosphate Summary Statistics and Assessments. (Concentrations in mg/L).

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceed-ances	Possible Exceed-ances	Assessment
1465798	0.028	0.025	0.008	0.025	0.050	9	9	0	9	Needs more evaluation
1467042	0.507	0.508	0.251	0.186	0.909	9	0	9	0	Non-attaining
1467048	0.403	0.408	0.246	0.128	0.852	9	0	9	0	Non-attaining
1467086	0.028	0.025	0.008	0.025	0.050	9	9	0	9	Needs more evaluation
1467087	0.031	0.025	0.012	0.025	0.055	9	8	1	8	Needs more evaluation
1473900	0.379	0.336	0.150	0.250	0.723	9	0	9	0	Non-attaining
1474000	0.202	0.176	0.087	0.120	0.414	9	0	9	0	Non-attaining
1474500	0.145	0.119	0.103	0.025	0.367	9	1	8	1	Non-attaining
1475530	0.028	0.025	0.008	0.025	0.050	9	9	0	9	Needs more evaluation
1475548	0.028	0.025	0.008	0.025	0.050	9	9	0	9	Needs more evaluation

Similar examples of wastewater discharge impacts and upstream/downstream dilution have also begun to emerge with regard to 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 3). The only exceptions are the Pennypack and Wissahickon Creek gage sites, which as previously stated are directly impacted by treated wastewater discharge. It should be noted, however, that these statements and observations are in no way conclusive given that the dataset is still relatively limited in size. As this dataset grows in subsequent years, further statistical analysis can be carried out and any apparent patterns or phenomena can be explored.

Summary statistics for the nitrate samples, including results from application of the PADEP Chemistry Statistical Assessment protocol (PADEP, 2007), are shown in Table 4. Exceedances were evaluated relative to a) the PADEP water quality standard for nitrite and nitrate of 10 mg/L, and b) the USEPA (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 PADEP 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 USEPA subecoregion-based guideline.

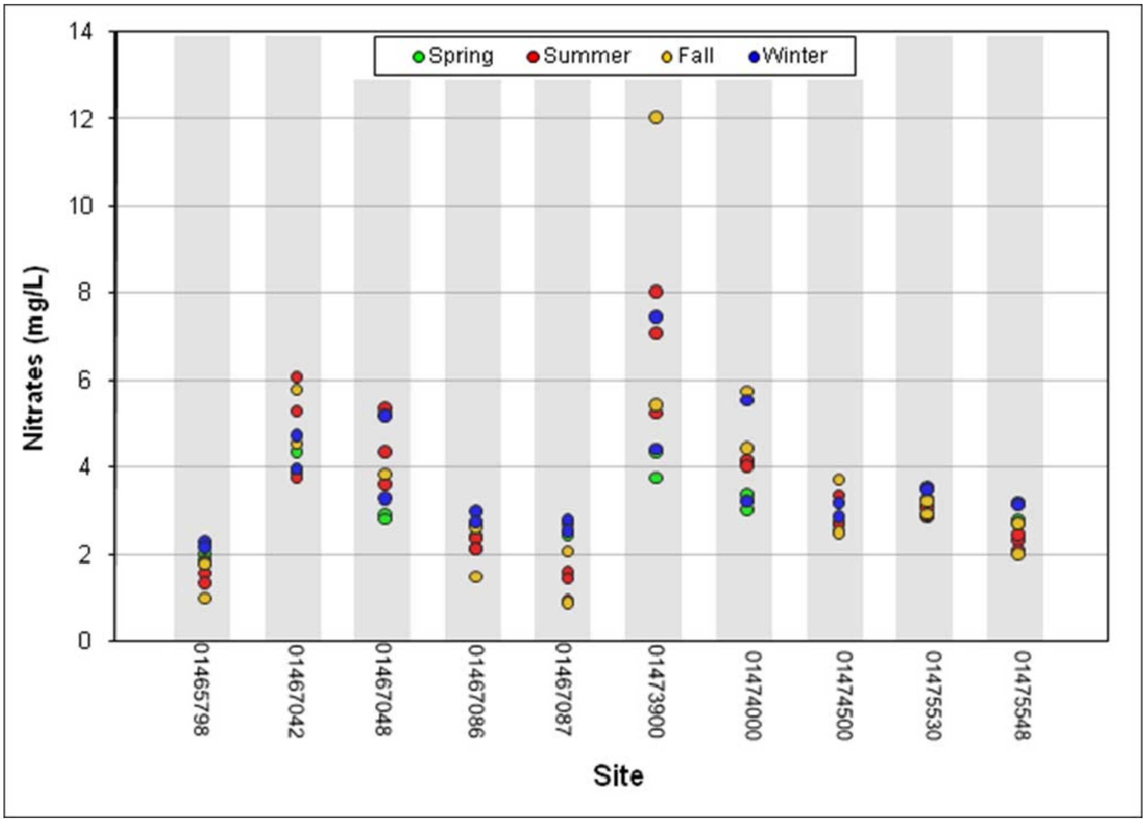

Figure 3 - Nitrate concentration at 10 USGS gage stations, July 2009-June 2011

Table 4 - Nitrate Summary Statistics and Assessments. (Concentrations in mg/L).

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceed-ances, PADEP	Exceed-ances, Sub-eco-region	Assess-ment , PADEP	Assessment, EPA Subeco-region
1465798	1.770	1.807	0.397	1.027	2.277	9	0	0	9	Attaining	Non-attaining
1467042	4.734	4.583	0.839	3.798	6.104	9	0	0	9	Attaining	Non-attaining
1467048	4.065	3.878	1.004	2.840	5.346	9	0	0	9	Attaining	Non-attaining
1467086	2.395	2.403	0.440	1.517	2.974	9	0	0	9	Attaining	Non-attaining
1467087	1.937	2.098	0.737	0.891	2.767	9	0	0	7	Attaining	Non-attaining
1473900	6.431	5.420	2.573	3.786	12.039	9	0	1	9	Needs more evalua-tion	Non-attaining
1474000	4.195	4.111	0.960	3.032	5.770	9	0	0	9	Attaining	Non-attaining
1474500	2.913	2.709	0.436	2.499	3.747	9	0	0	9	Attaining	Non-attaining
1475530	3.167	3.113	0.240	2.876	3.521	9	0	0	9	Attaining	Non-attaining
1475548	2.604	2.701	0.432	2.001	3.220	9	0	0	9	Attaining	Non-attaining

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 other river or stream that may have above normal salinity due to the geology of the area.

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/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, generally, results of microbial analyses from the four swimming season samples 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 four 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 five 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 three of the 10 sites, including the upstream Tacony, downstream Pennypack, and downstream Cobbs Creek sites. The downstream Cobbs site was affected by a single 3600CFU/100mL sample collected June 2009, without which the site would have attained the guideline. The enterococci geometric mean guideline was exceeded at seven of the 10 sites (Table 6).

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 4 through 6). Bacteria samples collected from 2009-2011 indicate a strong correlation between fecal coliform and *E. coli* (r (88) = 0.95, p < 0.001), and moderate yet significant correlations between fecal coliform and enterococci (r (88) = 0.45, p < 0.001), and *E. coli* and enterococci (r (88) = 0.46, p < 0.001) (Figure 7).

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. Furthermore, US EPA is currently revising recommended recreational use water quality criteria for microbial parameters. As the quarterly dry weather monitoring program continues, more samples will be obtained, allowing for more rigorous statistical analyses in the future.

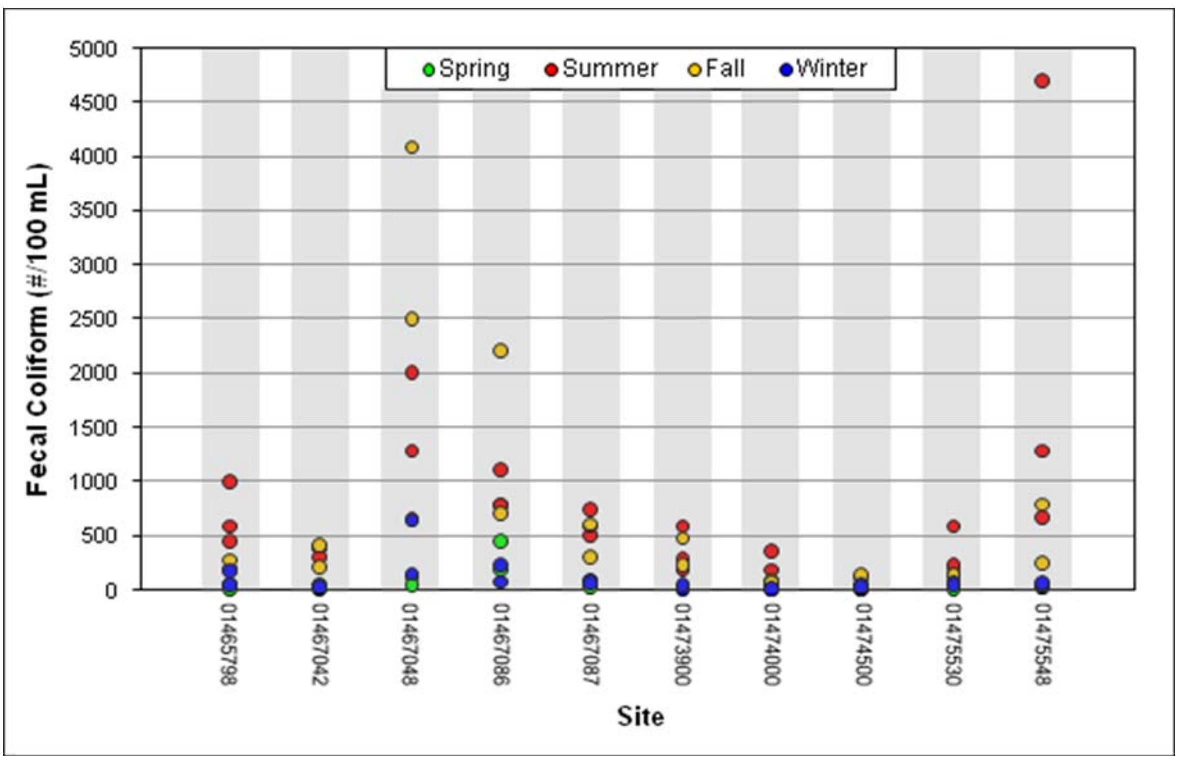

Figure 4 - Fecal coliform results at 10 USGS gage stations, July 2009 – June 2011

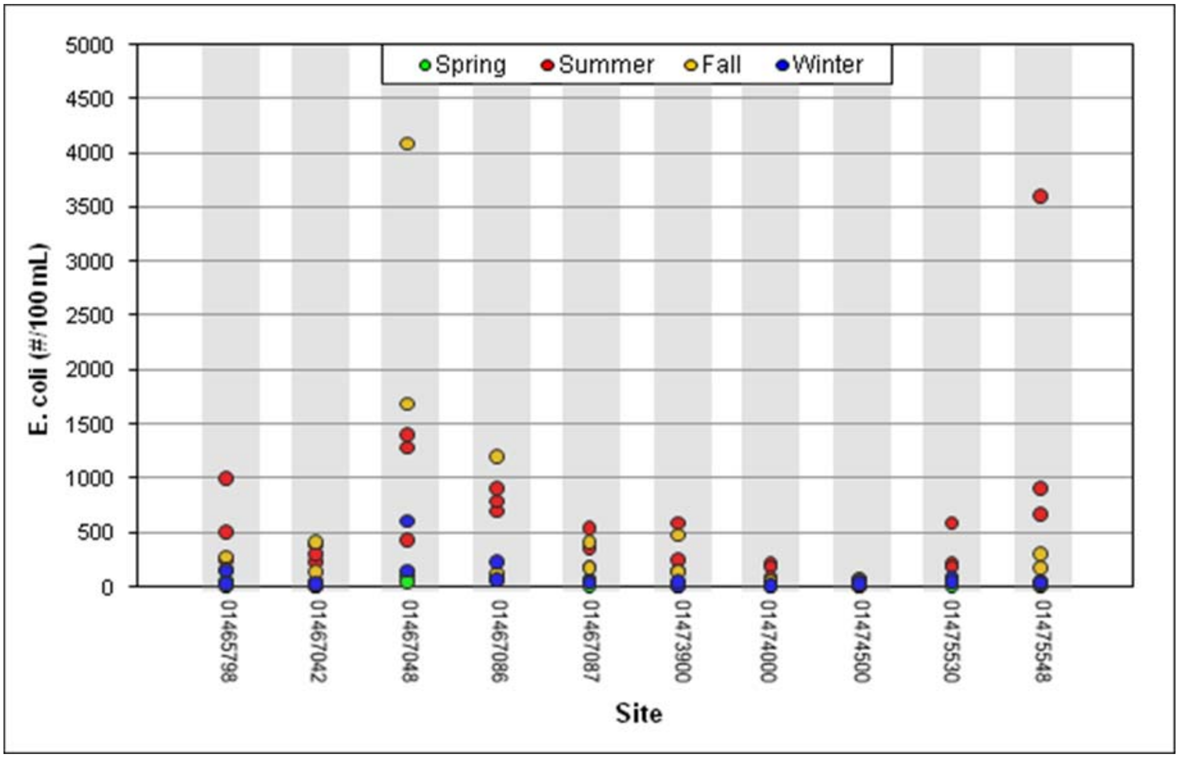

Figure 5 - *E. coli* results at 10 USGS gage stations, July 2009 – June 2011

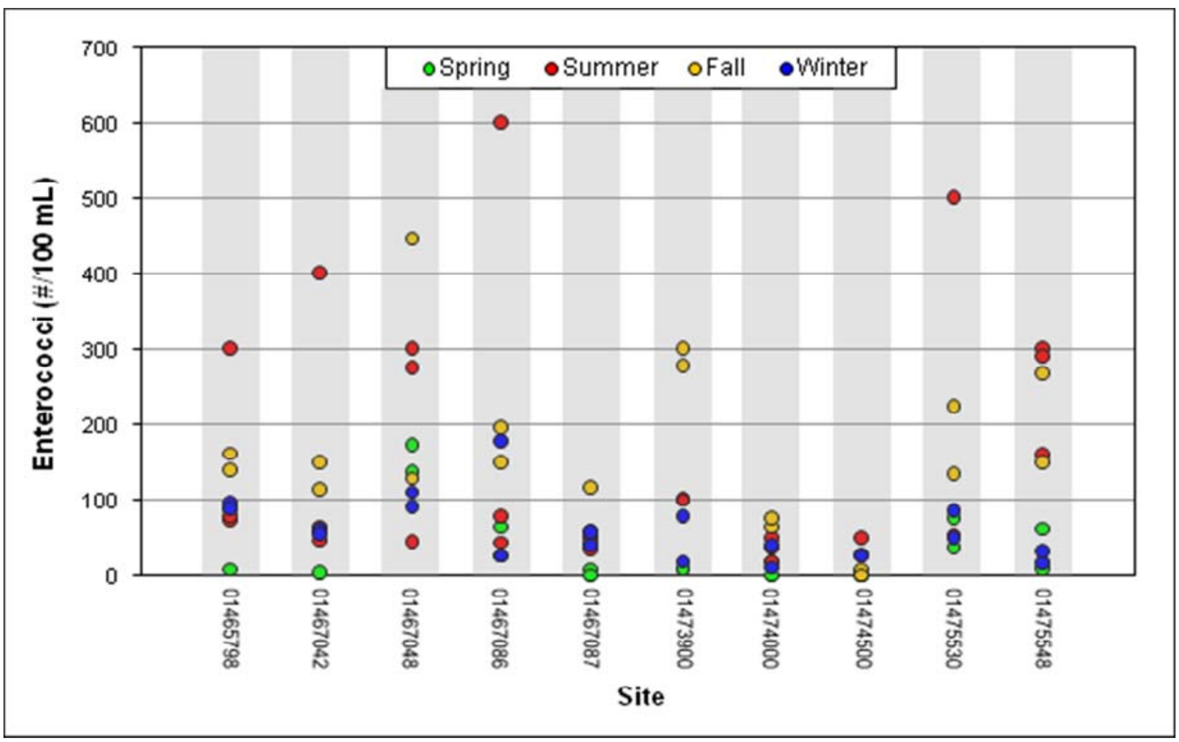

Figure 6 - Enterococci results at 10 USGS gage stations, July 2009 – June 2011

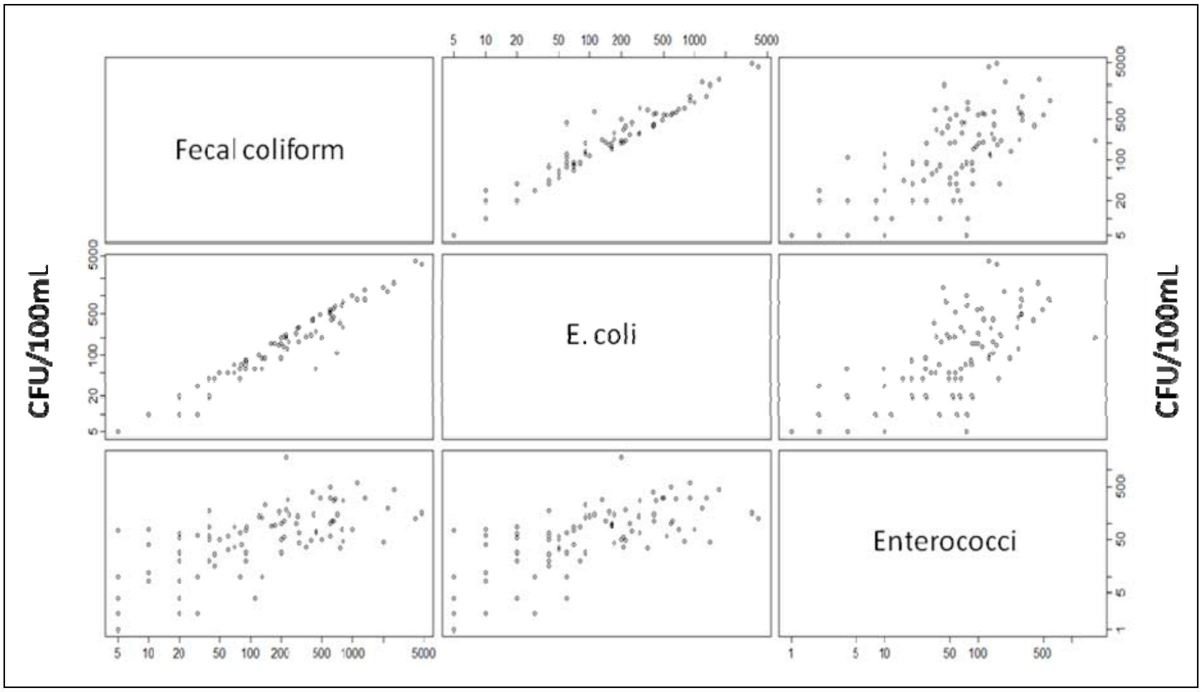

Figure 7 - Scatterplot Matrix of 2009-2011 Bacteria Data (x-y axes plotted in log10 scale)

Table 5 - Fecal Coliform Geometric Mean Results and PA DEP Water Quality Recreational Use Criteria Attainment Status by Season

Gage	n	n, non-detects	Geometric mean (CFU/100 mL)	Season	Attaining
1465798	5	1	54	non-swimming	Yes
1465798	4	0	526	swimming	No
1467042	5	1	30	non-swimming	Yes
1467042	4	0	372	swimming	No
1467048	5	0	263	non-swimming	Yes
1467048	4	0	1622	swimming	No
1467086	5	0	329	non-swimming	Yes
1467086	4	0	833	swimming	No
1467087	5	0	87	non-swimming	Yes
1467087	4	0	508	swimming	No
1473900	5	0	31	non-swimming	Yes
1473900	4	0	358	swimming	No
1474000	5	1	15	non-swimming	Yes
1474000	4	0	154	swimming	Yes
1474500	5	1	26	non-swimming	Yes
1474500	4	2	30	swimming	Yes

1475530	5	1	45	non-swimming	No
1475530	4	0	245	swimming	Yes
1475548	5	0	61	non-swimming	No
1475548	4	0	996	swimming	Yes

Table 6 - *E. Coli* and Enterococci Geometric Mean Results and USEPA Recreational Use Water Quality Guideline Attainment

	n, non-detects		Geometric mean (CFU/100 mL)		Attainment	
Gage	**E. coli**	**Enterococci**	**E. coli**	**Enterococci**	**E. coli**	**Enterococci**
01465798	1	0	122	87	Yes	No
01467042	1	0	73	63	Yes	No
01467048	0	0	506	154	No	No
01467086	0	0	257	94	No	No
01467087	0	1	121	30	Yes	Yes
01473900	0	0	82	60	Yes	No
01474000	1	1	36	25	Yes	Yes
01474500	3	2	23	7	Yes	Yes
01475530	1	0	82	138	Yes	No
01475548	0	0	152	81	No	No

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.

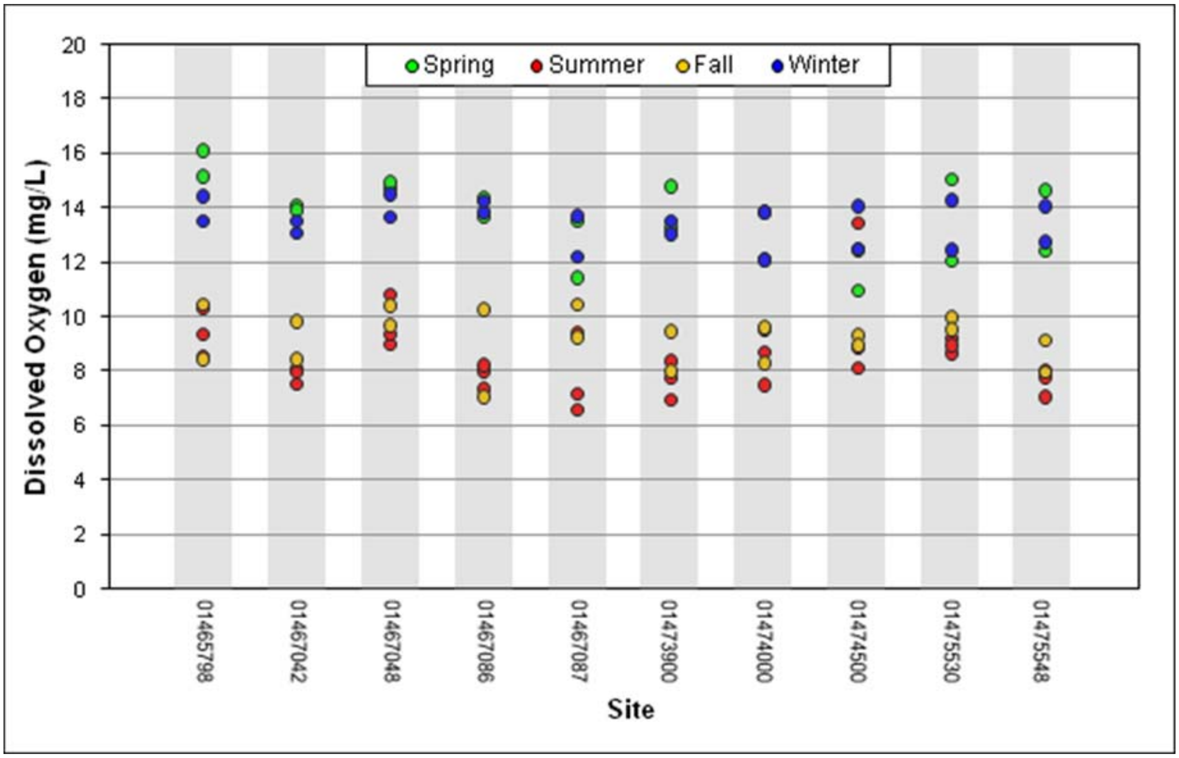

Figure 8 - Dissolved oxygen results at 10 USGS gage stations, July 2009 – June 2011

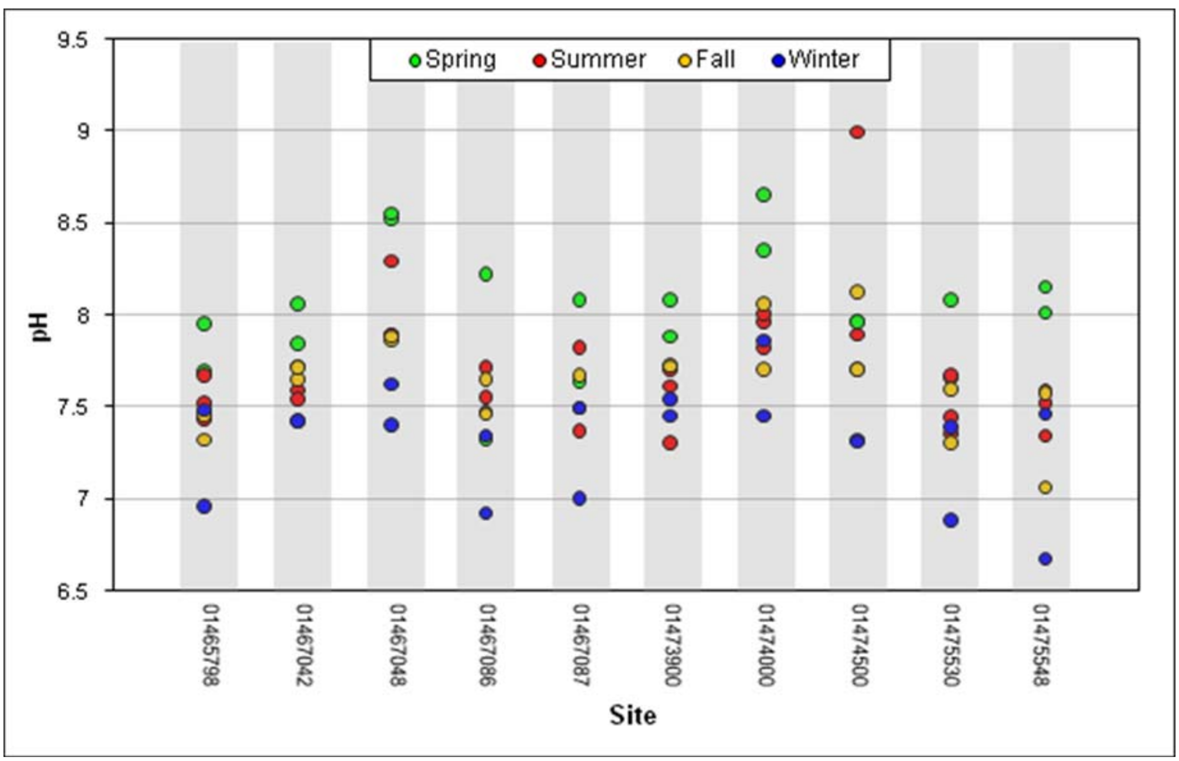

Figure 9 - pH results at 10 USGS gage stations, July 2009 – June 2011

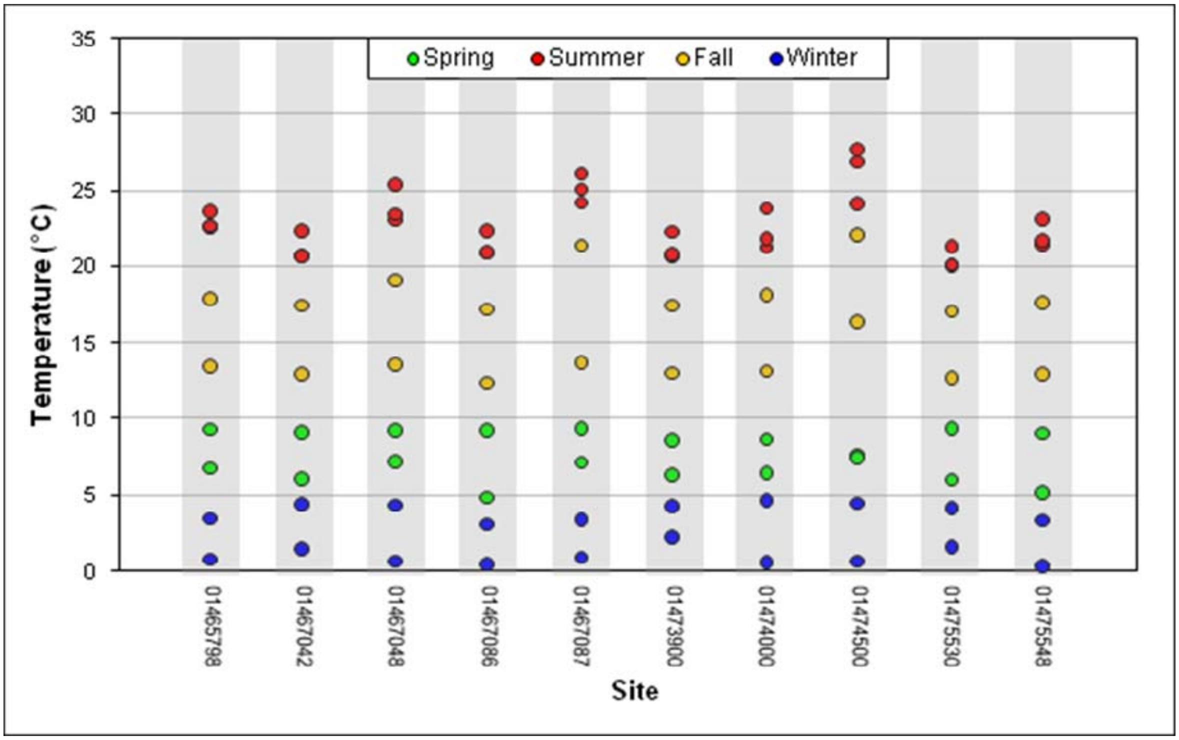

Figure 10 - Temperature results at 10 USGS gage stations, July 2009 – June 2011

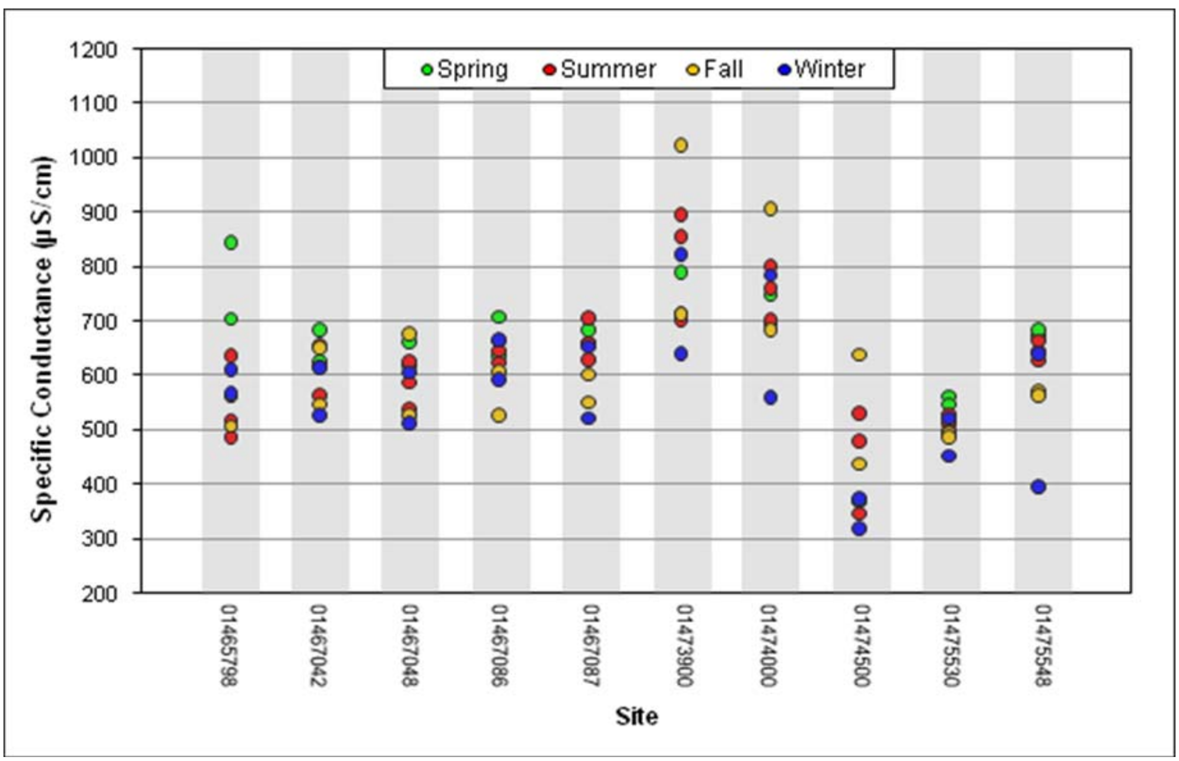

Figure 11 - Specific conductance results at 10 USGS gage stations, July 2009 – June 2011

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APPENDIX I – PWD-USGS COOPERATIVE WATER QUALITY MONITORING PROGRAM ANNUAL SUMMARY

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).

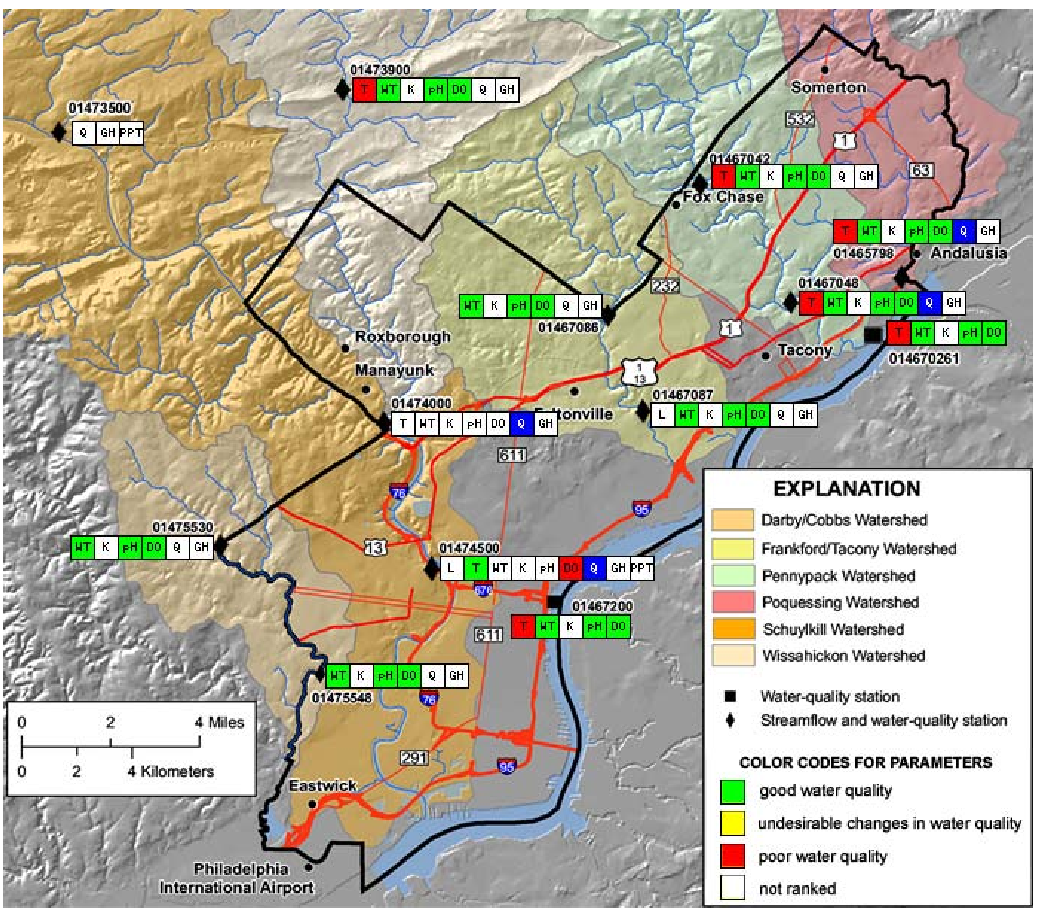

Figure 1 - Philadelphia Water Quality Gage Stations as Viewed on Cooperative USGS-PWD Website (**http://pa.water.usgs.gov/pwd/**).

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. A new gage (014670261) was added in 2011 on the Delaware River near Pennypack Woods to monitor water quality as the river enters Philadelphia.

This annual report summarizes water quality data from July 1, 2010 – June 30, 2011, excluding the period of December 2010 through February 2011, 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 2010 through March 2011. Finally, Schuylkill River gage data collection in 2011 did not begin until March 22.

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
014670261	Delaware River near Pennypack Woods, PA	March 2011 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
01467200*	Delaware River at Ben Franklin Bridge, Philadelphia, PA	August 1949 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)

USGS Gage Data Processing & Analysis Procedures

With 12 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 has developed procedures for processing and analyzing 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.

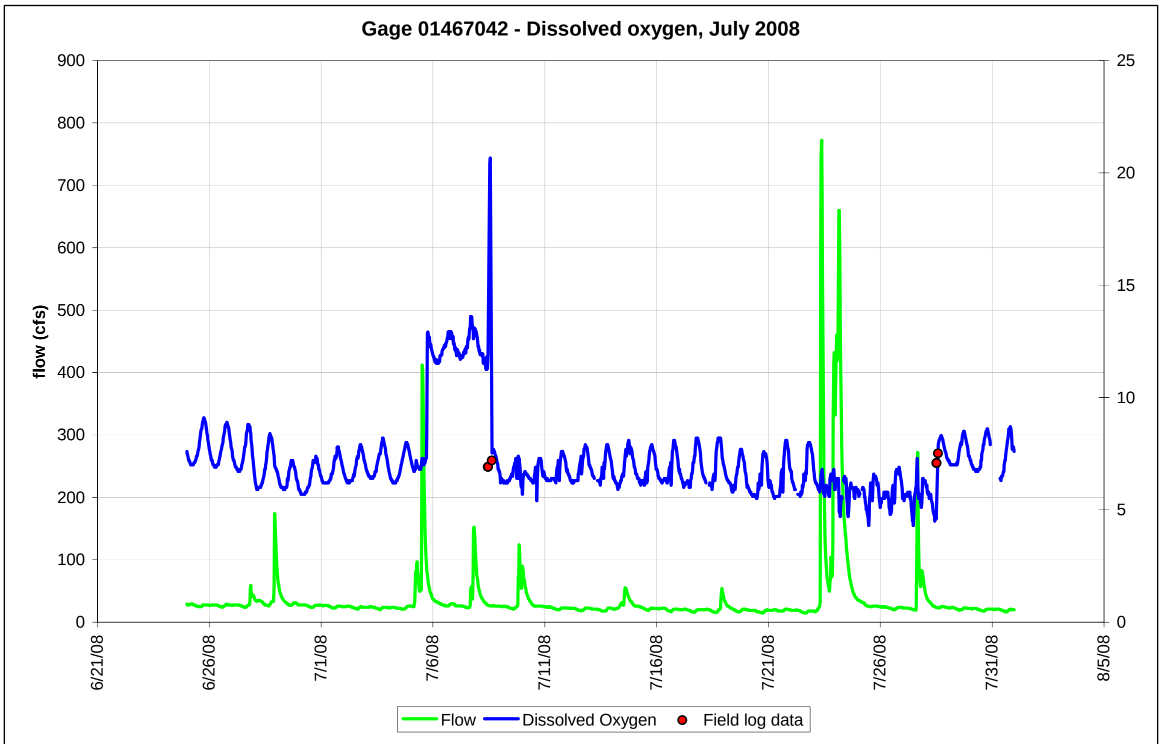

Figure 2 - Example of an Excel-generated data processing/analysis plot; Gage 01467042, Dissolved Oxygen, July 2008.

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 3); assorted statistics including accepted and questionable data comparisons, monthly exceedance 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.

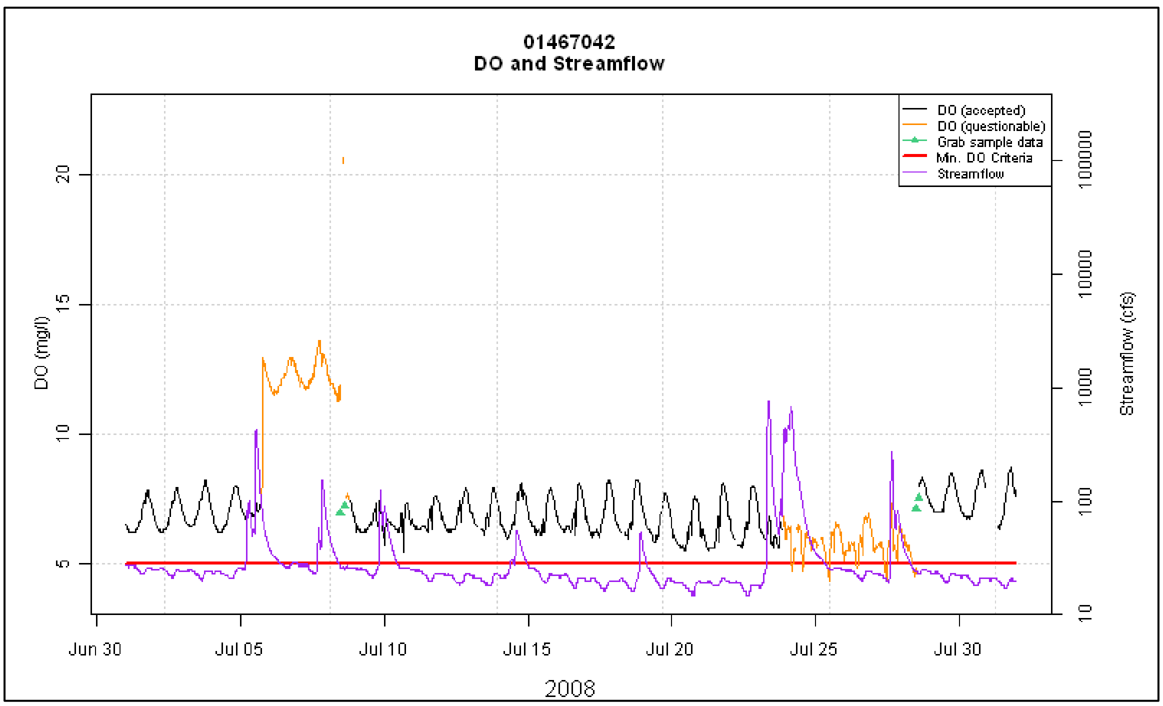

Figure 3 - Example of an R-generated plot showing accepted and questionable data, and minimum water quality criteria; Gage 01467042, Dissolved Oxygen, July 2008.

Continuous Water Quality Monitoring Results

Annual Summary, July 2010 - June 2011

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 gages 014670261 and 01467200 dissolved oxygen criteria are defined by the Delaware River Basin Commission (DRBC) criteria for Zones 2 and 3 (DRBC, 2007) , respectively, with daily mean of 5.0 mg/L for Zone 2 and 3.5 mg/L for Zone 3, and a seasonal mean (April 1 to June 15, and September 16 to December 31) of 6.5 mg/L for both zones (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 violated the standard and complied with the standard.

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 violated the standard and complied with the standard were calculated.

DO minimum and daily mean criteria were most frequently violated at the downstream Tacony Creek site (gage 01467087). At all other sites, the DO minimum criterion was violated less than 2.1% of the total accepted hours, and the daily mean criterion was violated less than 3.0% of the total accepted days. A more in-depth discussion of potential causes of DO problems at gage 01467087 is presented in the Monthly Results section.

Table 3 - USGS Gage July 2010 - June 2011 Dissolved Oxygen Minimum Criterion Summary Results

USGS Gage July 2009 - June 2010 Dissolved Oxygen Minimum Criteria Summary Information						
Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance
01465798	WWF	6368.0	265.3	3.2	0.0	100.0
014670261*	DRBC	NA	NA	NA	NA	NA
01467042	TSF	6145.5	256.1	3.9	0.0	100.0
01467048	TSF	6535.5	272.3	1.0	0.0	100.0
01467086	WWF	6143.5	256.0	5.0	1.7	98.3
01467087	WWF	5929.5	247.1	3.7	13.2	86.8
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	6170.5	257.1	5.5	1.3	98.7
01474000	TSF	5827.5	242.8	10.4	0.1	99.9
01474500	WWF	2690.5	112.1	8.1	0.0	100.0
01475530	WWF	6522.0	271.8	0.4	0.0	100.0
01475548	WWF	6169.5	257.1	5.0	2.0	98.0

*No minimum DO criterion applies at gages 014670261or 01467200

Table 4 - USGS Gage July 2010 - June 2011 Dissolved Oxygen Daily Mean Criterion Summary Results

USGS Gage July 2009 - June 2010 Dissolved Oxygen Daily Mean Criteria Summary Information					
Gage number	Designated Use	Total days accepted data	% days flagged data	% days violation	% days compliance
01465798	WWF	239.0	13.1	0.0	100.0
014670261	DRBC	105.0	12.5	0.0	100.0
01467042	TSF	231.0	14.7	0.0	100.0
01467048	TSF	245.0	10.9	0.0	100.0
01467086	WWF	232.0	14.7	1.3	98.7
01467087	WWF	222.0	18.4	18.5	81.5
01467200	DRBC	204.0	17.4	0.0	100.0
01473900	TSF	229.0	15.8	2.2	97.8
01474000	TSF	222.0	18.1	0.0	100.0
01474500	WWF	108.0	11.5	0.0	100.0
01475530	WWF	258.0	5.5	0.0	100.0
01475548	WWF	241.0	11.7	2.9	97.1

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	1818.5	75.8	0.3	9.61	Yes
014670261	DRBC	1818	75.8	0.3	9.75	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 violations of daily maximum pH violations at some sites (Table 6). There were no observed violations of the daily minimum pH criterion in the report time frame. pH fluctuations are typically observed concomitant with pronounced dissolved oxygen fluctuations, as detailed in the Monthly Results section.

At gages 014670261 and 01467200, 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 violated or complied with criteria, and the percentages of daily minima and maxima that violated or complied with criteria.

There were no observed violations of the daily minimum pH criterion in the report time frame. The daily maximum criterion was violated in 16.9%, 9.3%, 7.0%, and 6.3% of observed days at the Schuylkill River gage, upstream Tacony Creek gage, downstream Wissahickon Creek gage, and downstream Cobbs Creek gage, respectively. Also, at the upstream Wissahickon Creek gage, downstream Pennypack Creek gage, upstream Pennypack Creek gage, and upstream Cobbs Creek gage, maximum criterion violations took place in 6.0 %, 4.4%, 3.3%, and 0.4% of observed days, respectively.

Table 6 - USGS Gage July 2010 - June 2011 pH Criteria Summary Results

USGS Gage July 2010 - June 2011 pH Criteria Summary Information									
Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance
01465798	6052.0	252.2	8.3	0.0	0.0	0.0	0.0	100.0	100.0
014670261	2863.5	119.3	0.5	0.0	0.0	0.0	0.0	100.0	100.0
01467042	6408.0	267.0	1.5	0.7	3.3	0.0	0.0	99.3	96.7
01467048	6555.0	273.1	0.7	1.2	4.4	0.0	0.0	98.8	95.6
01467086	6354.0	264.8	2.7	1.7	9.3	0.0	0.0	98.3	90.7
01467087	6426.0	267.8	1.5	0.0	0.0	0.0	0.0	100.0	100.0
01467200	5045.0	204.6	17.2	0.0	0.0	0.0	0.0	100.0	100.0
01473900	6288.5	262.0	3.7	1.1	6.0	0.0	0.0	98.9	94.0
01474000	5385.5	224.4	17.2	1.8	7.0	0.0	0.0	98.2	93.0
01474500	2679.0	111.6	8.5	7.5	16.9	0.0	0.0	92.5	83.1
01475530	6522.0	271.8	0.4	0.0	0.4	0.0	0.0	100.0	99.6
01475548	6458.0	269.1	1.4	1.5	6.3	0.0	0.0	98.5	93.8

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 and 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 Wissahickon Creek gage, and least frequently surpassed at the upstream Pennypack Creek gage.

Table 7 - USGS Gage July 2010 - June 2011 Turbidity Summary Results

USGS Gage July 2010 - June 2011 Turbidity Summary Information					
Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	5801.5	241.7	12.1	29.4	70.6
014670261	2861.0	119.2	0.6	95.9	4.1
01467042	5748.0	239.5	11.6	24.2	75.8
01467048	6049.0	252.0	8.3	33.3	66.7
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	6082.0	253.4	6.8	47.1	52.9
01474000	5026.0	209.4	22.7	25.3	74.7
01474500	2487.0	103.6	15.1	87.9	12.1
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 25ºC). Dissolved ion content is useful in determining the start of wet weather events at ungaged water quality monitoring stations, but not applicable to the USGS gage network. Conductivity in Philadelphia streams is extremely sensitive to changes in flow, as stormwater (diluent) usually contains smaller concentrations of dissolved ions than stream baseflow. Data collected in the report timeframe were generally consistent with earlier observations. 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 2010 - June 2011 Specific Conductance Summary Results

USGS Gage July 2010 - June 2011 Specific Conductance Summary Information			
Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	6339.0	264.1	3.9
014670261	5724.0	119.3	0.6
01467042	6467.5	269.5	0.5
01467048	6555.0	273.1	0.7
01467086	6507.0	271.1	0.3
01467087	6459.0	269.1	1.0
01467200	5042	210.1	14.9
01473900	6350.0	264.6	2.7
01474000	6117.0	254.9	5.9
01474500	2679.5	111.6	8.5
01475530	6102.5	254.3	6.8
01475548	6475.0	269.8	1.2

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 014670261 and 01467200 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 gage, the lowest exceedance rates were observed at the Poquessing Creek, both Cobbs Creek, 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 2010 - June 2011 Temperature Maximum Criteria Summary Results

USGS Gage July 2010 - June 2011 Temperature Maximum Criteria Summary Information						
Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. compliance
01465798	WWF	6484.5	270.2	1.7	14.2	85.8
014670261	DRBC	2865.5	119.4	0.5	0.0	100.0
01467042	TSF	6467.5	269.5	0.5	29.0	71.0
01467048	TSF	6555.0	273.1	0.7	34.1	65.9
01467086	WWF	6507.5	271.1	0.3	14.0	86.0
01467087	WWF	6499.5	270.8	0.4	16.4	83.6
01467200	DRBC	5042.0	210.1	14.9	0.0	100.0
01473900	TSF	6324.0	263.5	3.1	29.9	70.1
01474000	TSF	6422.5	267.6	1.2	28.7	71.3
01474500	WWF	2688.0	112.0	8.2	17.5	82.5
01475530	WWF	6521.0	271.7	0.5	12.7	87.3
01475548	WWF	6514.0	271.4	0.6	15.3	84.7

Monthly Results, July 2010 - June 2011

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

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 criteria was violated, and percentage of days the daily mean criteria was violated were all much worse at the downstream gage (Tables 11-14). For example, DO was particularly poor at the downstream Tacony Creek gage in July 2010; the minimum DO criterion was violated throughout much of the month (Figure 4). Poor DO was also observed in the same month at the upstream gage. However, the minimum criterion was almost never violated there (Figure 5). 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 6).

Diel DO fluctuations are suppressed for a few days following a storm event because the event either scours away algae or temporarily inhibits growth. As dry weather continues, the algae recover and diel DO and pH fluctuations typically increase, sometimes resulting in pH maximum criterion violations, as observed at the upstream gage in March 2011 (Figure 7). Percent DO saturation extremes of 70% at night and over 150% in daylight were observed at gage 01467086 in March 2011, indicating high levels of algal activity (Figure 8). Diel DO fluctuations tended to increase with prolonged periods of sunlight, measured by a photosynthetically active radiation (PAR) sensor located at the downstream gage, further indicating high levels of algal activity.

Interestingly, no pH maximum criterion violations were recorded at the downstream gage. 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 (Tables 15-16).

