PHILADELPHIA'S WET WEATHER MANAGEMENT PROGRAMS

COMBINED SEWER MANAGEMENT PROGRAM ANNUAL REPORT

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

STORMWATER MANAGEMENT PROGRAM ANNUAL REPORT

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

Reporting Period July 1st 2011 to June 30th 2012

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

AIS	Aquatic Invasive Species
ANS	Academy of Natural Science
BEHI	Bank Erosion Hazard Index
BLS	Bureau of Laboratory Services, Philadelphia Water Department
BMP	Best Management Practice
BCWSA	Bucks Country Water & Sewer Authority
CAC	Citizens Advisory Council
CCR	Comprehensive Characterization Report
CCTV	Closed Circuit Television
CFD	Computation Flow Dynamic
CIP	Capital Improvement Project
CNPP	Coastal Non-Point Pollution Program
COA	Consent Order & Agreement
CSO	Combined Sewer Overflow
CSOMP	Combined Sewer Overflow Management Program
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DRBC	Delaware River Basin Commission
DWO	Dry Weather Outlet
E&S	Erosion and Sedimentation
EWS	Early Warning System
FGM	Fluvial Geomorphology
FPC	Fairmount Park Commission
FWWIC	Fairmount Water Works Interpretive Center
GIS	Geographic Information Systems
GSI	Green Stormwater Infrastructure
HHW	Household Hazardous Waste
HSI	Habitat Suitability Index
I/I	Inflow and Infiltration
ILF	In-Lieu Fee
IPM	Integrated Pest Management
IWMP	Integrated Watershed Management Plan
IWU	Industrial Waste Unit
LID	Low Impact Development
LTCPU	Long Term Control Plan Update
MS4	Municipal Separate Storm Sewer System
NBS	Near Bank Stress
NMC	Nine Minimum Controls
NSCD	Natural Stream Channel Design
NPDES	National Pollution Discharge Elimination System
O&M	Operation and Maintenance
OOW	Office of Watersheds
PADEP	Pennsylvania Department of Environmental Protection

PCB	Polychlorinated Biphenyl
PCIWMP	Pennypack Creek Integrated Watershed Management Plan
PCPC	Philadelphia City Planning Commission
PCSMP	Post-Construction Stormwater Management Plan
PCWCCR	Pennypack Creek Watershed Comprehensive Characterization Report
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
RDI/I	Rainfall Dependant Inflow and Infiltration
RFP	Request For Proposal
RTC	Real Time Control
SAN	Schuylkill Action Network
SAP	Sewer Assessment Program
SEC	Senior Citizen Environment 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
SWDD	Southwest Drainage District
SWMM	Stormwater Management Model
SYTF	Scrap Yard Task Force
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
TTF	Tookany/Tacony-Frankford
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, 2011 through June 30th, 2012, 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 initiated 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

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 2011 – June 2012, the length of TV inspections averaged about 3.89 miles a month for a total of over 46 inspected miles, as can be seen in **TABLE II.A.2-1 MONTHLY TV INSPECTIONS**.

Table II.A.2-1 Monthly TV Inspections

Date	Miles Inspected
Jul-11	2.6
Aug-10	4.2
Sep-11	2.8
Oct-11	2.9
Nov-11	3.1
Dec-11	4.9
Jan-12	3.0
Feb-12	3.7
Mar-12	5.1
Apr-12	4.3
May-12	5.4
Jun-12	4.7
Average	**3.89**
Total	**46.7**

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 A - FLOW MONITORING**. PWD is in the process of developing Comprehensive Monitoring Plan which will include details on monitoring and assessment of green stormwater infrastructure (GSI) performance, sewer system response to precipitation, receiving water quality, meteorological conditions and groundwater. The plan is projected to be complete by December 2012.

II.B.1.2 Modeling

The U.S. EPA's Storm Water Management Model (SWMM4) was used to develop the watershed-scale model for the PWD combined sewer system. The components of the SWMM4 model used in the development of the Philadelphia watershed and wastewater conveyance model were the RUNOFF and EXTRAN modules. Following model development, PWD converted all collection systems models to SWMM5.

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 has completed 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 Permanent Monitoring network and temporary monitoring programs to support planning for CSO control projects and to minimize dry weather overflows and tidal inflows.

II.B.2.1 Permanent Flow Monitoring Program

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 has allowed PWD to greatly increase the data capture rate. The Collector System Monitoring Network currently connects to 322 sites with over 720 individual level and / or flow measurements with over an eighty percent operational status. The listing of permanent flow monitors can be found in **APPENDIX A – 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 2012, PWD monitored 65 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 A – 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).

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
- August 27-28, 2011
- September 7-8, 2011
- May 15, 2012

*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. If PWD identifies blocks with structurally failing sewers these locations are added to the OWD 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. PWD has modified its customer complaint system to allow for basement backup data to be collected in a more useful way. 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.

<u>Sewer System Analysis</u>

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.

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 2011-2012, an additional 60+ monitors were installed. The information gathered is 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. PWD has also entered into a contract with a firm which will provide an analysis of NEXRAD radar coupled with observed rainfall depth. This radar rainfall will increase the accuracy and confidence associated with model results.

The modeling is still underway for South Philadelphia and the Washington West sections of the City. Flow and rain events have been validated and baseline conditions are being determined for the following trunks sewers.

- Snyder/McKean St sewer shed east of Broad St. (South Philadelphia)
- Lombard St sewer shed east of Broad St. (Washington Square West)
- Tasker and Reed St. sewer sheds (South Philadelphia)
- Oregon Ave, Shunk St., Porter St., Wolf St sewer sheds east of Broad St. (South Philadelphia)

  Passyunk Ave. and Shunk St sewer sheds west of Broad St. (South Philadelphia)
- Packer Ave and Penrose Ave sewer sheds west of Broad St. (South Philadelphia)
- Moore St east of 10th St. (South Philadelphia)

Many individual projects are being 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. A listing of the current SFR projects can be found in **TABLE II.B.3.3-1**.

The projects are large and complicated and will take several years to design and construct. 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.

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

Project Name	Location	Construction Estimate	Anticipated Construction Start	Project Status
Northern Liberties Phase 1	Delaware Avenue and Laurel Street	$3.31 million Final	April 2010	Construction Complete
Northern Liberties Phase 2	Canal Street Chamber	$3.7 million	F 2012	Design 90% Complete
Northern Liberties Phase 3	Delaware Ave to River (SugarHouse Site)	$3.9 million	Spring 2013	Design Started
Northern Liberties Phase 4	Canal & Laurel Sts. to Germantown Ave. & Wildey St.	$8.56 million	Spring 2013	Design 70% Complete
Northern Liberties Phase 5	Germantown Ave. from Wildey St. to Girard Ave.	$4.14 million	Spring 2014	Design 30% Complete
Northern Liberties Phase 6	Germantown Ave. & Thompson St. to Master & Randolph Sts.	$6.8 million	Spring 2015	Design 30% Complete
Moore Street	Moore St. ROW, Christopher Columbus Blvd. to Delaware River	$5 million	Spring 2012	Design 70% complete
Oregon Ave. Flood Relief Tunnel	Oregon Avenue from Broad to Front	$100 million	N/A	Preliminary Planning - complete
Weccacoe Avenue	Weccacoe Avenue, Wolf Street and Oregon Avenue	$13 million	N/A	Design Started
Washington West	Washington Ave. from 13th Street to the Delaware River	$25 million	N/A	Preliminary Planning
Porter Street	Porter, 10th to Broad	$3.5 million Final	June 2010	Construction Complete
Snyder Avenue	Snyder, Front to 4th	$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. Phase one is complete and Phase two will begin construction in 2012, pending electrical re-location.

The Washington Ave. SFR will provide additional storm flow capacity to the Lombard system, which serves Washington Square West, and the Tasker Street system which serves portions of South Philadelphia. The Washington Avenue SFR project area and the South Philadelphia SFR project area are now combined into a detailed model including all impacted streets for greater accuracy. The solution alternatives have been narrowed down to two sets of options that are made up of strategic pipe size increases on a combination of several streets. This could lead to replacement project phases that could happen in advance of larger, more complicated components. 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 modeling the East Germantown section of the City, which has also been impacted by flooding from intense rainstorms, particularly during Hurricane Irene (8/27/11) and Tropical Storm Lee (9/7/11) Preliminary trunk analysis and validation has occurred and the model is being expanded for greater accuracy and to include many solution alternatives.

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 195**.** 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.

PWD has budgeted over $225,000 in FY 2012 for the implementation of this program and other backwater valves. To date, PWD has retrofitted 412 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 FY2012, PWD has made 71 repairs relating to the Basement Protection Program, these repairs cost PWD $225,155 with each repair averaging at $3,171.19

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 backups. 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.3.5 Other Capital Project Support

In addition, hydraulic and hydrologic analysis has been conducted 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 79.

Other Capital Projects related modeling support included 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 112.

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.

Real Time Control Evaluation

The PWD has completed the installation of an inflatable dam in the Rock Run Relief Sewer and 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 volume reductions are achieved 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 74.

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.

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

II.B.5.1 Main Relief

The Main Relief Inflatable Dam storage project was completed in May of 2007. PWD continues to maintain and monitor this in-line collection system storage site. This project reduces the discharge of CSO into the Schuylkill River through utilization of the available in-system storage volume. 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.

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 kept 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.

As of October of 2011 following a major storm, the inflatable dam is no longer operating. A static 7.5 ft dam currently exists in its place as the volume control method. As a result of this change in operation, this relief system now achieves an overflow reduction of 3,665 MG; this is a difference of 12.2 MG from the original design specification.

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 that will be used during site inspections as part of its Pretreatment program. The updated form was faxed to Jennifer Fields, Regional Manager, PA DEP 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 currently regulates 132 SIUs that discharge to the sanitary system. During FY 2012, 123 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.

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 in deciding 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.pwdplanreview.org/StormwaterManual.aspx

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 2011 to July 2012, the SYTF conducted inspections 12 times and inspected 48 scrap yards. Violation notices of varying types from different agencies were issued to the majority of the sites. 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

Facility Concept Plans for each of the WPCPs are currently being developed that will evaluate increasing flow to the plants. These Facility Concept Plans are planned to be completed by June, 2013.

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

PWD provides wastewater service to some of its neighboring communities, for the communities that exceed their contractual limits; they must develop flow reduction plans under PWD review. The following progress has been conduct at the following municipalities/counties during the fiscal 2012 year.

<u>Bucks County Water & Sewer Authority</u>

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 negotiated agreement with PWD in 2008, 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 had been proposed by BCWSA as an effective manner in which to address high peak flows to PWD's system. BCWSA completed work on the surge tank and pump station by early 2012. Although the project was supposed to be completed by September of 2010, it was delayed due to issues with acquiring property rights. PWD has requested technical drawings and flow data from BCWSA in order to evaluate the effectiveness of the tank.

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. As part of the contract, PWD is obligated to provide DELCORA with an accurate estimate of its proportionate share of the City's Long Term Control Plan Update costs by July 25, 2012. At the conclusion of this short-term contract, DELCORA would either have to agree to pay their proportionate share of the City's LTCPU infrastructure to reduce combined sewer overflows, or pay $2,000,000 annually to PWD towards their share of the City LTCPU, until such time that DELCORA built or expanded its treatment facilities that would process the wastewater that is now sent to PWD. PWD did provide an estimated cost of $120 million to DELCORA for their share of the LTCPU, and the Authority has informally agreed to pay this amount and remain a customer of PWD.

Springfield Township

PWD has begun the process of assessing the Township's flow characteristics and possible modifications to the PWD interceptor to determine what reductions in flow will be required by the Township. Once these have been determined, a new contract will be prepared that will include new penalties for flow exceedances, charges for any modifications to the PWD collector system and the Township's proportionate share of the LTCPU.

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

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

Customers	Average Annual Daily Flow Maximum (MGD)	Maximum Daily Flow (MGD)	Instantaneous Maximum Rate (Cubic ft./sec)	Maximum Annual BOD Loadings (000's lbs.)	Maximum Annual SS Loadings (000's lbs.)
Northeast Plant					
Abington	4.453		9.542		
Bensalem	6.133		11.740	5,340	3,734
Bucks	24.000	33.000	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

PWD is currently aware of 62 connections from outlying communities. Presently, permanent flow monitors are installed at 37 connections and temporary monitors at 22 connections, there are 3 unmonitored connections. Through temporary deployments, average flow statistics were determined. **APPENDIX A – FLOW MONITORING: TABLE 1** contains the list of all known connections, their location and whether or not the connection is permanently monitored.

The U.S. EPA's Storm Water Management Model (SWMM5) was used to develop the watershed-scale model for the PWD combined sewer system. Outlying communities are modeled as separate runoff sheds that load directly to the PWD sewer network. The sheds are calibrated to flow monitoring data collected at each respective connection.

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 2012, there were a total of 222 blockages cleared from CSO regulators. The detailed inspection report summaries are included on pages 5 and 8 of **APPENDIX B – FY12 FLOW CONTROLS ANNUAL REPORT**.

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 132 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 2012, 6111 inspections were completed on 201 regulator units. There were 12 discharges with a total of 222 blocks cleared. Details of the inspections during the past fiscal year can be found on page 2 of **APPENDIX B – FY12 FLOW CONTROLS ANNUAL REPORT.**

Tide Gate Inspection and Maintenance Program

In FY 2012, CSO tide gate preventative maintenance was completed 9 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 1 of **APPENDIX B**

– FY12 FLOW CONTROLS ANNUAL REPORT, which documents the locations where preventative maintenance was performed on the tide gates.

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 2012, an estimated 22 tons of grit was removed from the Somerset Grit Chamber. Due to the Dauphin St. sewer rehabilitation work a substantial portion of this trunk sewer's flow was diverted towards the SWWPC & SEWPC Plants resulting in reduced grit accumulations through the year. The grit chamber is measured several times a month to monitor the amount of grit accumulating. Since the end of last fiscal year the chamber grit was removed and the Dauphin St. bypass discontinued.

Somerset Grit Chamber cleaning details, specifically tonnage removed and dates of cleaning during the past fiscal year are available on page 11 of **APPENDIX B – FY12 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 91% of inlet cleaning work orders are scheduled jobs, while the remaining 9% 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 2011– June 2012, 92,037 inlets were inspected, 81,239 inlets were cleaned. Average amount of debris removed from each cleaned inlet was 297.3lbs. 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 FY2012 can be found in **TABLE II.F.1-1.**

Table II.F.1-1: FY12 Inlet Cleaning Statistics

Total Inlets Inspected	92,037
Total Inlets Cleaned	81,239
Total Covers Replaced	817
Total Covers Retrieved	346
Total Covers Chained	680
Tons of Debris Removed	9,782
Avg. Lbs./ Inlet	297.3

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 cleanup 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 maintenance of the fish ladder, PWD plunge pool and streambank restoration projects, woody debris removal, inspection of intake walls and other PWD land-based stormwater management facilities Operation of PWD Floatables Pontoon Boat in spring/summer/fall

In FY 2012, WRT removed a total of 741 tons of debris, including 14 vehicles, 1,256 tires and 50 shopping carts from the City's waterways (**TABLE II.F.2-1**).

Table II.F.2- 1 Summary of Waterways Restoration Team - Performance Measurements FY 2006-2012

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

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 2012 fiscal year, the skimmer vessel was in operation from April 2011 through November 2012 before shutting down for winter maintenance. It resumed operation again in April 2012. The total amount of debris collected in FY 2012 from July 1, 2011 to June 30, 2012 was 36.12 tons. The weights of debris collected during each month are displayed in **TABLE II.F.3.1-1.**

Table II.F.3.1-1 Debris Collected by R.E. Roy Skimming Vessel

Month	Tons of Debris Collected
July 2010	2.43
August 2010	6.77
September 2010	5.60
October 2010	5.79
November 2010	3.89
December 2010	No winter service
January 2011	No winter service
February 2011	No winter service
March 2011	No winter service
April 2011	2.00
May 2011	7.00
June 2011	2.64
FY 2011Total	**36.12**

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)

The pontoon vessel was operated during the summer/fall 2011 and spring /summer 2012 season. In total during the fiscal 2012, the pontoon vessel removed a total of 4.1 cubic yards of recyclable material including bottles, plastic and paper and 2.9 cubic yards of mixed trash.

PWD continues its 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

In October 2010, PWD requested from the Department the removal of these nets removal of these nets due to PWD's belief that the nets are inefficient and resources could be better used elsewhere. Andy Sinclair of the PA DEP responded in April 2012 stating that the Department has accepted our request for removal. PWD is currently waiting to receive a confirmation letter from the Department until then PWD will continue to operate this program.

In FY 2012 the nets were replaced on April 2012 weighing 110 lbs. The nets were scheduled for replacement following several other storms that ripped the nets from their frames due to the velocity.

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 2012, 28 debris grill inspections and cleanings were done. The list of the debris grills receiving preventative maintenance is available on page 11 of **APPENDIX B – FY12 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 regular maintenance of catch basins can help to reduce the amount of pollutants entering the combined system and ultimately, the receiving water.

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

The Public Outreach and Participation conducted in FY2012 for the Green City, Clean Waters program which is the City's vision for addressing CSO reductions (CSO LTCP) has been provided in **SECTION 7.0 - PUBLIC OUTREACH AND PARTICIPATION** of the **APPENDIX C – COA ANNUAL REPORT** starting on page 30.

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

II.G.2.1 Phillywatersheds.org

An important PWD website, www.phillywatersheds.org, acts as a hub for all of the related PWD watershed-based programs and partnership information. The website describes what PWD is doing for the watersheds of Philadelphia, includes educational tools, public meeting materials, maps and the reports generated by PWD or it partners. 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 regularly, 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. During Fiscal Year 2012, 207 posts were made on a wide variety of topics including stormwater management, public events, new topics, and more.

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 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 increased compared to last year, according to Google Analytics. Traffic increased from 56,731 visitors in FY 2011 to 106,066 visitors in FY 2012, 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 that the water quality may not be suitable for any contact with the river. Over 475,000 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 safe 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 farthest 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. The workgroup has implemented best stormwater management practices at many 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.

Key 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.

More recent accomplishments of the SAN stormwater group include:

- Partnering with the Schuylkill Center for Environmental Education to host a two day 2011 teacher's workshop supporting Schuylkill Action Schools (SAS) program for stormwater Best Management Practice (BMP) implementation

- Raising over $100,000 in funding in 2011 to implement SAS projects at 7 different school sites including riparian buffer plantings and reforestation, invasive species removal, streambank stabilization, conversion of turf grass to meadow, and rain garden installations

- Partnering with Villanova University to learn about potential adaptations to urban green infrastructure designs that incorporate results of Dr. Robert Traver research quantifying evapotranspiration as a component of BMPs

In order to communicate to SAN stakeholders the accomplishments of the SAN Stormwater workgroup, as well as other workgroups in the partnership, the SAN routinely updates their website with input from PWD and the SAN Planning and Education and Outreach committees. The website, www.schuylkillwaters.org, includes an internal component that allows for improved communication among SAN workgroup members and facilitates on-the-ground work. 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 Delaware Valley 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 travel time estimates for each downstream intake based on current river conditions and plug flow transport equations. 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 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, temperature, conductivity, dissolved oxygen and pH, but the network will be expanded in future years as monitoring technologies advance and as other monitoring needs are identified. 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 implementation of our 5 year Strategic Plan for the EWS, which was completed in November 2011.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:

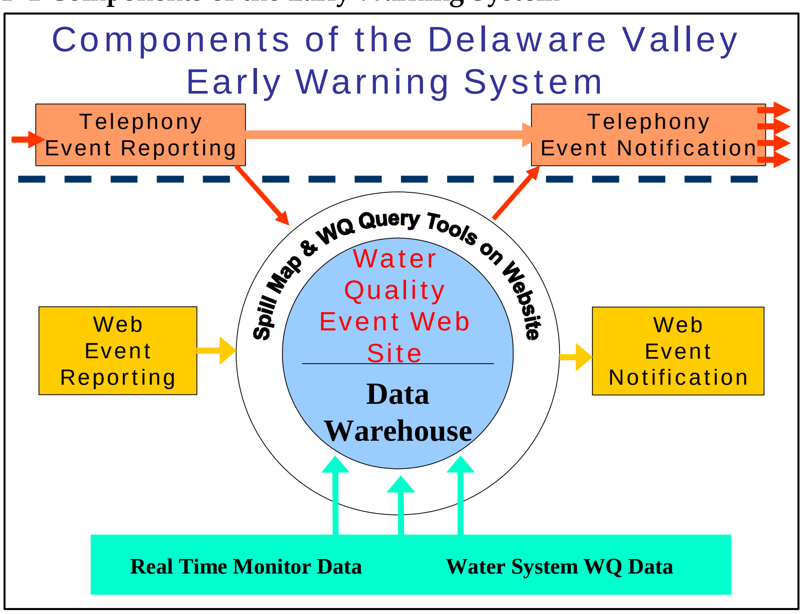
- expand the system's coverage area through both the user base and service area;
- expand system functionalities to support incorporation of Marcellus Shale-related water quality events into the EWS;
- update the EWS hardware and software systems;
- enhance EWS Partnership and Steering Committee communication; 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.2.4 -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 eighteen 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 5 active 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 105.

Development Review Program Website

PWD's Development Review Program has a website where developers can go to for guidance in the review process and submit stormwater plan applications for review: http://www.pwdplanreview.org/

Water Quality 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

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 have been shared to the public during FY2012:

Billstuffers

Rate Increase Billstuffer – July 2011

A billstuffer was distributed to explain to customers about the 4th phase increase in water, sewer and stormwater charges.

Water Emergency Preparedness Billstuffer – September 2011

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.

Publications

2012 Water Quality Report (with 2011 Data) – May 2012

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.

2011 Annual Financial Report – June 2012

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 – May 2012

An annual publication included in the annual Water Quality Report that is distributed to all the rate payers. PWD's Green City, Clean Waters partnership agreement with the US EPA and Green Stormwater Infrastructure were highlighted in the June 2012 edition.

Media Advisories

November 1, 2012 – Venice Island Underground Storage Tank Groundbreaking and Press Conference

February 29, 2012 – GREEN STREETS to Debut in Philadelphia Neighborhoods

March 6, 2012 – Soak it Up Philly! Another GREEN STREET Debuts in South Philadelphia

March 21, 2012 – Soak It Up Philly! Another GREEN STREET to Debut in Germantown

March 29, 2012 – Mayor Nutter and City Officials Debut Another GREEN STREET in North Philadelphia; Soak It Up Philly Saturates Neighborhoods Around the City

April 5, 2012 – Soak it Up Philly! Another GREEN STREET to Debut in East Falls

April 11, 2012 – City of Philadelphia Tapped as First City in U.S. to Install Wastewater Geothermal System Resource Recovery Project to Reduce Heating Costs at Southeast Plant

May 1, 2012 - City of Philadelphia Water Department Celebrates its First "Green Acre" Green City, Clean Waters Parking Lot Transformed into Green Oasis

June 27, 2012 - Philadelphia's Unveils its First "Greened Acre" 10,000 Square Feet of Concrete Transformed into Stormwater Management Oasis

Press releases
September 2, 2011 – Tenth Annual Philly Fishing Fest Feature Fun for All!

October 28, 2011 – Venice Island Underground Storage Tank Groundbreaking and Press Conference

February 21, 2012 - Ameresco and Philadelphia Water Department Announce Northeast Water Pollution Control Plant Biogas Project; New facility to generate electricity to power water utility operations, expected to save PWD over $12 million without additional ratepayer burden

April 10, 2012 – Mayor Nutter, EPA Administrator Jackson Sign Landmark Partnership Agreement for Green City, Clean Waters Plan

April 11, 2012 – City of Philadelphia Tapped as First City in U.S. to Install Wastewater Geothermal System Resource Recovery Project to Reduce Heating Costs at Southeast Plant

April 20, 2012 - WHYY to Air Philadelphia's *Green City, Clean Waters* Documentary Groundbreaking Stormwater Management Plan Highlights Benefits of Going Green

June 21, 2012 - PWD and PIDC Award $3.2 Million in Grants to Promote Green Stormwater Management Practices on Private and Non-Profit Properties Resulting in the Planned Development of 64 Green Acres

Events

Watershed Hero Award Ceremony

August 10- Water Commissioner Howard Neukrug presented Environmental Science Club students with "Watershed Hero" Awards for their "detective" work in tracking down the source of a fish kill in the Cobbs Creek in July. The ceremony took place at noon at the Cobbs Creek Community Environmental Education Center (CCCEEC) located at 700 Cobbs Creek Parkway, Philadelphia, PA 19143.

Community Meetings

September 19 – Joanne Dahme and John DiGiulio hosted a meeting with the 38th Ward CDC to discuss PWD plans for work in their neighborhood under the "Green City, Clean Waters" initiative. The planned work includes street tree planting, parking lot resurfacing and the possibility of a Green Streets program.

Awards

PWD won the 2011 Delaware Valley Green Building Council Award for its Green City, Clean Waters Plan.

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 10, 2011. 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. 325 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 900 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 many attendees also got to tour the Kalmar Nykel and the Gazela ships. In addition to all of the activities taking place at Coast Day over 250 people visited the neighboring Independence Seaport Museum (significantly higher than usual attendance) as well as over 150 adults and children took a free shuttle to the Fairmount Water Works Interpretive Center.

A 2012 Coast Day Event is currently scheduled for Saturday, September 8th, 2012. 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. This year, the event took place on Saturday, September 8, 2012, where approximately 97 individuals participated and approximately 225 fish were caught during the tournament.

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 thirteenth art contest for Philadelphia public, private and home-schooled students, grades K-12 in January 2011. The theme was updated from "Protect Philadelphia's Hidden Streams" to "Green City, Clean Waters" to help educate city residents not only of what they can do to protect our waterways but also PWD's new initiative. 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 over 740 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/.

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 2012. During FY 2012 the pages of the activity booklet were clicked on 4,486 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.

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 12 the Homeowners Guide was downloaded 1,100 times and the School Campus Guide 295 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 12 the Resource Guide was downloaded 722 times.

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. An event called Delaware River Day was held on May 19, 2012 to promote National Safe Boating Week (May 19-25, 2012), the United States Coast Guard and the PA Fish and Boat Commission provided education literature.

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.

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 2012.

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 2001-2012.

Delaware Estuary Watershed Workshop for Teachers

The 16th Annual Teacher Workshop was held July 9-13, 2012 in conjunction with the Partnership for the Delaware Estuary, Delaware National Estuarine Research Reserve and PWD. Eighteen teachers attended 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 "Islands of Aloha." The show took place from March 4th-11th, 2012, the Philadelphia Water Department's display this year featured key landmarks in Philadelphia as lushly planted "green islands" in a sea of pavement that absorb and filter polluted stormwater runoff to protect the rivers that provide the city's drinking water. The live exhibit was seen by over 200,000 people with stormwater pollution prevention messages and promotion of PWD's Green City, Clean Waters program.

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. In FY2012, the SEC continues 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 2012 the following topics were presented:

- Iodine 131
- Proposed Changes in Water, Wastewater and Stormwater Rates and Changes
- Residential Stormwater Best Management Practices Pilot Program

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

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

The mission of the Center is to: "to foster stewardship of our shared water resources by encouraging informed decisions about the use of land and water. We educate citizens about Philadelphia's urban watershed, its past, present and future, and collaborate with partners to instill an appreciation for the connections between daily life and the natural environment."

Teachers, students and other visitors are invited to explore innovative exhibits and interactive educational programs meld the history, technology and science of providing water to a regional urban watershed. As detailed in **TABLE II.G.4-1,** during the FY2012 nearly 53,000 visitors attended the Interpretive Center which consisted of general visitors, school groups, community groups, and attendees for special exhibits, visiting authors and lecturers.

Table II.G.4-1 2011-2012 Fairmount Water Works Interpretive Center Visitors

2011-2012 Fiscal Year Fairmount Water Works Interpretative Center Visitors	
School Groups	274 classes, totaling 6,949 students
Special Exhibits	(3 Events) 4,241 adults and children
Visiting Authors, Lecturers, Environmental Leaders	(12 events) 534 adults
Community Programs	2,254
General Visitors	38,965
Fiscal Year 2012 Total Visitors	**52,943**

Short descriptions of the FWWIC programs are described below:

<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: A Drop in the Bucket

Laboratory equipment and internet connection link students and visitors at the Interpretive Center's lab to Water Department scientists for real-time experiments and programs. Students learn with this technology, how our scientists utilizes real--time freshwater samples from the Schuylkill River to observe, record and draw the microscopic life in the river.

Green City, Clean Waters: Following Nature's Lead
Students learn how Philadelphians are using 21st century watershed management tools to transform the cityscape from grey (traditional) technologies to green sustainable technologies.

Global Water Action: Engineering a 21st Century Solution
Students learn that getting access clean water is a global issue. Young people need to make global connections to people, issues and solutions related to access to clean water, proper sanitation and hygiene in other parts of the world.

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. The table below describes the dates and topics of Schuylkill Soundings that occurred during FY2012 (**TABLE II.G.4-2**)

Table II.G.4-2 FY2012 Schedule of Schuylkill Soundings Presentations at the Fairmount Water Works

Presenter	Date	Topic
PWD and PHS Panel	July 20, 2011	Green City, Clean Waters: An Update
Danielle Kreeger, PDE Science Director	August 17, 2011	Partnership for the Delaware Estuary's Poster Presentations from the Delaware Estuary Environmental Summit
Samantha Muka, PhD student at University of Pennsylvania	September 21, 2011	Turbines to Tanks – The Early Days of the Philadelphia Aquarium at the Fairmount Water Works
Joanne Dahme, PWD	October 19, 2011	Flood! What Happened When the Hurricanes Hit
Gerald Bright, PWD	November 17, 2012	The Cobb's Creek Reaches 6-8 Stream Corridor Restoration Project
EWB-USA Leader	December 21, 2011	Engineers Without Borders-USA: Projects in Action
Adam Levine and C. Drew Brown, PWD	January 19, 2012	The History of Water Filtration in Philadelphia
Ed Grusheski, retired PWD employee	Februray 16, 2012	Life, Death and Rebirth of the Schuylkill River
TTF Partnership - Board of Directors	April 19, 2012	Celebrating Watershed Milestones with the TTF Watershed Partnership
Rich Wagner, Beer Historian	June 21, 2012	Turning Water into Beer: Breweries Along the Schuylkill River

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 effects 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 forecasts the water quality of the Schuylkill River.

<u>CSO Outfall Signage</u>

The CSO signage project was initiated to inform the public of the potential hazards of contact with the stream during combined sewer overflow events. The signs, placed at outfalls that are accessible by the public, let people know that during wet weather it is possible for polluted water to flow from the outfall and 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?*'.

<u>CSO Identification Signage</u>

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.

For additional information on PWD's public notification, please refer to **SECTION II.G.3 – "CONTINUE TO PROVIDE ANNUAL INFORMATION TO CITY RESIDENTS ABOUT PROGRAMS VIA TRADITIONAL PWD PUBLICATIONS"** on page 49.

For information on the web and telephone based Early Warning System for water suppliers and industrial users and PWD websites. Please refer to **SECTION II.G.2 "CONTINUE TO MAINTAIN WATERSHED MANAGEMENT AND SOURCE WATER PROTECTION PARTNERSHIP WEBSITES"** on page 40.

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. The CSOCast notification system at be accessed through: http://www.phillywatersheds.org/what_were_doing/documents_and_data/live_data/csocast.

Instead of using water quality parameters to forecast conditions, CSOcast relies on a network of depth 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. The map is available 24 hours a day and displays the most up-to-date data available (**FIGURE II.H.2-1**). A SWMM model was added to the CSOcast system to function as a check for the sewer monitoring data.

During the past fiscal year, CSOcast reported on all 24 rain gages and 147 monitors twice a day. 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.

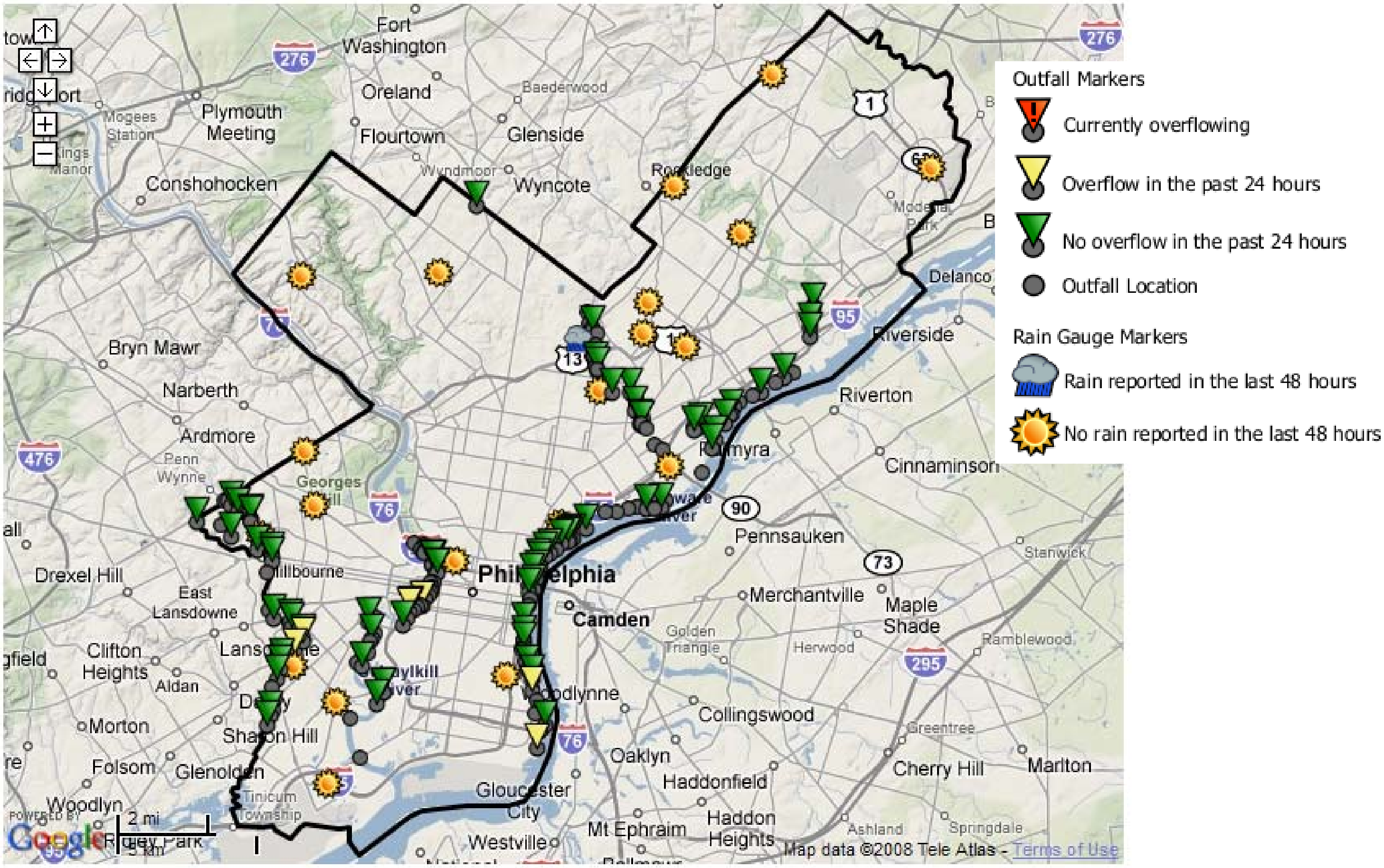


Figure II.H.2-1 Screen Capture of the CSOcast Website

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").

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

An amended Consent Order & Agreement was signed by PWD and PADEP on June 1, 2011, amending the Green City, Clean Waters Program 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 an update on implementation progress.

III.B Capital Improvement Projects

The Capital Improvement's phase of the PWD's CSO strategy is focused on technology-based capital improvements to the City's sewerage system that will further increase its ability to store and treat combined sewer flow, reduce inflow to the system, eliminate flooding due to system surcharging, decrease CSO volumes and improve receiving body water quality. PWD will continue to 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 and Rehabilitate and Maintain the Monitoring Network

The Real-time Control Center was completed in summer of 2003 and PWD continues to operate the center. For information pertaining to this topic, please refer to **SECTION II.B.4 - FULLY INTEGRATE THE REAL-TIME CONTROL FACILITY INTO THE OPERATIONS OF PWD** on page 24.

PWD continues to maintain and rehabilitate when necessary it's monitoring network, for details on FY2012 maintenance of monitoring network, please refer to **SECTION II.B.2 - CONTINUE TO OPERATE AND MAINTAIN A NETWORK OF PERMANENT AND TEMPORARY FLOW MONITORING EQUIPMENT** on page 18.

III.B.1.2 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 (**TABLE III.B.12-1**). 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.1.2-1 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.1.2.1 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.1.2.2 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 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 Notice to Proceed for this project was issued in February 2003 and the construction was complete by January 2006.

III.B.1.2.3 Plan, Design, and Construct Options 2 & 6 of the Stress Test Report to Increase the Secondary Plant Capacity to 435 MGD

The 2000 Northeast WPCP Stress Test report 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 were removed through the rerouting of the return activated sludge (RAS) piping and the construction of a new effluent conduit. The work was completed in February 2012 and the modified effluent conduit is in service.

Identified as upgrade option #7 in the 2000 Northeast WPCP Stress Test Report, the purpose of this project (#71069) is to increase the hydraulic throughput capacity of the Set 2 primary clarifiers by constructing four (4) 48" diameter conduits between existing grit chamber effluent conduit and the Set 2 primary influent channel. This will introduce flow to the clarifiers in a more uniform fashion. The construction of these conduits was completed by July 2012 including electrical work and valve control systems verification. These conduits became operational in August 2012.

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

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 design for the main rehab has been completed; construction is expected to start in 2013. PWD initiated detailed design work for a new, additional pretreatment facility and a diversion chamber from the Frankford high-level sewer to increase preliminary treatment.

PWD is currently performing extensive hydraulic modeling of the sewer to understand the sewer conveyance limits for a new pretreatment facility. The design of the third barrel / new sewer is currently in the conceptual phase, including hydraulic modeling work. PWD is evaluating several design and construction alternatives with the design consultant prior to completion of the conceptual design.

<u>III.B.1.2.5 Initiate the Facility Planning and Design for the By-pass Conduit</u>

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 channel 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 and bench scale chlorine disinfection studies support the feasibility of the bypass to reduce fecal coliform counts below 100 MPN/mL.

Detailed design of the bypass conduit is nearly complete, as prepared by a consulting engineering firm. PWD reviewed a draft of the 100% design documents in May 2012. The 100% design, bid ready documents should be delivered to PWD in the fall of 2012.

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

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

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

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.1.4 In-Line System Storage Projects (NE)

III.B.1.4.1 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. 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 helps 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 reduces 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, results 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. In FY2010, the new operations' building was completed. Since then, 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. On November 5, 2011 the testing was completed. At present, the system is in manual operation, the project is currently begin evaluated to determine optimum configuration.

III.B.1.4.2 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). 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 reduces the discharge of combined sewage into Tacony Creek. 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.

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.

The project construction bid was awarded on June 13, 2006. 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.

Due to concerns about safety operating the inflatable dam, the controls are 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.

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

Since no project with this name exists, this may actually be referring 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 75 of this report.

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

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

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

Table III.B.1.6.1-1 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. The Notice to Proceed was issued in August of 2000 and the project was completed by April 2002.

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

Please refer to **SECTION III.B.1.2.1 "EVALUATE STRESS TEST REPORT OPTIONS IN THE LTCPU"** on page 70 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 Central Schuylkill Pump Station (CSPS) based on the level in the Cobbs Creek Lower Level (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 3rd phase of the RTC conceptual design is enlargement of the S38 DWO pipe and regulation of flows using a computer-controlled DWO gate.

Phase I

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 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 was bid in April of 2006. 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. Projects were closed out by April 2010.

Phase II
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 early 2008 and 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 and has now been closed out.

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.

Phase III
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.

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 25 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

Stokely & Roberts (R22) - Dobson's Run Phase I
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). This project eliminated 2 of the City's intercepting chambers and completely eliminated CSO overflows at R22, resulting in a 173-MG reduction in overflow volume on an average annual basis. The contract was awarded to A.P. Construction and construction commenced on 7/18/1996. The construction was completed on 10/4/1998.

Kelly Drive (S01T) - Dobson's Run Phase II & Phase III
Phase II of the Dobson's Run Reconstruction consisted of the sewer reach from Henry Ave. to Kelly Drive and eliminated branch sewer contributions of sanitary sewage from reaching temporary CSO S01T. Phase III eliminated all CSO discharge from occurring at S01T. In order to take advantage of economies of scale, design work for Phase II and III of Dobson's Run had been combined into one project because both phases involve tunneling. The project consisted 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 contract was awarded in February 2007. 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 is constructing 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 being constructed on Venice Island, an artificial island between the Manayunk Canal and the Schuylkill River created when the Manayunk Canal was dug out.

The storage tank will accommodate sanitary sewer/combined sewer overflow (SSO/CSO) that currently averages approximately 10 million gallons of untreated wastewater each year and will return it to PWD's Southwest WWTP. 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 notice to proceed to start construction was issued to the contractors on July 22, 2011.

Construction commenced on August 16, 2011, reinforcing the Lock St. bridge to enable it to accommodate heavy construction vehicle traffic onto Venice Island. Demolition of existing site facilities, as well as clearing and grubbing, has been completed. All concrete work associated with the construction of the diversion chamber is complete. A total of 413 aggregate piers have been installed along the river bank to improve soil structural strength and slope stability. Excavation, and all related sheeting and shoring, for the construction of the storage tank is complete. A total of 528 rock-anchors have been installed for the storage tank base slab. The concrete base slab for the storage tank is complete. Concrete walls, columns for the storage tank are being constructed. Stormwater sewers, manholes, endwalls, and gabion walls along the river bank are being installed. The foundation work will commence for the Performing Arts Center concurrently is expected to start shortly.

In accordance with the PADEP Consent Order and Agreement, the storage tank and headhouse are to be on-line by March 22, 2013 and fully operational by May 22, 2013. The contract date of completion, which also includes construction of the Performing Arts Center, is January 7, 2014.

The consent order issued for Main and Shurs also includes two sewer relining projects to be completed around R-20 in an effort to reduce inflow and infiltration. Lining project at upper Schuylkill intercepting sewer has been completed and the lining project Wilde, Ridge, Dupont, Silverwood St. subtanially completed.

Manhole rehabilitation is also underway within this area; approximately 130 manholes on the interceptor and sewers are being sealed from I/I groundwater and infiltration.

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 17 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 identify and remediate areas of I/I as well as guide the capital improvement program to ensure that the existing sewer systems are adequately maintained, rehabilitated, and reconstructed. Please refer to **SECTION II.A.2 "IMPLEMENT A COMPREHENSIVE SEWER ASSESSMENT PROGRAM (SAP)"** on page 15 for more information on this program.

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.

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. Additional details on the progress of interceptor relining occurring in the Cobbs and Tacony-Frankford Watersheds are discussed in the **APPENDIX C – COA ANNUAL REPORT ON** page 23.

PC-30 Relief Sewer

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 Department granted the City an extension of time on it Consent Order and Agreement of 12/31/11. The project and all stipulations of the Consent Order and

Agreement were completed on 12/27/11; a final report was submitted to the Department. PWD is currently working with the department to complete any additional tasks to closeout this project.

There were 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 was a major source of I/I, will have significant reduction of I/I related overflows. A Notice to Proceed for this project 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, and Basile Rd. have been completed. Sewer linings at London Road, Narcissus Road, Red Lion, Derry Terrace, Fairdale Road, Morning Glory, and Academy Road are expected to start construction in the Fall of 2012. Comly Rd along with several other streets around the PC-30 area are expected to start construction in 2013.

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 78.

III.B.2.1.2 Sewer Separation

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

III.B.2.1.3 New Storage Facilities

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

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

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.

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. Implementation plans for the Pennypack Creek Watershed, in addition to updates to the Cobbs and Tookany/Tacony-Frankford Watersheds are in development. Adaptive management will be utilized as necessary at each 5-year planning interval to ensure that progress is being achieved.

The Darby Cobbs Creek IWMP was completed in October 2004 and can be accessed online through the following website:
http://www.phillywatersheds.org/doc/Darby_Cobbs_WMP.pdf .
The Tookany/Tacony Creek IWMP was completed in May 2005 and can be viewed online on our website:
http://www.phillywatersheds.org/doc/Tacony_Frankford_WMP.pdf .

The Pennypack Creek Act 167 was completed in 2011; the Bucks County Commissioners adopted it in June 2012 and the Montgomery County Commissioners in July 2012. With that watershed-wide groundwork in place, PWD is now forging ahead on development of the Pennypack Creek IWMP which will be completed by December 2012. The Poquessing Creek Act 167 was adopted by the Montgomery County Commissioners in July 2012. The Poquessing Creek IWMP is expected to be completed about 6-12 months after the PADEP approval of the Act 167 Plan. The Wissahickon Creek Act 167 should be complete by summer 2013. The 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.1-1** provides an update and status of the watershed partnerships that exist in the Philadelphia area.

Table III.C.1-1 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 regular 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 and has led the development of the Act 167 Stormwater Management Plan.
Wissahickon Creek Watershed Partnership	Initiated in 2005 for the development of an Integrated Watershed Management Plan and is currently advising the development of the Act 167 Stormwater Management Plan and coordinating municipal responses to the Siltation TMDL.
Poquessing Creek Watershed Partnership	Initiated in 2006 for the development of a River Conservation Plan; reconvened in 2009 for the development of an Act 167 Stormwater 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. Currently, this group convenes as needed for topics related to the implementation of Green City, Clean Waters.
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 Schuylkill Partnership will be charged with supporting and advising PWD in implementing Green City, Clean Waters.

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 (**TABLE III.C.1-2**). The partnership was integral in developing the Tookany/Tacony-Frankford Integrated Watershed Management Plan (TTF IWMP) and is currently working on implementing this plan

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 elects a Board of Directors each year and has received its tax-exempt status as the first multi-municipal Watershed Partnership in the region. The Partnership hired its first Executive Director in 2007, with the current Executive Director joining the organization in 2011. It now has a full-time staff of five.

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.1-2 Current Members of Tookany-Tacony/Frankford Partnership

Abington Township	PA Horticultural Society
AKRF	PECO
Arcadia University	Philadelphia City Council
Cheltenham Township	Philadelphia City Planning Commission
City of Philadelphia's Mayor's Office of Sustainability	Philadelphia Parks Alliance
Friends of High School Park	Philadelphia Parks and Recreation
Heritage Conservancy	Philadelphia Water Department
Jenkintown Borough	Rockledge Borough
Ogontz Avenue Revitalization Corporation	SEPTA
Montgomery County Commissioners	Senior Environmental Corps.
Montgomery County Conservation District	Springfield Township
PA Environmental Council	TD Bank

The Tookany/Tacony-Frankford Watershed Partnership held 103 meetings and events during FY2012; approximately 2,860 participants attended these events.

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."

During the past fiscal year, the partnership focused on public education and outreach, the formation of a Friends of Cobb group, the second annual Cobbs 5-K run, Cobbs stream restoration, and the promotion of stormwater BMPs. The partnership's activities during FY2012 are described below:

Public Education and Outreach Committee Activities & Friends of Cobbs Creek and 501c-3 effort

- Monthly meetings were held with Parks & Recreation and PWD to explore the initiation of a Friends of Cobbs Creek group.

Cobbs 5K

- The partnership assisted with the implementation of the 2nd Cobbs Creek 5k on April 21, 2012, which resulted in 163 participants, 32 volunteers, and approximately $2,500 of earnings towards programming in the park and creation of the Friends of Cobbs Creek.

Cobbs Creek stream restoration outreach

- The partnership conducted outreach to all property owners in the priority restoration reaches, and drafted a summary report that was utilized by PWD and its contractors at the kickoff meeting on April 25, 2012.

Lansdowne/Yeadon Borough Elm Street Project BMP/workshop

- The partnership coordinated a rain garden workshop on May 3, 2012 for homeowners in the Elm Street program geography, and set a follow-up second rain garden planting demonstration workshop on October 7, 2012.

58th street Greenway

- The partnership completed the final designs for the 58th Street Greenway, a 1.4 multi-use trail that connects Cobbs Creek Park with Bartram's Garden. The trail is currently under construction and includes two stormwater BMPs: an infiltration trench, and a bio-retention area.

Collaboration with Eastern Delaware County Council of Governments on regional stormwater management

- The partnership set up and facilitated a strategic meeting on April 17th with the Southeastern PA Research, Conservation & Development Council, the Delaware County Planning Department, The Delaware County Conservation District, and PWD to discuss collaboration opportunities with the shared stormwater manager project. Several opportunities were proposed and PEC will integrate these discussions into the creation of a work plan for the Cobbs Creek Watershed Partnership.

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.

Pennypack Watershed Partnership meetings: Partnership activities in FY12 focused on the finalization of the Pennypack Watershed Act 167 Plan

Pennypack Public Education and Outreach Activities:

- Act 167 planning team collected and addressed comments received at June 14th public hearing held for final Act 167 plan. Additional meeting held with counties to gather their comments on the plan.
- Coordinated with Act 167 planning team, municipalities, and counties to complete the steps necessary to adopt plans. Bucks County Commissioners adopted the plan on June 20, 2012; Montgomery County Commissioners adopted the plan on July 19 2012. Plan is ready to submit to PA DEP for final approval.
- An Integrated Watershed Management Plan (IWMP) for the watershed is also being drafted by PWD that will complement the Act 167 plan.
- Contacted partners to update and summarize partner activities for FY2012 Partnership Activities
- Coordinated with Trout Unlimited on potential Growing Green grant submittal for headwaters wetland; determined grant could not be obtained after receiving input from PA DEP. The partnership is coordinating further with Trout Unlimited on the identification of funding for headwater area projects.
- Partnership coordinated with Army Corps of Engineers and Trout Unlimited to identify volunteers to conduct before/after sampling for Southampton Creek restoration project.

A detailed listing of the Pennypack Creek Partnership plans and projects are described in **APPENDIX D – WATERSHED PUBLIC EDUCATION AND OUTREACH EVENTS & ACTIVITIES.**

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 and events:

- October 25, 2011 - Saint Christopher's Elementary School meadow planting project: partnership conducted classroom education on watersheds, followed by outdoor mulching of trees/shrubs to re-enforce maintenance.
- December 8, 2011 - partnership meeting addressing Act 167 update
- April 24, 2012 - meeting with new Executive Director of Glen Foerd to plan education and riverfront restoration projects at Glen Foerd that can be tied into Poquessing Watershed education.
- May 21, 2012 - partnership meeting that focused on final Act 167 plan and steps to adoption.
- July 10, 2012 - Act 167 public hearing - comments were collected and addressed by partnership and their consultant team. Plan was adopted by Montgomery County Commissioners on July 19th and will be scheduled shortly for Bucks County Commissioner approval).

Poquessing Watershed Partnership Public Education and Outreach Activities:

- Coordinated with Poquessing Watershed municipalities to gather comments on the Act 167 plan.
- Contacted municipalities regarding potential demonstration projects that can be tied to education.
- Coordinated with Bensalem and Lower Southampton who identified demonstration projects. Sent compilation of meadow photos to support Lower Southampton's outreach to Homeowner Association for creation of meadow in turf grass basin.
- Coordinated plans for Saint Christopher's Elementary School meadow planting project

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 and Events– The partnership was focused on stakeholder plans/projects and how they can overlap with the Green City, Clean Water Program:

- May 24th, 2012 - joint Delaware Direct/Schuylkill Partnership meeting focused on Green City, Clean Water program opportunities and stakeholder updates.
- Delaware Direct Newsletter initiated in April 2012; parallels effort for Schuylkill Partnership to engage partnership members.
- Continued to participate in Army Corps, PWD, Delaware River Waterfront Corporation, and Delaware River City Corporation meetings to explore prioritization and funding for ecological restoration projects along the Delaware (last met on August 10, 2011).
- Procured PDE funding to further promote Bridesburg riverfront ecological restoration. PPR briefed on December 16, 2011, to promote Bridesburg park development option tied to restoration. PDE grant is currently being used to address environmental assessment work required to consider property reuse as a park.
- Supported media outreach effort for the ribbon cutting of Delaware River City Corporation's Lardner's Point Park construction.
- Assessing riverfront ecological restoration opportunities along the soon to be constructed K&T trail alignment in north Philadelphia reach through a William Penn Foundation grant.
- Continued Paddle Penn's Landing program which continues through the summer; includes kayak and swan boat excursions and environmental education for the general public.

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.

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

This year the partnership has focused on Act 167 plan initiation and development, and on compliance with MS4 permit updates including Total Maximum Daily Load (TMDL) planning requirements.

Wissahickon Watershed Partnership Meetings and Public Education and Outreach Activities:

- October 25, 2011 Partnership meeting addressed status of Act 167 plan, plus upcoming PAG-13 permit update obligations (e.g. TMDL) and updates on watershed-wide BMP projects being completed by many of the partners.
- PEC followed-up with municipalities to prompt them to submit municipal data to the Temple/NTM Act 167 (e.g. problem areas, stormwater and flood infrastructure).
- Organized and facilitated May 10, 2012 municipal meeting that addressed opportunities to collaborate on PAG-13 permit requirements focusing on TMDL planning.
- Followed up with June 15, 2012 TMDL implementation and municipal collaboration meeting with municipal engineers and PA DEP officials. Meeting focused on what municipalities need to include in TMDL plans, including a common analytical approach for calculating sediment load reductions required by the TMDL.
- Currently developing watershed wide Public Education and Outreach strategy that municipalities can include under minimum control measures 1 and 2 permit requirements
- PEC participates on Wissahickon Valley Watershed Association's (WVWA) Water Resource Committee, providing updates on Partnership and Act 167 activities.
- PEC followed up on municipal ordinance changes that reflect Wissahickon Roundtable Ordinance review effort; several modest changes made by municipalities to their code to improve stormwater management.
- PEC participate (Patrick Starr as facilitator) in WVWA and Friends of Wissahickon March 29, 2012, town meeting (A Creek in Crisis?)

Basin and meadow projects:

- Completion of North Wales homeowner basin retrofit (fall 2011)
- Completion of Aiden Lair Park basin retrofits (fall-winter 2011)
- Continuation of meadow installation follow-up activities in Upper Dublin (Mondauk Park and Aiden Lair Park reseeding) and Whitemarsh (Koontz Park reseeding and May 21 2012 plug planting with volunteers).

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

- Schuylkill Watershed Partnership kick-off meeting held on October 5, 2011.
- Follow-up partnership survey conducted to further define goals and objectives of partnership.
- Monthly newsletters prepared for Partnership starting in November 2011.
- PEC provided initial support to PWD for creation of project inventory system that partners can easily populate to share information on their projects.
- May 24th joint Schuylkill/Delaware Direct Watershed Partnership meeting focused on PWD and stakeholder updates, followed by BMP tour.

<u>Assessment of Current Watershed Status; Identification of Problems</u>

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 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 (**TABLE III.C.1-3**) for each watershed is:

Table III.C.1.-3 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 (**TABLE III.C.1-4**) have been arranged such that they fit under the broader headings of the "Umbrella Goals".

Table III.C.1-4 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%.
Streamflow and Living Resources. Improve stream habitat and integrity of aquatic life.	Restore aquatic ecosystem health	• Increase benthic quality index to 80% of reference reaches. • Increase IBI to 40 averaged at all sampling sites.
Stream Corridors. Protect and restore stream corridors, buffers, floodplains, and natural habitats including wetlands.	Reduce channel erosion and sediment loads caused by runoff	• Reduce annual sediment load from overland flow by 10%. • Reduce annual sediment load from channel erosion by 75%
	Improve aquatic habitat	• Restore X miles of stream channel and habitat such that habitat scores are X% comparable to reference conditions.

IWMP "Umbrella" Goal	Wissahickon Watershed Partnership Goal Subset for City of Philadelphia	Measurable Objectives for the City of Philadelphia to Guide Implementation Process
Flooding. Identify flood prone areas and decrease flooding by similar measures	Reduce the frequency and severity of damaging (out of bank) flooding	• Reduce [flooding indicator] to [value at a specific location]. • Prioritize most vulnerable areas and ensure flood mitigation planning
Quality of Life. Enhance community environmental quality of life.	Improve awareness of watershed issues at a local level (municipalities and stakeholders)	• Convene a watershed partnership stakeholder forum • Establish a partnership website to serve as an information resource
	Make stormwater/watershed related educational opportunities available to every stakeholder in the watershed	• 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
Stewardship, Communication, and Coordination. Foster community stewardship and improve inter-municipal, inter-county, state-local, and stakeholder cooperation and coordination on a watershed basis.	Increase preparedness for natural hazards, spills, discharges and terrorism	• 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
	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. In the longer-term, PWD will work with the Watershed Partnership to develop a watershed-wide approach for addressing these goals. An IWMP will be pursued after the completion of a watershed-wide Act 167 Stormwater Management Plan, scheduled to be completed in the Summer of 2013.

<u>Pennypack Creek Watershed</u>

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 were not intended to be specifically measurable at that time. 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.1-5)**

Table III.C.1-5 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. These goals were integrated into the Pennypack Creek Watershed IWMP which focused on those most relevant to the City portion of the watershed.

City of Philadelphia Goals in the IWMP

At the completion of the watershed-wide goal setting process PWD began to evaluate how to move forward with their planning process while the upstream portion of the watershed continued to gather data and complete a number of ongoing initiatives. PWD determined that in order to meet their own permit commitments that they would continue the planning process and select from the "umbrella list" of watershed-wide goals those which were relevant to the City of Philadelphia portion of the watershed and move through the planning framework as prescribed with the evaluation of goals as appropriate to the City. These goals ensure consistency of management strategies throughout the City of Philadelphia. A significant effort was made to consolidate various goals into a single, coherent set that avoids overlap and is organized into clear categories. The "umbrella list" is shown below in **Table III.C.1-6 – IWMP Goals**. The corresponding number for each goal does not signify a ranking or priority and goals are numbered for organizational purposes only. In comparison to the goals listed in **Table**

III.C.1-5 - Pennypack Creek Watershed Stakeholders Goals and Objectives, the upstream areas and the City of Philadelphia share the majority of the same goals.

Table III.C.1-6 Integrated Watershed Management Plan Goals

IWMP GOALS	
Goal 1	Living Resources. Improve stream habitat and integrity of aquatic life.
Goal 2	Instream Flow Conditions. Reduce the impact of urbanized flow on living resources.
Goal 3	Water Quality and Pollutant Loads. Improve dry and wet weather stream quality to reduce the effects on public health and aquatic life.
Goal 4	Stream Corridors. Protect and restore stream corridors, buffers, floodplains, and natural habitats including wetlands.
Goal 5	Flooding. Identify flood prone areas and decrease flooding by similar measures intended to support Goals 1, 2, and 4.
Goal 6	Quality of Life. Enhance community environmental quality of life.
Goal 7	Stewardship, Communication, and Coordination. Foster community stewardship and improve inter-municipal, inter-county, state-local, and stakeholder cooperation and coordination on a watershed basis.

Pennypack Watershed Objectives
Clear, measurable objectives provide the guidance for developing options designed to meet the project goals and indicators to track progress. Both goals and objectives are rooted in the collective idea of the stakeholders on what the watershed management plan should achieve.