Table 11. Gage 01467086 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01467086 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	WWF	624.5	26.0	16.1	0.1	99.9	3.9	13.5	7.28
Aug-10	WWF	742.0	30.9	0.3	1.5	98.5	2.7	13.6	7.31
Sep-10	WWF	558.0	23.3	22.5	4.7	95.3	2.4	11.1	6.66
Oct-10	WWF	742.5	30.9	0.2	0.0	100.0	4.4	12.9	8.91
Nov-10	WWF	685.5	28.6	4.8	0.0	100.0	5.3	14.1	10.42
Mar-11	WWF	670.0	27.9	0.1	0.0	100.0	7.7	19.0	12.05
Apr-11	WWF	718.5	29.9	0.2	0.5	99.5	3.5	17.8	10.23
May-11	WWF	721.5	30.1	3.0	1.6	98.4	2.3	14.3	7.76
Jun-11	WWF	681.0	28.4	5.4	7.3	92.7	0.3	12.2	6.79

Table 12. Gage 01467087 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01467087 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	WWF	661.0	27.5	11.2	27.0	73.0	0.1	10.9	5.38
Aug-10	WWF	741.0	30.9	0.4	17.9	82.1	0.1	12.8	5.53
Sep-10	WWF	629.0	26.2	12.6	28.9	71.1	0.9	10.6	5.44
Oct-10	WWF	739.5	30.8	0.6	1.8	98.2	2.3	11.1	7.71
Nov-10	WWF	668.5	27.9	7.2	0.2	99.8	2.3	11.6	8.79
Mar-11	WWF	616.0	25.7	8.2	0.0	100.0	4.8	14.5	10.89
Apr-11	WWF	467.5	19.5	35.1	2.0	98.0	2.2	13.7	9.61
May-11	WWF	690.0	28.8	7.3	17.5	82.5	0.5	10.8	5.99
Jun-11	WWF	717.0	29.9	0.4	20.1	79.9	0.3	9.4	5.46

Table 13 - Gage 01467086 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01467086 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	WWF	23.0	25.8	0.0	100.0	6.3	9.0	7.35
Aug-10	WWF	29.0	6.5	0.0	100.0	5.4	8.3	7.33
Sep-10	WWF	20.0	33.3	10.0	90.0	4.3	8.3	6.69
Oct-10	WWF	30.0	3.2	0.0	100.0	6.2	10.3	8.92
Nov-10	WWF	26.0	13.3	0.0	100.0	7.2	12.0	10.35
Mar-11	WWF	26.0	7.0	0.0	100.0	9.7	14.0	12.04
Apr-11	WWF	29.0	3.3	0.0	100.0	6.2	13.1	10.25
May-11	WWF	27.0	12.9	0.0	100.0	5.1	10.3	7.79
Jun-11	WWF	22.0	26.7	4.5	95.5	4.0	8.5	7.06

Table 14 - Gage 01467087 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01467087 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	WWF	24.0	22.6	37.5	62.5	3.4	8.4	5.50
Aug-10	WWF	28.0	9.7	14.3	85.7	1.9	7.7	5.72
Sep-10	WWF	23.0	23.3	39.1	60.9	2.5	7.8	5.59
Oct-10	WWF	28.0	9.7	3.6	96.4	4.5	9.5	7.77
Nov-10	WWF	26.0	13.3	0.0	100.0	6.4	10.8	8.72
Mar-11	WWF	23.0	17.7	0.0	100.0	8.5	13.0	10.91
Apr-11	WWF	17.0	43.3	0.0	100.0	7.0	12.1	9.90
May-11	WWF	26.0	16.1	42.3	57.7	2.4	8.6	6.08
Jun-11	WWF	27.0	10.0	25.9	74.1	0.6	7.6	5.70

Table 15 - Gage 01467086 pH Criteria Summary Results by Month

Gage 01467086 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.8	7.53
Aug-10	619.0	25.8	16.8	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.9	7.76
Sep-10	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.2	7.42
Oct-10	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.3	7.50
Nov-10	687.0	28.6	4.6	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.4	7.65
Mar-11	670.0	27.9	0.1	10.1	46.4	0.0	0.0	89.9	53.6	7.3	9.6	8.06
Apr-11	718.5	29.9	0.2	5.3	40.0	0.0	0.0	94.7	60.0	6.9	9.3	7.84
May-11	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.9	7.57
Jun-11	716.5	29.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	9.0	7.58

Table 16 - Gage 01467087 pH Criteria Summary Results by Month

Gage 01467087 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	739.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.2	8.3	7.06
Aug-10	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.5	8.6	7.09
Sep-10	716.0	29.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.4	8.0	7.04
Oct-10	739.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.1	7.5	7.00
Nov-10	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.3	7.02
Mar-11	595.5	24.8	11.3	0.0	0.0	0.0	0.0	100.0	100.0	6.4	8.6	7.38
Apr-11	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.7	7.52
May-11	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.9	7.24
Jun-11	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.7	7.16

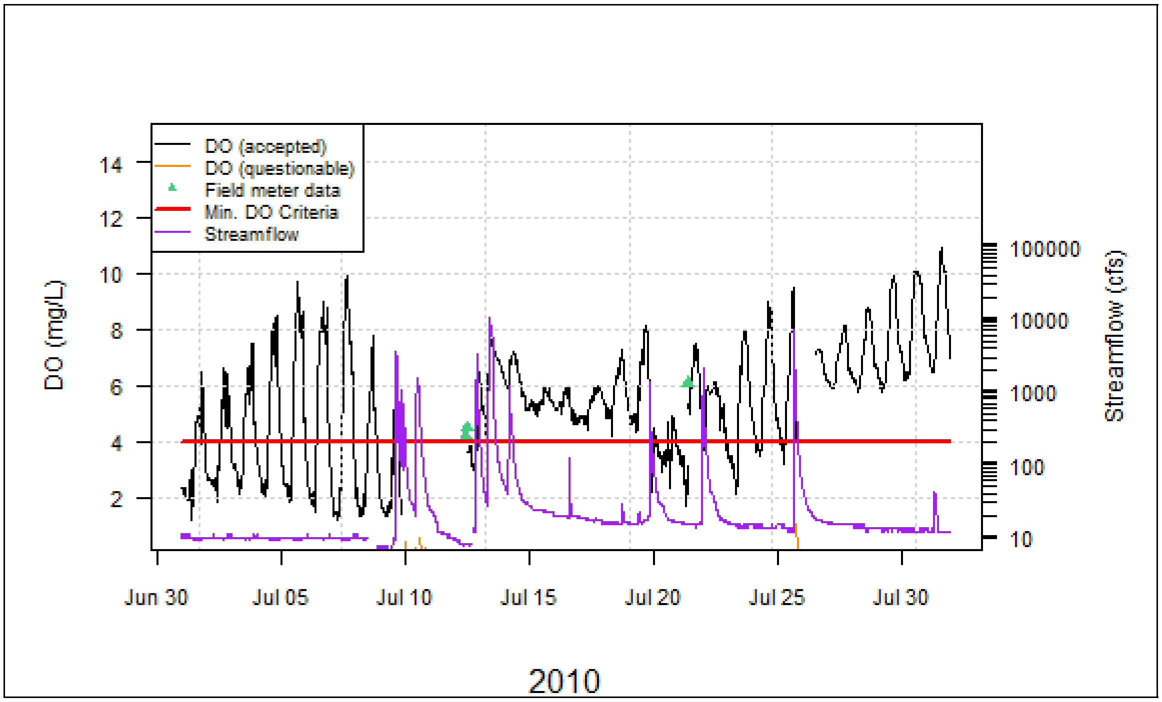

Figure 4 - Gage 01467087, Dissolved Oxygen and Streamflow, July 2010.

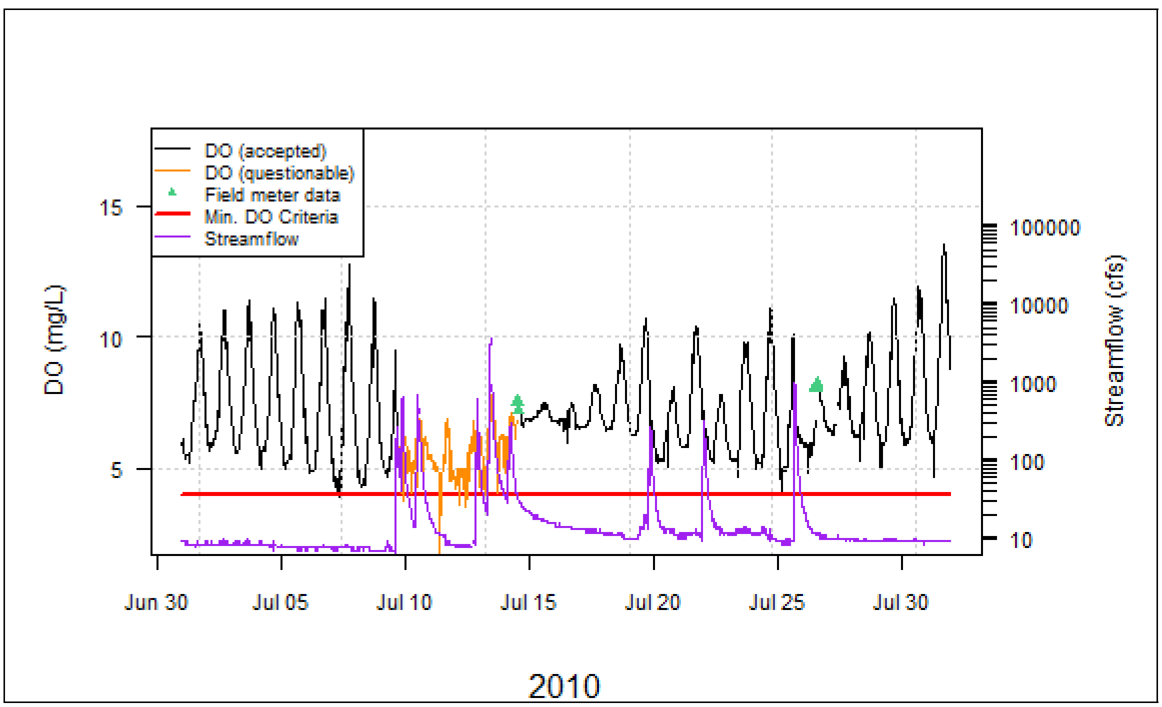

Figure 5 - Gage 01467086, Dissolved Oxygen and Streamflow, July 2010.

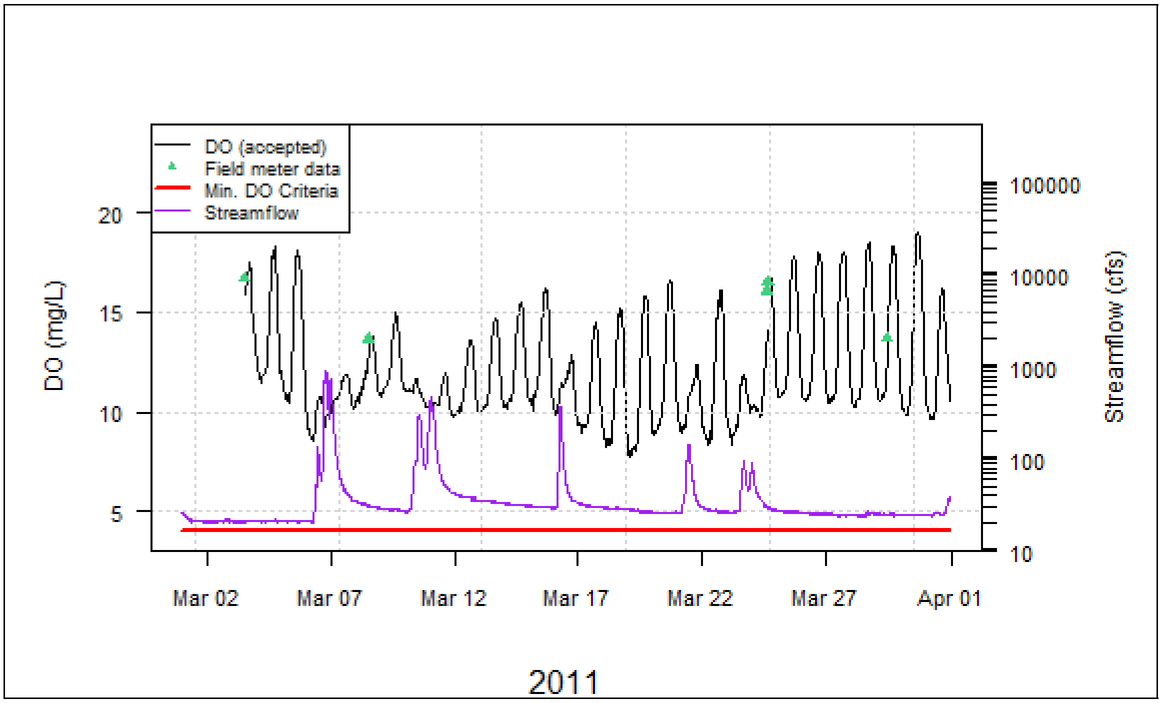

Figure 6 - Gage 01467086, Dissolved Oxygen and Streamflow, March 2011.

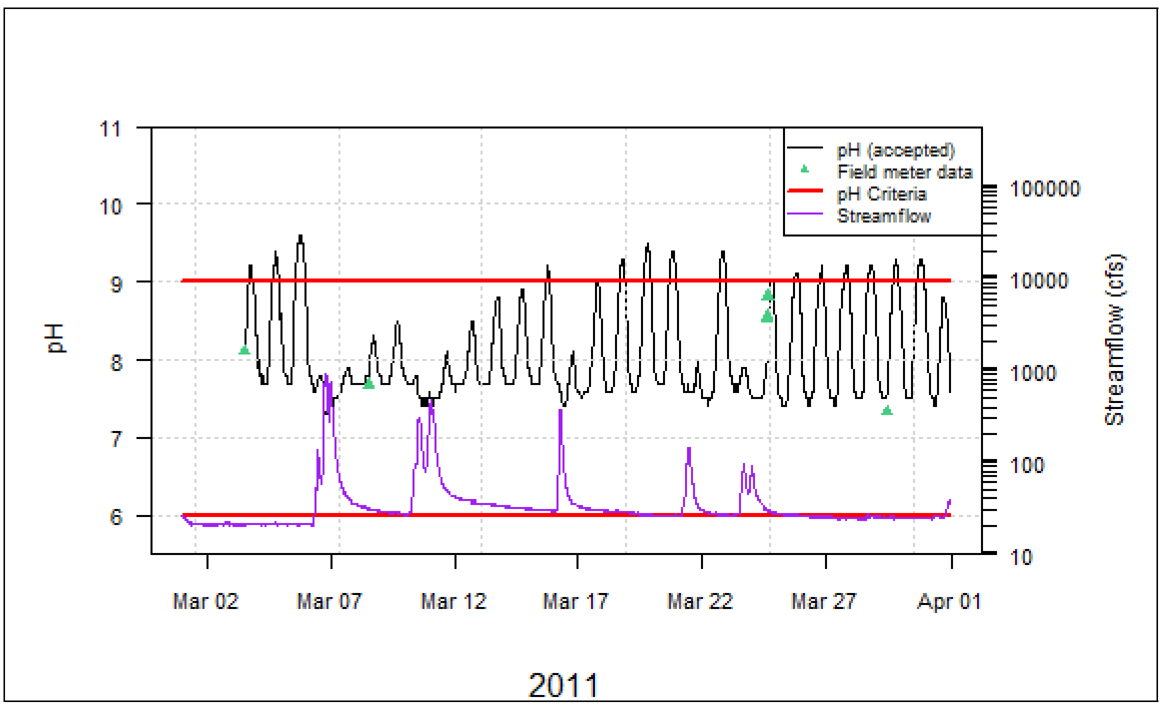

Figure 7 - Gage 01467086, pH and Streamflow, March 2011.

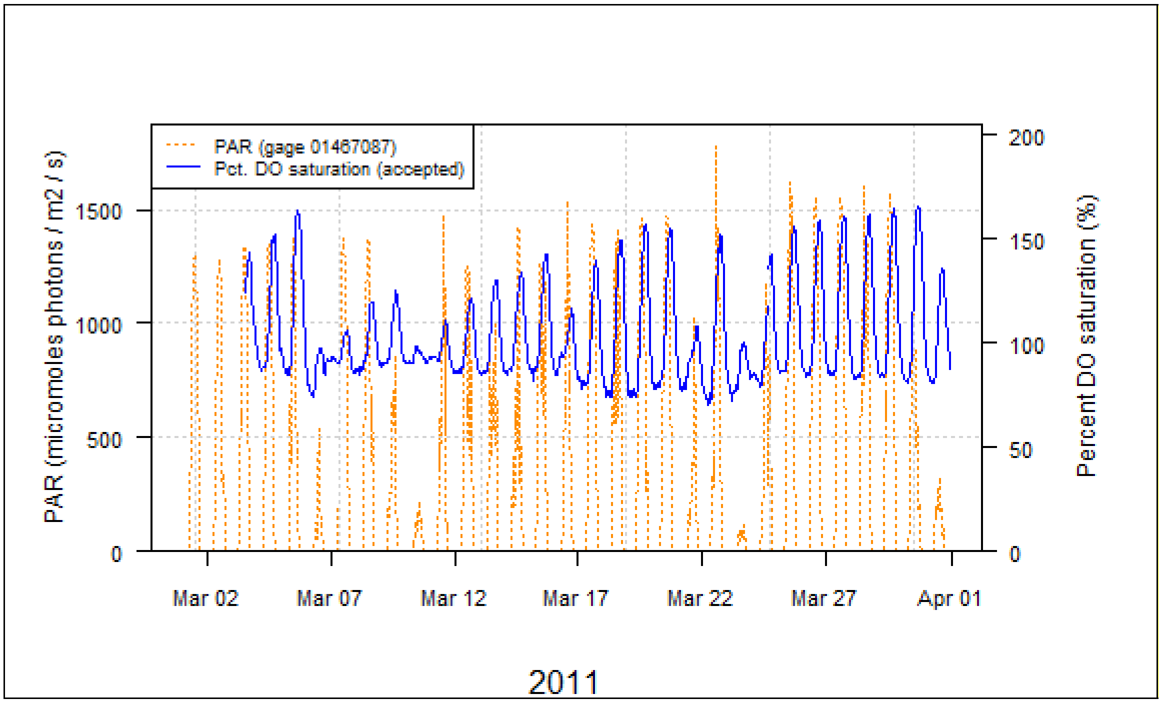

Figure 8 - Gage 01467086, PAR and Percent Dissolved Oxygen Saturation, March 2011.

Specific Conductance

Table 17 - Gage 01467086 Specific Conductance Summary Results by Month

Gage 01467086 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	739.5	30.8	0.6	47.0	684.0	505.38
Aug-10	742.0	30.9	0.3	110.0	708.0	599.45
Sep-10	718.5	29.9	0.2	89.0	706.0	582.19
Oct-10	742.5	30.9	0.2	52.0	649.0	481.16
Nov-10	717.0	29.9	0.4	155.0	671.0	567.41
Mar-11	670.0	27.9	0.1	137.0	813.0	626.72
Apr-11	718.5	29.9	0.2	59.0	687.0	563.36
May-11	742.5	30.9	0.2	220.0	733.0	589.73
Jun-11	716.5	29.9	0.5	68.0	711.0	619.24

Table 18 - Gage 01467087 Specific Conductance Summary Results by Month

Gage 01467087 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	739.5	30.8	0.6	48.0	894.0	459.13
Aug-10	741.0	30.9	0.4	157.0	710.0	579.38
Sep-10	716.0	29.8	0.6	143.0	741.0	590.38
Oct-10	739.5	30.8	0.6	74.0	633.0	418.37
Nov-10	717.0	29.9	0.4	179.0	644.0	510.85
Mar-11	669.5	27.9	0.2	195.0	891.0	678.00
Apr-11	677.5	28.2	5.9	74.0	703.0	562.97
May-11	742.0	30.9	0.3	267.0	735.0	597.34
Jun-11	717.0	29.9	0.4	74.0	732.0	620.15

Temperature

Monthly mean temperatures observed at the downstream gage were consistently higher than at the upstream gage. Consequently, a higher rate of temperature criteria violations was observed at the downstream gage in October, November, March, April, May and June. No violations were observed in the other months (Tables 19-20).

Table 19 - Gage 01467086 Temperature Summary Results by Maximum Criteria Period

Gage 01467086 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.5	740.0	30.8	18.6	29.5	24.60
WWF	1-Aug	15-Aug	0.0	100.0	0.3	359.0	15.0	18.8	28.5	23.39
WWF	16-Aug	31-Aug	0.0	100.0	0.3	383.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.1	359.5	15.0	16.1	26.7	20.53
WWF	16-Sep	30-Sep	0.0	100.0	0.3	359.0	15.0			
WWF	1-Oct	15-Oct	0.8	99.2	0.4	358.5	14.9	9.4	22.5	14.19
WWF	16-Oct	31-Oct	0.0	100.0	0.0	384.0	16.0			
WWF	1-Nov	15-Nov	0.0	100.0	0.4	358.5	14.9	3.3	13.6	8.26
WWF	16-Nov	30-Nov	17.6	82.4	0.4	358.5	14.9			
WWF	1-Mar	31-Mar	53.0	47.0	0.3	670.0	27.9	2.8	15.0	8.41
WWF	1-Apr	15-Apr	56.1	43.9	0.0	360.0	15.0	5.7	21.3	13.08
WWF	16-Apr	30-Apr	49.2	50.8	0.4	358.5	14.9			
WWF	1-May	15-May	10.2	89.8	0.3	359.0	15.0	11.5	25.4	17.52
WWF	16-May	31-May	19.7	80.3	0.1	383.5	16.0			
WWF	1-Jun	15-Jun	0.0	100.0	0.6	358.0	14.9	17.1	26.5	21.62
WWF	16-Jun	30-Jun	0.0	100.0	0.4	358.5	14.9			

Table 20 - Gage 01467087 Temperature Summary Results by Maximum Criteria Period

Gage 01467087 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.7	739.0	30.8	20.8	31.0	25.76
WWF	1-Aug	15-Aug	0.0	100.0	0.4	358.5	14.9	20.0	29.8	24.53
WWF	16-Aug	31-Aug	0.0	100.0	0.4	382.5	15.9			
WWF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	17.8	28.3	21.43
WWF	16-Sep	30-Sep	0.0	100.0	1.1	356.0	14.8			
WWF	1-Oct	15-Oct	0.8	99.2	0.8	357.0	14.9	10.3	22.6	14.58
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	4.2	14.0	8.48
WWF	16-Nov	30-Nov	18.8	81.2	0.4	358.5	14.9			
WWF	1-Mar	31-Mar	55.7	44.3	0.4	669.5	27.9	4.2	14.0	8.67
WWF	1-Apr	15-Apr	62.1	37.9	0.0	360.0	15.0	6.7	22.0	13.55
WWF	16-Apr	30-Apr	54.4	45.6	0.4	358.5	14.9			
WWF	1-May	15-May	16.6	83.4	0.3	359.0	15.0	13.4	27.3	18.51
WWF	16-May	31-May	33.7	66.3	0.3	383.0	16.0			
WWF	1-Jun	15-Jun	4.1	95.9	0.8	357.0	14.9	18.8	28.4	23.18
WWF	16-Jun	30-Jun	0.0	100.0	0.0	360.0	15.0			

Cobbs Creek (Gages 01475530 and 01475548)

Dissolved oxygen and pH

Higher pH was generally observed at the downstream gage (Tables 25-26), the reverse of the trend seen in Tacony Creek. In Cobbs Creek, this is likely due to a greater difference in algal activity between the two gages, with more algal growth occurring downstream. This is supported by comparing the monthly DO minima and maxima at the two gages (Tables 21-22). In all key algal growing-season months, minima are lower and maxima are higher at gage 01475548, indicating more pronounced diel DO fluctuations downstream (Figures 9-10). The minimum DO criterion was violated at the downstream gage immediately following several storm events in July 2010 and June 2011 (Figures 11-12).

Table 21 - Gage 01475530 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01475530 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	WWF	727.5	30.3	2.2	0.0	100.0	5.3	9.9	7.39
Aug-10	WWF	741.0	30.9	0.4	0.0	100.0	5.8	10.3	7.65
Sep-10	WWF	720.0	30.0	0.0	0.0	100.0	6.2	9.9	7.82
Oct-10	WWF	741.0	30.9	0.4	0.0	100.0	6.5	11.9	9.26
Nov-10	WWF	718.0	29.9	0.3	0.0	100.0	8.0	13.7	10.24
Mar-11	WWF	694.5	28.9	0.1	0.0	100.0	8.7	15.8	11.75
Apr-11	WWF	718.5	29.9	0.2	0.0	100.0	6.3	14.9	9.87
May-11	WWF	743.0	31.0	0.1	0.0	100.0	6.4	11.5	8.36
Jun-11	WWF	718.5	29.9	0.2	0.0	100.0	4.6	9.4	7.48

Table 22 - Gage 01475548 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01475548 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	WWF	648.0	27.0	12.9	8.6	91.4	3.1	11.1	6.45
Aug-10	WWF	679.0	28.3	8.7	0.0	100.0	4.5	11.0	7.02
Sep-10	WWF	720.0	30.0	0.0	1.5	98.5	3.5	10.8	6.80
Oct-10	WWF	611.0	25.5	17.9	0.2	99.8	0.4	12.0	8.95
Nov-10	WWF	693.0	28.9	3.8	0.0	100.0	7.6	14.1	10.94
Mar-11	WWF	693.5	28.9	0.2	0.0	100.0	6.3	18.6	11.90
Apr-11	WWF	719.5	30.0	0.1	0.0	100.0	4.4	17.9	10.05
May-11	WWF	687.0	28.6	7.7	0.0	100.0	4.7	12.7	7.85
Jun-11	WWF	718.5	29.9	0.2	7.4	92.6	1.6	10.4	6.47

Table 23 - Gage 01475530 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01475530 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	WWF	28.0	9.7	0.0	100.0	6.6	8.1	7.39
Aug-10	WWF	29.0	6.5	0.0	100.0	6.7	8.2	7.63
Sep-10	WWF	30.0	0.0	0.0	100.0	7.3	8.4	7.82
Oct-10	WWF	29.0	6.5	0.0	100.0	7.5	10.4	9.29
Nov-10	WWF	28.0	6.7	0.0	100.0	8.6	12.0	10.25
Mar-11	WWF	27.0	6.8	0.0	100.0	10.4	13.0	11.73
Apr-11	WWF	28.0	6.7	0.0	100.0	7.5	12.0	9.88
May-11	WWF	30.0	3.2	0.0	100.0	7.2	9.6	8.34
Jun-11	WWF	29.0	3.3	0.0	100.0	6.2	8.3	7.46

Table 24 - Gage 01475548 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01475548 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	WWF	26.0	16.1	11.5	88.5	4.3	8.5	6.48
Aug-10	WWF	25.0	19.4	0.0	100.0	5.6	7.8	7.06
Sep-10	WWF	30.0	0.0	6.7	93.3	4.5	8.7	6.80
Oct-10	WWF	24.0	22.6	0.0	100.0	7.0	10.6	8.95
Nov-10	WWF	26.0	13.3	0.0	100.0	8.3	12.7	10.95
Mar-11	WWF	26.0	10.2	0.0	100.0	9.3	13.8	11.86
Apr-11	WWF	29.0	3.3	0.0	100.0	5.6	13.5	10.14
May-11	WWF	27.0	12.9	0.0	100.0	6.6	9.5	7.86
Jun-11	WWF	28.0	6.7	7.1	92.9	2.9	8.3	6.58

Table 25 - Gage 01475530 pH Criteria Summary Results by Month

Gage 01475530 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	727.5	30.3	2.2	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.1	7.37
Aug-10	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.3	7.40
Sep-10	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.7	7.24
Oct-10	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.4	7.7	7.28
Nov-10	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.7	7.34
Mar-11	694.5	28.9	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.1	9.0	7.58
Apr-11	718.5	29.9	0.2	0.4	3.3	0.0	0.0	99.6	96.7	7.2	9.2	7.55
May-11	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.9	7.39
Jun-11	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.7	7.39

Table 26 - Gage 01475548 pH Criteria Summary Results by Month

Gage 01475548 pH Criteria Summary Information by Month												
Month	total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	725.8	30.4	2.1	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.7	7.57
Aug-10	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.4	7.55
Sep-10	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.5	7.52
Oct-10	734.0	30.6	1.3	0.0	0.0	0.0	0.0	100.0	100.0	6.3	8.4	7.69
Nov-10	716.0	29.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.75
Mar-11	693.5	28.9	0.2	6.8	31.0	0.0	0.0	93.2	69.0	7.2	9.4	8.03
Apr-11	719.5	30.0	0.1	7.2	26.7	0.0	0.0	92.8	73.3	7.0	9.5	7.91
May-11	687.0	28.6	7.7	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.6	7.44
Jun-11	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.1	7.40

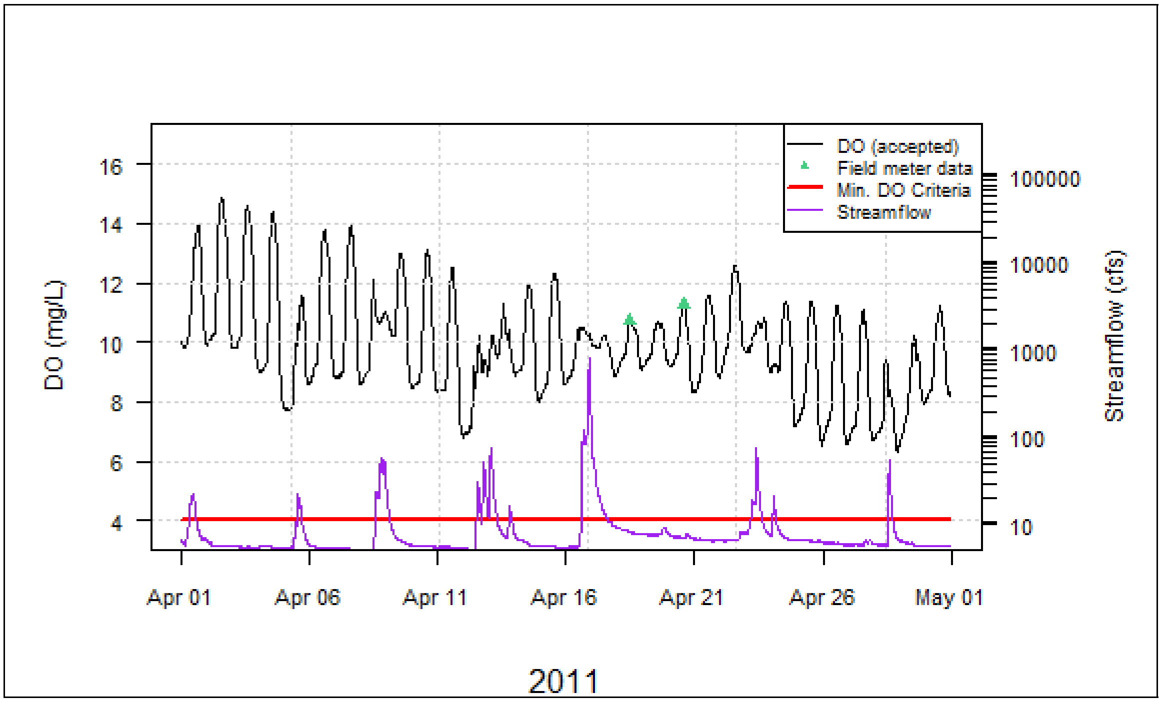

Figure 9 - Gage 01475530, Dissolved Oxygen and Streamflow, April 2011.

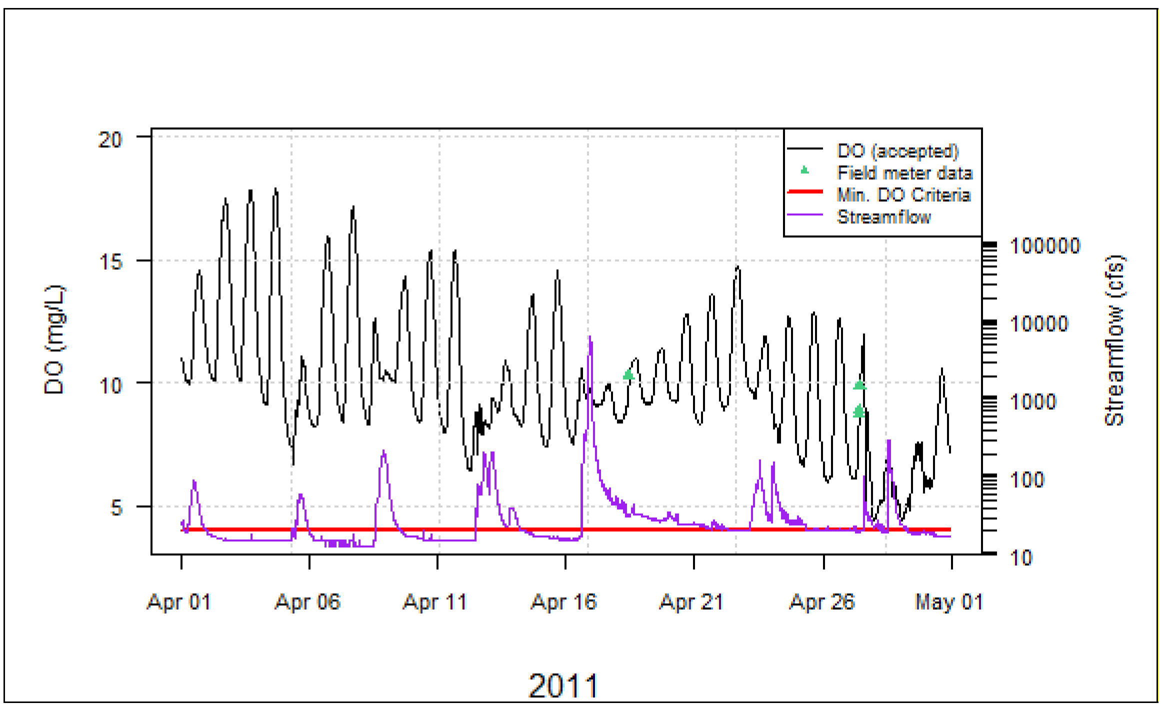

Figure 10 - Gage 01475548, Dissolved Oxygen and Streamflow, April 2011.

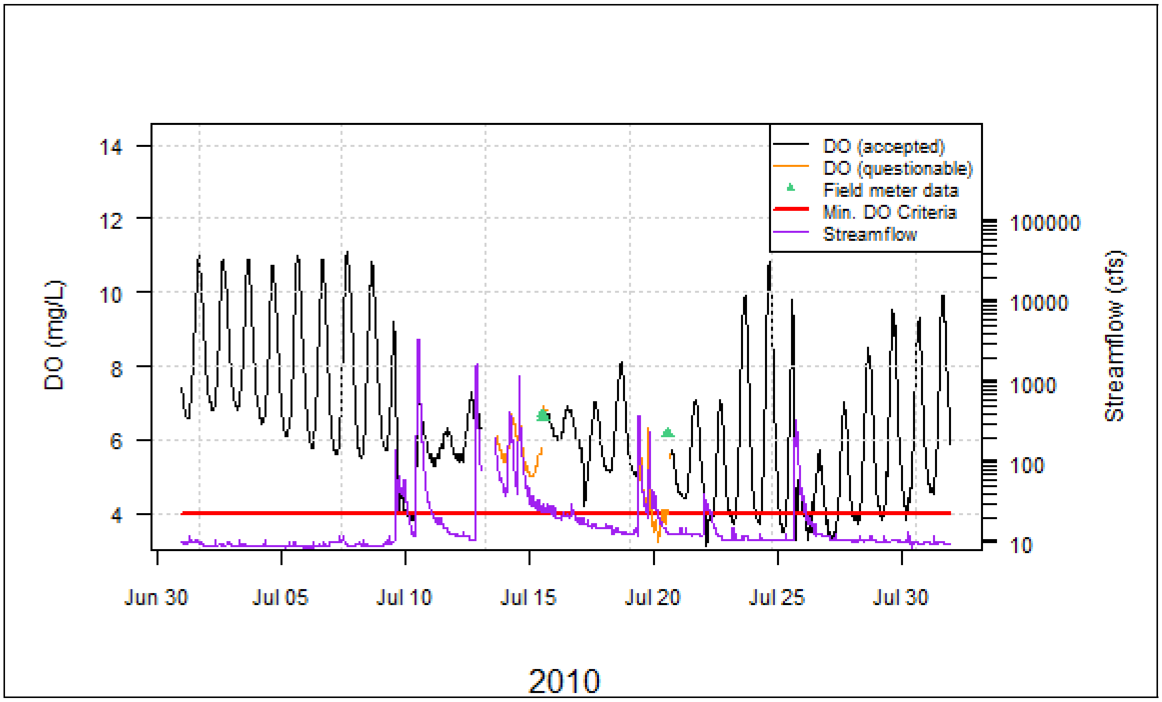

Figure 11 - Gage 01475548, Dissolved Oxygen and Streamflow, July 2010.

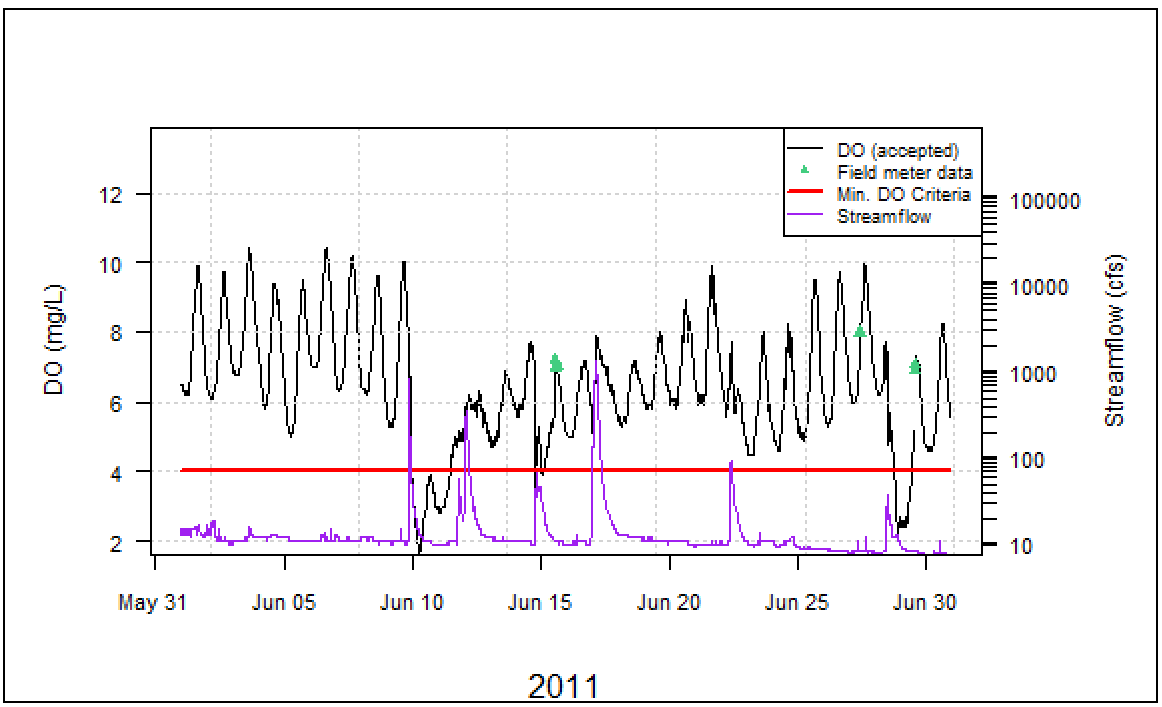

Figure 12 - Gage 01475548, Dissolved Oxygen and Streamflow, June 2011.

Specific Conductance

Specific conductance observations were consistently higher at the downstream gage 01475548 (Tables 27-28). Because stormwater runoff typically lowers the specific conductance in the stream, this might indicate stormwater runoff has a less dilutive effect at the downstream gage. A comparison of May 2011 specific conductance plots at each gage indicates higher concentrations were observed at the downstream gage throughout the month. (Figures 13-14). The higher concentrations also indicate a higher buffering capacity downstream.

Table 27 - Gage 01475530 Specific Conductance Summary Results by Month

Gage 01475530 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	496.0	20.7	33.3	72.0	507.0	450.50
Aug-10	678.5	28.3	8.8	161.0	495.0	458.68
Sep-10	720.0	30.0	0.0	70.0	524.0	449.70
Oct-10	616.0	25.7	17.2	48.0	491.0	406.51
Nov-10	718.0	29.9	0.3	134.0	512.0	464.55
Mar-11	694.0	28.9	0.1	121.0	674.0	517.62
Apr-11	718.5	29.9	0.2	60.0	765.0	445.18
May-11	743.0	31.0	0.1	82.0	590.0	452.01
Jun-11	718.5	29.9	0.2	86.0	547.0	485.94

Table 28 - Gage 01475548 Specific Conductance Summary Results by Month

Gage 01475548 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	728.5	30.4	2.1	85.0	711.0	533.97
Aug-10	740.0	30.8	0.5	230.0	672.0	603.84
Sep-10	720.0	30.0	0.0	119.0	696.0	575.58
Oct-10	734.0	30.6	1.3	52.0	621.0	480.62
Nov-10	716.0	29.8	0.6	155.0	639.0	564.70
Mar-11	693.5	28.9	0.2	172.0	840.0	575.19
Apr-11	682.0	28.4	5.3	113.0	731.0	558.78
May-11	742.5	30.9	0.2	218.0	702.0	582.22
Jun-11	718.5	29.9	0.2	93.0	683.0	562.95

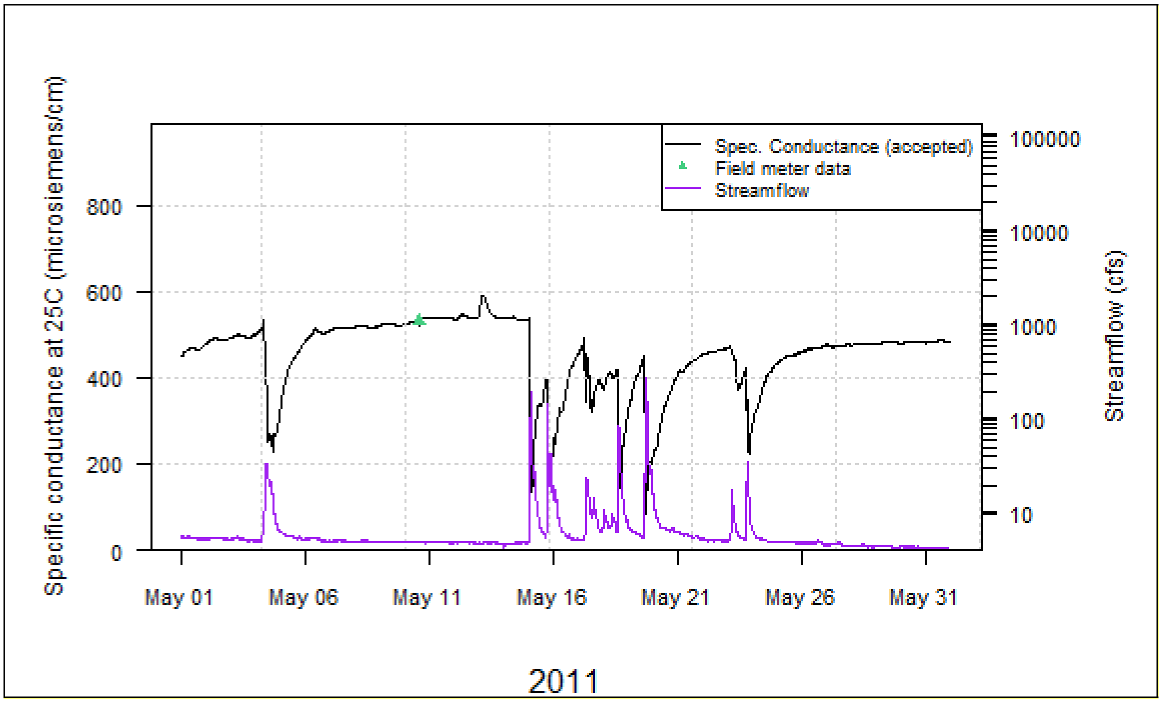

Figure 13 - Gage 01475530, Specific Conductance and Streamflow, May 2011.

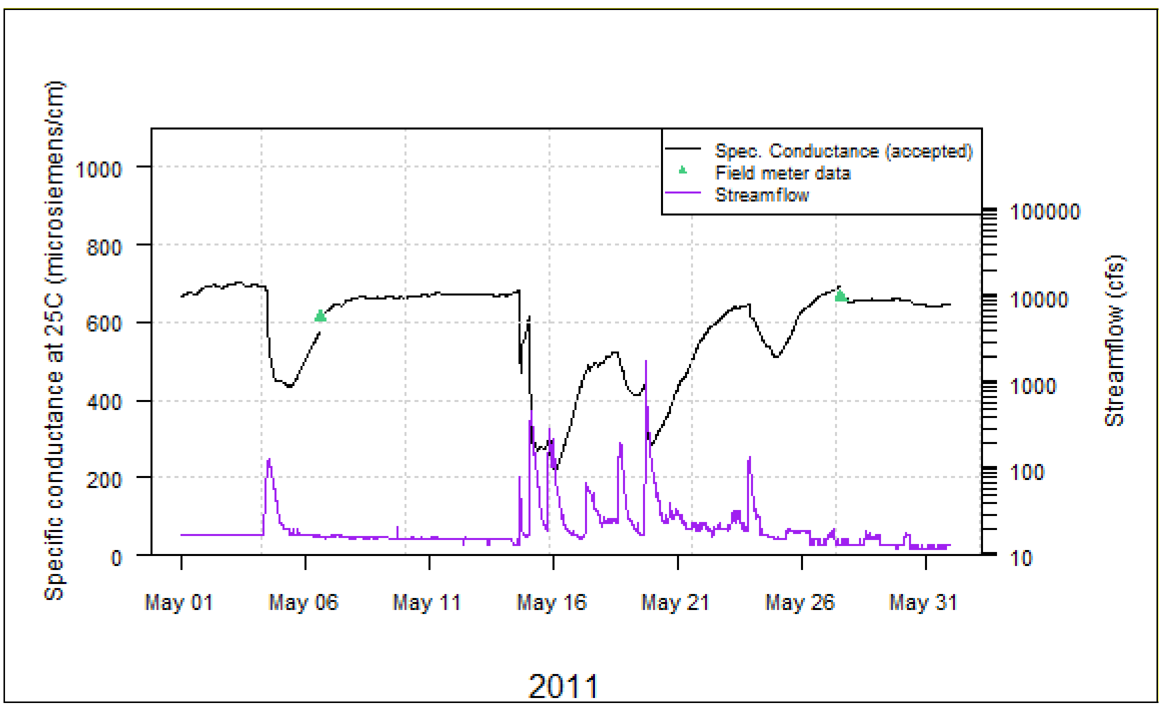

Figure 14.- Gage 01475548, Specific Conductance and Streamflow, May 2011.

Temperature

As was also observed in Tacony Creek, slightly higher temperatures were recorded at the downstream gage in Cobbs Creek, resulting in more frequent violations downstream in November, March, April and May (Tables 29-30).

Table 29 - Gage 01475530 Temperature Summary Results by Maximum Criteria Period

Gage 01475530 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	2.2	727.5	30.3	17.7	27.0	23.04
WWF	1-Aug	15-Aug	0.0	100.0	0.4	358.5	14.9	17.9	25.9	21.92
WWF	16-Aug	31-Aug	0.0	100.0	0.4	382.5	15.9			
WWF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	15.5	24.9	19.41
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.4	358.5	14.9	9.4	21.9	13.95
WWF	16-Oct	31-Oct	0.1	99.9	0.4	382.5	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.3	359.0	15.0	4.3	14.2	8.80
WWF	16-Nov	30-Nov	21.9	78.1	0.3	359.0	15.0			
WWF	1-Mar	31-Mar	50.5	49.5	0.4	693.5	28.9	3.1	14.7	8.28
WWF	1-Apr	15-Apr	52.2	47.8	0.0	360.0	15.0	5.9	20.8	12.84
WWF	16-Apr	30-Apr	47.7	52.3	0.4	358.5	14.9			
WWF	1-May	15-May	5.0	95.0	0.3	359.0	15.0	11.4	24.3	16.93
WWF	16-May	31-May	6.5	93.5	0.0	384.0	16.0			
WWF	1-Jun	15-Jun	0.0	100.0	0.4	358.5	14.9	16.2	25.7	20.49
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

Gage 01475548 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	2.1	728.5	30.4	19.6	29.0	24.83
WWF	1-Aug	15-Aug	0.0	100.0	0.6	358.0	14.9	19.2	28.2	23.62
WWF	16-Aug	31-Aug	0.0	100.0	0.3	383.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	16.6	26.5	20.52
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.9	99.1	2.4	351.5	14.6	9.8	22.5	14.36
WWF	16-Oct	31-Oct	0.0	100.0	0.4	382.5	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.7	357.5	14.9	4.0	13.9	8.60
WWF	16-Nov	30-Nov	19.9	80.1	0.3	359.0	15.0			
WWF	1-Mar	31-Mar	53.7	46.3	0.4	693.5	28.9	3.3	14.3	8.34
WWF	1-Apr	15-Apr	59.0	41.0	0.0	360.0	15.0	6.1	21.8	13.44
WWF	16-Apr	30-Apr	52.2	47.8	0.1	359.5	15.0			
WWF	1-May	15-May	14.5	85.5	0.1	359.5	15.0	12.4	26.4	18.13
WWF	16-May	31-May	26.2	73.8	0.3	383.0	16.0			
WWF	1-Jun	15-Jun	0.0	100.0	0.3	359.0	15.0	18.1	26.8	22.19
WWF	16-Jun	30-Jun	0.0	100.0	0.1	359.5	15.0			

Gages in Separate Sewer System Watersheds

Pennypack Creek (Gages 01467042 and 01467048)

Dissolved oxygen and pH

Both the upstream (gage 01467042) and downstream (gage 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, extended 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 as high as 9 mg/L (Figure 15), and daily pH fluctuations of approximately 1.5 units (Figure 16). Major pH fluctuations and maximum criterion violations occurred at both gages in April 2011 (Figures 17 and 18). It would be reasonable to conclude that if not for periodic interruptions of algal activity due to rainfall, those extreme fluctuations and subsequent criteria violations would likely occur on a constant basis during the entire growing season.

Algal populations in the area of gage 01467048 recover quickly after storm events, as seen in August 2010 (Figure 15). Prior to the storm event on 8/11/10, both DO and pH showed the typical high fluctuations indicative of strong algal activity. This stopped abruptly with each of the storms that occurred later in the month, especially the storms of 8/22 and 8/23. During these storms, much of the algae was likely scoured away and overcast conditions likely inhibited further growth, as indicated by the PAR data for August 2010 (Figure 19). However, within 3-4 days of the conclusion of the rainfall and the return of sunny conditions, the signature fluctuations of DO and pH made a very dramatic return, and within a few days the algal activity returned to high levels. This not only demonstrates the resilience of the algal population in this ecosystem, but also a likely abundance of nutrients that allows such a resurgence to occur.

Table 31 - Gage 01467042 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01467042 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	TSF	613.0	25.5	17.6	0.0	100.0	5.7	11.1	7.55
Aug-10	TSF	669.5	27.9	10.0	0.0	100.0	5.2	11.9	7.51
Sep-10	TSF	718.5	29.9	0.2	0.0	100.0	5.6	12.6	8.27
Oct-10	TSF	742.5	30.9	0.2	0.0	100.0	5.8	10.9	8.95
Nov-10	TSF	716.0	29.8	0.6	0.0	100.0	7.5	12.7	10.18
Mar-11	TSF	642.5	26.8	0.7	0.0	100.0	9.3	17.7	11.69
Apr-11	TSF	716.5	29.9	0.5	0.0	100.0	6.7	16.9	9.98
May-11	TSF	692.0	28.8	7.0	0.0	100.0	6.7	11.3	8.59
Jun-11	TSF	635.0	26.5	11.8	0.0	100.0	5.5	10.4	7.92

Table 32 - Gage 01467048 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01467048 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	TSF	741.5	30.9	0.3	0.0	100.0	5.7	15.8	7.83
Aug-10	TSF	742.5	30.9	0.2	0.0	100.0	5.1	15.0	8.04
Sep-10	TSF	718.5	29.9	0.2	0.0	100.0	5.8	13.6	8.26
Oct-10	TSF	742.5	30.9	0.2	0.0	100.0	7.2	11.4	9.51
Nov-10	TSF	717.5	29.9	0.3	0.0	100.0	9.0	14.6	11.24
Mar-11	TSF	719.0	30.0	3.2	0.0	100.0	9.7	17.4	12.25
Apr-11	TSF	717.0	29.9	0.4	0.0	100.0	7.5	17.2	10.45
May-11	TSF	737.0	30.7	0.9	0.0	100.0	6.9	11.9	9.00
Jun-11	TSF	715.5	29.8	0.6	0.0	100.0	5.6	11.9	8.33

Table 33 - Gage 01467042 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01467042 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	TSF	24.0	22.6	0.0	100.0	7.0	8.4	7.56
Aug-10	TSF	25.0	19.4	0.0	100.0	6.1	8.8	7.54
Sep-10	TSF	29.0	3.3	0.0	100.0	7.3	9.4	8.26
Oct-10	TSF	30.0	3.2	0.0	100.0	6.7	9.9	8.94
Nov-10	TSF	27.0	10.0	0.0	100.0	8.4	11.5	10.21
Mar-11	TSF	23.0	14.7	0.0	100.0	10.2	13.2	11.73
Apr-11	TSF	27.0	10.0	0.0	100.0	8.0	12.7	9.93
May-11	TSF	22.0	29.0	0.0	100.0	7.4	9.7	8.66
Jun-11	TSF	24.0	20.0	0.0	100.0	6.5	8.7	7.92

Table 34 - Gage 01467048 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01467048 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	TSF	28.0	9.7	0.0	100.0	7.1	9.8	7.86
Aug-10	TSF	30.0	3.2	0.0	100.0	6.3	9.0	8.04
Sep-10	TSF	29.0	3.3	0.0	100.0	7.5	9.0	8.27
Oct-10	TSF	29.0	6.5	0.0	100.0	8.0	10.5	9.49
Nov-10	TSF	28.0	6.7	0.0	100.0	9.6	13.1	11.24
Mar-11	TSF	25.0	19.2	0.0	100.0	10.8	13.7	12.18
Apr-11	TSF	27.0	10.0	0.0	100.0	8.1	13.4	10.52
May-11	TSF	27.0	12.9	0.0	100.0	8.1	9.9	9.01
Jun-11	TSF	27.0	10.0	0.0	100.0	6.8	9.1	8.36

Table 35 - Gage 01467042 pH Criteria Summary Results by Month

Gage 01467042 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hours max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.5	7.51
Aug-10	680.5	28.4	8.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.6	7.53
Sep-10	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.7	7.67
Oct-10	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.5	7.7	7.42
Nov-10	716.0	29.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.8	7.40
Mar-11	642.5	26.8	0.7	3.1	14.8	0.0	0.0	96.9	85.2	7.2	9.4	7.83
Apr-11	716.5	29.9	0.5	3.2	16.7	0.0	0.0	96.8	83.3	7.1	9.4	7.75
May-11	733.0	30.5	1.5	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.0	7.62
Jun-11	716.5	29.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.3	7.69

Table 36 - Gage 01467048 pH Criteria Summary Results by Month

Gage 01467048 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	741.5	30.9	0.3	0.3	3.2	0.0	0.0	99.7	96.8	6.5	9.1	7.66
Aug-10	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.7	9.0	7.72
Sep-10	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.9	7.72
Oct-10	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.1	7.56
Nov-10	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.1	7.65
Mar-11	738.5	30.8	0.6	3.7	12.9	0.0	0.0	96.3	87.1	7.2	9.3	7.96
Apr-11	717.0	29.9	0.4	6.8	23.3	0.0	0.0	93.2	76.7	6.9	9.4	7.87
May-11	737.0	30.7	0.9	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.3	7.62
Jun-11	715.5	29.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.7	7.72

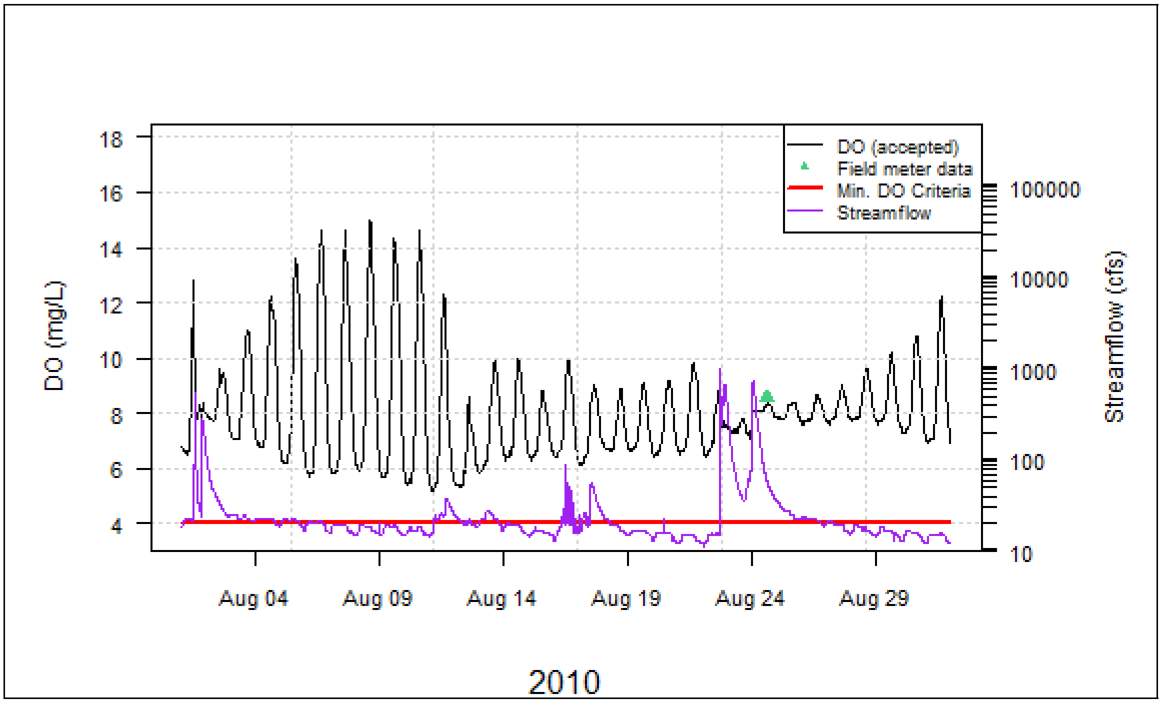

Figure 15 - Gage 01467048, Dissolved Oxygen and Streamflow, August 2010.

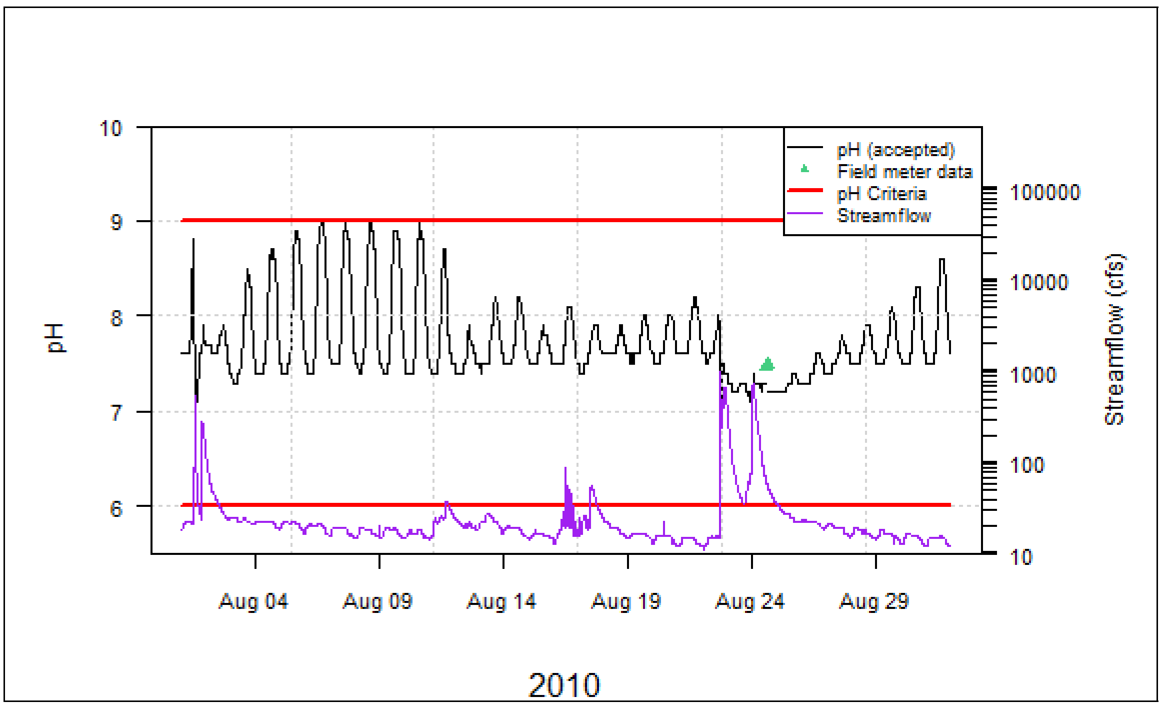

Figure 16 - Gage 01467048, pH and Streamflow, August 2010.

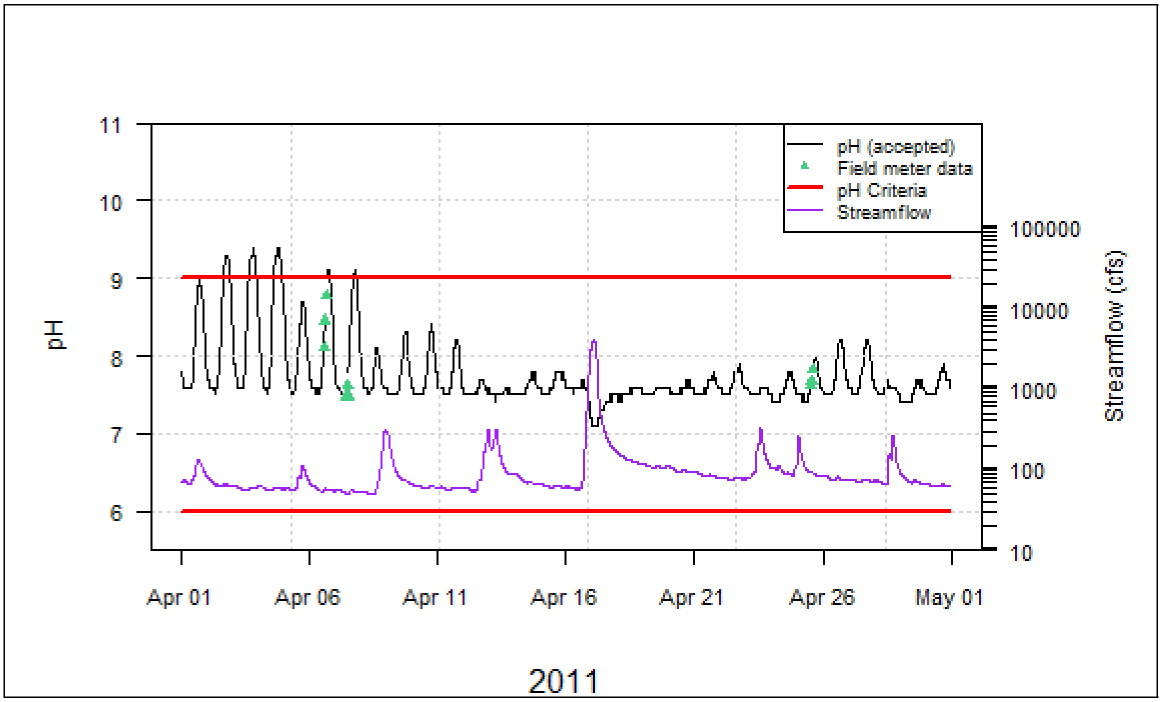

Figure 17 - Gage 01467042, pH and Streamflow, April 2011.

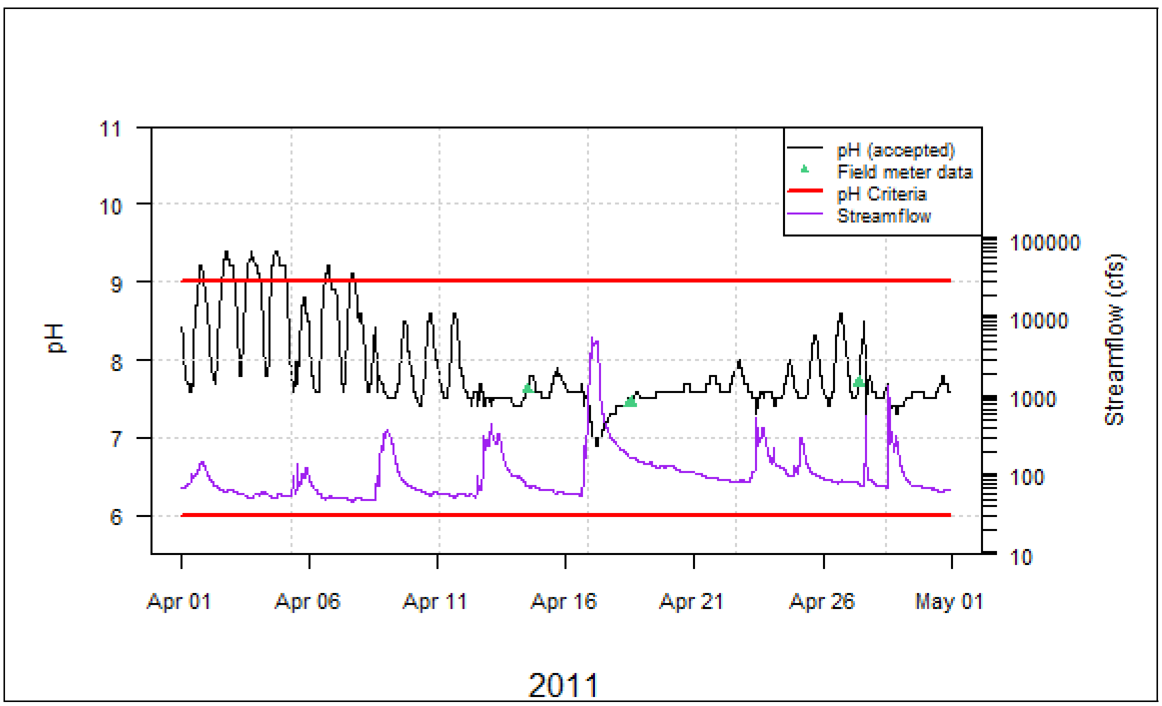

Figure 18 - Gage 01467048, pH and Streamflow, April 2011.

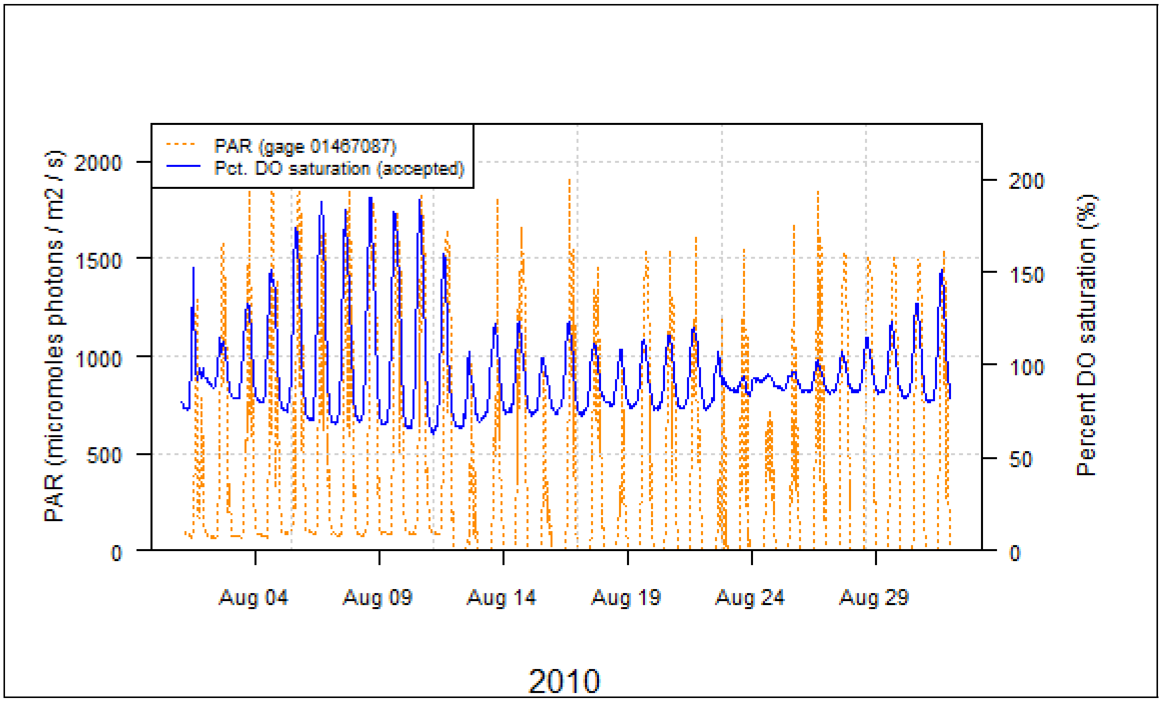

Figure 19 - Gage 01467048, PAR and Percent Dissolved Oxygen Saturation, August 2010.

Turbidity

Table 37 - Gage 01467042, Turbidity Summary Results by Month

Gage 01467042 Turbidity Summary Information 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-10	661.0	27.5	11.2	30.0	70.0	0.0	520.0	9.80
Aug-10	558.5	23.3	24.9	18.0	82.0	0.0	170.0	4.10
Sep-10	582.5	24.3	19.1	7.0	93.0	0.0	170.0	2.55
Oct-10	740.5	30.9	0.5	16.3	83.7	0.0	220.0	3.89
Nov-10	577.5	24.1	19.8	10.0	90.0	0.0	17.0	1.14
Mar-11	642.5	26.8	0.7	36.3	63.7	0.2	550.0	10.42
Apr-11	714.0	29.8	0.8	48.2	51.8	0.0	440.0	8.37
May-11	694.5	28.9	6.7	30.2	69.8	0.1	490.0	5.60
Jun-11	577.0	24.0	19.9	15.3	84.7	0.0	200.0	3.34

Table 38 - Gage 01467048, Turbidity Summary Results by Month

Gage 01467048 Turbidity Summary Information 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-10	563.5	23.5	24.3	49.2	50.8	0.0	580.0	15.83
Aug-10	740.5	30.9	0.5	41.1	58.9	0.0	200.0	5.85
Sep-10	709.5	29.6	1.5	19.2	80.8	0.0	190.0	4.50
Oct-10	742.0	30.9	0.3	37.0	63.0	0.1	240.0	6.92
Nov-10	630.0	26.3	12.5	25.4	74.6	0.2	62.0	2.75
Mar-11	599.0	25.0	19.4	36.3	63.7	0.0	1040.0	13.74
Apr-11	652.0	27.2	9.4	43.1	56.9	0.0	450.0	11.66
May-11	734.0	30.6	1.3	35.7	64.3	0.0	510.0	7.93
Jun-11	694.0	29.9	3.6	16.9	83.1	0.0	220.0	4.64

Specific Conductance

Table 39 - Gage 01467042 Specific Conductance Summary Results by Month

Gage 01467042 Specific Conductance Summary Information by Month						
Month	Total hours accepted data	Total days accepted data	Percent hours flagged data	Min.	Max.	Mean
Jul-10	742.0	30.9	0.0	74.0	733.0	508.30
Aug-10	740.0	30.8	0.5	165.0	718.0	590.48
Sep-10	718.5	29.9	0.2	190.0	787.0	649.79
Oct-10	742.5	30.9	0.2	82.0	691.0	521.19
Nov-10	716.0	29.8	0.6	251.0	705.0	580.41
Mar-11	642.5	26.8	0.7	228.0	846.0	629.19
Apr-11	716.5	29.9	0.5	84.0	693.0	555.73
May-11	733.0	30.5	1.5	156.0	660.0	547.48
Jun-11	716.5	29.9	0.5	194.0	725.0	594.44

Table 40 - Gage 01467048 Specific Conductance Summary Results by Month

Gage 01467048 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	741.5	30.9	0.3	67.0	681.0	467.61
Aug-10	742.5	30.9	0.2	92.0	695.0	544.21
Sep-10	718.5	29.9	0.2	84.0	738.0	606.47
Oct-10	742.5	30.9	0.2	74.0	629.0	457.67
Nov-10	717.5	29.9	0.3	247.0	619.0	521.79
Mar-11	738.5	30.8	0.6	228.0	1050.0	642.86
Apr-11	717.0	29.9	0.4	84.0	657.0	521.50
May-11	737.0	30.7	0.9	147.0	633.0	519.59
Jun-11	715.5	29.8	0.6	160.0	758.0	552.45

Temperature

Temperature data collected showed variable compliance with maximum temperature criteria (Tables 41-42). The main periods that exceeded maximum criteria were July 2010 and March-June 2011. 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. In July 2010 and June 2011, exceedances occurred during months that are prone to periods of above normal temperatures (*i.e.*, heat waves). However, the maximum criteria for this stream vary over the course of June and July (21-23°C) and therefore do not take into account natural summer temperature peaks, as occurred during both months (Figures 20 and 21). These periods of above normal air temperatures likely caused the high stream temperature exceedance rates in June. Similar exceedance rates and air temperature phenomena were also observed in April and May, 2011.

Table 41 - Gage 01467042 Temperature Summary Results by Maximum Criteria Period.

Gage 01467042 Temperature Summary Information by Max. Criteria Period										
Des. Use	Date range start	Date range end	Percent hours exceedance	Percent hours compliance	Percent hours flagged data	Total hours accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	76.3	23.7	0.3	742.0	30.9	18.6	28.1	24.15
TSF	1-Aug	15-Aug	1.3	98.7	0.6	358.0	14.9	18.7	27.3	23.00
TSF	16-Aug	31-Aug	0.0	100.0	0.5	382.0	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	0.4	358.5	14.9	16.1	25.4	20.03
TSF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
TSF	1-Oct	15-Oct	0.6	99.4	0.4	358.5	14.9	9.7	22.2	14.27
TSF	16-Oct	31-Oct	0.0	100.0	0.0	384.0	16.0			
TSF	1-Nov	15-Nov	0.0	100.0	0.4	358.5	14.9	4.1	13.2	8.58
TSF	16-Nov	30-Nov	20.3	79.7	1.0	356.5	14.9			
TSF	1-Mar	31-Mar	61.6	38.4	0.8	642.5	26.8	5.0	14.6	8.65
TSF	1-Apr	15-Apr	55.0	45.0	0.6	358.0	14.9	6.2	20.3	12.91
TSF	16-Apr	30-Apr	47.7	52.3	0.4	358.5	14.9			
TSF	1-May	15-May	5.6	94.4	0.6	358.0	14.9	11.8	25.2	17.34
TSF	16-May	31-May	36.0	64.0	2.1	376.0	15.7			
TSF	1-Jun	15-Jun	46.0	54.0	0.4	358.5	14.9	16.8	26.0	21.29
TSF	16-Jun	30-Jun	41.2	58.8	0.6	358.0	14.9			

Table 42 - Gage 01467048, Temperature Summary Results by Maximum Criteria Period.

Gage 01467048 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	91.5	8.5	0.3	741.5	30.9	20.1	30.2	25.39
TSF	1-Aug	15-Aug	12.9	87.1	0.0	360.0	15.0	19.4	29.2	24.05
TSF	16-Aug	31-Aug	0.0	100.0	0.4	382.5	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	0.4	358.5	14.9	16.4	27.4	20.84
TSF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
TSF	1-Oct	15-Oct	0.3	99.7	0.1	359.5	15.0	10.0	22.2	14.47
TSF	16-Oct	31-Oct	0.7	99.3	0.3	383.0	16.0			
TSF	1-Nov	15-Nov	0.0	100.0	0.3	359.0	15.0	3.8	13.1	8.41
TSF	16-Nov	30-Nov	17.9	82.2	0.4	358.5	14.9			
TSF	1-Mar	31-Mar	50.6	49.4	0.7	738.5	30.8	3.4	14.4	8.23
TSF	1-Apr	15-Apr	58.6	41.4	0.1	359.5	15.0	6.5	21.9	13.22
TSF	16-Apr	30-Apr	49.0	51.0	0.7	357.5	14.9			
TSF	1-May	15-May	11.3	88.7	1.5	354.5	14.8	12.7	26.5	17.99
TSF	16-May	31-May	38.7	61.3	0.4	382.5	15.9			
TSF	1-Jun	15-Jun	60.4	39.6	0.7	357.5	14.9	18.4	26.8	22.41
TSF	16-Jun	30-Jun	77.4	22.6	0.6	358.0	14.9			

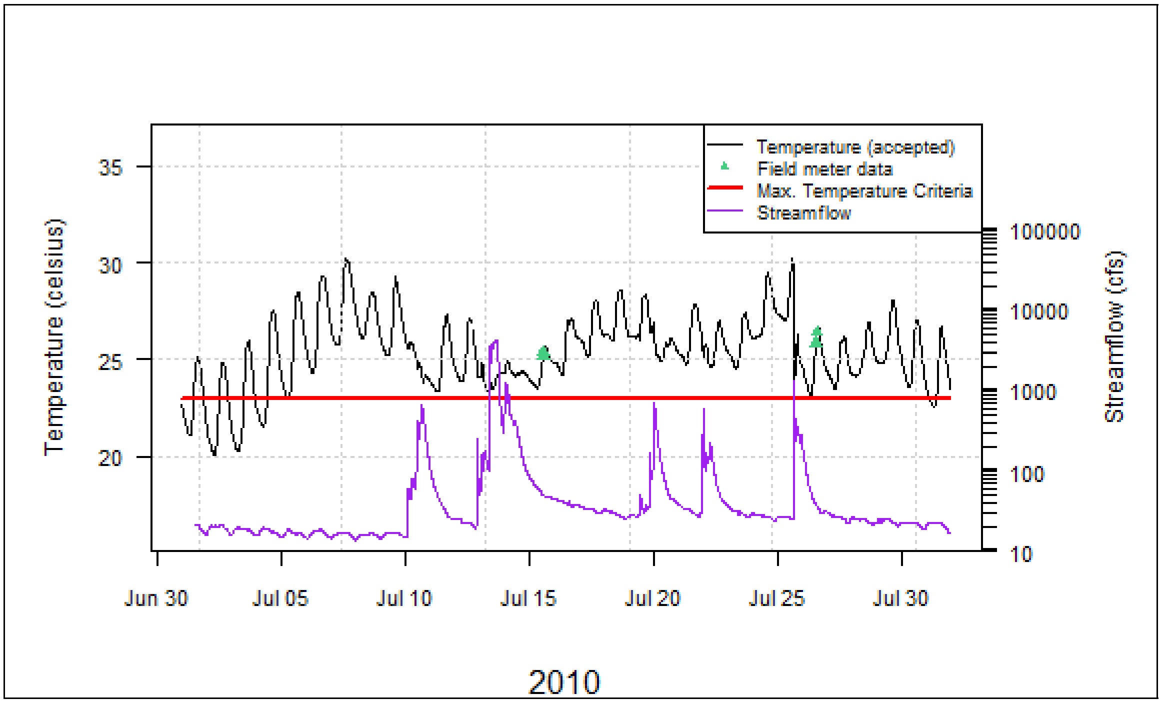

Figure 20 - Gage 01467048, Temperature and Streamflow, July 2010.

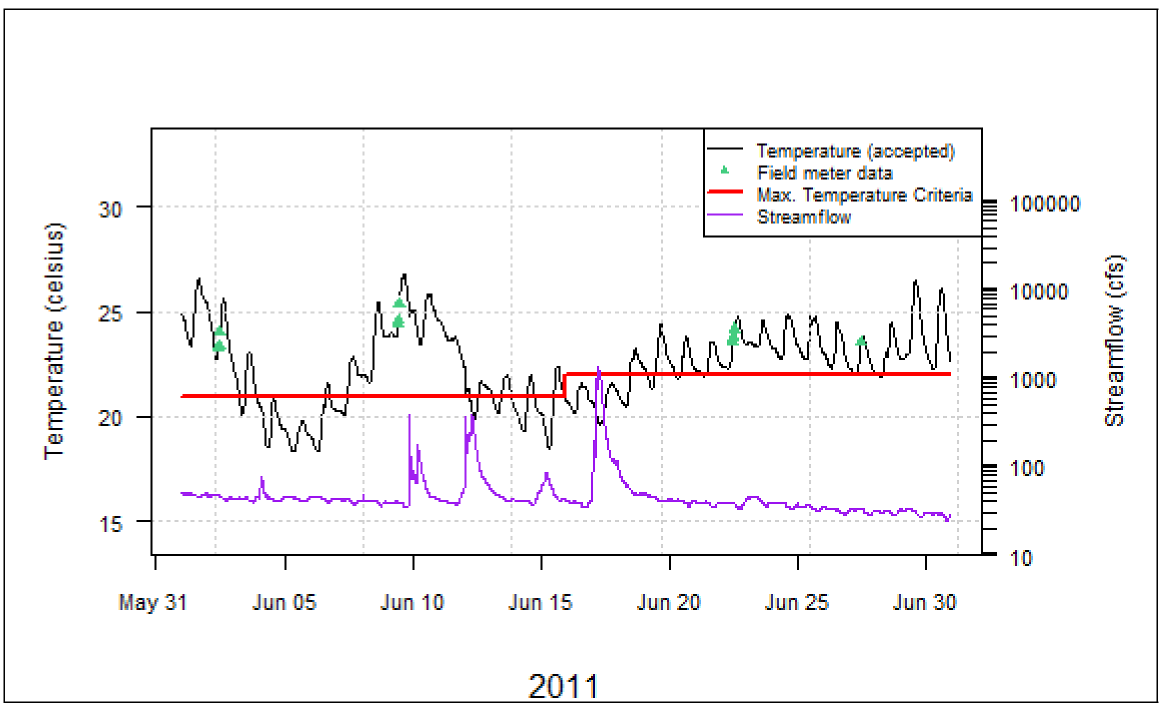

Figure 21 - Gage 01467048, Temperature and Streamflow, June 2011.

Wissahickon Creek (Gages 01473900 and 01474000)

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 March 2011, dissolved oxygen is seen fluctuating from 9.5 to 21.6 mg/L in a single day/night period (Figure 22), with pH ranging from approximately 7.9 to 9.3 at the same time (Figure 23). Frequent pH maxima exceedances also occurred during that month, a direct result of algal activity.

Dissolved oxygen at the upstream gage was severely affected by a series of moderate storms on four consecutive days in mid-May 2011 (Figure 24). The minimum DO in that span was 1.2 mg/L.

Table 43 - Gage 01473900 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01473900 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	TSF	660.0	27.5	11.3	4.1	95.9	4.4	12.2	7.07
Aug-10	TSF	740.0	30.8	0.5	0.1	99.9	3.9	13.4	7.65
Sep-10	TSF	713.5	29.7	0.9	0.0	100.0	5.3	12.5	7.95
Oct-10	TSF	640.0	26.7	14.0	0.0	100.0	5.6	13.2	8.81
Nov-10	TSF	574.0	23.9	20.3	0.0	100.0	7.4	15.8	10.25
Mar-11	TSF	668.5	27.9	0.4	0.0	100.0	8.1	21.6	12.19
Apr-11	TSF	717.0	29.9	0.4	1.3	98.7	3.6	19.8	10.23
May-11	TSF	742.5	30.9	0.2	4.5	95.5	1.2	15.7	7.71
Jun-11	TSF	715.0	29.8	0.7	1.1	98.9	4.5	11.0	7.40

Table 44 - Gage 01474000 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01474000 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	TSF	346.5	14.4	53.4	1.3	98.7	4.1	14.1	8.09
Aug-10	TSF	512.0	21.3	31.2	0.0	100.0	5.5	11.9	8.32
Sep-10	TSF	693.0	28.9	3.8	0.0	100.0	7.0	12.6	9.19
Oct-10	TSF	742.5	30.9	0.2	0.0	100.0	8.1	13.9	10.16
Nov-10	TSF	717.0	29.9	0.4	0.0	100.0	9.8	15.6	11.80
Mar-11	TSF	643.0	26.8	0.6	0.0	100.0	9.8	17.7	12.27
Apr-11	TSF	717.5	29.9	0.3	0.0	100.0	7.7	17.4	10.54
May-11	TSF	738.5	30.8	0.7	0.0	100.0	7.4	13.2	9.17
Jun-11	TSF	717.5	29.9	0.3	0.0	100.0	5.7	11.2	8.62

Table 45 - Gage 01473900 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01473900 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	TSF	22.0	29.0	4.5	95.5	5.8	8.2	7.08
Aug-10	TSF	29.0	6.5	0.0	100.0	5.4	8.4	7.63
Sep-10	TSF	26.0	13.3	0.0	100.0	6.9	8.7	7.90
Oct-10	TSF	25.0	19.4	0.0	100.0	6.4	10.2	8.78
Nov-10	TSF	21.0	30.0	0.0	100.0	9.0	11.3	10.31
Mar-11	TSF	24.0	14.2	0.0	100.0	9.8	14.1	12.19
Apr-11	TSF	26.0	13.3	0.0	100.0	6.4	13.3	10.19
May-11	TSF	30.0	3.2	10.0	90.0	3.9	10.6	7.70
Jun-11	TSF	26.0	13.3	3.8	96.2	5.8	8.3	7.41

Table 46 - Gage 01474000 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01474000 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	TSF	12.0	61.3	0.0	100.0	6.1	9.2	7.98
Aug-10	TSF	20.0	35.5	0.0	100.0	6.7	9.0	8.28
Sep-10	TSF	26.0	13.3	0.0	100.0	8.4	9.9	9.17
Oct-10	TSF	30.0	3.2	0.0	100.0	8.7	11.5	10.13
Nov-10	TSF	28.0	6.7	0.0	100.0	10.5	13.4	11.76
Mar-11	TSF	23.0	14.7	0.0	100.0	10.9	13.6	12.23
Apr-11	TSF	28.0	6.7	0.0	100.0	8.4	13.1	10.58
May-11	TSF	27.0	12.9	0.0	100.0	8.5	10.5	9.15
Jun-11	TSF	28.0	6.7	0.0	100.0	7.6	9.4	8.62

Table 47 - Gage 01473900 pH Criteria Summary Results by Month

Gage 01473900 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	737.0	30.7	0.9	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.5	7.78
Aug-10	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.6	7.83
Sep-10	716.5	29.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.4	7.83
Oct-10	679.0	28.3	8.7	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.1	7.48
Nov-10	573.5	23.9	20.3	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.6	7.57
Mar-11	668.5	27.9	0.4	7.8	39.3	0.0	0.0	92.2	60.7	7.3	9.3	7.99
Apr-11	716.5	29.9	0.5	2.7	16.7	0.0	0.0	97.3	83.3	7.2	9.3	7.89
May-11	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.9	7.71
Jun-11	715.0	29.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.2	7.71

Table 48 - Gage 01474000 pH Criteria Summary Results by Month

Gage 01474000 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	238.5	9.9	67.9	0.0	0.0	0.0	0.0	100.0	100.0	7.7	8.7	8.22
Aug-10	499.5	20.8	32.9	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.9	8.30
Sep-10	372.0	15.5	48.3	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.7	8.24
Oct-10	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.7	8.18
Nov-10	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.8	8.7	8.30
Mar-11	642.5	26.8	0.7	10.9	40.7	0.0	0.0	89.1	59.3	7.4	9.4	8.40
Apr-11	717.5	29.9	0.3	3.4	16.7	0.0	0.0	96.6	83.3	7.2	9.3	8.20
May-11	738.5	30.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.8	8.10
Jun-11	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.6	8.16

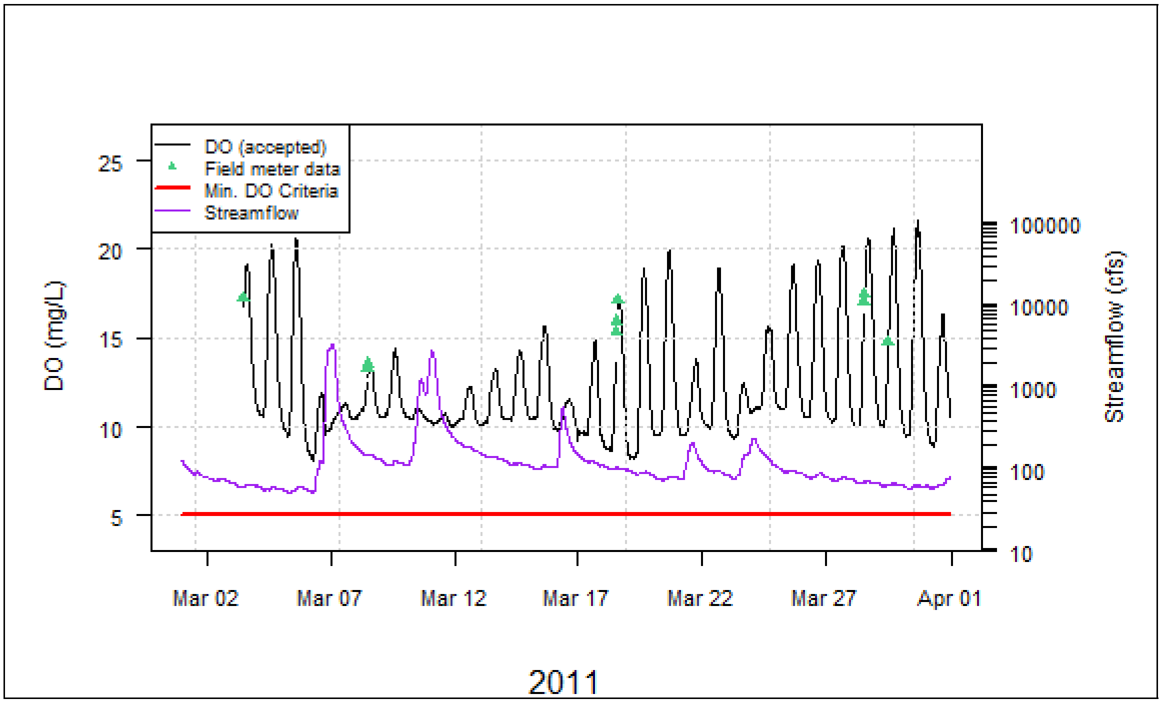

Figure 22 - Gage 01473900, Dissolved Oxygen and Streamflow, March 2011.

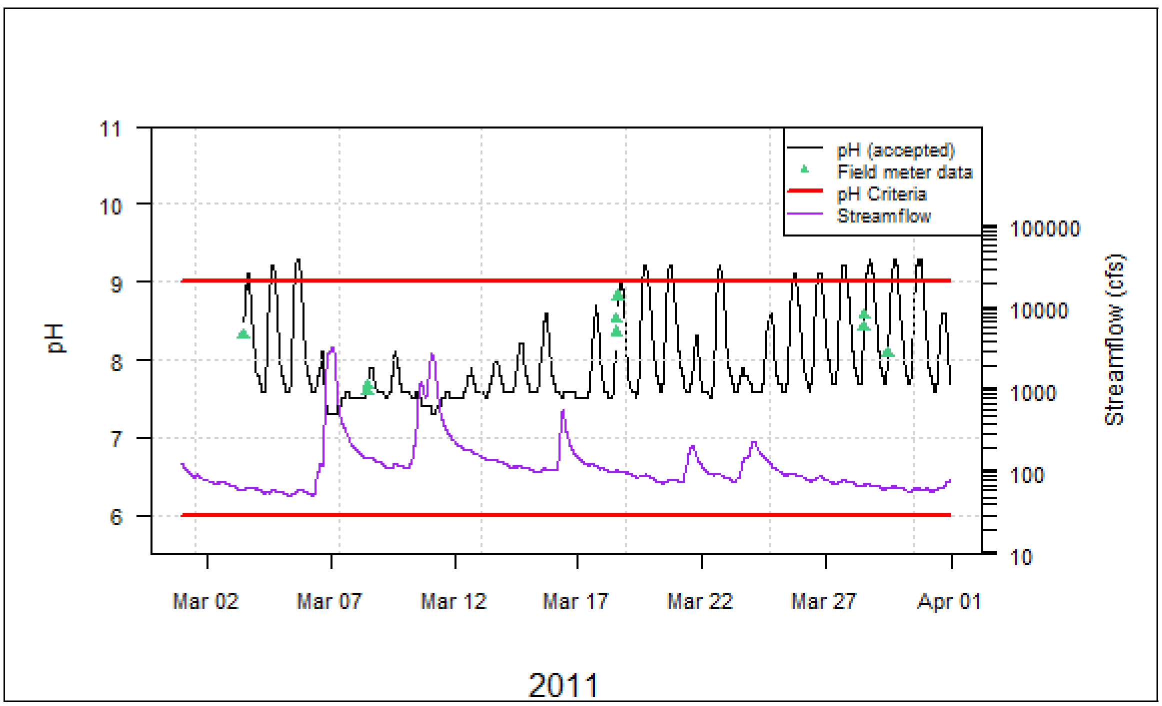

Figure 23 - Gage 01473900, pH and Streamflow, March 2011.

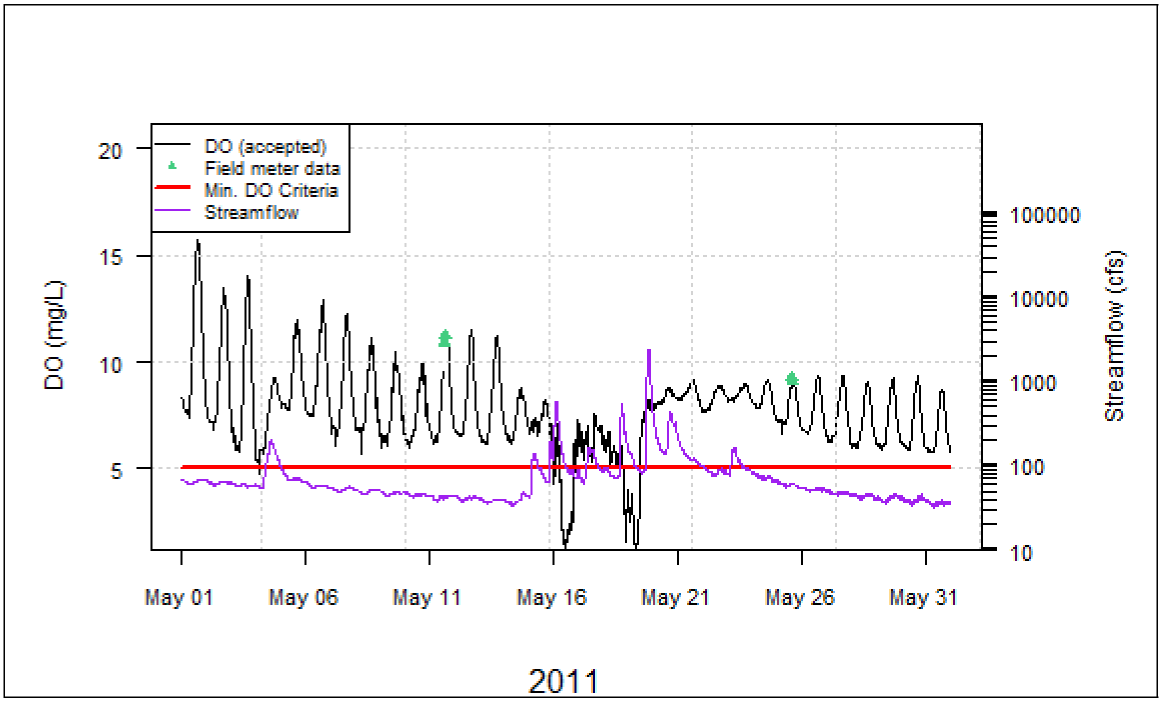

Figure 24 - Gage 01473900, Dissolved Oxygen and Streamflow, May 2011.

Turbidity

Turbidity at this site, as with most of Philadelphia's streams, increases drastically with increased flow from rainfall. During the wet month of July 2010, turbidity averaged well above the guideline (Tables 49-50). However, during dry periods between storm events, turbidity quickly decreased. A number of sizeable storm events during that month (Figure 25) 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

Gage 01473900 Turbidity Summary Information 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-10	723.5	30.1	2.8	57.6	42.4	0.1	620.0	16.46
Aug-10	739.5	30.8	0.6	41.5	58.5	0.2	230.0	5.19
Sep-10	716.5	29.9	0.5	39.6	60.4	0.6	370.0	7.22
Oct-10	643.0	26.8	13.6	42.5	57.5	1.0	1490.0	22.17
Nov-10	574.0	23.9	20.3	30.8	69.2	0.2	46.0	3.13
Mar-11	652.0	27.2	2.8	71.6	28.4	0.9	920.0	27.17
Apr-11	717.0	29.9	0.4	45.0	55.0	0.7	250.0	8.58
May-11	636.0	26.5	14.5	48.4	51.6	0.6	400.0	9.84
Jun-11	680.5	28.4	5.5	45.3	54.7	0.8	230.0	4.98

Table 50 - Gage 01474000 Turbidity Summary Results by Month

Gage 01474000 Turbidity Summary Information 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-10	276.5	11.5	62.8	51.5	48.5	0.0	660.0	60.92
Aug-10	130.0	5.4	82.5	0.4	99.6	0.0	3.6	0.43
Sep-10	441.5	18.4	38.7	5.9	94.1	0.0	480.0	5.19
Oct-10	742.5	30.9	0.2	23.5	76.5	0.3	330.0	6.60
Nov-10	717.0	29.9	0.4	10.3	89.7	0.2	19.0	1.49
Mar-11	642.0	26.8	0.8	35.4	64.6	0.0	620.0	12.06
Apr-11	717.5	29.9	0.3	37.6	62.4	0.0	420.0	9.64
May-11	680.5	28.4	8.5	40.1	59.9	0.0	430.0	10.52
Jun-11	678.5	28.3	5.8	12.5	87.5	0.0	200.0	2.11

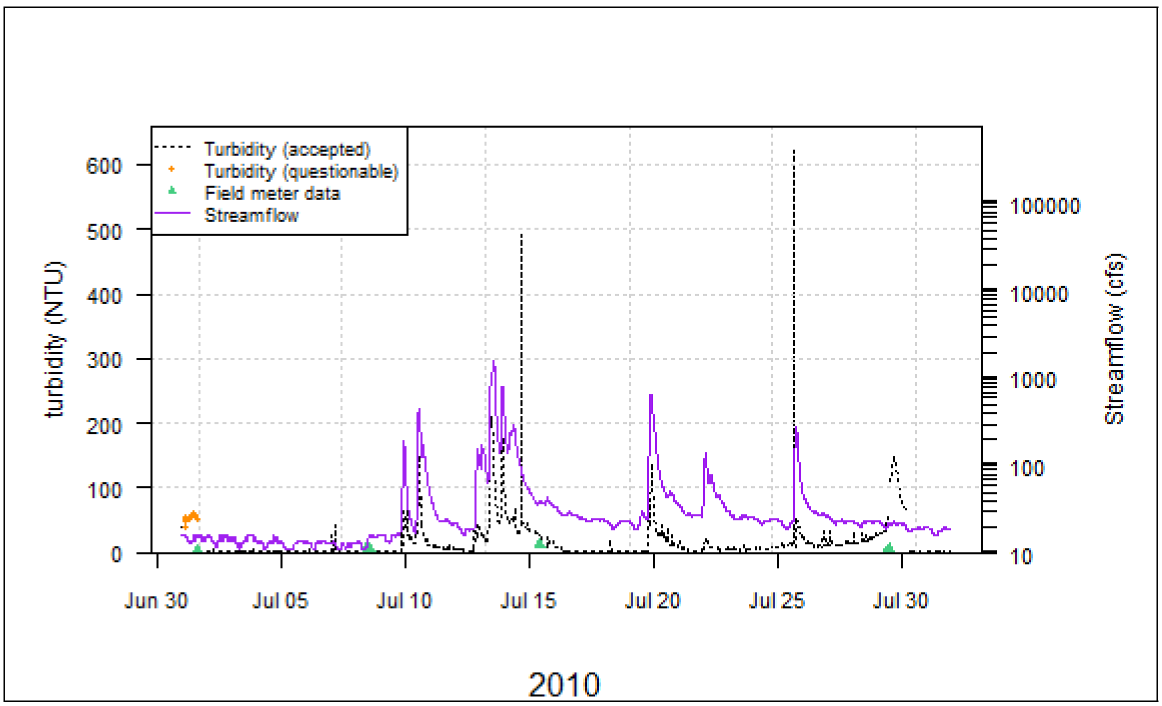

Figure 25 - Gage 01473900, Turbidity and Streamflow, July 2010.

Specific Conductance

Table 51 - Gage 01473900 Specific Conductance Summary Results by Month

Gage 01473900 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	737.0	30.7	0.9	115.0	1020.0	771.03
Aug-10	740.0	30.8	0.5	195.0	1170.0	896.71
Sep-10	716.5	29.9	0.5	191.0	1200.0	989.40
Oct-10	740.5	30.9	0.5	85.0	970.0	725.77
Nov-10	574.0	23.9	20.3	357.0	969.0	790.68
Mar-11	668.5	27.9	0.4	221.0	993.0	733.30
Apr-11	717.0	29.9	0.4	96.0	831.0	673.18
May-11	742.5	30.9	0.2	153.0	925.0	690.73
Jun-11	714.0	29.8	0.8	227.0	1230.0	797.98

Table 52 - Gage 01474000 Specific Conductance Summary Results by Month

Gage 01474000 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	437.5	18.2	41.2	220.0	832.0	664.33
Aug-10	711.0	29.6	4.4	296.0	878.0	755.69
Sep-10	693.0	28.9	3.8	216.0	954.0	838.31
Oct-10	742.5	30.9	0.2	92.0	835.0	655.22
Nov-10	717.0	29.9	0.4	378.0	847.0	737.69
Mar-11	643.0	26.8	0.6	229.0	921.0	669.19
Apr-11	717.5	29.9	0.3	119.0	764.0	618.47
May-11	738.5	30.8	0.7	168.0	772.0	641.03
Jun-11	717.0	29.9	0.4	229.0	999.0	720.43

Temperature

Temperature trends and exceedance rates in Wissahickon Creek Watershed were similar to those observed in Pennypack Creek (Tables 53-54, Figures 26-27).

Table 53 - Gage 01473900 Temperature Summary Results by Month by Maximum Criteria Period

Gage 01473900 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	79.6	20.4	0.9	737.0	30.7	18.4	28.1	24.20
TSF	1-Aug	15-Aug	1.0	99.0	0.4	358.5	14.9	19	27.5	23.19
TSF	16-Aug	31-Aug	0.0	100.0	0.7	381.5	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	0.7	357.5	14.9	16.4	25.7	20.41
TSF	16-Sep	30-Sep	0.0	100.0	1.0	356.5	14.9			
TSF	1-Oct	15-Oct	0.1	99.9	1.5	354.5	14.8	10	22.2	14.92
TSF	16-Oct	31-Oct	0.0	100.0	0.8	381.0	15.9			
TSF	1-Nov	15-Nov	0.0	100.0	0.8	357.0	14.9	5.8	13.4	9.85
TSF	16-Nov	30-Nov	44.3	55.7	40.7	213.5	8.9			
TSF	1-Mar	31-Mar	58.3	41.7	1.0	665.5	27.7	4.0	14.3	8.49
TSF	1-Apr	15-Apr	51.0	49.0	0.8	357.0	14.9	6.3	20.7	12.84
TSF	16-Apr	30-Apr	46.7	53.3	1.3	355.5	14.8			
TSF	1-May	15-May	6.0	94.0	1.0	356.5	14.9	12.2	24.9	17.35
TSF	16-May	31-May	34.4	65.6	0.4	382.5	15.9			
TSF	1-Jun	15-Jun	43.4	56.6	1.8	353.5	14.7	16.9	25.7	21.36
TSF	16-Jun	30-Jun	46.0	54.0	1.0	356.5	14.9			

Table 54 - Gage 01474000 Temperature Summary Results by Month by Maximum Criteria Period

Gage 01474000 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	84.3	15.7	3.7	716.5	29.9	20.2	29.7	24.01
TSF	1-Aug	15-Aug	1.0	99.0	0.3	359.0	15.0	19.4	27.6	23.14
TSF	16-Aug	31-Aug	0.0	100.0	1.0	380.0	15.8			
TSF	1-Sep	15-Sep	0.0	100.0	7.8	332.0	13.8	16.7	24.5	19.94
TSF	16-Sep	30-Sep	0.0	100.0	0.3	359.0	15.0			
TSF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	10.2	21.5	14.14
TSF	16-Oct	31-Oct	0.0	100.0	0.4	382.5	15.9			
TSF	1-Nov	15-Nov	0.0	100.0	0.4	358.5	14.9	4.4	11.8	8.39
TSF	16-Nov	30-Nov	16.0	84.0	0.4	358.5	14.9			
TSF	1-Mar	31-Mar	51.0	49.0	0.8	643.0	26.8	5.3	13.7	8.35
TSF	1-Apr	15-Apr	47.7	52.3	0.7	357.5	14.9	6.7	20.4	12.79
TSF	16-Apr	30-Apr	44.9	55.1	0.0	360.0	15.0			
TSF	1-May	15-May	3.4	96.6	0.8	357.0	14.9	12.8	25.4	17.51
TSF	16-May	31-May	35.5	64.5	0.7	381.5	15.9			
TSF	1-Jun	15-Jun	51.1	48.9	0.0	360.0	15.0	17.8	25.8	21.71
TSF	16-Jun	30-Jun	52.0	48.0	0.7	357.5	14.9			

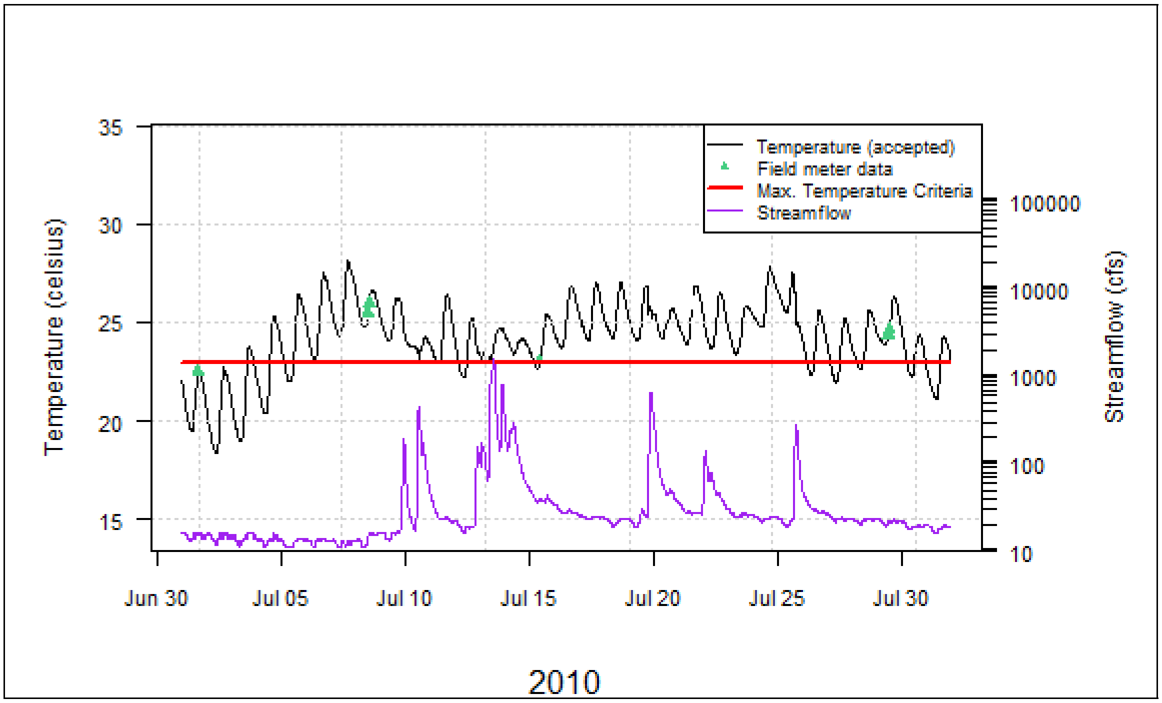

Figure 26 - Gage 01473900, Temperature and Streamflow, July 2010.