For each goal statement one or more objectives will be defined. An objective translates the broad language of a goal statement into a measurable quantity. The objective should lead toward the establishment of a target value, and could help to establish a trend over time.

The following long-term goals and objectives have been adopted by the City of Philadelphia:

Living Resources

Objective 1.1 Increase benthic quality index
Objective 1.2 Increase IBI averaged across all sampling sites
Objective 1.3 Maintain average annual dry weather flow

Instream Flow Conditions

Objective 2.1 Reduce amount of Directly Connected Impervious Cover (DCIA)

Water Quality and Pollutant Loads

Objective 3.1 Eliminate cross-connections of sanitary to storm sewers
Objective 3.2 Eliminate sanitary sewer discharges to stream in dry weather
Objective 3.3 Meet state numeric criteria for bacteria in dry weather
Objective 3.4 Meet state water quality standards for dissolved oxygen
Objective 3.5 Meet state criteria for pH at all sites and times
Objective 3.6 Remove Pennypack Creek from the state list of impaired waters
Objective 3.7 Install land-based control measures
Objective 3.8 Implement infrastructure-based control measures
Objective 3.9 Reduce the annual sediment load from overland flow and channel erosion

Stream Corridors

Objective 4.1 Restore miles of stream channel and improve habitat scores

Flooding

Objective 5.1 Identify flood prone areas

Quality of Life

No measurable objectives

Stewardship, Communication, and Coordination

Objective 7.1 Educate residents about benefits of rain barrel installation
Objective 7.2 Develop and conduct workshops on stormwater management/watershed issues
Objective 7.3 Convene a watershed partnership stakeholder forum
Objective 7.4 Establish a partnership website to serve as an information resource

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 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. 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. **TABLE III.C.1-7** below shows the planning efforts that have been conducted in each of the City's Watersheds.

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.

Table III.C.1-7 - 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		Completed in 2011	PWD continues to work with watershed partners on implementing specific projects.	Documented in the LTCPU and COA
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	Act 167 Stormwater Management Plan (currently in approval and adoption stage).	PWD initiated an IWMP in winter 2008, and will have a completed plan by December 2012. A 5-yr Implementation Plan will be developed in 2013.
Schuylkill River (tidal, non-tidal)	Monitoring Only		Completed in 2001 by the Academy of Natural Sciences, Natural Lands Trust, and the Conservation Fund	PWD continues to work with watershed partners on implementing specific projects.	Documented in the LTCPU and COA
Poquessing Creek	2001	2008-2009	Completed in 2007	Act 167 Plan was initiated 2009 and is scheduled for completion in 2012	To be developed 2013
Wissahickon Creek	2001	2005-2006	Completed in 2000 by FPC	Initiated in 2005, anticipated completion after the development of Act 167 plan and municipal TMDL commitments – (projected 2013-2014).	Wissahickon TMDL implementation commitments to be developed in 2012; IWMP implementation plan to be completed in 2013 and depends on watershed partnership support for a watershed-wide initiative.

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://pwdplanreview.org/WICLibrary/StormwaterRegulations.pdf

Please refer to the Stormwater Management Report **SECTION F.5.B "POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT"** on page 200 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

The City continues to implement stormwater BMPs and LID through its various different programs, since 2006 the City has built nearly 30 projects in the combined sewer area alone and over 170 projects are being planned or have begun construction.

Please refer to **APPENDIX C –COA ANNUAL REPORT** on page 6 for a detailed description on the City's implementation of Stormwater BMPs and LID during FY2012.

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

The City continues to maintain all City-owned inlets and catch basins to ensure that are clear and operating correctly. For a full description of the activities conducted by inlet cleaning program during FY2012, please refer to **CSO SECTION II.F.1 "CONTROL THE DISCHARGE OF SOLIDS AND FLOATABLES BY CLEANING INLETS AND CATCH BASINS"** on page 35.

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

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

Parcel-based Stormwater Billing

For many years, the PWD 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 reasonable at the time but relied on large assumptions. Recently, the City decided to use a formula based billing approach to more accurately calculate the relative volume of stormwater generated from a property. It was decided 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. After detailed analysis of each of the City's 450,000 residential properties, the City's decided the residential properties would treated as a single parcel with total gross area and imperviousness area factors with the total cost divided among all residences.

This is billing structure required having more detailed parcel information to transition from a meter based charge to a property based stormwater charge among its non-residential customers. In early 2006, PWD 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. PWD 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)

PWD will transition over the next four years to parcel-based stormwater charges among its non-residential customer base in FY 2011. This transition will result in more equitable stormwater charges that closely match the cost of managing stormwater runoff from each property. PWD 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. PWD is applying the same formula to these properties as is being applied to all other non-residential customers.

In an effort to reduce the burden of the parcel-based approach on customers, PWD designed a credit system to allow customers to decrease their bills by installing stormwater controls to manage at least the first inch of runoff. . 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, PWD will re-evaluate the property's stormwater fee based on the remaining unmanaged impervious area and the total area of the property. PWD offers free design assistance and site evaluation to the most highly impacted customers to identify potential stormwater management opportunities that might exist on the site, and to perform cost-benefit analyses to help the property owner weigh the cost of the retrofit against the annual savings on the stormwater bill.

<u>Plan Review</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 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 195.

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

PWD 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.

<u>Green Stormwater Projects</u>

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 (GSI) 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. Please refer to **APPENDIX C –COA ANNUAL REPORT** on page 6 for information on GSI projects.

Street Tree Planting

As part of supporting the City's GreenWorks goals, PWD was partnered with the PPR to conduct street tree plantings. Please refer to **APPENDIX C –COA ANNUAL REPORT** on page 19 for a full description of trees planted in Philadelphia.

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 to increase the tree canopy in the five county Philadelphia area. Tree Vitalize partners with numerous community groups throughout this area in order to work toward planting trees in neighborhoods lacking sufficient tree canopy.

III.C.2 WATER: Ecosystem Restoration and Aesthetics

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

During the fiscal year, the Waterways Restoration Team has continued their program include removal of cars, shopping carts, and other debris. Please refer to **Section II.F.2 "CONTINUE TO FUND AND OPERATE THE WATERWAYS RESTORATION TEAM (WRT)"** on page 36 for information pertaining to the Waterways Restoration Team's activities during FY2012.

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

During the fiscal year, the Waterways Restoration Team has continued their program include conducting minor stream bank and bed repairs around outfalls and removing debris around them. Please refer to **Section II.F.2 "CONTINUE TO FUND AND OPERATE THE WATERWAYS RESTORATION TEAM (WRT)"** on page 36 for information pertaining to the Waterways Restoration Team's activities during FY2012.

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

Since 2008, PWD is working 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.

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. In total, this project will set out to restore more than 8,000 feet of stream corridor.

During FY 2012, PWD awarded a contract for natural stream channel design of reaches 6-8. The services provided will include the design of bank stabilization, wetland creation, full scale stream restoration, trailheads and gateways to Cobbs Creek Park as well as green stormwater infrastructure along Cobbs Creek Parkway. We expected that the project will be ready to bid for construction in FY 2013.

Tacony Creek Stream Restoration

During FY 2010, PWD completed the *Tacony Creek Restoration and Ecosystem Enhancement Program Feasibility Study*. This document provides a comprehensive vision of the biological, physical, and 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.

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.

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. In FY 2012, PWD initiated a contract for design phase services for stream restoration, green stormwater management, and trail improvements in Reaches 4-5 of Tacony Creek. When completed, this project will accomplish almost 8,000 feet of stream corridor restoration. PWD anticipates completion of all associated tasks including full contract drawings and specifications, permitting, and public outreach by the end of FY 2014.

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.

During FY 2012, the Marshall Road restoration reach was modeled using a two-dimensional hydrodynamic model River2D. Two separate flow scenarios were modeled. The first was the baseflow condition which is the most frequent and prevailing regime within the system. This flow regime is important to model and understand as it is the condition most vital to macroinvertebrate and fish life history stages. The second flow scenario modeled was the bankfull condition. This flow scenario corresponds to the flow regime most critical to the maintenance of the active channel through fluvial-geomorphic processes. The bankfull regime also provides insight as the overall stability of stream banks during flow regimes equal to and greater than the bankfull discharge. The updated comprehensive report is expected to be complete at the end of the fiscal year.

Whitaker Avenue

The Tacony Creek – Whitaker Avenue stream restoration project is situated in the Tacony Creek Park downstream of the Whitaker Avenue Bridge and upstream of the Fishers Lane Bridge in northeastern Philadelphia. This project implemented 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 assembled a project team to develop an approach for the restoration of Tacony Creek that encompassed 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 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 was completed in November of 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. An assessment of all structures built was conducted. In FY 2012, PWD completed the first comprehensive monitoring report for the Whitaker Avenue Stream Restoration project, the *Whitaker Avenue Stream Restoration Monitoring Report*. Continued monitoring will include seasonal photomonitoring and reassessment of the site and the structures, which will result in the development of an annually updated Whitaker Avenue monitoring report.

Bell's Mill

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. 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.

In FY 2012, construction was completed on this project. At the completion of construction, PWD initiated the project monitoring phase of this project. PWD expects to continue monitoring the Bells Mill stream restoration project through FY 2016.

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

Saylor Grove Wetland in Wissahickon Watershed

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.

PWD resurveyed the Saylor Grove to determine the amount of sedimentation taking place within the facility during FY2009. During the FY 2010, 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.

During FY 2012, PWD completed the first ecological assessment of the Saylor Grove Wetland. The assessment was segregated into two components, consisting of a vegetation assessment conducted by ERG and subsequent macroinverbrate sampling which was conducted by BLS. The ensuing report detailing the physical, biological, and chemical performance of the facility is expected to be completed by the end of the fiscal year.

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 infiltrates, detains, and treats 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. In FY 2010, PWD received final necessary permits, and bid and awarded this project.

In FY 2012, construction was completed on this project. At the completion of construction, PWD initiated the project monitoring phase of this project. PWD expects to continue monitoring the Wises Mill wetland project through FY 2016.

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

In FY 2012, construction was completed on this project. At the completion of construction, PWD initiated the project monitoring phase of this project. PWD expects to continue monitoring the Cathedral Run wetland project through FY 2016.

Gorgas Run 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. PWD is applying NSCD principles to restore the 1,800 feet of stream channel that encompasses Gorgas Run. Rehabilitation of the stream corridor will also include restoration of a small tributary to Gorgas Run, repairs and protection for PWD and Fairmount Park infrastructure, stabilization of stormwater gullies below Henry Avenue, and implementation of interpretive signage. 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.

As of the end of FY 2012, PWD has developed final design plans and submitted all necessary permit applications, with hopes of constructing this project during FY 2013-14.

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.

During FY 2012, PWD and USACE completed the final bid package, including plans and specifications and initiated the bid process. In FY 2013, PWD expects to fully complete construction of this project.

Watershed Mitigation Registry

The City of Philadelphia's Watershed Mitigation Registry (WMR) is an innovative PWD 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.

Although a final Memorandum of Agreement was not signed, PWD continued to work with PADEP informally as a local sponsor of their potential statewide ILF program in FY2012.

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 through 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 included: spatterdock (Nuphar advena/lutea), pickerelweed (Pontederia cordata), duck potato (Sagittaria latifolia), and arrow arum (Peltandra virginica). Monitoring of the area was 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

<u>Fish Passage on Cobbs Creek</u>

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.

During the FY 2012 reporting year, PWD and USACE continued to work toward a design solution that will maximize fish passage, while maintaining a stable, healthy stream channel and corridor upstream of Woodland Dam. The comprehensive topographic survey was incorporated into the project base plan. The design team also worked with Philadelphia Parks and Recreation to identify a design solution that will result in minimal impact to Cobbs Creek Park. PWD and USACE also continued to work with PA state agencies responsible for project permitting. USACE has completed a HEC-RAS model to provide critical information to assure stability of the proposed design. In June, 2012, USACE provided an interim detailed design submittal. Over the coming year, PWD will continue to work with USACE to finalize the design for this dam removal and fish passage project. The PWD-USACE team will work to assure that fish passage goals are fully incorporated into the final design and all necessary permitting is acquired.

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, a construction team 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 FY 2012, a total of 3366 American shad passed through the Fairmount Fishway, indicating the highest amount of passage since the 1979 (**FIGURE III.C.2.5- 1**). Similarly, relative abundance of American shad, measured as catch-per-unit-effort (fish/minute), was also the highest recorded value since 2004 (**FIGURE III.C.2.5- 1**). These metrics indicate that the restoration of the Fairmount Fishway has contributed positively to the goal of a sustainable American shad population in the Schuylkill Drainage.

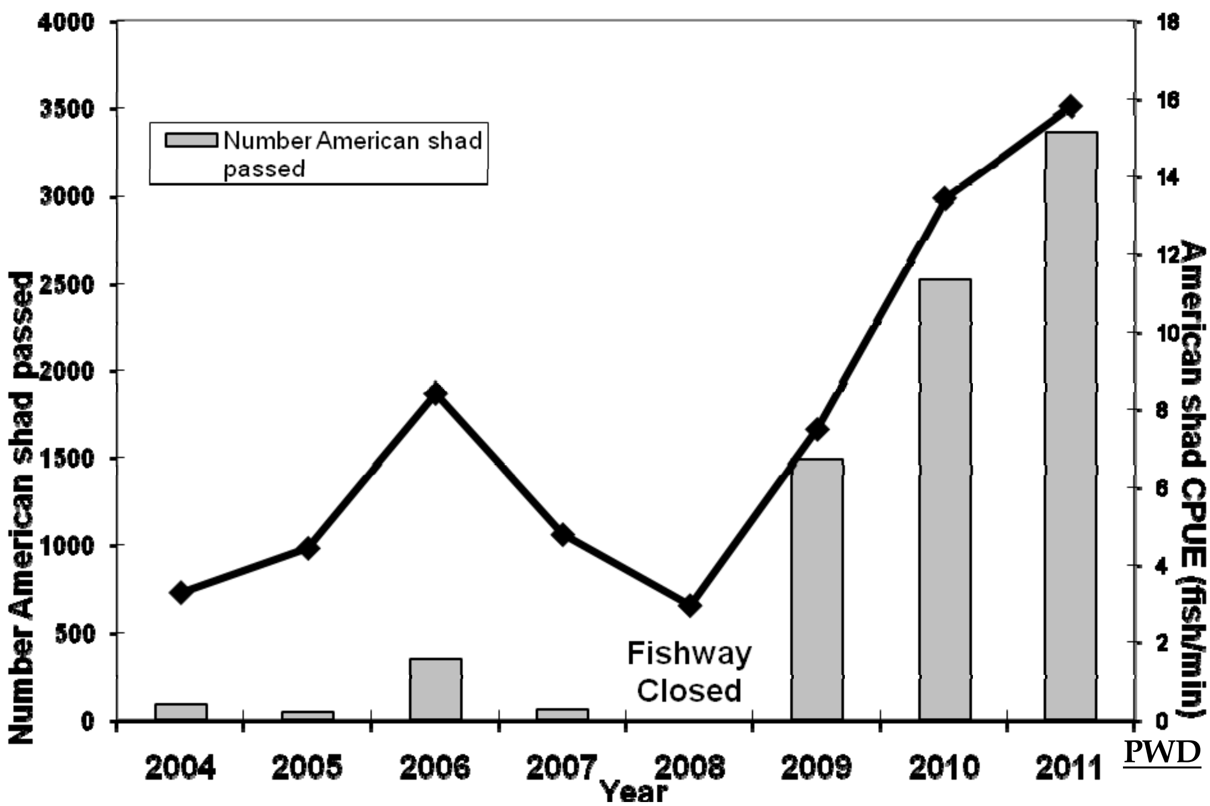


Figure III.C.2.5-1: Schuylkill River American shad passage and relative abundance at Fairmount Fishway 2004-2011

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 continues to conduct 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. However, in the spring of 2012, one adult American shad was found in Pennypack Creek above Rhawn Street, but below the Roosevelt Blvd dam. This finding was confirmed by state biologists and suggests that fish passage up to Roosevelt Blvd is possible. The PWD electrofishing surveys of the tidal Pennypack Creek have documented a spawning population of anadromous alewife and blueback herring. Both adult and juvenile striped bass have been collected in the tidal portion, but not above the rock ramp. The future of shad restoration in Pennypack Creek remains uncertain. 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. No hickory shad fry were stocked in 2012.

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.

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.

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)

As of the summer of 2011, all the River Conservation Plans have been completed for the Darby Creek, Tacony-Frankford Creek, Pennypack Creek, Poquessing Creek and Delaware River Direct Watersheds. At this point, there are no plans to re-evaluate theses plans.

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

The City maintains several websites that provide information on our watersheds and activities within them, please refer to **SECTION II.G.2 "CONTINUE TO MAINTAIN WATERSHED MANAGEMENT AND SOURCE WATER PROTECTION PARTNERSHIP WEBSITES"** on page 40 and **SECTION II.H.2 "EXPAND THE INTERNET-BASED NOTIFICATION SYSTEM (RIVER CAST) TO THE TIDAL SECTION OF THE LOWER SCHUYLKILL RIVER"** on page 62 for additional information on the websites.

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

PWD has two communication and water quality monitoring networks. 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 40 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 62 for information pertaining to this topic.

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

Tookany/Tacony-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.

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 been installed.

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

PWD supports several existing educational centers including the Fairmount Water Works Interpretive Center (FWWIC) and many public outreach efforts conducted by our partners, please refer to **SECTION II.G.3.2 – "ADDITIONAL PWD AND PARTNER SPONSORED EVENTS"** on page 51 and **SECTION II.G.4 "CONTINUE TO SUPPORT THE FAIRMOUNT WATER WORKS INTERPRETIVE CENTER"** on page 57 for more information on activities done in FY2012 by the FWWIC and partner sponsored events.

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

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,
– Pennypack Creek,
– Poquessing Creek,

– 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 in **TABLE III.C.3.7-1**:

Table III.C.3.7-1 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

(**TABLE III.C.3.7-2**). 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.3.7-2 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.3.7-3** shows a listing of the municipalities that exist within the Pennypack Creek Watershed.

Table III.C.3.7-3 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, finalized the plan in response to public comments provided in June, 2011. The plan has been adopted by the Bucks County Commissioners in June 2012 followed by the Montgomery County Commissioners in July 2012. Within six months following adoption and approval of the watershed stormwater plan, each municipality should adopt or amend, and implement an ordinances or regulations as are necessary to regulate development within the municipality in a manner consistent with the applicable watershed storm water plan and the provisions of this act.

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.3.7-4** shows a listing of the municipalities that exist within the Poquessing Creek Watershed.

Table III.C.3.7-4 Municipalities within Poquessing Watersheds

Montgomery County	**Bucks County**
Lower Moreland Township	Bensalem Township
Philadelphia County	Lower Southampton Township
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) was convened in order to help guide the process, and a draft plan is now completed and available online at http://ntmeng.com/poquessing/. A public hearing was held on June 12, 2012 and the Montgomery County Commissioners adopted the plan in July 2012 and Bucks County Commissioners are expected to officially adopt the plan soon.

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.3.7-5)**.

Table III.C.3.7-5 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) has been convened in order to help guide the process, which is expected to be wrapped up in Summer 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 FY2012, PWD reviewed 484 "Sewage Facilities Planning Module Application Mailers" for projects requiring building permits within Philadelphia County. During the same period, PWD issued 32 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 E** and other information provide within this annual report represent the average annual CSO overflow statistics for period July 1 2011 – June 30 2012 as required in the NPDES Permit. Please refer to **TABLE 1 IN APPENDIX E – NPDES – FY2012 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 E – NPDES – FY2011 CSO STATUS REPORT** on page 9 for the annual summary of the frequency and volume of CSO discharges during FY2012.

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

Please refer to **TABLE 3 IN APPENDIX E – NPDES – FY2012 CSO STATUS REPORT** on page 13 for an updated CSO frequency and volume for a typical hydrologic year.

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

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

As CSO controls and stream restoration projects are implemented, PWD expects 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 E – 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 page 1 of **APPENDIX B – 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.E.1 "CSO REGULATOR INSPECTION & MAINTENANCE PROGRAM"** on page 33 for information on this section. Also refer to page 2 of **APPENDIX B – FY2012 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 9 of **APPENDIX B – FY2012 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 E – NPDES – FY2012 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 *78* and **SECTION III.B.2.1.1 "INFLOW/INFILTRATION (I/I) CONTROLS- PC-30 RELIEF SEWER"** on page *79*. Please refer to **TABLE 16 IN APPENDIX E – 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 66 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 152 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. Philadelphia Code Section 13-603 was specifically enacted to ensure that the City had the proper authority necessary to implement the federal SW program. The actual language of this ordinance and other city ordinances can be found at http://www.phila.gov/philacode/. In addition, PWD has passed supplementary regulations to the city provision; they include Sections 500.0 to 500.6 which requires the abatement of cross connections and PWD Sections 600.14 & 600.15 which prohibits stormwater discharges. A copy of PWD's regulations can be obtained at the following website: http://www.phila.gov/water/pdfs/pwd_regulations.pdf

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

This Annual Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP), 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, 2011 to June 30, 2012.

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.

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).

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

The City's commitment was initiated in the 2005 through detailed monitoring and assessment of the Wissahickon Watershed. The goal of Philadelphia's implementation approach is to take a multi-faceted approach to reducing the amount of sediment in the Wissahickon. During the FY2012, PWD has finished developing a Sediment TMDL Implementation Plan. The plan is being submitted with this report; it is attached as **APPENDIX F - WISSAHICKON CREEK SEDIMENT TMDL IMPLEMENTATION PLAN**. This implementation plan documents the commitment to sediment load reductions through implementation measures including restoration prioritized stream segments, constructing stormwater wetlands, implementation of the Philadelphia Stormwater Regulations, and regular inlet cleaning with the continual use of adaptive management. The Plan describes how each practice will be implemented, monitored and tracked for TMDL compliance.

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

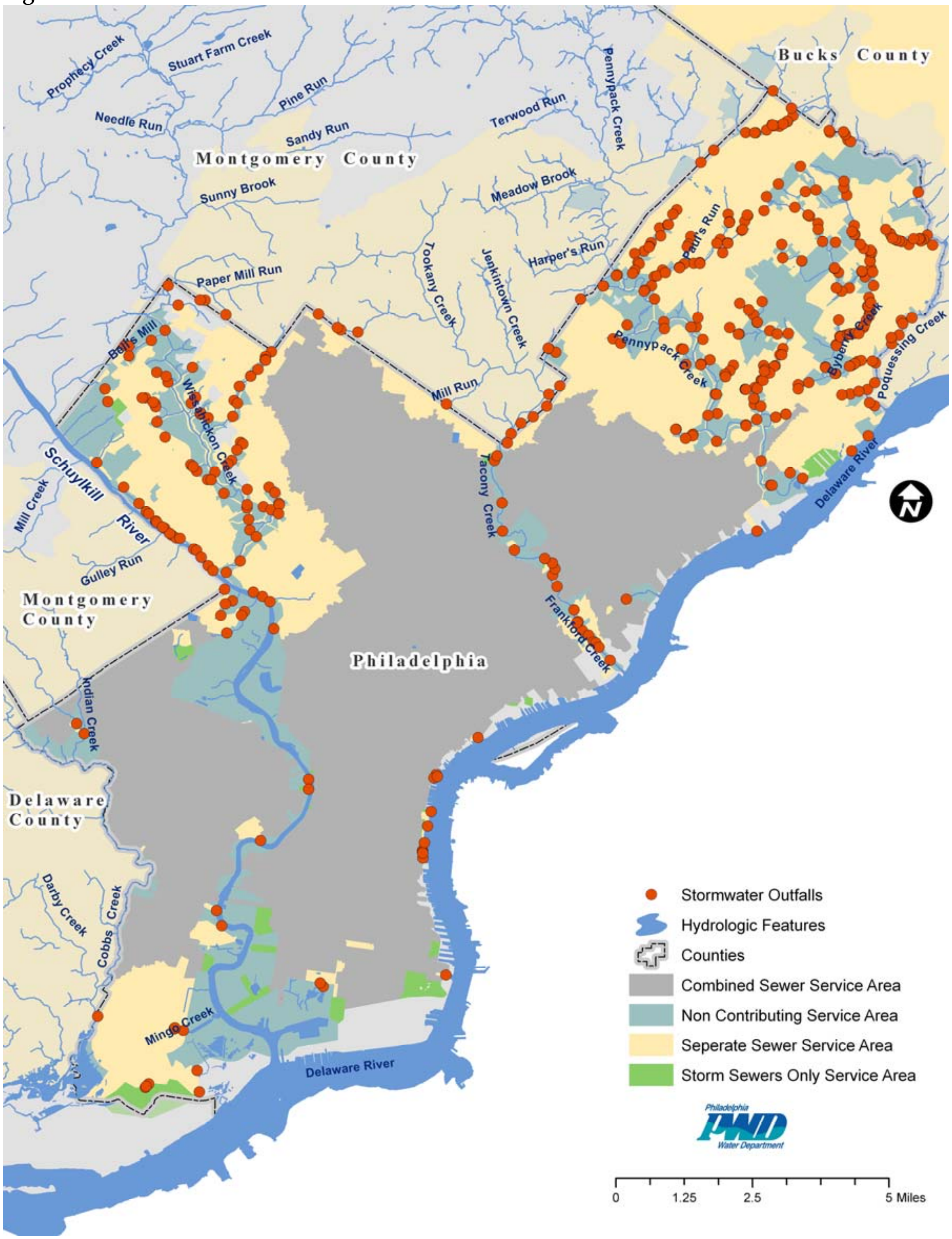
E.1 City PMP Contact Information:

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.2-1**.

Figure E.2-1 MS4 with all SW outfalls



E.3 / E.4 Investigation of Suspected 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 suspected locations that has been compiled from 2 lists (described below) where PCB material, equipment, processes, soil area, or facilities are or have been located (**APPENDIX G – FY2012 SUSPECTED PCB SOURCES AND INSPECTIONS**. During this permit cycle, the City has attempted to visit all 399 sites from the list of suspected PCB sources; results of these investigations found that many of sites no longer housed the PCB discharging device, many of the same sites occurred on both lists or the current owner has employed additional safety mechanisms to prevent any discharges. The details of these investigations are provided in **APPENDIX G – PCB INSPECTIONS.**

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. 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.

E.5 In- stream PCB sampling

The City collected and analyzed twelve (n=12) in-stream samples for PCBs during the spring of 2009, no future sampling events are planned.

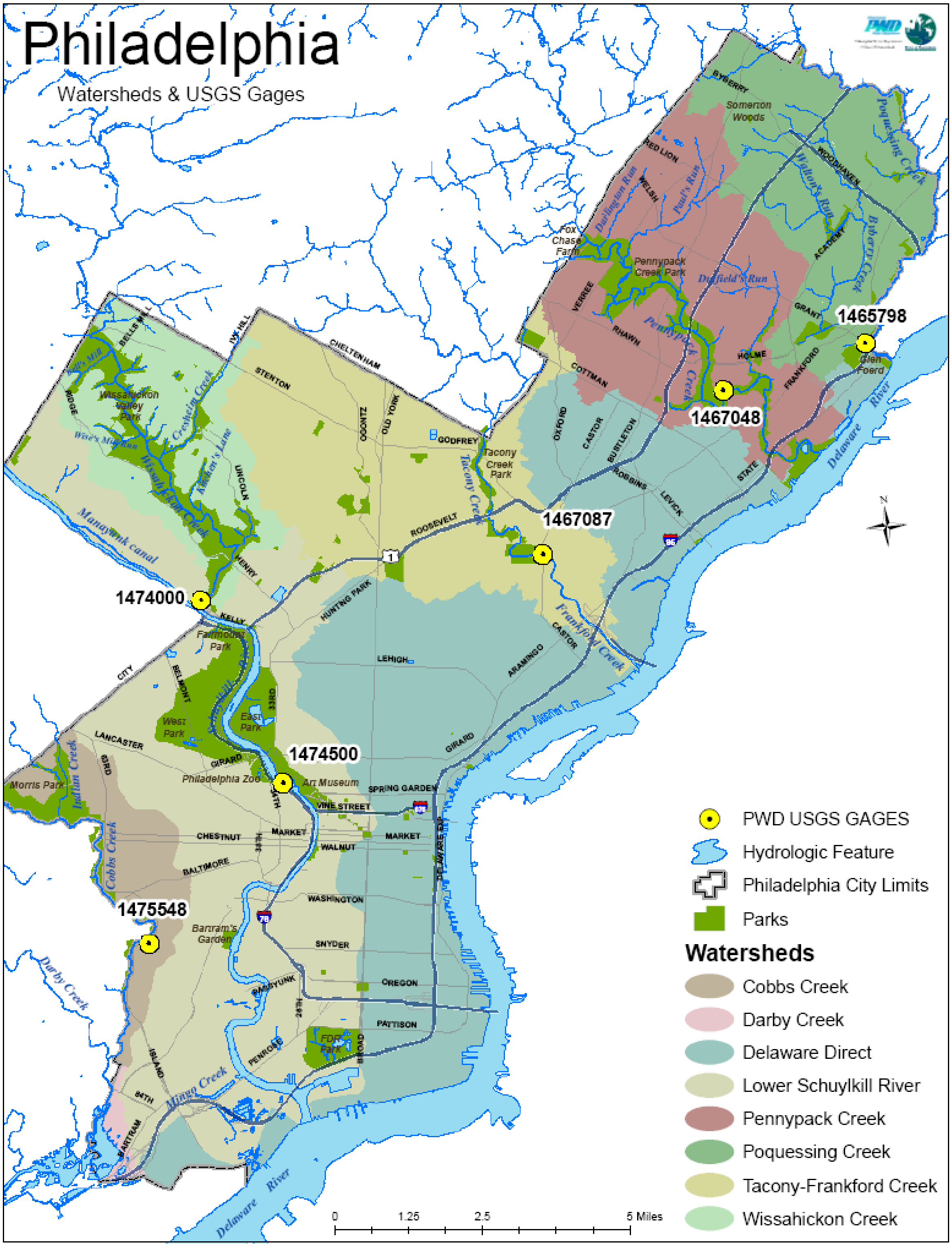
PCB Sampling Locations

Six monitoring locations were selected for sampling, and are listed in **TABLE E.5-1**. 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.5-1 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.5-1 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 Analysis

In-stream samples and trip blank samples were sent to AXYS Analytical, LTD. (Sidney, 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

In July 2009, PWD's Office of Watersheds received all in-stream PCB samples data from AXYS Analytical, LTD; this data has been included in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD** attached to this report. **TABLE E.5-2** 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.5-3** shows the results for the Penta homolog.

Table E.5-3 Penta Homolog 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

Table E.5-2 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

E.6 Develop Report on Control of PCB Discharges

The City has created a protocol to investigate possible PCB sources within the City that may require control measures to reduce its discharge of PCBs. This process and the plan of action are described within the PCB PMP, can be located in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD.**

E.7 Work with DRBC to Create PMP Template

PWD's PCB PMP was also submitted to the DRBC on September 30, 2005. The City will continue to enlist the cooperation of stakeholders throughout the Delaware Estuary in developing a template for other MS4 systems. As of September 2012, PWD has not received any communication from the DRBC on creating a PMP Template.

E.8 Annually Document PCB PMP Compliance

As of FY2012, PWD has completed its obligations to the PCB PMP. Following the PCB source trackdown and inspection that was performed throughout the permit cycle, PWD discovered that of the 399 records on the original listing created in 2005, only 344 were legitimate sources, the 55 records were removed due to blanks, duplication, and not locatable addresses. Of the 344 sites, only 74 are in use, 36 occur in the MS4 area and 35 have been retrofilled with a non-PCB material. Additional details of these inspections can be found in **APPENDIX G –PCB INSPECTIONS**. A copy of the PCB PMP can be found 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 table presents a description of the City's MS4 system, including; stormwater outfalls, lengths of sanitary sewer, and lengths of stormwater sewer within Philadelphia. These areas are depicted in **FIGURE F.1-1** on the following page.

Table F.1-1 Description of MS4 Infrastructure

Watershed	Drainage Area	Miles of Pipe			MS4 Outfalls	
		Stormwater	Sanitary	Total MS4	PWD Owned	Other
Darby-Cobbs	-	0.5	0.4	0.9	3	-
Delaware Direct	2.6	71.8	42.1	113.9	18	122
Pennypack	12.1	225.2	231.2	456.3	130	14
Poquessing	9.6	148.4	159.7	308.1	141	19
Schuylkill	8.9	152.9	151.9	304.8	45	47
Tacony	2.4	54.0	56.3	110.2	34	1
Wissahickon	6.1	88.4	108.1	196.4	63	2
Total	41.8	741.1	749.7	1490.6	434	205

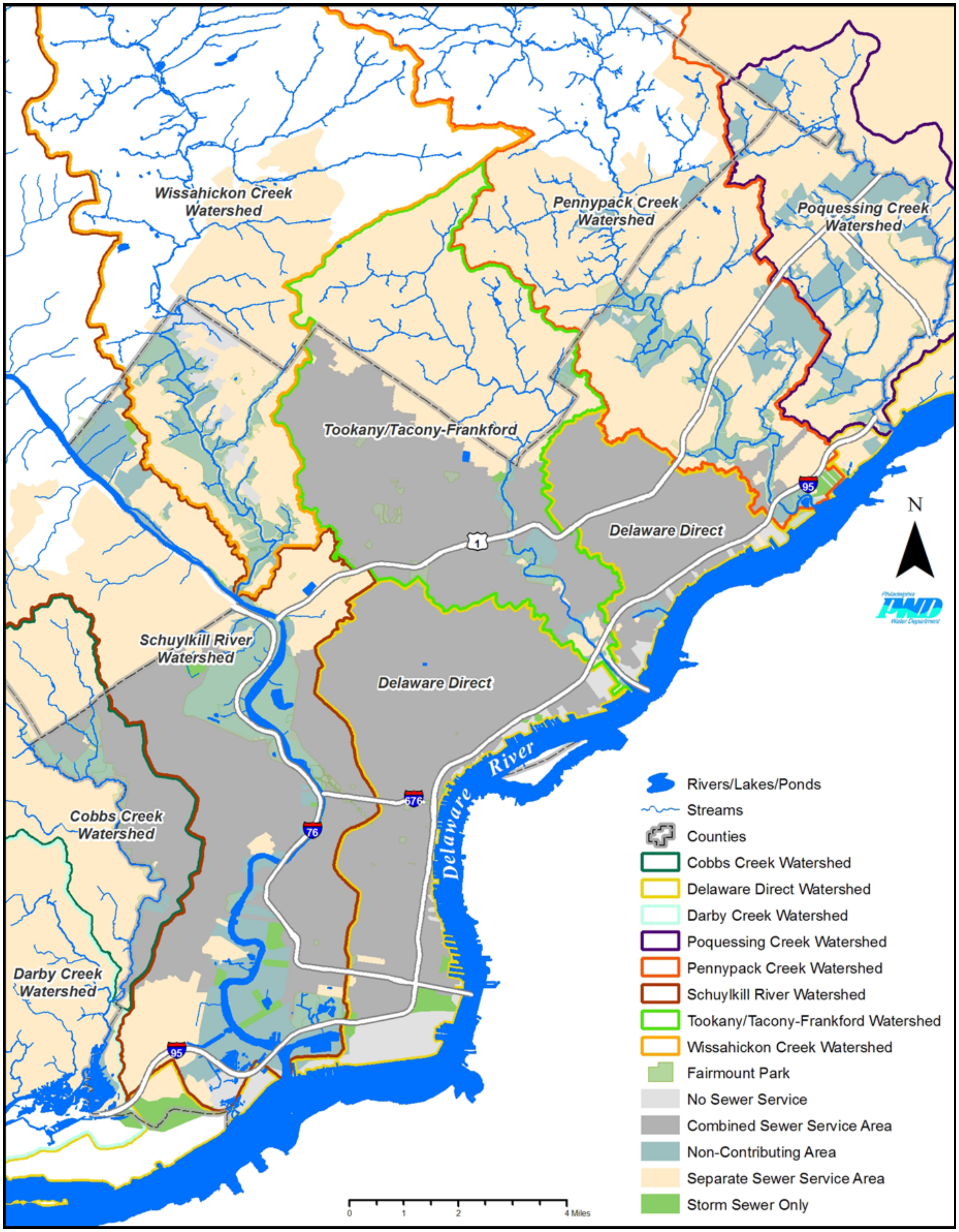


Figure F.1-1 Philadelphia Infrastructure System Areas

GIS Data Layers listed in **TABLE F.1-2** have been submitted within a geodatabase, **PWD_ANNUAL_REPORT_GIS_DATA_2012.MDB** which can be found on the **SUPPLEMENTAL CD.** The GIS Data Feature class filenames within the geodatabase are provided in **TABLE F-2.** Descriptions of the GIS layers referenced above are given below:

Table F.1-2 GIS Data Feature Classes within Geodatabase named - FY12_GISlayers.mdb

• All_PWD_Monitoring_FY12 • FY12_ES_Inspections • FY12_GSI_Projects • FY12_IWU_Pollution_Migration_Events • FY12_Known_Historical_PCB_Locations • FY12_PermittedDischargers • FY12_Tech_Approvals • FY12_Sanitary_Infiltration_Events • Hydro_Line • Hydro_Poly	• Land_Use_PCPC_2012 • Philadelphia_Detention_Basins • Philadelphia_Impervious • Philadelphia_Major_Watersheds • Philadelphia_only_Major_Watersheds • Philadelphia_Sewer_Sheds_2012 • PhiladelphiaBlocks2010 • Stormwater_Outfalls_442 • Wissahickon_Point_Source

All_PWD_Monitoring_2012

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 152.

FY12_ES_Inspections

This layer presents the locations of erosion and sedimentation inspections carried out at construction sites within Philadelphia in FY 2012. The contents of this layer are discussed in **SECTION F.5 – STORMWATER MANAGEMENT ON CONSTUCTION ACTIVITIES** on page 195.

FY12_GSI_Projects

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

FY12_IWU_Pollution_Migration_Events

This layer presents the locations of spills documented by PWD Industrial Waste Unit within Philadelphia in FY 2012. The contents of this layer are discussed in **SECTION F.7 – POLLUTANT MIGRATION/INFILTRATION** on page 208.

FY12_Known_Historical_PCB_Locations

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 141.

FY12_PermittedDischargers
This layer presents the location within Philadelphia of all permitted Dischargers FY12. The contents of this layer are discussed in **SECTION F.2.STEP 1.C** on page 165**.**

FY12_Sanitary_Infiltration_Events
This layer presents the locations of Sewage Pollution Incidents documented by PWD within Philadelphia in FY 2012.The contents of this layer are discussed in **SECTION F.8.G.III – INVESTIGATE, REMEDIATE, AND REPORT SANITARY INFILTRATION** on page 222.

FY12_Tech_Approvals
This layer presents the locations of projects issued post construction stormwater management technical approvals by the Philadelphia Water Department in FY 2012. The contents of this layer are discussed in **SECTION F.5.B - POST CONSTRUCTION STORMWATER MANAGEMENT** on page 200.

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

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

Land_Use_PCPC_2012
This layer presents Philadelphia land use as ascribed to individual parcel boundaries or units of land. Land use is the type of activity occurring on the land such as residential, commercial or industrial. Each unit of land is assigned to one of nine major classifications of land use (2-digit codes) and where possible more narrowly defined into one of 70 sub-classifications (3-digit codes).

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

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

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

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

Philadelphia Sewersheds_2012
This layer presents the boundaries of the MS4, combined sewer, un-sewered, non-contributing, and stormwater only areas within Philadelphia County and the neighboring contributing areas.

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

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

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

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

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

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

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

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

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

The City has conducted extensive mapping of information relevant to stormwater management planning. Previously discussed in **SECTION F.1 – SOURCE IDENTIFICATION** of this document on page 147, 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>

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

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.

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. From 1999 to 2012, 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.

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

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 2010-2016, 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.

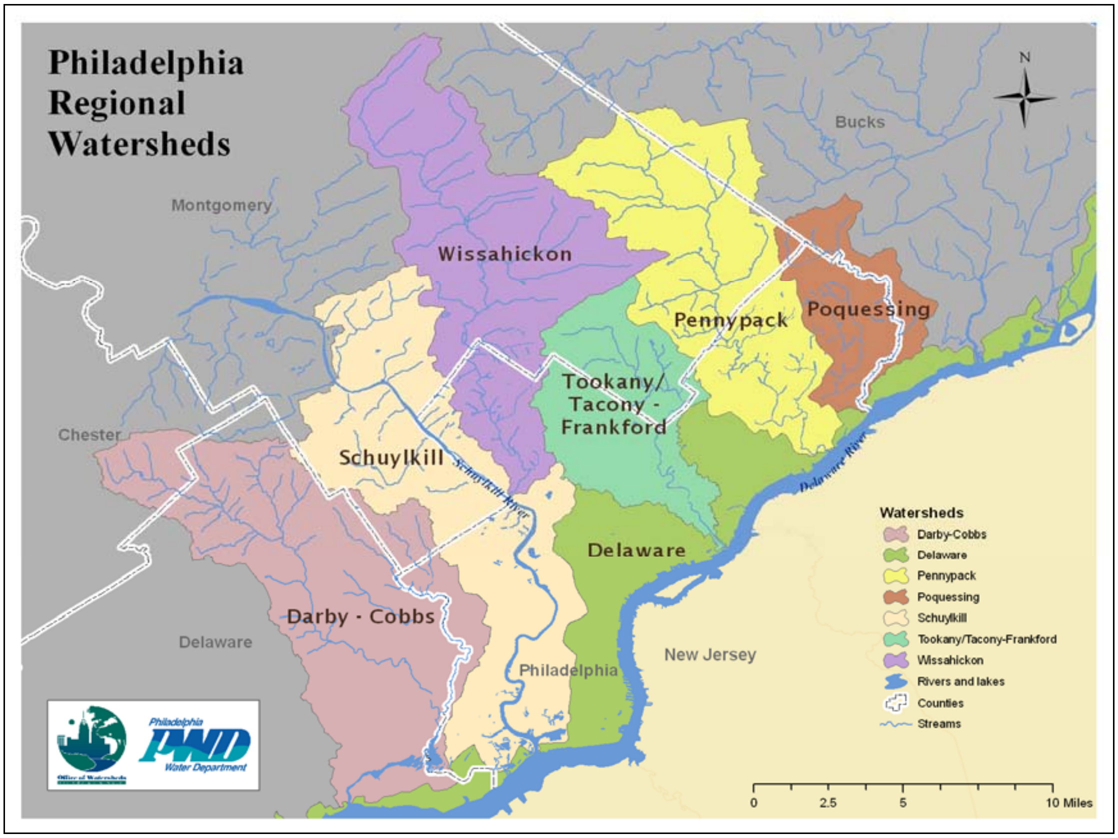


Figure F.2 Step1.b-1 Philadelphia Regional Watersheds

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

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

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-2**) 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, 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.

Table F.2.Step1.b-2: 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 CaCO3	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 projects to be implemented, 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.

The proposed strategy for watershed assessments 2010-2016 includes resuming watershed-scale bioassessment activities at several stations within targeted watersheds. This program resumed in Cobbs Creek Watershed in 2012. (**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 week intervals, 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 City-wide 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.

Table F.2.Step1.b-3 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																												

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-2**).

The primary use of automated samplers in the 2010-2016 period is assessment of stormwater BMP performance. It is expected that as 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.

Groundwater Monitoring

The basis of PWD's wet weather source control strategy is the "capture" and infiltration of as much rainwater as possible with green stormwater infrastructure (GSI). The direct benefits of such an effort are a reduction of stormwater discharged directly to streams, as well as the increased recharge of stormwater to supplement groundwater resources. Increased infiltration, though advantageous in several respects, must be carefully planned and closely monitored to avoid unwanted impacts.

The adaptive management approach being employed for the LTCPU is an iterative process strongly dependent on monitoring. In order to quantify the impact of this long-term effort on groundwater resources, it is necessary to monitor groundwater levels in Philadelphia. PWD has partnered with USGS to increase the geographic scope and frequency of groundwater monitoring in the Philadelphia region. A City-wide groundwater level monitoring network will provide long-term monthly data documenting current water levels and trends in groundwater elevations throughout the City, helping to track the impacts of widespread implementation of stormwater management practices (SMPs) and global climate change. Data from the groundwater monitoring network will also be used to calibrate a Philadelphia groundwater model and update the USGS groundwater contour map of Philadelphia (Paulachok 1984).

PWD and USGS identified existing wells that would be suitable for the network and obtained permission for site access. Once wells were identified and accessible, well condition and suitability for inclusion in the monitoring network were investigated by continuous water level monitoring and remote video camera inspection when accessible.

Wells that met acceptance criteria were added to the monitoring network. After examining readily available information about existing wells, PWD elected to drill additional wells in order to provide better spatial distribution of wells in the monitoring network. USGS staff conduct groundwater observations monthly and upload water level data to the NWIS web server. PWD staff periodically download water level data from NWIS and summarize these data annually. Current status of the groundwater monitoring network and a summary of data collected through June 30, 2012 are presented in **APPENDIX H– PWD/USGS GROUNDWATER MONITORING PROGRAM.**

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).

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. Targeted watershed assessments resumed in Cobbs Creek Watershed in June 2012. (**TABLE F.2.STEP 1.B-4 PROPOSED BENTHIC INVERTEBRATE MONITORING TIMELINE 2010-2015)**.

As described in the PWD Comprehensive Monitoring Program: Proposed Monitoring Strategy 2010-2016, 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.

Table F.2.Step 1.b-4 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 119.

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.

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.

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-aand 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. From June 2011 through June 2012, PWD has collected pre- and post-storm algae data from two sites Cobbs Creek and two sites in Tacony Creek in an attempt to parameterize these effects for inclusion in water quality models. Work over the next year will focus on completing this sampling effort in Cobbs Creek and further research into the physical phenomena that underlie 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

Physical Habitat Assessments

Habitat assessments are conducted at each benthic macroinvertebrate monitoring site based on 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.

As described above in the Benthic macroinvertebrate monitoring section, PWD has begun to incorporate semi-randomized and fixed station elements to its sampling design for assessment of wadeable streams. Each year, assessments are conducted at a set of fixed stations, as well as randomly selected sites.

Habitat Suitability Index (HSI)

In addition to habitat assessments, Habitat Suitability Index (HSI) models, developed by the U.S. Fish and Wildlife Service (USFWS), have been incorporated into the monitoring program. Based on empirical data and supported by years of research and comprehensive review of scientific literature, these models present numerical relationships between various habitat parameters and biological resources, particularly gamefish species and species of special environmental concern. To date, HSI have applied to Darby-Cobbs, Tookany/Tacony-Frankford, Wissahickon, and Pennypack Creek Watersheds. The Poquessing-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). Maps of assessment sites by watershed are presented in **APPENDIX I – MONITORING LOCATIONS.**

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

Watershed	Monitoring Program								
	Biological			Chemical			Physical		
	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

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

There are 135 NPDES permitted dischargers in Philadelphia, as shown in **APPENDIX J – 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 170.

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

Wissahickon Creek Watershed

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

A Comprehensive Characterization Report was completed for the Poquessing-Byberry Watershed in September 2010 which included analysis of data collected over the 2007-2008 monitoring period and presented a characterization of problems within this watershed area. 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

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 10 gage stations in the Philadelphia region from July 2011 through November 2011 and March 2012 through June 2012. The sampling and monitoring sites are presented in **APPENDIX I - MONITORING LOCATIONS**. Four types of sampling were performed as discussed below. Parameters were chosen based on state water quality criteria or because they are known or suspected to be important in urban watersheds.

Discrete Water Chemistry Assessment

In order to characterize conditions throughout the Philadelphia region and build a long-term record of water quality, PWD initiated a quarterly baseflow water quality sampling program at ten 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 K - 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 July 2011-June 2012. 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 US EPA. 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.

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 ten 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 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/. FY2012 monitoring results are presented in **APPENDIX L - 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 2011. Tidal sondes were deployed again in June 2012, with the intention of collecting data through November 2012.

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). This 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 four grab samples at 40 minute intervals and the remaining samples at one-hour intervals.

Biological Monitoring

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 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 nine USGS gages in the PWD/USGS Cooperative Monitoring program and 16 randomly selected sites. These data are presented in **APPENDIX M – PWD WADEABLE STREAMS BENTHIC MACROINVERTEBRATE AND PHYSICAL HABITAT ASSESSMENTS.** In March 2012, PWD sampled nine USGS gages, six sites in Cobbs Creek Watershed, and 10 randomly chosen sites. Results of these assessments will be presented in a Cobbs Creek Watershed Integrated Watershed Management Plan Indicator Status Update in 2013. PWD plans to conduct benthic macroinvertebrate samples from USGS gage fixed stations, targeted sites in Tookany-Tacony/Frankford Watershed, and randomly selected sites in spring 2013. .

Fish Assessments

Targeted watershed assessments resumed in June and July 2012 when fish assessments were conducted at 4 sites within the Cobbs Creek Watershed. PWD plans to collect fish samples from 7 sites in the Tookany-Tacony/Frankford Watershed in summer 2013 (**TABLE F.2.STEP 2.A -1 PROPOSED FISH MONITORING TIMELINE 2010-2015)**. All surveys were conducted using electrofishing gear as described in EPA RBP V (Barbour, et al. 1999). Results of these fish assessments will be presented in a Cobbs Creek Watershed Integrated Watershed Management Plan Indicator Status Update in 2013.

Table F.2.Step2.a-1 Proposed Fish Monitoring Timeline 2010-2016

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

Algae assessments were conducted June-September 2011 at two locations in Tookany-Tacony/Frankford Watershed. Further research was conducted in Tacony and Cobbs Creeks in spring 2012, in order to gather more data about the relationship between scouring stream flows, algae densities and dissolved oxygen. These algae samples are being collected primarily to assist in parameterization of water quality models. 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 Monitoring

Physical 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. PWD assesses stream physical habitat condition using PADEP Instream comprehensive

Evaluation (ICE) protocols. During April 2011, PWD conducted physical habitat assessments at 25 locations within Philadelphia area watersheds. Sampling was conducted at nine USGS gages in the PWD/USGS Cooperative Monitoring program and 16 randomly selected sites. These data are presented in **APPENDIX M – PWD WADEABLE STREAMS BENTHIC MACROINVERTEBRATE AND PHYSICAL HABITAT ASSESSMENTS.** In March 2012, PWD sampled nine USGS gages, six sites in Cobbs Creek Watershed, and 10 randomly chosen sites. Results of these assessments will be presented in a Cobbs Creek Watershed Integrated Watershed Management Plan Indicator Status Update in 2013. PWD plans to conduct physical habitat assessments at USGS gage fixed stations, targeted sites in Tookany-Tacony/Frankford Watershed, and randomly selected sites in spring 2013.

Fluvial Geomorphologic (FGM) / Infrastructure Analysis

FGM studies establish the physical attributes of the stream, identify areas of concern, and provide recommendations for rehabilitation of the stream corridors and floodplains. In FY 2008, geomorphologic and 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. Geomorphic evaluation was conducted through the survey of cross sections, longitudinal profiles, sediment assessment, photography, and reach characterization. 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. 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.**

F.2.Step 2.b. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Quality Assurance/Quality Control (QA/QC) and Data Evaluation

PWD have planned and carried out an extensive sampling and monitoring program to characterize conditions in Pennypack and Poquessing-Byberry Creek Watershed. Sampling and monitoring follow the Quality Assurance Project Plan (QAPP) and Standard Operating Protocols (SOPs) as prepared by PWD's 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.

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 is 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 will be presented as a watershed-wide set of "guidelines" for implementation.

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, result of this model are described in a **STORMWATER LOADS ESTIMATES MEMO** which can be found in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

Pennypack Watershed

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, result of this model are described in a **STORMWATER LOADS ESTIMATES MEMO** which 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, results of this model are described in a **STORMWATER LOADS ESTIMATES MEMO** which can be found in the **ADDITIONAL DOCUMENTS FOLDER ON THE SUPPLEMENTAL CD**.

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. This report forms a technical basis for the Wissahickon Creek Integrated Watershed Management Plan (WCIWMP), a plan for restoration and enhancement of the creek and its watershed currently under development.

Please review the entire CCR 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 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 as documented in the Wissahickon Siltation TMDL Implementation Plan (in **APPENDIX F**). 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. Recent interest in a watershed-wide long-term strategy for addressing the Siltation TMDL may provide the necessary incentives to develop a watershed-wide approach to water quality improvements.

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 Pennypack Creek Integrated Watershed Management Plan (PCIWMP), a plan for restoration and enhancement of the creek and its watershed currently under development. Please review the entire PCWCCR 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 (Fall 2010). The PCWCCR highlighted a multitude of water quality related issues within the watershed drainage. As stated in the CCR, "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 CCR 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 212**.**

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

The City has implemented the following projects to evaluate these technologies for stormwater runoff improvements:

Household Hazardous Waste Collections

During FY 2012, 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 9 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 2007 - 2012)

HHW Program Collection Summary		**# of Attendees**	**Quantity Accepted (lbs)**		
			HHW	**Computers**	**Total**
FY 2007 Total		3,358	240,198	59,660	299,858
FY 2008 Total		3,372	254,055	136,249	390,304
FY 2009 Total		3,711	250,903	237,270	488,173
FY 2010 Total		3,942	296,541	274,443	570,984
FY 2011 Total		3,803	256,337	338,181	594,518
FY 2012 Total		4,448	304,381	483,879	788,700
FY 2011 Collection Event Details		**# of Attendees**	**Quantity Accepted (lbs)**		
Location	**Date**		**HHW**	**Computers**	**Total**
State Road and Ashburner	7/24/11	923	57,969	13,040	71,009
22nd & York	9/24/11	444	29,190	4,045	33,235
63rd Street	10/22/11	350	26,133	7,459	33,592
Delaware and Wheatsheaf	11/05/11	634	38,311	7,260	45,571
State Road and Ashburner	4/12/12	991	71,339	11,249	82,588
1st Highway Yard 4800 Parkside Ave	5/12/12	326	27,180	4.665	31,845
Domino And Umbria	6/12/12	781	54,699	3,779	58,478
Computers at Drop-off Sites	Year-wide			432,382	432,382
Total		**4,448**	**304,821**	**483,879**	**788,700**

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

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. Implementation schedules for all the City's watersheds are detailed in the **CSO portion** of this report in **SECTION III.C – IMPLEMENTATION PLANNING** starting on page 83.

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.

F.2.Step 2.i. Pennypack, Poquessing, Wissahickon Watershed Plan Development - Public involvement

Public involvement, including education and outreach, is detailed in the **CSO PORTION** of this report in **SECTION II.G POLLUTION PREVENTION** starting on page 40**.**

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

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

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

Over the last permit year, 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 190.

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

PWD continues to employ the Waterways Restoration Team which charged with removing debris and conducting small scale stream restoration projects within the City's waterways. Please refer the CSO portion of the Annual Report **SECTION II.F –**

CONTROL OF SOLID AND FLOATABLE MATERIALS on page 35 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 Department. 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.

During FY 2012, 24 outfalls were inspected and 20 were sampled due to observed dry-weather flow under the Permit Inspection Program. In addition, 44 outfalls were inspected and 40 sampled due to observed dry-weather flow under the Priority Outfall quarterly sampling program during FY 2012. These samples are used to evaluate priorities for the Defective Lateral Detection and Abatement Program. A summary table (**TABLE F.2.Step 3.A.IV-1)** of the progress of the Defective Lateral Detection and Abatement Program from FY 05-FY 12 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 – FY2012 DEFECTIVE LATERAL QUARTERLY REPORTS.**

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

	Permit Inspection Program		Priority Outfall Program	
	Inspections:	Samples:	Inspections:	Samples:
FY 2005	73	69	83	74
FY 2006	97	56	90	81
FY 2007	46	33	46	31
FY 2008	56	30	30	30
FY 2009	8	8	56	56
FY 2010	237	121	44	44
FY 2011	79	39	43	43
FY 2012	24	20	44	40
Total	596	356	392	359

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.

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

In this priority outfall area, as of June 30, 2012, 2,830 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 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 2012 are listed below:

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

Location	ID#	Inspections	Blockages	Discharges
Plymouth Street, West of Pittville Ave.	CFD-01	35	3	0
Pittville Avenue, South of Plymouth St.	CFD-02	33	5	0
Elston Street, West of Bouvier Street	CFD-03	31	4	0
Ashley Street, West of Bouvier Street	CFD-04	27	1	0
Cheltenham Ave, East of N. 19 Street	CFD-05	33	4	0
Verbena Street, South of Cheltenham Ave.	CFD-06	27	4	0
IFO 600 W Cheltenham Ave.	CFD-07	151	28	0
IFO 6819 N 07th Street	CFD-08	149	25	0

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

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

Date	Outfall (Fecal Colonies per 100 ml)
7/5/11	1630
10/18/11	4200
1/3/12	5400
4/4/12	290

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, 2012, 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 12 are listed below:

Table F.2.Step 3.a.v-3 W-06-01 Inspections

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

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

Table F.2.Step 3.a.v-4 W-06-01 Quarterly Fecal Coliform Sampling

Date	Outfall (Fecal Colonies per 100 ml)
9/14/11	1300
11/14/11	1300
1/3/12	>6000
4/4/12	190

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, 2012, 2,744 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, Saylor Grove, in the fall of 2005 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.

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**.

Fecal coliform sampling at these outfalls continues quarterly. A listing of the results for the W-068-05 outfall samples in FY 12 are listed below:

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

Date	**Outfall (Fecal Colonies per 100 ml)**
9/14/11	20000
11/14/11	20000
1/3/12	>6000
4/4/12	7600

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

Outfall	Outfall Fecal Colonies per 100 mL			
	9/26/11	12/13/11	3/12/12	6/11/12
S-058-01	600	18	27	144
S-059-01	3,400	3,300	1,800	3,400
S-059-02	107,000	8,1000	>600	>60,000
S-059-03	4,700	6,100	4,600	3,600
S-059-04	15,182	24,000	510	7,900
S-059-05	420	1,900	>6,000	5,700
S-059-09	NF	NF	NF	NF

In these 7 outfalls, as of June 30, 2012, 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 2012 was 47. There was 1 blockage and 2 discharges reported in conjunction with these inspections.

Please reference **SECTION F.3 - DETECTION, INVESTIGATION, AND ABATEMENT OF ILLICIT CONNECTIONS AND IMPROPER DISPOSAL** on page 190 for a more detailed discussion of this subject

<u>F.2.Step 3.a.vi. Priority Outfall Closure Testing</u>

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 190 for a more detailed discussion of this subject.

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

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

PWD develops integrated stormwater management plans for all of the City's watersheds. Please refer the CSO portion of the Annual Report **SECTION III.C.3.7 - BASIN-SPECIFIC STORMWATER MANAGEMENT PLANS (ACT 167)** on page 127 for a detailed discussion on the City's watersheds stormwater management plans.

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

PWD has conducted several projects that have designed with Natural Stream Channel Design concepts in mind. 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.

NSCD Physical Monitoring

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 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

NSCD Biological/Habitat Monitoring

The Biological and Habitat monitoring component of PWD's NSCD monitoring program will be modeled after components of the PADEP Instream Comprehensive Evaluation (ICE).. Specifically, PWD will perform qualitative habitat assessments and collect benthic macroinvertebrates according to the "wadeable freestone" and "riffle run" protocols. 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, 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. Please refer the CSO portion of the Annual Report **SECTION III.C.2.3 – STREAM HABITAT RESTORATION** on page 108 for more information and projects associated with the Natural Stream Channel Design.