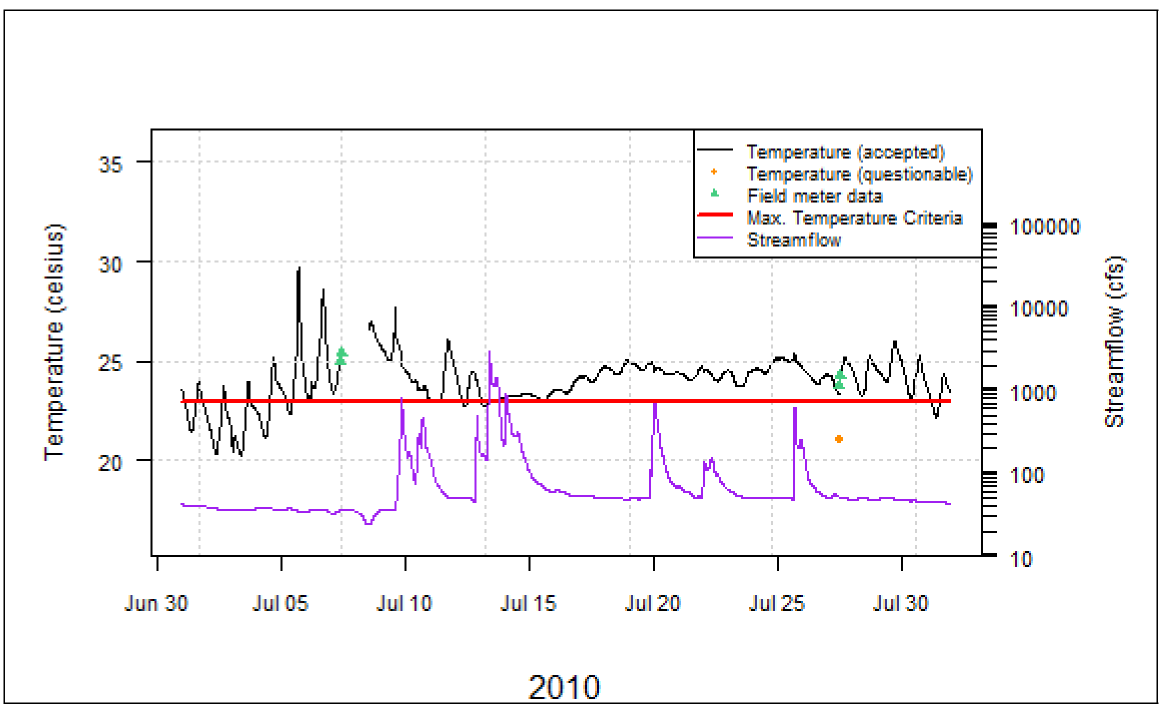

Figure 27 - Gage 01474000, Temperature and Streamflow, July 2010.

Poquesssing Creek (Gage 01465798)

Dissolved oxygen and pH

Dissolved oxygen and pH at this gage site were well within acceptable ranges and never violated criteria (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 28).

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 July 26-31 (Figure 29), one can expect steadily increasing DO and pH fluctuations.

Table 55 - Gage 01465798 Dissolved Oxygen Min. Criteria Summary Results by Month

Gage 01465798 Dissolved Oxygen Min. Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10	WWF	742.0	30.9	0.3	0.0	100.0	4.5	12.0	7.12
Aug-10	WWF	643.0	26.8	13.6	0.0	100.0	4.1	11.7	7.17
Sep-10	WWF	718.5	29.9	0.2	0.0	100.0	4.9	11.1	7.47
Oct-10	WWF	741.5	30.9	0.3	0.0	100.0	5.2	11.5	8.62
Nov-10	WWF	716.0	29.8	0.6	0.0	100.0	6.7	13.3	9.14
Mar-11	WWF	737.5	30.7	0.7	0.0	100.0	8.5	17.1	11.78
Apr-11	WWF	717.0	29.9	0.4	0.0	100.0	5.7	17.0	10.41
May-11	WWF	716.5	29.9	3.7	0.0	100.0	5.8	13.3	8.51
Jun-11	WWF	636.0	26.5	11.7	0.0	100.0	4.2	10.8	7.51

Table 56 - Gage 01465798 Dissolved Oxygen Mean Criteria Summary Results by Month

Gage 01465798 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10	WWF	30.0	3.2	0.0	100.0	6.0	8.3	7.13
Aug-10	WWF	24.0	22.6	0.0	100.0	5.9	7.8	7.14
Sep-10	WWF	29.0	3.3	0.0	100.0	6.6	8.4	7.46
Oct-10	WWF	28.0	9.7	0.0	100.0	6.4	9.7	8.59
Nov-10	WWF	27.0	10.0	0.0	100.0	7.7	10.4	9.06
Mar-11	WWF	25.0	19.2	0.0	100.0	9.9	14.0	11.80
Apr-11	WWF	27.0	10.0	0.0	100.0	7.0	13.0	10.40
May-11	WWF	26.0	16.1	0.0	100.0	6.6	10.0	8.49
Jun-11	WWF	23.0	23.3	0.0	100.0	5.5	8.6	7.64

Table 57 - Gage 01465798 pH Criteria Summary Results by Month

Gage 01465798 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.6	7.48
Aug-10	310.5	12.9	58.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.3	7.36
Sep-10	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.5	7.9	7.13
Oct-10	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.6	7.11
Nov-10	716.0	29.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.3	7.12
Mar-11	737.5	30.7	0.7	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.5	7.33
Apr-11	715.0	29.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	6.8	9.0	7.44
May-11	737.5	30.7	0.9	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.2	7.21
Jun-11	636.0	26.5	11.7	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.9	7.18

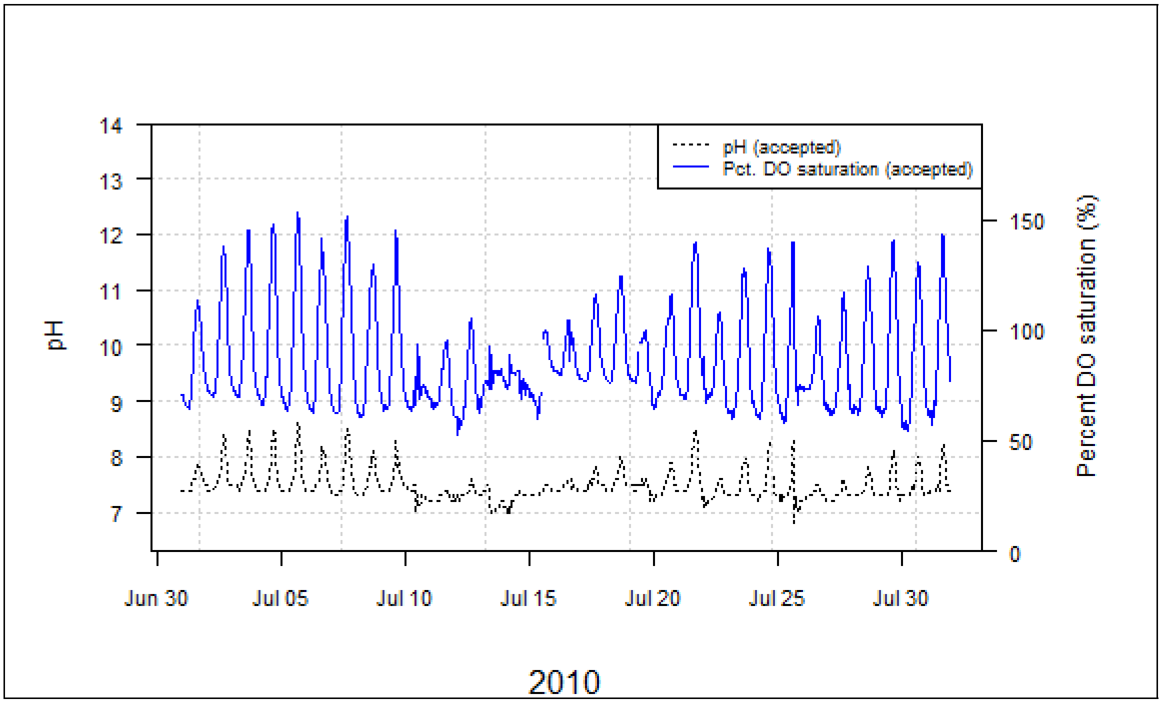

Figure 28 - Gage 01465798, pH and Percent Dissolved Oxygen Saturation, July 2010.

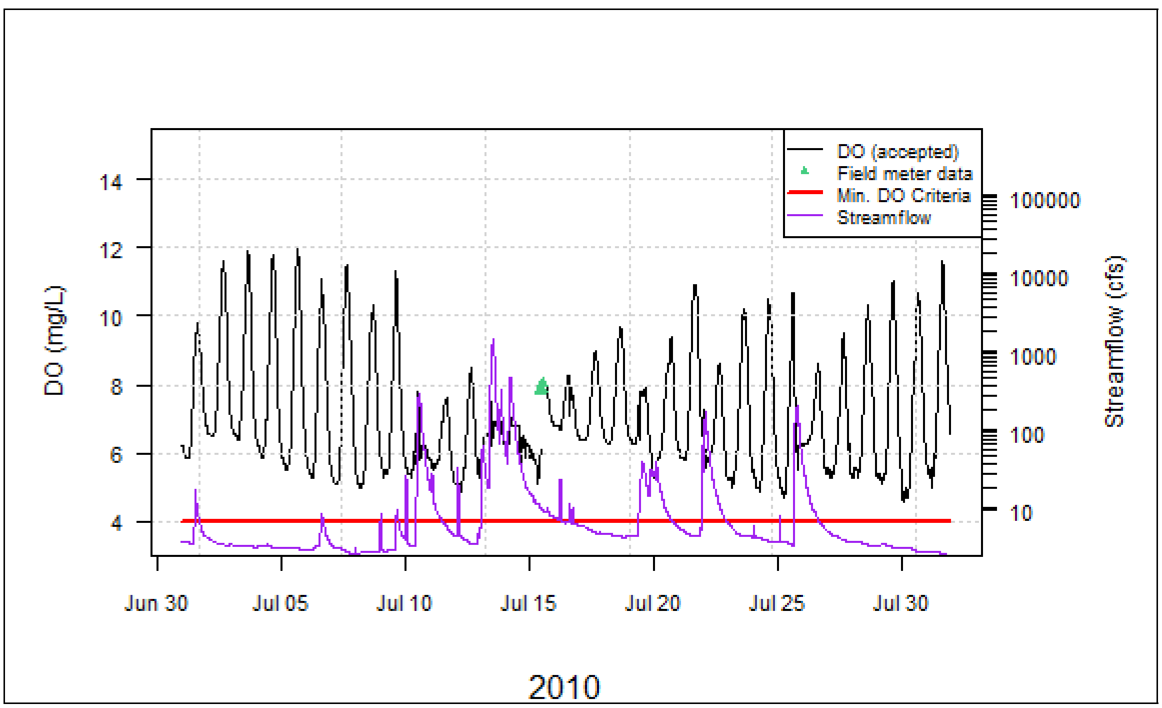

Figure 29 - Gage 01465798, Dissolved Oxygen and Streamflow, July 2010.

Turbidity

Table 58 - Gage 01465798 Turbidity Summary Results by Month

Gage 01465798 Turbidity Summary Information 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-10	688.0	28.7	7.5	24.0	76.0	0.0	520.0	7.74
Aug-10	635.0	26.5	14.7	16.3	83.7	0.2	800.0	4.53
Sep-10	496.0	20.7	31.1	18.5	81.5	0.0	97.0	3.31
Oct-10	719.0	30.0	3.4	28.8	71.2	0.0	150.0	4.33
Nov-10	542.0	22.6	24.7	26.6	73.4	0.0	84.0	3.58
Mar-11	737.5	30.7	0.7	41.8	58.2	0.3	490.0	9.83
Apr-11	684.5	28.5	4.9	57.6	42.4	0.7	350.0	13.38
May-11	669.0	27.9	10.1	28.0	72.0	0.0	160.0	6.08
Jun-11	630.5	26.3	12.4	16.9	83.1	0.0	230.0	4.19

Specific Conductance

Table 59 - Gage 01465798 Specific Conductance Summary Results by Month

Gage 01465798 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	742.0	30.9	0.3	56.0	739.0	494.62
Aug-10	739.5	30.8	0.6	202.0	688.0	515.61
Sep-10	718.5	29.9	0.2	66.0	748.0	502.41
Oct-10	742.0	30.9	0.3	57.0	585.0	405.30
Nov-10	716.0	29.8	0.6	136.0	635.0	488.32
Mar-11	590.5	24.6	20.5	205.0	1240.0	779.58
Apr-11	717.0	29.9	0.4	95.0	738.0	535.33
May-11	737.5	30.7	0.9	121.0	719.0	546.51
Jun-11	636.0	26.5	11.7	103.0	719.0	556.03

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

Gage 01465798 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.5	740.5	30.9	18.8	29.7	24.80
WWF	1-Aug	15-Aug	0.0	100.0	0.4	358.5	14.9	18.7	28.7	23.61
WWF	16-Aug	31-Aug	0.0	100.0	0.8	381.0	15.9			
WWF	1-Sep	15-Sep	0.0	100.0	0.4	358.5	14.9	16.0	27.2	20.52
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	1.0	99.0	0.6	358.0	14.9	9.8	22.8	14.44
WWF	16-Oct	31-Oct	0.0	100.0	0.0	384.0	16.0			
WWF	1-Nov	15-Nov	0.0	100.0	0.7	357.5	14.9	3.7	14.3	8.66
WWF	16-Nov	30-Nov	22.5	77.5	0.4	358.5	14.9			
WWF	1-Mar	31-Mar	46.5	53.5	0.9	737.5	30.7	2.5	14.6	7.97
WWF	1-Apr	15-Apr	52.3	47.7	0.7	357.5	14.9	5.5	21.8	13.10
WWF	16-Apr	30-Apr	50.2	49.8	0.1	359.5	15.0			
WWF	1-May	15-May	10.8	89.2	1.0	356.5	14.9	12.0	26.2	17.65
WWF	16-May	31-May	23.2	76.8	0.8	381.0	15.9			
WWF	1-Jun	15-Jun	0.6	99.4	0.6	358.0	14.9	17.4	27.2	21.81
WWF	16-Jun	30-Jun	0.0	100.0	22.8	278.0	11.6			

Gages in Large Watersheds

Schuylkill River (Gage 01474500)

Dissolved oxygen and pH

DO criteria were never violated at this location (Tables 61-62). pH criteria were exceeded in July 2010 and June 2011 due to apparent algal blooms (Table 63). Extreme supersaturated DO conditions were observed concomitant with pH above 8.0 for most of the observed days in July 2010 and June 2011 (Figures 30 and 31, respectively), indicating high algal activity.

Table 61 - Gage 01474500 Dissolved Oxygen Minimum Criterion Summary Results by Month

Gage 01474500 Dissolved Oxygen Min Criteria Summary Information by Month									
Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance	Min	Max	Mean
Jul-10*	WWF	218	9.1	17.4	0.0	100.0	4.9	26.3	13.3
Aug-10*	WWF	NA	NA	NA	NA	NA	NA	NA	NA
Sep-10*	WWF	283.5	11.0	0.0	0.0	100.0	7.3	9.5	8.60
Mar-11*	WWF	215.0	9.0	0.5	0.0	100.0	11.6	12.9	12.38
Apr-11	WWF	659.0	27.5	8.5	0.0	100.0	8.8	12.9	11.11
May-11	WWF	623.5	26.0	16.2	0.0	100.0	8.0	10.6	9.64
Jun-11	WWF	711.0	29.6	1.3	0.0	100.0	6.6	19.4	11.47

*Limited data collected due to fish ladder maintenance

Table 62 - Gage 01474500 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01474500 Dissolved Oxygen Daily Mean Criteria Summary Information by Month								
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Min.	Max.	Mean
Jul-10*	WWF	6.0	45.5	0.0	100.0	6.7	21.0	12.15
Aug-10*	WWF	NA	NA	NA	NA	NA	NA	NA
Sep-10*	WWF	11.0	0.0	0.0	100.0	7.9	9.1	8.59
Mar-11*	WWF	7.0	22.2	0.0	100.0	11.7	12.7	12.35
Apr-11	WWF	20.0	33.3	0.0	100.0	9.1	12.4	11.09
May-11	WWF	22.0	29.0	0.0	100.0	8.7	10.2	9.65
Jun-11	WWF	23.0	23.3	0.0	100.0	8.2	15.1	11.38

*Limited data collected due to fish ladder maintenance

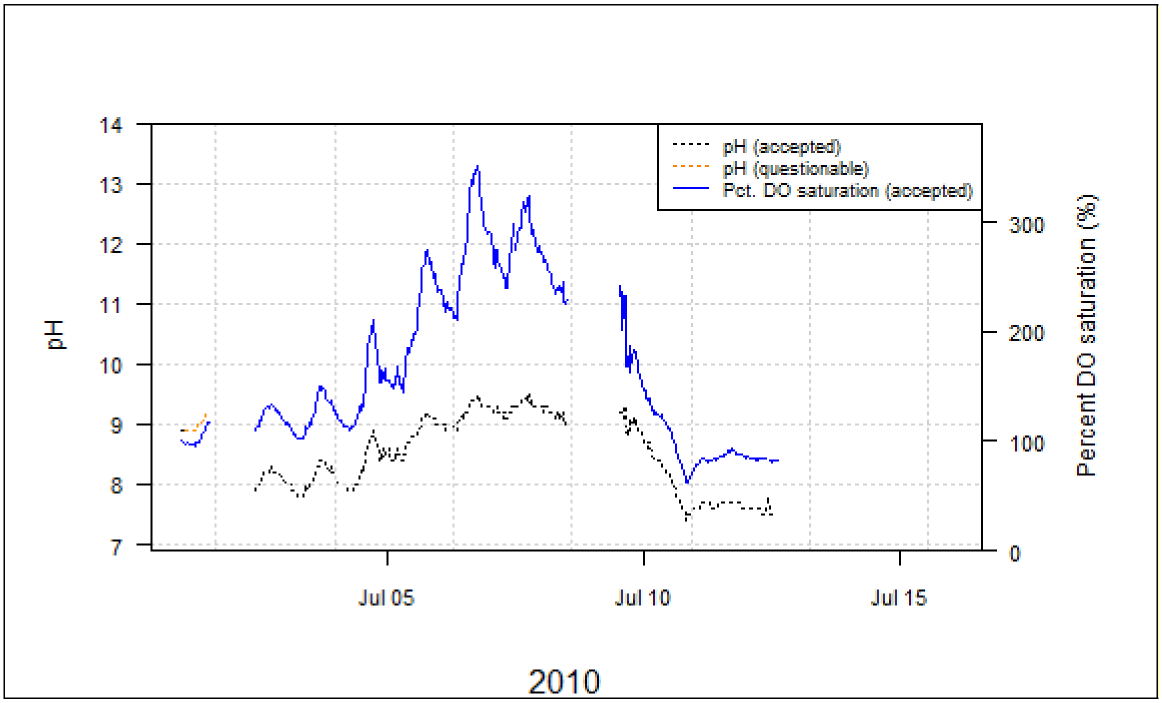

Figure 30 - Gage 01474500, pH and Percent Dissolved Oxygen Saturation, July 2010.

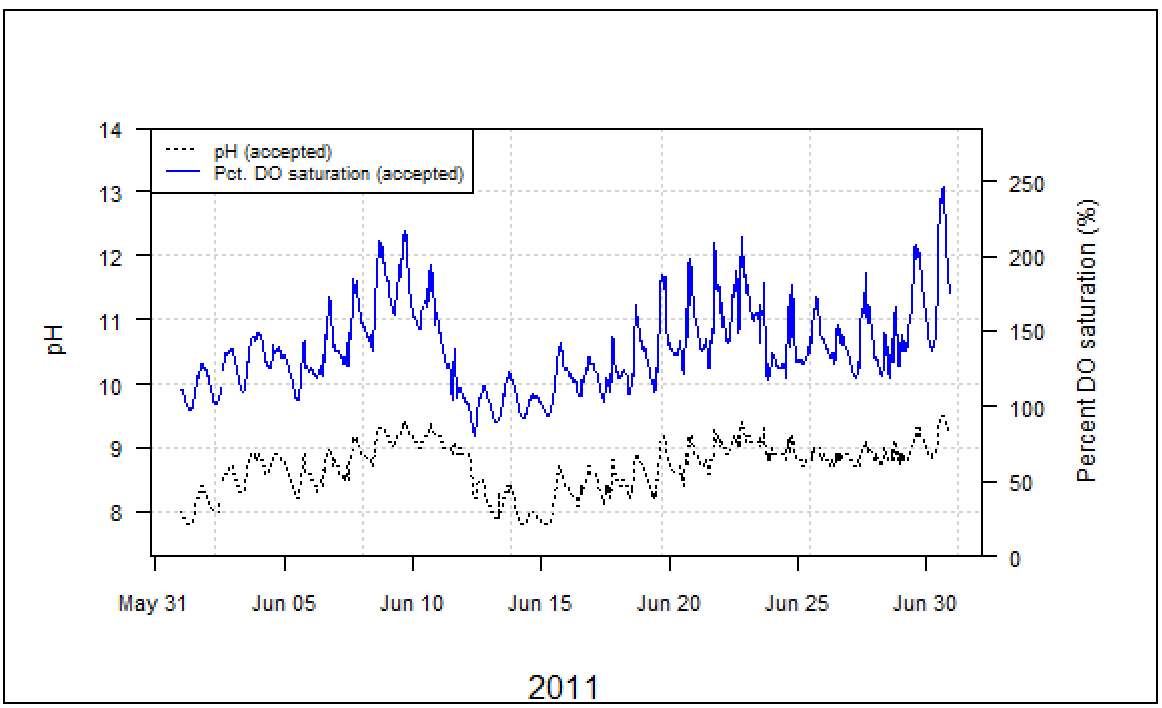

Figure 31 - Gage 01474500, pH and Percent Dissolved Oxygen Saturation, June 2011.

Table 63 - Gage 01474500 pH Criteria Summary Results by Month

Gage 01474500 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10*	222.0	8.6	21.6	29.7	45.5	0.0	0.0	70.3	54.5	7.4	9.5	8.53
Aug-10*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sep-10*	283.5	11.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.9	8.3	8.09
Mar-11*	215.0	9.0	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.5	7.8	7.61
Apr-11	659.5	27.5	8.4	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.5	7.85
May-11	622.5	25.9	16.3	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.2	7.81
Jun-11	711.0	29.6	1.3	19.6	50.0	0.0	0.0	80.4	50.0	7.8	9.5	8.70

*Limited data collected due to fish ladder maintenance

Temperature

Table 64 - Gage 01474500 Temperature Summary Results by Maximum Criteria Period

Gage 01474500 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul*	0.0	100.0	17.4	218	9.1	26.3	30.5	28.08
WWF	1-Aug	15-Aug*	NA	NA	NA	NA	NA	NA	NA	NA
WWF	16-Aug	31-Aug*	NA	NA	NA	NA	NA			
WWF	1-Sep	15-Sep*	0.0	100.0	0.0	120.0	5.0			
WWF	16-Sep	30-Sep*	0.0	100.0	0.0	144.0	6.0	21.4	24.1	22.04
WWF	1-Mar	31-Mar*	19.1	80.9	0.5	215.0	9.0	6.3	9.4	7.60
WWF	1-Apr	15-Apr	43.3	56.7	1.8	353.5	14.7			
WWF	16-Apr	30-Apr	43.3	56.7	15.4	304.5	12.7	7.3	19.6	12.5
WWF	1-May	15-May	9.8	90.2	23.3	276.0	11.5			
WWF	16-May	31-May	28.0	72.0	9.9	346.0	14.4	14.8	26	18.2
WWF	1-Jun	15-Jun	5.5	94.5	1.4	355.0	14.8			
WWF	16-Jun	30-Jun	0.0	100.0	1.1	356.0	14.8	21.6	28.4	24.8

*Limited data collected due to fish ladder maintenance

Turbidity

Table 65 - Gage 01474500 Turbidity Summary Results by Month

Gage 01474500 Turbidity Summary Information 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-10*	232.5	9.1	17.4	61.5	38.5	1.4	9.0	3.27
Aug-10*	NA	NA	NA	NA	NA	NA	NA	NA
Sep-10*	104.5	4.0	63.7	0.0	100.0	0.0	0.8	0.14
Mar-11*	215.0	9.0	0.5	98.4	1.6	2.6	43.0	6.05
Apr-11	648.5	27.0	9.9	90.2	9.8	2.2	320.0	17.26
May-11	599.0	25.0	19.5	93.6	6.4	1.8	22.0	6.94
Jun-11	710.5	29.6	1.3	97.9	2.1	2.5	14.0	5.25

*Limited data collected due to fish ladder maintenance

Specific Conductance

Table 66 - Gage 01474500 Specific Conductance Summary Results by Month

Gage 01474500 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10*	218	9.1	17.4	490.0	604.0	576.8
Aug-10*	NA	NA	NA	NA	NA	NA
Sep-10*	264	11.0	0.0	590.0	695.0	634.73
Mar-11*	215.0	9.0	0.5	354.0	395.0	369.64
Apr-11	652.0	27.2	9.4	175.0	400.0	338.24
May-11	620.5	25.9	16.6	287.0	398.0	332.17
Jun-11	710.0	29.6	1.4	317.0	492.0	414.85

*Limited data collected due to fish ladder maintenance

Delaware River (Gage 01467200 and 014670261)

Dissolved oxygen and pH

The DRBC DO daily mean criteria for Zones 2 and 3 were met at both gages for the entire reporting period (Tables 67 and 68). All water quality data from July 1, 2010 through August 6, 2010 at gage 01467200 (Ben Franklin Bridge) were flagged as questionable as described below.

On July 12, 2010, PWD received notification of an apparent low dissolved oxygen event in the Delaware River via web-based systems as well as communication from DRBC water resources staff. USGS gage 01467200 dissolved oxygen data displayed on the web were below 2 mg/L at times, indicating severe hypoxia. The apparent low dissolved oxygen event occurred at approximately the same time that the USGS gage structure suffered physical damage, including a damaged communication cable link, but the gage was able to send some data during this time via satellite transmission. Over the next few weeks, USGS, PWD and DRBC worked together to clarify whether in fact low dissolved oxygen values recorded by the *in-situ* water quality monitor were accurate and reflective of actual conditions in the Delaware River. However, field verification of poor dissolved oxygen gage data was delayed due to wet weather conditions in the Philadelphia area.

Initial observations during the week of 7/12/2010 suggested that the gage readings were in error, as field meter readings were greater than values being measured at the gage. USGS staff recorded field dissolved oxygen 3.33 mg/L at the gage on 7/12/2010, and DRBC staff measured dissolved oxygen from 13 shore points on 7/13/2010, including Penn's Landing, where 3.89 mg/L DO was observed. PWD collected field meter readings at gage 01467200 from a boat on 7/26/2010. Field meter DO values observed were consistently in the range of 1-1.5mg/L greater than those being recorded concurrently by the gage.

On 7/20/2010, staff from PWD Bureau of Laboratory Services conducted transect monitoring across the Delaware River west of the Navy Yard at "Horseshoe bend" (approximate river mile 94.7) over the course of a complete tide cycle to determine whether low DO conditions were present in the area between gages 01467200 and 01477050 (Chester). USGS conducted cross-sectional surveys at gages 01477050 and 01467200 on 7/21/2010 and 7/22/2010, respectively. In all cases in which dissolved oxygen measurements were made across the river and at varying depths, the river appeared to be generally well-mixed, with a slight vertical gradient consistently observed. While no overall lateral gradient was observed, readings along the right bank (Philadelphia side) appeared to be somewhat lower than the main channel. Again, spot field meter measurements at gage 01467200 were consistently 1-1.5mg/L greater than the values being reported by the *in situ* water quality instrument.

On August 6, 2010, USGS installed the water quality monitoring instrument at gage 01467200 in a new stilling well enclosure constructed of plastic pipe. It was noted that the former metal pipe enclosure had corroded, occluding perforations in the pipe and possibly inhibiting free exchange of water between the river and water quality sensor environment. In addition to the physical appearance of the metal stilling well, dissolved oxygen and specific conductance data collected after reinstallation of the monitoring instrument in its new plastic enclosure also supported the conclusion that there was limited circulation of river water in the stilling well enclosure during the time low dissolved oxygen values were being recorded by the sensors (Figures 32 and 33). All water quality data from July 1 2010 through August 6 2010 were flagged as questionable. PWD has concluded that these data are not representative of conditions in the river or suitable for evaluation of compliance with applicable water quality standards.

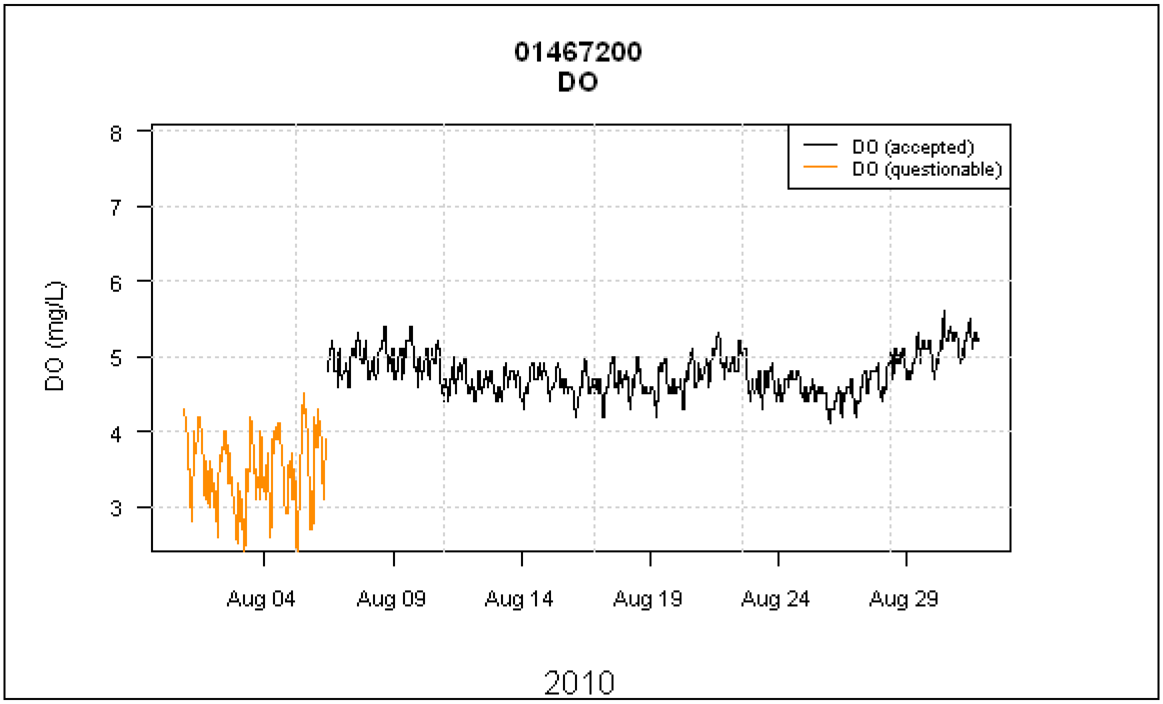

Figure 32 - Gage 01467200, Dissolved Oxygen, August 2010.

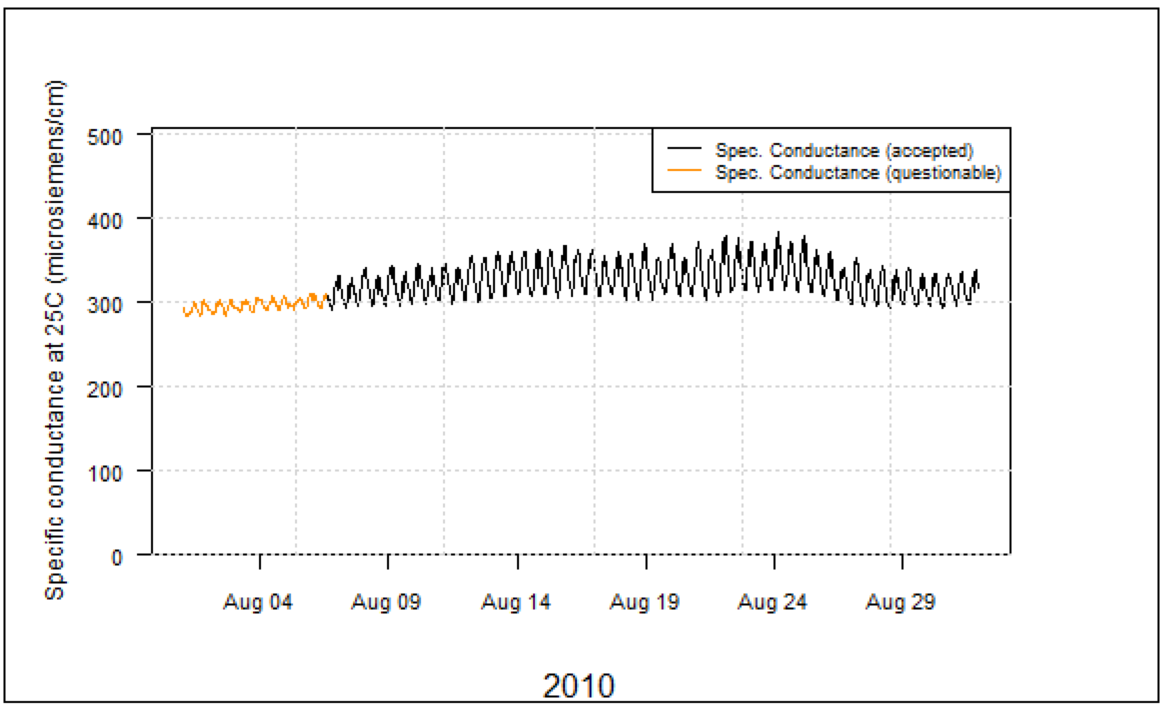

Figure 33 - Gage 01467200, Specific Conductance, August 2010.

Table 67 - Gage 01467200 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 01467200 Dissolved Oxygen Daily Mean Criteria Summary Information by Month										
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Jul-10*	DRBC	0.0	100.0	NA	NA	NA	NA	NA	NA	NA
Aug-10	DRBC	24.0	22.6	0.0	100.0	4.4	5.2	4.8	4.1	5.6
Sep-10	DRBC	29.0	3.3	0.0	100.0	5.0	5.9	5.4	4.6	6.3
Oct-10	DRBC	30.0	3.2	0.0	100.0	5.8	8.6	7.8	5.2	8.9
Nov-10	DRBC	30.0	0.0	0.0	100.0	8.1	10.5	9.5	7.7	10.9
Mar-11	DRBC	3.0	0.0	0.0	100.0	12.9	13.0	12.9	12.8	13.1
Apr-11	DRBC	30.0	0.0	0.0	100.0	9.5	12.7	11.4	9.3	12.8
May-11	DRBC	29.0	6.5	0.0	100.0	8.1	9.9	9.0	7.7	10.2
Jun-11	DRBC	29.0	3.3	0.0	100.0	5.7	8.2	7.1	4.8	8.8

*Explained further in text

Table 68 - Gage 014670261 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Gage 014670261 Dissolved Oxygen Daily Mean Criteria Summary Information by Month										
Month	Des. Use	Total days accepted data	% days flagged data	% days violation	% days compliance	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Mar-11	DRBC	22.0	24.0	0.0	100.0	11.7	13.8	12.75	11.6	13.9
Apr-11	DRBC	29.0	3.3	0.0	100.0	9.2	12.3	11.18	8.9	12.8
May-11	DRBC	29.0	6.5	0.0	100.0	8.2	9.8	9.09	7.8	10.1
Jun-11	DRBC	25.0	16.7	0.0	100.0	7.2	9.1	8.03	6.6	9.8

pH water quality criteria were never exceeded at gage 01467200 or 014670261 during the reporting period (Tables 69 and 70).

Table 69 - Gage 01467200 pH Criteria Summary Results by Month

Gage 01467200 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Jul-10	0.0	0.0	100.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aug-10	609.5	25.4	18.1	0.0	0.0	0.0	0.0	100.0	100.0	6.5	6.8	6.66
Sep-10	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.5	7.2	6.85
Oct-10	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.3	6.92
Nov-10	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.4	7.24
Mar-11	72.0	3.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.3	7.4	7.33
Apr-11	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.5	7.30
May-11	610.0	25.4	18.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.4	7.23
Jun-11	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.6	7.33

Table 70 - Gage 014670261 pH Criteria Summary Results by Month

Gage 014670261 pH Criteria Summary Information by Month												
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance	Min.	Max.	Mean
Mar-11	686.5	28.6	1.2	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.8	7.40
Apr-11	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.3	7.9	7.52
May-11	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.7	7.42
Jun-11	716.5	29.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.1	7.57

Temperature

Table 71 - Gage 01467200 Temperature Summary Results by Maximum Criteria Period

Gage 01467200 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Jul	31-Jul	NA	NA	100.0	0.0	0.0	NA	NA	NA
DRBC	1-Aug	31-Aug	0.0	100.0	18.1	609.5	25.4	25.4	28.5	27.03
DRBC	1-Sep	30-Sep	0.0	100.0	0.3	718.0	29.9	22.4	26.6	23.85
DRBC	1-Oct	31-Oct	0.0	100.0	0.0	744.0	31.0	13.7	22.7	15.83
DRBC	1-Nov	30-Nov	0.0	100.0	0.0	720.0	30.0	7.6	13.8	10.47
DRBC	1-Mar	31-Mar	0.0	100.0	0.0	72.0	3.0	5.1	6.0	5.63
DRBC	1-Apr	30-Apr	0.0	100.0	0.0	720.0	30.0	5.8	15.8	10.28
DRBC	1-May	31-May	0.0	100.0	0.3	741.5	30.9	14.0	22.8	16.83
DRBC	1-Jun	30-Jun	0.0	100.0	0.4	717.0	29.9	21.9	25.0	23.94

Table 72 - Gage 014670261 Temperature Summary Results by Maximum Criteria Period

Gage 014670261 Temperature Summary Information by Max. Criteria Period										
Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. compliance	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Mar	31-Mar	0.0	100.0	1.2	687.0	28.6	3.1	8.7	5.61
DRBC	1-Apr	30-Apr	0.0	100.0	0.2	718.5	29.9	5.9	16.1	10.48
DRBC	1-May	31-May	0.0	100.0	0.3	741.5	30.9	13.6	23.8	16.90
DRBC	1-Jun	30-Jun	0.0	100.0	0.2	718.5	29.9	21.9	25.4	23.67

Specific Conductance

Monthly mean concentrations observed at these gages were lower than those observed in all other gages described in the report.

Table 73 - Gage 01467200 Specific Conductance Summary Results by Month

Gage 01467200 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-10	0.0	0.0	100.0	NA	NA	NA
Aug-10	1219.0	25.4	18.1	291.0	384.0	327.77
Sep-10	1437.0	29.9	0.2	239.0	472.0	341.92
Oct-10	1487.0	31.0	0.1	106.0	375.0	175.82
Nov-10	1440.0	30.0	0.0	184.0	246.0	218.79
Mar-11	144.0	3.0	0.0	199.0	212.0	205.42
Apr-11	1440.0	30.0	0.0	130.0	225.0	185.78
May-11	1483.0	30.9	0.3	105.0	187.0	134.99
Jun-11	1434.0	29.9	0.4	125.0	237.0	188.13

Table 74 - Gage 014670261 Specific Conductance Summary Results by Month

Gage 014670261 Specific Conductance Summary Information by Month						
Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Mar-11	1366.0	28.5	1.7	116.0	291.0	185.43
Apr-11	1437.0	29.9	0.2	112.0	293.0	191.50
May-11	1485.0	30.9	0.2	111.0	231.0	163.19
Jun-11	1436.0	29.9	0.3	120.0	264.0	198.72

Turbidity

***Note that Gage 01467200 Turbidity Results are not available.**

Table 75 - Gage 014670261 Turbidity Summary Results by Month

Gage 01470261 Turbidity Summary Information 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
Mar-11	687.0	28.6	1.2	95.2	4.8	1.9	120.0	15.78
Apr-11	718.5	29.9	0.2	88.9	11.1	1.7	180.0	9.00
May-11	738.0	30.8	0.8	99.7	0.3	2.5	46.0	8.07
Jun-11	717.5	29.9	0.3	99.4	0.6	2.2	32.0	7.66

Wet Weather and Dry Weather Results

Annual Summary, July 2010 - June 2011

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 violations 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 violations of DO criteria were 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). In general, the pH maximum criterion was more frequently violated in dry weather due to the effect of algal growth (Tables 80-81). The turbidity maximum guideline was more frequently surpassed in wet weather (Tables 82-83). Temperature criteria violation frequencies were greater in wet weather conditions, a reverse trend of the previous two reporting years (Tables 86-87).

Table 76 - USGS Gage July 2010 - June 2011 Dissolved Oxygen Minimum Criterion Summary Results During Wet Weather

USGS Gage July 2010 - June 2011 Dissolved Oxygen Minimum Criteria Summary - Wet Weather						
Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance
01465798	WWF	3662.0	152.6	3.1	0.0	100.0
014670261*	DRBC	NA	NA	NA	NA	NA
01467042	TSF	3206.0	133.6	9.2	0.0	100.0
01467048	TSF	3735.0	155.6	0.8	0.0	100.0
01467086	WWF	3312.0	138.0	9.3	2.5	97.5
01467087	WWF	3288.5	137.0	13.7	15.9	84.1
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	3397.5	141.6	7.2	1.3	98.7
01474000	TSF	3298.5	137.4	11.7	0.1	99.9
01474500	WWF	1609.5	67.1	6.7	0.0	100.0
01475530	WWF	3535.5	147.3	0.2	0.0	100.0
01475548	WWF	3483.0	145.1	8.6	1.7	98.3

*No minimum DO criterion applies at these locations.

Table 77 - USGS Gage July 2010 - June 2011 Dissolved Oxygen Minimum Criterion Summary Results During Dry Weather

USGS Gage July 2010 - June 2011 Dissolved Oxygen Minimum Criteria Summary - Dry Weather						
Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. violation	% hrs. compliance
01465798	WWF	2706.0	112.8	4.0	0.0	100.0
014670261*	DRBC	NA	NA	NA	NA	NA
01467042	TSF	2939.5	122.5	0.9	0.0	100.0
01467048	TSF	2800.5	116.7	0.7	0.0	100.0
01467086	WWF	2831.5	118.0	1.4	0.6	99.4
01467087	WWF	2641.0	110.0	2.7	9.8	90.2
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	2773.0	115.5	3.2	1.2	98.8
01474000	TSF	2529.0	105.4	8.5	0.0	100.0
01474500	WWF	1023.5	42.6	8.7	0.0	100.0
01475530	WWF	2978.5	124.1	0.3	0.0	100.0
01475548	WWF	2678.5	111.6	1.2	0.0	100.0

*No minimum DO criterion applies at these locations.

Table 78 - USGS Gage July 2010 - June 2011 Dissolved Oxygen Daily Mean Criterion Summary Results During Wet Weather

USGS Gage July 2010 - June 2011 Diss. Oxygen Daily Mean Criteria Summary - Wet Weather					
Gage number	Designated Use	Total days accepted data	% days flagged data	% days violation	% days compliance
01465798	WWF	138.0	3.5	0.7	99.3
014670261	DRBC	72.0	0.0	0.0	100.0
01467042	TSF	122.0	10.9	0.0	100.0
01467048	TSF	140.0	1.4	0.0	100.0
01467086	WWF	124.0	12.1	3.2	96.8
01467087	WWF	124.0	16.2	25.8	74.2
01467200	DRBC	111.0	9.8	0.0	100.0
01473900	TSF	131.0	7.7	0.8	99.2
01474000	TSF	125.0	12.6	0.0	100.0
01474500	WWF	60.0	7.7	0.0	100.0
01475530	WWF	133.0	0.0	0.0	100.0
01475548	WWF	130.0	11.0	6.2	93.8

Table 79 - USGS Gage July 2010 - June 2011 Dissolved Oxygen Daily Mean Criterion Summary Results During Dry Weather

USGS Gage July 2010 - June 2011 Dissolved Oxygen Daily Mean Criteria Summary - Dry Weather					
Gage number	Designated Use	Total days accepted data	% days flagged data	% days violation	% days compliance
01465798	WWF	99.0	4.8	0.0	100.0
014670261	DRBC	37.0	0.0	0.0	100.0
01467042	TSF	112.0	0.9	0.0	100.0
01467048	TSF	104.0	0.0	0.0	100.0
01467086	WWF	106.0	1.9	0.0	100.0
01467087	WWF	96.0	4.0	17.7	82.3
01467200	DRBC	77.0	10.5	0.0	100.0
01473900	TSF	104.0	3.7	0.0	100.0
01474000	TSF	91.0	9.9	0.0	100.0
01474500	WWF	34.0	15.0	0.0	100.0
01475530	WWF	109.0	0.0	0.0	100.0
01475548	WWF	97.0	2.0	0.0	100.0

Table 80 - USGS Gage July 2010 - June 2011 pH Criteria Summary Results During Wet Weather

USGS Gage July 2010 - June 2011 pH Criteria Summary Information During Wet Weather									
Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance
01465798	3500.0	145.8	7.4	0.0	0.0	0.0	0.0	100.0	100.0
014670261	1845.0	76.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0
01467042	3452.5	143.9	2.2	0.7	3.0	0.0	0.0	99.3	97.0
01467048	3754.5	156.4	0.3	1.3	3.9	0.0	0.0	98.7	96.1
01467086	3509.5	146.2	3.9	1.5	9.4	0.0	0.0	98.5	90.6
01467087	3740.0	155.8	1.9	0.0	0.0	0.0	0.0	100.0	100.0
01467200	2770.0	115.4	14.9	0.0	0.0	0.0	0.0	100.0	100.0
01473900	3493.0	145.5	4.6	0.8	4.9	0.0	0.0	99.2	95.1
01474000	3154.0	131.4	15.6	1.4	6.6	0.0	0.0	98.6	93.4
01474500	1610.0	67.1	6.7	5.6	12.5	0.0	0.0	94.4	87.5
01475530	3535.5	147.3	0.2	0.1	0.6	0.0	0.0	99.9	99.4
01475548	3748.5	156.2	1.6	1.7	6.0	0.0	0.0	98.3	94.0

Table 81 - USGS Gage July 2010 - June 2011 pH Criteria Summary Results During Dry Weather

USGS Gage July 2010 - June 2011 pH Criteria Summary Information During Dry Weather									
Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. violation	% days max. violation	% hrs. min. violation	% days min. violation	% hrs. compliance	% days compliance
01465798	2552.0	106.3	9.5	0.0	0.0	0.0	0.0	100.0	100.0
014670261	1018.5	42.4	0.3	0.0	0.0	0.0	0.0	100.0	100.0
01467042	2955.5	123.1	0.4	0.7	2.6	0.0	0.0	99.3	97.4
01467048	2800.5	116.7	0.7	1.0	3.4	0.0	0.0	99.0	96.6
01467086	2844.5	118.5	1.0	1.9	6.8	0.0	0.0	98.1	93.2
01467087	2686.0	111.9	1.0	0.0	0.0	0.0	0.0	100.0	100.0
01467200	2140.5	89.2	10.7	0.0	0.0	0.0	0.0	100.0	100.0
01473900	2795.5	116.5	2.4	1.5	5.5	0.0	0.0	98.5	94.5
01474000	2231.5	93.0	19.3	2.3	5.7	0.0	0.0	97.7	94.3
01474500	1011.5	42.1	9.7	9.7	21.1	0.0	0.0	90.3	78.9
01475530	2978.5	124.1	0.3	0.0	0.0	0.0	0.0	100.0	100.0
01475548	2701.5	112.6	0.4	1.3	4.2	0.0	0.0	98.7	95.8

Table 82 - USGS Gage July 2010 - June 2011 Turbidity Summary Results During Wet Weather

USGS Gage July 2010 - June 2011 Turbidity Summary Information 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	3506.5	146.1	7.2	46.9	53.1
014670261	1843.0	76.8	0.3	95.1	4.9
01467042	3324.0	138.5	5.8	41.1	58.9
01467048	3609.0	150.4	4.1	50.0	50.0
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	3386.5	141.1	7.5	64.2	35.8
01474000	3156.5	131.5	15.5	40.2	59.8
01474500	1487.5	62.0	13.8	87.3	12.7
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA

*Turbidity not continuously monitored at this location

Table 83 - USGS Gage July 2010 - June 2011 Turbidity Summary Results During Dry Weather

USGS Gage July 2010 - June 2011 Turbidity Summary Information 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	2295.0	95.6	18.6	2.7	97.3
014670261	1018.0	42.4	0.3	97.2	2.8
01467042	2424.0	101.0	18.3	1.1	98.9
01467048	2440.0	101.7	13.5	8.7	91.3
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	2695.5	112.3	5.9	25.6	74.4
01474000	1869.5	77.9	32.4	0.3	99.7
01474500	942.0	39.3	15.9	79.1	20.9
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA

*Turbidity not continuously monitored at this location

Table 84 - USGS Gage July 2010 - June 2011 Specific Conductance Summary Results During Wet Weather

USGS Gage July 2010 - June 2011 Specific Conductance Summary - Wet Weather			
Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	3635.0	151.5	3.8
014670261	1844.0	76.8	0.2
01467042	3512.0	146.3	0.5
01467048	3754.5	156.4	0.3
01467086	3641.5	151.7	0.3
01467087	3754.0	156.4	1.5
01467200	2901.5	120.9	10.9
01473900	3555.0	148.1	2.9
01474000	3521.0	146.7	5.7
01474500	1601.0	66.7	7.2
01475530	3186.5	132.8	10.0
01475548	3766.0	156.9	1.2

Table 85 - USGS Gage July 2010 - June 2011 Specific Conductance Summary Results During Dry Weather

USGS Gage July 2010 - June 2011 Specific Conductance Summary - Dry Weather			
Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	2704.0	112.7	4.1
014670261	1018.0	42.4	0.3
01467042	2955.5	123.1	0.4
01467048	2800.5	116.7	0.7
01467086	2865.5	119.4	0.3
01467087	2705.0	112.7	0.3
01467200	2140.5	89.2	10.7
01473900	2795.0	116.5	2.4
01474000	2596.0	108.2	6.1
01474500	1021.0	42.5	8.9
01475530	2916.0	121.5	2.3
01475548	2701.0	112.5	0.4

Table 86 - USGS Gage July 2010 - June 2011 Temperature Maximum Criteria Summary Results During Wet Weather

USGS Gage July 2010 - June 2011 Temperature Maximum Criteria Summary - Wet Weather						
Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. compliance
01465798	WWF	3682.0	153.4	2.6	18.1	81.9
014670261	DRBC	1845.5	76.9	0.1	0.0	100.0
01467042	TSF	3512.5	146.4	0.5	33.6	66.4
01467048	TSF	3754.5	156.4	0.3	36.2	63.8
01467086	WWF	3642.0	151.8	0.3	18.2	81.8
01467087	WWF	3794.5	158.1	0.5	20.5	79.5
01467200	DRBC	2901.5	120.9	10.9	0.0	100.0
01473900	TSF	3540.0	147.5	3.4	31.6	68.4
01474000	TSF	3699.5	154.1	1.0	32.9	67.1
01474500	WWF	1608.0	67.0	6.8	19.5	80.5
01475530	WWF	3534.5	147.3	0.2	16.3	83.7
01475548	WWF	3804.0	158.5	0.2	17.1	82.9

Table 87 - USGS Gage July 2010 - June 2011 Temperature Maximum Criteria Summary Results During Dry Weather

USGS Gage July 2010 - June 2011 Temperature Maximum Criteria Summary - Dry Weather						
Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. compliance
01465798	WWF	2802.5	116.8	0.6	9.1	90.9
014670261	DRBC	1020.0	42.5	0.1	0.0	100.0
01467042	TSF	2955.0	123.1	0.4	23.6	76.4
01467048	TSF	2800.5	116.7	0.7	31.1	68.9
01467086	WWF	2865.5	119.4	0.3	8.6	91.4
01467087	WWF	2705.0	112.7	0.3	10.7	89.3
01467200	DRBC	2140.5	89.2	10.7	0.0	100.0
01473900	TSF	2784.0	116.0	2.8	27.7	72.3
01474000	TSF	2723.0	113.5	1.5	23.0	77.0
01474500	WWF	1022.5	42.6	8.7	15.2	84.8
01475530	WWF	2978.5	124.1	0.3	5.9	94.1
01475548	WWF	2702.0	112.6	0.4	10.1	89.9

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 J –
NPDES PERMITTED DISCHARGERS

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
1	PAR600091	A&H AUTO PARTS PASSYUNK AVE FAC	6255 W. PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	JUN-01-2006	MAY-31-2011	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
2	PAR800029	ABF FREIGHT SYSTEM INC	4000 RICHMOND ST, PHILADELPHIA, PA 19137	PHILADELPHIA	MAR-05-1996	MAR-05-2001	4213	TRUCKING, EXCEPT LOCAL	MS4	TACONY
3	PAR200041	ABINGTON METALS REFIN & MFG IN	4924 WELLINGTON ST, PHILADELPHIA, PA 19135	PHILADELPHIA	AUG-17-2004	AUG-31-2009	3339	PRIMARY SMELTING AND REFINING OF NONFERROUS METALS, EXCEPT COPPER AND ALUMINUM	CSO	DELAWARE
4	PAR800118	ACADEMY RECYCLING TORRESDALE FAC	8901 TORRESDALE AVENUE, PHILADELPHIA, PA 19154	PHILADELPHIA	DEC-04-2002	DEC-31-2007	4953	REFUSE SYSTEMS	MS4	PENNYPACK
5	PAR600034	ACER ENGINEERS INC	JIMMIES AUTO PARTS, PHILADELPHIA, PA 19137	PHILADELPHIA	FEB-26-1998	FEB-26-2001	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE
6	PAR800099	AIRCRAFT SRVC INTL GROUP	3 HOG ISLAND RD 19153	PHILADELPHIA	*	JAN-31-2016	5171	PETROLEUM BULK STATIONS AND TERMINALS	MS4	DELAWARE
7	PA0056090	AIRCRAFT SVC INTL GROUP TINICUM TWP FAC	3 HOG ISLAND RD, PHILADELPHIA, PA 19153	PHILADELPHIA	APR-12-2000	APR-12-2005	5171	PETROLEUM BULK STATIONS AND TERMINALS	NON-CONTRIBUTING	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
8	PA0057690	AKER PHILA SHIPYARD	PORTER AVENUE AND BRIDGE STREET, PHILADELPHIA, PA 19112	PHILADELPHIA	JUL-06-2000	JUL-06-2005	3731	SHIP BUILDING AND REPAIRING	CSO	DELAWARE
9	PAR600107	ALLEGHENY AUTO PARTS FAC	310-400 W ALLEGHENY AVE 19133	PHILADELPHIA	*	AUG-31-2014	5015	MOTOR VEHICLE PARTS, USED	MS4	FRANKFORD
10	PAR600026	ALLEGHENY IRON & METAL TACONY ST FAC	TACONY STREET AND ADAMS AVENUE, PHILADELPHIA, PA 19124	PHILADELPHIA	OCT-23-2001	OCT-26-2006	5093	SCRAP AND WASTE MATERIALS	CSO	TACONY
11	PAR200002	ALLIED TUBE & CONDUIT NORCOM RD PLT	11350 NORCOM ROAD, PHILADELPHIA, PA 19154	PHILADELPHIA	AUG-29-2005	AUG-31-2010	3317	STEEL PIPE AND TUBES	MS4	POQUESSING
12	PA0011428	AMERADA HESS - PHILADELPHIA TERMINAL	1630 SOUTH 51ST STREET, PHILADELPHIA, PA 19143	PHILADELPHIA	JUN-03-2004	JUN-30-2009	5171	PETROLEUM BULK STATIONS AND TERMINALS	CSO	SCHUYLKILL
13	PAR600054	AMERICAN AUTO PARTS & SALV CO	3501 S 61ST ST, PHILADELPHIA, PA 191533522	PHILADELPHIA	JUN-12-2000	JUN-12-2005	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	SCHUYLKILL
14	PA0054241	AMOCO OIL COMPANY	63RD & PASSYUNK AVENUE, PHILADELPHIA, PA 19142	PHILADELPHIA	JUL-03-2006	JUL-31-2011	5171	PETROLEUM BULK STATIONS AND TERMINALS	MS4	SCHUYLKILL

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15	PAR600112	ARCA ADVANCED PROC N DELAWARE AVE FAC	4301 N DELAWARE AVE 19137	PHILADELPHIA	*	MAY-31-2015	5093	SCRAP AND WASTE MATERIALS	NON-CONTRIBUTING	DELAWARE
16	PAR230068	ARDEX LABS INC	2050 BYBERRY RD 19116	PHILADELPHIA	*	AUG-14-2003	2842	SPECIALTY CLEANING, POLISHING, AND SANITATION PREPARATIONS	MS4	BYBERRY
17	PAR230044	ASHLAND CHEM	2801 CHRISTOPHER COLUMBUS BOULEVARD, PHILADELPHIA, PA 19148	PHILADELPHIA	MAR-29-1996	MAR-29-2001	2821	PLASTICS MATERIALS, SYNTHETIC RESINS, AND NONVULCANIZABLE ELASTOMERS	CSO	DELAWARE
18	PAR600080	ATLANTIC USED AUTO PARTS W PASSYUNK AVE FAC	6030 W PASSYUNK AVE, PHILA, PA 19153	PHILADELPHIA	APR-01-2005	MAR-31-2010	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	SCHUYLKILL
19	PAR600056	B & L AUTO PARTS 61ST STREET FAC	3404 S 61ST ST, PHILADELPHIA, PA 19153	PHILADELPHIA	JUL-25-2000	JUL-25-2005	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
20	PAR800041	BFI TRANSF SYS OF PA CHRISTOPHER COLUMBUS BLVD FAC	2904 S CHRISTOPHER COLUMBUS BLVD, PHILADELPHIA, PA 19148	PHILADELPHIA	OCT-16-2001	OCT-16-2006	4212	LOCAL TRUCKING WITHOUT STORAGE	CSO	DELAWARE

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21	PAR800064	BFI WASTE SVC OF PA	3000 E HEDLEY STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	SEP-28-2001	SEP-28-2006	4212	LOCAL TRUCKING WITHOUT STORAGE	NON-CONTRIBUTING	DELAWARE
22	PAU123244	BILL'S AUTOGLASS	3402 S. 61ST ST, PHILADELPHIA, PA 19153	PHILADELPHIA	*	*	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
23	PAR600109	BLUE MOUNTAIN RECYCLING ELLSWORTH ST FAC	2904 ELLSWORTH ST 19146	PHILA	*	AUG-31-2014	5093	SCRAP AND WASTE MATERIALS	MS4	SCHUYLKILL
24	PAR600073	BRUCE PAUL AUTO PARTS	LEHIGH AVE FAC, PHILADELPHIA, PA 19125	PHILADELPHIA	OCT-01-2004	SEP-30-2009	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE
25	PAR200036	BUDD COMP	PHILADELPHIA PLANT, PHILADELPHIA, PA 19129	PHILADELPHIA	MAY-09-2000	MAY-09-2005	3465	AUTOMOTIVE STAMPINGS	MS4	SCHUYLKILL
26	PAR600081	BUTCHS AUTO PARTS	SOUTH 61ST ST FAC, PHILADELPHIA, PA 19142	PHILADELPHIA	APR-01-2005	MAR-31-2010	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	SCHUYLKILL
27	PAR800159	CANADIAN PACIFIC PHILA NAVY YD FAC	LANGLEY AVE 19148	PHILA	*	JUL-31-2014	4013	RAILROAD SWITCHING AND TERMINAL ESTABLISHMENTS	NON-CONTRIBUTING	SCHUYLKILL

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28	PAR800055	CF MOTOR FREIGHT PHL	2625 E CASTOR AVE, PHILADELPHIA, PA 19134	PHILADELPHIA	AUG-08-1996	AUG-08-2001	4213	TRUCKING, EXCEPT LOCAL	CSO	DELAWARE
29	PAR600028	CIMCO TERMINAL INC	C/O CAMDEN IRON & METAL INC, PHILADELPHIA, PA 19125	PHILADELPHIA	NOV-01-1998	NOV-01-2001	5093	SCRAP AND WASTE MATERIALS	CSO	SCHUYLKILL
30	PAU123459	CJ ASHLAND	4001 ASHLAND AVE, PHILADELPHIA, PA 19124	PHILADELPHIA	*	*	5015	MOTOR VEHICLE PARTS, USED	MS4	TACONY
31	PAR900017	CLEAN EARTH OF PHILA FAC	3201 SOUTH 61ST STREET, PHILADELPHIA, PA 19153	PHILADELPHIA	JUN-01-2006	MAY-31-2011	4953	REFUSE SYSTEMS	NON-CONTRIBUTING	SCHUYLKILL
32	PAR800019	CROWLEY AMERICAN TRANS	TIOGA MARINE TERMINAL, PHILADELPHIA, PA 19134	PHILADELPHIA	SEP-11-1996	SEP-11-2001	4212	LOCAL TRUCKING WITHOUT STORAGE	CSO	DELAWARE
33	PAR110036	CROWN CORK & SEAL	9300 ASHTON ROAD, PHILADELPHIA, PA 191143464	PHILADELPHIA	AUG-15-1996	AUG-15-2001	3559	SPECIAL INDUSTRY MACHINERY, NOT ELSEWHERE CLASSIFIED	MS4	PENNYPACK
34	PAR200023	CROWN CORK & SEAL CO INC	9300 ASHTON RD 19136	PHILADELPHIA	*	JAN-26-2001	3411	METAL CANS	NON-CONTRIBUTING	PENNYPACK

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35	PAR800088	CSX INTERMODAL	GREENWICH YARD, PHILADELEPHIA, PA 19148	PHILADELPHIA	JUL-14-1998	JUL-14-2003	4011	RAILROADS, LINE-HAUL OPERATING	CSO	DELAWARE
36	PAR800027	CSX TRANSPORTATION	PHILADELPHIA RIP TRACK, PHILADELPHIA, PA 19145	PHILADELPHIA	JUN-01-2006	MAY-31-2011	4011	RAILROADS, LINE-HAUL OPERATING	CSO	SCHUYLKILL
37	PAR600092	DAVE S DELAWARE VALLEY TOWING PASSYUNK AVE FAC	6159 PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	*	*			MS4	SCHUYLKILL
38	PAR800060	DEGUSSA CORP	DEGUSSA CSX/BIDS FACILITY, PHILADELPHIA, PA 19145	PHILADELPHIA	OCT-09-2002	OCT-31-2007	4226	SPECIAL WAREHOUSING AND STORAGE, NOT ELSEWHERE CLASSIFIED	CSO	DELAWARE
39	PAR120008	DEGUSSA FLAVORS & FRUIT SYS	1741 TOMLINSON RD, PHILADELPHIA, PA 19116	PHILADELPHIA	SEP-06-2001	SEP-06-2006	2033	CANNED FRUITS, VEGETABLES, PRESERVES, JAMS, AND JELLIES	MS4	POQUESSING
40	PAR900005	DELAWARE VALLEY RECYCLING	3107 SOUTH 61ST STREET, PHILADELPHIA, PA 19153	PHILADELPHIA	JAN-26-1996	JAN-26-2001	4953	REFUSE SYSTEMS	NON-CONTRIBUTING	SCHUYLKILL
41	PAR600106	DELCO METALS N 2ND ST FAC	3053 N 2ND ST 19133	PHILA	*	JUL-31-2014	5093	SCRAP AND WASTE MATERIALS	CSO	FRANKFORD

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42	PAR800138	DHL EXPRESS USA INC	HOLSTEIN AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	APR-01-2006	MAR-31-2011	4215	COURIER SERVICES, EXCEPT BY AIR	MS4	SCHUYLKILL
43	PAR230043	DICKLER CHEMICAL LABORATORIES INCORPORATED	4201 TORRESDALE AVENUE, PHILADELPHIA, PA 191241001	PHILADELPHIA	MAR-05-1996	MAR-05-2001	2842	SPECIALTY CLEANING, POLISHING, AND SANITATION PREPARATIONS	CSO	TACONY
44	PAR120002	DIETZ & WATSON INCORPORATED	5701 TACONY ST., PHILADELPHIA, PA 19135	PHILADELPHIA	MAY-17-1996	MAY-17-2001	2013	SAUSAGES AND OTHER PREPARED MEAT PRODUCTS	NON-CONTRIBUTING	DELAWARE
45	PAR600089	DRIVE LINE AUTO PARTS	WEST PASSYUNK AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	JAN-01-2006	DEC-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
46	PAR600066	DRIVE TRAIN EXCHANGE	DBA VENICE AUTO PARTS, PHILADELPHIA, PA 19153	PHILADELPHIA	OCT-01-2005	SEP-30-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
47	PA0010855	DU PONT MARSHALL LAB	3401 GRAYS FERRY AVENUE, PHILADELPHIA, PA 19146	PHILADELPHIA	OCT-28-2004	OCT-31-2009	2851	PAINTS, VARNISHES, LACQUERS, ENAMELS, AND ALLIED PRODUCTS	CSO	SCHUYLKILL
48	PAR600071	ESSINGTON AVE AUTO PARTS	6746 ESSINGTON AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	SEP-01-2004	AUG-31-2009	5015	MOTOR VEHICLE PARTS, USED	CSO	SCHUYLKILL

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49	PA0011622	EXELON GENERATION CO DELAWARE STA	1325 NORTH BEACH STREET, PHILADELPHIA, PA 19125	PHILADELPHIA	JAN-16-2003	JAN-31-2008	4911	ELECTRIC SERVICES	NON-CONTRIBUTING	DELAWARE
50	PAG100018	EXELON GENERATION CO LLC	RICHMOND FAC 19137	PHILADELPHIA	*	OCT-31-2010	2211	BROADWOVEN FABRIC MILLS, COTTON	MS4	DELAWARE
51	PA0011649	EXELON RICHMOND GENERATING STA	3901 NORTH DELAWARE AVENUE, PHILADELPHIA, PA 19137	PHILADELPHIA	SEP-12-2002	SEP-30-2007	4911	ELECTRIC SERVICES	NON-CONTRIBUTING	DELAWARE
52	PAR800113	FEDERAL EXPRESS CORP	3600 GRAYS FERRY AVENUE, PHILADELPHIA, PA 19146	PHILADELPHIA	JUN-10-2002	JUN-09-2007	4513	AIR COURIER SERVICES	CSO	SCHUYLKILL
53	PAR800131	FEDEX GROUND	TOWNSEND RD FAC, PHILADELPHIA, PA 19154	PHILADELPHIA	MAR-01-2005	FEB-28-2010	4215	COURIER SERVICES, EXCEPT BY AIR	MS4	POQUESSING
54	PAR140020	FIBREFLEX PACKING & MANUF CO	INC, PHILADELPHIA, PA 19127	PHILADELPHIA	JUL-06-2000	JUL-06-2005	2675	DIE-CUT PAPER AND PAPERBOARD AND CARDBOARD	MS4	SCHUYLKILL
55	PAR600108	FIFTH STREET AUTO PARTS FAC	3105 N FIFTH ST 19133	PHILADELPHIA	*	AUG-31-2014	5015	MOTOR VEHICLE PARTS, USED	CSO	FRANKFORD
56	PAR600055	FIORES AUTO PARTS	3300 S 61ST ST, PHILADELPHIA, PA 19153	PHILADELPHIA	JUN-12-2000	JUN-12-2005	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL

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57	PAR600074	FREDDIES AUTO PARTS	CARTEL AUTO PARTS W PASSYUNK, PHILADELPHIA, PA 19153	PHILADELPHIA	NOV-01-2004	OCT-31-2009	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	SCHUYLKILL
58	PA0056430	FT. MIFFLIN TERMINAL	HOG ISLAND RR 4 19153	PHILADELPHIA	*	AUG-31-2015	4612	CRUDE PETROLEUM PIPELINES	NON-CONTRIBUTING	DELAWARE
59	ALR16E050	GADSDEN MALL-EXPANSION	200 SOUTH BROAD STREET, 3RD FLOOR 19102	PHILADELPHIA	*	SEP-16-2008	1522	MULTI FAMILY RESIDENTIAL	CSO	DELAWARE
60	PAR800158	GREENWICH TERM S COL	3301 S COLUMBUS BLVD 19148	PHILADELPHIA	*	FEB-28-2014	4491	MARINE CARGO HANDLING	NON-CONTRIBUTING	DELAWARE
61	PAR200011	GROSS METALS	221 WEST GLENWOOD AVENUE, PHILADELPHIA, PA 19135	PHILADELPHIA	MAY-07-1997	MAY-07-2002	3479	COATING, ENGRAVING, AND ALLIED SERVICES, NOT ELSEWHERE CLASSIFIED	CSO	DELAWARE
62	PAR600072	HAROLDS USED AUTO PARTS	WHITBY AVE FAC, PHILADEPHIA, PA 19143	PHILADELPHIA	OCT-01-2004	SEP-30-2009	5015	MOTOR VEHICLE PARTS, USED	CSO	DARBY-COBBS
63	PAR200007	HENSHELL CORP	2955 NORTH 20TH STREET, PHILADELPHIA, PA 19132	PHILADELPHIA	FEB-26-1997	FEB-26-2002	3479	COATING, ENGRAVING, AND ALLIED SERVICES, NOT ELSEWHERE CLASSIFIED	CSO	DELAWARE

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64	PAR110047	HOWARD MCCRAY REFRIG CO INC	GRANT AVE & BLUE GRASS RD, PHILADELPHIA, PA 19114	PHILADELPHIA	MAY-02-1997	MAY-02-2002	3585	AIR-CONDITIONING AND WARM AIR HEATING EQUIPMENT AND COMMERCIAL AND INDUSTRIAL REFRIGERATION EQUIPMENT	MS4	PENNYPACK
65	PAR120011	HYGRADE FOOD PROD	8400 EXECUTIVE AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	MAY-02-2001	MAY-02-2006	2013	SAUSAGES AND OTHER PREPARED MEAT PRODUCTS	MS4	SCHUYLKILL
66	PAR130004	IMPERIAL METAL & CHEM	2050 BYBERRY ROAD, PHILADELPHIA, PA 19116	PHILADELPHIA	JUL-16-1996	JUL-16-2001	2796	PLATEMAKING AND RELATED SERVICES	MS4	POQUESSING
67	PAR140005	INTL PAPER	2100 EAST BYBERRY ROAD, PHILADELPHIA, PA 19116	PHILADELPHIA	AUG-21-1996	AUG-21-2001	2656	SANITARY FOOD CONTAINERS, EXCEPT FOLDING	MS4	POQUESSING
68	PAR600076	JACKS AUTO PARTS SALES	61ST ST FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	DEC-01-2004	NOV-30-2009	5015	MOTOR VEHICLE PARTS, USED	CSO	DARBY-COBBS
69	PA0058947	JDM MATERIALS	2750 GRANT AVE, PHILADELPHIA, PA 19114	PHILADELPHIA	JUN-20-2006	JUN-30-2011	3273	READY-MIXED CONCRETE	NON-CONTRIBUTING	PENNYPACK
70	PA0058955	JDM MATERIALS CO	BARTRAM BATCH PLANT, PHILADELPHIA, PA 19153	PHILADELPHIA	JUN-20-2006	JUN-30-2011	3273	READY-MIXED CONCRETE	NON-CONTRIBUTING	SCHUYLKILL

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71	PAR600084	JIMS AUTO RECYCLING INC	W PASSYUNK FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	JUN-01-2005	MAY-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
72	PAR600090	JKL'S AUTO SALES & PARTS	ESSINGTON AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	JAN-01-2006	DEC-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
73	PAU123248	JOHN'S USED AUTO PARTS	PHILADELPHIA COUNTY, PA, 9400 STATE RD	PHILADELPHIA	*	*	5015	MOTOR VEHICLE PARTS, USED	MS4	DELAWARE
74	PAR200016	JOWITT & RODGERS STATE RD FAC	9400 STATE RD, PHILADELPHIA, PA 19114	PHILADELPHIA	OCT-02-2001	OCT-02-2006	3291	ABRASIVE PRODUCTS	MS4	DELAWARE
75	PAR210006	JOWITT & ROGERS COMP	9400 STATE RD 19114	PHILADELPHIA	*	SEP-18-2001	3291	ABRASIVE PRODUCTS	MS4	DELAWARE
76	PAR600065	JT S USED AUTO PARTS S 61ST ST FAC	3505 SOUTH 61ST STREET, PHILADELPHIA, PA 19153	PHILADELPHIA	NOV-01-2005	OCT-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
77	PAU123245	JT'S AUTOMOBILE PARTS	PHILADELPHIA COUNTY, PA, EAST SOMERSET ST FAC	PHILADELPHIA	*	*	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE
78	PAR600079	K & A AUTO SALVAGE	EAST SOMERSET ST FAC, PHILADELPHIA, PA 19134	PHILADELPHIA	APR-01-2005	MAR-31-2010	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE

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79	PAR600110	KAN CO METALS BRIDGE	2275 BRIDGE ST 19137	PHILADELPHIA	*	MAY-31-2015	5093	SCRAP AND WASTE MATERIALS	CSO	FRANKFORD
80	PAR600078	KNOCK OUT AUTO PARTS E TIOGA ST FAC	3201 E TIOGA ST, PHILADELPHIA, PA 19134	PHILADELPHIA	APR-01-2005	MAR-31-2010	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE
81	PAR110048	KURZ HASTINGS INCORPORATED	10901 DUTTON ROAD, PHILADELPHIA, PA 19154	PHILADELPHIA	DEC-09-1998	DEC-09-2003	3999	MANUFACTURING INDUSTRIES, NOT ELSEWHERE CLASSIFIED	MS4	POQUESSING
82	PAR110042	L3 COMMUNICATIONS ROOSEVELT BLVD FAC	13500 ROOSEVELT BOULEVARD, PHILADELPHIA, PA 191164299	PHILADELPHIA	MAY-22-2001	MAY-22-2006	3613	SWITCHGEAR AND SWITCHBOARD APPARATUS	MS4	POQUESSING
83	PAR110040	LAVELLE AIRCRAFT COMP	275 GEIGER RD, PHILADELPHIA, PA 19115	PHILADELPHIA	SEP-20-1996	SEP-20-2001	3724	AIRCRAFT ENGINES AND ENGINE PARTS	MS4	PENNYPACK
84	PAR150006	LAWRENCE MCFADDEN	7430 STATE RD., PHILADELPHIA, PA 191364299	PHILADELPHIA	AUG-15-1996	AUG-15-2001	2851	PAINTS, VARNISHES, LACQUERS, ENAMELS, AND ALLIED PRODUCTS	CSO	DELAWARE
85	PAU123460	LEGEND AUTO SALES	3990 FRANKFORD AVE, PHILADELPHIA, PA 19124	PHILADELPHIA	*	*	5015	MOTOR VEHICLE PARTS, USED	CSO	TACONY
86	PAR110007	MARTIN MARIETTA ASTRO SPACE	BUILDING 100, PHILADELPHIA, PA 19101	PHILADELPHIA	FEB-08-1996	FEB-08-2001	3769	GUIDED MISSILE AND SPACE VEHICLE PARTS AND AUXILIARY EQUIPMENT, NOT ELSEWHERE CLASSIFIED	CSO	SCHUYLKILL

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87	PAR110015	MELCO AUTO PARTS	5112 UMBRIA ST, PHILADELPHIA, PA 19128	PHILADELPHIA	APR-24-1996	APR-24-2001	3533	OIL AND GAS FIELD MACHINERY AND EQUIPMENT	MS4	SCHUYLKILL
88	PA0057479	METRO MACHINE CORP	5120 SOUTH 17TH STREET, PHILADELPHIA, PA 19112	PHILADELPHIA	JUN-26-2006	JUN-20-2011	3731	SHIP BUILDING AND REPAIRING	NON-CONTRIBUTING	DELAWARE
89	PAR600057	MICHAEL MACHINO DBA	OSCARS AUTO PARTS/PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	APR-01-2005	MAR-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
90	PAR600039	MORRIS IRON & STEEL CO INC	7345 MILNOR ST, PHILADELPHIA, PA 19136	PHILADELPHIA	AUG-28-1996	AUG-28-2001	5093	SCRAP AND WASTE MATERIALS	NON-CONTRIBUTING	DELAWARE
91	PAR120025	NABISCO	12000 EAST ROOSEVELT BOULEVARD, PHILADELPHIA, PA 19116	PHILADELPHIA	JUL-11-2002	JUL-10-2007	2052	COOKIES AND CRACKERS	MS4	POQUESSING
92	PA0050202	NATIONAL RAILROAD PASSENGER CO	AMTRAK RACE ST/PENN COACH YARD, PHILADELPHIA, PA 191042898	PHILADELPHIA	FEB-11-2003	FEB-28-2008	4011	RAILROADS, LINE-HAUL OPERATING	CSO	SCHUYLKILL
93	PAR600105	NDV RECYCLING N 2ND ST FAC	3630 N 2ND ST 19140	PHILADELPHIA	*	JUN-30-2014	5093	SCRAP AND WASTE MATERIALS	CSO	FRANKFORD

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94	PAR200010	NESBITT DIV OF MESTEK INC	TULIP & RHAWN STS, PHILADELPHIA, PA 19136	PHILADELPHIA	AUG-13-1996	AUG-13-2001	3499	FABRICATED METAL PRODUCTS, NOT ELSEWHERE CLASSIFIED	CSO	PENNYPACK
95	PAR800112	NORTHEAST PHILADELPHIA AIRPORT (PNE)	NORTHEAST PHILADELPHIA AIRPORT, PHILADELPHIA, PA 19114	PHILADELPHIA	FEB-12-2002	FEB-12-2007	4581	AIRPORTS, FLYING FIELDS, AND AIRPORT TERMINAL SERVICES	MS4	PENNYPACK
96	PA0026689	NORTHEAST WPCP	3900 RICHMOND STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	JUL-07-2000	JUL-07-2005	4952	SEWERAGE SYSTEMS	MS4	TACONY
97	PAR600030	ORTHODOX AUTO UNRUH AVE FAC	5247 UNRUH AVE, PHILADELPHIA, PA 19135	PHILADELPHIA	JUN-01-2006	MAY-31-2011	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	DELAWARE
98	PA0012572	PAPERWORKS INDUSTRIES INC	5000 FLAT ROCK ROAD, PHILADELPHIA, PA 19127	PHILADELPHIA	JUN-18-2004	JUN-30-2009	2631	PAPERBOARD MILLS	NON-CONTRIBUTING	SCHUYLKILL
99	PAR600070	PASCO INC	PASCO PASCHALL AVE FACILITY, PHILADELPHIA, PA 19142	PHILADELPHIA	MAY-04-2004	MAY-31-2009	5093	SCRAP AND WASTE MATERIALS	CSO	DARBY-COBBS

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
100	PA0011657	PECO ENERGY SCHUYLKILL GEN STA	2800 CHRISTIAN STREET, PHILADELPHIA, PA 19146	PHILADELPHIA	OCT-07-1999	OCT-07-2004	4911	ELECTRIC SERVICES	CSO	SCHUYLKILL
101	PAR600093	PENNSYLVANIA AUTO SALVAGE INC	4001 ASHLAND ST 19124	PHILADELPHIA	*	NOV-30-2011	**	**	MS4	FRANKFORD
102	PAR120003	PEPSI COLA	11701 ROOSEVELT BLVD., PHILADELPHIA, PA 19154	PHILADELPHIA	AUG-22-1996	AUG-22-2001	2086	BOTTLED AND CANNED SOFT DRINKS AND CARBONATED WATERS	MS4	POQUESSING
103	PAR140021	PERFECSEAL BUSTLETON AVE FAC	9800 BUSTLETON AVENUE, PHILADELPHIA, PA 19115	PHILADELPHIA	JAN-01-2006	DEC-31-2010	2671	PACKAGING PAPER AND PLASTICS FILM, COATED AND LAMINATED	MS4	PENNYPACK
104	PAR900024	PGW PASSYUNK PLANT	3100 W PASSYUNK AVE, PHILADELPHIA, PA 191455208	PHILADELPHIA	JUN-01-2006	MAY-31-2011	4925	MIXED, MANUFACTURED, OR LIQUEFIED PETROLEUM GAS PRODUCTION AND/OR DISTRIBUTION	CSO	SCHUYLKILL
105	PA0058483	PHILA AUTH FOR INDUSTRIAL DEV	PHILA NAVAL BUSINESS CENTER 19112	PHILADELPHIA	*	NOV-30-2015	9532	ADMINISTRATION OF URBAN PLANNING AND COMMUNITY AND RURAL DEVELOPMENT	NON-CONTRIBUTING	DELAWARE
106	PA0056766	PHILA CITY DEPT OF COMMERCE	DIV OF AVAIATION/PHILA INTL 19153	PHILADELPHIA	*	JUN-30-2013	4581	AIRPORTS, FLYING FIELDS, AND AIRPORT TERMINAL SERVICES	MS4	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
107	PA0046876	PHILA GAS WORKS PASSYUNK AVE PLT	3100 PASSYUNK AVE, PHILADELPHIA, PA 19145	PHILADELPHIA	OCT-26-1999	OCT-26-2004	4925	MIXED, MANUFACTURED, OR LIQUEFIED PETROLEUM GAS PRODUCTION AND/OR DISTRIBUTION	CSO	SCHUYLKILL
108	PA0012882	PHILA GAS WORKS RICHMOND PLT	3100 EAST VENANGO STREET, PHILADELPHIA, PA 191346192	PHILADELPHIA	MAR-29-2005	MAR-31-2010	4925	MIXED, MANUFACTURED, OR LIQUEFIED PETROLEUM GAS PRODUCTION AND/OR DISTRIBUTION	CSO	DELAWARE
109	PAG100021	PHILA INTL AIRPORT PIPELINE RELOCATIOIN PROJ	8000 ESSINGTON AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	*	*			MS4	SCHUYLKILL
110	PA0026662	PHILA SOUTHEAST POTW	25 PATTISON AVENUE, PHILADELPHIA, PA 19148	PHILADELPHIA	JUL-07-2000	JUL-07-2005	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
111	PA0040991	PHILA TERM	4210 G STREET, PHILADELPHIA, PA 19124-4821	PHILADELPHIA	SEP-23-2004	SEP-30-2009	5171	PETROLEUM BULK STATIONS AND TERMINALS	CSO	TACONY
112	PAR120018	PHILADELPHIA BAKING CO	GRANT AVE & ROOSEVELT AVE, PHILADELPHIA, PA 19115	PHILADELPHIA	APR-23-1996	APR-23-2001	2051	BREAD AND OTHER BAKERY PRODUCTS, EXCEPT COOKIES AND CRACKERS	MS4	PENNYPACK

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
113	PAR600042	PHILADELPHIA CITY POLICE DEPT	POLICE & AUTO IMPOUNDMENT LOT, PHILADELPHIA, PA 19153	PHILADELPHIA	SEP-20-1996	SEP-20-2001	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	DELAWARE
114	PAR900013	PHILADELPHIA CITY WATER DEPT	NE/WPCP, PHILADELPHIA, PA 19137	PHILADELPHIA	OCT-07-2002	OCT-31-2007	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
115	PAR900019	PHILADELPHIA CITY WATER DEPT	SOUTHWEST WPC PLANT 19153	PHILADELPHIA	*	OVT-30-2007	4952	SEWERAGE SYSTEMS	NON-CONTRIBUTING	SCHUYLKILL
116	PA0054712	PHILADELPHIA MS4	1101 MARKET STREET, PHILADELPHIA, PA 19107	PHILADELPHIA	SEP-30-2005	SEP-30-2010	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
117	PA0036447	PHILADELPHIA NAVAL BUSINESS CENTER	4500 SOUTH BROAD STREET, PHILADELPHIA, PA 19112-1403	PHILADELPHIA	MAR-03-2006	MAR-31-2011	8731	COMMERCIAL PHYSICAL AND BIOLOGICAL RESEARCH	NON-CONTRIBUTING	DELAWARE
118	PA0244431	PHILADELPHIA NAVAL SHIPYARD	5195 SOUTH 19TH STREET 19112	PHILADELPHIA	*	JUL-31-2013	3731	SHIP BUILDING AND REPAIRING	NON-CONTRIBUTING	DELAWARE
119	PAR900020	PHILADEPHIA WATER DEPT	SE WPCP, PHILADELPHIA, PA 19148	PHILADELPHIA	OCT-07-2002	OCT-31-2007	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
120	PA0011088	PLAINS PRODUCTS TERMINALS LLC	6850 ESSINGTON AVE., PHILADELPHIA, PA 19153	PHILADELPHIA	OCT-21-2005	OCT-31-2010	5171	PETROLEUM BULK STATIONS AND TERMINALS	SW ONLY	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
121	PAR600075	POOR BOYS USED AUTO PARTS W ANNSBURY ST FAC	532 W ANNSBURY ST, PHILADELPHIA, PA 19140	PHILADELPHIA	DEC-01-2004	NOV-30-2009	5015	MOTOR VEHICLE PARTS, USED	CSO	TACONY
122	PAR230060	RICHARDSAPEX INC	4202-10 MAIN STREET, PHILADELPHIA, PA 19127	PHILADELPHIA	SEP-17-2001	SEP-17-2006	2899	CHEMICALS AND CHEMICAL PREPARATIONS, NOT ELSEWHERE CLASSIFIED	NON-CONTRIBUTING	SCHUYLKILL
123	PAR800085	ROADWAY EXPRESS	CHURCH & PEARCE STREETS, PHILADELPHIA, PA 19124	PHILADELPHIA	AUG-29-2002	AUG-31-2007	4231	TERMINAL AND JOINT TERMINAL MAINTENANCE FACILITIES FOR MOTOR FREIGHT TRANSPORTATION	MS4	TACONY
124	PAR600083	ROBERT VOLIO	DBA NICE GUYS AUTO PARTS, PHILADELPHIA, PA 19153	PHILADELPHIA	MAY-01-2005	APR-30-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
125	PA0012777	ROHM & HAAS CHEMICAL RICHMOND ST PLT	5000 RICHMOND STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	FEB-28-2003	FEB-28-2008	2869	INDUSTRIAL ORGANIC CHEMICALS, NOT ELSEWHERE CLASSIFIED	NON-CONTRIBUTING	DELAWARE
126	PAR600024	S D RICHMAN SONS WHEATSHEAF LN FAC	2435 E WHEATSHEAF LANE, PHILADELPHIA, PA 19137	PHILADELPHIA	OCT-31-2001	OCT-31-2006	5093	SCRAP AND WASTE MATERIALS	MS4	TACONY
127	PAR600082	SAMMY'S AUTO PARTS	3405 SOUTH 61ST ST, PHILADELPHIA, PA 19153	PHILADELPHIA	APR-01-2006	MAR-31-2011	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
128	PAR800163	SAVAGE SVC E OREGON	52 E OREGON AVE 19148	PHILADELPHIA	*	AUG-31-2015	4321	TERMINAL AND JOINT TERMINAL MAINTENANCE FACILITIES FOR MOTOR FREIGHT TRANSPORTATION	CSO	DELAWARE
129	PAR800033	SEPTA	ALLEGHENY GARAGE, PHILADELPHIA, PA 19129	PHILADELPHIA	AUG-22-1996	AUG-22-2001	4111	LOCAL AND SUBURBAN TRANSIT	MS4	SCHUYLKILL
130	PAR800035	SEPTA	ROBERTS AVE FAC, PHILADELPHIA, PA 19129	PHILADELPHIA	FEB-01-2005	JAN-31-2010	4111	LOCAL AND SUBURBAN TRANSIT	MS4	SCHUYLKILL
131	PAR140023	SMURFIT STONE CONTAINER ENTER	BLUE GRASS RD PLT, PHILADELPHIA, PA 19114	PHILADELPHIA	JUN-01-2005	MAY-31-2010	2653	CORRUGATED AND SOLID FIBER BOXES	MS4	PENNYPACK
132	PA0026671	SOUTHWEST WATER POLLUTION CONTROL PLANT	8200 ENTERPRISE AVENUE, PHILADELPHIA, PA 19153	PHILADELPHIA	JUL-07-2000	JUL-07-2005	4952	SEWERAGE SYSTEMS	NON-CONTRIBUTING	SCHUYLKILL
133	PAR600025	SPC PENROSE AVE FAC	26TH STREET AND PENROSE AVENUE, PHILADELPHIA, PA 19145	PHILADELPHIA	JAN-28-2002	JAN-28-2007	5023	HOMEFURNISHINGS	CSO	SCHUYLKILL
134	PAR600111	STEFFA METALS CHURCH ST FAC	2190 CHURCH ST 19124	PHILADELPHIA	*	SEP-30-2015	5015	MOTOR VEHICLE PARTS, USED	CSO	FRANKFORD

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
135	PAR600085	STEVEN NGO	DBA STEVES AUTO PARTS II, PHILADELPHIA, PA 19153	PHILADELPHIA	JUL-01-2005	JUN-30-2010	5015	MOTOR VEHICLE PARTS, USED	NON-CONTRIBUTING	SCHUYLKILL
136	PAR230088	SUN CHEM HUNTING PARK AVE PLT	3301 HUNTING PARK AVE., PHILADELPHIA, PA 19129	PHILADELPHIA	APR-01-2005	MAR-31-2010	2893	PRINTING INK	CSO	SCHUYLKILL
137	PAR802212	SUN COMPANY INC	EXETER TERMINAL, PHILADELPHIA, PA 19103	PHILADELPHIA	NOV-07-1992	NOV-06-1997	5171	PETROLEUM BULK STATIONS AND TERMINALS	CSO	SCHUYLKILL
138	PAG100012	SUN PIPELINE CO	FORT MIFFLIN TERMINAL, PHILADELPHIA, PA 19153	PHILADELPHIA	MAR-04-2002	MAR-03-2007	2911	PETROLEUM REFINING	NON-CONTRIBUTING	SCHUYLKILL
139	PAR230045	SUNOCO CHEMICAL & FRANKFORD PLANT	MARGARET & BERMUDA STREETS, PHILADELPHIA, PA 191371193	PHILADELPHIA	APR-28-2003	APR-30-2008	2869	INDUSTRIAL ORGANIC CHEMICALS, NOT ELSEWHERE CLASSIFIED	CSO	DELAWARE
140	PA0011533	SUNOCO POINT BREEZE PROCESSING AREA	3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145	PHILADELPHIA	FEB-07-2006	FEB-28-2011	2911	PETROLEUM REFINING	CSO	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
141	PA0024252	SUNOCO TRANSP	1801 MARKET STREET, 26TH FLOOR, PHILADELPHIA, PA 19126	PHILADELPHIA	JUL-25-1995	JUL-25-2000	5171	PETROLEUM BULK STATIONS AND TERMINALS	CSO	SCHUYLKILL
142	PA0012629	SUNOCO, INC.-POINT BREEZE REFINERY	3144 PASSYUNK AVENUE 19145	PHILADELPHIA	*	JAN-31-2011	2911	PETROLEUM REFINING	NON-CONTRIBUTING	SCHUYLKILL
143	PAR600086	T&E AUTO PARTS W PASSYUNK AVE FAC	6219 W PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	SEP-01-2005	AUG-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
144	PAR800052	TDSI PHILADELPHIA BIDS TERM	36TH & MOORE STS, PHILADELPHIA, PA 19145	PHILADELPHIA	JUN-04-1996	JUN-04-2001	4011	RAILROADS, LINE-HAUL OPERATING	CSO	SCHUYLKILL
145	PAR200038	TJ COPE NORCOM RD FAC	11500 NORCOM RD, PHILADELPHIA, PA 19154	PHILADELPHIA	OCT-01-2003	OCT-31-2008	3443	FABRICATED PLATE WORK (BOILER SHOPS)	MS4	POQUESSING
146	PAR800148	TRANSRIVER PHILADELPHIA	3600 SOUTH 26TH ST 19145	PHILADELPHIA	*	JUL-31-2014	4212	LOCAL TRUCKING WITHOUT STORAGE	NON-CONTRIBUTING	SCHUYLKILL
147	PAU123461	UKNOWN AUTO SCRAP YARD	3970 FRANKFORD AVE, PHILADELPHIA, PA 19124	PHILADELPHIA	*	*	5015	MOTOR VEHICLE PARTS, USED	CSO	TACONY

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
148	PAR230089	UNITED COLOR MANUF INC	EAST TIOGA ST PLANT, PHILADELPHIA, PA 19134	PHILADELPHIA	NOV-01-2005	OCT-31-2010	2869	INDUSTRIAL ORGANIC CHEMICALS, NOT ELSEWHERE CLASSIFIED	CSO	DELAWARE
149	PA0053392	UPS INC	1 HOG ISLAND RD 19153	PHILADELPHIA	*	JUL-31-2012	4513	AIR COURIER SERVICES	NON-CONTRIBUTING	DELAWARE
150	PAR800062	US POSTAL SERV	BYBERRY RD FAC, PHILADELPHIA, PA 19116	PHILADELPHIA	NOV-01-2005	OCT-31-2010	4311	UNITED STATES POSTAL SERVICE THIS INDUSTRY INCLUDES ALL ESTABLISHMENTS OF THE UNITED STATES POSTAL SERVICE.	MS4	POQUESSING
151	PAR600015	WASTE MGMT OF PA	PHILLY TRANS STATION, PHILADELPHIA, PA 19146	PHILADELPHIA	DEC-13-2001	DEC-13-2006	5093	SCRAP AND WASTE MATERIALS	CSO	SCHUYLKILL
152	PAR800067	WASTE MGMT OF PA INC	FORGE RECYCLING & RES REC CENT, PHILADELPHIA, PA 19036	PHILADELPHIA	SEP-12-2002	SEP-30-2007	5621	WOMEN'S CLOTHING STORES	MS4	DELAWARE
153	PAR600088	WILLIAM DORTONE DBA BILLS AUTO	PASSYUNK AVE FAC, PHILADELPHIA, PA 19153	PHILADELPHIA	NOV-01-2005	OCT-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL