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

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

Implement several BMP projects

PWD and its partners implemented many BMP projects throughout the City, for a full listing of both completed & current BMP projects, please refer to the **APPENDIX C COA ANNUAL REPORT SECTION 3.1** on page 6.

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

PWD is in the process of developing a Comprehensive Monitoring Plan that will address the monitoring and assessment of surface waters, groundwater, rainfall, CSO discharge, sewer flows, and green infrastructure performance. The plan will also address hydrologic and hydraulic modeling. PWD is currently monitoring multiple stormwater BMP project types such as stormwater tree trenches, stormwater planters, and porous pavement in order to develop monitoring protocols and assess the performance of individual BMPs. Continuous monitoring is used in order to track the filling and emptying of the stormwater control structure, allowing for the evaluation of the effectiveness of the hydraulic control and the effectiveness of the storage and release process under various hydrologic conditions. Monitoring protocols will be finalized for inclusion in the Comprehensive Monitoring Plan, due December 1, 2012. More information about the Maintenance Manual can be found in **APPENDIX C COA ANNUAL REPORT SECTION 3.1** on page 26.

Monitoring and Maintenance of all PWD owned BMPs

PWD is committed to monitoring and maintaining all stormwater BMPs that are owned and operated by the Department. During 2011, PWD installed water HOBO level sensors at 10 different sites and collected continuous water level data at these sites to ensure BMP were functioning well. In addition to analysis data from level sensors, PWD conducted routine visual inspections as part of our maintenance program. From our results thus far, no sites have become clogged or stopped functioning.

PWD holds a contract for the inspection, maintenance and monitoring of BMP projects. Throughout FY 12, site visits were conducted throughout the city at the 31 sites listed in **Table F.2.Step 3.c.i- 1.** The monitoring and maintenance of these sites included routine visits to evaluate the condition of the BMPs, identify issues required for routine or follow-up maintenance activities, and coordinate any necessary maintenance.

Table F.2.Step 3.c.i – 1: Monitoring and Maintenance of PWD BMPs during FY12

Site Name	BMP Types on Site	Routine Monitoring & Maintenance Visits	Special Maintenance Visits
47th and Grays Ferry	Rain Garden	12	2
Clark Park	Infiltration Trench	7	0
Cliveden Park	Rain Garden	10	2
Jefferson Square	Swale	2	1
Waterview Rec. Center	Pervious Pavement, Stormwater Planter and Tree Trench	10	2
West Mill Creek	Tree Trenches	10	1
Liberty Lands	Rain Garden	8	1
Herron Playground	Pervious Pavement	8	2
Columbus Square	Stormwater Planter	12	0
Palmer Street	Tree Trench	8	1
16th Street	Tree Trench	10	1
Hartranft School	Tree Trench	9	1
Bureau of Laboratory Services	Tree Trench and Stormwater Planters	12	1
Queen Lane	Stormwater Bumpouts	13	1
Percy Street	Pervious Pavement	2	0
Sepviva Street	Stormwater Trees and Infiltration Trench	6	1
Rockland Street	Stormwater Trees and Infiltration Trench	9	1
Eadom Street	Rain Garden	10	1
Ben Franklin Parkway	Infiltration Trench	8	0
15th & Market Bus Shelter	Green Roof	8	0
NEW SITES ADDED IN 2012			
Lancaster Avenue	Tree Trench, Rain Garden and Stormwater Bumpout	2	0
Mill Creek	Pervious Pavement	1	0
Earl Street	Tree Trench	1	0
Front Street	Tree Trench	2	0
8th Street	Tree Trench	1	0
9th Street	Tree Trench	1	0
Diamond Street	Tree Trench	1	0
Reese Street	Tree Trench	1	0
Shissler Rec. Center	Tree Trench and Rain Garden	3	0
Madison Memorial	Rain Garden	1	0
Belfield Avenue	Tree Trench	1	1

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.

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 completed 3,024 dye tests in FY2012. This number includes the 62 that were identified and abated in FY2012. In addition, PWD reviewed 663 new construction connections in the 2011 calendar year and thus far in calendar year 2012, PWD has reviewed 506 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.

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

During FY 2012 the Defective Connections Abatement staff, performed 3,024 dye tests. Of these tests, 2,955 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 62 abatements performed in FY 12, both residential and commercial, was $389,249.67. Results of this fiscal year's program can be observed in **TABLE F.3.B.II-1**.

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 2012, the City investigated at least 21 reported sewage discharges.

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

Quarter	2011-3	2011-4	2012-1	2012-2	FY '12
Date Coverage	Jul11-Sep11	Oct11-Dec11	Jan12-Mar12	Apr12-Jun12	Total or Average
Completed Tests *	766	760	708	790	3,024
Confirmed Connections	756	744	689	766	2,955
Cross Connection Identified	10	16	19	24	69
% of Defective Connections	1.3%	2.0%	2.6%	3.0%	2.2%
Abatements **	22	14	20	6	62
Average # of days to abate	14.3	17	11.3	26.1	16.4

*Completed Tests includes revisits of connections

**Cross connections abated may have been identified in the prior fiscal year

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 FY2012.

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. 62 Notices of Defect were issued to the property owners in FY2012. 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.

<u>Abatements of Cross Connections</u>

In the past seven reporting periods, PWD has abated 546 cross connections at a cost of $2,672,885.11 (**TABLE F.3.D.I -1**)

Table F.3.d.i-1 Summary of Abatement FY 2005-FY 2012

	# 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
FY2012	51	11	$389,249.61
Total	492	54	$ 2,672,885.11

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

Abatement of Residential Cross Connections

The City requires abatement of all residential defective connections upon discovery. 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 2012 reporting period, the City funded abatement of 51 residential cross connections at an average cost of $7,260.10, for a total cost of $370,265.17.

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

Abatement of Commercial and Industrial Cross Connections

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 2012 reporting period, the City funded abatement of 11 commercial cross connections at an average cost of $1,725.86, for a total cost of $18,984.50.

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

When the City goes out to a property to perform a dye test where a cross connection result is found, this information (location, date, and site description) is entered into an electronic database which to notify the property owner. This notification is called a Notice of Defect, the defect type (internal vs. external) will determine who is financially responsible. All defects are expected to be completed within 120 days of notice. 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 FY2012, there are no properties that exceeded the 120 day requirement.

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 FY2012 had confirmation testing showing abatement were installed properly.

F.3.e. Defective Connection Program Reporting

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

Defective Lateral Quarterly Reports are submitted four times a year to Andrew Sinclair at 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 FY2012, **APPENDIX N – FY2012 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, numerical summary of properties determined to be properly connected, properties with defects, outfall areas in which work was conducted during the reporting period; numerical summary of abatements achieved through homeowner notification, enforcement, or City sponsored construction. For those outfalls (sewersheds) that have been identified as "priority" outfalls, 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 and 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. In 2011, the Fire Department inspected approximately150 of the more than 450 Tier II facilities in the City of Philadelphia. At this rate, it is estimated that the random inspections reach each facility at least once every three years.

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 can 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 STORMWATER 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 2012 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 2012 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
- Along with PADEP, organized a field change review policy which identifies how the two agencies will interact when significant design changes are submitted for review during active construction.
- 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.
- 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 regular 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.
- Formed a Development Services Committee to gather feedback from the development community regarding the stormwater plan review process, to internally assess the review program, and to formulate a list of program improvements, with a goal of becoming more business friendly and better streamlining development in the City.

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 2012 is presented in **TABLE F.5-1** at the conclusion of this section

Table F.5-1 Summary of Plan Review Activities throughout FY 2012

	Jul. '11	Aug. '11	Sep. '11	Oct. '11	Nov. '11	Dec. '11	Jan. '12	Feb. '12	Mar. '12	Apr. '12	May. '12	Jun. '12	FY 12 Total
Conceptual Review Stage													
Approvals	4	14	6	14	11	3	6	13	11	4	11	14	111
Rejections	32	32	30	30	19	29	30	19	12	22	40	25	320
Reviews	36	46	36	44	30	32	36	32	23	26	51	39	431
New Project Submittals	22	18	18	17	15	20	20	14	18	23	35	32	252
Average Review Time (days)	5.0	4.1	3.9	3.6	3.4	3.4	4.6	5.6	4.3	3.7	4.0	3.7	4.1
Post Construction Stormwater Management Plan Review Stage													
Administrative Screenings	4	16	15	12	9	9	6	12	13	13	13	21	143
Technical Approvals Issued	10	8	9	8	8	6	8	1	9	2	2	11	82
Rejections	39	36	28	35	28	22	21	29	23	29	35	38	363
Full Technical Reviews	54	48	41	48	38	34	30	35	42	37	45	57	509
New Project Submittals Received	8	10	5	10	7	6	9	5	10	8	12	12	102
Average Number of Reviews per Approval	4.4	4.8	3.7	5.6	4.1	3.3	4.4	3.0	3.1	5.5	5.0	4.5	4.3
Average Approval Time (days)	171	337	113	368	97	65	129	165	71	157	256	183	173
Acres of Earth Disturbance Approved	86.7	10.2	13.6	55.8	12.8	6.5	20.2	1.2	17.8	12.1	3.8	21.9	262.6
Acres of Green Roofs Approved	0.9	0.3	0.3	1.0	0.2	1.1	0.1	0.4	1.1	0.0	0.7	2.0	8.1
Acres of Porous Pavement Approved	1.3	0.0	1.8	4.6	0.1	0.4	0.2	0.0	0.5	0.2	0.7	9.9	19.8
Erosion and Sedimentation Inspections													
New Sites Inspected	1	7	6	10	8	9	6	7	7	10	1	7	79
Complaint Inspections	0	1	1	0	0	0	1	1	0	2	0	2	8
Total Inspections	66	58	85	82	81	122	143	99	95	85	97	105	1118
Inspections at Project Sites with MS4 Sewers	20	15	20	20	18	37	46	19	22	17	13	26	273
Inspections at Project Sites with Combined Sewer	45	34	57	53	53	68	71	70	65	63	79	74	732
DEP Reviews													
New Coordinated Reviews	6	2	9	5	9	5	4	4	5	2	7	5	63
Erosion and Sedimentation Plan Review													
Defer to DEP	2	0	1	0	0	1	1	1	0	0	0	0	6
Approved	8	5	6	8	6	7	4	3	11	5	6	14	83
Rejected	24	20	12	20	15	10	10	14	8	13	20	24	190
Not Applicable	7	7	5	11	9	5	7	6	11	8	13	11	100

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 2012.

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 2012 inspections, the major compliance issues continue to include improper use of silt fences, inadequate or lack of inlet protection, contractor not following the onsite E&S Plan and a complete absence of E&S controls. The sites visited cover all of Philadelphia including both separate storm sewer areas and combined sewer areas as depicted in **FIGURE F.5.A-1**.

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.

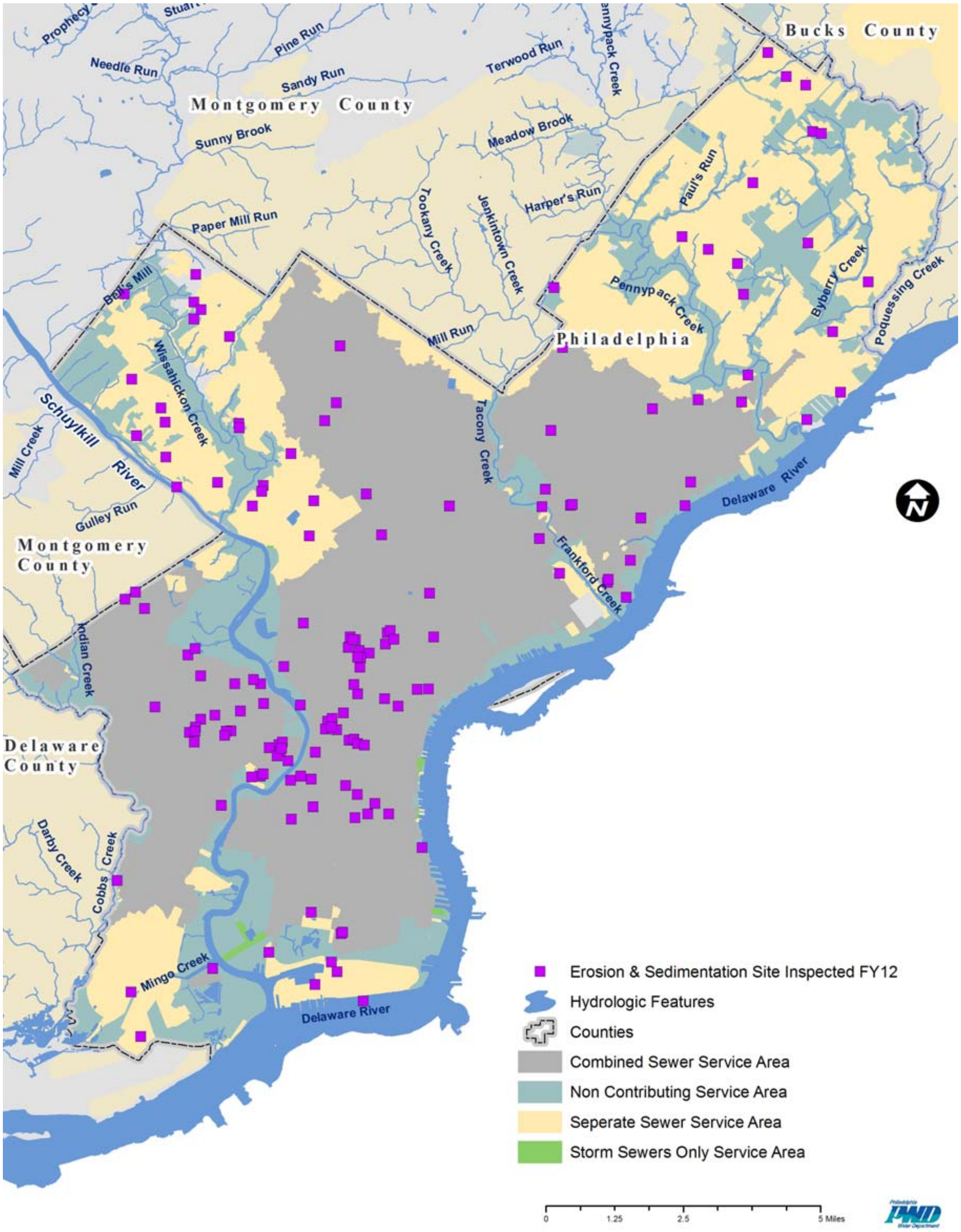


Figure F.5.a-1 Erosion and Sedimentation Site Inspections

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_regulations.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 2012 Annual Report, PWD's records indicate that projects are proposing use of pervious paving for a total of 55.9 acres and installation of green roofs at a total of 20.6 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 the Department of 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 2012, 252 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 82 full technical plans during FY 2012. 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 63 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	51
Non-Contributing Area	12
Separate Sewer Area	19
Total	82

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

Drainage Watershed	Number of Locations
Delaware River	20
Poquessing Creek	4
Pennypack Creek	5
Schuylkill River	37
Tacony/Frankford Creek	10
Wissahickon Creek	6
Total	82

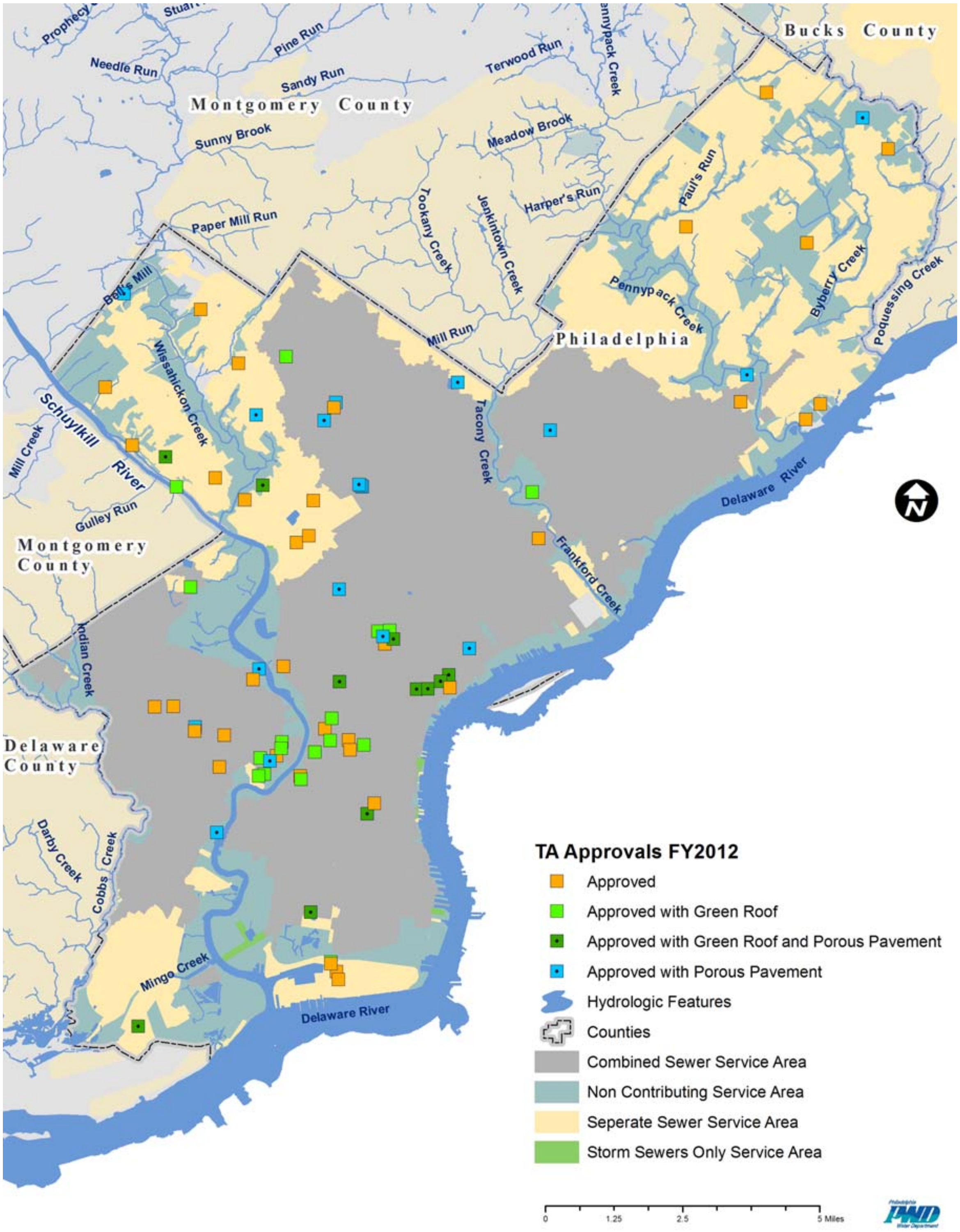


Figure F.5.c-1 Locations of Approved Post-Construction Stormwater Management Plans

F.5.d. Inspections

A total of 273 E&S Control Plans were reviewed during this reporting cycle. Inspectors conducted 1118 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	99
Non-Contributing Area	22
Separate Sewer Area	32
Total Locations	114

F.5.e. Monitoring/Enforcement

In FY12, PWD issued a total of eighteen 7-Day Notices for E&S violations on four construction sites. A total of three sites were 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 other's 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://www.PWDPlanReview.org/StormwaterManual.aspx. 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.

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 Planning and Environmental Services Division (PESD), strives to reduce the amount of point and non-point discharges entering regional waterways and improve the environmental health of the region so that all waters are fishable and swimmable. In a broad effort to enhance the health of the Philadelphia region's waterways, PWD 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 PESD, in addition to the Stormwater Management Program, 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. These 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 85 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 41 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 43 for information about this topic.

RiverCast

Please refer the CSO portion of the Annual Report **SECTION II.G.2.2 – RIVERCAST** on page 41 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 112 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 2012.

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 bills and newsletters are distributed biannually to educate property owners and prevent future events from occurring.

Table F.7.a-1 Pollutant Migration/Infiltration to the MS4 System

Date	Location	Pollutant	Sewershed Drainage
07/06/11	Schuylkill River, Shurs Lane vicinity	Brown floating globs	Separate
07/08/11	Clifton and Race Streets	Construction materials in inlet	Combined
07/12/11	Inlet at pub on Locust St	Grease	Combined
07/19/11	Naval Yard Facility	Oil	Non-contributing
07/20/11	Hahnemann Hospital ER	Discharge from decontamination tank	Combined
07/23/11	Levick & Marsden Streets	Oil	Combined
08/06/11	Hazzard and Memphis Streets	Hydraulic Oil	Combined
08/10/11	Sewer inlet IFO 2539 N Chadwick St	Oil	Combined
08/24/11	Coca-Cola Plant, 801 E Erie Ave	Diesel Fuel	Combined
08/26/11	Tabor Avenue	Cooking Oil	Combined
08/26/11	7500 Wheeler St	Sewage pumped into creek	Combined
08/29/11	Intersection of Allegheny Ave & Edgemont St	Suspected asphalt dumping into inlets	Combined
08/30/11	1316 Devereaux St	Unknown Chemicals	Combined
08/31/11	9254 Crispin St	Sink hole in yard	Separate
09/08/11	Outfall D-44 at Shackamaxon St	Red dye solution	Combined
09/12/11	NW corner of Rowan St & Germantown Ave	Direct discharge into inlet (no permit)	Combined
09/23/11	Poquessing Creek	Fuel sheen on creek	Non-contributing

Date	Location	Pollutant	Sewershed Drainage
09/28/11	Cottman Northbound Exit of I-95 to Ditman Street, North to Aldine St	Diesel Oil	Combined
09/29/11	Old SEPTA site along Callowhill St	Oil	Combined
10/11/11	NW corner of 11th St and Snyder Ave	Cement flushed into inlet	Combined
10/14/11	SW pipe next to Police Academy Firing Range on Pennypack Creek	Clear water discharge from basin at Baxter Treatment Plant	Separate
11/23/11	Hog Island Road, PWD valve box	Oil	Non-contributing
11/28/11	Arizona St automobile repair garage	Oil	Combined
11/30/11	Stevens and Poquessing Creek Drive	Oil	Separate
12/12/11	PGW Excavation of gas main	Oil	Unknown
12/14/11	Henry Ave and Seffert St	Brown sediment in pipe	Separate
01/05/12	IFO 1241 N Taney St	Potassium hydroxide	Combined
01/05/12	CSX Train Derailment	Oil	Unknown
01/24/12	Inlet at 7th and Dickinson Streets	Chicken parts/grease/street debris	Combined
01/26/12	I-95N south of Devereaux St	Oil	Combined
02/03/12	York St	Sewage pumped to street	Combined
02/07/12	SE corner of Hutchinson & McKean Streets	Sewage dumped into inlet	Combined
02/10/12	TPO2 at NEWPCP in bar screen area of PTB	Cumene odors	Separate
02/17/12	Sanitary sewer on City Line ave IFO chain restaurant	Grease	Separate
03/05/12	40th and Parrish Streets	Diesel fuel	Combined
03/08/12	Front St and Pattison Ave	Oil	Combined
03/21/12	5th and Champlost Streets	Cooking oil	Combined
03/26/12	Entertainment Restaurant on Columbus Blvd	Grease	Combined
04/01/12	Path off of Monastery Ave beneath Henry Ave bridge	Sewage overflow	Separate
04/24/12	Inlet on Braddock street	Oil	Combined
05/03/12	Residence on Edmund Street	Sewage overflow	Separate
05/09/12	I-95N south of Ashburner St	Diesel fuel	Separate
05/10/12	Stormwater pipe IRO 3720 Main St	Brownish discharge	Separate
06/04/12	N 6th St	heating oil	Combined
06/15/12	Richmond & Cambria Streets	Discharge from demolition site	Combined
06/22/12	Inlet at 7th and Dickinson Streets	Chicken parts and feathers	Combined
06/22/12	Ridge Ave & Osborn St	Septic overflow to river	Separate

F.7.b.i. Public Education Literature

The City takes an active role in provide information and education to the public and our community. Several events and programs are conducted each year in which the City provides numerous amounts of literature to the public. Please refer the CSO portion of the Annual Report **SECTION II.G – POLLUTION PREVENTION** on page 40 for information about this topic.

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

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

The City does not use pesticides or conduct any practices that require the use of the 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 and Spinosad (brand name Natular), a natural occurring bacteria in the soil, a new "green" larvicide**.** The larvicides are approved for use in the stormwater catch basins and are applied as such. The 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

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

F.7.d. Snow Management Plan

The City faces winter storms that bring potentially dangerous accumulations of ice, sleet, freezing rain, and snow. Such events carry the potential to virtually paralyze the metropolitan area. In order to mitigate the impact of these storms, the Streets Department has prepared a Snow and Ice Removal Operations Plan which provides a detailed outline of the City's response to adverse winter weather conditions. An updated version of Streets Department's Snow and Ice Removal Operations Plan for Winter 2011-2012 will be provided in **APPENDIX O**.

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.

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. 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

F.8.a.i. Submit 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.

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. 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 2012, the Basin was dewatered to inspect the sediment levels. The basin sediment appears to have not changed since its last inspection in 2009; therefore no further accumulation has been occurring. Photos from this inspection can be found in the **APPENDIX P – MINGO CREEK 2012 INPECTION PHOTOS**.

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.

New Stormwater Structural Controls

Development projects that construct 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 225 projects have had O&M Agreements recorded as part of the deed.

PWD requires a pre-construction meeting prior to commencement of earth moving activities. 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. 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.

Part of the inspection program growth during FY2012 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 230 active projects. Technical plan review staff was 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 FY2012, PWD assigned three 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 1,400 inspections on almost 325 sites. 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.

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 214.

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 195 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." An updated version of Streets Department's Snow and Ice Operations Plan for Winter 2011-2012 will be provided in **APPENDIX O**.

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

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

During FY 2012, 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 FY12, a total of 34,525 miles were cleaned. The Streets department continues to provide mechanical cleaning service in Center City and on major arterials commercial corridors.

In addition, 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.

Public awareness of litter

The City promotes, develops, and implements litter reduction programs, in an effort to increase public awareness of litter as a source of stormwater pollution. There are about 500 solar-powered, compaction litter receptacles in Center City, and another 400 in other commercial districts throughout the city. Several hundred standard wire baskets are also in place through the Philadelphia More Beautiful Committee Adopt-A-Basket program. The Philadelphia More Beautiful Committee organizes neighborhood cleaning events citywide. In the 2011 calendar year, Clean Block season, 10,287 blocks were cleaned by 87,321 volunteers; 917 tons of trash were collected and removed. Also on April 14, 2012 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

PWD continues to 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 35 for information this program and activity conducted during FY2012.

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
A new program to address dog waste in targeted neighborhoods was created in July of 2010. Through a pilot project in the Delaware Watershed, the Partnership for the Delaware Estuary found that many dog-owners are unaware of the connection of dog waste to water pollution. 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. In FY12 one dog was chosen from each of two source water protection neighborhoods, Queen Village (30 contestants) and Northern Liberties (25 contestants). 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 June 2 and June 9, 2012. Messages about the competition and runoff pollution caused by dog waste were featured in multiple articles in local newspapers, magazines and on television, reaching tens of thousands of Philadelphians. Also, PWD's website, which hosted the

Spokesdog Competition information, registration and online voting, received close to 8,000 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 (L&I) department will send all applicants with properties located in or close to the 100 Year Flood Plain to the Philadelphia City Planning Commission (PCPC) for review. If the property is determined to be within the Floodway or Floodway Fringe, structures built on the allowable property will be built at least one-foot above the Base Flood Elevation (BFE) or floodproofed such that plan complies to 14-1606 and any special Building code requirements. In FY2012, no applications were received by the Zoning Board of Adjustment for a Flood Plain Variance.

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 220, 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 19 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 108 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 112 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 1,181 abatements to correct cross connection in sewer laterals since 1994, 62 abatements were completed in FY2012 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 8.7 million gallons of contaminated flow from entering our waterways during FY2012. Please refer to **SECTION F.3 – DETECTION, INVESTIGATION AND ABATEMENT OF ILLICIT DISCHARGES** on page 190 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 ***APPENDIX C – COA ANNUAL* REPORT IN SECTION – INTERCEPTOR RELINING** on page 23 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 78 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 was completed in December of 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 79 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 PWD for those areas where homes are experiencing malfunctions and no practical means are available for their correction.

On-lot Sewage Disposal System Program 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.
- During the 2012 fiscal year, 5 complaints of malfunctioning On-Lot Sewage Disposal Systems were investigated and mitigated, 4 applications were received and issued for the installation of on-lot sewage disposal systems and 497 portable toilet 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 2012.

Table F.8.g.iii-1 FY 2012 Sanitary Infiltration Events

Report Date	Problem Location	Spill Notes	Affected Outfall	Discharge (GPM)	Abatement Date
6/28/12 3:00 PM	NADINA DR. & TOMLINSON RD.	CHOKED SEWER - OUTFALL TO STREAM	P-116-02	0.01	6/28/12 6:00 PM
6/26/12 9:40 AM	WISSAHICKON AVE. PARKING LOT. RAILROAD TRACKS.	CHOKED SEWER - SOIL PONDING	S-046-06	0.01	6/26/12 1:30 PM
5/23/12 10:00 AM	RENNARD & TOMLINSON RD	CHOKED SEWER - OUTFALL TO STREAM	P-116-01	1	5/23/12 12:00 PM
4/17/12 12:20 PM	INTERSECION ROWLAND & SHELMIRE IN REAR OF BASEBALL FIELD	CHOKED SEWER - OUTFALL TO STREAM	P-091-08	0.01	4/18/12 11:00 AM
4/1/12 2:30 PM	5900 JANNETTE ST. UNDER HENRY AVE OVER PASS	CHOKED SEWER - OVER LAND TO STREAM	W-060-01	0.03	4/1/12 6:00 PM
3/22/12 8:30 AM	NEW QUEEN AND CRESSON	DEFECTIVE SEWER PIPE	S-052-04	0.01	3/22/12 10:50 AM
2/23/12 12:00 PM	11500 ROSEVELT BLVD (I. RICE & COMPANY - BUILDING D)	DEFECTIVE SEWER PIPE	N/A	<1	3/5/12 12:00 PM
2/15/12 12:00 PM	3001 CASTOR AVE (ADJACENT TO NE WPCP FACILITY)	SEWAGE LEAK – OVER LAND TO SEWER	N/A	<1	2/15/12 5:00 PM
2/10/12 1:30 PM	RED LION RD & CALERA RD	CHOKED SEWER - OUTFALL TO STREAM	Q-106-13	0.01	2/11/12 3:30 PM
2/7/12 8:00 AM	326 ROXBOROUGH AVE	CHOKED SEWER - BASEMENT	S-051-08	0.01	2/7/12 12:00 PM
2/6/12 12:00 PM	PUMPING STATION #796 (PHILADELPHIA NAVAL YARD BUSINESS CENTER/ 13TH & ADMIRAL ST)	SEWAGE LEAK – SOIL PONDING	N/A	<1	2/6/12 4:00 PM
2/2/12 9:00 AM	6000 HENRY AVE BETWEEN MONESTARY AND DUPONT UNDER OVER PASS	CHOKED SEWER - OVER LAND TO STREAM	W-060-01	0.01	2/2/12 4:30 AM
12/14/11 12:00 PM	HENRY AVE & SEFFERT STREET	INVESTIGATED – NO SPILL IDENTIFIED	W-075-01	N/A	N/A
12/7/11 12:00 PM	REAR OF PROPERTY @ 4422 WISSAHICKON AVE	CHOKED SEWER - SOIL PONDING	S-046-06	0.01	12/8/11 7:00 AM
10/30/11 12:00 PM	LINCOLN DR & WISSAHICKON AVE	CHOKED SEWER	W-060-10	55	11/05/11 1:00 PM
10/17/11 1:20 PM	INTERSECTION OF BARNES & LONEY ST.	CHOKED SEWER - OUTFALL TO STREAM	P-090-02	0.01	10/17/11 3:10 PM
10/15/11 4:30 PM	9022 BUTTONWOOD PL.	CHOKED SEWER - OUTFALL TO STREAM	S-075-07	0.01	10/15/11 9:30 PM
10/9/11 6:00 PM	500 BLK. UNIVERSITY AVE	CHOKED SEWER OVER LAND TO STREAM	S-024-01	0.01	10/10/11 8:50 AM
8/12/11 12:00 PM	EAST BANK OF COBBS CREEK - APPROXIMATELY 300 YARDS SOUTH OF INTERSECTION OF 63RD ST AND MARCHALL ROAD	DISCHARGE AT CONSTRUCTION SITE	N/A	<1	8/12/11 5:00 PM
7/9/11 11:10 PM	337 LEVERINGTON ST.	CHOKED SEWER OUTFALL TO STREAM	S-059-04	0.01	7/10/11 10:40 AM
7/5/11 12:00 PM	SHURS LANE AND MAIN STREET	INVESTIGATED – NO SPILL IDENTIFIED	N/A	N/A	N/A

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 2012.

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. In addition, a customer service hotline (215 686-6300) is also operated that provides the ability to connect to the Dispatcher. This information is distributed in mailings, as well as online at http://www.phila.gov/water/contact_us.html.

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

PWD's customer service division received 292,738 calls during calendar year 2011. 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 2011, PWD received 112,154 emergency calls and 13,791 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 FY2012 PWD responded to 7 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 FY12 HHW event please refer to **SECTION F.2.STEP 2.G** on page 174 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, 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. 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.

PWD 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). These are conducted on a voluntary basis but storm drain marking materials are always available for groups that request them, packets of 15 markers are disturbed. 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 PWD, 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 170 and results of the model runs (Stormwater Load Estmates.pdf) 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.1-1** below. The table presents fiscal year budgets for both the reporting year as well as the upcoming fiscal year.

Table H.1-1 Fiscal Resources

Program	FY 2012 Budget	FY 2013 Budget
Office of Watersheds	\$11.52 Million	\$12.00 Million
Collector Systems Support	\$0.70 Million	\$0.76 Million
Sewer Maintenance and Flow Control	\$24.63 Million	\$25.94 Million
Inlet Cleaning	\$4.48 Million	\$4.56 Million
Abatement of Nuisances	\$7.63 Million	\$8.38 Million
Sewer Reconstruction	\$23.50 Million	\$24.50 Million
Public Affairs and Education	\$6.41 Million	\$10.28 Million
Total	\$78.87 Million	\$86.37 Million

H.2 Annually submit fiscal analysis

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

APPENDIX A – FLOW MONITORING

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 (7/1/2011-7/1/2012)

Rain Gage Network		
Rain Gage	**Location**	**Percent Working**
RG_01	70th and Essington Ave	96.09%
RG_02	66th and Regent St	99.97%
RG_03	Fox Chase Rd. and Castor Ave	98.31%
RG_04	State Rd and Pennypack St	99.97%
RG_05	3rd and Mifflin St	99.97%
RG_06	Cardinal Ave and City Line Ave	99.26%
RG_07	G St. and E Annsbury St	99.98%
RG_08	N Water St. and E Clarkson Ave	99.99%
RG_09	54th and Lancaster Ave	99.98%
RG_10	Pine Rd and Susquehanna Rd	99.09%
RG_11	Rising Sun Ave and Lardner St	99.96%
RG_12	Pattison Ave and Columbus Blvd	99.98%
RG_13	Glendale Ave and Algon Ave	99.44%
RG_14	Delaware Ave and Lewis St	96.71%
RG_15	E Montgomery Ave and Thompson St	99.95%
RG_16	19th and Wood St	100.00%
RG_17	Saul St. and Benner St	75.36%
RG_18	Fox St. and Roosevelt Blvd	99.99%
RG_19	Chew Ave and Sharpnack St	98.98%
RG_20	Woodhaven Rd and Knights Rd	89.93%
RG_21	Shawmont Ave and Eva St	90.32%
RG_22	N 67th and Callowhill St	85.04%
RG_23	Penrose Ave and Mingo Ave	97.29%
RG_24	Lockart Rd and Lockart Ln	99.04%

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
D05-001187	7/7/2010	7/8/2011	CSL	CSO model calibration
D25-000150	7/7/2010	7/8/2011	CSL	CSO model calibration
P108-17-S0010	7/9/2010	9/29/2011	CSL	I/I
P109-05-S0015	7/9/2010	7/14/2011	CSL	CSO model calibration
W060-11-S0015	7/9/2010	7/14/2011	CSL	I/I
W076-13-S0100	7/9/2010	7/14/2011	CSL	I/I
WLL-0028	8/11/2010	8/12/2011	CSL	I/I
THL-B0375	11/8/2010	6/4/2012	CSL	I/I
W086-03-S0015	11/8/2010	11/17/2011	CSL	I/I
S36A-000045	12/6/2010	12/9/2011	CSL	SFR
S44-000015	12/6/2010	12/9/2011	CSL	SFR
PP-B0770	12/9/2010	12/12/2011	CSL	I/I
P104-09-S0025	12/10/2010	Present	CSL	I/I
Q102-05-S0063	12/31/2010	8/24/2011	CSL	Pumping
D65-SW010	1/1/2011	8/5/2011	CSL	Design
D67-000010	1/6/2011	8/5/2011	CSL	Design
D67-SW010	1/6/2011	8/5/2011	CSL	Design
D65-000010	1/6/2011	Present	CSL	Design
T14-000490	2/1/2011	Present	CSL	Design
T14-014030	2/11/2011	Present	CSL	Design-SFR Germantown
T14-013940	2/18/2011	8/16/2011	CSL	Design-SFR Germantown
F04-000180	3/1/2011	3/7/2012	CSL	CSO model calibration
S05-000012	3/18/2011	Present	CSL	CSO model calibration
C31-000035	5/20/2011	9/9/2011	CSL	CSO model calibration
T14-023480	5/26/2011	Present	CSL	CSO model calibration
D66-001595	6/10/2011	Present	CSL	CSO model calibration
D22-000120	6/13/2011	9/9/2011	CSL	CSO model calibration
S38-000247	6/13/2011	9/9/2011	CSL	CSO model calibration
T14-029300	6/15/2011	Present	CSL	CSO model calibration
T08-000420	6/22/2011	Present	CSL	CSO model calibration
S50-001600	6/24/2011	Present	CSL	CSO model calibration
T08-000270	6/24/2011	Present	CSL	CSO model calibration
T14-013985	9/14/2011	Present	CSL	CSO model calibration
D05-000150	10/11/2011	Present	CSL	CSO model calibration

D05-001112	10/11/2011	Present	CSL	CSO model calibration
P083-03-S0050	10/11/2011	Present	CSL	I/I
C17-000810	10/13/2011	Present	CSL	CSO model calibration
F21-009745	10/13/2011	Present	CSL	CSO model calibration
S45-001110	10/13/2011	Present	CSL	CSO model calibration
D39-009050	10/14/2011	Present	CSL	CSO model calibration
D63-000035	10/14/2011	Present	CSL	CSO model calibration
S42A-000795	10/14/2011	Present	CSL	CSO model calibration
T14-000140	10/14/2011	Present	CSL	CSO model calibration
S42-000530	10/17/2011	Present	CSL	CSO model calibration
T14-001300	10/17/2011	Present	CSL	CSO model calibration
C11-000110	10/20/2011	Present	CSL	CSO model calibration
PR-0150	10/20/2011	Present	CSL	I/I
Q101-03-S0020	10/21/2011	Present	CSL	I/I
Q117-04-S0105	10/21/2011	Present	CSL	I/I
S05-001085	10/21/2011	Present	CSL	CSO model calibration
T088-01-S0050	10/21/2011	Present	CSL	I/I
C11-000030	10/21/2011	12/30/2011	CSL	CSO model calibration
S50-009140	10/21/2011	11/11/2011	CSL	CSO model calibration
D67-DW015	10/28/2011	Present	CSL	CSO model calibration
D65-DW0020	10/31/2011	Present	CSL	CSO model calibration
D61-000015	11/18/2011	Present	CSL	CSO model calibration
D62-000020	11/18/2011	Present	CSL	CSO model calibration
D63-000080	11/18/2011	Present	CSL	CSO model calibration
P090-02-S0715	11/29/2011	Present	CSL	I/I
P113-04-S0463	11/29/2011	Present	CSL	I/I
PR-0060	11/30/2011	Present	CSL	I/I
S45-000470	11/30/2011	Present	CSL	CSO model calibration
S50-002920	11/30/2011	Present	CSL	CSO model calibration
W068-05-S0047	11/30/2011	Present	CSL	I/I
BC-0055	12/1/2011	Present	CSL	I/I
T089-04-S0055	12/1/2011	4/1/2012	CSL	I/I
IALL-B0355	12/12/2011	Present	CSL	I/I
C17-003360	12/13/2011	Present	CSL	CSO model calibration
D39-000080	12/14/2011	4/17/2012	CSL	CSO model calibration
Q114-12-S0010	1/27/2012	Present	CSL	I/I

T14-013795	1/27/2012	Present	CSL	CSO model calibration
T14-S031640	1/27/2012	Present	CSL	I/I
PP-B1080	1/27/2012	3/18/2012	CSL	I/I
D54-000150	1/30/2012	Present	CSL	CSO model calibration
PC-0010	1/30/2012	Present	CSL	I/I
T14-000330	1/30/2012	Present	CSL	CSO model calibration
D39-000145	1/30/2012	4/5/2012	CSL	CSO model calibration
W086-01-S0060	1/30/2012	2/28/2012	CSL	I/I
D25-004055	1/30/2012	2/17/2012	CSL	
C06-000010	2/27/2012	Present	CSL	CSO model calibration
C24-000010	2/27/2012	Present	CSL	CSO model calibration
W076-13-0035	2/27/2012	Present	CSL	I/I
D38-000690	2/28/2012	Present	CSL	CSO model calibration
D54-001970	2/28/2012	Present	CSL	CSO model calibration
T14-013875	2/28/2012	Present	CSL	CSO model calibration
D54-000045	2/28/2012	4/6/2012	CSL	CSO model calibration
D48-000030	2/28/2012	4/5/2012	CSL	CSO model calibration
D54-004077	3/29/2012	Present	CSL	CSO model calibration
W076-01-0015	3/29/2012	Present	CSL	I/I
USE-0365	3/30/2012	Present	CSL	I/I
USE-0500	3/30/2012	Present	CSL	I/I
T14-010220	4/27/2012	Present	CSL	CSO model calibration

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

PWD COLLECTOR SYSTEMS

FLOW CONTROL UNIT

CSO REGULATING CHAMBER

MAINTENANCE

FISCAL YEAR 2012

PART 1					PHILADELPHIA WATER DEPARTMENT						Section 1	
DRY WEATHER STATUS					WASTE AND STORM WATER COLLECTION							
REPORT					FLOW CONTROL UNIT						FY 2012	

COLLECTOR	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Totals
UPPER PENNYPACK - 5 UNITS													
INSPECTIONS	13	20	19	11	16	9	24	11	16	11	11	11	172
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	2	0	0	0	0	1	1	0	1	0	1	6
UPPER DELAWARE LOW LEVEL - 12 UNITS													
INSPECTIONS	27	27	41	38	37	27	38	32	33	28	39	29	396
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	3	5	6	3	6	0	5	3	1	2	0	6	40
LOWER FRANKFORD CREEK - 6 UNITS													
INSPECTIONS	8	24	14	18	7	10	12	13	15	12	16	13	162
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	2	5	4	4	0	2	2	1	1	0	3	1	25
LOWER FRANKFORD LOW LEVEL - 10 UNITS													
INSPECTIONS	12	26	25	24	13	24	23	18	23	24	13	29	254
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	3	2	1	0	0	1	0	0	0	0	0	8
FRANKFORD HIGH LEVEL - 14 UNITS													
INSPECTIONS	32	30	46	32	32	28	22	28	36	43	40	23	392
DISCHARGES	0	0	1	0	1	1	2	0	1	0	1	0	7
BLOCKS CLEARED	0	1	2	0	0	0	0	1	0	0	0	0	4
SOMERSET - 9 UNITS													
INSPECTIONS	21	24	18	26	20	29	24	29	27	32	33	32	315
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	0	3	0	2	1	0	1	0	0	1	9
LOWER DELAWARE LOW LEVEL - 33 UNITS													
INSPECTIONS	73	132	98	83	64	87	68	82	81	74	89	91	1022
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	2	4	3	5	5	3	4	5	1	9	4	6	51
CENTRAL SCHUYLKILL EAST - 18 UNITS													
INSPECTIONS	53	65	56	63	65	57	60	46	46	42	60	44	657
DISCHARGES	0	0	1	0	0	0	0	0	0	0	0	0	1
BLOCKS CLEARED	1	7	5	3	0	1	0	2	1	0	0	1	21
LOWER SCHUYLKILL EAST - 9 UNITS													
INSPECTIONS	17	17	20	16	10	19	15	15	15	15	9	13	181
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	1	0	1	0	0	1	0	0	1	0	2	7
CENTRAL SCHUYLKILL WEST - 9 UNITS													
INSPECTIONS	21	19	14	18	21	29	20	20	34	20	24	27	267
DISCHARGES	0	0	0	0	0	0	1	0	1	0	0	1	3
BLOCKS CLEARED	0	1	2	0	0	0	0	0	2	0	0	1	6
SOUTHWEST MAIN GRAVITY - 10 UNITS													
INSPECTIONS	30	23	38	28	30	30	20	20	21	11	25	18	294
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	2	0	1	1	0	0	0	0	0	0	0	1	5
LOWER SCHUYLKILL WEST - 4 UNITS													
INSPECTIONS	14	11	9	10	4	13	8	12	8	8	5	6	108
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	2	1	0	0	0	0	1	1	0	0	6
COBBS CREEK HIGH LEVEL - 23 UNITS													
INSPECTIONS	73	92	105	106	86	85	68	61	76	75	57	54	938
DISCHARGES	1	0	0	0	0	0	0	0	0	0	0	0	1
BLOCKS CLEARED	3	0	4	4	6	4	2	2	0	3	1	0	29
COBBS CREEK LOW LEVEL - 13 UNITS													
INSPECTIONS	30	26	30	52	48	42	35	29	33	39	41	29	434
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	1	0	0	0	0	0	0	3	0	0	0	0	4
RELIEF SEWERS - 26 UNITS													
INSPECTIONS	38	48	42	34	48	34	28	50	49	49	48	51	519
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
TOTALS / MONTH for 201 REGULATOR UNITS													Totals
TOTAL INSPECTIONS	462	584	575	559	501	523	465	466	513	483	510	470	6111
TOTAL DISCHARGES	1	0	2	0	1	1	3	0	2	0	1	1	12
TOTAL BLOCKS CLEARED	18	29	31	26	17	13	17	18	8	17	8	20	222
AVER. # of INSP. / BC	26	20	19	22	29	40	27	26	64	28	64	24	32
DISC / 100 INSPECTIONS	0.2	0.0	0.3	0.0	0.2	0.2	0.6	0.0	0.4	0.0	0.2	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	3	4	4	2	3	2	5	2	3	2	2	2	34	2.8	10.7
P02	3	4	4	2	3	2	5	2	3	2	2	2	34	2.8	10.7
P03	2	4	4	2	4	2	5	2	3	2	2	2	34	2.8	10.7
P04	3	5	4	3	3	2	5	3	4	3	3	3	41	3.4	8.9
P05	2	3	3	2	3	1	4	2	3	2	2	2	29	2.4	12.6
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS															
D02	3	3	4	4	4	2	4	3	4	3	4	3	41	3.4	8.9
D03	2	2	4	3	3	3	4	2	3	2	3	2	33	2.8	11.1
D04	3	5	5	4	5	3	5	3	4	4	4	3	48	4.0	7.6
D05	2	2	4	3	4	3	4	2	3	3	4	3	37	3.1	9.9
D06	2	2	4	3	4	2	3	2	3	1	3	2	31	2.6	11.8
D07	2	2	2	3	2	2	3	2	2	2	3	2	27	2.3	13.5
D08	3	2	3	3	5	2	4	4	2	2	4	3	37	3.1	9.9
D09	2	2	3	3	2	2	3	2	2	2	3	2	28	2.3	13.0
D11	2	1	3	3	2	2	2	3	4	3	3	2	30	2.5	12.2
D12	2	2	3	3	2	2	2	3	2	2	3	1	27	2.3	13.5
D13	2	2	3	3	2	2	2	3	2	2	3	1	27	2.3	13.5
D15	2	2	3	3	2	2	2	3	2	2	2	5	30	2.5	12.2
LOWER FRANKFORD CREEK 6 NEWPC UNITS															
F13	2	5	3	3	1	2	2	3	3	2	2	2	30	2.5	12.2
F14	2	4	2	3	2	2	2	2	3	2	2	2	28	2.3	13.0
F21	1	3	2	3	1	1	2	2	2	2	2	2	23	1.9	15.9
F23	1	5	3	3	1	2	2	2	3	2	3	2	29	2.4	12.6
F24	1	4	2	3	1	2	2	2	2	2	3	3	27	2.3	13.5
F25	1	3	2	3	1	1	2	2	2	2	4	2	25	2.1	14.6
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS															
F03	1	2	2	2	1	2	2	2	2	2	1	2	21	1.8	17.4
F04	1	2	2	2	1	2	2	2	2	2	1	2	21	1.8	17.4
F05	1	2	2	2	1	2	2	2	2	2	1	2	21	1.8	17.4
F06	1	4	4	3	2	3	3	3	3	3	2	3	34	2.8	10.7
F07	1	3	2	2	1	2	2	2	2	2	1	2	22	1.8	16.6
F08	1	2	2	2	1	2	2	1	2	2	1	2	20	1.7	18.2
F09	2	4	4	3	2	3	3	2	3	3	1	3	33	2.8	11.1
F10	1	2	2	2	1	2	2	1	2	2	2	3	22	1.8	16.6
F11	1	2	2	2	1	3	3	1	2	3	1	7	28	2.3	13.0
F12	2	3	3	4	2	3	2	2	3	3	2	3	32	2.7	11.4
FRANKFORD HIGH LEVEL 14 NEWPC UNITS															
T01	2	3	3	3	2	1	1	2	2	3	3	3	28	2.3	13.0
T03	3	3	4	5	3	1	2	3	6	4	3	2	39	3.3	9.4
T04	2	2	3	3	2	1	1	2	2	4	2	1	25	2.1	14.6
T05	2	2	3	3	2	1	1	2	2	3	2	1	24	2.0	15.2
T06	2	2	3	3	2	1	1	2	2	3	2	1	24	2.0	15.2
T07	2	2	3	3	2	1	1	2	2	3	2	1	24	2.0	15.2
T08	2	2	5	2	2	3	1	2	2	3	5	1	30	2.5	12.2
T09	2	2	3	1	2	2	1	2	3	3	2	1	24	2.0	15.2
T10	3	3	3	2	3	5	5	3	3	4	6	3	43	3.6	8.5
T11	3	3	5	2	3	3	4	3	3	3	7	3	42	3.5	8.7
T12	2	3	3	1	2	2	1	1	2	3	1	2	23	1.9	15.9
T13	3	1	3	2	3	3	1	2	3	3	2	2	28	2.3	13.0
T14	2	1	2	1	2	2	1	1	2	2	1	1	18	1.5	20.3
T15	2	1	3	1	2	2	1	1	2	2	2	1	20	1.7	18.2

7 TOTAL DISCHARGES FOR NE & SE DISTRICTS — DTR = DAYS TO RETURN TO SITE
0.6 AVERAGE DISCHARGES PER MONTH — I/D/C = INSPECTIONS PER DAY PER CREW
12.6 AVER. DAYS BEFORE RETURNING TO SITE — I/D = INSPECTIONS PER DISCHARGE
3.7 AVER. INSPECTIONS PER DAY PER CREW

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
SOMERSET LOW LEVEL 9 NEWPC UNITS															
D17	2	4	2	3	2	5	3	3	3	3	4	3	37	3.1	9.9
D18	2	3	2	3	2	3	3	3	3	4	4	3	35	2.9	10.4
D19	3	4	2	3	2	3	3	3	3	4	4	3	37	3.1	9.9
D20	2	3	2	3	2	3	3	3	3	4	4	4	36	3.0	10.1
D21	2	2	2	2	1	3	3	3	3	3	3	2	29	2.4	12.6
D22	2	2	2	3	2	3	3	3	3	3	4	3	33	2.8	11.1
D23	2	2	2	2	2	3	2	3	3	3	3	4	31	2.6	11.8
D24	3	2	2	2	2	3	2	3	3	3	3	5	33	2.8	11.1
D25	3	2	2	5	5	3	2	5	3	5	4	5	44	3.7	8.3
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS															
D37	2	6	3	4	5	3	4	3	5	3	3	6	47	3.9	7.8
D38	1	3	3	2	2	3	2	3	4	3	6	4	36	3.0	10.1
D39	2	3	3	2	4	3	2	3	4	2	3	3	34	2.8	10.7
D40	2	2	6	2	3	4	2	3	3	2	3	3	35	2.9	10.4
D41	2	2	3	2	2	3	2	3	2	3	3	2	29	2.4	12.6
D42	2	2	3	2	2	3	2	3	2	2	3	2	28	2.3	13.0
D43	2	2	3	2	2	3	2	3	2	2	3	2	28	2.3	13.0
D44	2	4	4	2	3	5	2	3	2	2	3	2	34	2.8	10.7
D45	3	5	3	3	2	3	2	3	2	2	3	3	34	2.8	10.7
D46	2	2	3	2	2	3	2	3	3	2	3	3	30	2.5	12.2
D47	2	6	3	2	2	3	2	3	3	2	3	4	35	2.9	10.4
D48	2	11	4	2	2	3	2	3	3	4	5	6	47	3.9	7.8
D49	2	7	4	2	2	3	2	3	3	3	3	3	37	3.1	9.9
D50	2	5	4	3	2	3	2	4	3	2	3	2	35	2.9	10.4
D51	2	4	3	2	2	2	2	3	3	2	3	3	31	2.6	11.8
D52	2	3	3	2	2	2	2	3	3	2	2	2	28	2.3	13.0
D53	2	3	3	2	2	2	2	2	3	2	3	2	28	2.3	13.0
D54	2	4	3	3	2	2	2	2	2	2	3	2	29	2.4	12.6
D58	3	4	5	4	3	4	3	3	3	3	4	3	42	3.5	8.7
D61	2	3	3	2	2	2	2	2	2	2	3	2	27	2.3	13.5
D62	2	3	3	2	2	2	2	2	2	2	3	2	27	2.3	13.5
D63	2	6	2	3	3	3	2	2	2	4	3	4	36	3.0	10.1
D64	2	3	3	2	1	2	2	2	2	2	2	2	25	2.1	14.6
D65	3	3	3	4	1	2	2	2	2	2	3	3	30	2.5	12.2
D66	2	5	2	3	2	3	2	2	2	3	2	2	30	2.5	12.2
D67	3	5	2	5	1	2	2	2	2	2	1	3	30	2.5	12.2
D68	2	3	2	3	1	2	2	2	2	2	1	3	25	2.1	14.6
D69	3	4	2	2	1	2	2	2	2	2	1	3	26	2.2	14.0
D70	2	4	4	4	1	2	2	2	2	2	2	3	30	2.5	12.2
D71	3	3	2	3	1	2	3	2	2	2	2	3	28	2.3	13.0
D72	2	4	2	3	1	3	2	2	2	2	2	2	27	2.3	13.5
D73	6	8	2	2	1	3	2	2	2	2	2	2	34	2.8	10.7
TOTAL	186	283	261	232	189	214	211	213	231	224	241	228	2713		
I/D/C	3.1	4.7	4.3	3.8	3.1	3.5	3.5	3.5	3.8	3.7	4.0	3.7			
UP	13	20	19	11	16	9	24	11	16	11	11	11	172	2.9	10.7
UDLL	27	27	41	38	37	27	38	32	33	28	39	29	396	2.8	11.4
LFC	8	24	14	18	7	10	12	13	15	12	16	13	162	2.3	13.6
LFLL	12	26	25	24	13	24	23	18	23	24	13	29	254	2.1	15.0
FHL	32	30	46	32	32	28	22	28	36	43	40	23	392	2.3	13.9
SLL	21	24	18	26	20	29	24	29	27	32	33	32	315	2.9	10.6
LDLL	73	132	98	83	64	87	68	82	81	74	89	91	1022	2.7	11.7

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

													TOTAL
UP	0	0	0	0	0	0	0	0	0	0	0	0	0
UDLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LFC	0	0	0	0	0	0	0	0	0	0	0	0	0
LFLL	0	0	0	0	0	0	0	0	0	0	0	0	0
FHL	0	0	1	0	1	1	2	0	1	0	1	0	7
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
	0	0	1	0	1	1	2	0	1	0	1	0	7

NO OF UNITS IN DISTRICT BLOCKED													TOTAL
UP	0	0	0	0	0	0	0	0	0	0	0	0	0
UDLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LFC	0	0	0	0	0	0	0	0	0	0	0	0	0
LFLL	0	0	0	0	0	0	0	0	0	0	0	0	0
FHL	0	0	1	0	1	1	2	0	1	0	1	0	7
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		2					1	1		1		1	6
P04													0
P05													0
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS													
D02													0
D03	1	1			1			1				1	5
D04		3	2	1	1		2			1			10
D05												1	1
D06			1		1		1		1				4
D07													0
D08	1		1				1	1					4
D09													0
D11		1			1			1		1			4
D12													0
D13													0
D15	1		2	2	2		1					4	12
LOWER FRANKFORD CREEK 6 NEWPC UNITS													
F13	1	2	1	1									5
F14	1	3	2	2		1	1	1			2		13
F21													0
F23			1	1							1		3
F24						1	1		1			1	4
F25													0
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS													
F03													0
F04													0
F05		1					1						2
F06		1	1										2
F07													0
F08													0
F09		1	1	1									3
F10	1												1
F11													0
F12													0
FRANKFORD HIGH LEVEL 14 NEWPC UNITS													
T01		1											1
T03			1					1					2
T04													0
T05													0
T06													0
T07													0
T08													0
T09													0
T10			1										1
T11													0
T12													0
T13													0
T14													0
T15													0

11.92 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						2							2
D18									1				1
D19	1												1
D20				2								1	3
D21													0
D22													0
D23							1						1
D24													0
D25				1									1
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS													
D37		1				1	2		1				5
D38											3		3
D39													0
D40			1	1				1		1		1	5
D41										1			1
D42					1								1
D43													0
D44													0
D45								1					1
D46				1									1
D47		1			1								2
D48	1	2		1	1	1	1	1		2	1	1	12
D49	1			1				1					3
D50													0
D51										1		1	2
D52													0
D53													0
D54													0
D58								1					1
D61												1	1
D62												1	1
D63					1					1			2
D64													0
D65							1						1
D66					1								1
D67			1										1
D68			1	1		1							3
D69										1			1
D70													0
D71										1		1	2
D72										1			1
D73													0
D75													0
													TOTAL
	9	20	17	16	11	7	14	11	4	12	7	15	143
UP	0	2	0	0	0	0	1	1	0	1	0	1	6
UDLL	3	5	6	3	6	0	5	3	1	2	0	6	40
LFC	2	5	4	4	0	2	2	1	1	0	3	1	25
LFLL	1	3	2	1	0	0	1	0	0	0	0	0	8
FHL	0	1	2	0	0	0	0	1	0	0	0	0	4
SLL	1	0	0	3	0	2	1	0	1	0	0	1	9
LDLL	2	4	3	5	5	3	4	5	1	9	4	6	51