*-PERMIT DATES NOT AVAILABLE **-NO SIC PROVIDED

APPENDIX K – MONITORING LOCATIONS

Page

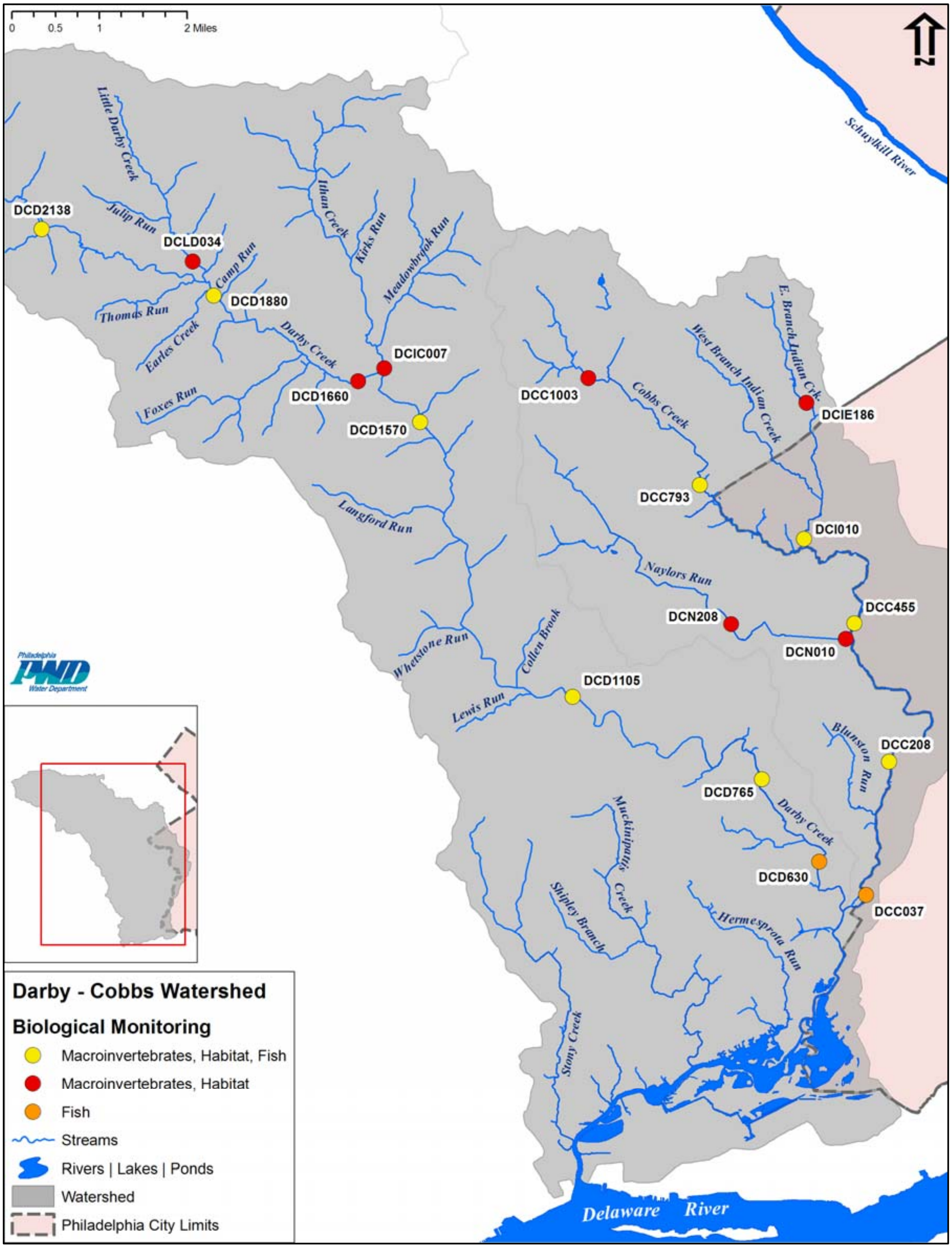

Figure - 1 Biological and Physical assessment locations in Darby-Cobbs Watershed

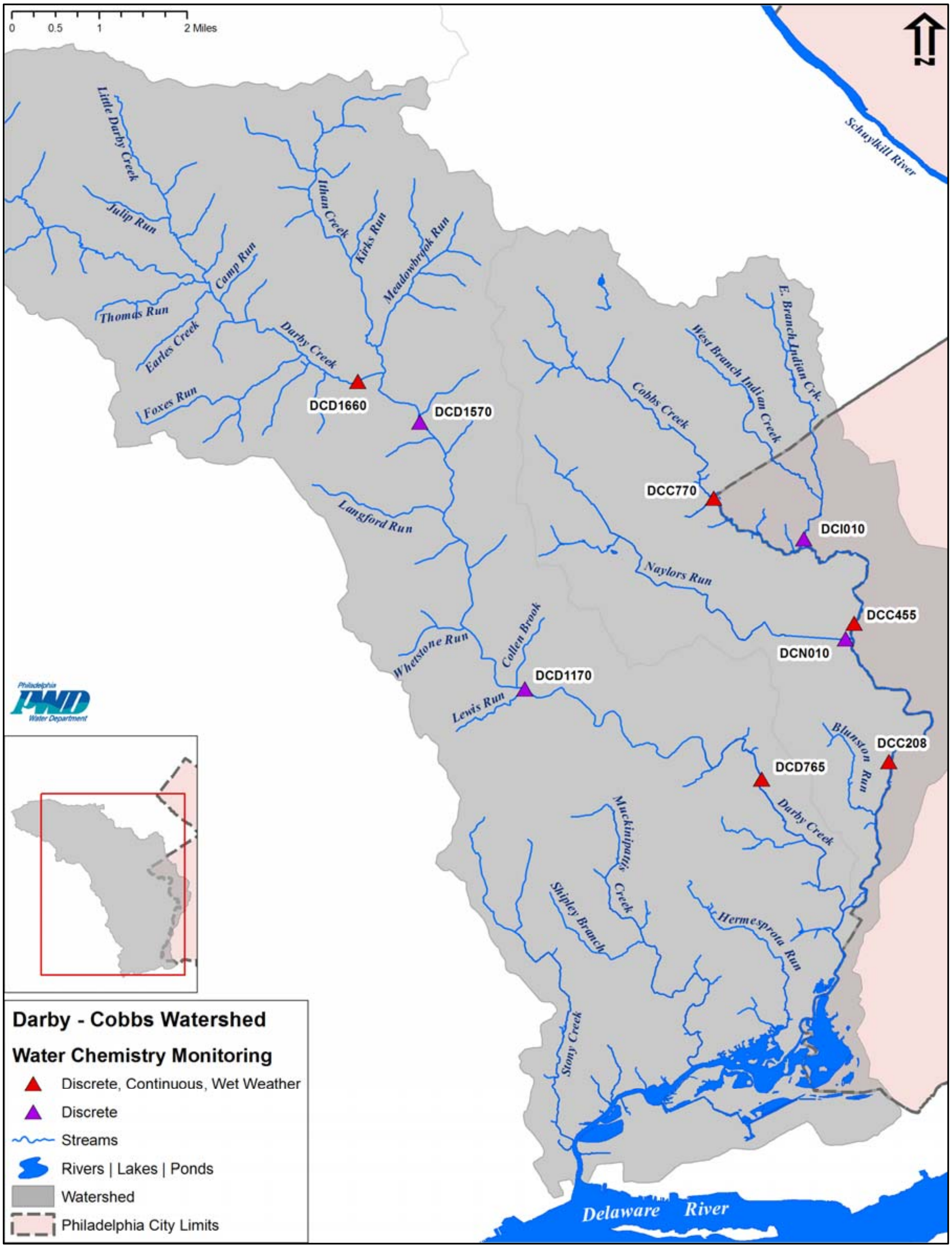

Figure - 2 Chemical monitoring locations in Darby-Cobbs Watershed

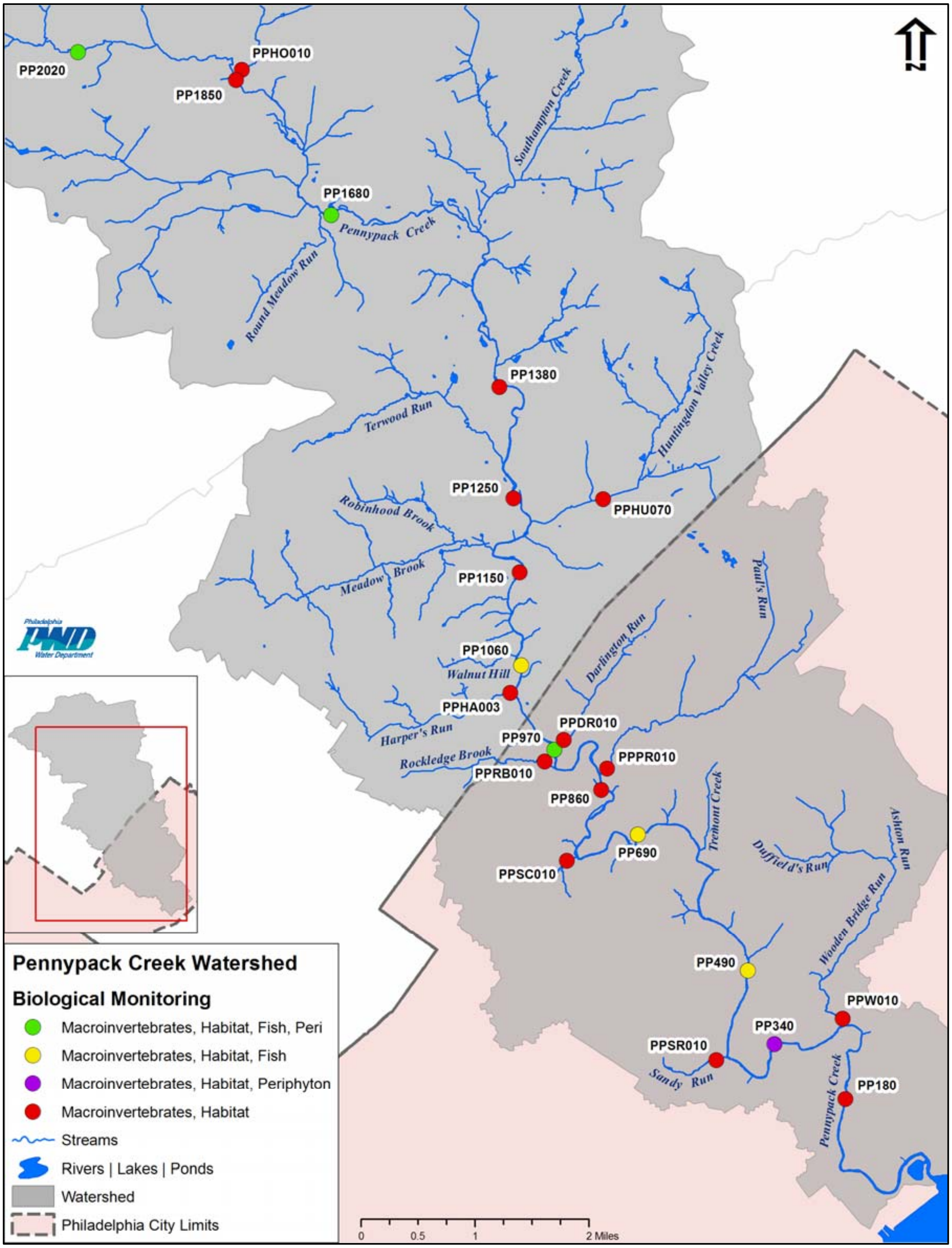

Figure - 3 Biological and Physical assessment locations in Pennypack Watershed

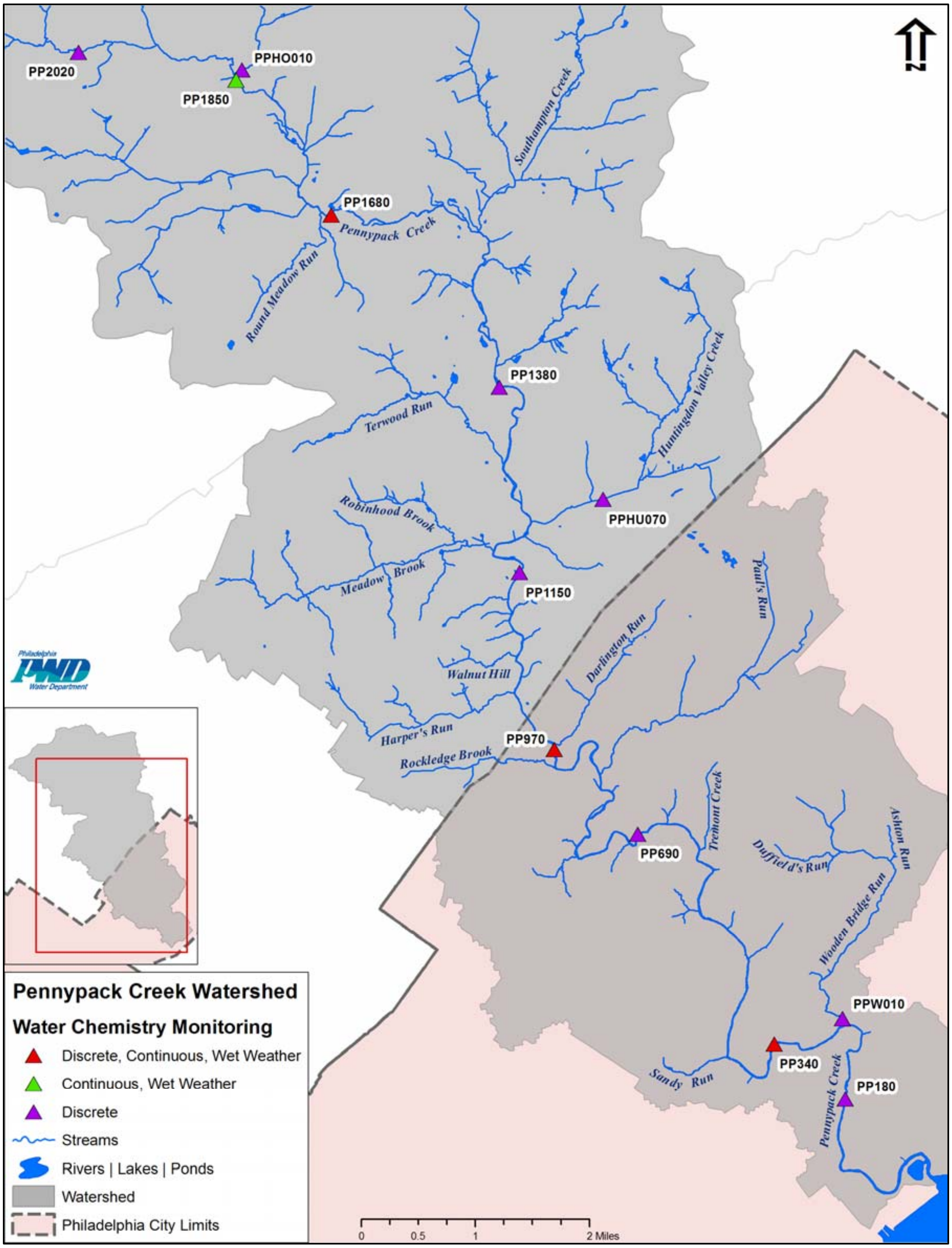

Figure - 4 Chemical monitoring locations in Pennypack Watershed

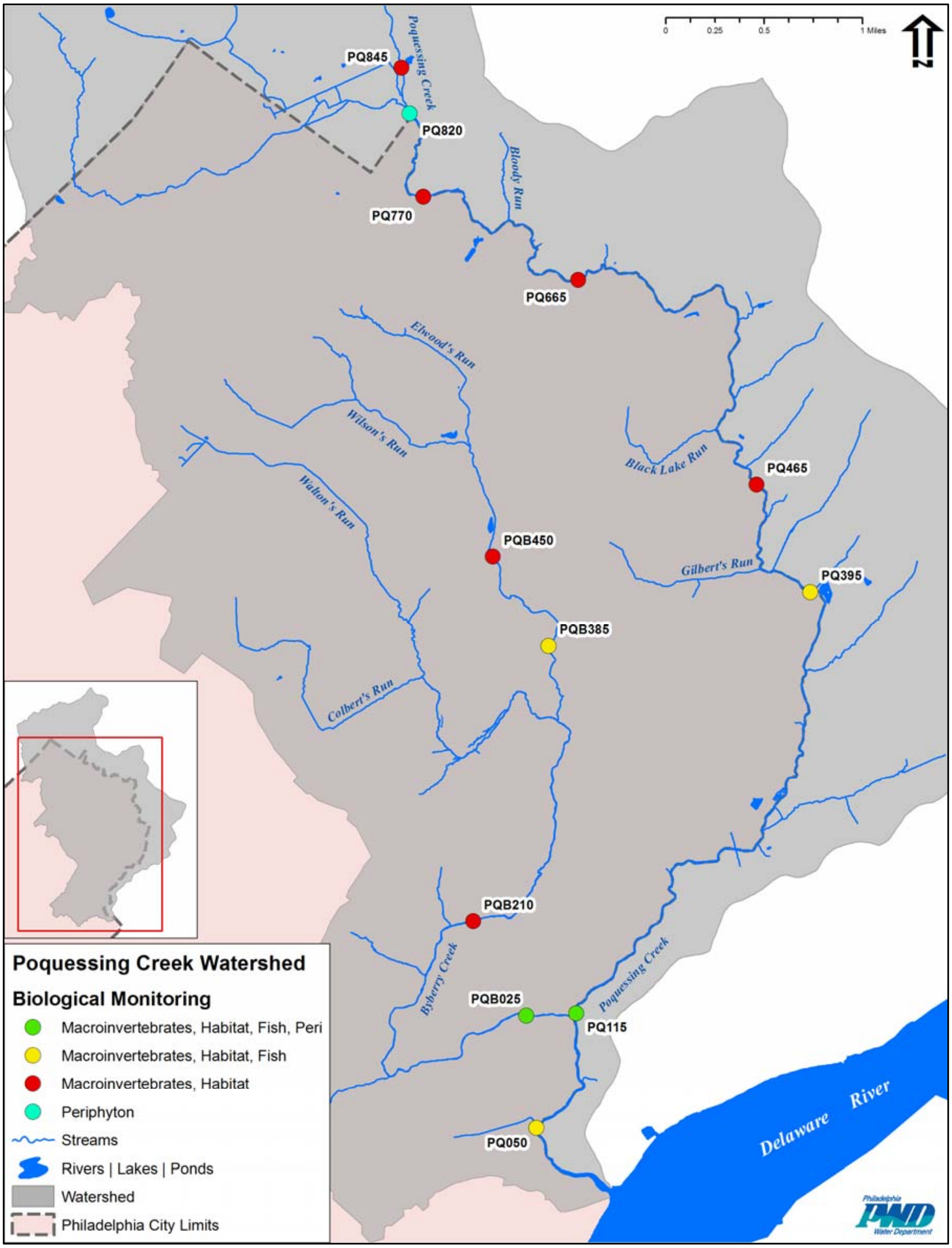

Figure - 5 Biological and Physical assessment locations in Poquessing-Byberry Watershed

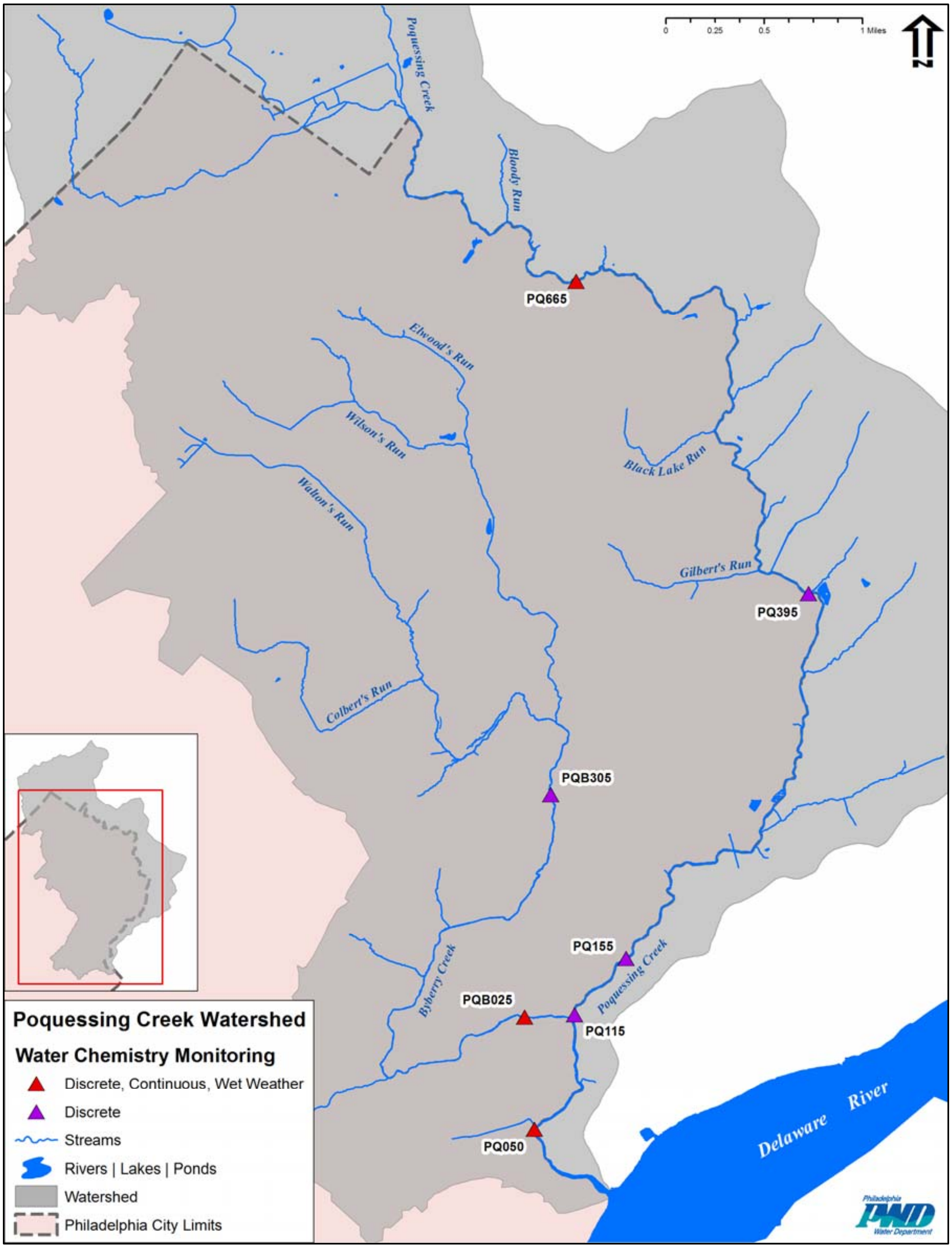

Figure - 6 Chemical monitoring locations in Poquessing-Byberry Watershed

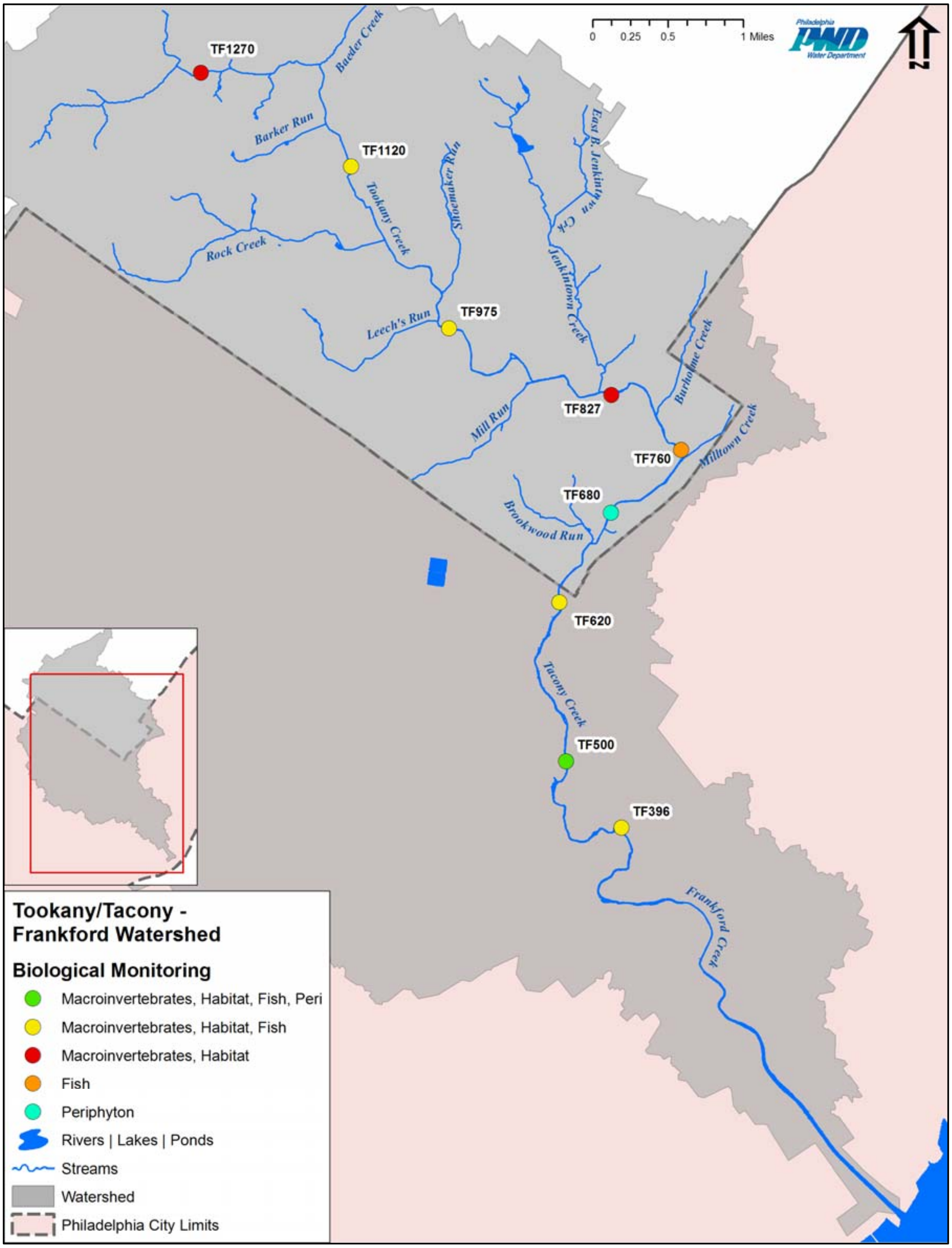

Figure - 7 Biological and Physical assessment locations in Tacony-Frankford Watershed

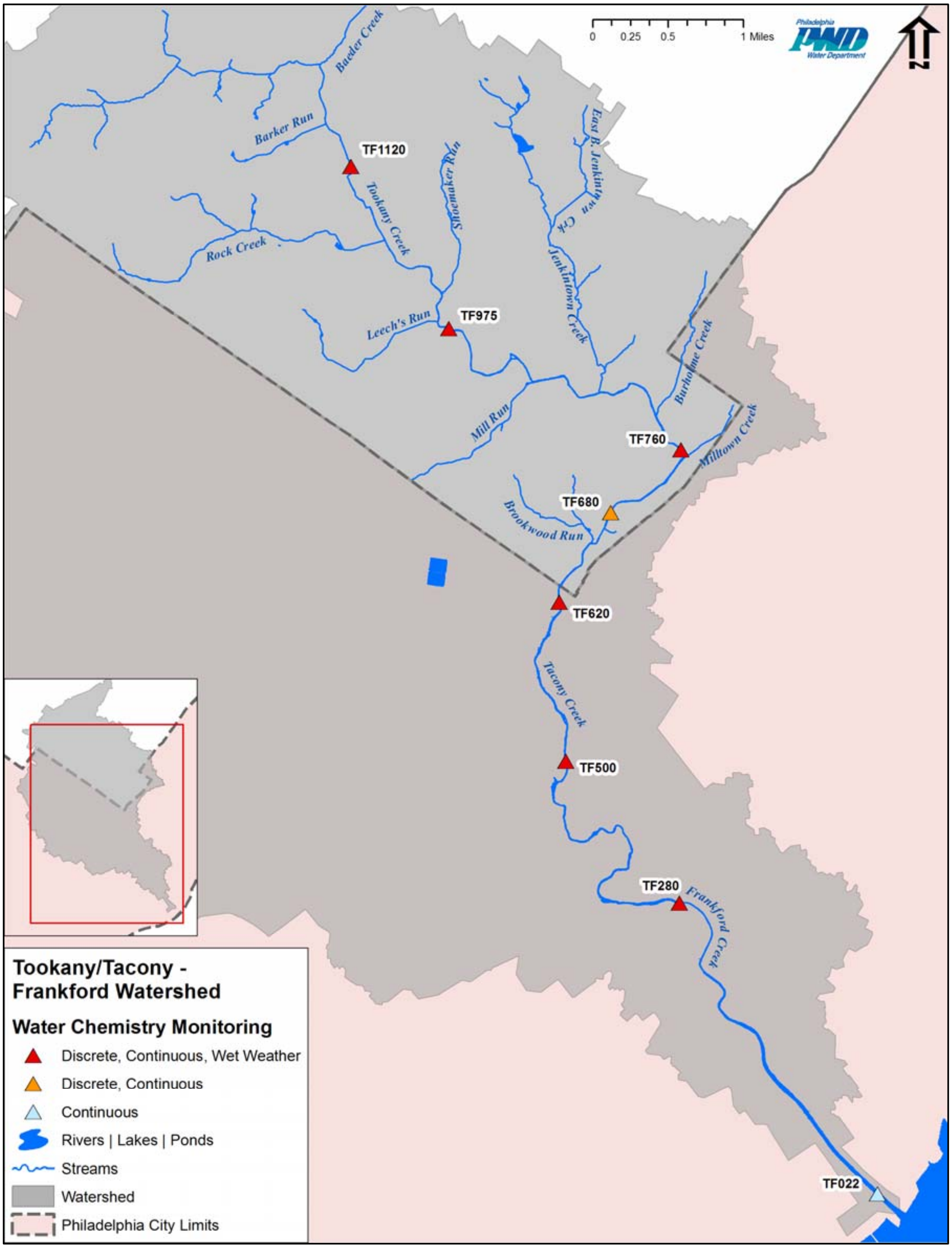

Figure - 8 Chemical monitoring locations in Tacony-Frankford Watershed

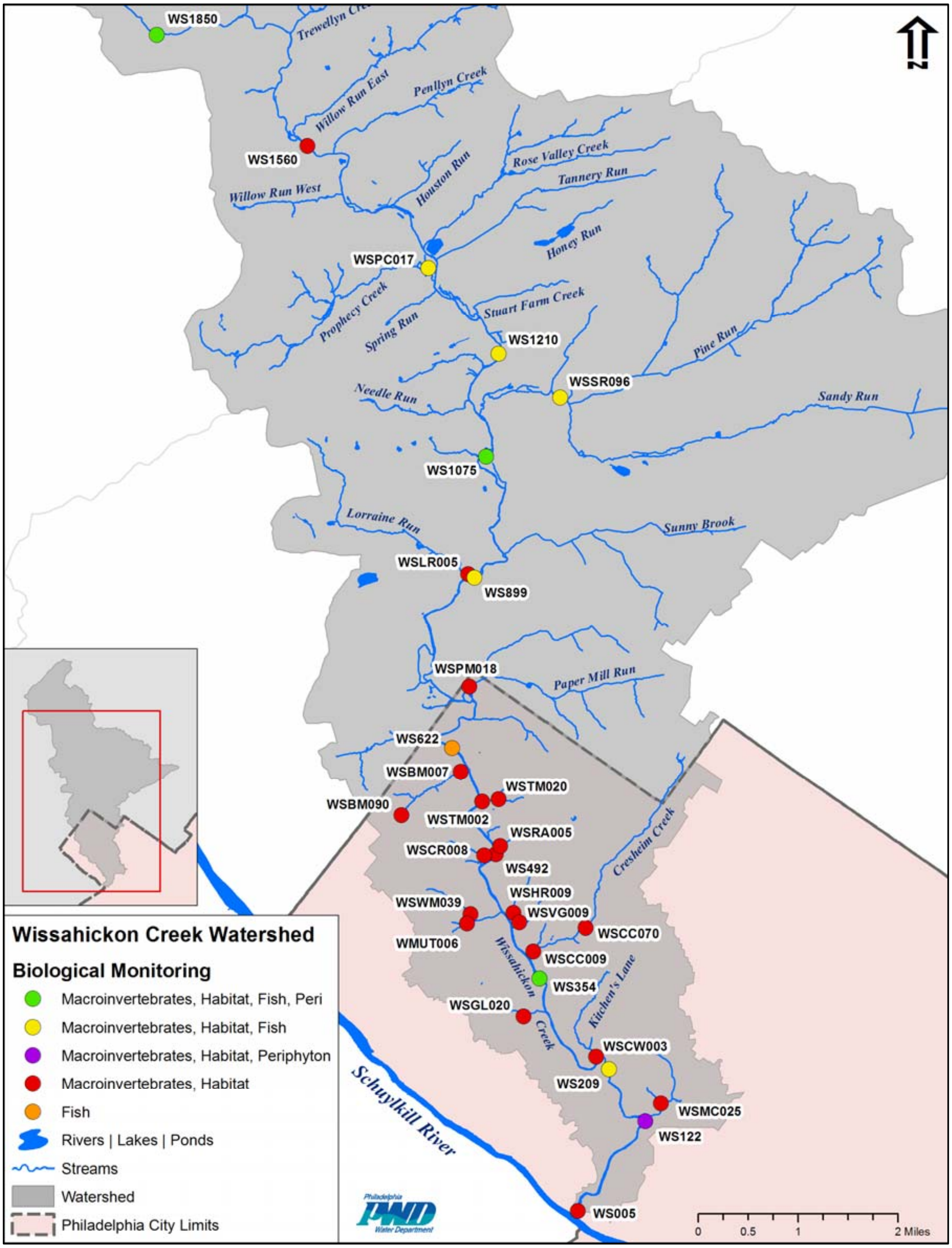

Figure - 9 Biological and Physical assessment locations in Wissahickon Watershed

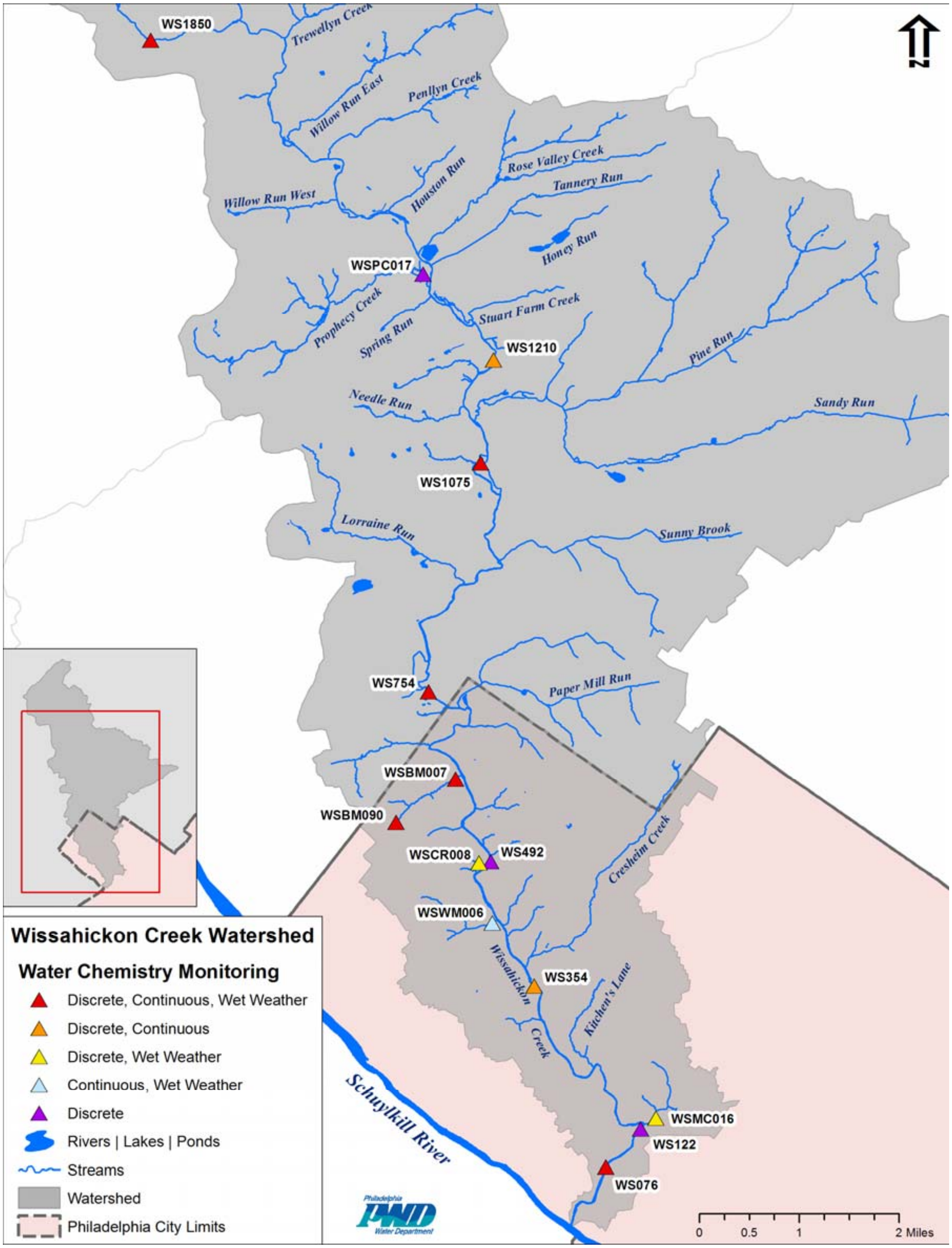

Figure - 10 Chemical monitoring locations in Wissahickon Watershed

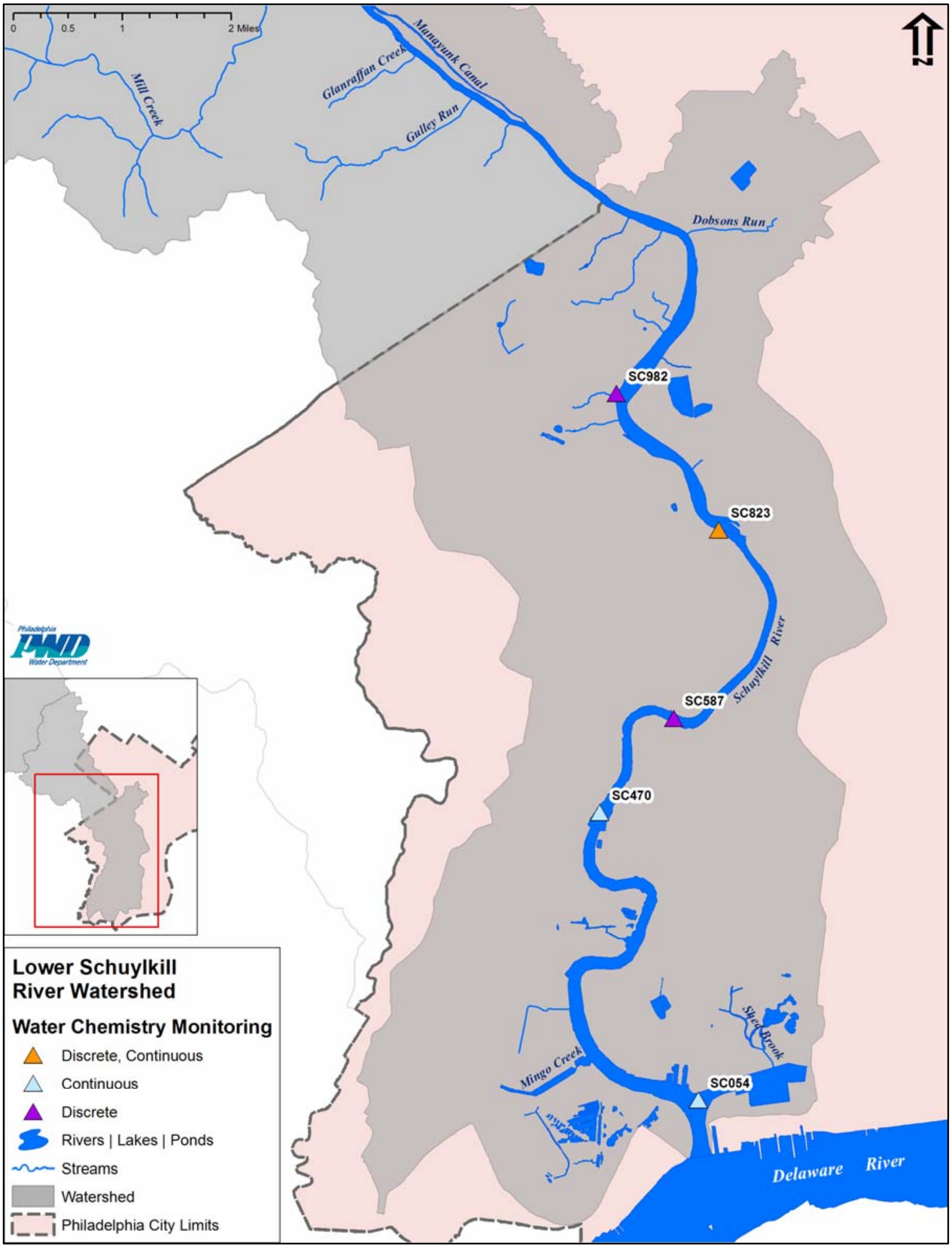

Figure - 11 Chemical monitoring locations in Lower Schuylkill River Watershed

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 L-
DEFECTIVE LATERAL GROUP FY 2011 ANNUAL REPORT

Defective Connections Group

Fiscal Year 2011 Annual Report

Reggie Williams

I. BACKGROUND INFORMATION

A. Phase I Stormwater Regulations

In 1990, the Environmental Protection Agency (EPA) promulgated Stormwater Regulations that required National Pollutant Discharge Elimination System (NPDES) permits for stormwater discharges from large (populations in excess of 250,000) and medium-sized (populations between 100,000 and 250,000) municipalities with separate storm sewer systems, (MS4)[1]. The City of Philadelphia with a 1990 population of 1.4 million was one of two NPDES Stormwater Phase I permittees in Pennsylvania. The other permittee was the City of Allentown.

B. NPDES Permit for Stormwater

The City of Philadelphia received its first NPDES Stormwater Permit under the 1990 Federal Regulations as issued by the Pennsylvania Department of Environmental Protection (PA DEP) in September 1995. This permit had a 5-year term. Among other requirements, the permit required the city to reduce stormwater based pollution of local streams, creeks and rivers, from (1) residential and commercial areas, (2) construction sites, (3) industrial sites and (4) defective lateral connections.

The renewal of the NPDES Stormwater Permit that expired in September 2000 was approved by the PA DEP in September 2005. The new permit provides for the same scope and requirements for the Defective Laterals Detection and Abatement Program as the previous permit and incorporates some provisions from the Consent Order and Agreement (COA) of July 1998 although the COA was successfully completed on March 18, 2004.

With the Water Department's internal reorganization and creation of the Office of Watersheds (OOW) in January 1999, the responsibilities numbered (1) through (3) above, along with the periodic reporting thereon was transferred to the OOW. The Defective Connections group continues to pursue the 4th objective of NPDES Permit, namely the detection of defective laterals that cause sanitary wastewater to be carried to the local streams and rivers. The Plumbing Repair Programs unit is responsible for abating the defective laterals detected.

II. DEFECTIVE LATERALS DETECTION AND ABATEMENT PROGRAM

A. Scope of Investigations

The MS4 impacts the areas of the city where there are two separate sewers in the street. The sanitary sewer system, which consists of a network of pipes of smaller diameter, carries domestic wastewater to the City's three Water Pollution Control Plants located in the Northeast, Southeast and Southwest sections. The storm sewer system consists of pipes of larger diameter but significantly shorter lengths and transports the stormwater to the nearest natural waterways. In general, the relatively newer sections of the city in the northeast, northwest and southwest are served by a MS4.

[1] Municipal Separate Storm Sewer System

Due to problems generally attributed to improper installation or lack of oversight during construction, sanitary wastewater from some properties can be transported into the storm sewers and from there, to the streams and rivers. This intrusion of sanitary wastewater causes pollution of the streams and rivers, which are the source of city's water supply. The polluted streams and rivers also endanger the physical health and safety of residents and users of the streams. The NPDES Permit requires the city to identify and abate the plumbing connections (defective laterals) that cause the sanitary wastewater to drain into the streams.

The investigations of stream pollution are triggered by the presence of a dry weather discharge from the storm sewer outfalls into the streams. There are over 400 stormwater outfalls in city's MS4 system of which some 200 have exhibited some dry weather flow.

It should be mentioned however, that not all dry weather discharge from an outfall comes from sanitary wastewater incursion; some may come from underground natural streams or from groundwater inflow. Additional testing of chemical and biochemical composition of samples collected from the outfalls determines whether or not stream pollution may be caused by defective laterals.

B. Outfall Sampling

A systematic sampling of the quality of dry weather flow from the 200 plus wet outfalls was performed in 1991 as part of the NPDES permit application process. This program attempted to document the amount of flow (gph) and in many cases, fecal coliform count (number of fecal colonies per ml of water). The outfall sampling results were updated in 1998 when additional observations of fluoride levels (mg/l) were included to provide some indication of the origin of water seen in the outfalls. This is based on the fact that the natural water coming from streams or ground water seepage does not contain any significant fluorides, but the City water contains 1.0 mg/l of fluorides.

The more likely outcomes of fluoride and fecal count analyses are interpreted as follows:

i. **High fluoride level with high fecal count:** possible intrusion of sanitary wastewater into the storm sewer
ii. **Low fluoride level with high fecal count:** possible transport of surface contamination in the non-domestic discharge
iii. **High fluoride with low fecal count**: possible water main leak

The Leak Detection unit is alerted when the condition listed at (iii) above is encountered.

As a part of the MS4 permit, all stormwater outfalls are to be inspected once every five years. If there is dry-weather flow present then the outfall is to be sampled and tested for fecal presence and fluoride levels. In addition, the priority outfalls of the watersheds where the current detection and abatement efforts are concentrated are to be sampled on a quarterly basis. Outfall inspections and sampling are handled by the Industrial Waste unit.

During FY2011, 43 outfall inspections were conducted and 43 samples were taken due to observed dry-weather flow as part of the Priority Outfall Sampling program. During FY2011, 79 outfall inspections were conducted and 39 samples were taken due to observed dry-weather flow as part of the Permit Inspection program. This work was completed by the Industrial Waste unit.

C. Field Screening

The object of field screening is to identify the areas in a sewershed that are suspected of contributing to stream pollution through defective laterals. The field screening begins systematically at an outfall that shows a dry weather flow[2].

Proceeding upstream from the outfall, the storm sewer manholes are successively opened and observed for the presence of flow. The term "**flow**" has been widened to include "**wet**" stormwater manholes on the assumption that the wetness was caused by earlier active flow. These observations are continued upstream along a specified sewer line and stop when a stormwater manhole no longer exhibits any flow or wetness. The field screening is then continued along another tributary sewer and eventually through the entire sewershed of the outfall.

D. Identification of Defective Laterals

1) Dye Tests

Dye testing is a process by which a cross-connected lateral at a property that carries sanitary wastewater to a storm sewer is identified.

(a) Initial Dye Test

Before a test is conducted, the fresh air inlets (FAIs) located at the curbside of the property are identified as being the sanitary or storm FAIs. The dye test protocol adopted by the City requires the presence of two properly functioning FAIs for successful initial tests. If one or no FAI is seen at a property or one or both of the FAIs are clogged or damaged, the initial dye test is aborted with a notation "**Inconclusive**".

During the initial dye test, a water-soluble fluorescent dye is placed in the fresh air inlets (FAIs). The dye is then washed down with water.

In the case of a **"Camera Assisted Dye Test"** the emergence of the dye is observed in the **storm sewer** by a closed circuit television camera positioned in the storm sewer in front of the stormwater lateral connection of the property. Possible observations include:

- (i) Green dye placed in storm FAI is seen in the storm sewer
- (ii) Green dye paced in storm FAI is not seen in the storm sewer
- (iii) Red dye placed in the sanitary FAI is seen in the storm sewer
- (iv) Red dye placed in the sanitary FAI is not seen in the storm sewer.

The above observations are interpreted as follows:

1) Combination of (i) and (ii): **Proper connection**
2) Combination of (i) and (iii): **Probable cross connection**
3) Combination of (ii) and (iv): **Inconclusive result**
4) Combination of (ii) and (iii): **Probable cross connection**

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[2] A dry weather flow is defined as one that is detected after an elapse of 72 hours of a continuous dry spell from the previous rainfall event.

In certain cases, the use of the closed circuit television camera is not possible. In such cases, the initial tests are conducted manually.

In a **"Manual Dye Test"**, a green dye placed in the storm FAI is drained and observed in the **storm sewer**. At the same time, a red dye is placed and drained in the sanitary FAI and observed in the **sanitary sewer**. If the green dye appears in the sanitary sewer, irrespective of the red dye's appearance in the storm sewer, the conclusion arrived at is "**Proper Connection**". If the green dye is not seen in the sanitary sewer, the test is repeated by placing and draining more dye from the sanitary FAI and observing its emergence in the **storm sewer**. This result signifies the presence of a "**Cross Connection**". All other combinations of observations in the Manual Dye Test are held to be "**Inconclusive**".

The initial dye tests, whether conducted manually or by a camera are intended to be least intrusive to the water customers. During these initial tests, no entry into the home is involved. In order to provide water for dye tests at the FAIs, field crews use portable water equipment. The Defective Connections group has two vehicles (Econoline vans) each retrofitted with 200 gallon water supply tanks.

(b) Confirmation Dye Test

A confirmation dye test is conducted in case of an Inconclusive test or a Possible cross connection. This test is conducted after a second notification to the customer has been sent. This test is **intrusive**; admission inside the home is required to conduct the testing.

The confirmation dye test is conducted **manually** by placing and flushing the fluorescent dye in household plumbing fixtures, such as a toilet. The emergence of the dye is then observed in the **sanitary sewer**.

If the dye does appear in the sanitary sewer, it is concluded that the property tested has a "**Proper Connection**." If on the other hand the dye from the household plumbing does not appear in the sanitary sewer, then and only then an observation is made in the storm sewer. The presence of the dye in the storm sewer confirms the existence of a "**Cross Connection.**"[3]

(c) Notification of Defect

When a confirmation dye test indicates that there exists a cross connection at the subject property, the property owner is advised that if the property qualifies as a residential property (with no more than 4 units in one of which the owner has his/her residence), the city will make repairs to the defective lateral(s) at no cost to the property owner. If later on it is discovered that the property does not fall within this category, the customer is informed by a follow up notice of his responsibility to repair the defect at their cost.

The Plumbing Repair Programs unit handles customer communications and is responsible for the abatement of these defects.

2) Customer Notifications

[3] This step was modified in CY2001 to conduct the tests from **all** plumbing fixtures, including any in the basement in order to identify the existence of an internal cross connection, where all fixtures but one are properly connected to the sanitary sewer, with one offending connection to the storm sewer.

(a) Initial Notification

The identification of the defective laterals begins after delineating the parts of a sewershed suspected of contributing dry weather flow to the MS4 system, after field screening. All property holders in the specified area receive an initial notification letter, generated through the Oracle-based DLS computer program. The notification provides an introduction of the program and requests the customer's cooperation in enabling dye tests at their property. A dye test is conducted after an initial notification is sent out to a customer. There are three possible outcomes of a dye test:

(i) A test is conducted and no cross connection is found. In this case, a result of "No Cross Connection" is entered in the database and the case is closed.

(ii) A test is conducted and it is concluded that there might exist a cross connection that results in the transport of sanitary wastewater into the storm sewer. This condition requires additional tests to confirm the existence of a cross connection.

(iii) A test cannot be conducted due to any of a variety of reasons, such as FAIs were not conclusively identified, were clogged, etc. This situation also warrants additional tests to conclude whether or not a cross connection exists.

(b) Confirmation Notification

In either of case (ii) or (iii) above, a follow up notification is sent out to the customer, informing them of the results of the previous attempt and requesting them to be available at a specified date for additional "Confirmation" tests at their property. Of course, if the date provided by the City is not suitable to the customer, they can schedule an alternative appointment that suits them.

Dye tests are then conducted at the property from within the customer's premises as described earlier. The results of the tests, (a) a Proper Connection or (b) a Cross Connection, are entered in the DLS computer program.

(c) Water Shutoff Notification

Not all dye tests are completed as a result of confirmation notifications. Some customers ignore the scheduled date and fail to make an alternative appointment. In such cases an informatory note is left at the property and a follow up attempt for tests is made. If this also results in no test, another notification is sent out informing the customer that if they do not make a firm appointment by a specified date (usually within two calendar weeks of the notification date), their water service would be scheduled to be turned off by the Customer Service unit. Of course if the customers do respond and make an appointment for dye tests, the service shutoff is withdrawn and tests are completed as soon as possible.

(d) Miscellaneous Closures

In some cases, where there was no response to dye test requests or water service shutoff notifications due to properties being vacant or abandoned, the cases were closed with a notation "**Miscellaneous Closure**". A miscellaneous closure is activated because of any of the following reasons:

- No active water service to the premises

- Property abandoned, empty or unoccupied
- No billing to the property per Revenue Department
- No sewer connection

From time to time, the miscellaneously closed accounts are revisited. If we find that the reason that caused the account to be originally closed is no longer valid, a dye test is conducted and the property is then re-classified according to the test results.

III. PRIORITY OUTFALLS

During FY2011, the emphasis of the Defective Laterals Detection and Abatement program has been on outfalls on the Priority Outfall List. The Priority Outfall List ranks all outfalls sampled with dry-weather flow based on a preset formula that includes the fecal coliform results, the estimated volume of flow, whether the outfall discharges to a drinking water source water, and a complaint factor. The Priority Outfall List is periodically updated based on the results of the (Permit) Outfall Inspection and Sampling Program described earlier.

IV. SUMMARY OF DYE TESTS AND ABATEMENTS

Table 1 provides a summary of the work performed in detecting and abating defective laterals. It shows the cumulative numbers since the inception of the project in 1994, and the progress that was attained during FY2011.

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Table 1.
Updated Progress on Dye Tests in Philadelphia MS4 Area

	Since Inception of the Program	**During Fiscal 2011**
Dye Tests Initiated	45,236	4,250
No Cross Connections Found	43,080	4,171
Cross Connections Identified	1,137	69
Completed Tests	44,217	4,240
Abatements Completed	1,119	83

Of the 83 abatements above, 74 were residential properties. The cost for these abatements was $ 496,100.50. Additionally, 9 commercial properties were abated at a cost of $ 31,884.00.

V. MISCELLANEOUS

Estimates of Pollution Removed

The following data provides a rough measure of the effectiveness of the Defective Connections group's positive contribution to improving the local environment:

- Number of Cross Connections Abated
  Since Inception of the Program 1,119

During FY2011	83

- Estimated gallons of Polluted Water Prevented from entering the stormwater outfalls[4]

Since Inception of the Program	157.2 million gallons per year
During FY2011	11.7 million gallons per year

VI. STAFF LEVELS

Because of the high priority assigned to the Defective Connections group, the availability of manpower is extremely important. The sanctioned personnel for the unit is as follows:

One **Water Conveyance Supervisor**

Two **Field Representative Supervisors**

Four **Science Technicians / SM Crew Chief Is**
One position vacant (since 10/12/07)

Eight **Utility Representatives**
One position vacant (since 10/17/08)
One position vacant (since 4/18/11)

One **Clerk Typist II**

The above field and office staffs are organized under the Water Conveyance Supervisor. This position is responsible for all aspects of the unit. The two Field Representative Supervisors are each responsible for two field crews, four crews in all. Each crew is led by a Science Technician / SM Crew Chief I and has two Utility Representatives.

In addition to the field staff, the Defective Connections group has the following position which provides general support:

Clerk Typist II: The CT II handles the intricacies of the DLS database, creation of various correspondences related to dye tests, and follows-up with the field staff.

The CT II also handles a variety of communications with the customers, makes appointments, and follows-up with delinquent customers. They also maintain the record of water shutoff warnings and miscellaneous closures.

At the end of FY2011, 13 of the 16 approved positions in the Defective Connections group were filled.

[4] Based on an average use of 110 gallons per capita per day, over a family size of 3.5 persons.

APPENDIX M-
DEFECTIVE LATERAL GROUP QUARTERLY REPORTS

Page

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from July 1, 2010 to September 30, 2010)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

November 14, 2010

DLC Program Update
3rd Quarter 2010

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, 2010 and ending September 30, 2010.

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 2,829 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Six (6) 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.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	10	3	0
CFD-02	10	7	0
CFD-03	10	6	0
CFD-04	8	0	0
CFD-05	8	3	0
CFD-06	10	0	0

On June 30, 2010, the PWD installed and activated two new Sanitary Diversion Valves upstream of stormwater outfall T-088-01. The first SDV is located in existing manhole #T-088-01-S0215 on West Cheltenham Avenue between Oak Lane and 7th Street. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 54 inch diameter storm sewer, to the existing 15 inch diameter sanitary sewer located under it. The second SDV is located in existing manhole #T-088-01-S0270 on 7th Street just south of West Cheltenham Avenue. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 36 inch diameter storm sewer, to the existing 12 inch diameter sanitary sewer located under it.

The two (2) new sites intercepting flow are listed below.

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-07	59	11	0
CFD-08	58	0	0

The most recent fecal sample value was 830 fecal colonies per 100 ml. at the outfall on September 16, 2010.

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	1	0
MFD-02	7	0	0

The most recent fecal sample value was 200 fecal colonies per 100 ml. at the outfall on September 20, 2010.

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 2,742 Complete tests in these sewershed areas, identifying 92 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 4800 fecal colonies per 100 ml. at the W-068-05 outfall on September 20, 2010.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,444 Complete tests in these sewershed areas, identifying 59 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 260 fecal colonies per 100 ml. at the S-058-01 outfall, 4200 fecal colonies per 100 ml. at the S-059-01 outfall, >20000 fecal colonies per 100 ml. at the S-059-02 outfall, 3500 fecal colonies per 100 ml. at the S-059-03 outfall, >20000 fecal colonies per 100 ml. at the S-059-04 outfall, 4700 fecal colonies per 100 ml. at the S-059-05 outfall, 3100 fecal colonies per 100 ml. at the S-059-09 outfall, all on September 15, 2010.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

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	9	0	0

2. Franklin and Hasbrook Outfall (T-089-04)

A Sanitary Diversion Valve (SDV) was installed over the existing east 3'-0" x 6'-6" twin concrete storm water sewers in Franklin Avenue and activated on October 29, 2009. The new SDV diverts all existing dry weather sanitary flow from the storm sewer that previously drained into Outfall T-089-04, to the existing sanitary sewer located under it.

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	62	1	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-091-01	260	7	1
P-091-06	52	(1)	2
P-091-08	27	0	1
P-091-10	1	0	1
P-100-08	1	0	1
P-100-17	2	1	1
P-101-01	28	1	1
P-104-07	0	0	2
P-108-03	59	0	0
P-108-14	59	1	1
P-108-24	11	0	0
P-112-04	1	0	1
Q-101-09	(1)	(1)	0
Q-101-10	6	1	0
Q-106-18	77	2	0
Q-110-15	303	3	0
Q-121-05	92	0	0
S-046-06	(2)	(2)	(2)
T-01	0	1	1
W-077-01	32	2	3

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 priority 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 priority 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 priority 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-091-01
- P-091-06
- P-091-08
- P-091-10
- P-091-11

- P-100-21
- P-104-06
- P-105-01
- P-105-06
- Q-101-10
- Q-106-18
- Q-110-15
- S-046-06
- S-052-04

4. Continue to perform property testing within the following outfalls.

- P-100-05
- P-108-24
- Q-110-06
- Q-114-12
- Q-121-05

Table 1
DLC Program Summary
July 1, 2010 to September 30, 2010

Complete Tests:

- 40,985 Complete tests have been performed under the DLC program
- **1008 Complete tests were performed this past quarter**
- 260 Complete tests were performed in outfall P-091-01
- 52 Complete tests were performed in outfall P-091-06
- 27 Complete tests were performed in outfall P-091-08
- 1 Complete test was performed in outfall P-091-10
- 1 Complete test was performed in outfall P-100-08
- 2 Complete tests were performed in outfall P-100-17
- 28 Complete tests were performed in outfall P-101-01
- 59 Complete tests were performed in outfall P-108-03
- 59 Complete tests were performed in outfall P-108-14
- 11 Complete tests were performed in outfall P-108-24
- 1 Complete test was performed in outfall P-112-04
- (1) Complete test was performed in outfall Q-101-09
- 6 Complete tests were performed in outfall Q-101-10
- 77 Complete tests were performed in outfall Q-106-18
- 303 Complete tests were performed in outfall Q-110-15
- 92 Complete tests were performed in outfall Q-121-05
- (2) Complete tests were performed in outfall S-046-06
- 32 Complete tests were performed in outfall W-077-01

Cross-Connections Found:

- 1,083 Cross-connections have been identified under the DLC program
- **15 Cross-connections were identified this past quarter**
- 7 Cross-connections were identified in outfall P-091-01
- (1) Cross-connection was identified in outfall P-091-06
- 1 Cross-connection was identified in outfall P-100-17
- 1 Cross-connection was identified in outfall P-101-01
- 1 Cross-connection was identified in outfall P-108-14
- (1) Cross-connection was identified in outfall Q-101-09
- 1 Cross-connection was identified in outfall Q-101-10
- 2 Cross-connections were identified in outfall Q-106-18
- 3 Cross-connections were identified in outfall Q-110-15
- (2) Cross-connections were identified in outfall S-046-06
- 1 Cross-connection was identified in outfall T-01
- 2 Cross-connections were identified in outfall W-077-01

Abatements:

- 1,049 Abatements have been performed under the DLC program
- **14 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-091-01
- 2 Abatements were performed in outfall P-091-06
- 1 Abatement was performed in outfall P-091-08
- 1 Abatement was performed in outfall P-091-10
- 1 Abatement was performed in outfall P-100-08
- 1 Abatement was performed in outfall P-100-17
- 1 Abatement was performed in outfall P-101-01
- 2 Abatements were performed in outfall P-104-07
- 1 Abatement was performed in outfall P-108-14
- 1 Abatement was performed in outfall P-112-04
- (2) Abatements were performed in outfall S-046-06
- 1 Abatement was performed in outfall T-01
- 3 Abatements were performed in outfall W-077-01

Outfall/Manhole Screening and Sampling:

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 11 outfall samples were taken due to observed dry-weather flow during the above inspections

- 70 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 31 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, 2010 to September 30, 2010

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	9/16/2010	11:55	Outfall: 7th & Cheltenham	84		0.39	830	
T-088-01	9/16/2010	12:00	Outfall: 7th & Cheltenham @ Bridge	84		0.38	800	
W-060-01	9/20/2010	11:00	Outfall: Monastery Lane	5'-0"x4'-4"		0.20	200	
W-068-05	9/20/2010	11:40	Outfall: Lincoln & Morris	90		0.46	4800	
S-058-01	9/15/2010	10:45	Outfall: Domino Lane	54		0.36	260	
S-059-01	9/15/2010	11:00	Outfall: Parker	60		<.2	4200	
S-059-02	9/15/2010	11:15	Outfall: Fountain	42		0.44	>20000	
S-059-03	9/15/2010	11:25	Outfall: Wright	42		<.2	3500	
S-059-04	9/15/2010	11:40	Outfall: Leverington	51		0.25	>20000	
S-059-05	9/15/2010	11:45	Outfall: Leverington (east)	4'-0"x2'-8"		0.39	4700	
S-059-09	9/15/2010	12:05	Outfall: Green Lane	36		0.95	3100	
B. Permit Inspection Program								
C-032-01	7/12/2010	13:30	Outfall: Intersection of Haverford Ave & 69th St	54	NF	N/A	N/A	
C-032-02	7/1/2010	11:30	Outfall: NE of Pennwood & Brockton Sts	18	30	<0.2	3000	
M-002-01	7/16/2010	10:45	Outfall: Mingo Creek	48	NA	N/A	N/A	No access
M-002-02	7/16/2010	10:46	Outfall: Mingo Creek	48	NA	N/A	N/A	No access
M-002-03	7/16/2010	10:47	Outfall: Mingo Creek	66	NA	N/A	N/A	No access
M-002-04	7/16/2010	10:48	Outfall: Mingo Creek	54	NA	N/A	N/A	No access
M-005-01	7/16/2010	11:30	Outfall: Enterprise Ave & Southwest WPCP	66	NA	<0.2	28000	Sampled from creek
M-005-02	7/16/2010	10:40	Outfall: Enterprise Ave & Southwest WPCP	8'-0"x8'-0"	NA	<0.2	4000	Sampled from creek
M-005-03	7/16/2010	11:25	Outfall: Mingo Creek	Unk	NA	N/A	N/A	No access
P-091-08	7/1/2010	10:35	Outfall: NW of Rowland & Hartel Aves	54	60	0.22	<10	
P-091-11	7/1/2010	11:00	Outfall: E of Wintrop & Draper Sts	30	60	0.73	>20000	
P-104-08	7/9/2010	12:05	Outfall: S of Krewstown Rd & Rising Sun Ave	36	NF	N/A	N/A	
P-104-10	7/12/2010	11:20	Outfall: N of Bustleton & Benton Aves	36	NF	N/A	N/A	
P-104-11	7/9/2010	12:25	Outfall: Ridgerun & Parkhollow Lanes	18	60	<0.2	600	
P-105-07	7/8/2010	11:33	Outfall: NW of Grant Ave & Ashton Rd	48	180		13000	
P-105-08	7/6/2010	11:00	Outfall: NW of Grant Ave & Ashton Rd	36	600	0.90	<10	

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
July 1, 2010 to September 30, 2010

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
P-105-09	7/6/2010	11:20	Outfall: SE of Grant Ave & Blue Grass Rd	21	NF	N/A	N/A	
P-105-10	7/8/2010	10:56	Outfall: SE of Grant Ave & Blue Grass Rd	24	NF	N/A	N/A	
P-105-11	7/8/2010	12:15	Outfall: N of Blue Grass Rd & Grant Ave	36	NF	N/A	N/A	
P-105-12	7/8/2010	12:53	Outfall: N of Blue Grass Rd & Grant Ave	42	NF	N/A	N/A	
P-105-13	7/8/2010	13:40	Outfall: NE of Blue Grass Rd & Grant Ave	6'-0"x11'-11"	600		900	
P-108-03	7/1/2010	11:55	Outfall: SW of Millwood Rd & Alicia St	48	30	0.94	>20000	
P-108-08	7/7/2010	9:50	Outfall: N of Kings Oak Ln North	42	NF	N/A	N/A	
P-108-09	7/6/2010	11:45	Outfall: NE of Darlington Rd & Grace Ln	36	NF	N/A	N/A	
P-108-11	7/6/2010	11:00	Outfall: SE of Darlington Rd & Stratford Dr	60	30	0.48	>20000	
P-108-15	7/9/2010	11:20	Outfall: E of Verree & Marchman Rds	36	15	0.58	5600	
P-108-18	7/6/2010	10:35	Outfall: NW of Welsh Rd & Walley Ave	36	NF	N/A	N/A	
P-108-19	7/7/2010	11:25	Outfall: Walley Ave & Twist Rd	36	NF	N/A	N/A	
P-108-20	7/6/2010	10:00	Outfall: Northeast Ave & Fulmer St.	60	30	0.14	520	
P-108-21	7/6/2010	10:10	Outfall: W of Northeast Ave & Fulmer St.	60	30	0.16	3000	
P-108-22	7/7/2010	10:45	Outfall: W of Redd Rambler Tr & Dr	18	NF	N/A	N/A	
P-108-23	7/7/2010	11:05	Outfall: W of Redd Rambler Dr & Oakfield La	36	NF	N/A	N/A	
P-108-24	7/7/2010	10:15	Outfall: S of Verree Rd & Pine Hill Ave	60	480	0.79	3500	
P-109-04	8/20/2010	10:20	Outfall: NW of Bustleton & Haldeman Aves	54	300	0.83	636	Manhole at Einstein Medical Center
P-113-01	7/12/2010	11:50	Outfall: SE of Red Lion Rd & Northeast Ave	60	60	0.28	5200	
P-113-02	7/12/2010	11:55	Outfall: SE of Red Lion Rd & Northeast Ave	27	NF	N/A	N/A	
P-113-03	7/12/2010	12:15	Outfall: SE of Northeast Ave & Gorman Sts	36	30	0.74	>200000	
P-113-05	7/9/2010	12:50	Outfall: NW of Red Lion Rd & Bustleton Ave	18	NF	N/A	N/A	
P-113-06	7/12/2010	12:25	Outfall: NE of Northeast Ave & Gorman St	42	120	0.79	10000	
P-113-07	7/9/2010	12:55	Outfall: NW of Red Lion Rd & Bustleton Ave	60	180	<0.2	700	
P-113-08	9/1/2010	11:40	Outfall: Verree Rd & Greymont St.	6'-0"x9'-5"	20			
P-113-12	7/12/2010	12:30	Outfall: NW of Red Lion Rd & Bustleton Ave	18	NF	N/A	N/A	
P-113-13	7/12/2010	12:35	Outfall: NW of Red Lion Rd & Bustleton Ave	21	NF	N/A	N/A	
P-116-02	7/27/2010	11:45	Outfall: Rennard St @ Pumping Station	54	NF	N/A	N/A	
Q-101-11	8/4/2010	10:30	Outfall: SE Grant & Torresdale Aves	36	NF	N/A	N/A	
Q-101-12	7/9/2010	12:35	Outfall: SE Grant & Torresdale Aves	18	NF	N/A	N/A	
Q-113-10	8/20/2010	10:40	Outfall: E of Foster & Dedaker Sts	27	1	1.02	>200000	Sampled from manhole
Q-118-04	7/23/2010	11:10	Outfall: W of McNulty & Southampton Rds	21	NF	N/A	N/A	
Q-119-03	8/11/2010	11:55	Outfall: Meetinghouse & McNulty Rds	36	NF	N/A	N/A	
S-046-08	7/7/2010	11:35	Outfall: NW of City Line Ave & Presidential Blvd	54	NF	N/A	N/A	

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
July 1, 2010 to September 30, 2010

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
S-051-01	7/7/2010	11:20	Outfall: 3798 Main St	36	NF	N/A	N/A	
T-050-01	7/1/2010	10:45	Outfall: N of Delaware Ave & Lewis St	42	NF	N/A	N/A	
T-050-01	7/27/2010	13:15	Outfall: N of Delaware Ave & Lewis St	42	NF	N/A	N/A	
T-050-02	7/1/2010	11:00	Outfall: SW of Bath & Hedley Sts	48	NF	N/A	N/A	
T-050-02	8/4/2010	13:00	Outfall: SW of Bath & Hedley Sts	48	NF	N/A	N/A	
T-056-05	7/1/2010	11:40	Outfall: N of Luzerne & Almond Sts	66	NF	N/A	N/A	
T-056-07	7/1/2010	11:10	Outfall: SE of Richmond & Roxborough Sts	36	NF	N/A	N/A	
T-056-08	7/1/2010	11:15	Outfall: SW of Richmond & Roxborough Sts	36	NF	N/A	N/A	
T-063-01	7/6/2010	14:40	Outfall: SW of Whitaker Ave & Pennway St	18	NF	N/A	N/A	
T-063-04	7/6/2010	14:15	Outfall: Wingohocking & Frogmoor Sts	Unk	NF	N/A	N/A	
T-080-01	7/9/2010	13:20	Outfall: SE of Tookany Creek Pkwy & Levick St	42	30	<0.2	330	
T-080-03	8/4/2010	11:32	Outfall: SW of Newtown Ave & Van Kirk St	30	NF	N/A	N/A	
W-060-05	7/9/2010	10:40	Outfall: Forbidden Drive & Rittenhouse St	48	300	<0.2	100	
W-067-06	7/21/2010	9:50	Outfall: Mt. Airy Ave & Blue Bell Tr	36	1500	0.51	<100	
W-068-06	7/21/2010	10:25	Outfall: SE Wayne & North Mt. Pleasant Aves	36	60	0.89	700	
W-076-08	7/27/2010	7:20	Outfall: SW of Davidson Rd & McCallum St	18	60	<0.2	100	
W-077-01	7/16/2010	10:45	Outfall: NW of Elmen St & Cresheim Rd	48	300	0.76	47000	
W-077-02	7/21/2010	9:15	Outfall: Cresheim Valley & Lincoln Drives	66	6000	0.51	171000	
W-084-01	7/23/2010	11:15	Outfall: SW of Bells Mill Rd & Forbidden Dr	36	600	<0.2	2000	
W-084-02	7/23/2010	10:40	Outfall: NE of Bells Mill Rd & Lykens La	48	180	0.82	>200000	

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
00803 Bergen St	P-104-07	08-12-2009		07-20-2010	
03301 Welsh Rd	P-091-10	11-23-2009		08-12-2010	
03523 Primrose Rd	Q-101-05	12-05-2009		04-05-2010	
08062 Crispin St	P-091-10	01-09-2010		06-04-2010	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments
03513 Indian Queen La	S-052-04	06-10-2004		Was never referred to Program. Dye tests were never confirmed.
02615 W Allegheny Ave	S-046-06	05-31-2006		Inspection pending.
05400 Archer St	S-046-06	06-15-2006		Property in non bill status, may be vacant. Sold to a bank
00425 W Abbottsford Ave	S-046-06	06-24-2006		Inspection pending
05054 Mc Kean Ave	S-046-06	09-26-2006		Inspection pending
03264 N Marston St	S-046-06	12-15-2006		
09390 Neil Rd	P-105-06	05-31-2008		
09514 Clark St	P-105-01	06-19-2009		
01112 Bloomfield Ave	P-104-06	07-29-2009		
03165 Draper St	P-091-11	09-19-2009		
08053 Cresco Ave	P-091-10	11-23-2009		
09317 Cloverly Rd	P-100-21	01-14-2010		
02322 Strahle St	P-091-06	05-22-2010		

Table 4
Spills to Storm Sewers and/or Receiving Waters
July 1, 2010 to September 30, 2010

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
08/04/10	P-105-12	Blue Grass Road and Grant Avenue Wooden Bridge Run	3009	Sewage	08/05/10	Sewer Maintenance unit flushed 15" diameter sanitary sewer to relieve choke (grease) after notification from the PA DEP.
08/05/10	P-108-24	800 Pine Hill Road Paul's Run	3009	Sewage	08/11/10	Industrial Waste unit investigated a reported sewage discharge. No choked sewer identified. Area referred to Defective Connections group for further investigation.
08/07/10	Q-110-06	Academy and Amity Roads Walton Run	3011	Sewage	08/07/10	Sewer Maintenance unit flushed 12" diameter sanitary sewer to relieve choke causing approximate 2 gpm discharge from manhole #Q110-06-S0020 to DRW after notification from the Industrial Waste unit. Affected area cleaned.
08/19/10	S-052-05	Ridge and Rochelle Avenues Schuylkill River		Sewage	08/19/10	Sewer Maintenance unit initiated bypass pumping then flushed 8" diameter sanitary sewer to relieve choke causing approximate 0.02 gpm discharge from manhole #S052-05-S0035 to ground. Debris removed from manhole invert. Affected area cleaned.
09/02/10		9823 Verree Road Paul's Run		Sewage	09/02/10	Industrial Waste unit investigated a reported sewage discharge from a nearby 36" diameter pipe. No active discharge or evidence of a past discharge observed.
09/08/10	S-052-05	5100 Rochelle Avenue Schuylkill River	3009	Sewage	09/08/10	Sewer Maintenance unit flushed 10" diameter sanitary sewer to relieve choke causing approximate 0.1 gpm discharge through nearby storm inlet.
09/09/10	S-046-05	Neill Drive Pumping Station - 4000 Neil Drive Schuylkill River	3011	Sewage	09/10/10	Flow Control unit discovered approximate 30 gpm sewage discharge to ground surface through defective coupling on 16" diameter force main. Sewer Maintenance unit initiated bypass pumping to manhole #S046-05-S0010 while Distribution unit excavated to make repairs. Affected area cleaned.
09/24/10		Winchester Avenue and Axe Factory Road Pennypack Creek		Sewage	09/24/10	Industrial Waste and Sewer Maintenance units investigated a report of sewage seeping to ground surface in nearby park land. Sewage currently being channeled into sewer system. No discharge to creek at this time. PWD will next conduct records research in effort to identify source.

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, 2010 to December 31, 2010)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

February 11, 2011

DLC Program Update
4th Quarter 2010

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, 2010 and ending December 31, 2010.

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 2,829 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Six (6) 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.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	14	1	0
CFD-02	12	6	0
CFD-03	10	3	0
CFD-04	12	2	0
CFD-05	10	2	0
CFD-06	9	0	0

On June 30, 2010, the PWD installed and activated two new Sanitary Diversion Valves upstream of stormwater outfall T-088-01. The first SDV is located in existing manhole #T-088-01-S0215 on West Cheltenham Avenue between Oak Lane and 7th Street. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 54 inch diameter storm sewer, to the existing 15 inch diameter sanitary sewer located under it. The second SDV is located in existing manhole #T-088-01-S0270 on 7th Street just south of West Cheltenham Avenue. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 36 inch diameter storm sewer, to the existing 12 inch diameter sanitary sewer located under it.

The two (2) new sites intercepting flow are listed below.

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-07	63	4	0
CFD-08	61	3	0

The most recent fecal sample value was 280 fecal colonies per 100 ml. at the outfall on December 21, 2010.

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	8	0	0
MFD-02	8	0	0

The most recent fecal sample value was 200 fecal colonies per 100 ml. at the outfall on September 20, 2010.

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 2,743 Complete tests in these sewershed areas, identifying 93 Cross-connections, all but one 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 4800 fecal colonies per 100 ml. at the W-068-05 outfall on September 20, 2010.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,444 Complete tests in these sewershed areas, identifying 59 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 <100 fecal colonies per 100 ml. at the S-058-01 outfall, 6300 fecal colonies per 100 ml. at the S-059-01 outfall, 40000 fecal colonies per 100 ml. at the S-059-02 outfall, 1200 fecal colonies per 100 ml. at the S-059-03 outfall, 7000 fecal colonies per 100 ml. at the S-059-04 outfall, 1300 fecal colonies per 100 ml. at the S-059-05 outfall, 1200 fecal colonies per 100 ml. at the S-059-09 outfall, all on November 30, 2010.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

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	9	0	0

2. Franklin and Hasbrook Outfall (T-089-04)

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	62	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	(1)	0	0
P-091-01	4	0	6
P-091-06	1	0	4
P-091-08	0	0	1
P-091-10	0	0	2
P-100-05	8	0	0
P-100-06	44	4	0
P-100-08	1	0	0
P-100-21	0	0	1
P-104-06	0	0	1
P-105-01	0	0	1
P-105-06	0	0	1
P-108-03	14	1	0
P-108-24	114	1	0
P-109-01	(7)	0	0
Q-101-10	0	0	1
Q-106-18	2	0	2
Q-106-21	(4)	0	0
Q-110-06	107	2	0
Q-110-15	12	0	3
Q-114-12	312	3	1
Q-115-09	1	0	0
Q-115-12	62	0	0
Q-121-05	186	2	2
S-046-06	0	0	3

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 priority 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 priority 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 priority 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-091-01
- P-091-08
- P-091-11
- P-100-06
- P-104-06

- P-108-03
- P-108-24
- Q-110-06
- Q-114-12
- S-046-06
- S-052-04
- W-068-05

4. Continue to perform property testing within the following outfalls.

- P-091-01
- Q-113-09
- Q-115-12

Table 1
DLC Program Summary
October 1, 2010 to December 31, 2010

Complete Tests:

- 41,842 Complete tests have been performed under the DLC program
- **857 Complete tests were performed this past quarter**
- (1) Complete test was performed in outfall P-090-02
- 4 Complete tests were performed in outfall P-091-01
- 1 Complete test was performed in outfall P-091-06
- 8 Complete tests were performed in outfall P-100-05
- 44 Complete tests were performed in outfall P-100-06
- 1 Complete test was performed in outfall P-100-08
- 14 Complete tests were performed in outfall P-108-03
- 114 Complete tests were performed in outfall P-108-24
- (7) Complete tests were performed in outfall P-109-01
- 2 Complete tests were performed in outfall Q-106-18
- (4) Complete tests were performed in outfall Q-106-21
- 107 Complete tests were performed in outfall Q-110-06
- 12 Complete tests were performed in outfall Q-110-15
- 312 Complete tests were performed in outfall Q-114-12
- 1 Complete test was performed in outfall Q-115-09
- 62 Complete tests were performed in outfall Q-115-12
- 186 Complete tests were performed in outfall Q-121-05
- 1 Complete test was performed in outfall W-068-05

Cross-Connections Found:

- 1,097 Cross-connections have been identified under the DLC program
- **14 Cross-connections were identified this past quarter**
- 4 Cross-connections were identified in outfall P-100-06
- 1 Cross-connection was identified in outfall P-108-03
- 1 Cross-connection was identified in outfall P-108-24
- 2 Cross-connections were identified in outfall Q-110-06
- 3 Cross-connections were identified in outfall Q-114-12
- 2 Cross-connections were identified in outfall Q-121-05
- 1 Cross-connection was identified in outfall W-068-05

Abatements:

- 1,078 Abatements have been performed under the DLC program
- **29 Abatements were performed this past quarter**
- 6 Abatements were performed in outfall P-091-01
- 4 Abatements were performed in outfall P-091-06
- 1 Abatement was performed in outfall P-091-08
- 2 Abatements were performed in outfall P-091-10
- 1 Abatement was performed in outfall P-100-21
- 1 Abatement was performed in outfall P-104-06
- 1 Abatement was performed in outfall P-105-01
- 1 Abatement was performed in outfall P-105-06
- 1 Abatement was performed in outfall Q-101-10
- 2 Abatements were performed in outfall Q-106-18
- 3 Abatements were performed in outfall Q-110-15
- 1 Abatement was performed in outfall Q-114-12
- 2 Abatements were performed in outfall Q-121-05
- 3 Abatements were performed in outfall S-046-06

Outfall/Manhole Screening and Sampling:

- 9 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 9 outfall samples were taken due to observed dry-weather flow during the above inspections

- 2 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 2 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
October 1, 2010 to December 31, 2010

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	12/21/2010	10:30	Outfall: 7th & Cheltenham	84		0.31	280	
T-088-01	12/21/2010	10:35	Outfall: 7th & Cheltenham @ Bridge	84		0.32	270	
S-058-01	11/30/2010	9:05	Outfall: Domino Lane	54		0.39	<100	
S-059-01	11/30/2010	9:25	Outfall: Parker	60		<.2	6300	
S-059-02	11/30/2010	9:40	Outfall: Fountain	42		0.90	40000	
S-059-03	11/30/2010	9:50	Outfall: Wright	42		<.2	1200	
S-059-04	11/30/2010	10:00	Outfall: Leverington	51		0.43	7000	
S-059-05	11/30/2010	10:05	Outfall: Leverington (east)	4'-0"x2'-8"		0.40	1300	
S-059-09	11/30/2010	10:20	Outfall: Green Lane	36		1.00	1200	
B. Permit Inspection Program								
P-108-16	11/23/2010	10:15	Outfall: Welsh & Alburger	54	30	0.88	89000	
P-108-17	11/23/2010	10:25	Outfall: Welsh & Alburger	42	30	0.48	72000	

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
05400 Archer St	S-046-06	06-15-2006		12-23-2010	Property in non bill status, may be vacant. Sold to a bank
00425 W Abbottsford Ave	S-046-06	06-24-2006		11-03-2010	Inspection pending
03264 N Marston St	S-046-06	12-15-2006		12-09-2010	
01108 Rising Sun Pl	P-104-06	07-17-2009		10-05-2010	
03301 Welsh Rd	P-091-10	11-23-2009		08-12-2010	
02322 Strahle St	P-091-06	05-22-2010		11-03-2010	
02326 Strahle St	P-091-06	05-22-2010		10-12-2010	
03214 Fuller St	P-091-10	06-07-2010		11-09-2010	
02723 Solly Ave	P-091-06	06-16-2010		10-15-2010	
07442 Brous Ave	P-091-01	06-17-2010		10-18-2010	
07424 Brous Ave	P-091-01	06-21-2010		11-18-2010	
03301 Chippendale Ave	P-091-08	06-22-2010		10-28-2010	
11933 Alberta Dr	Q-110-15	07-31-2010		12-17-2010	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments
03513 Indian Queen La	S-052-04	06-10-2004		Was never referred to Program. Dye tests were never confirmed.
02615 W Allegheny Ave	S-046-06	05-31-2006		Inspection pending.
05054 Mc Kean Ave	S-046-06	09-26-2006		Inspection pending
01112 Bloomfield Ave	P-104-06	07-29-2009		
03165 Draper St	P-091-11	09-19-2009		
03320 Chippendale Ave	P-091-08	06-12-2010		
02842 Cottman Ave	P-091-01	08-19-2010		

Table 4

Spills to Storm Sewers and/or Receiving Waters

October 1, 2010 to December 31, 2010

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
09/17/10	P-082-01	Ditman Street and Solly Avenue Pennypack Creek	3009	Sewage	09/17/10	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate < 1 gpm discharge.
11/02/10	P-116-01	Rennard Street and Rennard Place Huntingdon Valley Creek	3011	Sewage	11/02/10	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing discharge. Affected area cleaned.
11/03/10		Cottman and West Laurel Avenues		Sewage	11/03/10	Sewer Maintenance unit flushed 12" diameter sanitary sewer to relieve choke causing approximate < 1 gpm discharge from manhole #THL-B0675 to DRW. 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, 2011 to March 31, 2011)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

May 13, 2011

DLC Program Update
1st Quarter 2011

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, 2011 and ending March 31, 2011.

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 2,829 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Six (6) 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.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	14	1	0
CFD-02	12	6	0
CFD-03	10	3	0
CFD-04	12	2	0
CFD-05	10	2	0
CFD-06	9	0	0

On June 30, 2010, the PWD installed and activated two new Sanitary Diversion Valves upstream of stormwater outfall T-088-01. The first SDV is located in existing manhole #T-088-01-S0215 on West Cheltenham Avenue between Oak Lane and 7th Street. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 54 inch diameter storm sewer, to the existing 15 inch diameter sanitary sewer located under it. The second SDV is located in existing manhole #T-088-01-S0270 on 7th Street just south of West Cheltenham Avenue. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 36 inch diameter storm sewer, to the existing 12 inch diameter sanitary sewer located under it.

The two (2) new sites intercepting flow are listed below.

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-07	63	4	0
CFD-08	61	3	0

The most recent fecal sample value was 250 fecal colonies per 100 ml. at the outfall on March 8, 2011.

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	8	0	0
MFD-02	8	0	0

The most recent fecal sample value was 100 fecal colonies per 100 ml. at the outfall on March 15, 2011.

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 2,743 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 220 fecal colonies per 100 ml. at the W-068-05 outfall on March 15, 2011.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,444 Complete tests in these sewershed areas, identifying 59 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 18 fecal colonies per 100 ml. at the S-058-01 outfall, 25000 fecal colonies per 100 ml. at the S-059-01 outfall, 360 fecal colonies per 100 ml. at the S-059-02 outfall, 820 fecal colonies per 100 ml. at the S-059-03 outfall, 540 fecal colonies per 100 ml. at the S-059-04 outfall, <10 fecal colonies per 100 ml. at the S-059-05 outfall, 56000 fecal colonies per 100 ml. at the S-059-09 outfall, all on March 14, 2011.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

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	9	0	0

2. Franklin and Hasbrook Outfall (T-089-04)

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	62	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-091-01	19	0	1
P-091-06	235	10	0
P-100-06	3	0	4
P-104-06	0	0	1
P-108-03	0	0	1
P-108-24	41	0	1
Q-110-06	9	0	2
Q-113-09	229	5	0
Q-114-12	19	1	3
Q-115-12	534	8	2
Q-121-05	2	0	0
S-046-06	0	0	1
W-068-05	0	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 priority 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 priority 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 priority 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-091-01
- P-091-06
- P-091-08
- P-091-11
- Q-113-09
- Q-115-12
- S-046-06
- S-052-04

4. Continue to perform property testing within the following outfalls.

- P-091-02
- P-100-03
- P-104-10
- P-105-03
- P-108-24
- P-113-06
- Q-106-12

- Q-110-11
- Q-110-14
- Q-113-09
- Q-115-12
- Q-119-01
- S-046-09
- W-077-02

Table 1
DLC Program Summary
January 1, 2011 to March 31, 2011

Complete Tests:

- 42,932 Complete tests have been performed under the DLC program
- **1,091 Complete tests were performed this past quarter**
- 19 Complete tests were performed in outfall P-091-01
- 235 Complete tests were performed in outfall P-091-06
- 3 Complete tests were performed in outfall P-100-06
- 41 Complete tests were performed in outfall P-108-24
- 9 Complete tests were performed in outfall Q-110-06
- 229 Complete tests were performed in outfall Q-113-09
- 19 Complete tests were performed in outfall Q-114-12
- 534 Complete tests were performed in outfall Q-115-12
- 2 Complete tests were performed in outfall Q-121-05

Cross-Connections Found:

- 1,121 Cross-connections have been identified under the DLC program
- **24 Cross-connections were identified this past quarter**
- 10 Cross-connections were identified in outfall P-091-06
- 5 Cross-connections were identified in outfall Q-113-09
- 1 Cross-connection was identified in outfall Q-114-12
- 8 Cross-connections were identified in outfall Q-115-12

Abatements:

- 1,095 Abatements have been performed under the DLC program
- **17 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-091-01
- 4 Abatements were performed in outfall P-100-06
- 1 Abatement was performed in outfall P-104-06
- 1 Abatement was performed in outfall P-108-03
- 1 Abatement was performed in outfall P-108-24
- 2 Abatements were performed in outfall Q-110-06
- 3 Abatements were performed in outfall Q-114-12
- 2 Abatements were performed in outfall Q-115-12
- 1 Abatement was performed in outfall S-046-06
- 1 Abatement was performed in outfall W-068-05

Outfall/Manhole Screening and Sampling:

- 13 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 13 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, 2011 to March 31, 2011

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	3/8/2011	9:55	Outfall: 7th & Cheltenham	84		<.2	250	
T-088-01	3/8/2011	10:55	Outfall: 7th & Cheltenham @ Bridge	84		<.2	54	
W-060-01	1/4/2011	10:20	Outfall: Monastery Lane	5'-0"x4'-4"		<.2	45	
W-068-05	1/4/2011	10:50	Outfall: Lincoln & Morris	90		0.44	4000	
W-060-01	3/15/2011	10:35	Outfall: Monastery Lane	5'-0"x4'-4"		<.2	100	
W-068-05	3/15/2011	11:20	Outfall: Lincoln & Morris	90		0.29	220	
S-058-01	3/14/2011	10:00	Outfall: Domino Lane	54		0.21	18	
S-059-01	3/14/2011	10:15	Outfall: Parker	60		<.2	25000	
S-059-02	3/14/2011	10:30	Outfall: Fountain	42		0.66	360	
S-059-03	3/14/2011	10:40	Outfall: Wright	42		<.2	820	
S-059-04	3/14/2011	10:55	Outfall: Leverington	51		0.46	540	
S-059-05	3/14/2011	11:00	Outfall: Leverington (east)	4'-0"x2'-8"		0.34	<10	
S-059-09	3/14/2011	11:20	Outfall: Green Lane	36		<.2	56000	

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
05400 Archer St	S-046-06	06-15-2006		12-23-2010	Property in non bill status, may be vacant. Sold to a bank
00425 W Abbottsford Ave	S-046-06	06-24-2006		11-03-2010	Inspection pending
03264 N Marston St	S-046-06	12-15-2006		12-09-2010	
01112 Bloomfield Ave	P-104-06	07-29-2009		03-16-2011	
02322 Strahle St	P-091-06	05-22-2010		11-03-2010	
03214 Fuller St	P-091-10	06-07-2010		11-09-2010	
02723 Solly Ave	P-091-06	06-16-2010		10-15-2010	
07442 Brous Ave	P-091-01	06-17-2010		10-18-2010	
07424 Brous Ave	P-091-01	06-21-2010		11-18-2010	
03301 Chippendale Ave	P-091-08	06-22-2010		10-28-2010	
11933 Alberta Dr	Q-110-15	07-31-2010		12-17-2010	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments
05054 Mc Kean Ave	S-046-06	09-26-2006		Water shut-off at curb 3/23/11
03320 Chippendale Ave	P-091-08	06-12-2010		
02842 Cottman Ave	P-091-01	08-19-2010		Cross connection abated 3/2/11

Table 4
Spills to Storm Sewers and/or Receiving Waters
January 1, 2011 to March 31, 2011

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
02/18/11	S-046-06	2900 Henry Avenue Schuylkill River	3009	Sewage	02/18/11	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate 1 gpm discharge from manhole #S046-06-S1475 to storm inlet #88946. Removed debris from manhole invert. Also, flushed storm inlet.
03/10/11		3100 Grant Avenue Wooden Bridge Run	3011	Sewage	03/10/11	Industrial Waste unit investigated a reported discharge from a 10" diameter pipe. Cross connection identified at Grant Meadows apartment complex. Plumber to be hired to make repairs.
03/17/11	S-024-01	400 University Avenue Schuylkill River	3009	Sewage	03/17/11	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate <1 gpm discharge from manhole to storm inlet. Also, flushed storm inlet.

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, 2011 to June 30, 2011)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

August 12, 2011

DLC Program Update
2nd Quarter 2011

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, 2011 and ending June 30, 2011.

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 2,829 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Six (6) 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.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	8	1	0
CFD-02	9	2	0
CFD-03	8	0	0
CFD-04	9	0	0
CFD-05	8	0	0
CFD-06	6	0	0

On June 30, 2010, the PWD installed and activated two new Sanitary Diversion Valves upstream of stormwater outfall T-088-01. The first SDV is located in existing manhole #T-088-01-S0215 on West Cheltenham Avenue between Oak Lane and 7th Street. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 54 inch diameter storm sewer, to the existing 15 inch diameter sanitary sewer located under it. The second SDV is located in existing manhole #T-088-01-S0270 on 7th Street just south of West Cheltenham Avenue. This new SDV will allow the diversion of all of the existing dry weather sanitary flow from the 36 inch diameter storm sewer, to the existing 12 inch diameter sanitary sewer located under it.

The two (2) new sites intercepting flow are listed below.

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-07	61	6	0
CFD-08	63	2	0

The most recent fecal sample value was 721 fecal colonies per 100 ml. at the outfall on April 26, 2011.

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 >6000 fecal colonies per 100 ml. at the outfall on May 3, 2011.

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 2,743 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 2900 fecal colonies per 100 ml. at the W-068-05 outfall on May 3, 2011.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,444 Complete tests in these sewershed areas, identifying 59 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 190 fecal colonies per 100 ml. at the S-058-01 outfall, 1700 fecal colonies per 100 ml. at the S-059-01 outfall, 116000 fecal colonies per 100 ml. at the S-059-02 outfall, 430 fecal colonies per 100 ml. at the S-059-03 outfall, 20000 fecal colonies per 100 ml. at the S-059-04 outfall, 3100 fecal colonies per 100 ml. at the S-059-05 outfall, 56000 fecal colonies per 100 ml. at the S-059-09 outfall (on March 14, 2011), all but one on June 6, 2011.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

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	5	0	0

2. Franklin and Hasbrook Outfall (T-089-04)

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	57	2	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-090-02	1	0	0
P-091-01	5	0	1
P-091-02	1	0	0
P-091-03	16	1	1
P-091-04	119	0	0
P-091-06	11	1	7
P-091-08	(1)	(1)	0
P-091-11	0	0	1
P-099-01	6	0	0
P-104-10	113	2	0
P-105-03	84	1	0
P-108-24	3	0	0
P-113-06	20	0	0
P-113-07	2	0	0
P-113-08	(2)	0	0
Q-106-12	19	0	0
Q-107-07	65	0	0
Q-110-11	272	2	0
Q-110-14	229	2	0
Q-113-09	19	0	5
Q-115-12	20	3	7
Q-119-01	6	0	0
S-046-06	(1)	(1)	0
S-046-09	177	3	1
S-052-04	0	0	1
T-089-03	4	0	0
T-089-04	(4)	0	0
W-077-02	101	3	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 priority 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 priority 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 priority 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-091-06
- P-104-10
- P-105-03

- Q-110-11
- Q-110-14
- Q-115-12
- S-046-09
- W-077-02

4. Continue to perform property testing within the following outfalls.

- P-100-04
- P-109-02
- P-113-06
- Q-106-12
- Q-110-14
- Q-113-09
- Q-119-01
- T-080-02

Table 1
DLC Program Summary
April 1, 2011 to June 30, 2011

Complete Tests:

- 44,217 Complete tests have been performed under the DLC program
- **1,285 Complete tests were performed this past quarter**
- 1 Complete test was performed in outfall P-090-02
- 5 Complete tests were performed in outfall P-091-01
- 1 Complete test was performed in outfall P-091-02
- 16 Complete tests were performed in outfall P-091-03
- 119 Complete tests were performed in outfall P-091-04
- 11 Complete tests were performed in outfall P-091-06
- (1) Complete test was performed in outfall P-091-08
- 6 Complete tests were performed in outfall P-099-01
- 113 Complete tests were performed in outfall P-104-10
- 84 Complete tests were performed in outfall P-105-03
- 3 Complete tests were performed in outfall P-108-24
- 20 Complete tests were performed in outfall P-113-06
- 2 Complete tests were performed in outfall P-113-07
- (2) Complete tests were performed in outfall P-113-08
- 19 Complete tests were performed in outfall Q-106-12
- 65 Complete tests were performed in outfall Q-107-07
- 272 Complete tests were performed in outfall Q-110-11
- 229 Complete tests were performed in outfall Q-110-14
- 19 Complete tests were performed in outfall Q-113-09
- 20 Complete tests were performed in outfall Q-115-12
- 6 Complete tests were performed in outfall Q-119-01
- (1) Complete test was performed in outfall S-046-06
- 177 Complete tests were performed in outfall S-046-09
- 4 Complete tests were performed in outfall T-089-03
- (4) Complete tests were performed in outfall T-089-04
- 101 Complete tests were performed in outfall W-077-02

Cross-Connections Found:

- 1,137 Cross-connections have been identified under the DLC program
- **16 Cross-connections were identified this past quarter**
- 1 Cross-connection was identified in outfall P-091-03
- 1 Cross-connection was identified in outfall P-091-06
- (1) Cross-connection was identified in outfall P-091-08
- 2 Cross-connections were identified in outfall P-104-10
- 1 Cross-connection was identified in outfall P-105-03
- 2 Cross-connections were identified in outfall Q-110-11
- 2 Cross-connections were identified in outfall Q-110-14
- 3 Cross-connections were identified in outfall Q-115-12
- (1) Cross-connection was identified in outfall S-046-06
- 3 Cross-connections were identified in outfall S-046-09
- 3 Cross-connections were identified in outfall W-077-02

Abatements:

- 1,119 Abatements have been performed under the DLC program
- **24 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-091-01
- 1 Abatement was performed in outfall P-091-03
- 7 Abatements were performed in outfall P-091-06
- 1 Abatement was performed in outfall P-091-11
- 5 Abatements were performed in outfall Q-113-09
- 7 Abatements were performed in outfall Q-115-12
- 1 Abatement was performed in outfall S-046-09
- 1 Abatement was performed in outfall S-052-04

Outfall/Manhole Screening and Sampling:

- 10 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

- 7 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 6 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
April 1, 2011 to June 30, 2011

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	4/26/2011	9:45	Outfall: 7th & Cheltenham	84		0.18	721	
T-088-01	4/26/2011	9:55	Outfall: 7th & Cheltenham @ Bridge	84		<0.2	631	
W-060-01	5/3/2011	10:40	Outfall: Monastery Lane	5'-0"x4'-4"		<0.2	>6000	
W-068-05	5/3/2011	11:20	Outfall: Lincoln & Morris	90		0.31	2900	
S-058-01	6/6/2011	9:45	Outfall: Domino Lane	54		0.35	190	
S-059-01	6/6/2011	10:05	Outfall: Parker	60		0.21	1700	
S-059-02	6/6/2011	10:20	Outfall: Fountain	42		0.47	116000	
S-059-03	6/6/2011	10:35	Outfall: Wright	42		<0.2	430	
S-059-04	6/6/2011	10:45	Outfall: Leverington	51		0.29	20000	
S-059-05	6/6/2011	10:50	Outfall: Leverington (east)	4'-0"x2'-8"		0.37	3100	
B. Permit Inspection Program								
P-109-04	4/12/2011	8:20	Outfall: NW of Bustleton & Haldeman Aves.	54	60	0.74	>60000	
P-109-04	4/20/2011	12:00	Outfall: NW of Bustleton & Haldeman Aves.	54		0.88	>60000	
P-109-04	4/20/2011	12:15	Manhole: Haldeman Ave. after Bustleton Ave.	36		0.29	3800	
P-109-04	4/20/2011	12:20	Manhole: Bustleton Ave. before Haldeman Ave.	42		0.26	1000	
P-109-04	5/3/2011	12:38	Outfall: NW of Bustleton & Haldeman Aves.	54		0.84	145	
P-109-04	5/9/2011	11:15	Outfall: NW of Bustleton & Haldeman Aves.	54	NF	N/A	N/A	
Q-102-02	6/20/2011	12:55	Outfall: St. Denis Dr. & Hegerman St.	48	1	0.95	7300	

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
03513 Indian Queen La	S-052-04	06-10-2004		04-04-2011	Internal Cross connection abated on 4/4/11
01112 Bloomfield Ave	P-104-06	07-29-2009		03-16-2011	
03165 Draper St	P-091-11	09-19-2009		04-13-2011	Cross connection abated 4/13/11
02842 Cottman Ave	P-091-01	08-19-2010		03-02-2011	Cross connection abated 3/2/11
12679 Biscayne Dr	Q-115-12	02-12-2011		06-15-2011	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments

Table 4
Spills to Storm Sewers and/or Receiving Waters
April 1, 2011 to June 30, 2011

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
04/01/11	W-076-13	Henry Avenue and Wises Mill Road Wissahickon Creek	3009	Sewage	04/01/11	Industrial Waste unit investigated a reported discharge during wet weather. No choked sanitary sewers identified.
05/15/11	P-091-08	Rowland and Hartel Avenues Pennypack Creek	3011	Sewage	05/15/11	Sewer Maintenance unit manually cleaned 12" diameter sanitary sewer causing approximate 40 gpm discharge from manhole #P091-08-S0015. Also, removed debris from manhole and reset manhole frame and cover.
05/24/11	P-083-03	9001 Torresdale Avenue Pennypack Creek	3009	Sewage	05/25/11	Industrial Waste unit investigated a reported discharge. Cross connection identified at Lannett Company. Plumber to be hired to make repairs.
06/06/11	Q-110-06	Academy and Amity Roads Walton Run	3011	Sewage	06/07/11	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate 10 gpm discharge from manhole #Q110-06-S0015.
06/21/11	S-051-08	3900 Terrace Street Schuylkill River	3009	Sewage	06/21/11	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing approximate 3 gpm discharge. Also, flushed storm sewer (with dechlorination).

Source Codes:
3009 - Spill to Storm Sewer
3011 - Spill to Receiving Stream

APPENDIX N- MONOSHONE WATERSHED – QUARTERLY WATER QUALITY UPDATES

PAGE

Philadelphia PWD Water Department

The Monoshone Watershed

Quarterly Water Quality Update

Issue No. 1 May 2009

Caring About Philadelphia's Water Resources

The City of Philadelphia cares greatly about the streams that define its neighborhoods. We recognize that streams are critical human habitats, in addition to ecosystems that support aquatic life.

The Philadelphia Water Department (PWD) initiated a number of pollution prevention programs in the Monoshone Watershed in 1999. Since then, we have seen reductions in the levels of bacteria that indicate the presence of sewage at the seven stormwater outfalls that drain into the Monoshone Creek.

Much of this work is supported by local environmental organizations such as the Senior Environment Corps (SEC) and Chestnut Hill College (CHC). As a result of this partnership, PWD is publishing a quarterly water quality update to share bacteria sampling results at Outfall 5 and at a point downstream on the Monoshone, just south of RittenhouseTown.

This report is the first of those quarterly issues.

What is a WATERSHED?

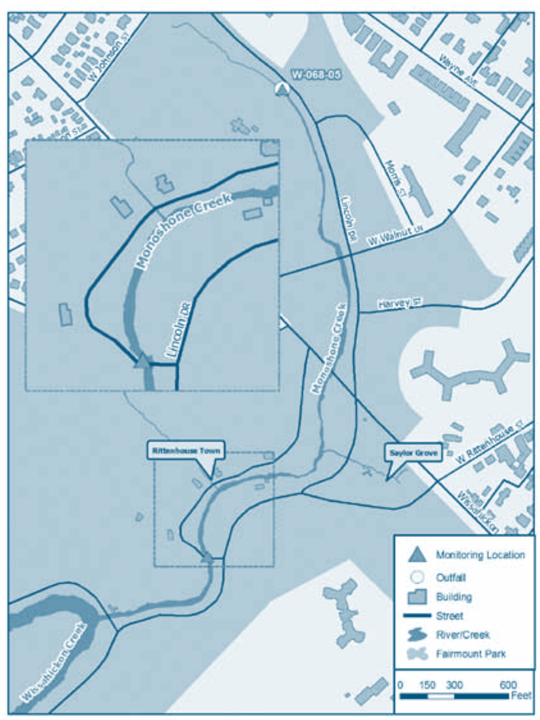
A watershed is the land surrounding a system of rivers (or streams or creeks), or a particular river, that, when it rains, sheds the runoff into that waterway. Everything you do impacts your watershed. Runoff from garden fertilizers, hazardous substances like used motor oil, and trash dumped into one area of a river bank can pollute water many miles downstream. Protecting and preserving our watersheds helps protect our water resources.

About the Monoshone Creek Watershed

PWD is working to protect the Monoshone Creek Watershed. One way we are doing this is through a number of programs focused on the basic problems of separate sewer systems in urban areas. This is a system in which one sewer collection system is dedicated to sanitary collection, such as waste from bathrooms and kitchens, and the other is dedicated to stormwater runoff collection, such as the rainwater that goes into the storm drains.

The Challenges of a Separate Sewer System

Separate storm sewers systems drain directly to waterways such as rivers, creeks, and streams. Urban environments can be challenging for these storm sewers, as the stormwater runoff can contain litter, gasoline, oils, fertilizers, animal wastes, and other pollutants that are washed from our lawns and streets into storm drains. In addition, high volumes of stormwater runoff are delivered to streams during intense rain storms, which harm stream habitats for fish and other wildlife.



Overview of the Monoshone Watershed: This map shows the Monoshone Creek and the locations of the Water Department's stormwater outfalls along the creek. Outfall Number 5, which receives the largest volume of stormwater runoff due to the size of the drainage area, is the location where PWD takes its quarterly fecal coliform sample. At the same time, a sample will be taken just south of Historic RittenhouseTown.

(Continued on page 2)

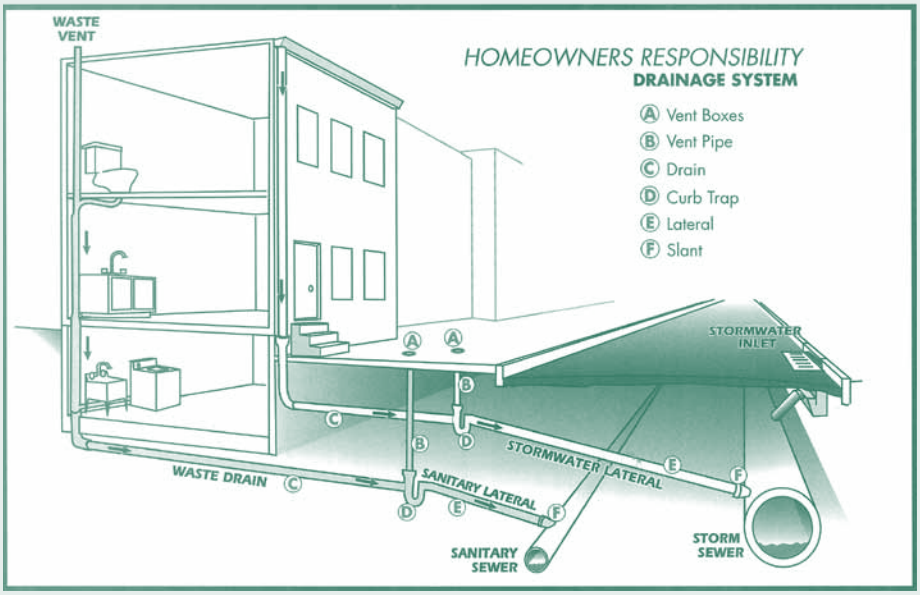
(Continued from page 1)

Our projects in the Monoshone Creek Watershed include the inspection and repair of defective sewer lateral pipes; the relining of the sanitary sewer under Lincoln Drive; stream channel restoration; the creation of the Saylor Grove Treatment Wetland demonstration project; and the initiation of the Wissahickon Watershed Partnership.

All of these projects are designed to help control stormwater runoff and stop pollutants from getting into our waterways.

For the Monoshone Creek and our other stream systems throughout the City – the Cobbs, the Tacony, the Wissahickon, the Pennypack and the Poquessing – this restoration will take some time. Each stream system has its own challenges.

In an urban environment, it is impossible to clean a river or stream to the point where there is no bacteria in that waterway. Animal wastes and other urban pollutants that are picked up by rainfall will always be a factor. Our challenge is to work with the City of Philadelphia and our community partners to achieve streams that are healthy for fish and wildlife, and are a joy to see and touch. That is a vision that the City champions.



The diagram above depicts a home plumbing system. The homeowner's responsibility for maintenance and repair includes all internal plumbing and fixtures, and extends to the items labelled "A" through "F." PWD is responsible for the sanitary sewers and storm sewers, as well as the stormwater inlets.

LONG TERM BACTERIA TRENDS MEASURED AS FECAL COLIFORM AT OUTFALL 5

Outfall 5 Lincoln & Morris	Date	Fluoride (milligrams per liter)	Fecal Count (# per 100 milligrams)
2007			
Outfall 5	3/26/07	0.33	2,000
Outfall 5	5/16/07	0.46	2,300
Outfall 5	9/17/07	0.97	3,800
Outfall 5	10/22/07	0.69	22,000
2008			
Outfall 5	3/13/08	0.12	360
Outfall 5	4/23/08	0.35	3,000
Outfall 5	9/15/08	0.57	138,000
Outfall 5	12/3/08	0.53	191,000

As the sampling above results illustrate, fecal coliform numbers are often in the low thousands which means we all still have much work to do. But at the same time, we have witnessed a marked improvement from sampling results taken a decade ago. Often, a high result is an indicator that there is a problem within the City's sewer or a property lateral(s), resulting in sewage entering the creek. PWD inspects the sewers in this area to track down and repair potential problems

Strategies For a Healthy Future

Meeting the challenges we face is a step-by-step process. In order to have success tomorrow, we need to put a number of small programs in place today. These programs will result in consistent, incremental improvements.

Revitalized, healthy streams will become a reality through the many approaches that the City has embraced. These strategies look at traditional pollutant sources such as property sewer lines and aging infrastructure, and how we can repair and maintain these to prevent pollution. Our strategies also include innovative programs that make green, sustainable development part of our everyday city planning.

Looking at the Numbers: What We Do on the Land Impacts Our Water

Bacteria sampling measures the levels of fecal coliform per 100 milliliters.

Fecal Coliform are bacteria that indicate the presence of sewage. The water quality standard is 200 fecal coliforms/100 ml – an extremely difficult goal to consistenly meet in urban streams. Typical sources of high fecal coliform counts in the Monoshone Creek include stormwater runoff, improperly connected house laterals, clogged sewer pipes, and leaking septic systems.

Fecal coliform bacteria are used as an indicator of the presence of sewage in streams and rivers.

Fluoride is a naturally occurring element, but high levels can indicate that treated water is finding its way into the creek. A fluoride concentration above 0.5 milligrams per liter may be an indicator of a leaking lateral(s), a sewer problem, or a leaking water service line or main.

PWD and the PA Department of Environmental Protection (PA DEP) measure water quality improvements over the long term. Our goal is to ensure that bacteria levels continue to decline as we put watershed protection programs in place and alter the way the urban landscape impacts our waterways. This topic will be covered in our next issue.

Responding to Emergency Events

PWD investigates and responds to incidents such as accidental spills, illegal dumping activities and sewer emergency repairs. These emergencies may result in large spikes in bacteria volumes. When high bacteria sampling results are discovered, they indicate to PWD that something unusual is happening in the drainage area, or that there may be a problem with a property lateral or with the City's sewer collection system.

The following sewage causing events and PWD follow up actions took place between September 2007 and December 2008. These events are related to the periodic spikes in high fecal counts in the Monoshone Creek:

September 2007: A choke in the manhole at Walnut and Kingsley Street resulted in a backup through the manhole and into the street. PWD's Sewer Maintenance Unit flushed and cleaned the manhole and sewer.