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
CENTRAL SCHUYLKILL EAST SIDE 18 SWWPC UNITS															
S05	5	3	17	9	6	3	3	8	2	2	4	4	66	5.5	5.5
S06	5	7	4	4	3	3	3	3	2	2	3	2	41	3.4	8.9
S07	4	12	4	4	3	3	3	3	2	2	3	2	45	3.8	8.1
S08	3	6	5	4	3	3	3	2	7	2	3	2	43	3.6	8.5
S09	3	3	3	4	3	3	3	2	2	2	3	2	33	2.8	11.1
S10	3	2	2	3	3	3	3	2	2	3	3	2	31	2.6	11.8
S12	3	3	3	4	5	4	4	3	3	3	4	3	42	3.5	8.7
S12A	3	3	3	4	5	3	4	3	3	3	4	3	41	3.4	8.9
S13	3	3	2	3	4	4	4	3	3	3	4	3	39	3.3	9.4
S15	3	3	2	3	5	4	4	2	2	2	3	2	35	2.9	10.4
S16	2	2	1	2	3	3	3	2	2	2	3	2	27	2.3	13.5
S17	2	2	1	3	2	3	3	2	2	2	3	2	27	2.3	13.5
S18	2	2	1	2	3	3	3	1	2	2	3	2	26	2.2	14.0
S19	3	3	2	3	4	3	4	2	3	3	4	3	37	3.1	9.9
S21	3	2	2	3	4	3	4	3	3	3	4	3	37	3.1	9.9
S23	2	6	2	4	3	3	3	2	2	2	3	2	34	2.8	10.7
S25	2	2	1	2	3	3	3	1	2	2	3	2	26	2.2	14.0
S26	2	1	1	2	3	3	3	2	2	2	3	3	27	2.3	13.5
LOWER SCHUYLKILL EAST SIDE 9 SWWPC UNITS															
S31	2	1	2	2	1	2	2	2	2	1	1	1	19	1.6	19.2
S35	2	1	2	2	1	2	2	2	2	2	1	1	20	1.7	18.2
S36	2	1	1	1	1	1	1	1	1	2	1	1	14	1.2	26.1
S36A	2	1	3	2	1	2	2	2	2	1	1	1	20	1.7	18.2
S37	2	1	1	1	1	1	1	1	1	2	1	1	14	1.2	26.1
S42	2	8	5	3	1	5	2	2	2	3	1	4	38	3.2	9.6
S42A	1	2	2	2	1	2	2	2	2	1	1	1	19	1.6	19.2
S44	2	1	1	1	1	1	1	1	1	2	1	1	14	1.2	26.1
S46	2	1	3	2	2	3	2	2	2	1	1	2	23	1.9	15.9
CENTRAL SCHUYLKILL WEST 9 SWWPC UNITS															
S01	2	2	3	2	2	4	2	2	3	2	2	3	29	2.4	12.6
S02	2	2	2	2	2	4	3	4	3	2	2	3	31	2.6	11.8
S03	2	2	2	2	2	4	3	2	3	2	2	2	28	2.3	13.0
S04	2	1	1	2	2	3	2	2	3	2	3	2	25	2.1	14.6
S11	2	1	1	2	2	2	2	2	3	2	3	2	24	2.0	15.2
S14	3	1	1	2	2	3	2	2	3	2	3	2	26	2.2	14.0
S20	4	2	1	2	3	3	2	2	10	2	3	2	36	3.0	10.1
S22	2	4	2	2	3	3	2	2	3	3	3	6	35	2.9	10.4
S24	2	4	1	2	3	3	2	2	3	3	3	5	33	2.8	11.1
SOUTHWEST MAIN GRAVITY 10 SWWPC UNITS															
S27	2	1	2	2	3	3	2	2	2	1	3	2	25	2.1	14.6
S28	2	2	2	2	3	3	2	2	2	1	3	2	26	2.2	14.0
S30	2	1	2	2	3	3	2	2	2	1	3	2	25	2.1	14.6
S34	2	1	2	2	3	3	2	2	2	1	2	2	24	2.0	15.2
S39	2	1	2	2	3	3	2	2	2	1	2	2	24	2.0	15.2
S40	2	1	3	3	3	3	2	2	2	2	2	2	27	2.3	13.5
S43	2	1	3	2	3	3	2	2	2	1	2	1	24	2.0	15.2
S47	2	1	3	1	3	3	2	2	2	1	2	1	23	1.9	15.9
S50	9	8	14	9	3	3	2	2	3	1	3	3	60	5.0	6.1
S51	5	6	5	3	3	3	2	2	2	1	3	1	36	3.0	10.1
LOWER SCHUYLKILL WEST SIDE 4 SWWPC UNITS															
S32	3	2	1	2	1	3	2	3	2	2	1	1	23	1.9	15.9
S33	5	2	1	2	1	3	2	3	2	2	1	1	25	2.1	14.6
S38	4	6	6	4	1	4	2	3	2	2	2	3	39	3.3	9.4
S45	2	1	1	2	1	3	2	3	2	2	1	1	21	1.8	17.4

5 TOTAL DISCHARGES IN SW DISTRICT DTR = DAYS TO RETURN TO SITE

0.4 AVERAGE DISCHARGES PER MONTH I/D/C = INSPECTIONS PER DAY PER CREW

13.0 AVER. DAYS BEFORE RETURNING TO SITE I/D = INSPECTIONS PER DISCHARGE

2.6 AVER. INSPECTIONS PER DAY PER CREW

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
COBBS CREEK HIGH LEVEL 23 SWWPC UNITS															
C01	3	4	5	5	5	3	2	2	3	3	2	2	39	3.3	9.4
C02	3	4	7	5	5	3	2	2	3	3	2	2	41	3.4	8.9
C04	3	5	6	5	3	3	2	2	3	3	2	2	39	3.3	9.4
C04A	3	4	6	4	3	3	2	2	3	3	2	2	37	3.1	9.9
C05	3	4	6	4	3	3	2	1	3	3	2	2	36	3.0	10.1
C06	4	5	5	5	4	4	3	2	4	4	3	3	46	3.8	7.9
C07	4	5	7	5	4	4	4	2	4	3	3	3	48	4.0	7.6
C09	4	5	6	5	5	3	4	2	4	3	3	3	47	3.9	7.8
C10	4	4	5	4	4	2	3	2	3	4	4	2	41	3.4	8.9
C11	3	4	2	4	3	2	3	2	3	3	2	3	34	2.8	10.7
C12	3	4	3	3	3	2	3	2	3	3	2	2	33	2.8	11.1
C13	3	4	2	3	3	1	3	2	3	3	2	2	31	2.6	11.8
C14	3	3	3	4	6	21	12	14	5	4	4	4	83	6.9	4.4
C15	3	3	3	6	5	3	3	2	3	3	3	3	40	3.3	9.1
C16	3	3	3	5	5	3	3	3	4	4	4	3	43	3.6	8.5
C17	3	3	1	4	4	3	3	2	3	3	3	2	34	2.8	10.7
C31	3	4	5	5	3	4	2	2	4	3	2	2	39	3.3	9.4
C32	3	4	5	5	3	3	2	2	3	4	2	2	38	3.2	9.6
C33	3	4	5	5	3	3	2	2	3	3	2	2	37	3.1	9.9
C34	3	4	5	5	3	3	2	3	3	3	2	2	38	3.2	9.6
C35	3	4	5	5	3	3	2	2	3	3	2	2	37	3.1	9.9
C36	3	4	5	5	4	3	2	2	3	3	2	2	38	3.2	9.6
C37	3	4	5	5	2	3	2	4	3	4	2	2	39	3.3	9.4
COBBS CREEK LOW LEVEL 13 SWWPC UNITS															
C18	3	2	3	4	4	3	3	2	3	3	3	3	36	3.0	10.1
C19	3	2	2	4	5	3	4	2	3	3	3	2	36	3.0	10.1
C20	2	2	2	4	5	3	3	2	3	4	3	2	35	2.9	10.4
C21	2	2	2	4	4	4	3	2	3	4	3	2	35	2.9	10.4
C22	2	2	3	4	4	3	3	2	3	4	3	2	35	2.9	10.4
C23	2	2	3	4	4	3	4	2	2	5	3	3	37	3.1	9.9
C24	2	2	2	4	3	3	4	2	2	3	4	2	33	2.8	11.1
C25	2	2	3	4	4	4	3	4	4	3	4	3	40	3.3	9.1
C26	3	2	2	4	3	3	2	3	2	2	3	2	31	2.6	11.8
C27	3	2	2	4	3	3	2	2	2	2	3	2	30	2.5	12.2
C28A	2	2	3	4	3	4	2	2	2	2	3	2	31	2.6	11.8
C29	2	2	2	4	3	3	1	2	2	2	3	2	28	2.3	13.0
C30	2	2	1	4	3	3	1	2	2	2	3	2	27	2.3	13.5
TOTAL	238	253	272	293	264	275	226	203	233	210	221	191	2879		
I/D/C	2.6	2.8	3.0	3.2	2.9	3.0	2.5	2.2	2.6	2.3	2.4	2.1			
CSES	53	65	56	63	65	57	60	46	46	42	60	44	657	3.0	10.6
LSES	17	17	20	16	10	19	15	15	15	15	9	13	181	1.7	19.8
CSW	21	19	14	18	21	29	20	20	34	20	24	27	267	2.5	12.5
SWMG	30	23	38	28	30	30	20	20	21	11	25	18	294	2.5	13.4
LSW	14	11	9	10	4	13	8	12	8	8	5	6	108	2.3	14.3
CCHL	73	92	105	106	86	85	68	61	76	75	57	54	938	3.4	9.3
CCLL	30	26	30	52	48	42	35	29	33	39	41	29	434	2.8	11.1

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							1						1
S03													0
S04													0
S11													0
S14													0
S20									1				1
S22												1	1
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	1												1
C11													0
C12													0
C13													0
C14													0
C15													0
C16													0
C17													0
C31													0
C32													0
C33													0
C34													0
C35													0
C36													0
C37													0
COBBS CREEK LOW LEVEL 13 SWWPC UNITS													
C18													0
C19													0
C20													0
C21													0
C22													0
C23													0
C24													0
C25													0
C26													0
C27													0
C28A													0
C29													0
C30													0
													TOTAL DISC
	1	0	1	0	0	0	1	0	1	0	0	1	5

	NO OF UNITS IN DISTRICT BLOCKED												**TOTAL**
CSE	0	0	1	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	1	0	1	0	0	1	3
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	0	0	0	0	0	0	0	0	0	0	0	1
CCLL	0	0	0	0	0	0	0	0	0	0	0	0	0

	NO OF DISCHARGES IN DISTRICT												**TOTAL**
CSE	0	0	1	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	1	0	1	0	0	1	3
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	0	0	0	0	0	0	0	0	0	0	0	1
CCLL	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
CENTRAL SCHUYLKILL EAST SIDE 18 SWWPC UNITS													
S05			3	3				2					8
S06		1	1										2
S07		1							1				2
S08		1	1			1							3
S09		1											1
S10													0
S12													0
S12A													0
S13												1	1
S15													0
S16													0
S17													0
S18													0
S19													0
S21	1												1
S23		2											2
S25		1											1
S26													0
LOWER SCHUYLKILL EAST SIDE 9 SWWPC UNITS													
S31													0
S35													0
S36										1			1
S36A				1			1						2
S37													0
S42	1											2	3
S42A													0
S44													0
S46		1											1
CENTRAL SCHUYLKILL WEST 9 SWWPC UNITS													
S01			1										1
S02													0
S03													0
S04													0
S11													0
S14													0
S20									2				2
S22		1	1									1	3
S24													0
SOUTHWEST MAIN GRAVITY 10 SWWPC UNITS													
S27													0
S28													0
S30													0
S34													0
S39													0
S40			1										1
S43													0
S47													0
S50	2			1								1	4
S51													0
LOWER SCHUYLKILL WEST SIDE 4 SWWPC UNITS													
S32										1			1
S33	1								1				2
S38			2	1									3
S45													0

6.5 AVERAGE BLOCKAGES PER MONTH

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
COBBS CREEK HIGH LEVEL 23 SWWPC UNITS													
C01					1								1
C02			1										1
C04	1				1					1			3
C04A													0
C05													0
C06	1										1		2
C07													0
C09				1	1								2
C10													0
C11													0
C12													0
C13													0
C14						2							2
C15			1	1									2
C16	1							1		1			3
C17													0
C31			1		2	1							4
C32													0
C33				1									1
C34													0
C35			1			1							2
C36					1		1						2
C37				1			1	1		1			4
COBBS CREEK LOW LEVEL 13 SWWPC UNITS													
C18													0
C19													0
C20													0
C21													0
C22													0
C23													0
C24	1												1
C25								3					3
C26													0
C27													0
C28A													0
C29													0
C30													0
													TOTAL
	9	9	14	10	6	5	3	7	4	5	1	5	78

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
CSE	1	7	5	3	0	1	0	2	1	0	0	1	21
LSE	1	1	0	1	0	0	1	0	0	1	0	2	7
CSW	0	1	2	0	0	0	0	0	2	0	0	1	6
SWG	2	0	1	1	0	0	0	0	0	0	0	1	5
LSW	1	0	2	1	0	0	0	0	1	1	0	0	6
CCHL	3	0	4	4	6	4	2	2	0	3	1	0	29
CCLL	1	0	0	0	0	0	0	3	0	0	0	0	4

RELIEF SEWER MONTHLY INSPECTION

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
THOMAS RUN RELIEF SEWER													
R01	2	3	1	1	2	1	1	2	2	2	2	2	21
R02	1	3	1	1	2	1	1	2	2	2	2	2	20
R03	1	3	1	1	2	1	1	2	2	2	2	2	20
R04	1	2	1	1	2	1	1	2	2	2	2	2	19
R05	1	2	1	1	2	1	1	2	2	2	2	2	19
R06	1	2	1	1	2	1	1	2	2	2	2	2	19
MAIN RELIEF SEWER													
R07	1	2	2	1	3	2	2	2	2	2	2	2	23
R08	1	2	2	1	4	1	1	2	2	2	2	2	22
R09	1	2	2	1	2	1	1	2	2	2	2	2	20
R10	1	2	1	1	2	1	1	2	2	2	3	2	20
R11	1	2	1	1	2	2	1	2	2	2	2	2	20
R11A	1	2	1	1	2	1	1	2	2	2	2	2	19
R12	2	1	1	1	2	1	1	2	2	2	2	2	19
WAKLING RELIEF SEWER													
R13	2	1	2	2	2	1	1	2	3	2	2	2	22
R14	2	1	2	2	2	1	1	2	3	2	2	2	22
ROCK RUN STORM FLOOD RELIEF SEWER													
R15	2	2	2	2	1	2	1	2	3	3	2	2	24
OREGON AVE RELIEF SEWER													
R16	2	3	2	2	1	2	2	2	1	1	1	2	21
R17	2	3	2	2	1	2	2	2	1	1	1	2	21
FRANKFORD HIGH LEVEL RELIEF SEWER													
R18	2	3	6	1	1	2	1	2	1	2	2	2	25
32ND ST RELIEF SEWER													
R19	2	1	2	2	1	2	1	2	2	2	2	2	21
MAIN STREET RELIEF SEWER													
R20	2	2	2	2	1	2	1	2	2	2	2	2	22
SOMERSET SYSTEM DIVERSION CHAMBER													
R21													0
TEMPORARY REGULATOR CHAMBER													
R22													
R23	2	1	2	2	2	2	1	2	2	3	1	3	23
ARCH ST RELIEF SEWER													
R24	2	1	1	1	3	1	1	2	2	2	2	2	20
16TH & SNYDER													
R25	1	1	1	1	2	1	1	2	1	1	2	2	16
GRANT & STATE RD. RELIEF													
R26	2	1	2	2	2	1	1	2	2	2	2	2	21
TOTAL	38	48	42	34	48	34	28	50	49	49	48	51	519
AVER	1.4	1.8	1.6	1.3	1.8	1.3	1.0	1.9	1.8	1.8	1.8	1.9	1.6

RELIEF SEWER MONTHLY DISCHARGE

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

RELIEF SEWER MONTHLY BLOCKS CLEARED

PAGE 9

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

FY 2012 CSO Dry Weather Discharge Listing

Discharge Observed		Discharge Stopped		Last Inspection						
DateDO	TimeDO	DateDS	TimeDS	DateLI	TimeLI	SiteID	Collector	TypeUnit	Location	Comment
07/23/11	01:00 PM	07/23/11	02:30 PM	07/12/11	02:10 PM	C-10	CCHL	SLOT	Gross St. & Cobbs Creek	DEBRIS WAS BLOCKING THE SLOT, DWO PIPE AND CLEANOUT MANHOLE.
09/14/11	01:30 PM	09/14/11	02:40 PM	09/08/11	02:10 PM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	SLOT BLOCKED WITH GRIT & DEBRIS
09/20/11	09:30 AM	09/20/11	07:40 PM	09/16/11	09:30 AM	S-05	CSES	B & B	24th St. 155 S of Park Towne Place	SHUTTERGATE CLOSED DUE TO REGULATOR OPENING BEING BLOCKED BY THE FLOAT
11/26/11	01:10 PM	11/26/11	01:50 PM	11/23/11	02:10 PM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	DWO PIPE BLOCKED WITH LEAVES AND DEBRIS
12/14/11	10:50 AM	12/14/11	01:00 PM	11/26/11	09:30 AM	T-10	FHL	SLOT	Roosevelt Blvd. E of Tacony Creek	BLOCKED WITH ROAD SIGN, GRIT AND BOTTLES
01/14/12	09:40 AM	01/14/12	03:10 PM	01/13/12	02:00 PM	T-10	FHL	SLOT	Roosevelt Blvd. E of Tacony Creek	SLOT OPENING BLOCKED
01/28/12	12:30 PM	01/28/12	01:10 PM	01/18/12	12:10 PM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	DEBRIS IN SLOT
01/31/12	01:40 PM	01/31/12	02:10 PM	01/18/12	10:50 AM	S-02	CSW	B & B	Haverford Ave. & West River Dr.	ROCKS AND GRIT IN REG OPENING
03/22/12	08:50 AM	03/22/12	01:10 PM	03/08/12	10:30 AM	S-20	CSW	B & B	NNW of South St. (Behind Penn Stad.)	A LOG WAS STUCK UNDER THE ORIFICE PLATE WITH DEBRIS AROUND IT.
03/24/12	08:20 AM	03/24/12	08:30 AM	03/24/12	01:10 PM	T-03	FHL	SLOT	Champlost Ave. W of Tacony Creek	THERE WAS GRIT IN SLOT BOX BLOCKING THE DWO PIPE.
05/05/12	12:40 PM	05/05/12	01:10 PM	04/18/12	11:00 AM	T-11	FHL	SLOT	Ruscomb St. E of Tacony Creek	THERE WAS GRIT IN THE SLOT BOX BLOCKING THE DWO PIPE.
06/04/12	08:50 AM	06/04/12	09:30 AM	05/30/12	10:40 AM	S-22	CSW	B & B	660 ft S of South St E of Penn Field	SHUTTER GATE STUCK IN CLOSE POSITION.

Dry Weather Discharges are continually tracked and analyzed to determine if new or modified maintenance procedures would help to prevent them from occurring. Although our established procedures have greatly reduced the number and duration of these discharges, the combined system picks up all manner of trash and debris that is unpredictable in its pattern of causing flow disruptions. Despite our best management practices of; having all inlets trapped and cleaned; preventative maintenance schedules for sewer flushing and cleaning or the regulators; CCTV inspection of DWO pipes; etc., it is virtually impossible to eliminate all blockages that could occur.

The City continues to aggressively control and minimize these dry weather overflows by utilizing the latest technology-based controls including our Collector System Remote Monitoring Network that currently includes over 320 sites with over 720 individual level and/or flow measurements. The CSO maintenance personnel are trained in the use of the system's computer programs for analyzing the data and have developed a comprehensive understanding of individual CSO site's distinct flow patterns. This familiarity allows them to quickly recognize abnormal conditions that may indicate accumulating debris so that they can respond before developing into a dry weather CSO blockage.

Collector System - Flow Control Unit - CSO Annual Report - Miscellaneous Maintenance - 2012

SOMERSET GRIT CHAMBER CLEANINGS

DATE	TONS
10/11/2011	12.7
1/31/2012	9.3

T-04 DEBRIS NET REPLACEMENTS FLOATABLES PILOT PROJECT

DATE	TOTAL WEIGHT lbs.
4/9/2012	110

CSPS GRIT POCKET CLEANINGS

DATE	CU. YARDS
10/3/2011	25
1/19/2012	30
4/25/2012	30
7/27/2012	25

CSO B&B REGULATOR PREVENTATIVE MAINTENANCE

SITE	DATE
D-73	7/23/2011
D-71	7/23/2011
S-38	7/30/2011
S-50	7/30/2011
S-09	8/27/2011
D-48	8/27/2011
S-23	9/1/2011
S-33	10/1/2011
D-63	4/28/2012
D-48	4/28/2012
D-47	6/2/2012
D-65	6/2/2012
S-24	6/18/2012
S-22	6/18/2012
S-02	6/29/2012
S-01	6/29/2012
D-71	6/30/2012

CSO TIDE GATE PREVENTATIVE MAINTENANCE

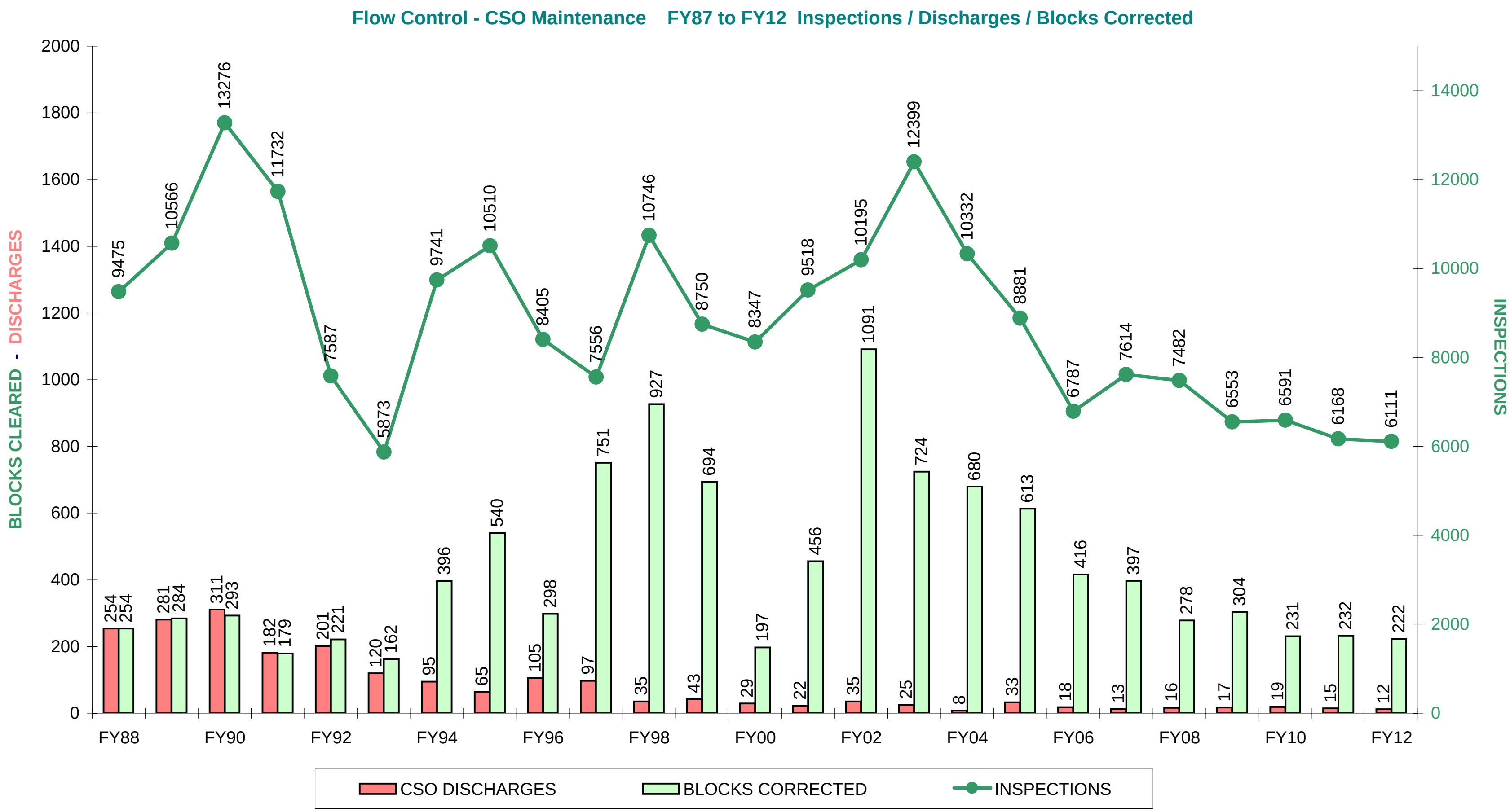
SITE	DATE
S-38	7/30/2011
S-50	7/30/2011
D-48	8/27/2011
S-09	8/27/2011
S-38	10/1/2011
D-18	10/18/2011
S-18	11/15/2011
D-17	12/10/2011
S-38	5/17/2012

CSO COMPUTER CONTROL CHAMBER PREVENTATIVE MAINTENANCE

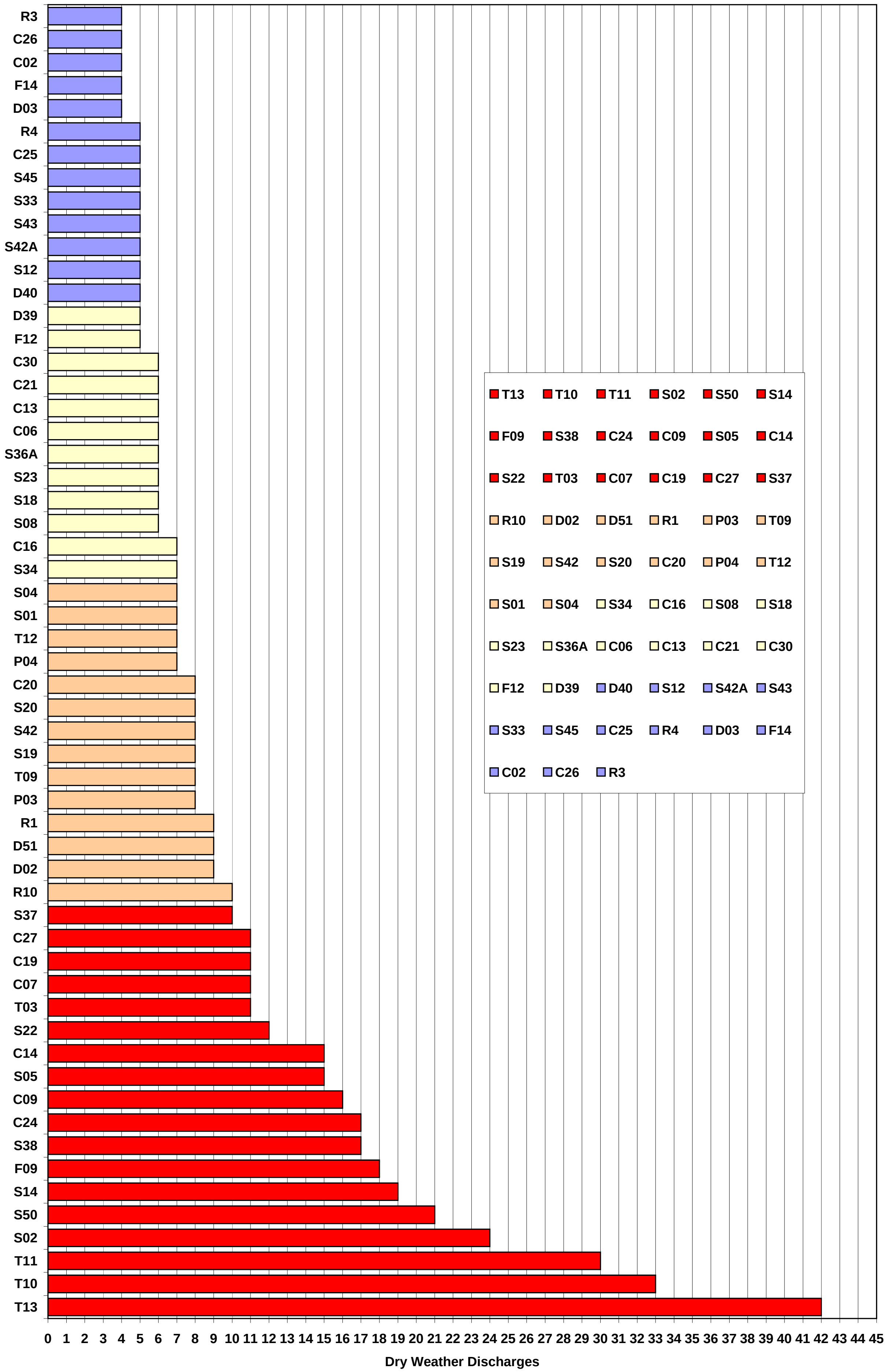
SITE	DATE	SITE	DATE
F-25	6/15/12	D-07	12/30/11
D-11	6/14/12	D-11	12/30/11
D-15	6/14/12	D-09	12/20/11
D-02	6/13/12	F-25	12/20/11
D-07	6/13/12	D-15	12/19/11
D-09	6/13/12	D-15	11/9/11
D-03	6/11/12	F-25	11/9/11
D-05	6/11/12	D-05	11/8/11
F-25	5/16/12	D-11	11/8/11
D-05	4/26/12	D-07	11/3/11
D-07	4/26/12	D-02	11/2/11
D-02	4/25/12	D-03	11/2/11
D-03	4/25/12	D-15	10/6/11
D-15	4/19/12	F-25	10/5/11
F-25	4/19/12	D-05	10/4/11
D-09	4/18/12	D-07	10/4/11
D-11	4/18/12	D-09	10/3/11
D-09	3/28/12	D-11	10/3/11
D-11	3/28/12	D-02	9/22/11
D-02	3/26/12	D-03	9/22/11
D-03	3/26/12	D-09	8/25/11
D-15	3/23/12	D-15	8/25/11
F-25	3/23/12	F-25	8/24/11
D-05	3/22/12	D-03	8/18/11
D-07	3/22/12	D-09	7/27/11
D-07	2/29/12	F-25	7/27/11
D-09	2/29/12	D-05	7/25/11
F-25	2/29/12	D-07	7/25/11
D-02	2/28/12	D-11	7/20/11
D-15	2/28/12	D-15	7/20/11
D-05	2/24/12	D-02	7/19/11
D-03	2/23/12	D-03	7/19/11
D-11	2/23/12	D-05	6/15/11
D-05	1/27/12	D-07	6/15/11
D-07	1/27/12	D-15	6/14/11
D-09	1/19/12	F-25	6/14/11
D-15	1/19/12	D-03	6/13/11
D-11	1/5/12	D-02	6/8/11
D-02	1/4/12	D-11	6/7/11
D-03	1/4/12	D-09	6/6/11

CSO OUTFALL - DEBRIS GRILL PREVENTATIVE MAINTENANCE

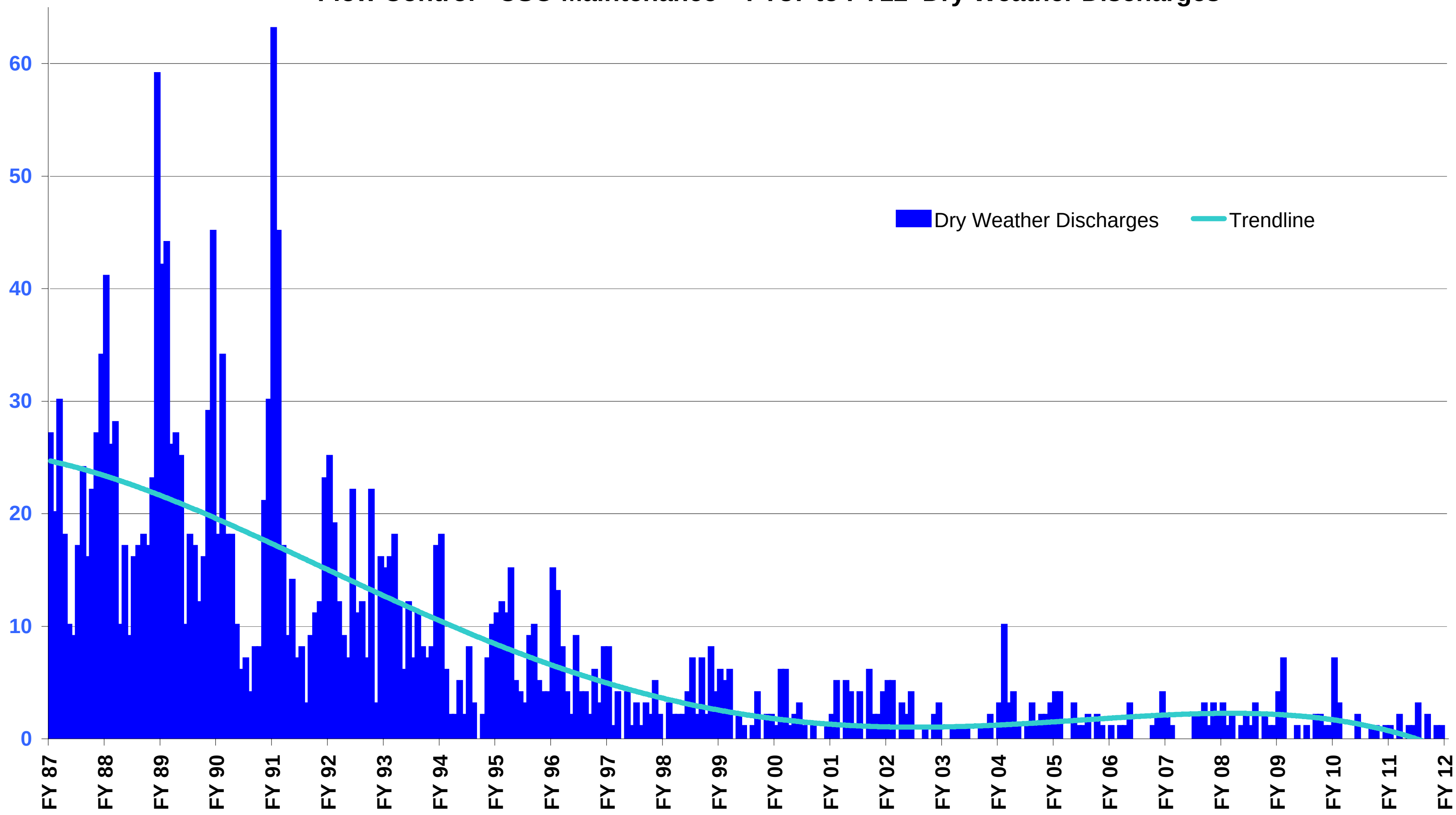
SITE	DATE
D-45	5/15/2012


Flow Control - CSO Maintenance FY87 to FY12 Inspections / Discharges / Blocks Corrected
BLOCKS CLEARED - DISCHARGES
INSPECTIONS
FY88
FY90
FY92
FY94
FY96
FY98
FY00
FY02
FY04
FY06
FY08
FY10
FY12
CSO DISCHARGES
BLOCKS CORRECTED
INSPECTIONS

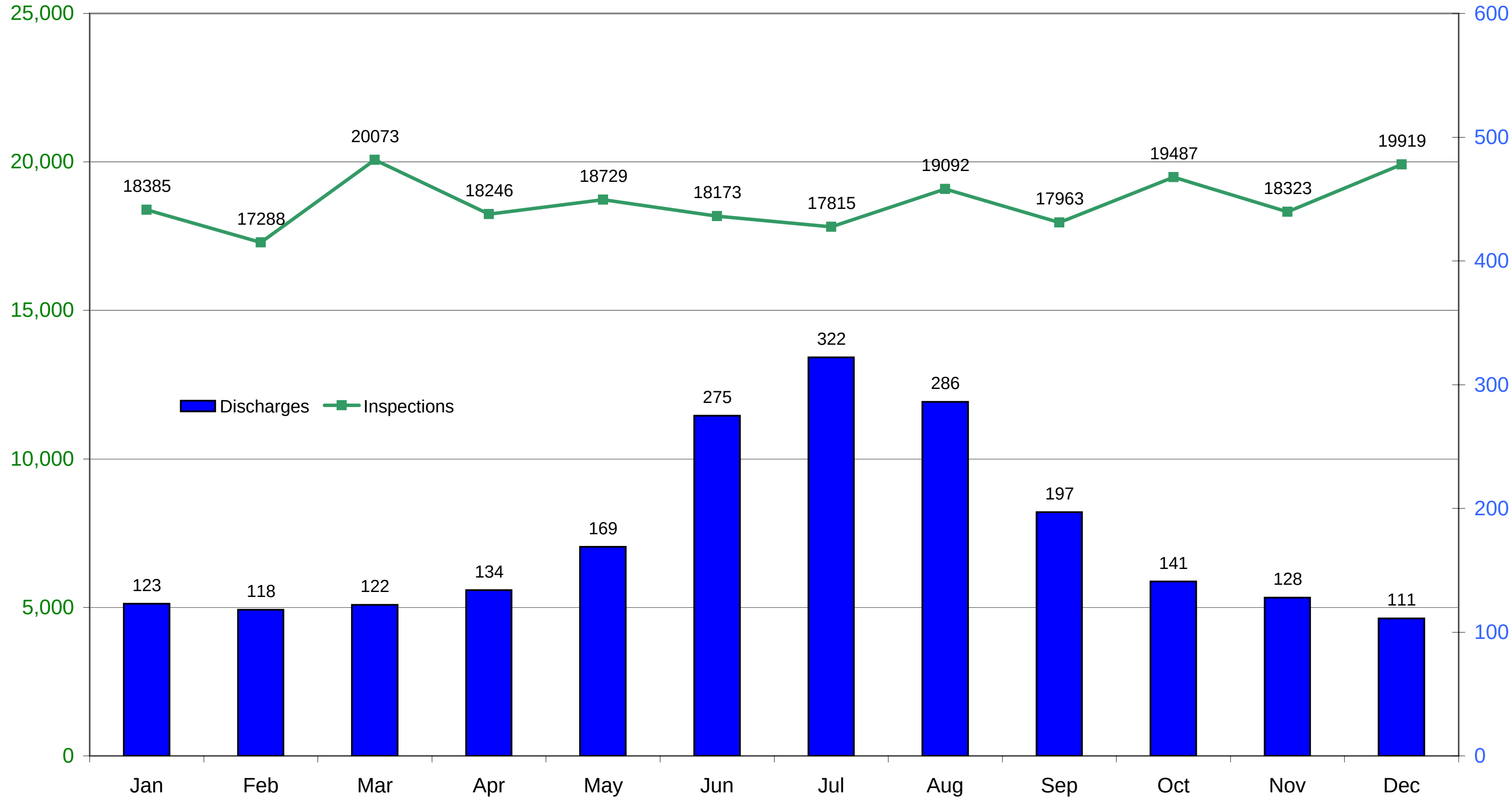
CSO Sites With 4 or More Dry Weather Discharges Since FY 1994



Flow Control - CSO Maintenance FY87 to FY12 Dry Weather Discharges



Flow Control - CSO Maintenance   FY87 to FY12 Total Number of Inspections / Discharges By Month



Green City, Clean Waters

FY2012 Annual Reporting for COA and WQBEL Obligations

City of Philadelphia Combined Sewer Overflow Long Term Control Plan Update

Submitted to

The Commonwealth of Pennsylvania

Department of Environmental Protection

By the Philadelphia Water Department

September 28, 2012

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7.0 Public Outreach and Participation

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3.0 Capital Projects

Glossary

ADCP	Acoustic Doppler Current Profiler
ADA	Americans with Disabilities Act
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CCLL	Cobbs Creek Low Level
CMP	Comprehensive Monitoring Plan
COA	Consent Order and Agreement
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
DO	Dissolved Oxygen
DPP	Department of Public Property
ECA	Energy Coordinating Agency
GA	Greened Acre
GCCW	*Green City, Clean Waters*
GSI	Green Stormwater Infrastructure
IAMP	Implementation and Adaptive Management Plan
JIUS	Joint Initiative on Urban Sustainability
L&I	Department of Licenses and Inspection
LTCP	Long Term Control Plan
LTCPU	Long Term Control Plan Update
MOU	Memorandum of Understanding
MOTU	Mayor's Office of Transportation and Utilities
MS4	Municipal Separate Storm Sewer System
NMCs	Nine Minimum Controls
NOAA	National Oceanic and Atmospheric Association
NPDES	National Pollutant Discharge Elimination System
PADEP	Pennsylvania Department of Environmental Protection
PCPC	Philadelphia City Planning Commission
PDE	Partnership for the Delaware Estuary
PEC	Pennsylvania Environmental Council
PennDOT	Pennsylvania Department of Transportation
PHA	Philadelphia Housing Authority
PIDC	Philadelphia Industrial Development Corporation
PPR	Philadelphia Parks and Recreation
PWD	Philadelphia Water Department
RDA	Redevelopment Authority
RFP	Request for Proposal
RTC	Real Time Control
RTP	Rebuilding Together Philadelphia
SDP	School District of Philadelphia
SEPTA	Southeastern Pennsylvania Transportation Authority
SMIP	Stormwater Management Incentive Program
SMP	Stormwater Management Practice
SOD	Sediment Oxygen Demand
Streets	Philadelphia Streets Department
SSES	Sewer System Evaluation Survey
SWMM	Stormwater Management Model
TIGER	Transportation Investment Generating Economic Recovery
TPL	Trust for Public Land
TTF	Tookany/Tacony-Frankford Watershed
USEPA	United States Environmental Protection Agency
WASP	Water Quality Analysis Simulation Program
WPCP	Water Pollution Control Plant
WQBEL	Water Quality Based Effluent Limit
ZCC	Zoning Code Commission

1.0 Introduction

The following progress updates present the accomplishments by the City from July 1, 2011 to the end of the fiscal year on June 30, 2012.

1.1 Water Quality Based Effluent Limit (WQBEL) Performance Standards

The City's Combined Sewer Overflow (CSO) Long Term Control Plan Update (LTCPU) 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 1-1 contains the WQBEL implementation as defined by the Consent Order and Agreement (COA).

Table 1-1 WQBEL Performance Standards

Metric	Units	Base line value	Cumulative amount as of Year 5 (2016)	Cumulative amount as of Year 10 (2021)	Cumulative amount as of Year 15 (2026)	Cumulative amount as of Year 20 (2031)	Cumulative amount as of Year 25 (2036)
NE / SW / SE WPCP upgrade: Design	percent complete	0	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	GAs	0	744	2,148	3,812	6,424	9,564

2.0 Implementation Tracking, Reporting, and Adaptive Management

2.1 Reporting Implementation Progress

Section 2.1 provides written progress on the implementation of CSO Controls as required in Paragraph 3d of the COA to be included in the Annual Reports.

2.1.1 Implementation of the Nine Minimum Controls from the National CSO Policy

In the first phase of the Philadelphia Water Department's (PWD) CSO strategy, and in accordance with its National Pollutant Discharge Elimination System (NPDES) permits, the PWD submitted to the Pennsylvania Department of Environmental Protection (PADEP) on September 27, 1995, "CSO Documentation: Implementation of Nine Minimum Controls". The Nine Minimum Controls (NMCs) are low-cost actions or measures that can reduce CSO discharges and their effect on receiving waters, do not require significant engineering studies or major construction, and can be implemented in a relatively short time frame. The City's commitments towards implementing each of the NMCs are described in detail in the **CSO and Stormwater NPDES Annual Reports** starting on page 14.

2.1.2 Progress on Capital Projects Described in 1997 Long Term Control Plan

The second phase of the PWD's CSO strategy focused on technology-based capital improvements to the City's sewerage system to 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 water quality. Table 2-1 provides a status update on the 17 capital projects selected by the PWD in the 1997 Long Term Control Plan (LTCP) to provide significant CSO load reduction.

During the 2012 fiscal year, construction was completed on the Tacony Creek Park Storage Project (T-14). The Main and Shurs Storage Tank, designed to eliminate any overflows occurring at R-20, is expected to be completed in the summer of 2013.

Table 2-1 Summary of Phase II Capital Projects

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

Project	Status
Collection System Improvements	
Upgrade Frankford Siphon	Complete
Somerset Interceptor Sewer Conveyance Improvements	Complete
Cobbs Creek Low Level Conveyance Improvements	Complete
Cobbs Creek Low Level Control Project	Complete
Water Pollution Control Plant (WPCP) Wet Weather Treatment Maximization Program	Complete

2.1.3 COA Deliverables

The COA requires twelve deliverables due between December 1, 2011 and June 1, 2015 as documented in **Table 2-2**. Two deliverables were submitted to PADEP during the reporting period from July 1, 2011 to June 30, 2012:

The Implementation and Adaptive Management Plan (IAMP) was submitted to the PADEP by December 1, 2011. This plan provided the framework for the *Green City, Clean Waters (GCCW)* program proposed in the LTCPU. This plan described the programmatic elements that will be developed during the first five years of COA implementation.

The Green Stormwater Infrastructure (GSI) Maintenance Manual Development Process Plan was submitted to the PADEP by June 1, 2012. This plan provided an overview of the process to develop the GSI Maintenance Manual by June 1, 2014.

Table 2-2 COA Deliverables

Deliverable Name	Deliverable Date	Status
Implementation and Adaptive Management Plan	December 1, 2011	Submitted
Green Infrastructure Maintenance Manual Development Process Plan	June 1, 2012	Submitted
Comprehensive Monitoring Plan	December 1, 2012	In Development
Facility Concept Plan for NE WPCP	June 1, 2013	In Development
Facility Concept Plan for SE WPCP	June 1, 2013	In Development
Facility Concept Plan for SW WPCP	June 1, 2013	In Development
Updated Nine Minimum Controls Report	June 1, 2013	In Development
Tributary Water Quality Model – Bacteria	June 1, 2013	In Development
Tributary Water Quality Model - Dissolved Oxygen	June 1, 2014	In Development
Green Infrastructure Maintenance Manual - First Edition	June 1, 2014	In Development
Tidal Waters Water Quality Model - Bacteria	June 1, 2015	In Development
Tidal Waters Water Quality Model - Dissolved Oxygen	June 1, 2015	In Development

2.2 *Green City, Clean Waters* Project Tracking System

PWD has a number of robust data tracking systems in place and in development which will be integrated through the creation of a *Green City, Clean Waters* Project Tracking System “hub”. The “hub will provide the means to simplify the compilation of information from these systems for information dissemination and regulatory reporting. Over the last year, PWD has initiated updates to some of these data systems to enhance their ability to track data and prepare for the development of the *GCCW* “hub”.

The major components of the *Green City, Clean Waters* “hub” will include:

- Stormwater Plan Review Database
- GreenIT (GSI Implementation Tracking System)
- PWD’s Capital Projects (CAPIT) System – evolving to reCAPIT

During FY2012, significant progress was achieved toward development of GreenIT, PWD’s tracking system for all GSI projects from planning to construction. This system is designed to track compliance information related to PWD’s GSI projects. Progress on GreenIT development during this past year includes the finalization of system metrics and definitions, data migration, database hardware and software procurement, and understanding of the GSI project planning-completion process. A few final elements need to be developed in the coming months but GreenIT is anticipated to be fully operational in the fall of 2012.

The *Green City, Clean Waters* project tracking system will be designed to produce compliance reporting outputs for submission to the PADEP on an annual basis.

The tracking system reporting format will provide details as illustrated in **Table 2-3**.

Table 2-3 Project Tracking Metrics and Sample Reporting Format

Project Tracking Metrics						
Project ID	Watershed	SMP Type	Greened Acres	Storage Volume (cf)	Impervious Area Managed (sf)	New Trees
…	…	…	…	…	…	…

Annual reporting field definitions:

Project ID (formerly Project Name)
For PWD initiated and/or public property projects, a project name will be developed that can include the location and also the main SMP type(s) utilized.

For private properties, a Project Identification Number and zip code will be provided within the annual report (PWD withheld private property addresses from this public document but has this information tracked within the Plan Review tracking system).

Watershed
The watershed within the City of Philadelphia which the project location drains into.

Stormwater Management Practice (SMP) Type
The SMP associated with the project as defined in the IAMP in Table 2-1 on page 2-4.

Greened Acres (GAs)
The number of GAs associated with an SMP in the tracking system.

Storage Volume
The volume of stormwater runoff temporarily stored by the SMP.

Impervious Area Managed
This represents the total directly connected impervious area (DCIA) managed by the SMP.

New trees
The number of new trees will be tracked by type as follows:

1. New Trees planted in association with a system SMP
2. A Stormwater Tree SMP
3. Non-credit tree SMP, that would be planted associated with a project

3.0 Capital Projects

3.1 Green Stormwater Infrastructure

The COA requires that the City account for 9,564 GAs within the 25 year program horizon. Of that total, at least 744 GAs will be achieved within the first five years.

The *Green City, Clean Waters* programmatic strategies for achieving these GAs:

1. Water Department-initiated GSI projects,
2. GSI following "public works" projects, and
3. Private investment

3.1.1 Water Department Initiated Green Stormwater Infrastructure

The following section provides a status update on Water Department-initiated GSI. As shown in **Table 3-1,** 25 Water Department-initiated GSI projects have been completed as part of the GCCW plan, adding over 21 GAs and 587 new trees to the City. Over the next year, 171 GSI project are planned to be designed or constructed (**Table 3-2**). As of July 2012, 97 projects are in design, 39 projects have completed designs and are in contract development, and 33 projects are in construction.

Table 3-1 Completed Water Department Initiated GSI Project List

Project Name	SMP(s) Utilized	Construction Completed Date	New Trees	Drainage Area (sq. ft)	Storage Volume (cf)	GA (acre-inch)
West Mill Creek Farm Swales	Rain Garden, Swale	4/15/2006	4	13942	360	0.10
Mill Creek Playground Porous Basketball Court	Pervious Paving	6/1/2006	0	9350	1870	0.52
West Mill Creek Recreation Center	Stormwater Tree Trench	7/1/2006	5	17345	755	0.21
47th & Grays Ferry Rain Garden	Rain Garden	4/1/2007	7	19200	1260	0.35
Cliveden Park Stormwater Project	Rain Garden	9/1/2007	0	52355	4378	1.21
Clark Park Basketball Court Project	Infiltration/Storage Trench	11/1/2007	0	32517	3080	0.85
Waterview Recreation Center - McMahon St from Price St to Haines St	Stormwater Tree Trench, Stormwater Planter, Pervious Paving	7/1/2008	8	14773	2022	0.56
Herron Playground Porous Basketball Court	Infiltration/Storage Trench, Pervious Paving	4/1/2009	0	14480	5927	1.63
Liberty Lands Stormwater Project	Rain Garden	6/1/2009	24	8000	849	0.23
Columbus Square Stormwater Planters	Stormwater Planter, Infiltration/Storage Trench	1/1/2010	0	7854	730	0.20
Sepviva St from Susquehanna Ave to Dauphin St	Infiltration/Storage Trench	1/27/2010	13	27425	962	0.27
Shissler Playground	Stormwater Tree Trench	6/1/2010	12	17600	33844	9.32

Project Name	SMP(s) Utilized	Construction Completed Date	New Trees	Drainage Area (sq. ft)	Storage Volume (cf)	GA (acre-inch)
Lancaster Ave from N 58th St to N 63rd St	Stormwater Tree Trench, Stormwater Bumpout, Swale	11/1/2010	219	76689	11281	3.11
16th St between Passyunk Ave and Jackson St	Stormwater Tree Trench	11/10/2010	8	14735	571	0.16
Hartranft School - 7th St, 8th St, and Cumberland St	Stormwater Tree Trench	11/10/2010	6	44524	3460	0.95
Palmer St from Frankford Ave to Blair St	Stormwater Tree Trench	11/10/2010	6	9250	1250	0.34
Percy St from Catharine St to Christian St	Pervious Paving	4/30/2011	0	4740	657	0.18
Bureau of Laboratory Services	Stormwater Tree Trench, Stormwater Planter	5/14/2011	6	13408	1290	0.36
Benjamin Franklin Parkway from 21st St to 23rd St	Infiltration/Storage Trench	6/1/2011	0	29605	3651	1.01
PHS PennVest Tree Trenches - Reese St	Stormwater Tree Trench	6/1/2011	26	52556	4563	1.26
Rockland St from Broad to 11th	Infiltration/Storage Trench	6/22/2011	41	186500	5542	1.53
Montgomery from Frankford Ave to Blair St	Stormwater Tree Trench, Infiltration/Storage Trench	8/1/2011	21	34090	1572	0.43
Belfield Ave from Chew Ave to Walnut Ln	Stormwater Tree Trench	9/1/2011	84	68465	5573	1.54
Madison Memorial Park	Infiltration/Storage Trench	12/1/2011	13	7015	401	0.11
Eadom Parking Lot - 5312-50 Eadom St	Rain Garden	5/2/2012	20	100945	11704	3.22
Water Department Initiated GA Total						**21.24**

Table 3-2: Planned GSI Projects

Project Name	Primary Program	Watershed	Status
PWD Facility Employee Parking Lot	Streets	Schuylkill	In Design
40th Street Portal	Streets	Schuylkill	In Design
42nd and Lancaster	Streets	Schuylkill	In Design
73rd and Grays	Streets	Cobbs-Darby	In Design
Barry Playground	Streets	Schuylkill	In Design
Beeber Middle School	Streets	Schuylkill	In Design
Benjamin Franklin Pkwy from 16th St to 19th St	Streets	Schuylkill	In Design
TIGER III Bustleton Ave	Streets	Delaware	In Design
Callowhill Stormwater Trees	Streets	Delaware	In Design
Cecil B Moore Recreation Center	Streets	Delaware	In Design
Chelten Hills Cemetery	Streets	TTF	In Design
Cobbs Creek Reaches 6-8	Public Open Spaces	Cobbs-Darby	In Design
Collazo Park	Public Open Spaces	Delaware	In Design

Project Name	Primary Program	Watershed	Status
Connell Park	Streets	Schuylkill	In Design
Donald Finnegan Playground	Streets	Schuylkill	In Design
Drexel College of Media Arts & Design	Streets	Schuylkill	In Design
E.H. Vare Middle School	Streets	Schuylkill	In Design
Elmwood Park	Streets	Schuylkill	In Design
Finley Playground	Streets	TTF	In Design
Frankford from Placid to Ellie	Streets	Pennypack	In Design
Gathers Recreation Center	Public Open Spaces	Delaware	In Design
George W. Nebinger School	Schools	Delaware	In Design
Harrowgate Park	Public Open Spaces	Delaware	In Design
HM Stanton School	Streets	Delaware	In Design
Hunting Park	Public Open Spaces	TTF	In Design
Ingersoll Commons	Public Open Spaces	Delaware	In Design
Ivy Hills Cemetery	Streets	TTF	In Design
John F Kennedy Blvd from 30th St to 32nd St	Streets	Schuylkill	In Design
Julian Abele Park	Streets	Schuylkill	In Design
Kemble Park	Public Open Spaces	TTF	In Design
Kenderton Field	Streets	Delaware	In Design
Kinsey School	Streets	TTF	In Design
Logan School	Streets	TTF	In Design
Malcolm X Park	Streets	Schuylkill	In Design
Monkiewicz Playground	Public Open Spaces	Delaware	In Design
Mother Mary of Peace School	Streets	Schuylkill	In Design
Mt. Airy School of God in Christ	Streets	TTF	In Design
National Cemetery	Streets	TTF	In Design
Panati Playground	Public Open Spaces	Delaware	In Design
Patterson School	Streets	Schuylkill	In Design
Pennypacker School	Streets	TTF	In Design
Richmond Library	Streets	Delaware	In Design
Rowen William School	Streets	TTF	In Design
Safe Routes to Schools	Streets	Schuylkill	In Design
Sedgwick Station	Streets	TTF	In Design
Sharswood School and Our Lady of Carmel School	Streets	Delaware	In Design
Skevchenko Park	Streets	TTF	In Design
Southwark School	Streets	Delaware	In Design
Southwest Treatment Plant Parking Lot	Public Facilities	Delaware	In Design
St. Dominic School	Streets	Pennypack	In Design
St. James Episcopal Church of Kingesessing	Streets	Cobbs-Darby	In Design
St. Monica Manor	Streets	Delaware	In Design
Stenton Avenue and Washington Lane, NE Intersection	Streets	TTF	In Design
Stephen Girard School	Streets	Schuylkill	In Design
Stokley Playground	Streets	Delaware	In Design
Tacony Creek Park	Public Open Spaces	TTF	In Design
Tacony Creek Reaches 4/5	Public Open Spaces	TTF	In Design

Project Name	Primary Program	Watershed	Status
Taggert School	Streets	Delaware	In Design
Upland Way	Streets	Schuylkill	In Design
Wagner Louis Middle School	Streets	TTF	In Design
Wayne Ave and Abbottsford Ave	Streets	TTF	In Design
Westmoreland and Tulip	Streets	Delaware	In Design
William Dick Elementary	Schools	Delaware	In Design
Wilson Park	Streets	Schuylkill	In Design
Windrim Ave from Wayne Ave to Germantown Ave	Streets	TTF	In Design
Wister Woods Park	Public Open Spaces	TTF	In Design
TIGER III Woodland Ave	Streets	Schuylkill	In Design
30th St and Huntingdon St	Streets	Schuylkill	In Design
31st - Cecil B Moore to Montgomery	Streets	Schuylkill	In Design
31st St and Huntingdon St	Streets	Schuylkill	In Design
31st St from York St to 150'S of Cumberland St	Streets	Schuylkill	In Design
59th, Vodges	Streets	Cobbs-Darby	In Design
Adams Ave from Ruan to Factory	Streets	TTF	In Design
Carlisle, Hicks, and Mole	Streets	Schuylkill	In Design
Cecil B Moore - 31st to 32nd	Streets	Schuylkill	In Design
Clifford from 31st to Montgomery	Streets	Schuylkill	In Design
Cloud St from Church St to Waln St	Streets	TTF	In Design
Collins, Tulip, and Agate	Streets	Delaware	In Design
Dauphin from Frankford to Tulip	Streets	Delaware	In Design
Federal St, Wharton St	Streets	Delaware	In Design
Galloway, Howard, & Hancock	Streets	Delaware	In Design
Germantown Ave Storm Flood Relief	Streets	Delaware	In Design
Germantown Ave SFR - Phase 5	Streets	Delaware	In Design
Germantown Ave Storm Flood Relief	Streets	Delaware	In Design
Hollywood, Stanley, and Douglass	Streets	Schuylkill	In Design
Hope St from Berks to Norris	Streets	Delaware	In Design
Hope St from Master to Jefferson	Streets	Delaware	In Design
Hunting Park from Old York Rd to Roosevelt Blvd	Streets	TTF	In Design
Kinsey St from Frankford Ave to Sellers St	Streets	TTF	In Design
Marshall St from Hunting Park Ave to Cayuga St	Streets	TTF	In Design
Marston St, Eyre St, and Taney St	Streets	Schuylkill	In Design
Mole St from Fitzwater to Catharine St and Webster St from 16th to 17th	Streets	Schuylkill	In Design
Ontario St from A St to 6th St	Streets	Delaware	In Design
Patton - Turner to Cecil B Moore	Streets	Schuylkill	In Design
Penn St and Belfield Ave, Clearview and Washington	Streets	TTF	In Design
Ridgewood - 55th to 54th	Streets	Cobbs-Darby	In Design
Strawberry Mansion	Streets	Schuylkill	In Design
Thompson, Conestoga	Streets	Schuylkill	In Design
Warrington - 54th to 55th	Streets	Cobbs-Darby	In Design
21st St from Venango to Pacific	Streets	Delaware	Contract Management

Project Name	Primary Program	Watershed	Status
27th St from Indiana to Toronto	Streets	Schuylkill	Contract Management
29th and Chalmers Playground	Streets	Delaware	Contract Management
A.S. Jenks School	Streets	Delaware	Contract Management
Alder St from Norris St to Diamond St	Streets	Delaware	Contract Management
Anna B. Day School	Streets	TTF	Contract Management
Baltimore Ave Island from S 60th St to Wharton St	Streets	Cobbs-Darby	Contract Management
Barton School	Streets	TTF	Contract Management
Belmont School	Streets	Schuylkill	Contract Management
Blue Bell Inn Triangle	Public Open Spaces	Cobbs-Darby	Contract Management
Bridesburg Recreation Center & Bridesburg School	Streets	Delaware	Contract Management
Cassidy Elementary School	Streets	Cobbs-Darby	Contract Management
Dick Elementary School	Streets	Delaware	Contract Management
Dickinson Square	Streets	Delaware	Contract Management
Dorsey Playground	Streets	Delaware	Contract Management
Epiphany of Our Lord School	Streets	Delaware	Contract Management
Francis Scott Key School	Streets	Delaware	Contract Management
James Rhoads School	Streets	Schuylkill	Contract Management
Little Sisters of the Poor	Streets	Schuylkill	Contract Management
Longstreth School	Streets	Cobbs-Darby	Contract Management
Magnolia Cemetary	Streets	Delaware	Contract Management
Mastery Charter School	Streets	Schuylkill	Contract Management
McCreesh Playground / Catharine Elementary School	Streets	Cobbs-Darby	Contract Management
Muhammed Square	Streets	Schuylkill	Contract Management
Old Cathedral Cemetary	Streets	Schuylkill	Contract Management
Overbrook Elementary	Streets	Schuylkill	Contract Management
Parking Lot - 12th St, Marvine St, and Diamond St	Streets	Delaware	Contract Management
Philadelphia Zoo	Streets	Schuylkill	Contract Management
Roosevelt Playground	Streets	Delaware	Contract Management
Sacks Playground	Streets	Delaware	Contract Management
Sister Clara Muhammad School	Streets	Schuylkill	Contract Management
Smith Elementary School	Streets	Schuylkill	Contract Management
Springfield Ave and Cobbs Creek Island	Streets	Cobbs-Darby	Contract Management
St Thomas Aquinas School	Streets	Schuylkill	Contract Management
Thompson St and Columbia Ave	Streets	Delaware	Contract Management
Trenton Ave and Norris St	Streets	Delaware	Contract Management
William Cramp School	Streets	Delaware	Contract Management
William Gray Youth Center	Streets	Delaware	Contract Management
Yorktown Park	Streets	Delaware	Contract Management
10th St from Wilder St to Reed St	Streets	Delaware	In Construction
12th St and Reed St	Streets	Delaware	In Construction
12th St from Dickinson St to Tasker St	Streets	Delaware	In Construction
3rd St and Fairmount Ave Intersection	Streets	Delaware	In Construction
58th St Connector	Streets	Schuylkill	In Construction
Andrew Hamilton School	Streets	Cobbs-Darby	In Construction

Project Name	Primary Program	Watershed	Status
Bodine High School	Streets	Delaware	In Construction
Bryant Elementary School	Streets	Cobbs-Darby	In Construction
Carmella Playground/Warren G Harding School/White Hall Commons	Streets	Delaware	In Construction
Chew Playground	Streets	Schuylkill	In Construction
Christy Recreation Center	Streets	Cobbs-Darby	In Construction
Daroff School	Streets	Cobbs-Darby	In Construction
Dendy Recreation Center	Streets	Delaware	In Construction
Diamond St from 25th St to Stillman St	Streets	Delaware	In Construction
Frederick Douglass Elementary School	Streets	Delaware	In Construction
Harpers Hollow Park	Public Open Spaces	TTF	In Construction
MLK Recreation Center	Streets	Delaware	In Construction
Morris Leeds Middle School	Streets	TTF	In Construction
Passyunk Ave	Streets	Schuylkill	In Construction
Passyunk Ave from Dickinson St To Reed St	Streets	Delaware	In Construction
Philadelphia Military Academy	Streets	Delaware	In Construction
Pleasant Playground	Streets	TTF	In Construction
Poplar St from 8th St to Franklin St	Streets	Delaware	In Construction
Samuel B. Huey Elementary School	Streets	Cobbs-Darby	In Construction
Sayre High School	Streets	Cobbs-Darby	In Construction
Shepard Recreation Center	Streets	Cobbs-Darby	In Construction
Simons Recreation Center	Streets	TTF	In Construction
Towey Recreation Center	Streets	Delaware	In Construction
Wakefield Park	Public Open Spaces	TTF	In Construction
Wakisha Charter School	Streets	Delaware	In Construction
Welsh School	Streets	Delaware	In Construction
William Harrity School	Streets	Cobbs-Darby	In Construction
Womrath Park	Public Open Spaces	TTF	In Construction

PENNVEST Funded Projects

In 2009, PWD entered into a $30M loan agreement with the Commonwealth's PENNVEST program, much of which was targeted for the design and construction of GSI. As of July 2012, there are 53 projects with completed designs and are currently in contract management, 20 projects are in construction and 3 Stream Restoration & 6 GSI projects have been constructed with the PENNVEST Funding (**Table 3-3**).

Table 3-3: PENNVEST Projects

Work Order #	Project Name	Type	Watershed(s)	Status	Cost*	Drainage Area (SF)	SMP Types
50038	Donald Finnegan Playground Wilson Park E.H. Vare Middle School Stephen Girard School Southwark School Julian Abele Park	GSI	Schuylkill	Contract Management	$1,046,075	182,243	Tree Trenches
50010	Barry Playground	GSI	Schuylkill	Contract Management	$641,910	111,831	Tree Trenches
50040	Yorktown	GSI	Delaware	Contract Management	$353,561	61,596	Planters
50034	Thompson St and Columbia St Trenton Ave and Norris St.	GSI	Delaware	Contract Management	$377,968	65,848	Tree Trenches, Bumpout, Rain Garden
50036	29th and Chalmers Playground William Cramp School Barton School 27th St from Indiana to Toronto	GSI	Delaware/ Schuylkill	Contract Management	$1,765,986	307,663	Tree Trenches, Rain Gardens
50019	Anna B. Day School Francis Scott Key School Epiphany of Our Lord School Dickinson Square	GSI	Delaware	Contract Management	$735,581	128,150	Tree Trenches, Bumpout
50042	Bridesburg Recreation Center Dorsey Playground Roosevelt Playground Magnolia Cemetery Carmella Playground	GSI	Delaware	Contract Management	$1,454,229	253,350	Tree Trenches, Planters, Rain Garden
50025	A.S. Jenks School Smith Elementary St Thomas Aquinas School Sacks Playground	GSI	Delaware	Contract Management	$747,865	130,290	Tree Trenches
50007	Blue Bell Inn Triangle	GSI	Darby-Cobbs	Contract Management	$500,000	28,380	Rain Gardens
50041	Longstreth School Little Sisters of the Poor McCreesh Playground Springfield Ave & Cobbs Creek Island	GSI	Darby-Cobbs/ Schuylkill	Contract Management	$1,220,000	207,905	Tree Trenches, Planters, Rain Garden
50039	Temple Engineering & Architecture Building William Gray Youth Center Dick Elementary School 12th & Diamond	GSI	Delaware	Contract Management	$683,445	119,067	Tree Trenches
50029	Simons Recreation Center Pleasant Playground Morris Leeds Middle School	GSI	TTF	Contract Management	$1,502,632	307,335	Tree Trenches
50037	Cassidy Elementary School Overbrook Elementary School Old Cathedral Elementary Belmont School James Rhoads School Sister Clara Muhammad School Mastery Charter School Muhammed Square	GSI	Schuylkill/ Darby-Cobbs	Contract Management	$1,568,828	273,315	Tree Trenches
50028	MLK Recreation Center	GSI	Delaware	In Construction	$611,200	163,904	Tree Trenches

Work Order #	Project Name	Type	Watershed(s)	Status	Cost*	Drainage Area (SF)	SMP Types
	Towey Recreation Center Philadelphia Military Academy Fredrick Douglass Elementary						
50026	Daroff School Sayre High School Andrew Hamilton School Shepard Recreation Center	GSI	Darby-Cobbs	In Construction	$1,072,497	252,610	Tree Trenches, Bumpouts
50046	Womrath Park	GSI	TTF	In Construction	$522,000	46,174	Swale, Rain Garden, Infiltration Trench
50027	Bryant Elementary School William Harity School Samuel B. Huey Elementary Christy Recreation Center Baltimore Ave Island	GSI	Darby-Cobbs	In Construction	$980,930	168,982	Tree Trenches
50043	Harpers Hollow Park Wakefield Park	GSI	TTF	Contract Management	$448,340	65,421	Stormwater Basin, Rain Garden
50020	Welsh School Wakisha Charter School Diamond St from 25th to Stillman Poplar St from 8th to Franklin St Dendy Recreation Center	GSI	Delaware	In Construction	$817,970	96,731	Tree Trenches, Rain Garden
50001	Chew Playground Passyunk Ave- Dickinson to Reed St. 12 St to Reed St 12 St from Dickinson to Tasker St 10th St from Wilder to Reed St	GSI	Delaware	In Construction	$885,740	107,338	Tree Trenches, Bumpouts, Rain Garden
50003	Bodine High School 4th St from Poplar to Wildey St 3rd St and Fairmount Ave Intersec. Fairmount Ave - N 3rd to N 4th St	GSI	Delaware	In Construction	$407,903	49,126	Tree Trenches, Bumpout
50004	Belfield and Chew	GSI	TTF	In Construction	$285,000	68,470	Tree Trench
40642	Bells Mill Stream	Stream	Wissahickon	Construction Complete	$2,032,000	NA	Stream Restoration
40641	Wise's Mill Stream	Stream	Wissahickon	Construction Complete	$1,606,000	NA	Stream Restoration
40544	St. Martin's	Stream	Wissahickon	Construction Complete	$1,441,000	NA	Stream Restoration
50002	Blair St from Hewson to Palmer Hewson St – Blair St to Trenton Ave Montgomery – Frankford to Blair St	GSI	Delaware	Construction Complete	$197,000	18,870	Tree Trenches
50009	Queen Lane from Henry St to Fox St. Bureau of Laboratory Sciences	GSI	TTF/ Schuylkill	Construction Complete	$675,000	95,899	Bumpout, Planter
50005	Hartranft School Palmer St – Frankford Ave to Blair St 16th St betw. Passyunk Ave & Jackson St.	GSI	Delaware/ Schuylkill	Closed	$412,000	68,509	Infiltration/ Storage Trench, Tree Trench

*RED INK INDICATES ESTIMATES

Stormwater Management Enhancement Districts (SMEDs)

In FY2012, PWD has moved forward with the SMED initiative by releasing an RFP and initiating contracts with 6 contractor teams. The contract amounts range in size from \$100,000 - \$250,000 to conduct a thorough analysis of existing conditions, develop a matrix of different combinations of SMP options, engage stakeholders, and develop a stormwater improvements plan for the area. PWD is near the end of the lengthy contract conformance process and work on individual study areas is expected to begin during FY 2013. The projected timeframe from kickoff to concept design phase will vary based on the size and complexity of each study area.

In addition to selecting contractor teams, PWD has been working to develop the strategic planning, agency partnerships, and supporting project management tools needed to successfully initiate and implement these projects. The first round of study areas will be comprised of a diverse range of potential partners, land-use types, and potential management solutions. Most study areas will fall into one of the following categories; neighborhood/district planning, gateway and corridor planning, transit oriented development, commercial centers, or waterfront planning. PWD will be looking to complete a variety of these project types during the first five years.

Green Campus Initiative

During FY2012, PWD has developed various strategies for engaging and partnering with universities and healthcare campuses in Philadelphia. PWD has identified three approaches for this initiative:

1) Developing campus stormwater master plans,

2) Providing planning and design assistance on a project-by-project basis, and

3) Piloting technologies and designs for green infrastructure research purposes.

These approaches will help PWD provide context-specific solutions that account for variations in GA opportunity, partnership potential and research benefits. PWD will initiate strategic partnerships with campuses to develop stormwater management plans, with the intention of implementing Best Management Practices (BMPs) that will maximize stormwater management opportunities and provide ancillary benefits for users. In other instances, PWD will work with campuses on a project-by-project basis, as a result of development requests received from Plan Review or from internal project identification conducted by the GSI planning team.

PWD is in the preliminary stages of forming a partnership with Temple University. A letter of intent has been sent to contacts at the University and an initial Memorandum of Understanding (MOU) aimed at partnership between PWD and the University has been developed. The next phase of this project will include development of a scope of service request to begin planning for this area. We expect to use a contractor team (one of the selected SMED Contractors) to facilitate the planning process and analysis needed for this project. PWD will also be continuing to develop other strategies for working with the University of Pennsylvania and Drexel University and other large campuses within the CSO drainage on future projects.

Green Schools Initiative

In the last fiscal year, PWD has been developing the strategic planning and agency partnerships necessary to implement the Green Schools program. The scope of this program has expanded to include a combination of school types reflective of Philadelphia's neighborhood schools, including public, charter, private and faith based schools. While the program has expanded to include other types of schools, the School District of Philadelphia (SDP) is still a significant focus within the Green Schools program for policy agreements and partnership development. An opportunity analysis has been conducted to identify the program approaches and the short term and long term goals have been adjusted to reflect lessons learned from project experience.

Two Green School program efforts, Green 2015 and the George W. Nebinger School project, are giving PWD the opportunity to address issues related to policy, funding, and partnership development, while providing project level coordination for planning, design, and stakeholder engagement and stewardship.

1. Through the Green 2015 initiative of Philadelphia Parks and Recreation (PPR), PWD is partnering with the Trust for Public Land (TPL) and the SDP to make improvements to two 'pilot' school playgrounds, two Elementary Schools, and two 'pilot' recreational facilities. To date, outreach and schematic design for William Dick Elementary School has been completed, and construction documentation is the next step with construction projected to take place in 2013. The outreach and schematic design process for William Cramp Elementary School is set to begin in the fall of 2012. More details on the Green 2015 Initiative can be found in the Streamlining section starting on page 25.

2. As part of a partnership between PWD, the US Environmental Protection Agency (USEPA), the Partnership for the Delaware Estuary (PDE), and the SDP, a national and international model is in development for stormwater management and educational programming at George W. Nebinger School at 6th and Carpenter Street in South Philadelphia. The green tools that may be integrated into the design of the school yard include rain gardens, porous play surfaces, porous pavement, and stormwater planters, and they will manage stormwater runoff from the school yard and select adjacent streets. To date, a consultant has begun developing a design for the schoolyard with input from the school community. The project may additionally provide an opportunity for Philadelphia students to collaborate with similar schools in the City of Rio de Janeiro, Philadelphia's sister city in stormwater management. This collaboration is an extension of the Joint Initiative on Urban Sustainability (JIUS), a partnership among the USEPA, Brazil's Ministry of Environment and Ministry of Foreign Affairs, the City of Rio de Janeiro, and the City of Philadelphia, formed to advance sustainable cities. More details on this Partnership can be found in the Streamlining section starting on page 26.

Green Parking Lots Initiative

In FY2012, PWD has focused on further developing the strategic planning for the Green Parking Program and has implemented a green parking project on a City-owned parking lot. Parking lots present a great opportunity to reduce stormwater runoff in Philadelphia's combined sewer area. Parking lots have a significant visual impact on urban areas, and greening can contribute to the overall improvement in the appearance of the City's residential, commercial, and business districts. PWD's green parking initiatives will address both public and privately owned parcels using a variety of GSI approaches.

City-owned parking facilities, as well as other publicly owned parcels, will be targeted in early phases to demonstrate the City's commitment to GSI. Public Property parking lots that have been designated as neighborhood parking lots will be prioritized in order to engage stakeholders and potentially gain long-term support for maintenance.

Several public parking property owners were identified including the Department of Public Property (DPP), the Philadelphia Housing Authority (PHA), Philadelphia Industrial Development Corporation (PIDC), and the Philadelphia Redevelopment Authority (RDA). SDP also owns parcels that are primarily used as parking lots; however these properties will be addressed through the Green Schools program. PWD aims to build working relationships with all of the property owners of public parking lots to align with any planned capital improvements and to explore opportunities for cost effective implementation. Public parking lot projects will also be planned with other green parking or schoolyard projects to take advantage of coordinated outreach and construction. These parking lots could serve as demonstration projects for what private parking lots owners can do to be eligible for stormwater credits on their stormwater bills.

Stormwater opportunities for green stormwater retrofits on public parking lots will be identified from a list of over 200 public parking lots. PWD is developing a prioritized list of public parking lots according to baseline data (i.e. land area, % impervious cover, potential GAs) and other leveraging criteria. An initial desktop screening has been conducted based on these physical characteristics, and the following criteria will be used to further identify and prioritize potential sites:

- Project feasibility of site based on geographic and physical features, opportunities and constraints
- Entire parcel is owned by the City or other public entity
- GA potential, including adjacent right-of-way runoff
- Under-utilized parking lots, where green infrastructure features can be above ground in existing parking spaces
- Existing condition of the parking lot
- Need for capital improvement or re-paving to improve the benefit -cost ratio
- Potential funding and leveraging through partnership to achieve a complete improvement
- Parking lots designated as “neighborhood parking” lots by DPP/City of Philadelphia
- Potential for green parking project to be planned with a green streets, parks and schools projects
- Neighborhood engagement with the site
- Alignment with other neighborhood and City-wide planning initiatives (ex. Philadelphia2035)
- Opportunity to pilot new project type or to cluster projects

An example of a green parking project recently implemented, marking Philadelphia's first depaving project is located at Eadom and Bridge Streets in the Frankford neighborhood of Philadelphia. PWD coordinated with neighborhood volunteers to depave a portion of the parking lot and install and plant six rain gardens. The Eadom Street Project converted 10,000 square feet of impervious concrete to rain gardens that allow stormwater to infiltrate the soil instead of flowing into the sewer. In all, the Eadom Street project will manage stormwater runoff from two acres.

In addition to public lots, PWD will work with private customers heavily impacted by the stormwater fee change. Incentives provided by PWD’s Parcel Based Billing Initiative should make retrofits (aimed at reducing stormwater fees) more feasible for private parking lots. PWD also aims to work with Philadelphia’s Department of Licenses & Inspections (L&I) office, the Zoning Code Commission (ZCC), Philadelphia City Planning Commission (PCPC), and PWD Plan Review on a strategy to coordinate parking lot reconfiguration or new parking zoning approval and review process with the stormwater credit process.

Vacant Land Initiative

During the past year, PWD's strategy for implementing GSI on vacant land has been adjusted to align with City-wide goals, policy/logistic constraints, and partner agency needs. PWD is currently focusing efforts on publically owned vacant parcels that have low redevelopment potential and can be repurposed solely for GSI or have a clear potential use and/or maintenance support. Over the past year, PWD has worked on a variety of vacant parcels but is still refining the process and policy support needed for successful implementation of future projects. The projects that have been implemented or are in design include traffic triangle rain gardens, end of block parcels adjacent to water sewer work, and partnership projects with the Pennsylvania Environmental Council (PEC), Philadelphia City Planning Commission (PCPC), and the Southeastern Pennsylvania Transportation Authority (SEPTA). PWD plans to continue building partnerships with the various City agencies with ownership of public vacant parcels to help streamline the implementation process.

During the past year, PWD has established the following goals of the vacant land initiative:

- Align PWD’s vacant land program with other City initiatives and City-wide vacant land strategy in order to leverage funds for implementation and maintenance of GSI
- Utilize publicly owned vacant land to capture as many acres of onsite and offsite runoff possible
- Reduce the cost per GA by maximizing the capture of adjacent street runoff
- Create a long term strategy to encourage the greening of privately owned vacant parcels

The adjusted criteria for selecting sites include:

- Focus on undevelopable parcels or parcels with low redevelopment potential
- Parcel must be within 15 feet of an existing City inlet
- Parcel must be able to manage a combination of adjacent street or onsite runoff totaling more than 8,000 sq. ft. or have a price per GA lower than $100,000
- All projects must align with the 2035 comprehensive plan and any local or neighborhood plans
- Selected sites must not impede or negatively affect future development potential
- Sites that have structures, have a high likelihood of contamination, have mature vegetation, and/or have a history of dumping will be avoided
- There must be some community interest or benefit

After an initial screening of the potential projects sites PWD/partners can further prioritizes parcels by looking for sites that are:

- Adjacent to parks, schools, or other amenities
- In areas with low tree cover or access to green space
- Adjacent to other PWD projects
- Adjacent to other community initiated projects sites that have political support or momentum

GSI Pilot Program

PWD is actively selecting sites to be included in the GSI pilot program, as described in the IAMP. Information regarding selected sites and monitoring commitments will be detailed in the forthcoming Comprehensive Monitoring Plan (CMP), due December 1, 2012.

3.1.2 Implementing GSI with Public Works Projects

During the first five years of implementation, PWD is committed to including GSI elements in an increasing percentage of public works projects, including Philadelphia Streets Department (Streets) led work, PWD's water and sewer line replacement projects, and PPR tree planting initiatives. To facilitate and standardize GSI elements as incorporated into work within the public right-of-way, PWD in conjunction with the Mayor's Office of Transportation and Utilities (MOTU) and Streets have been jointly developing a Green Streets Design Manual for the City of Philadelphia. The manual is projected for completion in early 2013.

Green Stormwater Infrastructure into Water and Sewer Projects

Over the course of the 2012 fiscal year, PWD's internal processes for integrating GSI with traditional water/sewer replacement projects have been further developed. During the past year, PWD has initiated adding GSI components to 14 water/sewer projects. With addition of the 7 GSI water/sewer projects that were started in 2011, there are a total of 21 green water/sewer projects currently in design (26 anticipated GAs).

Green Streets Program Development

In the last fiscal year, PWD has been developing the strategic planning, agency partnerships, and design guidelines necessary for the Green Streets Program. The strategic planning initiatives have identified short and long term goals for the program, work flows associated with the variety of green street opportunities, and key team members in the program. PWD has been working closely with Streets through the Green Streets Design Manual, and the PWD Streets Department liaison position to facilitate reviews of PWD led green street projects and to identify additional GSI opportunities on Streets led street projects.

PWD is currently collaborating with Streets on a number of projects. A partnership between the City, the Pennsylvania Department of Transportation (PennDOT), and SEPTA won a TIGER grant (Transportation Investment Generating Economic Recovery), which will fund upgrades of 100 intersections along state routes within the City with transit signal priority technology as well as Americans with Disabilities Act (ADA) ramps. PWD is collaborating to add GSI projects at every intersection where it is physically feasible and will meet program goals.

Additionally, PWD is collaborating on the Safe Routes to Schools program also being led by Streets. In this case pedestrian signals, speed tables and bumpouts will be added to 25 intersections. PWD will add GSI projects to intersections, such as greening for the constructed bumpouts that provide stormwater management opportunities.

PWD is also collaborating with the SEPTA on a stop consolidation and bus stop bumpout project being piloted by SEPTA. No project sites were identified during the past year; however, this established process will provide opportunity for additional routes to be reviewed in the coming year.

Green Streets Design Manual

The Green Streets Design Manual is the primary mechanism being developed to drive coordination between PWD and various other agencies (Streets, PennDOT, MOTU, PPR, PCPC and others) surrounding green streets projects. The manual will address technical issues, developing standard designs for the variety of GSI tools utilized in green street projects, as well as document policies and protocol governing the design and construction of green streets.

The manual development process was initiated in summer 2011. The process has been informed by a series of coordination meetings including PWD, Streets, MOTU, PennDOT, and SEPTA representatives.

Coordination meetings were used to address both technical aspects as well as policy and protocol aspects of green street projects. The manual will contain details, renderings and design requirements for GSI green street tools as well information on the siting, suitability and sizing of such tools for green street projects. PWD plans to complete the draft by early 2013, refining the design portion of the manual and developing guidelines for process and procedure surrounding green streets implementation.

Tree Planting, Street Trees, and Piloting Stormwater Tree Pit Design

This past year, to support the Mayor's GreenWorks goals, PPR spent $700,000 to contract street tree plantings, and $150,000 for natural lands plantings and the distribution of residential yard trees. These plantings are part of the first phase of a 7-year, $10.5 million commitment from the City's General Fund to PPR that will fund the installation of thousands of trees City-wide. **Table 3-4** breaks down the number of trees planted in different locations throughout the City in 2012.

Table 3-4 Trees Planted in Philadelphia during FY12

Tree Location	Total # of Trees Planted	# of Trees in CSO	% of Trees in CSO
Street	1,500	1,080	72%
Parks and Rec	2,280	2,280	100%
Watershed Park	4,878	410	8%
Residential Yard*	1,400	1,120	80%
Total	**10,058**	**4,890**	**49%**

*Residential Yard Trees were distributed by Parks and Rec and planted by homeowners

Coordinating with PPR's tree planting contract through the development of the stormwater tree pit pilot project offers an opportunity to increase the number of trees planted in the City while piloting various types of stormwater tree pits. This effort will allow different tree pit technologies to be tested to confirm adequacy of designs, constructability, cost, inter-department cost sharing arrangement, and maintenance requirements.

In July of 2011, PPR issued an RFP for an On Call Services Contract to install trees throughout the City. This requirements contract included a number of designs and specifications for tree pits, but also language that will allow PWD to add additional designs and specifications for stormwater management tree pits as these are developed. PWD supplied PPR with an initial stormwater tree pit design to be included with this requirements contract. This detail will be the first of a number of versions of stormwater tree pits that will be tested in the pilot project during the fall 2012 planting season. A detail of Version 1 of the tree pit design is attached in **Appendix 1 – Stormwater Tree Pit Detail.** Locations for the initial phase of the stormwater tree pit pilot project have been selected from a list of City-owned recreation sites based on ease of constructability and specific design requirements. Additional site investigations have also determined potential locations for future versions of the stormwater tree pit as these are developed.

A revised requirements contract is also in the process of being developed. It will incorporate finalized versions of the stormwater tree pit from the start. This requirements contract will serve as an opportunity to integrate stormwater tree pits into the more traditional tree planting contracts administered by other City agencies. PWD will continue to evaluate the requirements contract as an efficient implementation method for stormwater tree pits. The possibility of constructing the stormwater tree pits through PWD's available contract mechanisms while partnering with PPR to plant the trees through their requirements contract is also being considered.

3.2 Green Stormwater Infrastructure on Private Property

3.2.1 GAs from Private Redevelopment

The City's Stormwater Regulations were revised in January of 2006, which provided the foundation for the private sector's role in the *GCCW* program. As projects are developed in the combined sewered area, they accrue GAs through compliance with the regulations. In order to calculate the number of GAs accrued by private development since 2006, PWD is verifying the number of sites with technically approved plans (2006-present) that were constructed. GAs are counted once SMPs are constructed, inspected and accepted by PWD as functioning. PWD plans to conduct detailed inspections on all constructed approvals that have not already been inspected to verify that all approved SMP components are properly installed and that the overall systems have been maintained and are properly functioning.

Private development projects (**Table 3-5**) included in this year's GA total were derived from constructed projects for which PWD has conducted a satisfactory compliance review of record drawings. A compliance review of a record drawing consists of verifying that the approved stormwater management practices and components were constructed and installed per the approved plan set and that the runoff meets the applicable regulatory requirements.

Between 2006 and 2008 PWD received inconsistent post-construction documentation on private development projects. At this time, PWD is undertaking a verification process for projects constructed between 2006 and 2011 to assess each project prior to counting GAs toward compliance totals. In the past year, PWD conducted a pilot inspections initiative for the purpose of inspecting historic approvals with minimal available construction data to determine if site conditions meet necessary regulatory requirements for GA credit. For this pilot, inspections were conducted using various technologies (including survey equipment, closed circuit TV, and ground penetrating radar) to identify effective inspection techniques to be applied to future inspections. PWD plans to expand the pilot inspections to all historic approvals in need of additional construction data.

Table 3-5: Verified Private Development GSI Projects

Project ID	Zip code	Watershed	Management Practices	Storage Volume (cf)	Impervious Area Managed (sf)	GA
2010-BROA-1347-01	19141	TTF	Subsurface infiltrating basin	2,808	27,695	0.77
2007-WASH-642-01	19146	Delaware	Subsurface infiltrating basin	3,573	33,550	0.98
2008-DREX-788-01	19104	Schuylkill	Subsurface infiltrating basin, bio-infiltration systems, and porous pavement	7,566	34,471	2.08
2006-PROG-400-01	19122	Delaware	Subsurface infiltrating basins	12,288	123,274	3.39
2010-ESPE-1288-01	19140	TTF	Subsurface infiltrating basin	3,112	35,668	0.86
2009-PASC-1226-01	19142	Darby-Cobbs	Subsurface infiltrating basins	12,982	88,571	3.58
2006-0076-01	19144	TTF	Subsurface infiltrating and subsurface detention basins	7,739	34,046	2.13
2009-THEM-1167-01	19121	Delaware	Green roof and porous pavement	2,164	830	0.60
2007-1615-544-01	19121	Schuylkill	Subsurface infiltrating basin and porous pavement	2,150	19,714	0.59
2009-FRAN-1130-01	19137	Delaware	Subsurface infiltrating basins	10,224	113,759	2.82
Verified Private Development GSI GA Total						**17.21**

3.2.2 Review of Post Construction Stormwater Management Plans

During the past year, PWD's Plan Review group has continued to review Post Construction Stormwater Management Plans for compliance with the City's Stormwater Regulations. This evaluation process conducted by the Plan Review group included conducting 143 administrative screenings, 509 full technical reviews, 363 rejections, issuing 82 technical approvals and receiving 102 new project submittals during FY2012. A detailed description of this program and progress done this past year is explained in **SECTION F.5 MONITOR AND CONTROL STORMWATER FROM CONSTRUCTION ACTIVITIES** in the **CSO and Stormwater NPDES Annual Reports** starting on page 201.

3.2.3 Incentives to non-residential, condominium and multi-family property owners to implement and maintain functional SMPs to help the City meet its stormwater management goals

Stormwater Management Incentive Program

PWD offers incentives to private parcel owners to implement stormwater management best practices through both a low-interest loan program and a grant program administered by PIDC. In January 2012, PIDC and PWD launched the Stormwater Management Incentive Program Grant (SMIP) to provide assistance to non-residential customers in achieving credits on their stormwater bills and to facilitate implementation of GAs on private property. The program provides grant funding for the design and construction of stormwater mitigation measures. Interest in the SMIP Grant was very strong, with over 48 applications submitted by the March 2012 deadline. The PWD awarded grants to 8 applicants, and once constructed the selected projects will achieve approximately 66 GAs, 23 of which are within the CSO drainage area. The total SMIP Grant disbursement is $3.2 million with awardees providing an additional $800,000 in matching funds. Awardees are currently moving forward with executing the grant agreements and PWD expects projects will begin design by Fall 2012. In the upcoming year, PWD plans on working with these applicants to review and approve their stormwater management plans. PWD also plans to host a second round of SMIP Grants in the coming year. Additionally, the first SMIP loan project was built – a green roof on a building in west Philadelphia – totaling roughly 5,000 sq. ft.

Fast-track Stormwater Plan Review Project Review

Projects with 95% or more of the impervious area disconnected from the combined or separate storm sewer can qualify for a fast track Green Review in which the stormwater management section of the project will be reviewed within five days of submittal. During the past year, 10 projects have qualified for a fast track Green Review.

Free Assistance Program

PWD provides free assistance through site inspections and design recommendations for green retrofits that allow customers to obtain fee credits. In total, PWD has provided concept design assistance to approximately 120 customers since the inception of the program.

3.3 Waterfront Disconnection

The disconnection of the waterfront area from the CSO system is intended to happen incrementally throughout the duration of the COA. Coordination of this process to date has been on cost-share arrangements between PennDOT and PWD and collaborative planning for the construction of new separate sewer pipes upsized to manage the stormwater needs of all future development between I-95 and the Delaware.

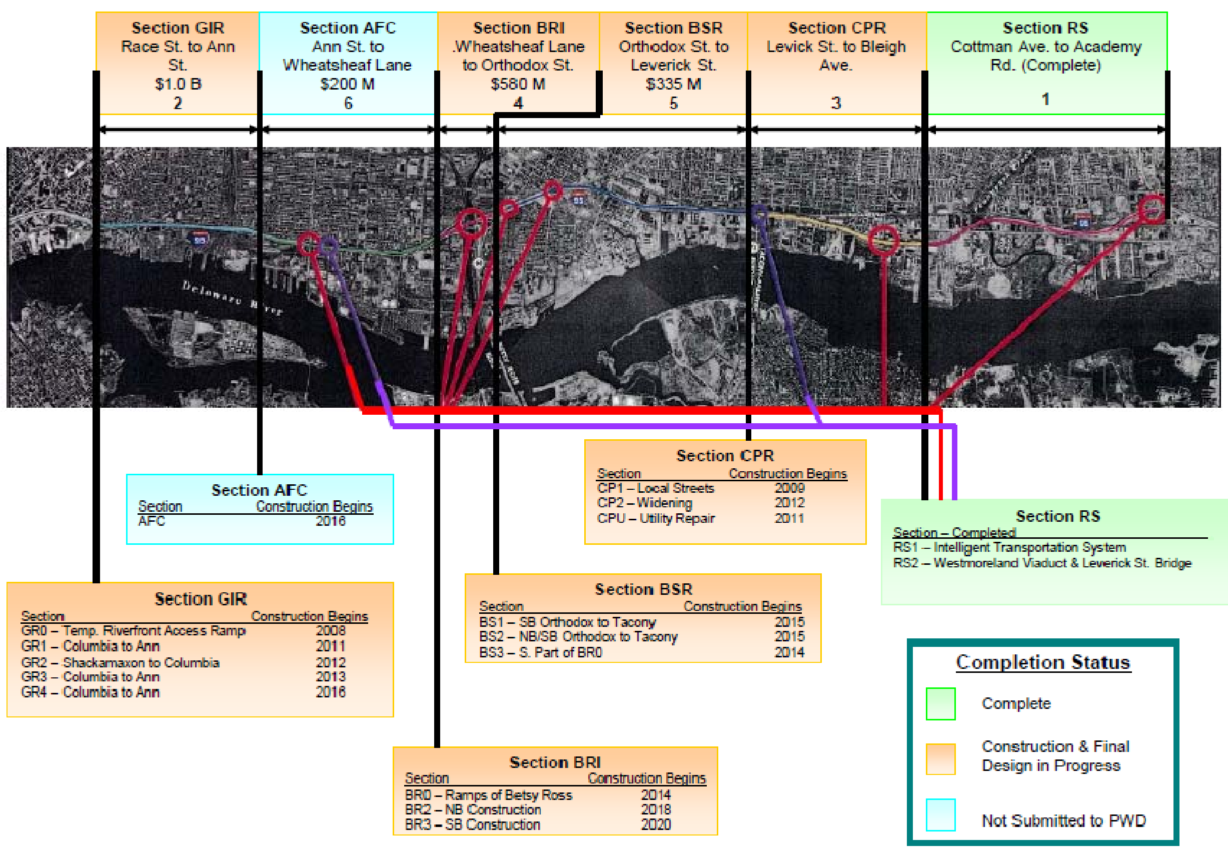
The first phase of the I-95 reconstruction project is divided into six sections **(Figure 3-1)**. PWD and PennDOT have agreed that five of these sections (GIR, AFC, BRI, BSR and CPR) will include new separate sewer pipes sized to manage not only the runoff from the new and existing impervious surface of I-95, but also runoff from the parcels located between I-95 and the Delaware River. The sixth section, RS, did not include major reconstruction and was executed on an accelerated timeline which ended in 2010. As such, it was not possible to incorporate sewer separation into the project.

Currently, sewer separation and construction of the new sewer pipes are taking place in the CPR section. In the GIR section, disconnection of I-95 runoff is currently in progress, and construction of the new sewer pipes is projected to begin in 2013. Preliminary design is underway for the BRI and BSR sewer separation process, and construction is estimated to begin in 2014. Planning for the AFC section has not yet begun.

PennDOT provides plans and details of the new separate sewer pipes to PWD via its submittals to meet the PWD Stormwater Regulations. PWD staff work closely with PennDOT, attending bi-weekly utility planning meetings for the I-95 project where all construction affecting PWD pipes and facilities is discussed.

PWD is also working to develop a plan for disconnection of the waterfront area that relies upon construction of the new pipes as well as connection of existing properties and properties undergoing redevelopment to the new separate sewer lines. The plan will take into consideration the most recent master planning efforts along the waterfront, current redevelopment, construction and stormwater management being conducted by PennDOT, Municipal Separate Storm Sewer System (MS4) permitting needs, ecological restoration opportunities and existing PWD infrastructure in the area.

Figure 3-1: I-95 Expansion Phases – Proposed Schedule



3.4 Interceptor Rehabilitation Program

The WQBEL Performance Standards requires 2 miles of interceptor lining by the end of year 5 (2016). As of July 2012, PWD is well ahead of that target with 4.6 miles completed, 3.8 miles in construction or in projects control, and 6.6 miles in design (**Table 3-6**).

Table 3-6: Interceptor Lining Status Update

Interceptor Lining Projects -Darby-Cobbs						
Segment ID	Project #	Complete Yr	Estimated Cost	Actual Cost	Length (Miles)	Status
DC-A	NA	1999		$2,300,000	2.2	Construction Complete
DC-D	NA	2004		$1,177,410	0.5	Construction Complete
DC-C	S-40518-R	Ant. 2012	$5,225,000	-	1.6	Construction 90% Complete
DC-B	S-40612-R	Ant. 2013	$4,513,000	-	1.0	In Projects Control
DC-E	S-40613-R	Ant. 2014	$1,560,000	-	1.7	Design 95% Complete
DC-F	S-40614-R	Ant. 2014	$2,720,000	-	1.6	Design 95% Complete
					8.5	
Interceptor Lining Projects -Tookany/Tacony-Frankford						
Segment ID	Project #	Complete Yr	Estimated Cost	Actual Cost	Length (Miles)	Status
TF-D	S-40615-R	2012	$5,897,905	$5,947,220	1.9	Construction Complete
TF-E	S-40616-R	Ant. 2013	$3,388,845	-	1.3	In Projects Control
TF-C	S-40617-R	Ant. 2015	$6,500,000	-	1.0	Design 30% Complete
TF-B	S-40618-R	Ant. 2015	$1,930,000	-	1.1	Design 30% Complete
TF-A	S-40619-R	Ant. 2016	$3,470,000	-	1.2	Design Started
					6.5	

3.5 Facility Concept Plans for each of the Three Water Pollution Control Plants

PWD is actively developing Facility Concept Plans for each of the three WPCPs to meet the June, 2013 deliverable deadline.

3.6 Implementation of NMCs Update

Reviews of each of the NMCs are currently underway to determine if efforts conducted for each NMC may be updated. The PWD staff has been working to create updates. The team is on schedule to submit a report under terms of the COA in June of 2013.

4.0 Streamlining

To achieve Performance Standards prescribed by the WQBEL, PWD has been evaluating procedures, policies, and tools for coordination between agencies for potential enhancements.

4.1 Analyze relevant ordinances and laws to identify possible conflicts with implementation needs.

PWD has completed initial reviews of the Philadelphia Zoning, Building, and Plumbing codes. The goal of these reviews was to evaluate potential barriers in each of the codes to the *GC, CW* program. These code reviews were then evaluated to determine the applicability and importance of each potential barrier found within the codes. These code reviews will be maintained and updated as new barriers are identified and the codes are updated over time.

In addition, the Philadelphia Zoning Code has recently been rewritten, and the new code took effect in August of 2012. PWD played an active role in developing recommendations for incorporation in the code rewrite and advocating for language supportive of stormwater management. Some of the changes PWD recommended included an increase in steep slope protection, better stream buffer mechanism, and various landscaping and street tree requirements that remove green infrastructure barriers present in the former Zoning Code. PWD is currently working with the PCPC to attempt to revise and expand the stream buffer requirements of the new code.

Tracking Federal and State Policy Developments

PWD has also created a policy tracking protocol for federal, state and local policy developments that may affect *GC, CW* goals. This protocol requires a weekly review of policies, regulations, guidance, bills, and reports from a number of priority sources including governments, advocacy organizations, non-profits, and news sources. All policy developments that are relevant to PWD are reviewed and then imported into a policy tracking database.

4.2 Coordination with other City and non-City agencies to achieve policy goals

PWD has implemented a pilot-based approach to coordination with other agencies to sort through the many complex policy issues encountered in implementing *Green City, Clean Waters*. Two of these pilots are described below.

Green2015

Green2015 is an initiative of PPR to add 500 acres of new publicly accessible green space to the City by 2015. PWD has committed to the first phase of the initiative, which will concentrate on making improvements to two 'pilot' school playgrounds and two 'pilot' recreational facilities. The planning and implementation of phase one is a collaborative effort between PWD, PPR, SDP and TPL. PWD will be funding GSI projects through separate agreements with PPR and SDP. Additionally, PWD will be providing support to the partners through oversight of GSI concept designs and implementation. Green2015 provides PWD with the opportunity to establish precedents for working with SDP and PPR. Currently, PWD is finalizing MOU and funding mechanisms with both SDP and PPR.

EPA PDE PWD Green Infrastructure Academic and Business Partnership project

PWD is collaborating with the USEPA and the PDE on a Green Infrastructure Academic and Business Partnership project. The Partnership seeks to demonstrate support and advance higher performing, cost effective green infrastructure practices, designs and jobs throughout the region. The George W. Nebinger School is currently the focus of the academic component of the partnership and the USEPA has provided grant funding to PWD for green infrastructure investment at the school site (more details on the progress conducted at the Nebinger School can be found in the Green Schools Initiative section that discussed on page 15). PWD is taking the lead in coordinating with PSD and agreements between SDP and PWD are under review. PWD views this initiative as another opportunity to pilot coordination tools and innovative funding mechanisms with SDP. Agreements and process plans from this project will be applicable to future projects with SDP.

5.0 Operation and Maintenance

In order to ensure the function and sustainability of stormwater management infrastructure investments, PWD is developing operation and maintenance protocols and commitments.

5.1 Green Stormwater Infrastructure Maintenance Manual

PWD is committed to ensuring that SMPs and their associated GAs continue to operate as designed as prescribed in the COA. PWD successfully completed the Green Infrastructure Maintenance Manual Development Process Plan, submitted to PADEP by June 1, 2012. The Maintenance Manual Development Process Plan outlines the steps and tasks that PWD is currently undertaking and will perform in order to produce the first edition of a GSI Maintenance Manual, due June 1, 2014.

5.2 Maintenance of Public Facilities

From July 1 through June 30, 2012, PWD held a contract to conduct routine inspections and maintenance activities at PWD-initiated GSI sites. The maintenance data and information that was collected through the contract supported the development of the GSI maintenance program and provided valuable data to inform the department about the condition and needs of GSI projects. PWD will award a contract for the upcoming fiscal year to perform inspections and maintenance, including additional tasks relating to the maintenance of sub-surface features. The upcoming contract will also focus efforts to include coordination with various PWD departments to aid in the development of operating procedures in addition to synthesizing data gathered from current and past maintenance activities to create protocols for the maintenance of green infrastructure. These steps will aid PWD to complete the Green Infrastructure Maintenance Manual.

During the past year, PWD conducted 209 site inspections for maintenance at 31 different sites including 20 visits for special maintenance. A detailed table of the site visits associated with the inspection and maintenance visits to GSI sites is provided in **Section F.2.Step 3.c.i – Monitoring of BMPs** of the **CSO and Stormwater NPDES Annual Reports** on page 188.

5.3 Maintenance of Private Facilities

The Plan Review Group is developing the details of the process plan that will address the priority issues identified this past year. These issues may include streamlining the Project Review close-out process for projects that have submitted As-Built plans for constructed SMPs; and evaluating the feasibility for online, searchable files to assist private SMP owners with understanding their stormwater management systems and maintenance responsibilities.

Progress has continued to expand the Private GSI Inspections program to include obtaining operations and maintenance agreements prior to SMP approval, periodic post-construction inspections to ensure long-term maintenance of the SMPs. This will require additional staff, training for developers and contractors, and establishment of a defined inspection schedule based on a number of criteria.

To formalize the post-construction process to ensure long-term maintenance, PWD is considering the following options:

- Use Right-to-Access for regular inspections of all sites
- Random inspections
- Targeted inspections to supplement and enforce a self-inspection program
- On-going inspection program

PWD is working to establish a time table for the Plan Review process from conceptual review to submitting As-Built Plans at final inspection. PWD is also working on an agreement with L&I to require As-Built Plans of SMPs before a Certificate of Occupancy is issued.

6.0 Data Collection and Analysis

6.1 Comprehensive Monitoring Plan due for completion by December 1, 2012

PWD is currently developing the CMP, due December 1, 2012.

6.2 Develop Dissolved Oxygen (DO) models and bacteria models of the Tacony-Frankford and Cobbs Creek

PWD is developing water quality models for the two non-tidal receiving water bodies within the City boundary, the Tacony-Frankford Creek and the Cobbs Creek. In order to collect key parameters in both water bodies, monitoring has been ongoing to provide model inputs and reference values for validation. These include real-time, continuous monitoring at PWD-USGS stations for discharge, pH, conductivity, DO, and temperature. In addition to data collected at the PWD-USGS stations, field data was collected for biological oxygen demand (BOD), ammonia, nutrients, fecal coliform, *E. coli,* and a range of other biological and chemical parameters. Sediment oxygen demand (SOD) data were collected in collaboration with Rutgers University using a published in situ method. Periphyton data for the two water bodies were also collected.

Development of methods to pass the Storm Water Management Model (SWMM) hydraulic output to the Water Quality Analysis Simulation Program (WASP) water quality model was successfully completed with the assistance of EPA and Tetra Tech. Optimization of segmentation in both models for WASP input is ongoing. A base flow analysis of each watershed that would appropriately distribute freshwater inputs in the two models is ongoing. As of July 2012, developments on the DO and Bacteria models are on target for the June 1, 2013 COA deliverable date.

6.3 Hydrodynamic and Water Quality Model for the Tidal Delaware and Schuylkill Rivers

PWD is developing water quality models for the tidal Schuylkill River and tidal Delaware River. In the case of the latter, the model spans 73 river miles from Trenton, NJ to Delaware City, DE in order to fully represent the extent within and beyond City influence. In order to develop these complex models, historic data from other agencies and monitoring executed by PWD needed to be conducted. Data acquisition for a historic validation period was completed including the National Oceanic and Atmospheric Administration (NOAA) 1984-85 current survey in the Delaware River and Bay. These data include tidal water level, current speed and direction, salinity and temperature. Data acquisition for the contemporary period is underway with a major effort to collect current data using Acoustic Doppler Current Profiler (ADCP) technology and an SOD monitoring program conducted by Woods Hole Group, Academy of Natural Sciences, University of Delaware, and Chesapeake Biogeochemical Associates. The latter program is supplemented with monitoring of SOD surrogate parameters such as total organic carbon and sediment chlorophyll-*a*. Acquisition of regional meteorological data for the historic period through present was completed. Water quality data from other agencies, DMR records and data on other NPDES discharges are being compiled into a comprehensive database for model input and calibration.

Bathymetry data acquisition from historic NOAA surveys for main stem model depths was completed and converted to NAVD88 vertical datum. Bathymetry survey of tributary confluence areas for modeled tidal stream segments is ongoing. A computational grid of the model domain from Delaware City to Trenton was completed. Initial sensitivity analysis simulations for bottom roughness are ongoing. As of July 2012, developments on the Hydrodynamic and Water Quality model are on target for the June 1, 2015 COA deliverable date.

6.4 Sewer System Evaluation Survey (SSES)

The Sewer Systm Evaluation Survey (SSES) draft outline was completed for the IAMP. Additional progress to date includes identification of potential monitoring locations, contacting communities for any available sewer data and information, and the preparation of a scope of work to complete the SSES by June 1, 2014.

7.0 Public Outreach and Participation

A core commitment of the PWD is to develop the best methods and preferred tools for engaging a broad range of stakeholders. A great deal of progress has been made in the first year of implementation. The following includes updates to current programs and projects referenced in the IAMP in addition to newer initiatives. At this point, PWD is not using these public outreach efforts to achieve GAs or meet our COA commitments.

Green City, Clean Waters Blog

PWD hosts a blog on its main website: http://www.phillywatersheds.org/blog. The blog enables PWD to inform the public of current programs and events, relevant partner initiatives, and programs that support GSI, the City's waterways, parks and the urban landscape. From July 1, 2011 – June 30, 2012, there were 207 blog posts made and at least 10,000 page views of the blog's main page. This number does not represent the grand total of views as it does not reflect the number of views accessed from outside posts, such as Facebook, therefore it is assumed that the true number would be higher.

Green City, Clean Waters Year-in-Review

PWD produced a 2012 *Green City, Clean Waters* Year in Review - an online photojournalistic-style portfolio of PWD's most visible public projects and events that support *GCCW* from July 1, 2011 – June 30, 2012. The primary audiences for the publication are PWD's rate payers and its partners. The publication is scheduled to be posted on PWD's main website (www.phillywatersheds.org) September, 2012.

Green City, Clean Waters Partners Master List

The *Green City, Clean Waters* Partners Master List is a distribution list of email addresses that gets updated after collecting contact information at PWD hosted public events and meetings. As of July, 2012, there are approximately 6,150 live entries on the list. This number reflects the number of individuals confirmed through the email management system (Constant Contact) as participants with accurate contact information and those specifically interested in receiving email updates, regarding their program of interest and/or of PWD special initiatives and events related to *GCCW*.

Green Stormwater Infrastructure Project-specific Events

PWD understands the value of public engagement as important opportunities to promote *GCCW* investments and to build excitement around GSI. Successes, small and large, are celebrated on a regular basis. Events often take the form of a press conference highlighting a GSI demonstration project or a ribbon-cutting ceremony for the completion of a major project. The events provide opportunities to see and learn more about GSI for the participants of the events, but because the events are covered by various media (news on television and radio, blogs on-line, dedicated web pages, etc.), audiences not present at the events, have opportunities to learn about *GCCW* as well. Many of the events hosted by PWD provide green stormwater educational opportunities, such as tours of the infrastructure, green tool demonstration displays and volunteer planting. Through the 2012 Soak It Up events, art had a presence as well – drawing attention to the infrastructure through public installations of yarn art (trees with knitted yard wrapping) and chalk art. PWD will continue coordinating events and highlighting successful projects over the first five years of the program.

The following public *GCCW* events were hosted by PWD from during FY2012:

- Celebration of Philadelphia's 1st Porous Green Street:
 800 S. Percy St., South Philadelphia, May 10, 2011
- Celebration of Philadelphia's 1st Green Roof Bus Shelter:
 15th St. & JFK St., Philadelphia, June 15, 2011
- Celebration of Philadelphia 1st Green Parking Lot:
 Eadom St. & Bridge St., North Philadelphia, June 29, 2012
- *2012 Soak It Up, Philly! Completion of Green Streets Events*
    - Stormwater Tree Trenches:
      East Montgomery Avenue & Blair Street, New Kensington, Philadelphia—March 1, 2012
    - Stormwater Tree Trenches:
      16th Street & Jackson Street, Newbold, South Philadelphia – March 8, 2012
    - Stormwater Tree Trenches:
      Belfield Avenue & East Walnut Lane, Germantown, Philadelphia – March 22, 2012
    - Stormwater Tree Trenches:
      7th Street & Cumberland Street, Hartranft School, Eastern North Philadelphia – March 29, 2012
    - Stormwater Bumpouts:
      Queen Lane & Fox Street, East Falls, Philadelphia, April 5, 2012

PWD partnered on the following *GCCW* events with PADEP and USEPA, respectively:

- June 1, 2011 – PADEP & PWD *Green City, Clean Waters* Agreement, PADEP Office, Norristown
- April 10, 2012 - USEPA & PWD *Green City, Clean Waters* Partnership Agreement

Rebuilding Together Philadelphia (RTP) – Green Homes

After PWD experienced the success of the Cobbs Creek neighborhood Green Homes Block Build in October 2010 with RTP, where over 100 volunteers spent a Saturday building and installing 20 downspout planters, 15 rain barrels and one rain garden, the Green Homes program continues to grow. Over the past year, RTP volunteers built and installed a total of 34 downspout planters in economically disadvantaged sections of West Oak Lane, Mantua, Germantown, Overbrook and Nicetown to encourage residents to "soak it up" with GSI during their Block Builds. These events include complete critical home repairs, energy efficiency upgrades and home modifications for multiple homeowners at a time. Exterior work, such as tree planting, sidewalk remediation and block cleanups, is also completed throughout the participating blocks to tie the residential projects together and to further galvanize the community to continue improvements.

Rain Check Pilot Program – Green Homes

PWD believes that every homeowner can make a difference in transforming Philadelphia into a green city with clean waters. Rain Check gives homeowners an opportunity to contribute to improving water pollution in Philadelphia's waterways. For homeowners who choose to participate in the Rain Check pilot program, PWD will help them adopt green tools (rain gardens, porous pavers, downspout planters, yard trees and de-paving) that manage stormwater runoff on their residential properties and share in the cost of these green improvements as residents will only pay a fraction of the total cost. From July 1, 2011, through June 30, 2012, PWD developed the framework for the pilot program in addition to training materials for contractors that will assess the residential properties and training materials for contractors that will install the green tools. PWD also secured the participation of eleven neighborhoods in Philadelphia to participate in the pilot program along with a total of approximately 250 interested

Rain Check participants from these communities. The Rain Check assessments and installations are scheduled to occur over the course of the following year.

Neighborhoods represented by Rain Check participants:

- Northern Liberties
- New Kensington
- Germantown
- Frankford
- Fairmount
- Eastern North Philadelphia (Association of Puerto Ricans on the March)
- Passyunk Square
- Graduate Hospital (South Of South Neighborhood Association)
- Lower Moyamensing
- Wynnfield
- University City District

Downspout Planter Technology Improvements– Green Homes

PWD is working with Shift Design on fabricating a stormwater downspout planter that is prefabricated and modular while it improves the stormwater storage capacity and controlled drain down compared to the previous planter box models. It will be aesthetically appealing to homeowners and of a "do-it-yourself" style assembly. During the past year, prototype development has been underway and piloting of several installations through the Rain Check program is being planned.

Rain Barrel Program – Green Homes

PWD's Rain Barrel program continues to grow. Over the past year, approximately 475 rain barrels were distributed and installed throughout Philadelphia by the Energy Coordinating Agency (ECA) on behalf of PWD. Rain barrels are still offered free of charge to residents that participate in PWD sponsored rain barrel workshops, where they have the opportunity to learn about the benefits of managing stormwater runoff.

Online Community Input Form

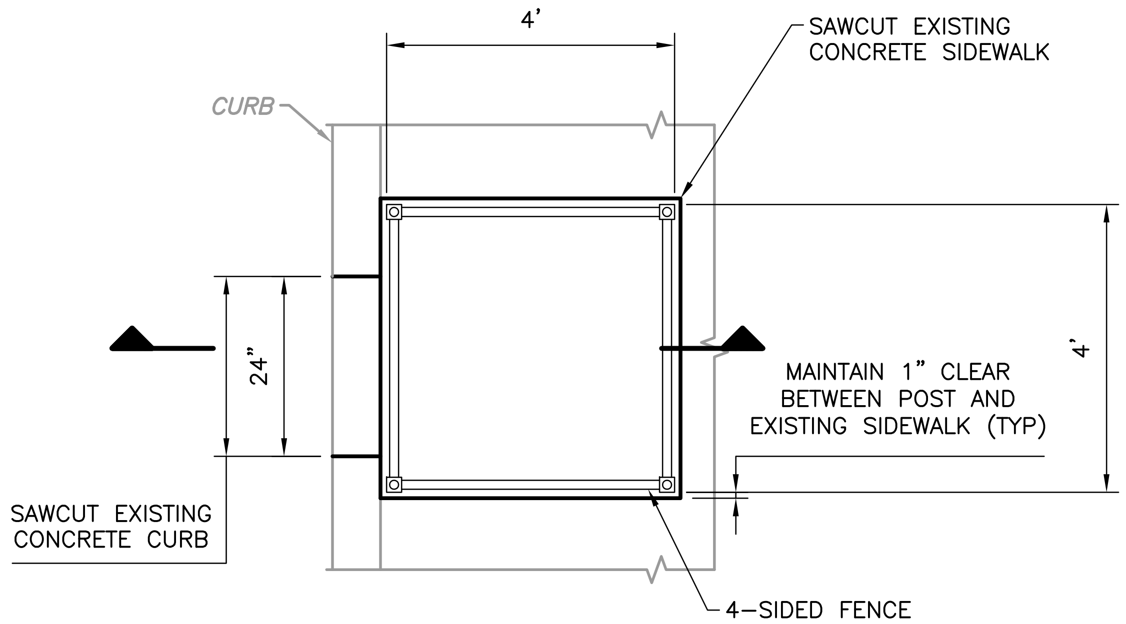
Over the past year, PWD has developed an on-line tool that accepts community input on the identification of potential GSI projects at schools, recreation centers, parks, public spaces, parking lots, vacant lots and on streets. PWD is also accepting neighborhood-wide submissions for potential GSI opportunities. Submissions of input do not guarantee that a project will be selected for implementation, however, each submission is reviewed and submitters are notified of the results of the review of their project within a six week period. The community input form may be accessed at www.philllywatersheds.org/CIF.