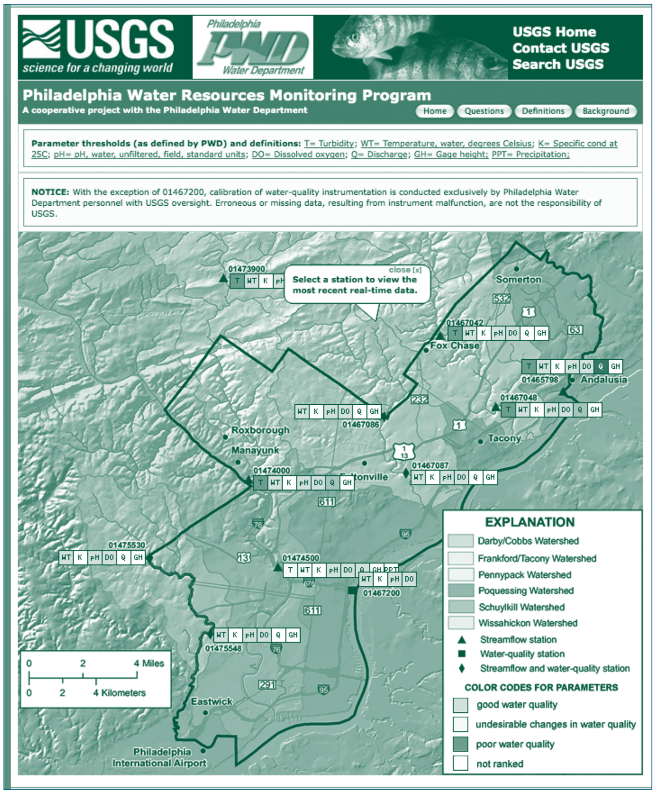
December 2007: A choke in the manhole at Walnut and Kingsley Street resulted in a backup through the manhole and into the street. PWD's Sewer Maintenance Unit flushed and cleaned the manhole and sewer.

September 2008: The sanitary lateral from the Park building in Blue Bell Park was found to be connected to the storm sewer, resulting in periodic sewage flows into the creek. PWD Sewer Maintenance cleaned the area. Fairmount Park made the necessary repairs and connected the building's sanitary lateral to the sanitary sewer.

December 2008: PWD's Industrial Waste Unit investigated an apparent discharge into the outfall by Saylor's Grove. The source of the discharge was traced to improper oil/grease disposal practices by the Burger King restaurant on Chelten Avenue. The practice was brought to the attention of the restaurant and district managers. PWD is continuing to monitor the outfall to ensure this practice doesn't happen again.

A number of these events were reported to the PWD by the public. We appreciate and rely on the public to call our hotline number at 215-685-6300 whenever they see a sewage or water leak on the street or in a stream.

Welcome to the Philadelphia Water Department's "Water Resources Monitoring Program" website (see below). The link is: http://pa.water.usgs.gov/pwd/



PWD has entered into a cooperative agreement with the United States Geological Survey (USGS) to develop a long-term monitoring system for our watersheds.

As you can see on the above map, which is displayed on the front page of the project website, each station, including Schuylkill at Fairmount Dam, has water quality information which includes Dissolved Oxygen, pH, Conductivity, Water Temperature and, in some instances, Turbidity.

This program was instituted as part of our comprehensive watershed monitoring program and will continue as an integral component of PWD's Storm Water and Combined Sewer Overflow (CSO) permits' monitoring requirements, as well as our Source Water Protection Program.

Under the agreement, PWD assumes the responsibilities of the water quality instrumentation while USGS continues to perform the operations and maintenance on the stations.

With this data, PWD will track spatial (upstream vs. downstream) patterns in water quality as well as temporal (day vs. night, historical, and interannual variation) patterns.

This will allow us to determine changes in water quality and quantity as we progress with the implementation of our integrated watershed management plans, as well as serving as a barometer for changes in global climate and sea level changes.

Next Issue: Information on PWD's Low Impact Development Green Infrastructure Program will be featured. This issue will appear in September, 2009.

For More Information:

PWD's Annual Stormwater and Combined Sewer Overflow (CSO) Annual Report and other watershed management and comprehensive characterization reports can be found at: www.phillyriverinfo.org.

For up to date information on the recreational water quality of the Schuylkill River, go to http://www.phillyrivercast.org/.

Here's What You Can Do:

Join a watershed partnership. For information, go to: www.phillyriverinfo.org.

Visit the Fairmount Water Works Interpretive Center, both on line at www.fairmountwaterworks.org, or in person at 640 Water Works Drive in Philadelphia.

Philadelphia PWD Water Department

The Monoshone Watershed

Quarterly Water Quality Update

Issue No. 2 September 2009

Separate and Combined Sewer Systems

In many of Philadelphia's homes, sanitary sewage and stormwater travel together through a combined sanitary/storm sewer system for treatment at one of the City's three sewage treatment plants, where it is cleaned before it is discharged to the Delaware River.

In some areas of Philadelphia, such as the Wissahickon Creek Watershed, stormwater from downspouts, yards and streets is piped to separate storm sewers and released into local streams. This stormwater runoff is not treated before it is released.

Homes that are serviced by separate storm sewers also have a separate drainage system for their sanitary sewage, which is collected in the sanitary sewer and sent to a treatment plant.

In some homes, the pipes (called laterals) leading to these two systems may be leaking or improperly connected. In this situation, sanitary sewage may enter stormwater sewers and may be released untreated into local waterways.

Laterals that are improperly connected (also known as crossed laterals or cross connections) and laterals that are leaking due to deterioration are known as defective laterals.

PWD (Philadelphia Water Department) funds the correction of the crossed laterals in its effort to improve stream water quality with minimal public impact.

Introduction

Welcome to PWD's Second Quarterly Water Quality Update for the Monoshone Creek. Following our May 2009 issue, we received a number of inquiries concerning the periodic high levels of fecal coliform that were measured at Outfall Five. Part of the problem of placing these high levels in some context — to determine if such high levels are a chronic problem and representative of the typical quality of the flow from Outfall 5 into the Monoshone — was the lack of a large sampling pool. As we shared in our last update, PWD is required to perform four quarterly samples at its priority stormwater outfalls and test all 404 of its stormwater outfalls within a five year period.

(Continued on page 2)

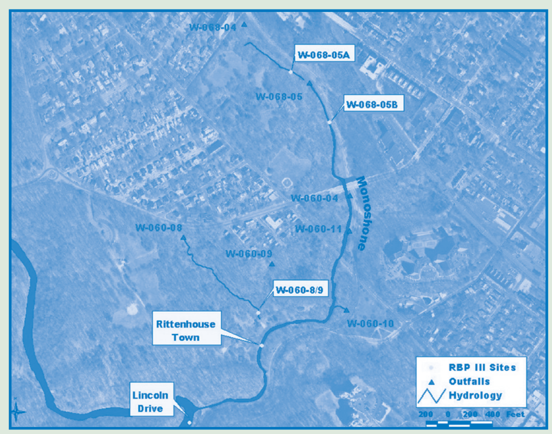
Challenges

Separate storm sewers can be beneficial to our rivers and streams as they often contain underground streams, providing essential base flow to our waterways.

But urban environments also present some challenges, as the quality of stormwater runoff can be tainted by litter, gasoline, oils, fertilizers, animal wastes and other pollutants that are washed from our lawns and streets into storm drains.

In addition, high volumes of stormwater runoff are delivered to streams during intense rain storms, which impacts stream habitats. The programs that PWD has instituted in the Monoshone Creek Watershed are programs focused on the inherent problems of separate sewer systems in urban areas.

Monoshone Watershed



Aerial View of the Monoshone Watershed:

The above aerial photograph shows the Monoshone Creek and the locations of the Water Department's stormwater outfalls along the creek. Outfall Number 5, which receives the largest volume of stormwater runoff due to the size of the drainage area, is the location where PWD takes its quarterly fecal coliform sample.

(Continued from page 1)

Summary of Fecal Coliform Results

Stormwater Outfall Monitoring Program

Data from project initiation (May '09) to present.

MONOSHONE CREEK Outfall #5 (ST068050)

Sample Date	Fecal Coliform (# per 100 milligrams)
5/12/09	720
5/19/09	4,000
5/26/09	1,700
5/26/09	4,900
6/02/09	3,000
6/22/09	3,000
6/24/09	4,800
7/06/09	11,000
7/15/09	1,100
7/27/09	78000
8/17/09	26000
8/26/09	560000*
9/02/09	9400

*As the sampling above illustrates, fecal coliform numbers are often in the low thousands, which means we all still have work to do. But, at the same time, we have witnessed a marked improvement from sampling results taken a decade ago. Often, a high result – such as the one obtained on 8/26/09 – is an indicator that there is a problem within the City's sewer or a property lateral(s), resulting in sewage entering the creek. PWD inspects the sewers in this area to track down and repair potential problems. We did not find a problem in our system and therefore believe it is related to a private property problem.

MONOSHONE CREEK -- Downstream Site (MONO250)

Sample Date	Fecal Coliform (# per 100 milligrams)
5/12/09	400
5/19/09	300
5/26/09	1,000
6/02/09	180
7/06/09	900
7/15/09	200
8/17/09	700
8/26/09	540
9/02/09	500

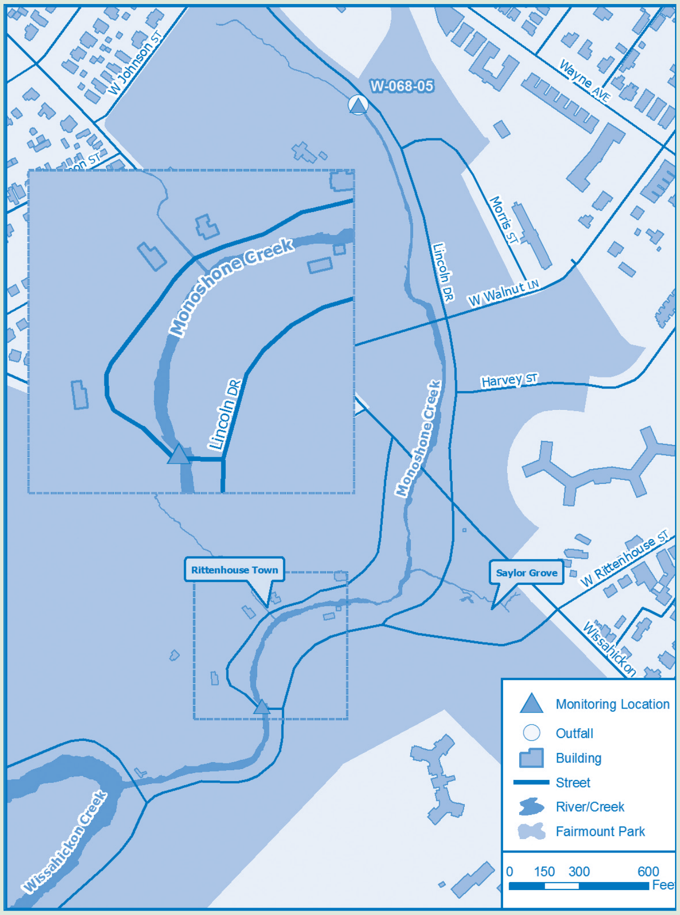
Pilot Monitoring Program

We felt that additional samples were needed at Outfall 5 to give us a better picture of typical water quality at this outfall. We also wanted to determine if PWD crews could make a more timely response if sampling showed that a pollution-causing event was happening somewhere in the Outfall 5 drainage area.

To address these issues, this past May we initiated a pilot sampling program, geared to collect samples at both Outfall 5 and a location downstream of RittenhouseTown, above the confluence of the Monoshone and Wissahickon creeks. Originally, we were going to collect samples on a weekly basis, three times a month, during dry weather (no rainfall within a 72 hour period), as the sampling goal was to determine the quality of the stream flow within Outfall 5 untainted by polluted stormwater runoff. Because this summer was a fairly wet one, we did not collect as many samples as we had hoped. However, we did accumulate a fair number of samples at both locations and plan to continue this sampling program into the future.

Pilot Monitoring Program Results

The good news: fecal coliform results, beginning in May 2009, illustrate a consistently fair water quality for an urban stream like the Monoshone, and sampling results are even better in the creek itself by the time the stream travels past RittenhouseTown. These results are comparable to fecal counts found in all of the streams in the urban Southeast PA Region.



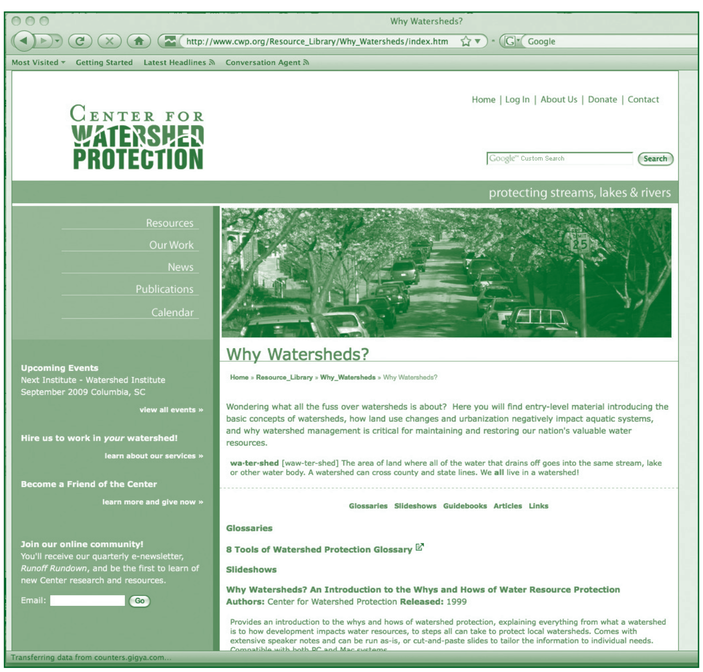
Overview of the Monoshone Watershed:

This map shows the Monoshone Creek and the locations of the Water Department's stormwater outfalls along the creek. Outfall Number 5, which receives the largest volume of stormwater runoff due to the size of the drainage area, is the location where PWD takes its quarterly fecal coliform sample. At the same time, a sample is taken just south of Historic RittenhouseTown.

FACT:

The Monoshone Watershed drains approximately 1,100 acres, of which 40 percent is impervious.

Information from the Center for Watershed Protection on Impervious Surfaces and their Impact on Stream Water Quality



Research has revealed that imperviousness is a powerful and important indicator of future stream quality and that significant degradation occurs at relatively low levels of development. The strong relationship between imperviousness and stream quality presents a serious challenge for urban watershed managers. It underscores the difficulty in maintaining urban stream quality in the face of development. At the same time, imperviousness represents a common currency that can be measured and managed by planners, engineers and landscape architects alike. It links activities of the individual development site with its cumulative impact at the watershed scale. With further research, impervious cover can serve as an important foundation for more effective land use planning decisions.

For the entire article, go to the Center for Watershed Protection's Website at: http://www.cwp.org/Resource_Library/Why_Watersheds/index.htm.

Long Term Plan

PWD will continue to invest in its long term plans to address water quality problems in its streams and rivers through its integrated watershed management approach, seeking opportunities to slowly redevelop the City so that it manages stormwater in an environmentally beneficial way. Additional information about the Department's strategy can be found in its recent report titled, *Green City, Clean Watershed*, submitted to the PA DEP and EPA on September 1. The entire report, and a public summary, are currently on line at www.phillywatersheds.org/ltcpu.

Aeration

How it works

As a stream flows over rocks and riffles, oxygen gets introduced into the water, which improves the ability of beneficial microbes in the stream to break down and remove bacteria and excess nutrients.

In some urban streams, this process does not occur due to a lack of riffles or excessive amounts of sediment deposition, which decreases the flow of oxygen through the streambed.

This in turn decreases the amount of oxygen available to stream insects and the fish that use them as a food source. It also promotes the presence of anaerobic bacteria. These microbes break down nutrients and the waste products of other organisms (more slowly), but the by-product of this anaerobic process (similar to fermentation of beer or lactic acid production in a runner's legs) is the creation of methane gas, nitrates, hydrogen sulfide (swamp gas) and other chemicals that are harmful or toxic to stream organisms.

That is why aerators are used in man-made ponds and detention basins. Adding oxygen, artificially or naturally, improves water's ability to self-cleanse.

We are also continuing to investigate pollution sources to the Monoshone that include: defective laterals, spills, improper disposal of wastes, and other sources that can impact the Monoshone Creek.

Investigations

When we received the high fecal count at Outfall Five on August 26, we dispatched a Sewer Maintenance crew to check the outfall and sewers in the immediate area for the source of pollution.

However, although only a day had passed since the sample was taken and tested, and the crew notified, when the crew reached the site, the outfall no longer showed apparent contamination. This is a constant challenge in a separate sewer system - contamination can happen anywhere in the system, at any time. It is not necessarily a constant.

Moving forward, PWD will be assessing health facilities, businesses and other non-residential properties to ensure that proper use of storm and area drains are taking place. We will also be identifying sections of the watershed that have septic systems and private sewers.

Next Issue:

Update on Pilot Sampling Program

For More Information:

PWD's Annual Stormwater and Combined Sewer Overflow (CSO) Annual Report and other watershed management and comprehensive characterization reports can be found at: www.phillyriverinfo.org.

For up to date information on the recreational water quality of the Schuylkill River, go to http://www.phillyrivercast.org/.

Here's What You Can Do:

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What is a WATERSHED?

A watershed is the land surrounding a system of rivers (or streams or creeks), or a particular river, that, when it rains, sheds the runoff into that waterway. Everything you do impacts your watershed. Runoff from garden fertilizers, hazardous substances like used motor oil, and trash dumped into one area of a river bank can pollute water many miles downstream. Protecting and preserving our watersheds helps protect our water resources.

Philadelphia Water Department

The Monoshone Watershed

Quarterly Water Quality Update

Issue No. 3 February 2010

Introduction

Welcome to the Philadelphia Water Department's (PWD) Third Quarterly Water Quality Update for the Monoshone Creek. This issue provides updates on our Saylor Grove Treatment Wetland, and more detailed sampling information.

Saylor Grove Site Facts

- Saylor Grove Park is approximately 3.2 acres. The Saylor Grove Wetland makes up about one-third of the park.
- Saylor Grove Wetland drains approximately 156 acres of stormwater runoff from Germantown. The wetland is designed to drain the stormwater within 24 hours.
- Saylor Grove Wetland will filter a significant portion of the estimated 70 million gallons of stormwater per year.
- The wetland will remove approximately 13 tons of total suspended solids from the Monoshone Creek per year.
- The first 0.7 inches of every rainfall event will be sent to and treated at the wetland. According to the long-term historical record of the airport's rainfall data, 70% of all storms make up 0.7 inches or less of rainfall.
- The wetland will improve flow variability of the Monoshone Creek.
- The wetland will increase biodiversity (vegetation and animals).
- Approximately 3,000 trees, shrubs, and herbaceous plugs have been planted.

Saylor Grove Treatment Wetland: What has been happening there?

The Saylor Grove Treatment Wetland had been treating stormwater runoff from a drainage area of approximately 156 acres for over three years now. During this time, the wetland bottom has seen an accumulation of a large amount of sediment and some organic matter that settled as the water was retained in the basin. This sediment buildup has reduced the volume of water that the wetland can hold and treat, which created the need for the dredging operation of the pond. We expected this to happen, as both detention basins and man-made treatment wetlands require periodic dredging in order to allow them to continue to operate in an optimal manner. (The sediment collected in the treatment wetland is sediment that does not make its way to the Monoshone Creek).

(continued on page 2)

Separate and Combined Sewer Systems

In many of Philadelphia's homes, sanitary sewage and stormwater travel together through a combined sanitary/storm sewer system for treatment at one of the City's three sewage treatment plants, where it is cleaned before it is discharged to the Delaware River.

In some areas of Philadelphia, such as the Wissahickon Creek Watershed, stormwater from downspouts, yards and streets is piped to separate storm sewers and released into local streams. This stormwater runoff is not treated before it is released.

Homes that are serviced by separate storm sewers also have a separate drainage system for their sanitary sewage, which is collected in the sanitary sewer and sent to a treatment plant.

In some homes, the pipes (called laterals) leading to these two systems may be leaking or improperly connected. In this situation, sanitary sewage may enter stormwater sewers and may be released untreated into local waterways.

Laterals that are improperly connected (also known as crossed laterals or cross connections) and laterals that are leaking due to deterioration are known as defective laterals.

PWD funds the correction of the crossed laterals in its effort to improve stream water quality with minimal public impact.

(Saylor Grove *from page 1)*

PWD has done a topographic survey of the wetland, using the as-built elevations versus the survey gathered prior to the dredging to determine the amount of sediment that had built-up throughout the wetland and that would have to be removed to get the wetland back to the as-built elevations and volume. This information will give us the sense as to how often the wetland should be dredged as a component of its long-term operation and maintenance.

In order to effectively dredge the site, the wetland was drained so that the material removed would have a larger solid content. During the work, a survey was done to confirm that the appropriate elevations were achieved in a particular area prior to moving on. The forebay pond area was dug to about three feet in the deepest part and graded, while the channel areas around the left and right sides of the island were excavated up to two feet. The northeast area of the wetland was left undisturbed due to the existence of vegetation that we wanted to preserve and the 48-inch stormwater pipe that runs beneath the wetland. Currently, PWD is testing the removed material to determine its characteristics and content, including moisture content, organic vs. inorganic composition, nutrients such as nitrogen and phosphorus, and chemical constituents. With this knowledge, we will gain a better understanding of just how effective the wetland has been in treating stormwater runoff, as this wetland is serving as a model for similar projects in the Wissahickon Creek Watershed.

Why we use Fecal Coliform as an Indicator

Fecal coliform bacteria indicate fecal contamination and the potential presence of human pathogens (microorganisms that can make people sick). The fecal coliform test is used because it is reliable, relatively simple to perform, and provides results quickly and inexpensively compared to tests for specific pathogens. One of the disadvantages of the fecal coliform test is that these bacteria are found in feces of many different kinds of warm-blooded animals, not just in sanitary flow. Although not ideal, fecal coliform is presently regulated by PADEP water quality standards and used by PWD for screening sources of potential pollution in streams and dry weather flow from stormwater outfalls.

When performing a fecal coliform test, lab scientists do not actually count individual bacteria themselves, but count the colonies that grow from a single bacterium. A sample of water is passed through a very fine filter which is then placed in a petri dish containing a food source and a selective indicator chemical. If bacteria are able to consume the food source and multiply, the chemical indicator changes color. Each color spot on the petri dish is considered one "colony forming unit" (CFU).

PWD lab scientists need to be able to test for bacteria in samples that range from very pure (drinking water) to polluted (stormwater), so they may use a much smaller subsample of water when testing stormwater and multiply the number of colonies counted by the amount that the sample was diluted. This is why the precision of the results decreases as bacteria concentration increases. With the large dilution factors applied for testing a stormwater sample, each spot on the plate can represent 1000 bacteria (or more) in the final sample result.

Summary of Fecal Coliform Results

Stormwater Outfall Monitoring Program

Data from project initiation (May '09) to present.

MONOSHONE CREEK Outfall #5 (ST068050)

Sample Date	Fecal Coliform (# per 100 milliliters)
05/12/09	720
05/19/09	4,000
05/26/09	1,700
05/26/09	4,900
06/02/09	3,000
06/22/09	3,000
06/24/09	4,800
07/06/09	11,000
07/15/09	1,100
07/27/09	78,000
08/17/09	26,000
08/26/09	560,000*
09/02/09	9,400
09/08/09	5,100
09/21/09	7,600
09/21/09	1,100
10/06/09	4,900
10/14/09	7,270
10/27/09	12,300
11/09/09	5,000
11/18/09	7,545
11/30/09	45,000
12/29/09	200
12/29/09	210
12/30/09	280
01/05/10	964
01/12/10	4,600

MONOSHONE CREEK -- Downstream Site (MONO250) RITTENHOUSETOWN SITE

Sample Date	Fecal Coliform (# per 100 milliliters)
05/12/09	400
05/19/09	300
05/26/09	1,000
06/02/09	180
07/06/09	900
07/15/09	200
08/17/09	700
08/26/09	540
09/02/09	500
09/08/09	800
09/21/09	1,100
10/06/09	800
10/14/09	200
11/09/09	100
11/18/09	100
11/30/09	300
12/30/09	150
01/05/10	10
01/12/10	45

*As the sampling above illustrates, fecal coliform numbers are often in the low thousands, which means we all still have work to do. But, at the same time, we have witnessed a marked improvement from sampling results taken a decade ago. Often, a high result – such as the one obtained on 8/26/09 – is an indicator that there is a problem within the City's sewer or a property lateral(s), resulting in sewage entering the creek. PWD inspects the sewers in this area to track down and repair potential problems. We did not find a problem in our system and therefore believe it was related to a private property problem.

Water is considered safe for recreation (immersing oneself in the water) when it tests below 200 colonies per 100 milliliters of sample. The Monoshone, as is true with other urban streams, rarely consistently meets that target as bacteria sources include sewage leaks, wildlife and stormwater runoff. That is why it is important to wash your hands or other parts of your body that come into contact with waterways when fishing or hiking just as you would do when gardening in your backyard.

Why does fecal coliform bacteria concentration decrease in the Monoshone from Outfall 5 to RittenhouseTown?

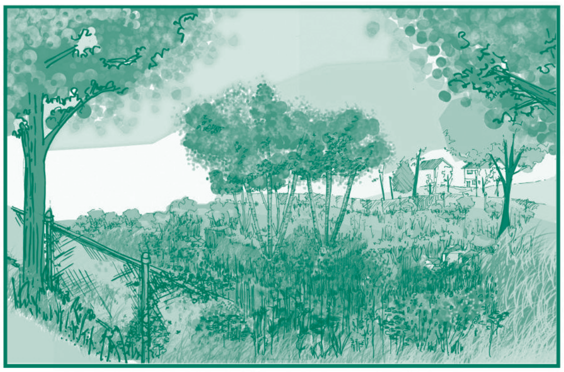
Indicator bacteria generally grow best under conditions similar to the gut of warm-blooded animals. Once exposed to the environment, these bacteria may die or become otherwise injured such that they do not produce colonies in laboratory tests. Bacteria may die from natural causes, such as being eaten by other organisms, or changes in water chemistry, temperature, and sunlight exposure. Urban stormwater may also contain pollutants that are toxic or injurious to bacteria.

Dilution by other sources of water with smaller concentrations of indicator bacteria causes the overall bacteria concentration to decrease. There are several sources of flow to the Monoshone Creek between outfall 5 and the MONO250 RittenhouseTown monitoring site.

Bacteria, and particles to which bacteria are attached, settle out of the water column. Indicator bacteria in sediments generally die and are consumed by decomposers. However, some bacteria may be re-suspended during subsequent storm events, or rarely, even multiply within sediments under favorable conditions.

Additional Stormwater Treatment Wetlands to be Constructed in the Wissahickon Creek Watershed

The Saylor Grove Stormwater Treatment Wetland served as a working model for two new treatment wetlands planned to begin construction this spring - the Cathedral Road and Wises Mill Stormwater Treatment Wetlands. PWD and its partners are very excited about the opportunity to treat polluted stormwater runoff before it flows into these important tributaries of the Wissahickon Creek.



PWD and the Fairmount Park Commission are working together to design a stormwater treatment wetland at the headwaters of Cathedral Run. Cathedral Run is a small first order tributary to the Wissahickon Creek. The stream originates from springs downstream of Courtesy Stables and then travels approximately 2,500 ft through a wooded section of Fairmount Park before entering Wissahickon Creek. The stream is relatively steep with an average gradient of 8.5%; however, the downstream half of the tributary is visibly steeper than the upstream reach.

The watershed is highly developed with 31% impervious cover and 361 homes. The natural drainage area is 116 acres; however two outfalls collect stormwater from an additional 40 acres. Base flow is low and was measured to be 0.06 cfs during August 2005. One outfall (W-076-01) located at the headwaters of the tributary drains approximately 91 acres of residential and commercial property.

The stormwater wetland will be designed to achieve the following goals:
- Reduce downstream sediment loading
- Improve the flow variability of storm related flows on Cathedral Run
- Increase base flow
- Improve diversity of in-stream biological community
- Maintain and enhance recreational use/aesthetics
- Reduce shear stress in channel
- Ensure wetland drains within 72 hours

Schuylkill Soundings Presents:

Freshwater Mussel Restoration Program
A Project of the Partnership for the Delaware Estuary

Wednesday, February 17, 2010 • 6:00 pm to 8:00 pm
Fairmount Water Works Interpretive Center

Please RSVP by February 15. For reservations or information, please call 215-685-0723. Visit us at 640 Water Works Drive, Phila PA 19130 or online at www.fairmountwaterworks.org.

Next Issue:

PWD will be reaching out to its environmental and citizen partners to initiate a Stormwater Troopers program –– an event in which PWD and community partners saturate the neighborhood that drains into Outfall 5 to raise awareness of defective laterals and other problems that can contribute to the pollution of the Monoshone Creek.

For More Information:

PWD's Annual Stormwater and Combined Sewer Overflow (CSO) Annual Report and other watershed management and comprehensive characterization reports can be found at: www.phillywatersheds.org.

For up to date information on the recreational water quality of the Schuylkill River, go to http://www.phillyrivercast.org/.

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Philadelphia PWD Water Department

The Monoshone Watershed

Quarterly Water Quality Update

Issue No. 4 July 2010

Introduction

Welcome to PWD's Fourth Quarterly Water Quality Update for the Monoshone Creek.

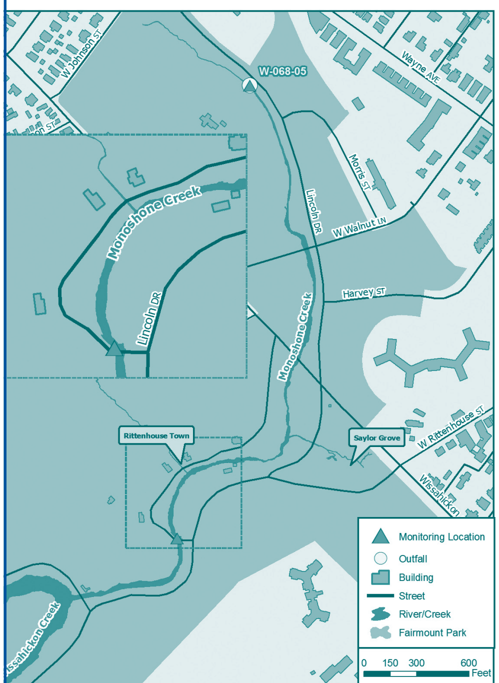
As you may remember, we initiated a pilot sampling program in May 2009, geared to collected samples at Outfall 5 and a location downstream of RittenhouseTown, above the confluence of the Monoshone and Wissahickon creeks.

Samples are collected on a weekly basis, three times a month, during dry weather (no rainfall within a 72 hour period) as the sampling goal is to determine the quality of the stream flow within Outfall 5 untainted by polluted stormwater runoff.

During some months, we did not collect as many samples as we had hoped due to lots of rain. However, in this report, we have a full year of data to share, which reflects the water quality of the Monoshone Creek during all four seasons.

Pilot Monitoring Program Results

We still believe that the news on water quality is generally good for an urban stream like the Monoshone, and sampling results prove consistently better in the creek itself by the time the stream travels past RittenhouseTown. These results are comparable to fecal counts found in all of the streams in the built out, Southeast PA Region. But we still find some outliers in this data, and our goal has been to track down and resolve the sources of this bacteria.



Overview of the Monoshone Watershed:

This map shows the Monoshone Creek and the locations of the Water Department's stormwater outfalls along the creek. Outfall Number 5, which receives the largest volume of stormwater runoff due to the size of the drainage area, is the location where PWD takes its quarterly fecal coliform sample. At the same time, a sample is taken just south of Historic RittenhouseTown.

Summary of Fecal Coliform Results

Stormwater Outfall Monitoring Program

Data from project initiation (May '09) to present.

MONOSHONE CREEK -- Downstream Site (MONO250) RITTENHOUSETOWN SITE

Sample Date	Fecal Coliform (# per 100 milliliters)
05/12/09	400
05/19/09	300
05/26/09	1,000
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08/26/09	540
09/02/09	500
09/08/09	800
09/21/09	1,100
10/06/09	800
10/14/09	200
11/09/09	100
11/18/09	100
11/30/09	300
12/30/09	150
01/05/10	10
01/12/10	45
01/26/10	no sampling
03/02/10	no sampling
03/10/10	209
04/06/10	100
04/20/10	10
05/11/10	60
06/08/10	200

(continued on page 2)

(Pilot Monitoring *continued from page 1*)

MONOSHONE CREEK Outfall #5 (ST068050)	
Sample Date	**Fecal Coliform (# per 100 milliliters)**
05/12/09	720
05/19/09	4,000
05/26/09	1,700
05/26/09	4,900
06/02/09	3,000
06/22/09	3,000
06/24/09	4,800
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07/15/09	1,100
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08/17/09	26,000
08/26/09	560,000*
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11/18/09	7,545
11/30/09	45,000
12/29/09	200
12/29/09	210
12/30/09	280
01/05/10	964
01/12/10	4,600
03/10/10	5,500
04/06/10	11,000
04/20/10	3,600
05/11/10	2,200
06/08/10	2,400

*As the sampling above illustrates, fecal coliform numbers are often in the low thousands, which means we all still have work to do. But, at the same time, we have witnessed a marked improvement from sampling results taken a decade ago. Often, a high result – such as the one obtained on 8/26/09 – is an indicator that there is a problem within the City's sewer or a property lateral(s), resulting in sewage entering the creek. PWD inspects the sewers in this area to track down and repair potential problems. We did not find a problem in our system and therefore believe it was related to a private property problem.

Defective Laterals and Private Sewers

We shared in the past that identifying the sources of sewage in our stormwater sewer pipes may begin at the outfall – the end of the stormwater sewer that empties into the Monoshone Creek – but that is only the beginning of the journey.

We have been focusing on Outfall 5, which receives the stormwater flow from homes, businesses and streets spread over a 630-acre area. We know that sewage from properties enters the city's storm sewers from two chronic sources: leaking property sewer and storm laterals and from property laterals that are connected to the wrong sewer.

As we noted in past updates, the Monoshone Creek Watershed is a separate sewer area, which means there is a sanitary sewer pipe and a stormwater sewer pipe in every block. Every property has a lateral pipe connection to the sanitary sewer which drains your household plumbing fixtures (sinks, showers, toilets, washers) and a stormwater lateral pipe which captures your roof and yard runoff for delivery to the storm sewer. The laterals pipes are often installed side by side. Over the years they age and deteriorate and sometimes allow the flow from the one pipe into the other.

But our efforts now are targeted at identifying the lateral pipes that are "crossed" or connected to the wrong sewer. Even though these are the property owner's responsibility, PWD will pay for the correction of these crossed laterals as a component of its program.

Since 1999, PWD has inspected approximately 2,400 properties out of the 4,100 homes in the Monoshone Creek Watershed in its quest to find the crossed lateral connections that result in a continuous sewage contribution to the Monoshone Creek. Properties are investigated only after evidence has determined that they may have defective laterals. As a result of these inspections, 92 properties were found to have crossed lateral connections.

Most recently, we are now working on 14 blocks in the outfall 5 drainage area that are blocks with private sewers – sewers that are not owned or maintained by PWD but connect into our system. These sewers are "combined" sewers – sewers that collect both household sanitary wastes and stormwater into one sewer. Our testing over the next month will determine whether or not the entire block sewer is connected to the appropriate city sewer.

Philadelphia Water Department

The ARAMARK Tower
1101 Market Street
Philadelphia, Pennsylvania 19107-2994

BERNARD BRUNWASSER
Commissioner

June 3, 2010

Dear Resident:

Within the next week or two, the Water Department will be inspecting the sewer system in your neighborhood. These inspections are aimed at insuring proper configuration of your drainage system. Due to State and Federal regulatory requirements, the Water Department is required to investigate these conditions.

The Water Department personnel will be performing these tests from the street. However, there may be situations where we need to access your property in order to complete these tests. If such situations arise, we will send you a follow-up letter.

Thank you for your attention and cooperation in this matter. Should you have any questions, please feel free to contact me at 215-685-6255.

Very truly yours,

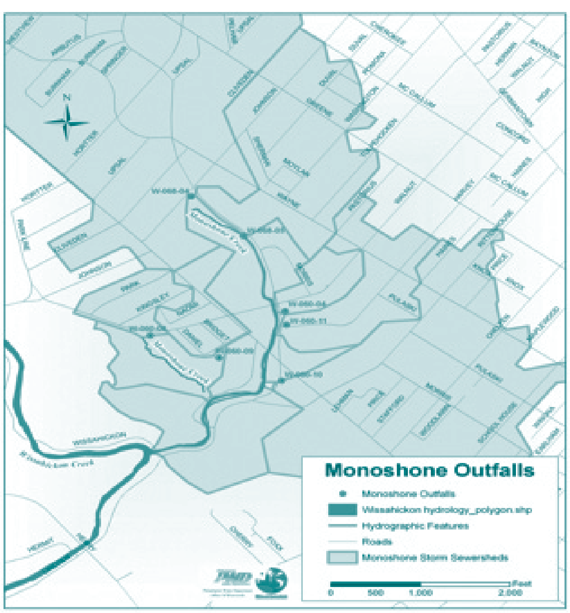
Project Manager

An Equal Opportunity Employer

This letter (right) will go out to residents on the private sewer blocks in the area to let them know about the inspections PWD will be performing to determine if there are crossed laterals in the neighborhood. The majority of the Monoshone drainage area has already completed defective lateral testing at the block level.

The map (below) shows the outfalls in the Monoshone Creek area.

The PWD worker (below left) is placing a CCTV (Closed Circuit Television) video camera into the sewer in order to see if there are crossed laterals in the system.



What are the Challenges of the Defective Lateral Program?

It is like looking for a needle in a haystack because:

- A block may not appear "wet" if no one is using their plumbing
- Once a block is established as wet, extremely time consuming to test every property on block (often 40 – 60 houses)
- If tests results are not clear, must get into property to dye test plumbing fixtures on all floors – letters to customers and appointments. Can result in an average of 4 – 5 internal tests per day
- Vast majority of sewage infiltration is from broken, leaking laterals

Update on Saylor Grove

Recently we found a plant that we hadn't discovered before at the Saylor Grove Stormwater Treatment Wetland. The plant was identified as an American bur reed, and there are a cluster of them on the pond banks. It is a native stalk like plant that has a lithe beauty and attracts birds and insects such as butterflies. The best habitat for these plants is shallow waters and mud banks. In addition, Fairmount Park and PWD have recently completed a seeding of the area that was disturbed during the dredging of the forebay section of the pond. The area was planted with 19 pounds of native seeds. Birds spotted at the wetland during a recent stroll included red-winged blackbirds and goldfinches.

Schuylkill Soundings at the Fairmount Water Works Interpretive Center Presents:

July 21 at 5:30 p.m.: Joan Blaustein and Tom Witmer, Parks and Rec, present "Models of Ecological Restoration in Philadelphia"

August 18 at 5:30 p.m.: Adam Levine presents "The City's Hidden Streams"

**To reserve, contact emilie.hickerson@phila.gov.
Visit us at 640 Water Works Drive, Phila PA 19130 or online at www.fairmountwaterworks.org. On Twitter: @FWWIC.**

Next Issue:

Our next issue will include the results of the defective lateral testing completed on the 14 private sewer blocks.

For More Information:

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Philadelphia PWD Water Department

The Monoshone Watershed

Quarterly Water Quality Update

Issue No. 5 December 2010

Introduction

Welcome to PWD's Fifth Quarterly Water Quality Update for the Monoshone Creek.

This issue provides a year-in-review of our pilot sampling program that began in May 2009. The sampling is done at Outfall 5 and a location downstream of RittenhouseTown, above the confluence of the Monoshone and Wissahickon creeks.

Samples are collected on a weekly basis, three times a month, during dry weather (no rainfall within a 72-hour period) as the sampling goal is to determine the quality of the stream flow within Outfall 5 untainted by polluted stormwater runoff.

During some months, we did not collect as many samples as we had hoped due to lots of rain. However, in this report, we have a full year of data to share, which reflects the water quality of the Monoshone Creek during all four seasons.

Sampling The Monoshone Creek:
A One-Year Review of Water Quality Monitoring and Infrastructure Inspections

Between the spring of 2009 and summer of 2010, Philadelphia Water Department (PWD) scientists and engineers embarked on an aggressive monitoring and inspection program to further strengthen our understanding of the effects of defective lateral connections on water quality in the Monoshone Creek Watershed.

Figure 1. PWD scientist collecting water samples at Outfall 5.

The goal of this program was to develop a uniform and robust data set that quantified differences in water quality from the upstream "headwater" outfall to downstream Historic RittenhouseTown (figure 1). In total, PWD field staff collected 26 discrete samples at Outfall 5 and Historic RittenhouseTown between 2009 and 2010 (n=52 total sample events).

In tandem with water quality assessments, engineers and field inspectors investigated privately-owned sewers on a variety of blocks in an attempt to identify and abate improperly connected households. These blocks included:

- 100 block of Carpenter Lane
- 6700 and 6800 blocks of Cresheim Road
- 300 and 500 blocks of Pelham Road
- 6600 to 6800 blocks of Quincy Street
- 100 block of W. Upsal Street
- 300 block of W. Cliveden Street
- 6600 block of Emlen Street
- 6700 block of Sherman Street
- 73300 block of Rural Lane
- 200 block of W. Mt. Airy Avenue

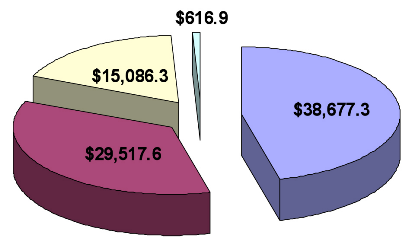
To date, only one property on the 300 block of Pelham Road was found to have a defective (cross) connection, which has since been corrected.

During this aggressive inspection period, PWD expended approximately 360 man-hours in water quality investigations, totaling approximately $39,000.

Similarly, field investigations in privately-owned sewered areas by PWD's Collector Systems staff amounted to $29,500 in staff hours. In total, monitoring and inspections, laboratory services and equipment, and associated administrative costs were $83,898 between 2009 and 2010 (Figure 2).

(continued on page 2)

(Sampling continued from page 1)



LEGEND

- Field Water Quality Sampling & Laboratory Analysis
- Infrastructure Inspection
- Administrative
- Vehicle/Equipment

Why does fecal coliform bacteria concentration decrease in the Monoshone from Outfall 5 to RittenhouseTown?

Fecal coliform bacteria concentration consistently decreases in the Monoshone from Outfall 5 to RittenhouseTown. This is a result of a number of factors, including: bacteria may die from natural causes, such as being eaten by other organisms, or changes in water chemistry, temperature and sunlight exposure.

Urban stormwater may also contain pollutants that are toxic or injurious to bacteria. In addition, dilution by other sources of water with smaller concentrations of indicator bacteria causes the overall bacteria concentration to decrease. There are several sources of flow to the Monoshone Creek between Outfall 5 and the RittenhouseTown monitoring site.

The good news is, despite sometimes higher levels of bacteria found in water samples from Outall 5, the creek, with nature's assistance, cleans itself to achieve better levels where the public may be enjoying the stream.

MONOSHONE CREEK -- Downstream Site (MONO250) RITTENHOUSETOWN SITE

Sample Date	Fecal Coliform (# per 100 milliliters)
05/12/09	400
05/19/09	300
05/26/09	1,000
06/02/09	180
07/06/09	900
07/15/09	200
08/17/09	700
08/26/09	540
09/02/09	500
09/08/09	800
09/21/09	1,100
10/06/09	800
10/14/09	200
11/09/09	100
11/18/09	100
11/30/09	300
12/30/09	150
01/05/10	10
01/12/10	45
03/10/10	209
04/06/10	100
04/20/10	10
05/11/10	60
06/08/10	200
06/23/10	100
07/06/10	260
09/20/10	1,460

*As the sampling above illustrates, fecal coliform numbers are often in the low thousands, which means we all still have work to do. But, at the same time, we have witnessed a marked improvement from sampling results taken a decade ago. Often, a high result – such as the one obtained on 8/26/09 – is an indicator that there is a problem within the City's sewer or a property lateral(s), resulting in sewage entering the creek. PWD inspects the sewers in this area to track down and repair potential problems. We did not find a problem in our system and therefore believe it was related to a private property problem.

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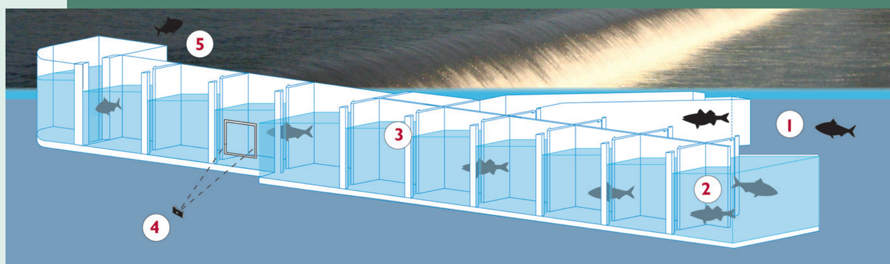
07/06/09	11,000
07/15/09	1,100
07/27/09	78,000
08/17/09	26,000
08/26/09	560,000 *
09/02/09	9,400
09/08/09	5,100
09/21/09	7,600
09/21/09	1,100
10/06/09	4,900
10/14/09	7,270
10/27/09	12,300
11/09/09	5,000
11/18/09	7,545
11/30/09	45,000 *
12/29/09	200
12/29/09	210
12/30/09	280
01/05/10	964
01/12/10	4,600
01/26/10	5,500
03/02/10	13,500
03/10/10	11,000
04/06/10	3,600
04/20/10	2,200
05/11/10	2,400
06/08/10	2,000
06/23/10	11,000
07/06/10	5,900
09/20/10	4,400
09/20/10	4,800
09/21/10	52,000 *

Other Projects That Are Revitalizing Our Waterways: Fairmount Dam Fishway Facility

How the Fishway Works



1. A fish following its instinct to swim upstream in the Schuylkill River encounters the turbulent water of the Fairmount Dam's spillway. A current of water, produced by the fishway, flows into the river from the fishway entrance, serving as a guide for the fish, and attracting them to swim through the entrance into the first chamber.

2. The water, pouring through the slots connecting each chamber, guides the fish through the fishway. The water levels, in each chamber, are slightly higher than the chamber before it, allowing the fish to gradually bypass the dam. Additional chambers were added to the fishway, decreasing the effort required by the fish to swim from one chamber to the next.

3. The slots between adjacent chambers maintain the varied water levels throughout the fishway. The slots were widened to ease the passage of fish through the fishway.

4. Live images are captured by a camera through a window in one chamber of the fishway, which are then transmitted to the web and to the Fairmount Water Works Interpretive Center across the river. The live camera feed can be accessed at www.fairmountwaterworks.org.

5. Fish exit the fishway through the gate and swim into the waters beyond the Fairmount Dam.

The Fairmount Dam, a municipally-owned facility, was built in 1820 to help provide safe and potable drinking water to the City of Philadelphia. However, in its over 150-year history, the dam has decreased the population of American shad, as well as other fish of the Schuylkill River that migrate upriver from the sea to breed in fresh water.

In 1979, with funding from the City of Philadelphia, United States Fish and Wildlife Service (USFWS) and the Pennsylvania Fish and Boat Commission, a vertical slot fish passage on the west side of the dam was constructed to aid in revitalizing the underwater ecology of that stretch of the Schuylkill, specifically for American shad and river herring. Even with this new construction, the populations of these fish did not rise as expected. Because of this failure, the fishway began to deteriorate due to lack of active maintenance or monitoring by 1984.

Between 1984 and 2004, there were no fish counts performed at the Fairmount Dam, as the efforts for fishways had moved on to the Lehigh River, another tributary to the Delaware River. In 2004, the Philadelphia Water Department took over responsibility for the monitoring, maintenance and operation of the fishway, having developed a digital video system to observe the species and volume of fish using the passage.

Improvements

The renovation project, led by the U.S. Army Corps of Engineers and PWD, was completed in the spring of 2009 and has brought many improvements to the overall condition of the fishway as well as to its performance. Before the project, security fences surrounding the fishway had been damaged, which was not only unsightly but allowed trespassers access to the fishway. Finally, stormwater and regular erosion had flooded an underground storage and viewing room. The electrical power in the room was inoperable, making the real-time camera of the fish passing through the fishway useless.

When the project was finished, the fishway itself was completely renovated, with new chambers, entrances and exits and an attraction flow that steers migrating fish towards the fishway. The fences and surrounding area of the fishway have been cleared, cleaned and made more aesthetically pleasing for visitors.

The underground viewing room has also been renovated, with waterproofing to avoid flooding, and with a direct video feed to the Fairmount Water

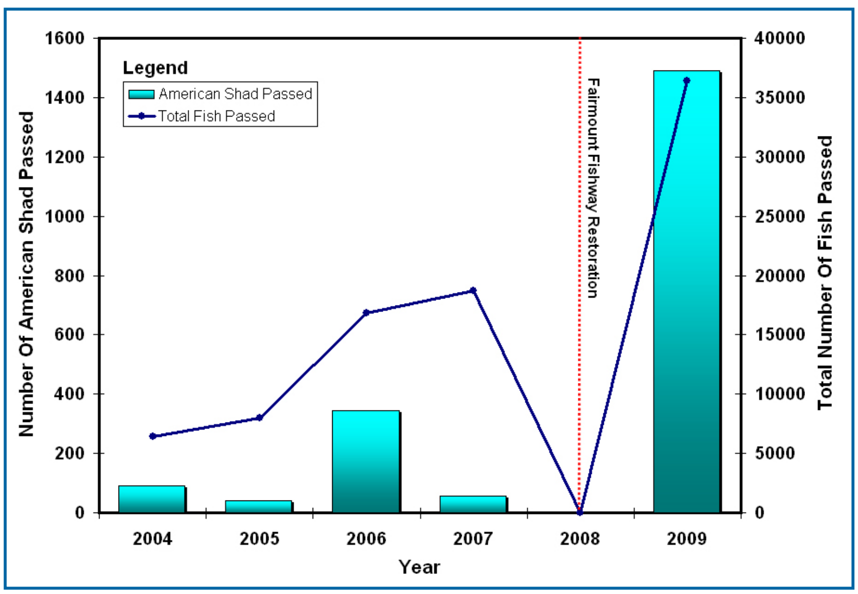
(continued on page 4)

(Fishway continued from page 3)

Works Interpretive Center and the Philadelphia Zoo. The feed will show all of the fish species travelling upstream during peak season. Finally, the Philadelphia Water Department and other agencies and organizations will use the fishway for a greater amount of educational and community outreach opportunities. Included in the renovation is an outdoor amphitheater, where additional PWD educational programs will take place including instruction by trained fishery biologists.

Benefits

The restoration of the Fairmount Dam fishway is important because it is the furthest downstream passage of the Delaware River Basin. This means that the water of this passageway flows most directly into the ocean, allowing any fish that travel upstream to spawn a direct passage to their spawning areas. American shad, the main target of the fishway, are a fish that spawn genetically, meaning that a population of shad will spawn at the same area for numerous generations. Eliminating any impediments to the Schuylkill drainage will benefit the population growth of American shad and any other fish that inhabit the Schuylkill.



Schuylkill Soundings at the Fairmount Water Works Interpretive Center Presents:

December 15 at 5:30 p.m.: "Marcellus Shale and Gas Drilling in Pennsylvania: A Watershed Perspective"

To reserve, contact emilie.hickerson@phila.gov. Visit us at 640 Water Works Drive, Phila PA 19130 or online at www.fairmountwaterworks.org or on Facebook. On Twitter: @FWWIC.

Next Issue:

Our next issue will provide more updates on investigations into the stormwater sewer system of the Monoshone Creek Watershed.

For More Information:

PWD's Annual Stormwater and Combined Sewer Overflow (CSO) Annual Report and other watershed management and comprehensive characterization reports can be found at: www.phillywatersheds.org.

For up-to-date information on the recreational water quality of the Schuylkill River, go to http://www.phillyrivercast.org/.

Here's What You Can Do:

Join a watershed partnership. For information, go to: www.phillyriverinfo.org.

Visit the Fairmount Water Works Interpretive Center, both online at www.fairmountwaterworks.org, or in person at 640 Water Works Drive in Philadelphia. You may also find us on Facebook and on Twitter (@FWWIC).

What is a WATERSHED?

A watershed is the land surrounding a system of rivers (or streams or creeks), or a particular river, that, when it rains, sheds the runoff into that waterway. Everything you do impacts your watershed. Runoff from garden fertilizers, hazardous substances like used motor oil and trash dumped into one area of a river bank can pollute water many miles downstream. Protecting and preserving our watersheds helps protect our water resources.