Green City, Clean Waters Educational Demonstration Projects

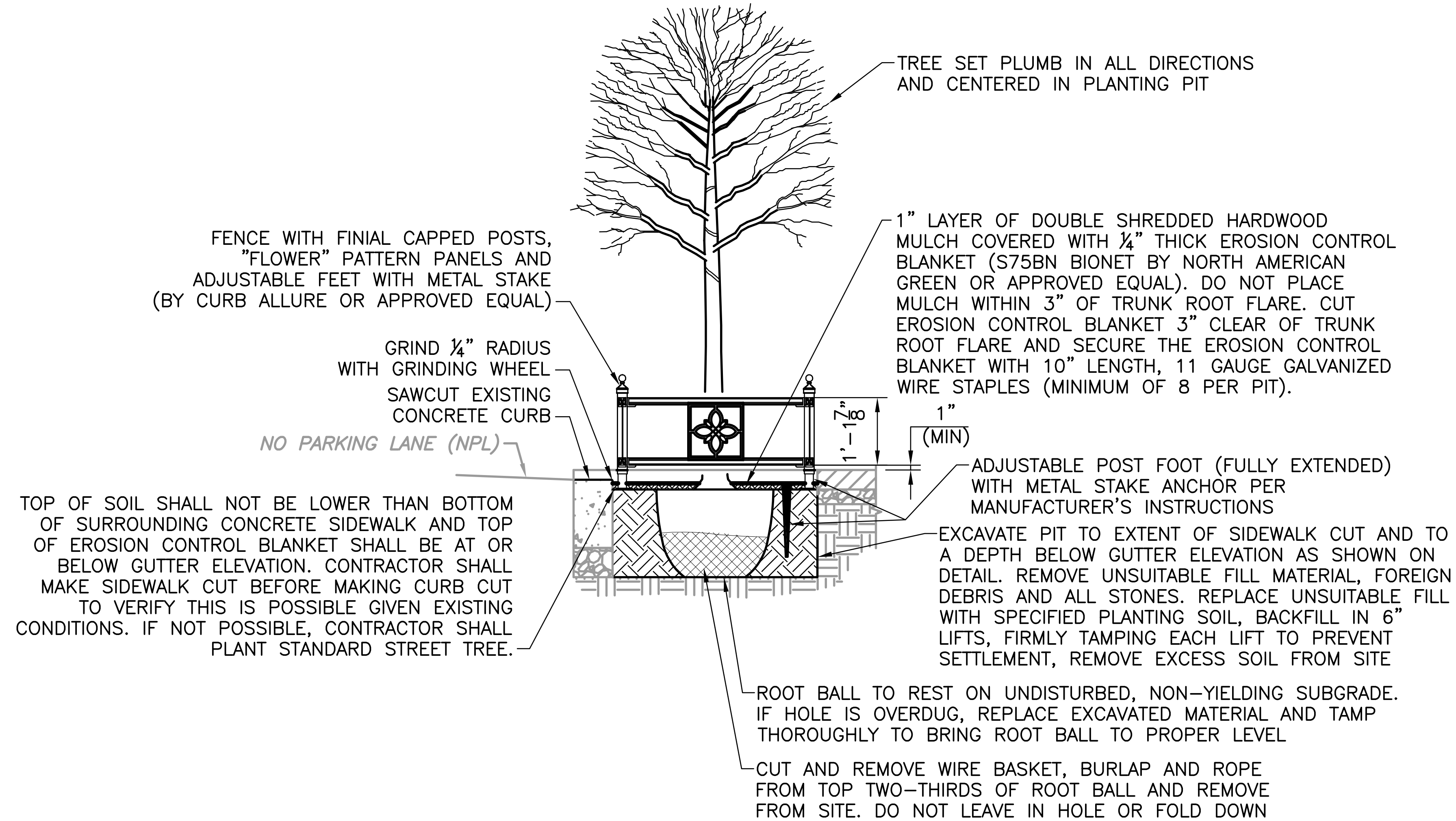
PWD will continue to develop GSI demonstration projects in partnership with other City agencies that provide high visibility opportunities. In June, 2011, PWD partnered with MOTU, Mayor's Office of Sustainability, Titan, and Roofmeadow to install a demonstration green roof bus shelter at 15th and Market 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. PWD will continue to partner with City agencies on innovative and educational demonstration projects and pocket parks. More information on the green roof bus shelter project can be found at http://www.phillywatersheds.org/green-roof-bus-shelter.

Appendix 1

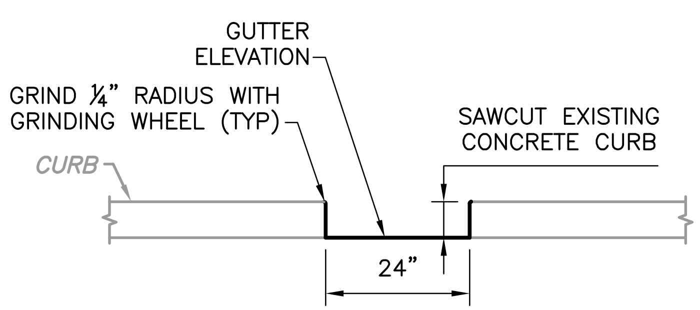
Stormwater Tree Pit Detail



TOP VIEW



SECTION



FRONT ELEVATION

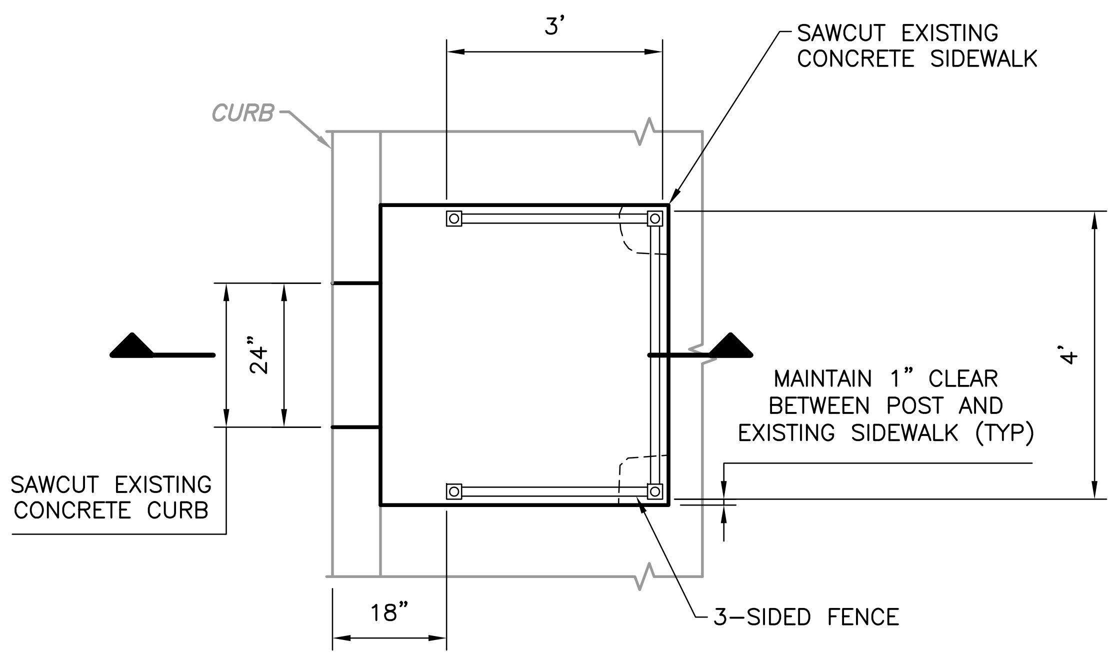
TREE NOTES:

1. CONTRACTOR SHALL ENSURE THE HIGHEST TREE ROOT FLARE IS LOCATED PRIOR TO EXCAVATING.
2. TREES PLANTED LOW OR HIGH WILL BE REJECTED.
3. ALL SOIL SHALL BE REPLACED WITH SPECIFIED PLANTING SOIL.
4. CONTRACTOR SHALL VERIFY TREE PIT IS FREE DRAINING AND NOTIFY OWNER IF IT IS NOT.
5. CONTRACTOR SHALL NOTIFY OWNER OF BELOW GRADE OBSTRUCTIONS PRIOR TO PLANTING.
6. THE TRUNK OF THE TREE SHALL NOT BE USED AS A LEVER IN POSITIONING OR MOVING THE TREE.
7. CONTRACTOR SHALL REMOVE TREE WRAP AND/OR SHIPPING MATERIALS FROM TREE ONCE PLANTING IS COMPLETE.
8. DO NOT PRUNE THE TREE AT PLANTING, EXCEPT TO REMOVE CO-DOMINANT LEADERS, BROKEN, DEAD OR DAMAGED BRANCHES. PRUNE WITH A CLEAN CUT PER ANSI A300 & ISA (2008 OR LATEST) STANDARDS. DO NOT CUT TREE LEADER.

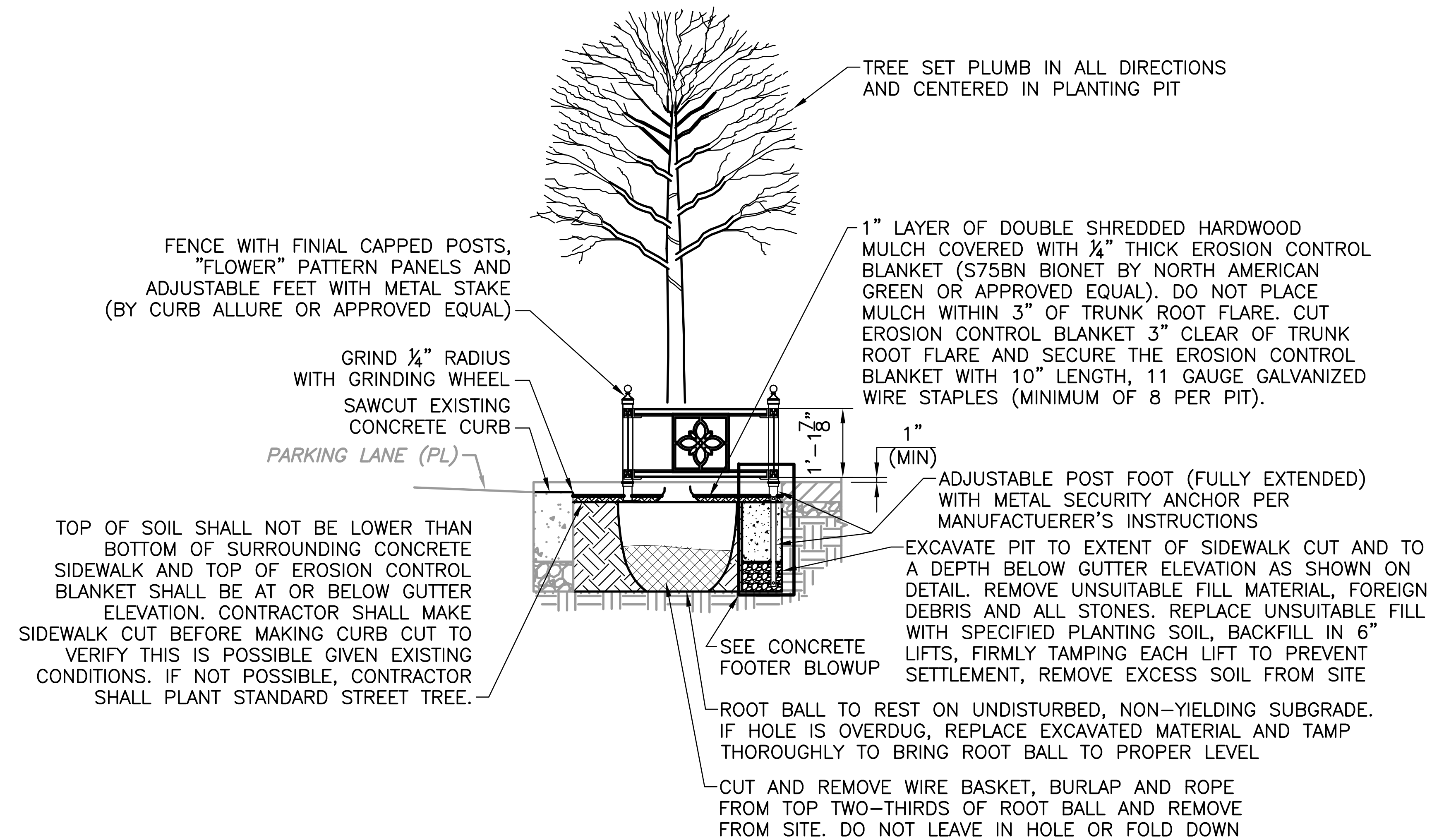
Philadelphia Water Department

PHILADELPHIA PARKS & RECREATION

Detail SST-1 (NPL)
Stormwater Street Tree
Curb Cut and Fence (No Parking Lane)



TOP VIEW



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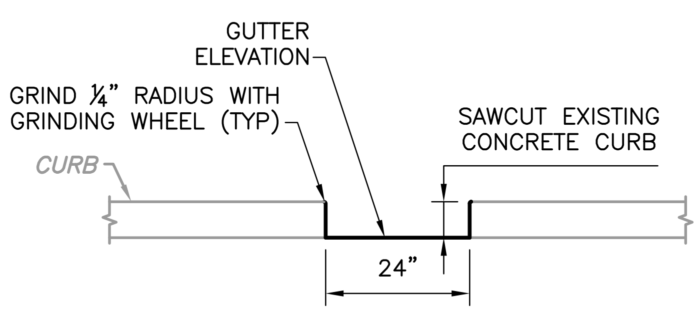
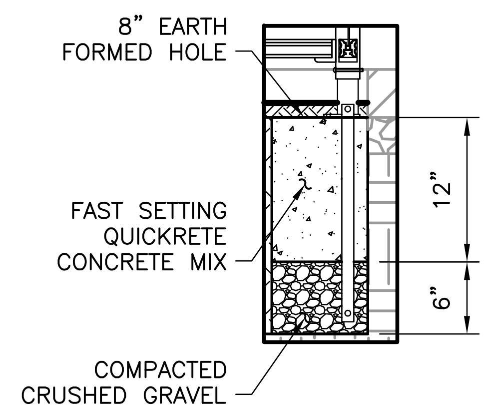


FRONT ELEVATION



CONCRETE FOOTER

TREE NOTES:

1. CONTRACTOR SHALL ENSURE THE HIGHEST TREE ROOT FLARE IS LOCATED PRIOR TO EXCAVATING.
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Philadelphia Water Department

PHILADELPHIA PARKS & RECREATION

Detail SST-1 (PL)
Stormwater Street Tree
Curb Cut and Fence (Parking Lane)

APPENDIX D -
Watershed Public Education and Outreach Events & Activities

Event Title	Date	Location	Event Type	Description	# Attended
Roots to Reentry - Women's Class	7/7/2011	Bartram	Lesson	Job Training and Placement Program	4
Roots to Reentry - Women's Class	7/12/2011	Bartram	Lesson	Job Training and Placement Program	4
Roots to Reentry - Women's Class	7/15/2011	Bartram	Lesson	Job Training and Placement Program	4
Fifth Vernon Park Improvement Effort Stakeholders' Meeting	7/19/2011	Vernon House, Vernon Park	Community meeting	Look at work done in Hunting Park to use as a model for our future work in Vernon Park and to learn more about our group and interests for Vernon Park.	21
Every Other Wednesday Event in Vernon Park	7/20/2011	Vernon Park	Clean-up	Remove trash and debris from the park, prune the trees and tend and added mulch to the garden beds. Over 20 bags of trash were removed.	30
YES Watershed Lesson	7/28/2011	Tacony Creek Park @ Adams & Crescentville	Lesson	Taught students basics of watershed science and stewardship	60
ACE Mentor Group Service Learning Cleanup	7/28/2011	Tacony Creek Park at E. Ashdale & Bingham	Clean-up	Short watershed lesson and cleanup, 20 bags of trash and 15 bags of recycling plus a hand grenade	27
Vernon Park Improvement Effort Sub-Committee Meeting	8/2/2011	TTF Office	Sub-Committee Meeting	Developed an action plan for the every other Wednesday cleanup event, discussed the flyers and a method for volunteer coordination	9
Gaudenzia Volunteers Watershed Lesson	8/3/2011	Awbury Arboretum	Lesson	45 minute presentation covering the watershed concept, the combined sewer system and what we can do to improve water quality in Philly	15
Every Other Wednesday Event in Vernon Park	8/3/2011	Vernon Park	Clean-up	Worked to remove trash and debris from the park, to prune the trees and bushes and tend to the garden beds located around the Vernon House.	25

Event Title	Date	Location	Event Type	Description	# Attended
Sixth Vernon Park Improvement Effort Stakeholders' Meeting	8/16/2011	Vernon House, Vernon Park	Community Meeting	Discussed rain garden designs and technical factors concerning the demonstration project, key historical features and significance of the park, and the Open Spaces, Sacred Spaces grant opportunity for Vernon Park.	16
Every Other Wednesday Event in Vernon Park	8/17/2011	Vernon Park	Clean-up	Volunteers from TTF, CBNC, Philadelphia Parks & Recreation, City Planning Commission, Friends of Vernon Park, and Action United helped beautify Vernon Park.	26
Women in Science Tour at Awbury	8/23/2011	Awbury Arboretum	Tour	Watershed lesson and tour of stormwater management features at Awbury.	20
Seventh Vernon Park Improvement Effort Stakeholder's Meeting	8/30/2011	Vernon House, Vernon Park	Community Meeting	Decided to have a professional work day and volunteer-based work day for the rain garden installation; created a list of roles and responsibilities for the rain garden demonstration project.	17
Vernon Park Improvement Effort Sub-Committee Meeting	8/30/2011	Vernon House, Vernon Park	Sub-Committee Meeting	Developed action plan for Every Other Wednesday Clean-up; discussed community outreach, needs for the park, surrounding streets, a method for volunteer coordination.	7
Every Other Wednesday Event in Vernon Park	8/31/2011	Vernon Park	Clean-up	Clean-up with Temple and U Penn students, members of the CBNC, landscapers of the Pennsylvania Horticultural Society, and community members.	45
Tabling at Men In Motion in the Community Fair	9/10/2011	Tacony Creek Park	Table	TTF had a table and presented briefly at a Men In Motion back to school community event.	50
Clearview Community Park Ribbon Cutting Ceremony	9/14/2011	Clearview Community Park	Ribbon Cutting	Celebration with talks by Reverend Williams and Philadelphia Water Department Commissioner Howard Neukrug.	30

Event Title	Date	Location	Event Type	Description	# Attended
Every Other Wednesday Event in Vernon Park	9/14/2011	Vernon Park	Clean-up	Clean-up event with students from the Green Tree School, community members, and the PHS Philly Green Machine.	29
Watershed Presentation at the Germantown Community Connection (GCC)	9/15/2011	First Presbyterian Church	Lesson	Gave a 30 minute presentation on the watershed concept, the Philadelphia stormwater system and watershed stewardship, and an update on the Vernon Park activities.	16
Jenkintown Clean-up	9/17/2011	Jenkintown	Clean-up	Cleaned up downtown Jenkintown along Old York Rd. in preparation for the Jenkintown Festival of the Arts.	60
Commission of Parks & Recreation Tacony Creek Park Community Input Meeting	9/21/2011	LV Boys & Girls Club	Community Meeting	Public meeting regarding improvements to TCP and community concerns.	60
Every Other Wednesday Event in Vernon Park	9/28/2011	Vernon Park	Clean-up	Clean-up and gardening efforts with park patrons and folks from the Germantown community.	18
Vernon Park Improvement Effort 2nd Community Meeting	9/29/2011	First Presbyterian Church at 35 W. Chelten Avenue, 19144	Community meeting	Showed a video of PWD's Green City, Clean Waters Program followed by a Q&A; discussed the Every Other Wednesday Clean-up efforts, and the rain garden demonstration project's engineering and planting plan.	40
Good Business Practices for Clean Water	10/5/2011	Glenside Memorial Hall, Elkins Park Library, Rowland Community Center	Lesson	Collaborated with Dottie Baumgarten from PWD to help her with her presentation.	N/A

Event Title	Date	Location	Event Type	Description	# Attended
Good Business Practices for Clean Water	10/11/2011	Glenside Memorial Hall, Elkins Park Library, Rowland Community Center	Lesson	Collaborated with Dottie Baumgarten from PWD to help her with her presentation.	N/A
TCP Clean-up with The Hackley School	10/13/2011	Tacony Creek Park at Adams and Crescentville	Clean-up	Planned event with Jackie Olson from PPR; volunteers from The Hackley School in New York state.	40
Every Other Wednesday Event in Vernon Park	10/14/2011	Vernon Park	Clean-up	Removed trash and debris, cleared storm drains before the rain garden installation.	39
Vernon Park Rain Garden Construction (Day 1)	10/17/2011	Vernon Park	Rain Garden Site Plan	Prepared site plan for the earth moving needs, marked and staked the elevations for the rain garden foundation.	4
Rock Creek Riparian Buffer Planting	10/17/2011	Cedarbrook Middle School	Planting	TTF staff organized site prep and native shrub/bush planting with Cedarbrook staff and students.	N/A
Vernon Park Rain Garden Construction (Day 2)	10/18/2011	Vernon Park	Rain Garden Construction	PPR came out with backhoe and operator; began hand grading the rain garden foundation.	6
Rock Creek Riparian Buffer Planting	10/18/2011	Cedarbrook Middle School	Planting	TTF staff organized site prep and native shrub/bush planting with Cedarbrook staff and students.	N/A
8th Vernon Park Improvement Effort Stakeholder's Meeting	10/19/2011	Vernon House, Vernon Park	Community Meeting	Discussed the LOVE Your Park: Fall Edition event; strategized rain garden construction and planting plan, volunteer needs.	16
Vernon Park Rain Garden Construction (Day 3)	10/20/2011	Vernon Park	Rain Garden Construction	Continued digging out and grading the foundation.	13
Rock Creek Riparian Buffer Planting	10/20/2011	Cedarbrook Middle School	Planting	TTF staff organized site prep and native shrub/bush planting with Cedarbrook staff and students.	187

Event Title	Date	Location	Event Type	Description	# Attended
Good Business Practices for Clean Water	10/20/2011	Glenside Memorial Hall, Elkins Park Library, Rowland Community Center	Lesson	Collaborated with Dottie Baumgarten from PWD to help her with her presentation.	10
Vernon Park Rain Garden Construction (Day 4)	10/21/2011	Vernon Park	Rain Garden Construction	Continued digging out and grading the foundation with shovels, pick axes, and rakes and laid down the compost, which was delivered from PPR.	13
Love Your Watershed Environmental Fair (1 of 3)	10/22/2011	Friends Hospital-Tacony Creek Park	Fair	Tables with flyers, enviroscape, wildlife matching game, tree walk with David Hewitt and Ned Barnard, Aaron Slater from ECA doing rain barrel workshops.	10
Vernon Park Rain Garden Construction (Day 5)	10/24/2011	Vernon Park	Rain Garden Construction	Laid out erosion control material and mulch and planted the chokeberry and hydrangeas.	10
Vernon Park Rain Garden Construction (Day 6)	10/25/2011	Vernon Park	Rain Garden Construction	Finised laying out mulch and planted 3 truck beds of plants before the big volunteer planting day.	9
Vernon Park Rain Garden Construction (Day 7)	10/26/2011	Vernon Park	Rain Garden Construction	First large volunteer planting day with groups from Crefeld School, Brian Rudnick's Campaign Office, AmeriCorps YouthBuild USA, members of the Germantown community, and all of our stakeholder organizations.	64
Womrath Park Community Input Meeting	11/2/2011	Womrath Park	Community Meeting	Invited community to come learn about proposed rain garden design for Womrath Park.	15
Vernon Park LOVE Your Park Day	11/5/2011	Vernon Park	Clean-up and Ribbon Cutting	Celebration of our rain garden installation with informational tables, kids' activities, and speeches.	100

Event Title	Date	Location	Event Type	Description	# Attended
Vernon Park Clean-up	11/9/2011	Vernon Park	Clean-up	Vernon Park Improvement Effort.	N/A
Oxford Christian Circle Watershed Lessons	11/14/2011	Tacony Creek Park	Lesson	Taught intro watershed lesson to the afterschool group at the Oxford Christian Circle.	8
Wingohocking Tree Tenders Fall Tree Planting	11/18/2011	Germantown	Planting	Volunteers from Earth Force, Arcadia University, and the DePaul House planted trees as part of PHS's Tree Tenders fall planting.	17
Vernon Park Clean-up	12/7/2011	Vernon Park	Clean-up	Ruth Seeley from FOVP and Dave Bower from PPR starting to organize cleanups without TTF initiative.	10
Vernon Park Clean-up	12/12/2011	Vernon Park	Clean-up	Finished up some work that needed to be done last time when it was raining.	5
Love Your Watershed Environmental Fair (3 of 3)	12/17/2011	Friends Hospital-Tacony Creek Park	Fair	Tables with flyers and wildlife matching game, Dan Efroymson led bird walk, Teddie the PWD Spokesdog.	25
Martin Luther King Day of Service	1/16/2012	Clearview Community Park	Clean-up	Volunteers led by Rev Williams (CBNC) dispersed around neighborhood for clean-up.	10
Martin Luther King Day of Service	1/16/2012	Vernon Park	Clean-up	Members of the TTF team worked with volunteers from Philadelphia Parks & Recreation, Friends of Vernon Park and Villanova University to clean Vernon Park	30
Martin Luther King Day of Service	1/16/2012	Mount Moriah Baptist Church	Clean-up	TTF also worked with Mount Moriah Baptist Church, Habitat for Humanity and local residents to clean up trash and debris in Southeast Germantown.	15
Tree Tenders Stormwater Lesson	1/28/2012	PHS Building at 20th and Arch	Lesson	Gave successful watershed lessons at Tree Tenders Trainings (this was the first one).	30

Event Title	Date	Location	Event Type	Description	# Attended
Tree Tenders Stormwater Lesson	2/11/2012	Temple Univ. Community Education Center	Lesson	Gave successful watershed lessons at Tree Tenders Trainings (this was the second one).	25
Bryn Mawr Intro Watershed Lesson	2/15/2012	Bryn Mawr	Lesson	Intro watershed lesson for sociolgy class at Bryn Mawr	30
Social Action and Social Change (Arcadia University Class) 1 of 6	2/21/2012	Arcadia University	Lesson	TTF collaborated with Arcadia University professor Jeff Shultz to add a component of the course that allows students to learn about clean water and the environment outside of the class. This class focused on the history of the TTF Watershed and what our organization does.	20
Roots to Reentry	2/22/2012	State Rd.	Lesson	Intro lesson at prison with City Harvest folks	20
Community Service Networking Breakfast	2/23/2012	Awbury Arboretum	Networking	Educators and community service coordinators gathered to learn about how to get more involved with TTF and to network.	15
Tree Tenders Networking Event	2/28/2012	LaSalle	Networking	Tree tenders from across the watershed discussed why trees are important for our watershed and how we can all work together to plant more trees.	15
Social Action and Social Change (Arcadia University Class) 2 of 6	3/1/2012	Wall Park	Clean-up	Students visited a nearby park to observe characteristics of an urban stream and pick up trash along the stream bank.	16
What You Can Learn from the Vernon Park Rain Garden for Your Home and Community	3/6/2012	Gardener's Studio, PHS Flower Show	Lesson	AKRF Presentation covered the basic structure of a rain garden, how to choose a site to build your own, and which plants to use.	100

Event Title	Date	Location	Event Type	Description	# Attended
Social Action and Social Change (Arcadia University Class) 3 of 6	3/8/2012	Wyncote	Storm drain making	Students learned about methods of public outreach and applied over 20 markers on neighborhood storm drains.	15
AmeriCorps Week Tree Surveying in Germantown and West Oak Lane	3/13/2012	Rite Aid at Washington Ln x Ogontz Ave	Surveying	TTF collaborated with Earth Force and AmeriCorps to survey trees so that the Parks and Recreation Department can plant more trees.	12
Social Action and Social Change (Arcadia University Class) 4 of 6	3/29/2012	Arcadia University	Lesson	Jerry from Protecting Our Waters came and talked to Arcadia students.	17
Roots to Reentry	4/4/2012	Prison on State Rd.	Lesson	Steph gave an extended watershed lesson to a Roots to Reentry class.	17
Social Action and Social Change (Arcadia University Class) 5 of 6	4/5/2012	West Oak Lane	Surveying	Arcadia students split into groups to survey streets for tree locations (part of PPR project with Erica Smith) and cleaned up trash along the way.	15
Rain Barrel Workshops	4/9/2012	True Light Fellowship Church	Workshop	Aaron from ECA taught workshops so that homeowners can sign up to get rain barrels installed.	20
Social Action and Social Change (Arcadia University Class) 6 of 6	4/10/2012	Arcadia University	Lesson	Julie talked to Arcadia students about developing a relationship with their politicians.	16
Rain Barrel Workshops	4/12/2012	Center in the Park	Workshop	Aaron from ECA taught workshops so that homeowners can sign up to get rain barrels installed.	20
Philly Spring Cleanup	4/14/2012	Bingham and Ruscomb Sts 19120	Clean-up	Volunteers picked up trash from the meadow and along the sidewalk.	8

Event Title	Date	Location	Event Type	Description	# Attended
Tree Surveying in West Oak Lane	4/15/2012	Rite Aid at Washington Ln x Ogontz Ave	Surveying	Volunteers surveyed streets for empty tree pits and picked up trash in the Rite Aid parking lot	2
Whole Foods 5% Day	4/18/2012	Whole Foods, Jenkintown	Table	TTF hosted a table with button making to reach out to shoppers in the store.	150
Schuylkill Soundings	4/19/2012	Fairmount Water Works Interpretive Center	Lesson	PWD and TTF staff members presented about TTF's history, mission, and current volunteer efforts.	10
Tree Planting	4/21/2012	Chew Ave, Baynton St	Planting	Planted trees around Philadelphia and the surrounding area through the Plant One Million campaign.	40
Tree Planting	4/22/2012	Queen Lane and Knox Street	Planting	Planted trees around Philadelphia and the surrounding area through the Plant One Million campaign.	13
Tree Tenders Stormwater Lesson	4/24/2012	Meadowbrook Farm, Abington	Lesson	Presented a brief watershed lesson about the role of trees in our watershed at the Meadowbrook (Montgomery County) Tree Tenders class.	22
Roots to Reentry	4/24/2012	Awbury Arboretum, Friends Hospital, Bartrams Gardens	Lesson	Steph gave extended watershed lessons to Roots to Reentry classes.	12
Roots to Reentry	4/26/2012	Awbury Arboretum, Friends Hospital, Bartrams Gardens	Lesson	Steph gave extended watershed lessons to Roots to Reentry classes.	N/A
Cedarbrook Earth Day Festival	4/28/2012	Cedarbrook Middle School	Table	Info about TTF and buttonmaker for students and families.	50
Whole Foods Ecofest	4/29/2012	Whole Foods, Jenkintown	Table	Table with watershed steward information at Whole Foods Ecofest.	50

Event Title	Date	Location	Event Type	Description	# Attended
Frankford Parks Meeting	4/30/2012	2nd Baptist Church 1801 Meadow St.	Lesson	Steph gave a watershed lesson and learned about the history of the creeks in the Frankford area.	10
Arts to Outdoors (A2O) Field Trip	5/2/2012	Adams Ave	Lesson	Ashley led a tour of a section of Tacony Creek Park for the Arts to Outdoors class.	10
Germantown Tree Tenders Meeting	5/8/2012	Germantown Restoration CDC	Community Meeting	Organized a meeting of the Germantown Tree Tenders to discuss what community members want to see and identify members interested in leadership roles.	10
Philadelphia Stormwater Infiltration Project Landowner Outreach Meeting	5/9/2012	Harvest Time Christian Fellowship	Community Meeting	Informational sessions for potential PSIP project participants.	8
Watershed Lessons	5/10/2012	Cheltenham High School	Lesson	Led watershed lessons for two AP Environmental Science classes at Cheltenham High School.	40
Riparian Buffer Planting	5/10/2012	Glenside Elementary School	Riparian Buffer Planting	Planted 200 wildflowers and native grasses to fill in the section that got dub up during the school's construction.	5
Olney Recreation Center Rain Garden Community Meeting	5/10/2012	Olney Recreation Center	Community Meeting	Community members came out to learn about plans for the rain garden at Olney Rec Center and vote on a design.	15
Earth Force Youth Summit	5/11/2012	Philadelphia Zoo	Table	Led watershed activity for groups of students who rotated through.	250
LOVE Your Park Week Kick-off at Tacony Creek Park	5/12/2012	Tabor Road	Clean-up	Volunteers from schools, the AmeriCorps NCCC, the community, and more helped plant flowers, weed and mulch tree pits, mulch paths, remove invasives, and pick up trash.	100
Jenkintown Storm Drain Marking	5/17/2012	Mather St.	Storm drain marking	Employees from Sightlines LLC helped mark storm drains in their neighborhood in Jenkintown PA	12

Event Title	Date	Location	Event Type	Description	# Attended
Vernon Park Garden Party	5/19/2012	Vernon Park	Table	Lori Hayes gave a talk on the plants in the rain garden to a small group of community members.	10
Freshwater Mussel Surveying with PDE	5/22/2012	Cedarbrook Middle School	Surveying	PDE staff led a lesson inside, then we put on waders and went outside to practice surveying in the creek.	20
Glenside Ribbon Cutting Ceremony	5/24/2012	Glenside Elementary School	Ribbon Cutting	Principal Bruce Williams led a program to introduce the 3rd and 4th graders to the project started in 2009; members of the PTO spoke about the riparian buffer and what it means for the watershed and the school.	73
Watershed Lesson at the Frankford Library	5/26/2012	Frankford Library	Lesson	Intro to watersheds at the Frankford Library	6
Watershed Milestones Award Ceremony & Reception	5/31/2012	Fairmount Water Works Interpretive Center	Fundraiser	$8,000 raised and 9 awards given at ceremony.	150
Abington Rain Barrel Workshop	6/6/2012	McKinley Firehouse	Workshop	Hosted by Abington EAC, rain barrel lesson taught by TTF staff.	40
Roots to Reentry	6/7/2012	Bartram's Gardens	Lesson	Watershed lesson for R2R class.	15
Friends of the Pennypack Monthly Meeting	6/21/2012	Lafayette Redeemer on Veree Road	Lesson	TTF staff talked about rain barrels and what's going on in the TTF.	35
Tacony Creek Park Botany Walk	6/23/2012	Tacony Creek Park	Nature Walk	TTF and Peter Kurtz from the Pennypack Environmental Center led a tour of the Tacony Creek Park.	9
Springfield Rain Barrel Workshop	6/23/2012	Springfield Township Building	Workshop	Hosted by the Springfield EAC, rain barrel lesson taught by TTF staff.	30
Bird & Plant Walk	6/30/2012	Friends Hospital-Tacony Creek Park	Nature Walk	Led a bird and plant tour of the Friends Hospital property and neighboring Tacony Creek Park.	12

Pennypack Watershed Partnership Plans and Projects

Act 167 Plan Stormwater Management Plan: In final approval stage, public hearing held on June 14, 2011, comments received and reviewed/approved by PA DEP, counties have adopted plan, and we now can request PA DEP, followed by municipalities adopting plan/stormwater ordinance updates within 6 months. Plan also includes project inventory which could be integrated in the IWMP.

- Jeff Featherstone, Temple University Center for Sustainable Communities, feather1@temple.edu, 267-468-8311

Pennypack Greenway Partnership: Focus on greenway and greenway trail alignment, along with interest in stormwater, education and outreach and other related topics. Greenway Partnership has been cross-linked with Watershed Partnership; with many overlapping partners.

The Greenway Partnership is in a hiatus phase since the summer of 2011. The GreenSpace Alliance no longer funds Greenway Partnership facilitation. A conversation with David Robertson of Pennypack Ecological Restoration Trust indicated that near term Montgomery County Open Space funding for the greenway is focused on a trail extension segment into Rockledge Borough. David indicated that while the County remains committed to closing the greenway/trail gap between Lorimer Park and Pennypack Trust lands, this is now a longer term (5 year horizon) project due to funding limitations.

- David Roberston, Pennypack Ecological Restoration Trust, Executive Director, (215) 657-0830
- Dulcie Flaharty, Montgomery County Land Trust, Executive Director, (215) 513-0100.

Pennypack Ecological Restoration Trust (PERT): PERT has preserved 809 acres of land in the heart of the watershed, a critical "sponge" that helps manage stormwater where it falls. Includes expansive warm season grass meadows, and they also have 11 miles of public trail. David Robertson reported that they completed 2 four-acre acquisitions in 2011, but do not have any additional near term acquisition plans for their central Pennypack Watershed area. They are doing some restoration projects focusing on invasive plant removal and monitoring of deer herds.

- David Roberston, Pennypack Ecological Restoration Trust, Executive Director, (215) 657-0830

Financing SW projects meeting in Upper Moreland: Group of elected officials in the Pennypack and Tookany/Tacony-Frankford Watersheds have been meeting to address transportation and stormwater management issues. Currently interested in how to finance stormwater projects. Several townships/boroughs applied unsuccessfully for PennVest funds, and Upper Moreland applied unsuccessfully for PADEP flood mitigation funds. An April 9, 2012 stormwater finance workshop was held at the Upper Moreland Township Building with all Partnerships invited. There is interest by the elected officials on stormwater finance opportunities, but no consensus yet on pursuing stormwater authority.

- Lisa Romaniello, Upper Moreland Commissioner, lisa@romaniellodesign.com, (215) 706-0406
- Michael Golden, Jenkintown Borough Commissioner, magolden1@aol.com

Delaware Valley Planning Commission Route 611 and 263 Corridor Study: Study focused on transportation but also addressed potential stormwater management projects. David Anderson of DVRPC noted that some of the transportation initiatives are moving forward (a shuttle system and a way point signage system), but that any effort to move forward on the environmental/stormwater projects would need to come from the municipalities. See link for plan at http://www.dvrpc.org/asp/pubs/publicationabstract.asp?pub_id=08045C

- David Anderson, DVRPC, danderson@dvrpc.org, 215-592-1800 ext. 2815
- Alison Hastings, DVRPC, ahastings@dvrpc.org, 215-592-1800

Trout Unlimited, SE PA Chapter: They first initiated stream restoration (Lorimer Park) and dam removal projects, and then initiated Project Headwaters in order to address stormwater in order to protect stream restoration projects. They have several projects installed, such as headwater tree planting at NLT Thompson property and Blair Mill Elementary. Also have proposed projects for which they are looking for funding. See webpage at http://www.projectheadwaters.org/)

Update call with Mike Wilson indicated frustration in not being able to procure more grant funding for headwaters projects. He has recruited an engineer from Michael Baker who lives in watershed (John Hohenstein) to help with pro-bono design (e.g. for head water wetland swale project at College Settlement), with Trout Unlimited donating the person power for the projects.

His NLT headwaters tree planting projects have experienced high mortality last year, so he is planning to plant batches (20-30) of hardier trees (river birches and red oaks doing the best) over several years to slowly improve project success. They are doing O/M work in June at their planting sites. They will continue with maintenance work for the stream habitat improvement devices (18 total) they installed at Lorimer Park. They will also help PERT install a stream habitat improvement device on their preserve land.

He also wants to promote basin naturalization projects in Horsham, with strategy of over planting basins with native grasses/shrubs to gradually push out turf grass.

- Mike Wilson, Trout Unlimited and Project Headwaters, Michael.Wilson@agcs.allianz.com, 215-600-4542

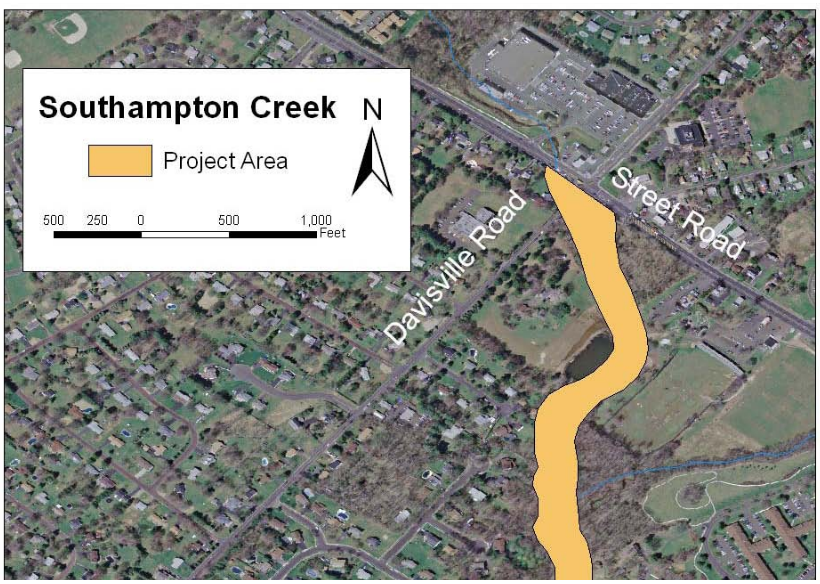
Horsham Township: Has worked with Project Headwaters effort. Example project is the Clearbrook Park wetland creation project installed in 2010. Township would also be good point of contact for status of the Willow Grove Naval Air Station conversion and what opportunities may be present for stormwater management

- Bill Walker, Township Manager, wwalker@horsham.org, 215-643-3131

Lower Southampton Township: Township is working with Army Corps on a stream restoration project that involves many private parcels. Restoration plan developed and outreach initiated with landowners to gain site control. Check in with Michael Golden, Township Manager, indicated that not enough of the homeowners could be convinced to provide easement for project. Gaps in landowner agreements have caused Township and Army Corps to scale back project considerably (see below figure which makes up about 6 parcels), and Michael is unsure of moving ahead.

Heather Jensen, the Army Corps contact for the project, is assuming for now that stream restoration will proceed on smaller scale. She is talking to me about recruiting people to monitor before and after restoration condition in creek.

- Joe Golden, Township Manager, jgolden@southamptonpa.com. 215- 322-9700 ext 7
- Carl Loscalzo, Environmental Advisory Committee, carl.loscalzo@pgworks.com
- Heather Jensen, Army Corps of Engineers, (215) 656-6586



Upper Moreland Township (War Memorial Park trail and stream restoration project underway)

- Jonathan Dejonge, Upper Moreland Environmental Advisory Committee, JHRdeJonge@aol.com
- Lisa Romaniello, Upper Moreland Commissioner, lisa@romaniellodesign.com, (215) 706-0406

Huntington Valley Country Club: Initiated stormwater and stream restoration initiative to address impacts to the Pennypack Terwood Run tributary that runs down the middle of their golf course. Installed infiltration trenches in 2010 that capture stormwater flow entering their property from surrounding roads and residences. Have additional plans for wetlands and stream restoration. Unfortunate to fund out that the person spearheading this work just passed away suddenly (Dick Sayer).

URS/Tony Federicci: URS was under contract with PWD to host stream buffer workshops, and to conduct stream buffer assessments. They have evaluated approximately 30 properties in the Pennypack and Poquessing watersheds, and created restoration and BMP fact sheets. They installed a stream side restoration planting project in the Pennypack at Fountain Point Condos.

Warminster Township: They have not been active with Watershed Partnership, but we have had contact regarding meadow restoration at Warminster Community Park. This is a very expansive park that is a former airfield. The park includes extensive meadows in a major headwater area of Pennypack Creek. Township is planting 300 trees in the park this spring via the DVRPC/PHS PennVest tree planting grant, and via the grant will get two years of tree maintenance.

- Karen Whitney, Parks Director, kwhitney@warminstertownship.org

Dam removals: Series of dam removals have taken place on lower watershed; PWD is probably the best contact or this. PEC has a summary report (forwarded to PWD) that includes text and table for dams and dam removal projects; not sure who prepared but I assume PWD.

- Denis Mora, PWD Waterways Team, denis.mora@phila.gov

Upper Moreland School District/Temple University: Temple was coordinating with school district on environmental/watershed education curriculum in schools, hosting an environmental education program at Pennypack Ecological Restoration Trust, and promoting stormwater management projects on school property. Per Richard Nalbandian e-mail of 5/23/2012, this project has not moved forward based on budget restrictions.

- Richard Nalbandian, Temple University, nalband@temple.edu, 215-925-6585 or
- Jeff Featherstone, Temple University Center for Sustainable Communities, feather1@temple.edu, 267-468-8311

APPENDIX E – NPDES ANNUAL CSO STATUS REPORT FY2012

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 7/1/11 – 6/30/2012

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
NE	D02	51	356.5	48813219
NE	D03	49	361.25	14087892
NE	D04	28	217.75	1582911
NE	D05	60	418.25	1.2E+08
NE	D06	24	127	2894516
NE	D07	33	137.25	54405525
NE	D08	48	236.5	3110355
NE	D09	10	8.75	418494.6
NE	D11	22	98.5	12030967
NE	D12	48	123.75	525178.8
NE	D13	18	26	823337.1
NE	D15	18	38	2837794
NE	D17	48	184.25	18906948
NE	D18	49	185.75	13332037
NE	D19	51	219	11130139
NE	D20	33	109.75	7192536
NE	D21	42	151.5	13670319
NE	D22	78	506.5	50497392
NE	D23	48	94.5	644063.4
NE	D25	71	399.75	2.15E+08
NE	F03	38	97.25	9607730
NE	F04	68	241	21985658
NE	F05	74	276	2427539
NE	F06	27	59.25	2198764
NE	F07	46	120.5	6523998
NE	F08	45	103.5	3726133
NE	F09	63	229.5	1822194
NE	F10	67	313.5	6620105
NE	F11	75	402.75	32353286
NE	F12	36	72.25	1740969
NE	F13	55	148.75	4091164
NE	F21	71	370.25	1.8E+08
NE	F23	43	136.25	3819361
NE	F24	46	115.25	1677840
NE	F25	17	39.25	8458932
NE	P01	29	36.75	1691733
NE	P02	57	155.25	8031873
NE	P03	34	144.5	2557809
NE	P04	21	128.25	13639556
NE	P05	34	210.5	35880111
NE	D_FRW	55	154.25	72652967

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
NE	T_FRRR	12	47.25	4438981
NE	F_FRFG	78	575.25	2.49E+08
NE	T01	75	274	15578087
NE	T03	63	173.75	9327015
NE	T04	60	165	6684233
NE	T05	51	94.75	4081111
NE	T06	46	113	28652514
NE	T07	22	25.25	776974.5
NE	T08	81	399.75	2.08E+08
NE	T09	48	99.75	2691957
NE	T10	65	240.5	6866665
NE	T11	58	155.25	3917830
NE	T12	18	22.25	256320.9
NE	T13	63	216.25	12356948
NE	T14	68	271	4.02E+08
NE	T15	57	190	17214660
SE	D37	68	456	46600617
SE	D38	59	416.75	49966634
SE	D39	67	462.5	65727266
SE	D40	79	476	3975307
SE	D41	60	384	5419149
SE	D42	48	241	791168.4
SE	D43	45	247	676737.9
SE	D44	57	426	16725074
SE	D45	53	381.25	1.23E+08
SE	D46	45	280.25	2149547
SE	D47	89	496.75	17354247
SE	D48	55	364.75	45283702
SE	D49	35	218	311982.3
SE	D50	42	249.5	971594.1
SE	D51	87	733.75	5191324
SE	D51A	73	410	5411039
SE	D52	47	267.25	1296812
SE	D53	34	283.5	8746309
SE	D54	39	298	24454990
SE	D58	47	298.5	2647212
SE	D61	66	289.25	1951619
SE	D62	54	240	750175.2
SE	D63	48	333	29803223
SE	D64	52	275	513819.9
SE	D65	46	316.5	18352329
SE	D66	50	356.25	18645558
SE	D67	49	334.75	8753054
SE	D73	53	371.25	28154867

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
SE	R08	35	87.5	31966824
SE	R09	22	125.25	608837.4
SE	R10	56	203.25	1299083
SE	R21	3	5	733778.1
SE	D68	57	418.75	47653446
SE	D69	40	342	14921167
SE	D70	34	333	18958713
SE	D71	49	373.25	17126076
SE	D72	39	345.25	14901451
SW	C01	28	29.25	987046.2
SW	C02	10	8.25	112890.6
SW	C04A	28	64.5	8628746
SW	C05	27	34	1355202
SW	C06	62	200.5	12399352
SW	C07	34	76.25	4327348
SW	C09	40	96.25	5338529
SW	C10	22	67.75	596151
SW	C11	44	175.5	32681864
SW	C12	43	151.75	6162581
SW	C13	41	115.75	4615539
SW	C14	42	143.75	8866985
SW	C15	33	88.75	1244519
SW	C16	9	10.25	148800.6
SW	C17	59	299.75	97962120
SW	C18	42	126	9733602
SW	C19	31	41.25	2951695
SW	C20	30	50	1606589
SW	C21	30	63.75	2163048
SW	C22	48	130.75	6414260
SW	C23	19	63.25	922349.7
SW	C25	33	122.25	10356579
SW	C28A	49	88	1175817
SW	C29	58	245.5	5258107
SW	C30	38	192	3106706
SW	C31	43	131	3720150
SW	C32	41	81.75	3998365
SW	C33	34	40.75	1560883
SW	C34	25	22.5	1100413
SW	C35	21	21.5	379304.1
SW	C36	17	18	351657.9
SW	C37	28	28	473609.7
SW	C_FRTR	89	490.5	49416011
SW	S_FRM	20	174.75	58017936
SW	R21	3	5	733778.1

District	Outfall	Frequency	Duration (hrs)	Overflow (ft^3)
SW	S01	50	171.5	34282124
SW	S01T	44	98	8636890
SW	S02	54	173.25	2762860
SW	S03	18	14.5	424235.7
SW	S04	79	340.75	5901921
SW	S05	71	300.25	63357459
SW	S06	75	278	29497742
SW	S07	25	59	5154633
SW	S08	43	96	586074.6
SW	S09	43	103	17162113
SW	S10	57	194	6195544
SW	S11	58	170.25	1881554
SW	S12A	46	100.25	1974722
SW	S13	27	22.75	1191241
SW	S14	65	256.25	4713505
SW	S15	31	47.75	912435.3
SW	S16	69	218	2702974
SW	S17	32	55	1885497
SW	S18	49	194	23546245
SW	S19	34	50.5	794007
SW	S20	81	458.5	34483202
SW	S21	31	34	513792
SW	S22	44	116.25	7116544
SW	S23	57	172.25	3090660
SW	S24	42	108.25	1919731
SW	S25	43	132	4782125
SW	S26	71	321.25	32573545
SW	S30	12	11.5	378620.1
SW	S31	55	165.5	10567598
SW	S32	28	31.75	714402
SW	S33	74	322.5	33990652
SW	S36A	66	272.25	15028627
SW	S37	59	215.5	6660997
SW	S38	40	95	13591210
SW	S42	41	140.75	22101143
SW	S42A	73	442	43589525
SW	S44	46	140	15903125
SW	S45	45	153.25	53961992
SW	S46	29	81.25	5204525
SW	S50	61	349.5	3.21E+08
SW	C_FRA	22	18.75	5668169

Table 3 - Overflow Summary for a Typical Year

*This analysis was performed 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 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**
7/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/2/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/3/2011	0.05	0.05	0.05	0.32	0.01	0.03	0	0	0.04	0.07	0.01	0.03	0	0	0	0.01	0.01	0	0	0.172	0	0.03	0.03	0.044
7/4/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/6/2011	0	0	0	0	0	0.01	0.02	0	0.009	0	0	0	0	0.01	0.01	0	0	0.01	0	0.01	0	0.009	0	0.14
7/7/2011	0	0	0.02	0	0.05	0.03	0	0	0.02	0	0.01	0.26	0.04	0	0	0	0	0	0.17	0	0.06	0	0.007	0.02
7/8/2011	2.11	2.12	0.98	0.93	1.66	1.73	2.34	1.74	2.97	1.18	1.42	1.37	1.11	2.16	2.5	2.51	1.96	1.96	1.15	0.73	0.54	2.45	2.093	0.95
7/9/2011	0	0	0	0	0.01	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/14/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/15/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/16/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/17/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/18/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/19/2011	0	0.07	0	0	0.06	0.14	0.06	0	0.23	0	0	0.1	0	0.05	0.08	0.08	0	0.47	0.08	0.02	0.99	0.01	0.17	0
7/20/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/21/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/22/2011	0	0	0	0	0	0	0	0	0	0	0.03	0	0.03	0	0	0	0.01	0	0	0	0	0	0	0.01
7/23/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/24/2011	0	0	0.75	0.45	0.03	0.07	0.57	0.19	0.08	0.75	0.13	0	0.44	0.26	0.14	0.01	0.33	0.05	0	0.94	0	0	0	0.63
7/25/2011	0.24	0.29	0.58	3.38	0.37	1.26	1.02	0.94	0.54	0.73	0.75	0.25	0.51	1.18	1.07	0.24	0.76	0.44	1.1	1.23	0.55	0.44	0.26	0.76
7/26/2011	0	0	0.03	0.04	0	0	0.08	0.05	0	0.09	0.05	0	0.03	0.02	0	0	0.03	0.04	0.08	0.1	0.11	0	0	0.05
7/27/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/28/2011	0	0	0.02	0.01	0.03	0.04	0.01	0.01	0.06	0.04	0.01	0.03	0.01	0	0.02	0.06	0.01	0.04	0.02	0.01	0.05	0.03	0.01	0.01
7/29/2011	0.14	0.11	0.3	0.42	0.16	0.15	0.13	0.28	0.16	0.37	0.38	0.1	0.38	0.16	0.21	0.11	0.52	0.05	0.17	1.12	0.13	0.06	0.11	0.85
7/30/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/31/2011	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0

Table 5 - August 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**
8/1/2011	0.45	0.44	0.32	0.1	0.3	0.71	0.71	0.75	0.51	0.15	0.33	0.26	0.22	0.49	0.3	0.18	0.56	0.24	0.07	0.01	0.16	0.17	1.06	0
8/2/2011	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
8/3/2011	0.71	0.93	0.89	0.89	0.61	0.79	1.02	0.86	0.71	0.75	0.98	0.58	0.85	0.77	0.61	0.79	0.97	0.9	0.87	0.6	0.98	0.68	1.25	0.73
8/4/2011	0.2	0.2	0.09	0.12	0.22	0.06	0.07	0.07	0.13	0.09	0.07	0.13	0.08	0.1	0.22	0.09	0.09	0.06	0.05	0.17	0.05	0.1	0.08	0.17
8/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/6/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/7/2011	0.04	0.04	0.42	0.47	0.07	0.11	0.13	0.16	0.11	0.55	0.2	0.04	0.43	0.16	0.07	0.18	0.28	0.13	0.29	0.44	0.28	0.16	0.04	0.33
8/8/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/9/2011	1.37	1.79	1.27	1.34	1.02	1.56	1.05	1.35	1.46	0.98	1.38	1.58	1.27	1.04	1.02	1.27	1.33	1.17	0.97	1.25	1.3	1.2	1.95	1.158
8/10/2011	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0.004
8/11/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/12/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/13/2011	0	0.01	0	0	0.01	0.09	0	0	0.02	0	0	0.02	0	0	0.01	0	0	0	0	0	0	0.02	0.08	0
8/14/2011	4.65	4.2	4.87	4.88	5.06	3.51	5.19	5.34	3.56	4.95	6.06	5.62	5.17	4.65	5.06	4.96	4.89	3.61	3.09	6.49	3.1	3.43	4.81	5.76
8/15/2011	1	0.65	0.87	0.87	0.31	0.76	0.54	0.33	0.44	0.65	0.57	0.42	0.75	0.31	0.31	0.27	0.84	0.2	0.42	0.38	0.74	0.62	1.69	0.45
8/16/2011	0.01	0.12	0.21	0.05	0.13	0	0.04	0.04	0	0.07	0.02	0.07	0.09	0.06	0.13	0.07	0.08	0.05	0.1	0.15	0	0.01	0	0.04
8/17/2011	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
8/18/2011	1.758	1.89	0.37	0.31	1.42	1.53	0.66	0.48	1.45	0.38	0.5	1.61	0.45	0.66	1.42	1.24	0.51	1.05	1.15	0.75	0.7	1.33	2.48	0.32
8/19/2011	0.657	0.64	0.75	1.07	1.03	0.81	0.73	1.29	0.93	1.3	1.34	0.7	0.82	0.47	1.03	0.78	1.09	0.68	1.07	0.65	1.44	1.05	0.7	0.99
8/20/2011	0	0	0.01	0	0	0.01	0	0	0.01	0.01	0.01	0	0	0.83	0	0	0	0	0	0	0.01	0	0	0
8/21/2011	0.549	0.62	2.96	2.46	0.63	1.2	1.84	2.6	0.98	2.79	2.89	0.24	2.6	0.51	0.63	0.63	2.52	1.93	3.2	2.515	3.37	0.8	0.18	2.2
8/22/2011	0	0	0	0.01	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0.01	0.005	0	0	0	0
8/23/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
8/24/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/25/2011	0.39	0.35	0.81	0.66	0.54	0.83	0.55	0.64	0.67	0.43	0.67	0.49	0.83	0.609	0.54	0.43	0.59	0.9	0.52	0.63	0.56	0.6	0.58	0.33
8/26/2011	0.008	0.01	0.01	0	0	0	0	0.01	0	0.01	0.01	0	0	0.002	0	0.01	0	0.01	0.01	0.01	0	0	0	0
8/27/2011	4.787	5.07	5.31	5.88	4.95	3.7	4.76	4.34	4.09	5	4.98	2.2	5.19	4.762	4.95	3.93	5.05	3.73	4.53	4.77	4.82	2.94	3.56	3.48
8/28/2011	1.581	1.69	1.99	2.25	1.46	2.16	1.94	1.79	2.23	2.25	2.07	0.66	2.12	1.983	1.46	1.58	1.98	1.46	1.98	1.83	2.23	0.96	1.11	1.48
8/29/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/30/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/31/2011	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 6 - September 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**
9/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/2/2011	0	0	0	0	0	0	0	0.05	0	0.23	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0
9/3/2011	0.07	0	0	0	0	0	0	0.04	0	0	0.001	0	0	0	0	0.02	0	0.16	0	0.01	0	0	0	0.05
9/4/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
9/5/2011	0	0	0.01	0.01	0	0.18	0.01	0.01	0.04	0.01	0.01	0	0	0	0	0	0.01	0.05	0.33	0.01	0.15	0.04	0	0.01
9/6/2011	2.29	2.4	2.6	2.11	2.15	3.08	2.66	2.61	2.88	2.601	2.73	1.34	2.76	1.91	2.15	2.45	2.88	2.46	2.98	2.24	3.56	2.45	2.18	2.99
9/7/2011	0.55	1.05	0.38	0.15	0.26	1.33	0.55	0.86	1.01	0.462	0.76	0.16	0.36	0.23	0.26	0.6	0.28	0.92	0.76	0.24	1.23	0.85	0.68	0.6
9/8/2011	3.4	3.63	1.56	2.06	2.29	3.39	1.85	2.07	4.36	1.608	1.66	1.92	1.33	1.1	2.29	3.95	1.51	5.93	5.6	2.47	4.58	2.64	4.07	2.12
9/9/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10/2011	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0.2	0	0	0.02	0	0	0	0	0	0	0
9/11/2011	0.77	0.26	0.22	0	0.34	0.52	0.12	0.41	0.75	0	0.47	0	0.32	0.53	0.34	0.32	0.15	0.8	0.81	0.01	0.64	0.57	0.24	0.1
9/12/2011	0.14	0.37	0.13	0	0.11	0.04	0.14	0.05	0.12	0	0.04	0	0.09	0.16	0.11	0.88	0.17	0.02	0.05	0.2	0.06	0.33	0.15	0.08
9/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
9/14/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/15/2011	0.14	0.06	0.15	0.17	0.11	0.19	0.23	0.21	0.21	0.15	0.2	0.23	0.14	0.22	0.11	0.08	0.19	0.16	0.19	0.13	0.14	0.15	0.14	0.09
9/16/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/17/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/18/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/19/2011	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
9/20/2011	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.03	0.01	0	0.01
9/21/2011	0.01	0.03	0.01	0.05	0.05	0.05	0.01	0.01	0.03	0.02	0.02	0.07	0.02	0.03	0.05	0.02	0.04	0.03	0.02	0.02	0.05	0.02	0	0.01
9/22/2011	0	0	0.01	0.01	0	0.01	0.01	0	0.01	0.01	0	0	0	0	0	0.01	0	0	0.01	0.01	0.04	0	0	0.01
9/23/2011	2.29	2.05	1.64	1.37	2.01	2.29	1.94	2.23	1.97	1.91	2	1.61	1.66	1.64	2.01	2.43	2.17	1.8	1.5	1.36	1.68	1.66	0.688	0.81
9/24/2011	0.01	0.04	0.05	0.03	0.02	0.04	0.03	0.08	0.04	0.09	0.09	0.02	0.05	0.03	0.02	0.09	0.07	0.04	0.07	0.04	0.11	0.04	0.02	0.02
9/25/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/26/2011	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
9/27/2011	0.1	0.2	0	0.09	0	0.01	0	0.01	0.07	0.01	0	0.02	0	0	0	0.04	0	0.11	0.05	0.07	0.01	0	0.08	0
9/28/2011	0.54	0.53	0.6	1.01	0.31	0.51	0.33	0.33	0.58	0.83	0.39	0.19	0.56	0.29	0.31	0.25	0.45	0.83	0.83	0.97	0.63	0.4	0.72	0.44
9/29/2011	0.02	0.36	0.78	0.14	0.18	0.23	0.57	0.46	0.25	0.25	0.5	0.1	0.73	0.06	0.18	0.02	0	0.16	0.2	0.08	0.1	0.2	0.01	0.04
9/30/2011	0.15	0.13	0.18	0.15	0.2	0.13	0.19	0.16	0.13	0.18	0.16	0.2	0.18	0.21	0.2	0.18	0.15	0.13	0.14	0.14	0.135	0.08	0.18	0.04

Table 7 - October 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**
10/1/2011	0.1	0.17	0.31	0.11	0.09	0.09	0.09	0.12	0.12	0.38	0.09	0.08	0.12	0.08	0.09	0.1	0.064	0.11	0.15	0.4	0.129	0.17	0.13	0.07
10/2/2011	0.23	0.27	0.15	0.05	0.18	0.21	0.18	0.14	0.22	0.24	0.11	0.08	0.2	0.12	0.18	0.18	0.173	0.16	0.14	0.08	0.166	0.26	0.33	0.04
10/3/2011	0	0.01	0.08	0	0	0	0.04	0	0	0.02	0.03	0	0.06	0.01	0	0.01	0.04	0	0	0	0	0	0	0.01
10/4/2011	0.01	0.03	0.01	0.01	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.025	0.03	0.03	0.01
10/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/6/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/7/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/8/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/9/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
10/10/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/11/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
10/12/2011	0.24	0.28	0.232	0.29	0.32	0.25	0.25	0.24	0.31	0.25	0.24	0.19	0.26	0.23	0.32	0.27	0.22	0.3	0.31	0.25	0.291	0.2	0.25	0.22
10/13/2011	0.02	0.04	0.01	0.03	0.05	0.04	0.04	0.03	0.02	0.03	0.03	0.04	0.02	0.02	0.05	0.03	0	0.03	0.03	0.02	0.03	0.03	0.03	0.02
10/14/2011	0.35	0.56	0.08	0.05	0.11	0.5	0.11	0.2	0.59	0.19	0.2	0.23	0.1	0.18	0.11	0.37	0.12	0.22	0.32	0.06	0.35	0.42	0.3	0.1
10/15/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0.01	0	0	0	0	0	0	0
10/16/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/17/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/18/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/19/2011	1.01	1.06	1.01	1.2	0.99	1.02	0.99	0.98	1.06	1.14	1.07	0.51	1.12	0.908	0.99	1.01	0.53	1.12	1.15	1.07	1.091	0.77	0.83	0.87
10/20/2011	0	0	0	0.02	0	0.01	0.01	0.01	0	0.01	0	0	0	0.01	0	0.01	0.02	0.01	0.03	0.02	0.019	0	0	0.03
10/21/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0
10/22/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/23/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/24/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0
10/25/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0
10/27/2011	0.12	0.21	0.37	0.38	0.15	0.27	0.34	0.3	0.27	0.37	0.37	0.15	0.39	0.28	0.15	0.24	0.378	0.25	0.32	0.38	0.29	0.21	0.19	0.33
10/28/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/29/2011	1.56	1.75	1.69	1.79	1.65	1.445	1.59	1.29	1.47	0.98	1.37	0.79	1.29	1.49	1.65	1.43	1.326	0.9	1.32	1.64	1.268	1.31	1.4	0.91
10/30/2011	0	0	0.05	0.13	0	0.295	0.06	0.31	0.33	0.51	0.36	0	0.44	0.11	0	0	0.392	0.22	0.12	0.01	0.183	0.01	0	0.41
10/31/2011	0	0.01	0	0	0	0	0	0	0	0.32	0	0	0.06	0	0	0	0.042	0	0	0	0	0	0	0.09

Table 8 - November 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**
11/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/2/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/3/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/4/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/5/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/6/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/7/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/8/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/9/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/10/2011	0.06	0.07	0.06	0.05	0.08	0.09	0.07	0.06	0.08	0.07	0.07	0.07	0.06	0.06	0.08	0.06	0.063	0.04	0.08	0.04	0.09	0.05	0.08	0.04
11/11/2011	0	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
11/12/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/14/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/15/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/16/2011	0.68	0.68	0.62	0.6	0.73	0.62	0.61	0.58	0.64	0.66	0.61	0.71	0.62	0.63	0.73	0.67	0.612	0.61	0.59	0.62	0.63	0.633	0.79	0.57
11/17/2011	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.01	0.017	0.01	0.02
11/18/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/19/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/20/2011	0.01	0.03	0	0.01	0.02	0.04	0.04	0.01	0.03	0	0.01	0.03	0.01	0.02	0.02	0.03	0.011	0.04	0.01	0	0.02	0.01	0.04	0
11/21/2011	0.05	0.05	0.13	0.13	0.06	0.11	0.12	0.11	0.11	0.14	0.14	0.04	0.14	0.09	0.06	0.08	0.136	0.1	0.13	0.14	0.13	0.06	0.05	0.13
11/22/2011	1.7	1.84	1.73	1.92	1.9	1.65	1.93	1.67	1.74	1.8	1.73	1.44	1.85	1.58	1.9	2.04	1.814	1.74	1.68	1.77	1.72	0.91	1.61	1.65
11/23/2011	0.68	0.76	0.65	0.56	0.7	0.69	0.65	0.65	0.74	0.69	0.63	0.68	0.59	0.58	0.7	0.77	0.6	0.65	0.58	0.69	0.57	0.43	0.77	0.59
11/24/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/25/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/27/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/28/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
11/29/2011	0.59	0.69	0.79	0.53	0.69	0.63	0.71	0.68	0.63	1.06	0.75	0.62	0.94	0.7	0.69	0.78	0.878	0.65	0.65	0.73	0.72	0.632	0.64	0.77
11/30/2011	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0

Table 9 - December 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**
12/1/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/2/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/3/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/4/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/5/2011	0.03	0.04	0.03	0.03	0.03	0.01	0.04	0.02	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.03	0.02	0.01	0.03	0.01	0.027	0.04	0.02
12/6/2011	0.12	0.19	0.13	0.1	0.17	0.13	0.15	0.11	0.16	0.17	0.13	0.15	0.14	0.12	0.17	0.18	0.134	0.1	0.14	0.15	0.17	0.152	0.2	0.18
12/7/2011	2.17	2.22	2.43	2.26	2.09	2.41	2.32	2.11	2.22	2.29	2.28	1.53	2.25	1.93	2.09	2.32	2.25	1.64	2.02	2.38	2.32	2.247	2.33	1.9
12/8/2011	0.13	0.15	0.2	0.21	0.18	0.19	0.17	0.17	0.24	0.21	0.18	0.09	0.17	0.16	0.18	0.16	0.171	0.09	0.15	0.23	0.15	0.229	0.15	0.2
12/9/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/10/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/11/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/12/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/13/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/14/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/15/2011	0.01	0.04	0.02	0.01	0.02	0.03	0.03	0.01	0.03	0.03	0.02	0.01	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.01
12/16/2011	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0.008	0	0
12/17/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/18/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/19/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/20/2011	0.04	0.07	0.1	0.09	0.06	0.08	0.09	0.08	0.08	0.13	0.09	0.04	0.1	0.092	0.06	0.07	0.095	0.08	0.1	0.12	0.12	0.077	0.05	0.14
12/21/2011	0.03	0.05	0.14	0.18	0.04	0.05	0.09	0.11	0.07	0.23	0.14	0.04	0.12	0.103	0.04	0.05	0.123	0.03	0.12	0.22	0.22	0.064	0.05	0.25
12/22/2011	0.1	0.11	0.09	0.1	0.12	0.08	0.09	0.07	0.09	0.08	0.08	0.14	0.09	0.09	0.12	0.1	0.088	0.09	0.09	0.1	0.09	0.088	0.13	0.07
12/23/2011	1.48	1.5	1.24	1.47	1.37	1.2	1.37	1.19	1.3	1.26	1.26	1.04	1.3	1.34	1.37	1.45	1.291	1.09	1.22	1.26	1.28	1.292	1.33	1.1
12/24/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/25/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/26/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/27/2011	0.67	0.49	0.55	0.43	0.61	0.52	0.6	0.54	0.52	0.69	0.61	0.57	0.54	0.56	0.61	0.66	0.56	0.53	0.54	0.67	0.89	0.52	0.62	0.65
12/28/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/29/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/30/2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/31/2011	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 10 - January 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1/1/2012	0.01	0.03	0.04	0.01	0.02	0.01	0.03	0.02	0.02	0.02	0.03	0.01	0.03	0.02	0.02	0.02	0.028	0.02	0.01	0.02	0.02	0.018	0.02	0.02
1/2/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/3/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/4/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/5/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/7/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/8/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/9/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/10/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/11/2012	0.37	0.36	0.37	0.42	0.42	0.34	0.36	0.37	0.37	0.38	0.36	0.26	0.39	0.33	0.42	0.4	0.38	0.37	0.37	0.36	0.38	0.365	0.33	0.33
1/12/2012	0.78	0.74	1.16	1.38	1.06	0.85	1.02	1.06	0.92	1.24	1.13	0.77	1.25	1.04	1.06	1.05	1.207	1	1.13	1.15	1.19	0.9	0.73	1.15
1/13/2012	0.06	0.07	0.06	0.04	0.07	0.05	0.04	0.05	0.06	0.04	0.05	0.09	0.06	0.06	0.07	0.06	0.057	0.03	0.06	0.11	0.08	0.059	0.07	0.05
1/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/15/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/16/2012	0.02	0.03	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.02	0.029	0.02	0.02	0.02	0.04	0.03	0.04	0.02
1/17/2012	0.26	0.3	0.35	0.33	0.27	0.26	0.31	0.28	0.33	0.35	0.31	0.26	0.34	0.33	0.27	0.36	0.33	0.25	0.25	0.4	0.29	0.177	0.3	0.36
1/18/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/19/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/20/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/21/2012	0	0	0.18	0	0	0	0.29	0	0	0	0.15	0	0	0	0	0.31	0.039	0	0.29	0.17	0	0	0	0.11
1/22/2012	0	0	0.06	0.01	0	0.01	0.04	0	0	0	0.03	0	0	0	0	0.01	0.007	0	0.04	0.12	0	0	0	0.04
1/23/2012	0.56	0.68	0.43	0.81	0.59	0.64	0.35	0.68	0.67	0.88	0.58	0.45	0.81	0.66	0.59	0.32	0.733	0.65	0.33	0.36	0.61	0.57	0.65	0.57
1/24/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/25/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/26/2012	0.07	0.06	0.06	0.07	0.08	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.06	0.08	0.05	0.05	0.05	0.03	0.06	0.039	0.05	0.06	0.04
1/27/2012	0.4	0.36	0.38	0.31	0.38	0.49	0.33	0.35	0.39	0.41	0.36	0.41	0.33	0.33	0.38	0.4	0.36	0.42	0.5	0.395	0.467	0.37	0.46	0.58
1/28/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/29/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/30/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/31/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 11 - February 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
2/1/2012	0	0	0	0.01	0.01	0	0	0	0	0.02	0	0.01	0	0	0.01	0	0	0	0.01	0	0	0	0.01	0.02
2/2/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/3/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/4/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/5/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/7/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/8/2012	0.07	0.06	0.06	0.01	0.02	0.12	0.07	0	0.01	0	0.07	0.03	0.01	0.01	0.02	0.06	0.03	0.01	0.07	0.14	0	0.01	0.09	0.06
2/9/2012	0.01	0.02	0	0.06	0.06	0.01	0	0.07	0.05	0.11	0	0.01	0.08	0.04	0.06	0	0.03	0.08	0	0.07	0.12	0.07	0	0
2/10/2012	0	0	0	0	0.01	0	0	0	0	0	0	0.01	0	0	0.01	0	0	0	0	0	0	0	0	0
2/11/2012	0.24	0.26	0.24	0.28	0.27	0.28	0.27	0.25	0.28	0.31	0.3	0.21	0.28	0.25	0.27	0.24	0.23	0.24	0.24	0.44	0.24	0.23	0.27	0.23
2/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/13/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/15/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/16/2012	0.13	0.15	0.15	0.16	0.14	0.13	0.14	0.13	0.14	0.15	0.14	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.14	0.27	0.15	0.13	0.16	0.16
2/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/18/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/19/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/20/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/21/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/22/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/23/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/24/2012	0.28	0.28	0.32	0.36	0.3	0.26	0.3	0.27	0.26	0.33	0.32	0.24	0.34	0.28	0.3	0.28	0.3	0.23	0.28	0.59	0.28	0.23	0.29	0.24
2/25/2012	0	0	0.01	0	0.03	0.01	0.02	0	0.01	0.01	0.01	0	0	0.01	0.03	0	0.01	0	0.02	0	0.04	0	0	0.01
2/26/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/27/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/28/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/29/2012	1.09	1.21	0.88	0.99	1.12	1.09	0.99	0.96	1.16	0.92	0.93	0.97	0.93	1	1.12	1.16	0.93	1.01	0.97	1.44	1.01	1.07	1.12	0.82

Table 12 - March 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
3/1/2012	0.01	0.03	0.04	0.08	0.02	0.01	0.02	0.07	0.01	0.04	0.05	0.02	0.06	0.01	0.02	0.01	0.04	0.02	0.04	0.1	0.03	0.01	0.02	0.11
3/2/2012	0.18	0.19	0.22	0.19	0.17	0.21	0.21	0.22	0.22	0.23	0.24	0.15	0.23	0.17	0.17	0.2	0.21	0.24	0.19	0.208	0.17	0.17	0.21	0.23
3/3/2012	0.17	0.17	0.15	0.17	0.17	0.12	0.16	0.15	0.14	0.12	0.14	0.17	0.15	0.16	0.17	0.18	0.16	0.12	0.12	0.15	0.14	0.15	0.17	0.12
3/4/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/5/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/7/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/8/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/9/2012	0.01	0.03	0.04	0.02	0.01	0.04	0.02	0.02	0.03	0.04	0.03	0.03	0.02	0.02	0.01	0.06	0.01	0.01	0.02	0.037	0.04	0.04	0.05	0.07
3/10/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/11/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/13/2012	0.07	0.09	0.09	0.1	0.08	0.11	0.14	0.12	0.1	0.11	0.13	0.07	0.12	0.11	0.08	0.1	0.11	0.12	0.1	0.102	0.08	0.08	0.07	0.11
3/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/15/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/16/2012	0	0	0	0.01	0	0	0	0	0.01	0.01	0	0	0	0	0	0	0	0.01	0.01	0.006	0	0.01	0	0
3/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/18/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/19/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/20/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/21/2012	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.03	0.02	0.01	0.02	0.01	0.02	0	0	0.01	0.02	0.021	0.02	0.01	0.02	0.02
3/22/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/23/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/24/2012	0.05	0.07	0.07	0.08	0.14	0.06	0.1	0.09	0.07	0.06	0.09	0.09	0.07	0.1	0.14	0.11	0.08	0.06	0.06	0.07	0.06	0.04	0.06	0.05
3/25/2012	0.01	0.01	0.01	0.01	0.01	0	0.01	0	0.01	0.02	0.01	0	0.03	0.03	0.01	0.01	0.02	0.01	0.02	0.011	0.02	0	0.01	0.01
3/26/2012	0	0	0.02	0	0.01	0	0	0	0	0	0	0	0	0.01	0.01	0	0	0	0	0.02	0.01	0	0	0
3/27/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
3/28/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
3/29/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
3/30/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
3/31/2012	0.25	0.22	0.33	0.38	0.29	0.43	0.34	0.35	0.36	0.34	0.36	0.23	0.35	0.33	0.29	0.34	0.33	0.38	0.31	0	0.32	0.24	0.23	0.39

Table 13 - April 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
4/1/2012	0.1	0.11	0.1	0.08	0.1	0.07	0.07	0.06	0.08	0.1	0.08	0.12	0.1	0.08	0.1	0.09	0.06	0.06	0.07	0.087	0.06	0.09	0.13	0.09
4/2/2012	0.1	0.11	0.13	0.19	0.12	0.13	0.14	0.14	0.11	0.1	0.12	0.13	0.17	0.16	0.12	0.12	0.14	0.12	0.12	0.148	0.16	0.07	0.19	0.09
4/3/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/4/2012	0	0.01	0	0.01	0	0	0	0	0	0.01	0.01	0	0.01	0.01	0	0	0	0	0	0.02	0	0	0.01	0
4/5/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/7/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/8/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/9/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/10/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/11/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/13/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/15/2012	0.01	0.02	0.02	0.01	0.04	0.04	0.01	0.01	0.04	0.04	0.01	0.03	0.01	0.01	0.04	0.04	0.01	0.02	0.01	0.01	0.01	0.03	0.03	0.03
4/16/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/18/2012	0	0.01	0.01	0.01	0.01	0.02	0.01	0	0.01	0.02	0.01	0.01	0.01	0	0.01	0	0.01	0.01	0.02	0.01	0.02	0	0.01	0
4/19/2012	0	0	0.02	0.01	0	0.01	0.01	0.02	0.01	0.01	0.02	0	0.02	0.01	0	0	0	0.01	0.01	0.02	0.02	0.01	0.01	0.02
4/20/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/21/2012	0.05	0	0.12	0.11	0.13	0.04	0.06	0.03	0.03	0.05	0.04	0.2	0.12	0.05	0.13	0	0.06	0.02	0.14	0.11	0.16	0.03	0.05	0.04
4/22/2012	1.92	2.02	1.79	2.47	1.67	2.13	1.96	1.84	2.05	1.95	2.01	1.18	1.98	1.97	1.67	1.89	1.92	1.58	1.84	1.87	2.12	1.77	1.76	1.28
4/23/2012	0.14	0.2	0.18	0.18	0.15	0.25	0.17	0.15	0.2	0.2	0.16	0.1	0.17	0.16	0.15	0.19	0.15	0.12	0.17	0.19	0.3	0.16	0.19	0.14
4/24/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0
4/25/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/26/2012	0.04	0.06	0.01	0.02	0.07	0.05	0.03	0.02	0.05	0.02	0.02	0.06	0.02	0.04	0.07	0.06	0.02	0.03	0.02	0.02	0.04	0.05	0.07	0.01
4/27/2012	0	0	0.02	0	0	0	0	0	0.01	0.02	0.01	0	0.01	0	0	0	0	0	0.01	0.04	0	0	0	0
4/28/2012	0	0	0.01	0	0	0	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0.01
4/29/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/30/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0

Table 14 - May 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
5/1/2012	0.17	0.16	0.37	0.28	0.26	0.23	0.24	0.3	0.11	0.23	0.35	0.21	0.35	0.11	0.26	0.15	0.26	0.27	0.26	0.38	0.2	0.1	0.27	0.43
5/2/2012	0.1	0.13	0.02	0.02	0.11	0.02	0.01	0.01	0.03	0.02	0.01	0.07	0.02	0.05	0.11	0.13	0.01	0.01	0.03	0.08	0.03	0.05	0.07	0.01
5/3/2012	0.22	0.22	0.13	0.09	0.19	0.19	0.13	0.13	0.25	0.17	0.12	0.19	0.11	0.12	0.19	0.19	0.11	0.18	0.17	0.12	0.24	0.18	0.08	0.15
5/4/2012	0.17	0.11	0.28	0.22	0.3	0.12	0.21	0.28	0.11	0.33	0.28	0.22	0.18	0.19	0.3	0.31	0.17	0.24	0.32	0.08	0.28	0.08	0.15	0.05
5/5/2012	0	0	0	0	0.01	0.01	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0.01	0
5/6/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
5/7/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0
5/8/2012	0	0	0.03	0.01	0	0.03	0.03	0.03	0.02	0.03	0.04	0	0.03	0.01	0	0.01	0.02	0.03	0.02	0.04	0.03	0.02	0.01	0.02
5/9/2012	0.45	0.47	0.46	0.36	0.44	0.53	0.36	0.37	0.46	0.38	0.43	0.47	0.42	0.34	0.44	0.44	0.4	0.4	0.39	0.4	0.42	0.41	0.62	0.32
5/10/2012	0.13	0.14	0.17	0.19	0.14	0.13	0.14	0.15	0.15	0.16	0.16	0.12	0.16	0.16	0.14	0.14	0.15	0.13	0.15	0.19	0.15	0.14	0.14	0.14
5/11/2012	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0	0	0	0
5/12/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/13/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/14/2012	0.05	0.09	0.1	0.1	0.04	0.11	0.07	0.07	0.1	0.09	0.09	0.04	0.09	0.08	0.04	0.1	0.08	0.09	0.09	0.18	0.15	0.12	0.08	0.1
5/15/2012	0.9	1.07	0.86	0.6	0.67	0.99	0.82	0.88	0.9	0.81	0.86	0.62	0.78	0.66	0.67	0.98	0.71	1.02	0.9	0.61	0.87	1.05	0.9	1.01
5/16/2012	0	0.44	1.74	1.07	0	0.91	1.74	1.85	1.28	2.12	1.94	0	1.71	0.77	0	0.36	1.7	1.48	1.33	1.19	1.22	0.93	0	1.44
5/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0
5/18/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
5/19/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/20/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/21/2012	0.16	0.28	0.3	0.36	0.2	0.14	0.19	0.21	0.14	0.3	0.29	0.15	0.3	0.19	0.2	0.15	0.21	0.18	0.16	0.3	0.16	0.13	0.18	0.33
5/22/2012	0.18	0.22	0.19	0.21	0.19	0.12	0.11	0.15	0.15	0.25	0.17	0.18	0.19	0.14	0.19	0.23	0.15	0.22	0.23	0.26	0.08	0.16	0.23	0.18
5/23/2012	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0	0	0	0
5/24/2012	0.82	0.2	0.06	0.11	0.02	0.53	0.03	0.22	0.52	0.15	0.6	0.1	0.27	0.01	0.02	0.34	0	0.14	0.32	0.34	0.47	0.36	0.43	0.09
5/25/2012	0	0.01	0.04	0.07	0	0	0.01	0	0	0.03	0.02	0	0.05	0.01	0	0.01	0.02	0.03	0.01	0.07	0	0	0	0.03
5/26/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/27/2012	0	0	0.73	0.54	0	0.02	0.24	0.22	0	0.68	0.34	0	0.47	0.08	0	0.02	0.26	0.4	0.39	0.36	0.55	0.06	0	0.46
5/28/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/29/2012	0.22	0.3	0.16	0.07	0.17	0.1	0.23	0.47	0.4	0.4	0.48	0.04	0.07	0.07	0.17	0.16	0.16	0.31	0.18	0.05	0.08	0.22	0.31	0.28
5/30/2012	0	0.02	0.04	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0	0	0.01	0.01	0.02	0.01	0.01	0.02	0.51	0.02	0.02	0.02	0.01
5/31/2012	0	0	0	0	0	0	0	0	0.48	0	0	0	0	0	0	0.29	0	0	0	0.44	0	0	0	0

Table 15 - June 2012 PWD Rain Gage Records

	Rain Gage Number																							
Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
6/1/2012	0.7	0.83	0.05	0.12	0.55	0.76	0.2	0.18	0.82	0.16	0.19	0.5	0	0.2	0.55	0.56	0.18	0.61	0.85	0.109	0.87	0.66	0.79	0.1
6/2/2012	0.14	0.14	0.04	0.62	0.18	0.08	0.17	0.12	0.09	0.13	0.13	0.31	0	0.38	0.18	0.2	0.47	0.07	0.08	0.379	0.12	0.08	0.13	0.22
6/3/2012	0.21	0.12	0	0.05	0.21	0.43	0.11	0.07	0.24	0.11	0.09	0.17	0.03	0.09	0.21	0.26	0.06	0.18	0.11	0.35	0.1	0.21	0.14	0.25
6/4/2012	0.08	0.47	0.02	0.08	0.17	0.47	0.1	0.06	0.4	0.11	0.08	0.11	0.13	0.09	0.17	0.28	0.05	0.24	0.48	0.085	0.33	0.46	0.47	0.11
6/5/2012	0	0	0	0	0	0	0.02	0.01	0	0.06	0.01	0	0.05	0	0	0	0.01	0	0	0.01	0	0	0	0
6/6/2012	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0.01	0	0	0	0
6/7/2012	0	0.03	0	0	0	0	0.06	0.06	0	0	0	0	0	0.02	0	0	0	0.01	0	0.02	0.02	0	0	0
6/8/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0
6/9/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/10/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/11/2012	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
6/12/2012	0.95	1.2	0.01	0.52	0.75	1.07	0.91	0.79	1.24	0.73	0.9	0.69	0.78	0.69	0.75	1.14	0.77	1.03	0.82	0.65	0.78	1.24	1.11	0.65
6/13/2012	0	0.02	0	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0	0.01	0.01	0	0.02	0.02	0.022	0.03	0.02	0.02	0.03
6/14/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
6/15/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
6/16/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/17/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/18/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
6/19/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/20/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0
6/21/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/22/2012	0.9	1.1	0.43	0.8	0.96	2.26	1.1	0.86	1.63	0.4	0.87	0.51	0.6	1.41	0.96	1.54	0.81	1.23	0.99	0.31	0.66	1.64	0.58	0.19
6/23/2012	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0.01	0	0	0	0
6/24/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/25/2012	0	0	0.02	0	0	0	0	0	0	0	0.03	0	0.03	0	0	0	0	0	0.02	0.115	0.02	0	0	0
6/26/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0
6/27/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0
6/28/2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/29/2012	0.35	0.34	0.06	0.06	0.24	0.21	0.34	0.41	0.28	0.07	0.35	0.15	0.19	0.14	0.24	0.14	0.3	0.11	0.23	0.43	0.01	0.37	0.06	0.03
6/30/2012	0.05	0.17	0.03	0.04	0.05	0.09	0.04	0.03	0.05	0.03	0.04	0.07	0.04	0.04	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.12	0.01

Table 16 - Rain Gage records by year and month for FY 2012

		Rain Gage Number 1-12											
Year	**Month**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
2011	7	2.54	2.64	2.73	5.55	2.39	3.46	4.23	3.22	4.11	3.23	2.79	2.14
2011	8	18.17	18.65	21.15	21.36	17.76	17.83	19.23	20.05	17.31	20.38	22.08	14.62
2011	9	10.51	11.13	8.33	7.36	8.05	12.02	8.65	9.60	12.46	8.39	9.09	5.89
2011	10	3.64	4.39	3.99	4.06	3.55	4.16	3.72	3.63	4.42	4.46	3.88	2.08
2011	11	3.78	4.14	3.99	3.82	4.20	3.84	4.15	3.77	3.99	4.43	3.96	3.61
2011	12	4.78	4.86	4.93	4.88	4.69	4.70	4.95	4.41	4.75	5.11	4.82	3.63
2012	1	2.53	2.63	3.11	3.40	2.92	2.72	2.84	2.88	2.84	3.40	3.09	2.35
2012	2	1.82	1.98	1.66	1.87	1.96	1.90	1.79	1.68	1.91	1.85	1.77	1.63
2012	3	0.76	0.82	0.99	1.06	0.92	1.00	1.01	1.03	0.96	1.00	1.07	0.77
2012	4	2.36	2.54	2.41	3.09	2.29	2.74	2.46	2.27	2.59	2.54	2.49	1.83
2012	5	3.58	3.87	5.68	4.31	2.75	4.20	4.58	5.35	5.12	6.17	6.20	2.41
2012	6	3.38	4.42	0.66	2.30	3.12	5.39	3.06	2.60	4.77	1.82	2.72	2.53
		Rain Gage Number 13-24											
Year	**Month**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
2011	7	2.55	3.84	4.03	3.02	3.63	3.06	2.77	4.33	2.44	3.03	2.68	3.46
2011	8	20.87	17.41	17.47	16.41	20.78	16.12	18.33	20.66	19.74	14.07	19.57	17.45
2011	9	8.21	6.62	8.15	11.36	8.10	13.61	13.56	8.03	13.15	9.44	9.16	7.42
2011	10	4.07	3.46	3.54	3.66	3.33	3.33	3.92	3.97	3.84	3.41	3.50	3.12
2011	11	4.23	3.68	4.09	4.44	4.13	3.85	3.73	4.03	3.89	2.74	3.99	3.77
2011	12	4.76	4.44	4.87	5.06	4.76	3.69	4.41	5.18	5.28	4.73	4.92	4.52
2012	1	3.31	2.86	3.06	3.00	3.22	2.81	3.03	3.16	3.12	2.54	2.66	3.27
2012	2	1.78	1.73	1.93	1.87	1.66	1.70	1.73	2.95	1.84	1.74	1.94	1.54
2012	3	1.05	0.95	1.07	1.01	0.96	0.98	0.89	0.77	0.89	0.75	0.84	1.11
2012	4	2.62	2.49	2.52	2.39	2.37	1.97	2.41	2.57	2.89	2.21	2.45	1.71
2012	5	5.20	3.00	3.92	4.03	4.42	5.14	4.97	5.77	4.95	4.03	3.50	5.05
2012	6	1.86	3.06	2.91	4.19	2.69	3.54	3.63	2.74	2.97	4.71	3.42	1.59

Table 17 - SSO Statistics for Period July 1 2011 – June 30 2012

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)
Main & Shurs (modeled)					
1	7/19/2011 20:35	7/19/2011 20:35	0:00	1	0.00001
2	8/3/2011 23:27	8/3/2011 23:32	0:05	18	0.0001
3	8/9/2011 13:22	8/9/2011 14:00	0:37	5502	0.0412
4	8/14/2011 6:52	8/14/2011 15:32	8:40	10070	0.0753
5	8/21/2011 14:55	8/21/2011 17:35	2:40	47452	0.3549
6	8/27/2011 19:10	8/28/2011 22:30	27:20	3270431	24.4628
7	9/6/2011 12:15	9/6/2011 19:57	7:42	8750	0.065
8	9/7/2011 4:37	9/7/2011 5:07	0:30	7856	0.059
9	9/8/2011 1:52	9/8/2011 13:27	11:35	724629	5.420
10	9/23/2011 11:30	9/23/2011 20:10	8:40	8760	0.066
11	5/15/2012 9:47	5/16/2012 1:30	15:42	70207	0.525
12	6/22/2012 18:55	6/22/2012 19:15	0:20	437	0.003
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	8/9/2011 14:45	8/9/2011 15:32	0:47	17304	0.129
2	8/14/2011 5:32	8/14/2011 19:20	13:47	1054629	7.889
3	8/21/2011 15:52	8/21/2011 23:00	7:07	458862	3.432
4	8/27/2011 17:55	8/28/2011 18:00	24:05	2039613	15.256
5	9/6/2011 16:17	9/7/2011 0:32	8:15	502488	3.759
6	9/8/2011 3:00	9/8/2011 15:40	12:40	935523	6.999
7	9/23/2011 12:27	9/23/2011 15:12	2:45	194225	1.453
8	9/28/2011 14:00	9/28/2011 14:10	0:10	2501	0.019
9	11/22/2011 20:02	11/23/2011 7:17	11:15	419210	3.136
10	12/7/2011 17:42	12/8/2011 3:45	10:02	645792	4.831
11	12/23/2011 2:12	12/23/2011 5:25	3:12	141501	1.059

Note: Prior to FY 2011, 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 2012. As a result, the modeled estimates may not be as accurate as in previous years.

APPENDIX - F
Wissahickon Creek Sediment TMDL Implementation Plan

Wissahickon Siltation TMDL

Implementation Plan for the City of Philadelphia

September 28, 2012

Introduction

The purpose of this document is to provide an implementation strategy for the City of Philadelphia's commitment to address the Wissahickon Total Maximum Daily Load (TMDL) for Siltation. This approach utilizes stream restoration and stormwater wetlands, implementation of stormwater regulations, and inlet cleaning. The City's commitment was initiated in the 2005 Stormwater NDPES Permit through detailed monitoring and assessment of the Wissahickon Watershed. Forthcoming Annual Reports will document the implementation measures and monitoring procedures being initiated in this watershed to determine appropriate adaptive management techniques as needed.

As part of its mission to be a steward and protector of Philadelphia's rivers and streams, the Philadelphia Water Department (PWD) has committed to an integrated program for the Wissahickon Creek Watershed comprised of watershed characterization, planning, and management. In 2006, PWD developed a compendium document to represent the analysis of two years' worth of physical, chemical and biological data collected for the Wissahickon Creek Watershed, titled the Wissahickon Creek Comprehensive Characterization Report (WCWCCR). PWD is currently sponsoring the development of an Act 167 Stormwater Management Plan for the Wissahickon Creek Watershed. Upon the completion of this plan, PWD seeks to work with upstream partners to complete an Integrated Watershed Management Plan (IWMP) for the Wissahickon Creek Watershed to manage multiple regulatory programs through a coordinated approach.

The United States Environmental Protection Agency (USEPA) developed a TMDL for the Wissahickon Creek in 2003 to address the stream's listing on Pennsylvania's 1996 and 1998 Clean Water Act Section 303(d) list of impaired waters, and the 2000 305(b) report. The TMDL sets the current sediment load from the Philadelphia portion of the Creek at 1,547,690 lbs/yr. The Waste Load Allocation (WLA) is set at 380,861 lbs/yr, therefore requiring a reduction of approximately 1,166,829 lbs/yr of sediment. Because the Wissahickon Creek Watershed is considered an "urbanized" area subject to coverage by MS4 stormwater permits, all sources of siltation to Wissahickon Creek and tributaries (i.e., overland flow and streambank erosion) are considered by EPA as point sources (2003).

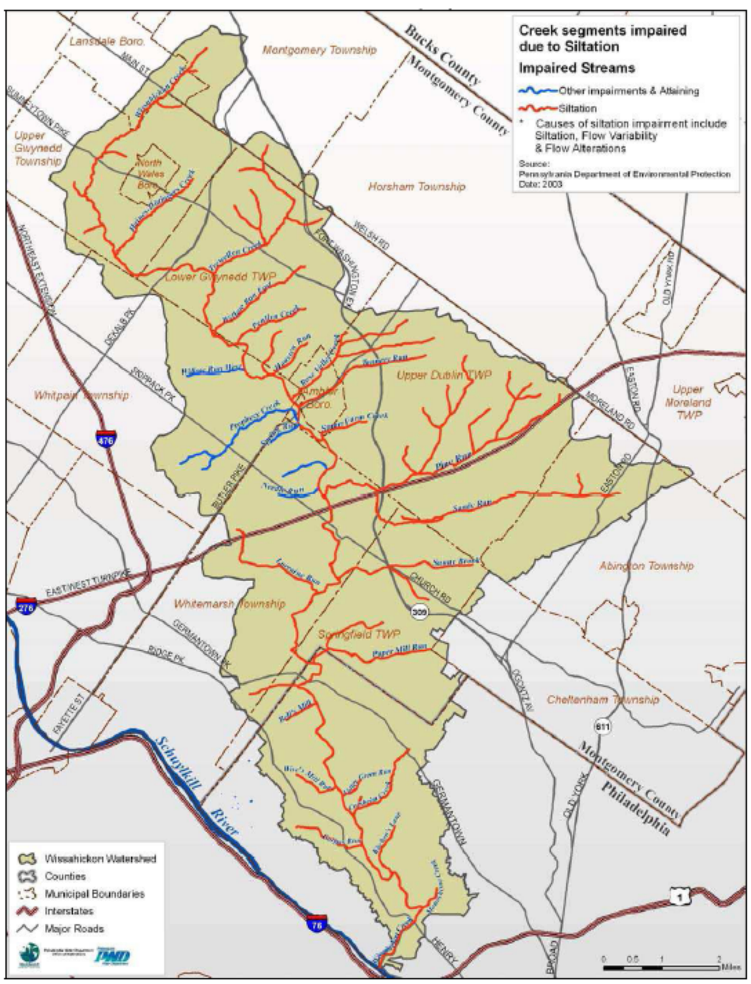
Philadelphia's strategy for TMDL compliance is to focus on meeting the sediment load reduction target of 1,166,829 lbs/year through stream restoration projects, stormwater wetland projects, implementation of the Philadelphia's Stormwater Regulations, and inlet cleaning. This document also provides a description of PWD's monitoring plan to ensure the continued effectiveness of the PWD's investment in meeting the targeted sediment reductions required by the EPA siltation TMDL for the Wissahickon Creek.

The Wissahickon Creek Watershed

The headwaters of the Wissahickon Creek originate in Montgomery Township, Montgomery County, from which the mainstem flows for approximately 27 miles before reaching its confluence with the Schuylkill River in the City of Philadelphia. Numerous tributaries flow to the Wissahickon Creek; the total number of stream miles contributing to Wissahickon Creek is roughly 114.6 miles, 10.5 of which are in the City. The Wissahickon Creek Watershed spans portions of fifteen municipalities. Philadelphia makes up 16.5% of the total 63.7 square mile drainage area.

The 2003 TMDL for the Wissahickon Creek documents water quality problems in the watershed by stating “the watershed is heavily impacted by urbanization and is listed as impaired due to problems associated with elevated nutrient levels, siltation, low dissolved oxygen concentrations, chlorine, water/flow variability, oil and grease, and pathogens.” The TMDL was developed to address impairments identified on Pennsylvania’s 1996 Section 303(d) List (USEPA, 2003). Figure 1, taken from the WCWCCR, illustrates that the entire length of the Creek and its tributaries in the City of Philadelphia are listed as impaired for sediments on Pennsylvania’s 303(d) list.

Figure 1: Wissahickon Creek Segments Designated as Impaired due to Siltation



Sediment Reduction

Philadelphia is committed to the reduction of sediment in the Wissahickon Watershed through an integrated watershed management and adaptive management approach. As previously noted, the TMDL sediment load reduction target is 1,166,829 lbs/yr; documented in table 1 is Philadelphia's commitment to implementation which will exceed this target by removing 1,630,000 pounds of sediment per year through the following methods:

> **Stream Restoration:** PWD has adopted an aggressive stream restoration strategy targeting subwatersheds of the Wissahickon Creek. Each project is designed to stabilize streambanks with structural controls and vegetative practices. Restoration protects streambank against erosive flows thereby reducing the existing instream contribution of sediment.
>
> **Stormwater Treatment Wetlands Creation:** Wetlands can be designed to accommodate diverse habitats, promote healthy living resources, and treat runoff and reduce sediment loadings to the creek. Stormwater 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.
>
> **Implement City of Philadelphia Stormwater Regulations:** The City of Philadelphia's Stormwater Regulations are a driving force behind the achievement of stormwater management using green stormwater infrastructure city-wide. These regulations will continue to reduce sediment from private development and redevelopment projects in the Wissahickon Creek Watershed by decreasing the flow and improving the quality of stormwater runoff.
>
> **Inlet Cleaning:** PWD routinely cleans and maintains the traps located in the City's stormwater inlets, reducing the sediment, nutrients, organics, bacteria, metals, hydrocarbons, and other pollutants from reaching the Wissahickon Creek. Debris is removed and handled as solid waste.

Together these practices will exceed the TMDL's sediment reduction target for the City of Philadelphia. The following sections describe in detail how each practice will be implemented, monitored and tracked for TMDL compliance.

Table 1: Total Sediment Load Reductions from all Project Types (2012-2017)

Project Type	Total Estimated Sediment Load Reduction (lbs/year)
Stream Restoration	1,100,000
Wetland Creation	31,000
Stormwater Regulations	11,400
Inlet Cleaning	489,000
TOTAL SEDIMENT REDUCTION	**1,630,000**

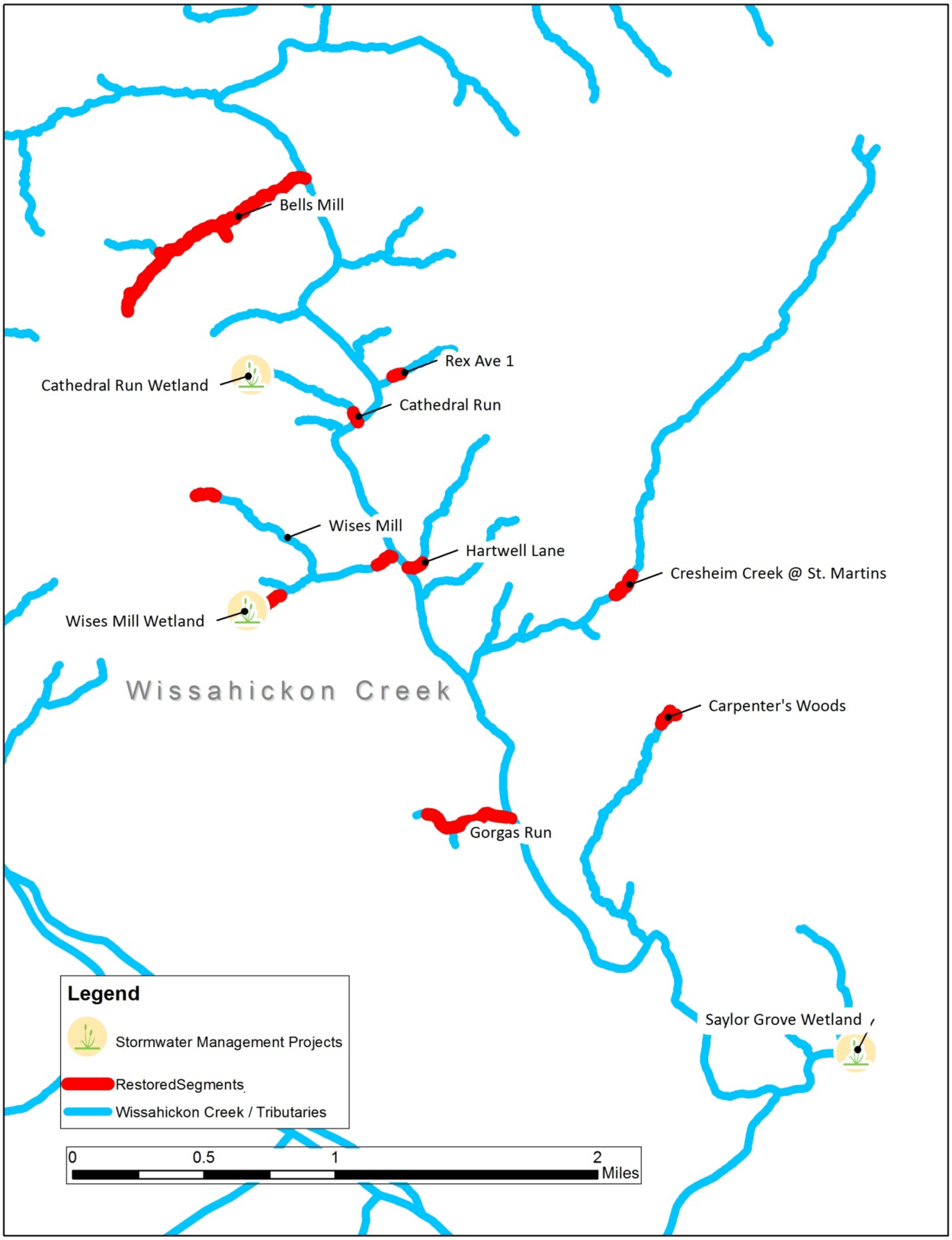
Stream Restoration Projects

Based on the combination of past experience and present understanding from over a decade of monitoring in the Wissahickon Creek Watershed, PWD scientists and engineers appreciate the value of implementing stream restoration projects as a means of reducing the sediment load due to streambank erosion and transport processes. Since 2006, PWD has implemented eight stream restoration projects on first and second-order stream in the Wissahickon Creek Watershed. These projects were conducted in response to highly erosive conditions that produced systematic instability in these stream corridors:

1. Carpenter's Woods
2. Cathedral Run
3. Cresheim Creek at St. Martins
4. Hartwell Lane
5. Rex Avenue
6. Bells Mill Run
7. Wises Mill Run
8. Gorgas Run

Figure 2 illustrates the locations of the stream restoration projects included in this TMDL sediment reduction strategy. Appendix I provides additional detail on each of the included stream restoration projects.

Figure 2: City of Philadelphia Stormwater Management and Stream Restoration Projects



The stream restoration projects, both completed and planned, are estimated to achieve a total sediment reduction of 690,000 to 1,700,000 lbs/year (Table 2), depending on the method used to calculate sediment reduction. Erosion rates are based on visual assessments of streambanks in the Wissahickon Watershed, calculations using Bank Erosion Hazard Index (BEHI) methodology, and a standard sediment density:

Bank Erosion (lbs/yr) = 96.3 (BLH)

Where:
Sediment Density = 96.3 lb/ft3 (Rosgen, 1996)
B= Average Lateral Erosion Rate (ft/yr)
L = Bank length (ft)
H= Bank height (ft)

The bank erosion reduction estimates for each stream restoration project were calculated based upon the change to the BEHI classification within each project reach. Prior to implementation, individual segments within each project reach were assigned BEHI conditions ranging from Very Low (VL), the least erosive condition observed, to Extreme, the most erosive condition observed. Post implementation, each of these segments were assigned the assumed BEHI classification of Low (L). The difference between the pre and post-implementation was determined to be the bank erosion reduction for each segment with each project reach. Bank erosion reduction estimates for each project were calculated using four different bank erosion models. The Bank Pin model was based exclusively on the measured erosion rates at PWD's monitoring locations, as reported in PWD's 2010 MS4 Annual Report submission. The BANCS / Bank Pin model was based on a hybrid of the BANCS model and the early bank pin data that PWD collected from 2005 - 2007, as reported in PWD's 2007 MS4 Annual Report submission. The two remaining models (BANCS Colorado Curve & BANCS Yellowstone Curve) were based entirely on the predicted published streambank erosion rates (Rosgen, 1996, 2006).

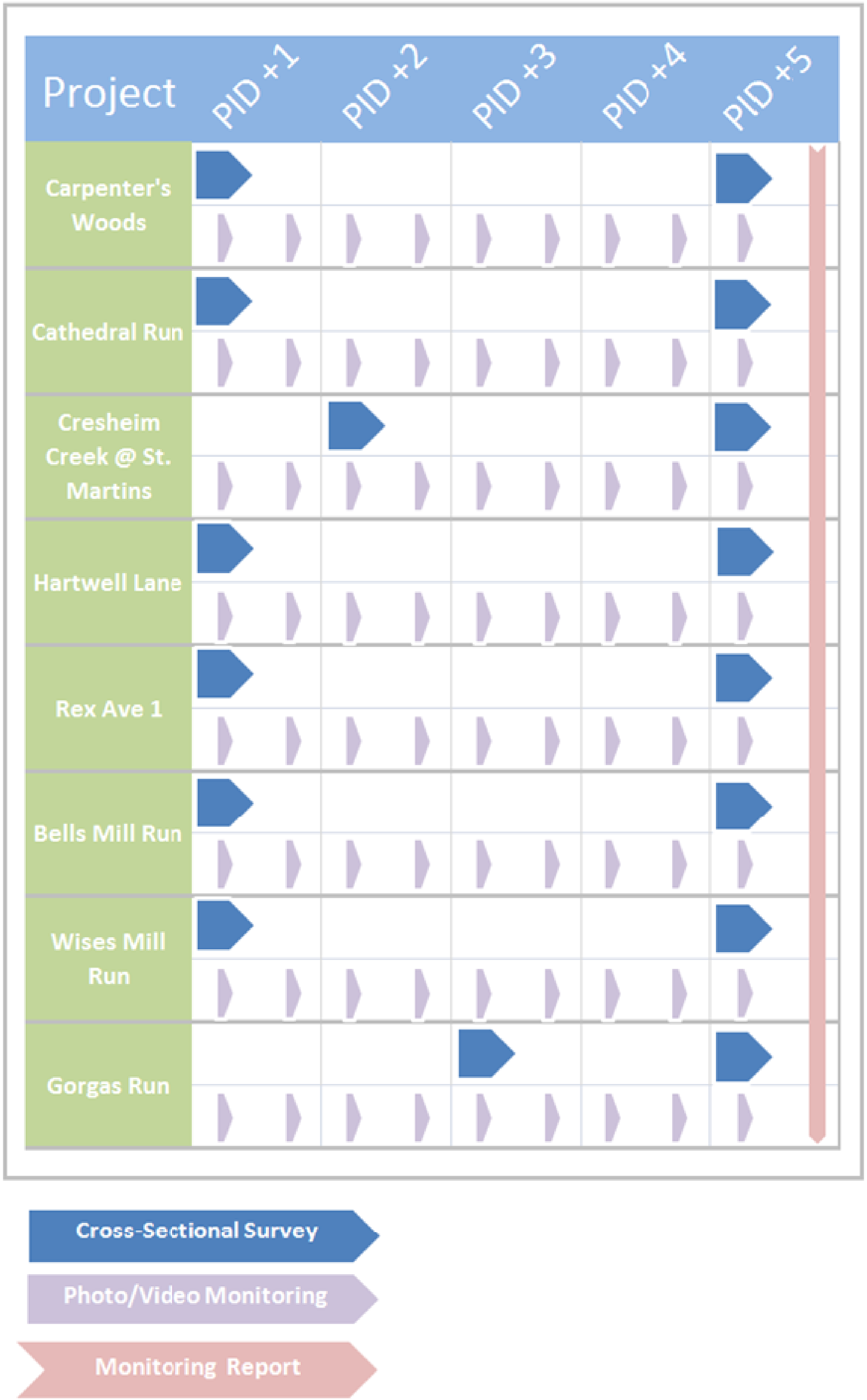
To ensure continued stability and protection from erosion in each of these stream corridors; PWD will conduct regular monitoring at each of the project sites. Baseline cross-sections will be installed at regular intervals within the project areas, and re-assessed in three years. Photo/video documentation will be collected regularly (bi-annually at first) to determine whether visible erosion is occurring.

The collected data will be used to ensure that the restoration project achieves the sediment reduction as designed. Photos and videos will also identify maintenance requirements should any significant instability be observed. Monitoring results will be analyzed and documented in a TMDL Implementation Monitoring Report within five years from the Permit Issuance Date (PID + 5) of the City’s NPDES MS4 Permit. Figure 3 displays the Monitoring Plan for the stream restoration component of the TMDL implementation.

Table 2: Stream Restoration Projects

Project Title	Stream	Stream Length (feet)	Anticipated Sediment Reduction based upon multiple bank erosion estimation methods (lbs/yr)				Average	Range	Construction Completion Date	Total Cost (design and construction)
			Bank Pin	BANCS / Bank Pin (2007 AR Method)	BANCS Colorado Curve	BANCS Yellowstone Curve				
Carpenter's Woods	Kitchen's Lane	530	15,000	21,000	19,000	41,000	24,000	15,000 - 41,000	2009	$200,318
Cathedral Run	Cathedral Run	220	14,000	25,000	26,000	54,000	29,750	14,000 - 54,000	2006	$864,131
Cresheim Creek at St. Martins	Cresheim Creek	610	27,000	97,000	58,000	120,000	75,500	27,000 - 120,000	2011	$292,294
Hartwell Lane	Hartwell Run	340	15,000	14,000	29,000	60,000	29,500	14,000 - 60,000	2009	$207,518
Rex Ave	un-named tributary 1	120	9,100	12,000	9,000	10,000	10,025	9,000 - 12,000	2010	$37,874
Bells Mill Run	Bells Mill Run	5,800	362,000	390,000	360,000	460,000	393,000	360,000 - 460,000	2012	$2,373,085
Wises Mill Run	Wises Mill Run	1,300	95,000	91,000	280,000	330,000	199,000	91,000 - 330,000	2012	$964,373
Gorgas Run	Gorgas Run	2,000	154,000	300,000	290,000	580,000	331,000	154,000 - 580,000	2014 (anticipated)	$2,831,251
TOTAL		**11,000**	**690,000**	**950,000**	**1,100,000**	**1,700,000**	**1,100,000**	**690,000 - 1,700,000**		**$7,770,843**

Figure 3: Stream Restoration Monitoring Plan



Stormwater Treatment Wetlands

PWD has designed and constructed stormwater treatment wetlands to reduce sediment loading to the Wissahickon Creek by managing stormwater run-off from their catchment. These constructed wetlands remove sediment from the water column and allow for the deposition of the sediment within the facility. This material can then be dredged periodically or as necessary when the facility's operational capacity is compromised.

Existing SWMM models were used to estimate the annual treated volumes at each of these facilities. The average rainfall year was run through the model to define the treated volume through each of these wetlands. The treatment volume of each wetland was defined as the total volume below the overflow grate on the outlet structure. The amount of sediment in the influent stormwater to these facilities was assumed to be 55 mg/l (based on native planting area in the PA Stormwater Manual Appendix A). A 75% removal efficiency was assumed to occur on the annual treated volume, thereby allowing for the average annual anticipated sediment reduction to be determined. In addition to calculated sediment retained and removed from the facility, the stormwater wetlands reduce the quantity of stormwater and therefore the sheer stress on downstream stream channels.

Philadelphia's commitment includes the construction and monitoring of three stormwater treatment facilities:

1. Saylor Grove Stormwater Treatment Wetland
2. Wises Mill Stormwater Treatment Wetland
3. Cathedral Run Stormwater Treatment Wetland

Table 3 provides the project details and their anticipated sediment reduction.

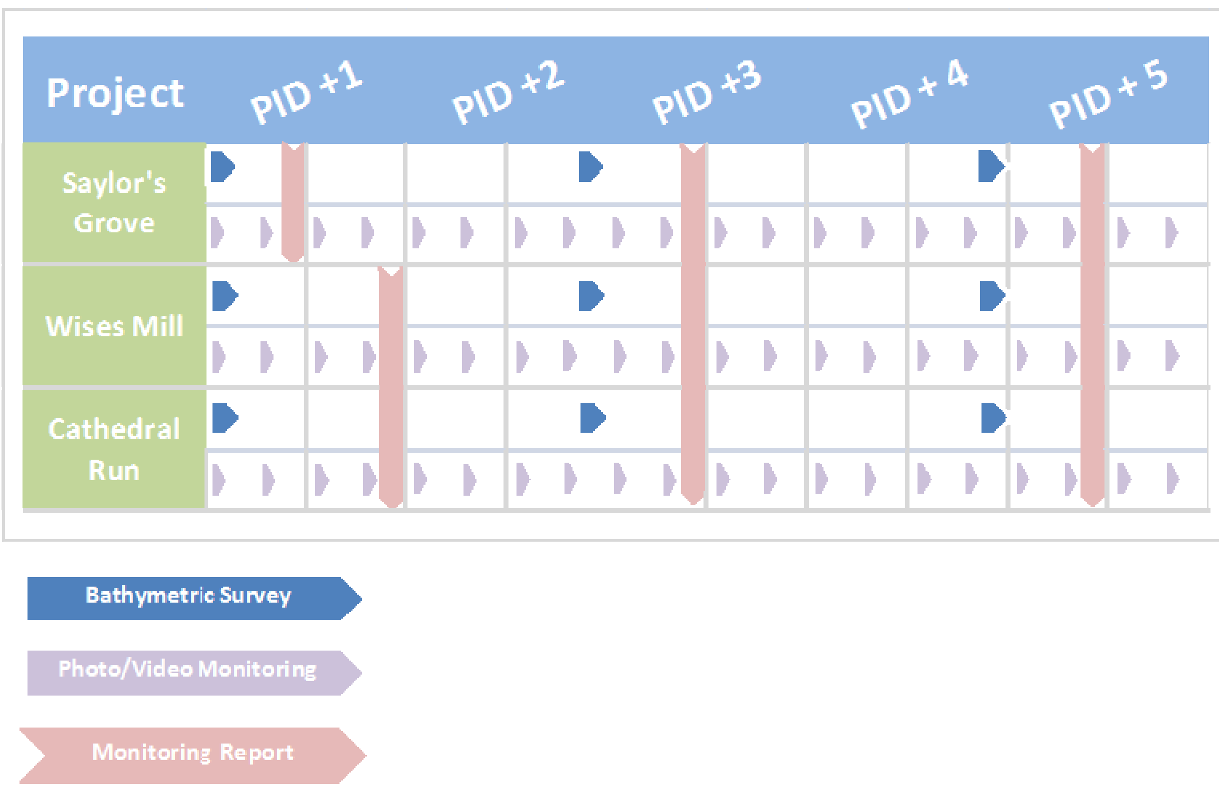
Overall, each of these wetlands were designed and constructed similarly. The existing stormwater conveyance infrastructure was modified through the construction of a diversion chamber to divert a portion of stormwater runoff from the catchment into the wetland. During larger storm events, the capacity of the treatment wetland becomes maximized. In these situations, the weir in the diversion chamber is overtopped, allowing the excessive volume to bypass the wetland and be conveyed and released to PWD's existing stormwater infrastructure.

PWD's monitoring plan for the Stormwater Treatment Wetlands includes photo/video monitoring and cross section measurements (Figure 4) to ensure the projects continue to remove sediments and do not require additional maintenance. Site specific monitoring plans have been developed for each wetland (Appendix II). Regular bathymetric (topographic) surveys within each facility's treatment area will be conducted within the first four years after issuance of the City's NDPES MS4 Permit. Quarterly photo-monitoring will be used to document visual changes to the site that could impact its overall performance. Issues including plant growth, trash accumulation, and damaged infrastructure are all readily identified using this monitoring technique.

Table 3: Stormwater Wetland Projects

Project Title	Stream	Treatment Volume (cubic ft)	Anticipated Sediment Reduction (lbs/yr)	Construction Completion Date	Total Cost (design and construction)
Saylor Grove	Monoshone Creek	55,000	10,000	2005	$1,152,393
Wises Mill	Wises Mill Run	102,000	13,000	2012	$767,295
Cathedral Run	Cathedral Run	46,000	8,000	2012	$622,788
TOTAL			**31,000**		**$2,542,476**

Figure 4: Monitoring Plan for Wissahickon Stormwater Wetlands



Inlet Cleaning Program

Approximately 3,000 inlets are maintained by PWD within the Philadelphia portion of the Wissahickon Creek Watershed. PWD determined that approximately 331 lbs of material is removed from each inlet per cleaning. City of Philadelphia inlets are typically cleaned at least once per year. This equates to 489,000lbs of material removal every year from PWD stormwater inlets in the Wissahickon Creek Watershed. Sediment is estimated at roughly 50% of this total, an estimate comparable to results from Dearborn Heights, MI, (Wade-Trim/Associates, Inc., 2001). A projection for the sediment removed through inlet cleaning in each sub-watershed is included in Table 4 with an estimated total of 489,384 lbs/yea r.

The monitoring strategy for this component of the implementation commitment consists of tracking the number of inlets cleaned, the pounds of debris removed per inlet, and the composition of material removed. Performance tracking allows PWD to confirm that expectations for inlet cleaning are being met – and ultimately, that sediment is being removed at expected levels. Monitoring results will be reported through the NPDES permit Annual Reports.

Table 4: Number of Inlets in Philadelphia Sub-sheds of the Wissahickon Creek Watershed

Subwatershed	PWD Stormwater Inlets	Sediment removal (lbs/year)
Bells Mill	143	23,700
Cathedral Run	131	21,700
Cresheim Creek	612	101,000
Gorgas Run	440	72,800
Hartwell Run	37	6,120
Hillcrest Run	82	13,600
Kitchen's Lane	69	11,400
Monoshone Creek	672	111,000
Paper Mill Run	17	2,800
Thomas Mill Run	20	3,300
Valley Green Run	35	5,790
Wise's Mill Run	221	36,600
Wissahickon Creek	478	79,100
TOTAL	**2,957**	**489,000**

City of Philadelphia's Stormwater Regulations

The adoption of city-wide stormwater regulations as of January 1, 2006 enabled PWD to review plans for both new and redevelopment sites. These regulations reduce sediment loads from private property by addressing the following technical components:

> **Water Quality:** The first inch of precipitation over directly connected impervious cover must be recharged. Where recharge is not feasible or limited, then any remaining volume is subject 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:** Once the Wissahickon Watershed has a completed Act 167 plan, projects will follow the model results for flood management districts.
>
> **Non-Structural Site Design:** Projects are required to maximize the site potential for stormwater management through appropriate placement and integration of stormwater management practices.

The total area that have received stormwater management plan review technical approval in the Wissahickon Creek Watershed from January 1, 2006 through May 31, 2012 is 45.7 acres, suggesting an average redevelopment rate of 7.1 acres per year. Assuming that this rate of development continues over the next five years, 81.3 acres will be developed resulting in a total sediment load removal estimate of 11,400 lbs/year. The sediment load reduction rate of 140 lbs/acre/year was calculated based on the sediment loads calculated in Section 7 of the Wissahickon Creek Comprehensive Characterization Report (PWD, 2007) and SWMM 5 modeling results.

Monitoring of this commitment will be conducted through the on-going inspections and enforcement of the Stormwater Regulations throughout the City. The number of inspections and enforcement actions are included in the Stormwater NPDES Annual Report. The calculated sediment reduction benefits from the data associated with new development and redevelopment projects occurring in the Wissahickon Creek Watershed will be reported within five years of the issuance of the City's NPDES MS4 permit.

Implementation Schedule

The City of Philadelphia anticipates fulfilling its TMDL requirement by reducing sediment loads in the Wissahickon Creek Watershed through a variety of projects and practices over the next five years. As previously explained, the stream restoration projects are all anticipated to be constructed by 2014 and will continue to be monitored with the other seven stream restoration projects in order to validate the sediment reduction values each year. The three stormwater wetland projects are completed and further monitoring will take place to refine the hydraulic and hydrologic models calculating the sediment reduction.

Implementation of Philadelphia's Stormwater Regulations will be tracked as stormwater management plans for development and redevelopment projects are reviewed by PWD. As previously mentioned, the

TMDL Implementation Monitoring Report will adjust the estimate of sediment reduction based on the number of projects reviewed and approved each year. Inlet cleaning will be conducted annually or more frequently if determined necessary.

Program Evaluation and Adaptive Management

PWD will use the results of the monitoring methods described above to evaluate performance against the load reduction target of 1,166,829 lbs/yr. If the target has not been met, PWD will implement adaptive management. PWD will also evaluate and revise its monitoring and evaluation methods if necessary.

References

United States Environmental Protection Agency (US EPA). Nutrient and Siltation TMDL Development for Wissahickon Creek, Pennsylvania: Final Report. Philadelphia, PA, 2003.

Philadelphia Water Department (PWD). Wissahickon Creek Watershed Comprehensive Characterization Report. Philadelphia, PA, 2007. Available online at: http://www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_rep.

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Rosgen, D.L. Watershed Assessment of River Stability and Sediment Supply (WARSSS). Colorado: Wildland Hydrology, 2006.

Wade-Trim/Associates, Inc. City of Dearborn Heights Street Sweeping Water Quality Study. Dearborn Heights, MI, 2001.

Wissahickon Siltation TMDL

Implementation Plan for the City of Philadelphia

Appendix I

Stream Restoration Project Descriptions

1. Carpenter's Woods

Construction Complete: 2009

Stream: Kitchen's Lane

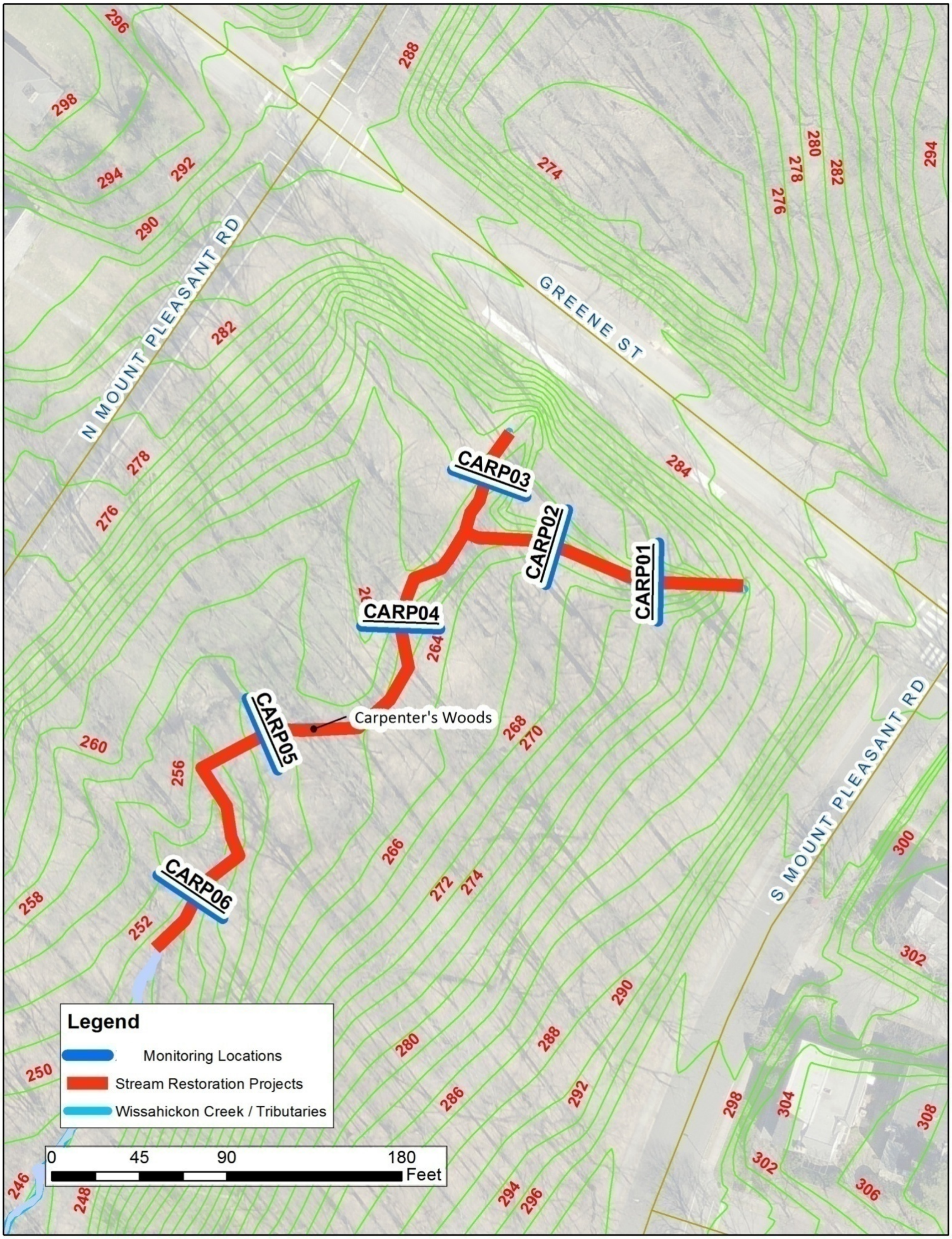
Stream Length: 530 feet

Project Cost: $200,318

# of Monitoring Locations: 6

Project Description

In the upstream-most reach of Kitchen's Lane, stabilization and repair work was completed in 2009 in a section of Fairmount Park known as Carpenter's Woods. Two stormwater outfalls were severely undermined due to high velocity stormwater flows from Green Street. The erosion was so severe that the aprons for these outfalls were suspended up to five feet from their respective conveyance channels. Terraced boulder infiltration swales were installed to compensate for the vertical drop as well as reduce the energy of future storm flows. Cobble and boulder armoring was installed within the conveyance channels to reduce erosion and stabilize the banks of the conveyance channels. The repair work was supplemented with shrub and tree plantings to further stabilize the site.



GREENE ST
N MOUNT PLEASANT RD
S MOUNT PLEASANT RD
CARP01
CARP02
CARP03
CARP04
CARP05
CARP06
Carpenter's Woods
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
45
90
180
Feet

2. Cathedral Run

Construction Complete: 2006

Stream: Cathedral Run

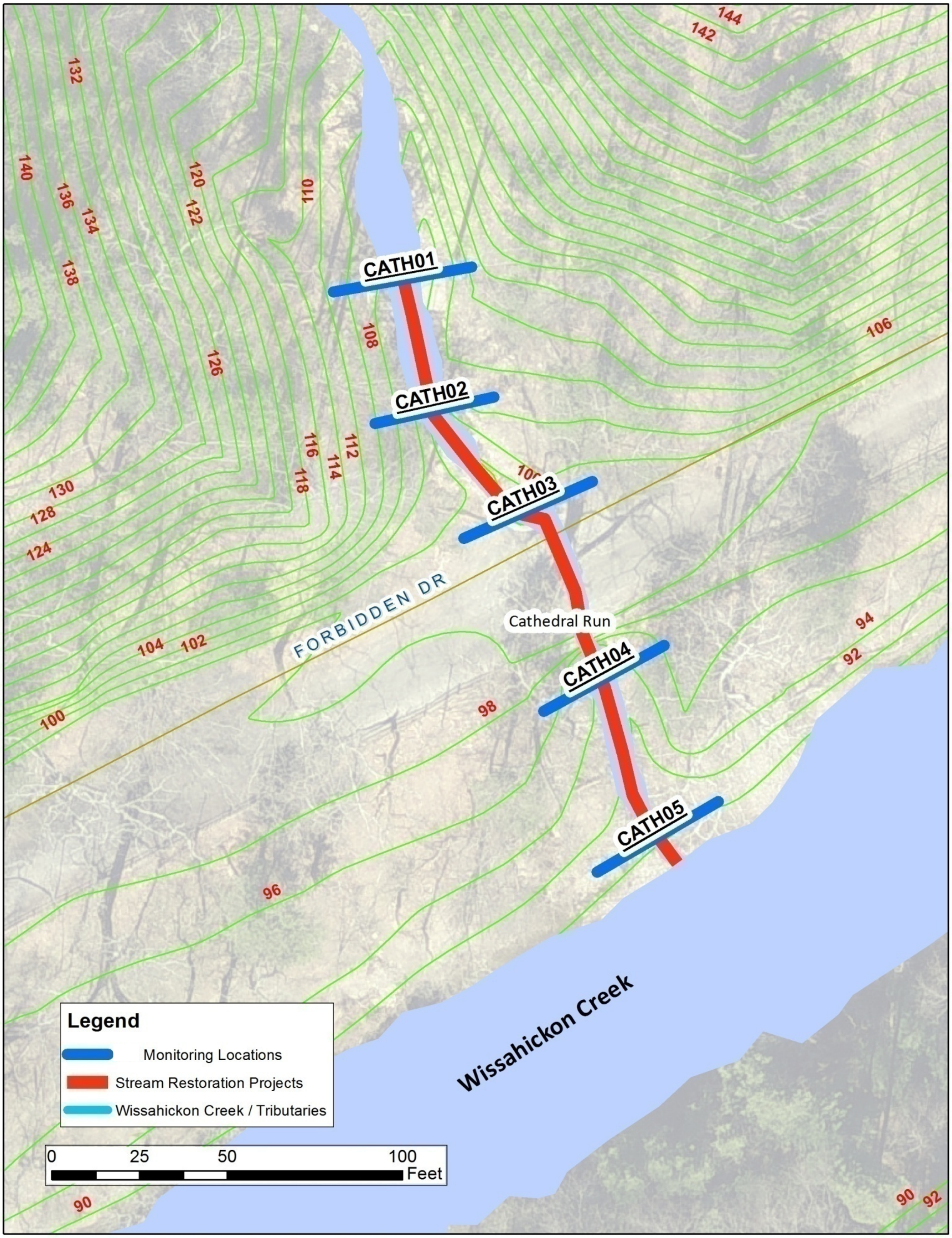
Stream Length: 220 feet

Project Cost: $864,131

# of Monitoring Locations: 5

Project Description

In April of 2006, stabilization work was completed 60 feet upstream of Forbidden Drive to protect a gas line crossing that was in danger of being exposed. Repairs consisted of the installation of a grouted native stone protection upstream and downstream of the pipe crossing as well as a grouted native stone weir downstream of the pipe crossing.


CATH01
CATH02
CATH03
CATH04
CATH05
Cathedral Run
FORBIDDEN DR
Wissahickon Creek
144
142
132
140
136
134
120
122
110
138
108
126
106
116
112
114
118
130
128
124
104
102
100
98
94
92
96
90
90
92
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
25
50
100
Feet

3. Cresheim Creek at St. Martins

Construction Complete: 2011

Stream: Cresheim Creek

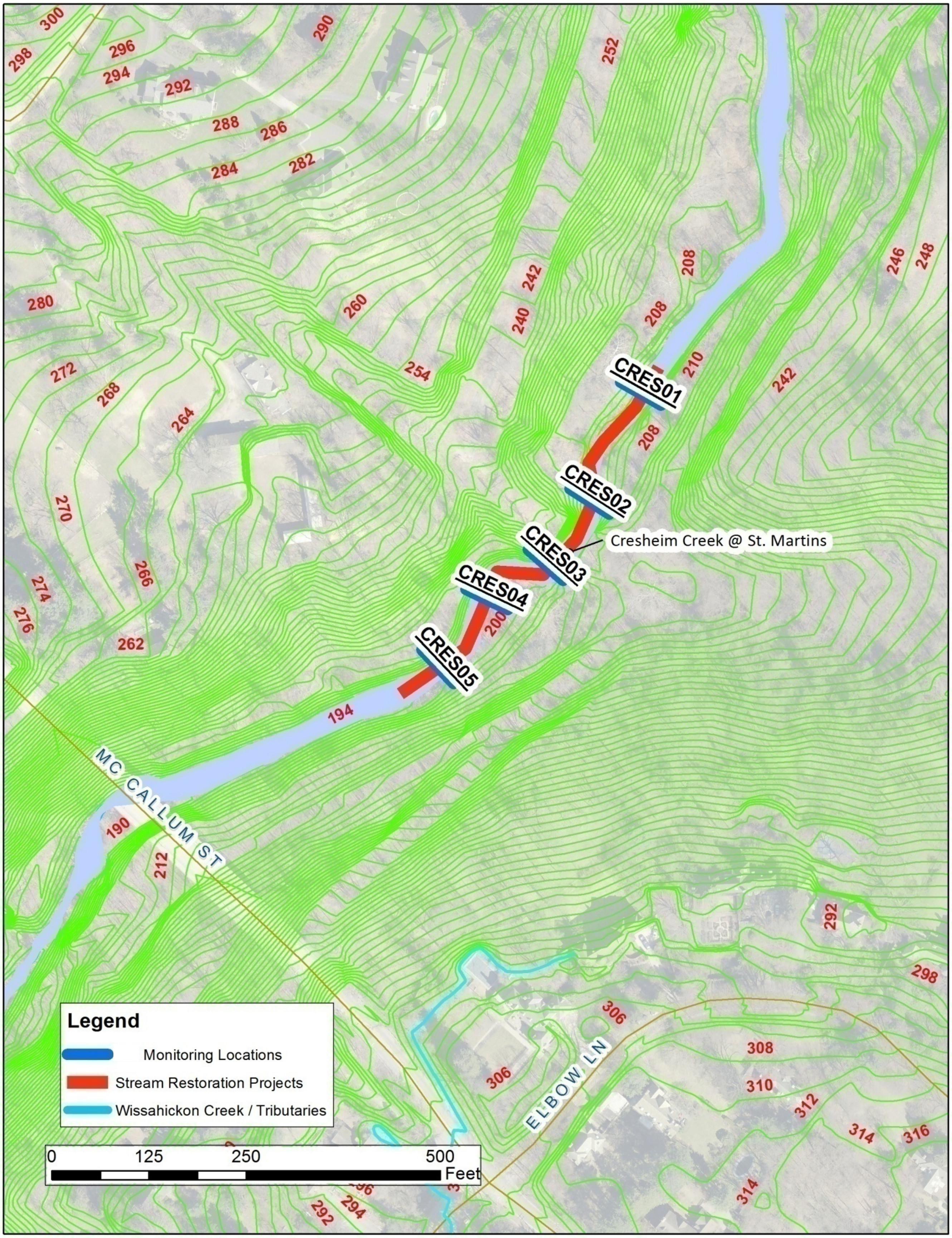
Stream Length: 610 feet

Project Cost: $292,294

# of Monitoring Locations: 5

Project Description

The St. Martin's project on Cresheim Creek in Fairmount Park relocated and protected eroding stream bank. Existing water and sewer infrastructure threatened by high storm flows was protected while restoring this reach of the Cresheim Creek stream channel, and restoring access to the stream valley with reconstruction of a pedestrian bridge. The project utilized stone toe protection, rock vane structures, and riparian plantings to preserve the long-term stability of this reach.


CRES01
CRES02
CRES03
CRES04
CRES05
Cresheim Creek @ St. Martins
MC CALLUM ST
ELBOW LN
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
125
250
500
Feet

4. Hartwell Lane

Construction Complete: 2009

Stream: Hartwell Run

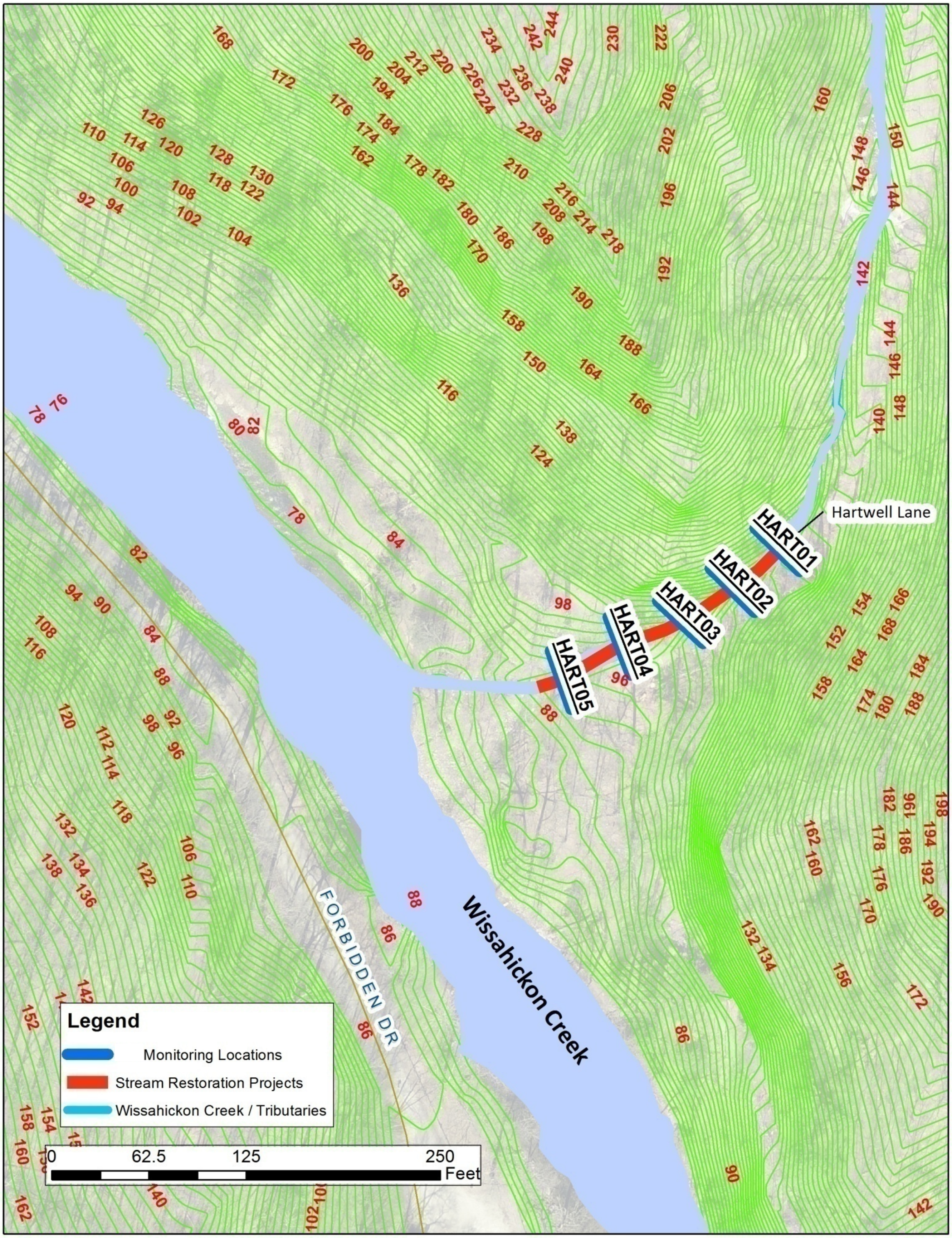
Stream Length: 340 feet

Project Cost: $207,518

# of Monitoring Locations: 5

Project Description

In October, 2009 emergency repairs were completed on Hartwell Run at the stream crossing of the Wissahickon High-Level Interceptor. The concrete masonry encased pipe had succumbed to severe erosion which had exposed the interceptor. Frequent blockage of the three foot conveyance orifice by boulders, woody debris and fine sediment cause stream flow to overtop the culvert. The combination of reduced flood flow conveyance, the steep slope of Hartwell Run cause severe bank erosion and plunge pool formation downstream of a culvert, as well as undermined a portion of the concrete-encase sanitary crossing. PWD completed repairs to the concrete encasement and stabilized the banks upstream and downstream of the culvert. Upstream of the structure, a step-terrace system was installed to reduce the energy of flood flows, which will alleviate the high shear stress in and around the conveyance orifice.


Hartwell Lane
HART01
HART02
HART03
HART04
HART05
Wissahickon Creek
FORBIDDEN DR
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
62.5
125
250
Feet

5. Rex Ave

Construction Complete: 2010

Stream: un-named tributary 1 (Rex Ave 1)

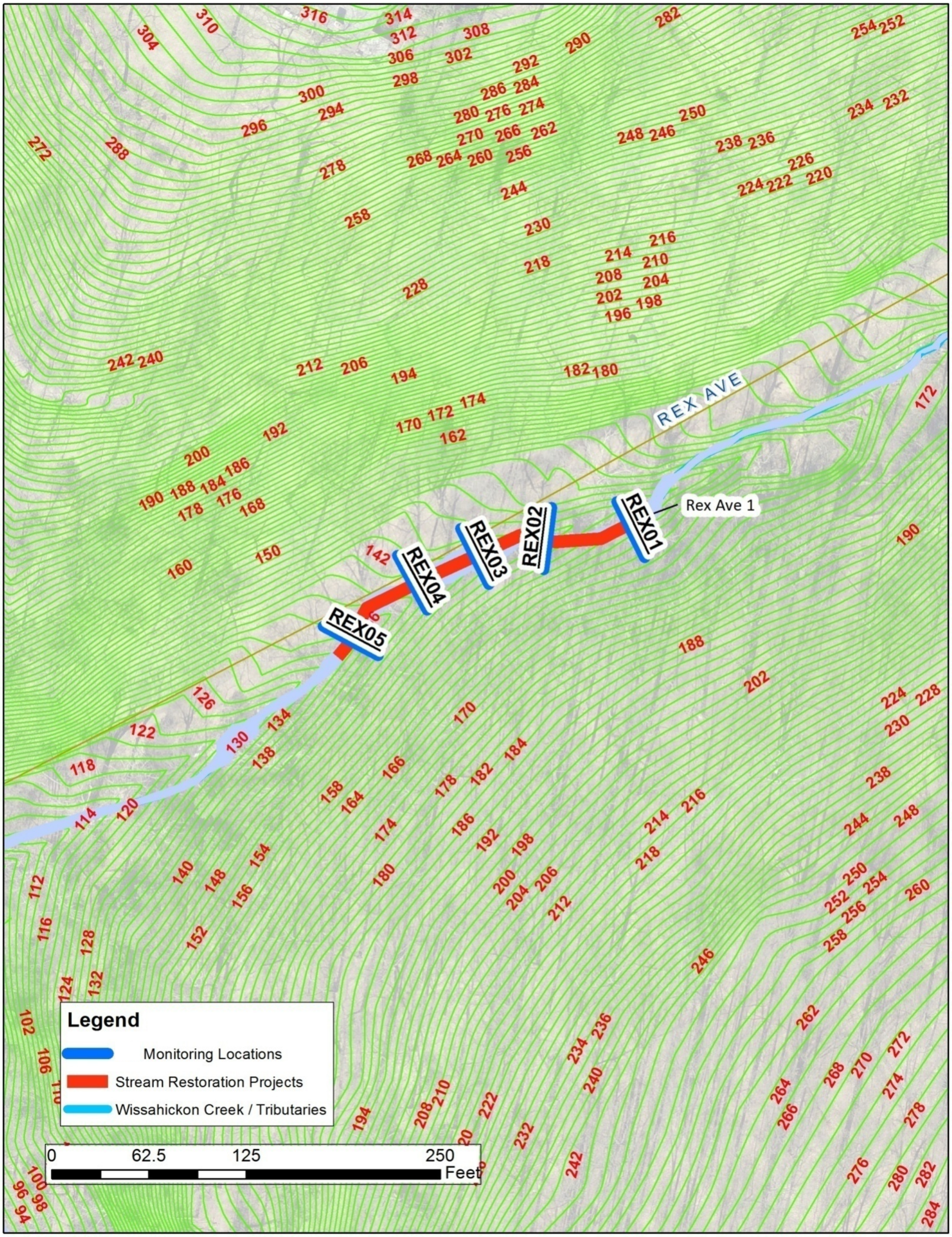
Stream Length: 120 feet

Project Cost: $37,874

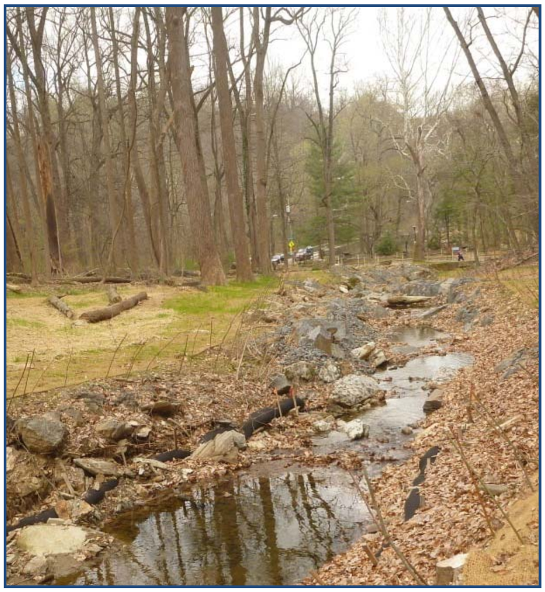
# of Monitoring Locations: 5

Project Description

This project repaired a section of stream bank that had been damaged by a break in the nearby 30" transmission water main. The project utilized multiple structural elements such imbricated rock banks and rock steps to provide protection against bank erosion and stream bed incision. These stabilization elements were supplemented with native riparian plantings.


REX AVE
Rex Ave 1
REX01
REX02
REX03
REX04
REX05
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
62.5
125
250
Feet

6. Bells Mill Run



Construction Complete: 2012

Stream: Bells Mill Run

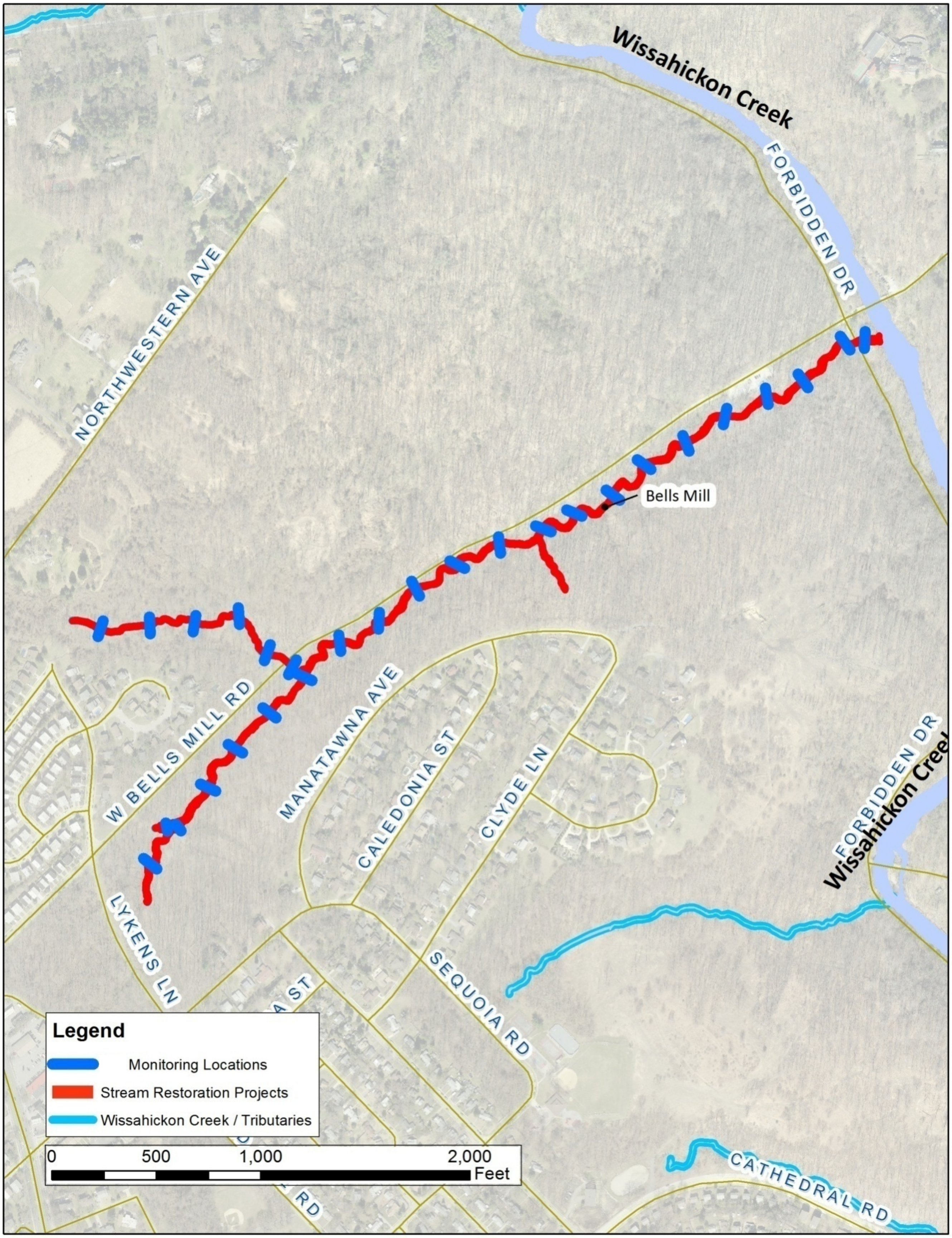
Stream Length: 5,800 feet

Project Cost: $2,373,085

# of Monitoring Locations: 28

Project Description

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 focuses on specific restoration areas, utilizing 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 reducing overall bank erosion and protecting critical sewer infrastructure.


Wissahickon Creek
FORBIDDEN DR
NORTHWESTERN AVE
Bells Mill
W BELLS MILL RD
MANATAWNA AVE
CALEDONIA ST
CLYDE LN
FORBIDDEN DR
Wissahickon Creek
LYKENS LN
SEQUOIA RD
CATHEDRAL RD
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
500
1,000
2,000
Feet

7. Wises Mill Run

Construction Date: 2012

Stream: Wises Mill Run

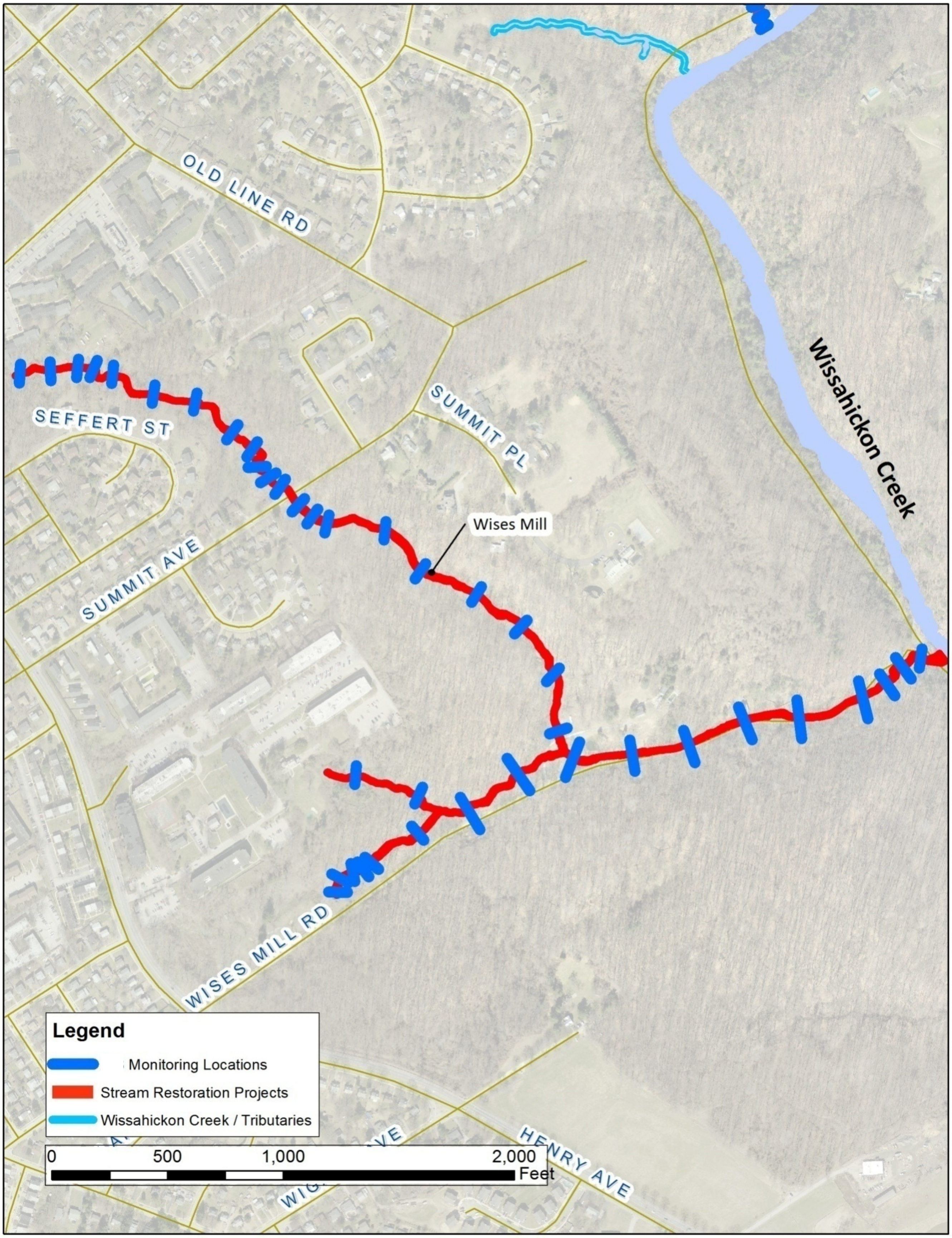
Stream Length: 1,300 feet

Project Costs: $964,373

# of Monitoring Locations: 40

Project Description

The Wises Mill Stream Restoration project focused on stabilizing and restoring multiple reaches along Wises Mill Run. This project utilized multiple restorative design elements such as stone toe bank protection, bank re-grading and stabilization, riparian corridor planting, and modified planform to actively reduce bank erosion within the Wises Mill Run system.



OLD LINE RD
SEFFERT ST
SUMMIT PL
SUMMIT AVE
Wissahickon Creek
Wises Mill
WISES MILL RD
HENRY AVE
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
500
1,000
2,000
Feet

8. Gorgas Run

Construction Date: 2014 (anticipated)

Stream: Gorgas Run

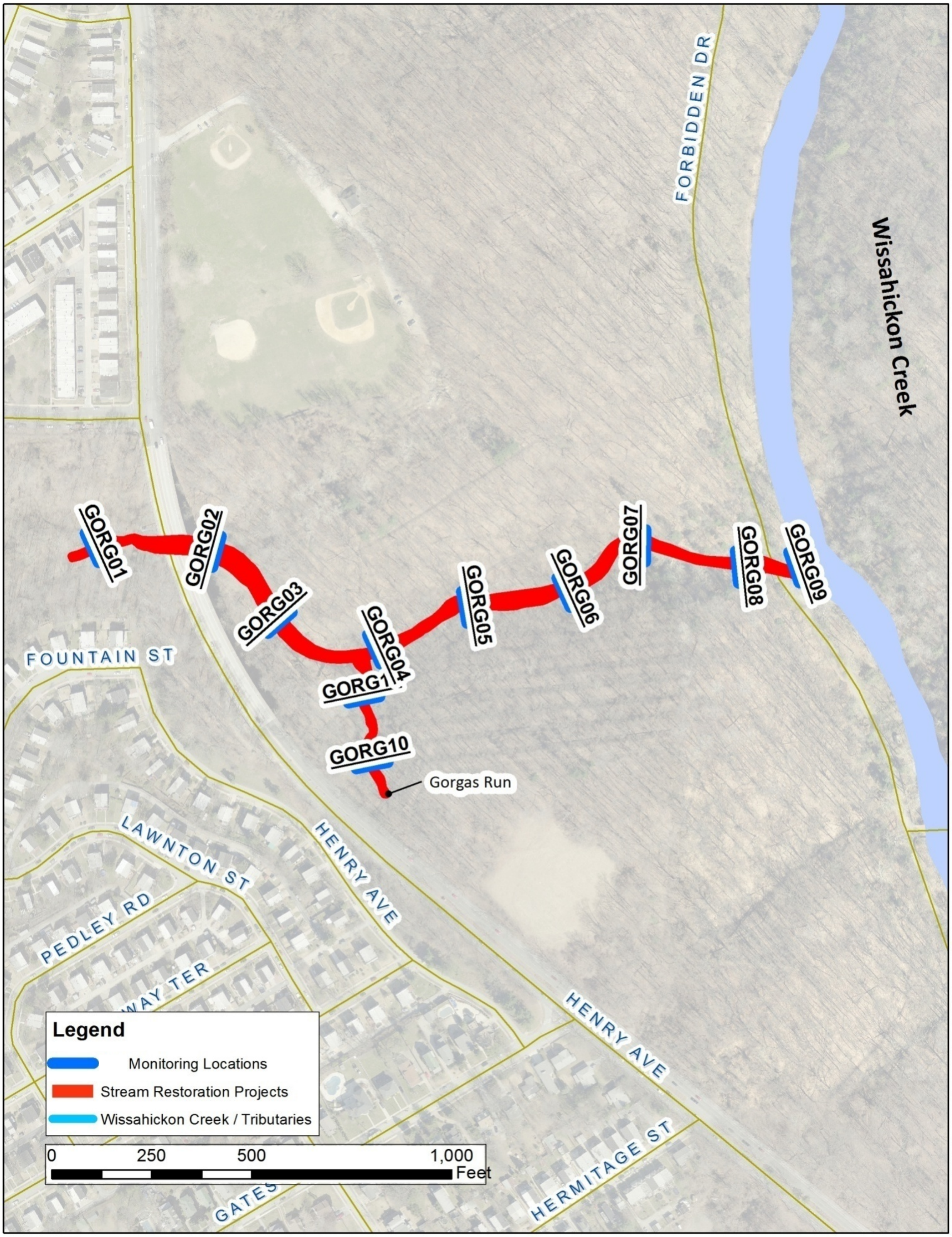
Stream Length: 2,000 feet

Anticpated Cost: $2,831,251

# of Monitoring Locations: 10

Project Description

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. To mitigate the impacts of development in the Gorgas Run watershed, PWD is proposing to apply NSCD principles to restore the 1,800 feet of stream channel that encompasses Gorgas Run. With this effort, 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. PWD expects to move toward final design plans and submit all necessary permit applications, with hopes of constructing this project during FY 2014.


FORBIDDEN DR
Wissahickon Creek
GORG01
GORG02
GORG03
GORG04
GORG05
GORG06
GORG07
GORG08
GORG09
GORG1
GORG10
Gorgas Run
FOUNTAIN ST
LAWNTON ST
HENRY AVE
PEDLEY RD
WAY TER
HENRY AVE
HERMITAGE ST
GATES
Legend
Monitoring Locations
Stream Restoration Projects
Wissahickon Creek / Tributaries
0
250
500
1,000
Feet

Wissahickon Siltation TMDL

Implementation Plan for the City of Philadelphia

Appendix II

Stormwater Treatment Wetland Project Descriptions

1. Saylor Grove Stormwater Treatment Wetland

Saylor Grove is a one-acre stormwater wetland that 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 catchment per year before it reaches the Monoshone Creek, a tributary of the Wissahickon Creek. 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 Creek Watershed.

2. Wises Mill Stormwater Treatment Wetland

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 stream reach constructed during FY 2008, PWD commenced the design of a stormwater treatment wetland on a 2-acre area of Fairmount Park. The wetland infiltrates, detains, and treats 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 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.

3. Cathedral Run Stormwater Treatment 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 designed a stormwater treatment wetland just west of the current location of outfall W-076-01. The wetland is 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.

APPENDIX G – SUSPECTED PCB SOURCES INSPECTIONS

Table 1 - PCB Inspection Summary by Fiscal Year

	All Records	Duplicate Records	Actual Records
FY 2006	39	0	39
FY 2007	103	6	97
FY 2008	54	4	50
FY 2009	12	1	11
FY 2010	72	20	52
FY 2011	101	6	95
Blank/Not Found	18	18	
Total	399	55	344

Table 2 – PCB Actual Sources Detail

Contributing Plants				Drainage Districts			
Outside	NE	SE	SW	Combined	MS4	Non-Contributing	Storm Sewer Only
7	140	65	132	100	36	2	10

Table 3 – PCB Facility & Equipment Status

Status of PCB Equipment				Status of Facility			Type of Equipment					
In Use	Off Site	Out of Service	Disconnected	Operating	Closed	Abandoned	Transformer	Capacitor	SEPTA Undercar	Regulator	Light & Power	Retrofilled
74	64	10	63	195	36	11	549	159	26	9	1	35

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				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Opera ting	Closed	Aban doned /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							

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-7	USEPA Megarule	2009-2	Duplicate Record	The School District of Philadelphia	1400 West Olney Avenue		4							
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							

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-15	USEPA Megarule	2011-1	Duplicate Record	Peco Energy Company	Walnut & Fourth Street		2							
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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**		
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**	

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-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		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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	
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

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-43	Phila. Fire Dept	2007-2	07/23/07	DODGE FOUNDRY	6501 STATE RD	TRANSFOR MER	1		X	X	X		X	Demo lished
NE-44	Phila. Fire Dept	2011-1	02/15/11	Boathouse Sport	401 E HUNTIN G PK	TRANSFOR MER	1	x				x		
NE-45	Phila. Fire Dept	2011-1	02/28/11	MUTUAL INDUS.	707 W. GRANG E	TRANSFOR MER	1	x				x		
NE-46	Phila. Fire Dept	2008-4	10/31/08	NE SHOPPING CTR	9173 ROOSEV ELT BLVD	TRANSFOR MER	1		x	x	x		X	
NE-47	Phila. Fire Dept	2008-4	10/31/08	NE SHOPPING CTR	9173 ROOSEV ELT BLVD	TRANSFOR MER	1		x	x	x		X	
NE-48	Phila. Fire Dept	2011-1	04/18/11	NORTHERN ASSOCIATES	7777 STATE RD.	TRANSFOR MER	1		x	x	x		x	x
NE-49	Phila. Fire Dept	2007-1	04/27/07	PHILA PRISONS	8215 TORRES DALE	TRANSFOR MER	1	X				X		
NE-50	Phila. Fire Dept	2010-4	12/20/10	PHILA SCHOOL BOARD	5TH & LUZERN E	TRANSFOR MER	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				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-51	Phila. Fire Dept	2010-4	12/20/10	PHILA SCHOOL BOARD	B & WYOMI NG	TRANSFOR MER	1		x	x	x	x		
NE-52	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	HEDGE & UNITY (STEAR NE)	TRANSFOR MER	1		x	x	x	x		
NE-53	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	KNIGHT S & CHALFO NT	TRANSFOR MER	1	x				x		
NE-54	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	SHARO N & ALICIA	TRANSFOR MER	3	x				x		
NE-55	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEV ELT BLVD	TRANSFOR MER	1				X	X		
NE-56	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEV ELT BLVD	TRANSFOR MER	1				X			Demo lished
NE-57	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEV ELT BLVD	TRANSFOR MER	1				X			Demo lished

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-58	Phila. Fire Dept	2007-1	04/24/07	PHILA STATE HOSPITAL	14000 ROOSEV ELT BLVD	TRANSFOR MER	1				X			Demo lished
NE-59	Phila. Fire Dept	2007-2	08/15/07	S.D. RICHMAN INC	2435 WHEAT SHEAF	TRANSFOR MER	1	X				X		
NE-60	Phila. Fire Dept	2007-1	09/04/07	SEARS & ROEBUCK Preit	4820 LANGD ON ST	TRANSFOR MER	1		X	X	X		X	
NE-61	Phila. Fire Dept	2009-4	10/06/09	SEPTA	4701 GRISCO M ST	TRANSFOR MER	1 0		X	X	X	X		
NE-62	Phila. Fire Dept	2009-1	03/07/09	SEPTA	8365 CASTOR AVE	TRANSFOR MER	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	TRANSFOR MER	1	X				X		
NE-65	Phila. Fire Dept	2007-2	07/19/07	TALCO METALS Specialty Engine Rebuilding	5201 UNRUH	TRANSFOR MER	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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
NE-68	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMER	0				X	X		
NE-69	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFORMER	0				X	X		
NE-70	Phila. Fire Dept	2011-4	03/04/11	TRIANGLE CONTAINER Menasha	601-21 E ERIE	TRANSFORMER	1	x				x		
NE-71	Phila. Fire Dept	2008-4	10/08/08	FAIRMOUNT PARK (BANDSTAND)	OLD YORK RD. & HUNTING PARK AVE	TRANSFORMER (PECO)	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
NE-72	Phila. Fire Dept	2009-1	04/27/09	SEPTA	WINDRIM & GERMANTOWN	TRANSFORMERS	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.	CAPACITORS	2				X	X		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
NE-81	Phila. Fire Dept	2011-1	03/09/11	FOX TRUST BLDG	3634 N BROAD	TRANSFORMERS	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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-90	Phila. Fire Dept	2007-2	07/24/07	STERNS	7300 BUSELT ON AVE	TRANSFOR MERS	2		X	X	X	X		Demo lished
NE-91	Phila. Fire Dept	2007-1	04/30/07	Sterqua Corp Sterling Paper	2155 E CASTOR	TRANSFOR MERS	2	X				X		
NE-92	Phila. Fire Dept	2006-1	05/17/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	0				X	X		
NE-93	Phila. Fire Dept	2006-1	05/18/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	0				X	X		
NE-94	Phila. Fire Dept	2006-1	05/19/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	0				X	X		
NE-95	Phila. Fire Dept	2006-1	05/20/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-96	Phila. Fire Dept	2006-1	05/21/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	0				X	X		
NE-97	Phila. Fire Dept	2006-1	05/22/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	0				X	X		
NE-98	Phila. Fire Dept	2006-1	05/23/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	0				X	X		
NE-99	Phila. Fire Dept	2006-1	05/24/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	0				X	X		
NE-100	Phila. Fire Dept	2006-1	05/25/06	Island Green Country Club, Formerly: TRANSIT AMERICA	1 RED LION RD	TRANSFOR MERS	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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
NE-108	Phila. Fire Dept	2007-2	07/26/07	COMMENWEALTH OF PA Northwest Human Services	2900 SOUTH HAMPTON	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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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 NORTH EAST AVE	TRANSFORMER	3		X	X	X	X		
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	

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-117	Phila. Fire Dept	2009-1	04/27/09	SEPTA	BROAD & ALLGEH ENY	TRANSFOR MER	3		x	x	x	x		
NE-118	Phila. Fire Dept	2009-1	03/25/11	SEPTA	BROAD & WYOMI NG	TRANSFOR MER	3		x	x	x	x		
NE-119	Phila. Fire Dept	2006-3	10/23/06	THALHEIME R BROS.	5601 TABOR AVE.	TRANSFOR MER	3	X				X		
NE-120	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-121	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACON Y	CAPACITOR S	4	X				X		
NE-122	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACON Y	CAPACITOR S	4	X				X		
NE-123	Phila. Fire Dept	2010-2	05/25/10	PHILA SCHOOL BOARD	18 & HUNTIN G PARK (GRATZ)	TRANSFOR MERS	4		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	Discon nected	Off Site	Opera ting	Closed	Aban doned /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	Discon nected	Off Site	Opera ting	Closed	Aban doned /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		

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-134	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACONY	CAPACITORS	5	X				X		
NE-135	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAWARE RIVER - 4301 Delaware Ave.	CAPACITORS	5				X	X		
NE-136	Phila. Fire Dept	2006-3	11/16/06	ANZON	2545 ARAMINGO AVE.	TRANSFORMERS	5				X		X	
NE-137	Phila. Fire Dept	2010-2	Duplicate of NE-156	PHILA ELECTRIC CO	7735 GERMANTOWN AVE	TRANSFORMERS	5							
NE-138	Phila. Fire Dept	2006-3	10/26/06	ALLEGHENY SCRAP	ADAMS & TACONY	CAPACITORS	6	X				X		
NE-139		2006-2	Blank record								NA		NA	

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-140	Phila. Fire Dept		04/29/11	PHILA ELECTRIC CO	3901 N DELAWARE AVE	TRANSFORMERS	6	x				x		
NE-141	Phila. Fire Dept	2011-1	02/18/11	PHILA ELECTRIC CO	4125 LONGSHORE ST	TRANSFORMERS	6	x				x		
NE-142	Phila. Fire Dept	2011-1	02/24/11	PHILA ELECTRIC CO	7549 THOURON ST	TRANSFORMERS Regulators	6 2	x				x		
NE-143	Phila. Fire Dept	2006-3	10/23/06	THALHEIMER BROS	700 E GODFREY AVE	TRANSFORMERS	7 (5 retrofilled 2 dry)	X				X		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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 & WHEAT SHEAF	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		
NE-151	Phila. Fire Dept	2010-4	11/26/10	JOHN F. KENNEDY HOSPITAL	CHELTENHAM AVE. & LANGDON ST.	TWO TRANSFORMERS				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
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	Discon nected	Off Site	Opera ting	Closed	Aban doned /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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
NE-169	Phila. Fire Dept	2006-4	03/12/07	AP GREENE CO - Delaware Ave. LLC	HEDLEY & DELAW ARE RIVER - 4301 Delaware Ave.	CAPACITOR	1				X	X		
NE-200	Phila. Fire Dept	2007-1	06/10/07	BUDD CO	2401 HUNTIN G PK		TRANSF ORMERS -1 REMOV ED NOW 4	??			X			
NE-201	Phila. Fire Dept	2007-1	04/25/07	Pioneer Leimel	2250 E ONTARI O ST	TRANSFOR MER	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							

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
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		
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							

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SE-14	Phila. Fire Dept	2010-2	4/26/2010	PHILA SCHOOL BOARD	8TH & MIFFLIN (BOK)	TRANSFOR MER	4	X				X		
SE-15	Phila. Fire Dept	2010-2	5/25/2010	PHILA SCHOOL BOARD	B & ALLEGE HENT (STETSO N)	TRANSFOR MER	1	x				x		
SE-16	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	E.YORK & TRENTO N (HACKE TT)	TRANSFOR MER	1		x	x	**x**	x		
SE-17	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	FKD & CLEMIN TINE	TRANSFOR MER	5		x	x	**x**	x		
SE-19	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1097 GERMA NTOWN	TRANSFOR MER	1				**X**		**2002**	
SE-20	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1097 GERMA NTOWN	TRANSFOR MER	1				**X**		**2002**	
SE-21	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1135 N 2ND	TRANSFOR MER	1				**X**		**2002**	
SE-22	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	128 W. VAN HORN	TRANSFOR MER	1				**X**		**2002**	

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
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		
SE-31	Phila. Fire Dept	2009-4	10/6/2009	SEPTA	MC KEAN & JUNIPER	TRANSFORMER	0		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	Discon nected	Off Site	Status of Facility: Opera ting	Closed	Aban doned /not secure
SE-32	Phila. Fire Dept	2008-1	1/9/2008	ZEIGLER & SONS Wholesale Florists	6215 ARDLEIGH ST	TRANSFORMER	1	X				X		
SE-33	Phila. Fire Dept	2011-1	2/24/2011	PHILA ELECTRIC CO	267 E JOHNSON ST	TRANSFORMERS Regulators	11 3	x				x		
SE-34	Phila. Fire Dept	2011-1	3/9/2011	PGW	1800 N. 9TH. ST.	CAPACITORS (6 TRANSFORMERS REMOVED)	2	x				x		
SE-35	Phila. Fire Dept	2011-1	Dup of SE-52	METRO HOSP	201 N 8TH ST	TRANSFORMERS	2							
SE-36	Phila. Fire Dept	2007-1	5/10/2007	PACKER MARINE TERMINAL	DELAWARE & PACKER	TRANSFORMERS	2				X	X		
SE-37	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	2400 N. 8TH (HARTRANFT REC. CENTER)	TRANSFORMERS	1		x	x	x	x		
SE-38	Phila. Fire Dept	2007-2	8/29/2007	PSFS	7TH & WALNUT	TRANSFORMERS	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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SE-39	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1147 N 2ND	TRANSFOR MERS	2				**X**		**2002**	
SE-40	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	1157 SOPHIA	TRANSFOR MERS	2				**X**		**2002**	
SE-41	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	119 EDWAR D	TRANSFOR MERS	2				**X**		**2002**	
SE-42	Phila. Fire Dept	2006-2	9/8/2006	SCHMIDTS INC	121 EDWAR D	TRANSFOR MERS	2				**X**		**2002**	
SE-43	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	8TH & RIDGE	TRANSFOR MERS	2		x	x	**x**	x		
SE-44	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	BROAD & SPRING GARDE N	TRANSFOR MERS	2		x	x	**x**	x		
SE-45	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKE T & 13TH	TRANSFOR MERS	2		x	x	**x**	x		
SE-46	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKE T & 5TH	TRANSFOR MERS	2		x	x	**x**	x		
SE-47	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKE T & 8TH	TRANSFOR MERS	2		x	x	**x**	x		
SE-48	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKE T & JUNIPER	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				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SE-49	Phila. Fire Dept	2007-2	8/27/2007	SHOE CTR PHILA [Loft Condos]	436-54 N 4TH ST	TRANSFOR MERS	2				X	X		
SE-50	Phila. Fire Dept	2006-3	10/30/2006	ABBOTTS DAIRIES Philadelphia Turf Club	700 PACKER AVE	TRANSFOR MERS	2				X		X	
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. GORDO N ST	TRANSFOR MER	3		x	x	x		x	
SE-54	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	8 & CUMBE RLAND (HARTR ANFT)	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 & MANNI NG	TRANSFOR MER	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				Status of Facility		
								In use	Out of Service	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SE-57	Phila. Fire Dept	2009-1	4/29/2009	SEPTA	RIDGE & CALLO WHILL	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 GARDE N	TRANSFOR MERS	4				X	X		
SE-59	Phila. Fire Dept	2007-2	8/28/2007	US GOVT (GSA) [Social Security Admin. Bldg.)	300 SPRING GARDE N	TRANSFOR MERS	4				X	X		
SE-60	Phila. Fire Dept		5/3/2011	QUAKER STORAGE	901 POPLAR ST	TRANSFOR MERS	5		x	x			x	
SE-61	Phila. Fire Dept	2011-1	3/2/2011	PENN MUTUAL	530 WALNU T ST.	TRANSFOR MERS	6		x	x	x	x		
SE-62	Phila. Fire Dept	2007-2	8/30/2007	US GOVT (GSA)	BROAD & WASHIN GTON	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 WALNU T ST	RETROFILLE D	[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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SE-65	Phila. Fire Dept	2011-1	3/3/2011	KEYSTONE SHIPPING	315 CHESTNUT ST	RETROFILLED		x				x		
SE-66	Phila. Fire Dept	2011-1	Duplicate	KEYSTONE SHIPPING	313 CHESTNUT ST	RETROFILLED								
SE-67		2011-1	3/2/2011	PHILA GIRARD SQ	21 S. 12TH ST	RETROFILLED	6		x	x	x	x		
SE-68	Phila. Fire Dept	2007-1	6/19/2007	PHILA STREETS (EAST CENTRAL INCINERATOR)	DELAWARE & SPRING GARDEN	RETROFILLED					X		X	
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	

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
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		
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		

PWD	Referral	Completed	Inspection	Company	Address	Type of PCB	# of PCB	Status of PCB Equipment				Status of Facility		
#	Agency		Date	Name		Equipment	Devices	In use	Out of Service	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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							

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-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	RETROFILLED	3 2	X				X		
SW-16	USEPA Megarule	2006-4	2/22/2007	Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	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		

PWD	Referral	Completed	Inspection	Company	Address	Type of PCB	# of PCB	Status of PCB Equipment				Status of Facility		
#	Agency		Date	Name		Equipment	Devices	In use	Out of Service	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SW-20	USEPA Megarule	2008-1	Duplicate Record	PECO Energy Co.	380 Long Lane		1							
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

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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
SW-31	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-32	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	1	X				X		
SW-33	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	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-34	Phila. Fire Dept	2006-4	2/22/2007	ATLANTIC REFINING Sunoco, Inc. (R&M) Philadelphia Refinery	3144 PASSYUNK AVE	RETROFILLED	1	X				X		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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	
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SW-50	Phila. Fire Dept	2010-2	4/26/2010	PHILA SCHOOL BOARD	23 & CHESTNUT (GREEN FIELD)	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							
SW-56	Phila. Fire Dept			PHILA SCHOOL BOARD	734 SCHYKILL AVE	TRANSFORMER	1							

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SW-57	Phila. Fire Dept			PHILA SCHOOL BOARD	734 SCHYKILL AVE	TRANSFORMER	1							
SW-58	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	HENRY & ROBERTS (RANDOLPH)	TRANSFORMER	1		x	x	x	x		
SW-59	Phila. Fire Dept	2011-1	3/17/2011	First Allied Cord	4500 CITY AVE	TRANSFORMER	1	x				x		
SW-60		2006-2	Blank Record											
SW-61	Phila. Fire Dept	2011-1	3/3/2011	GAP	1510 WALNUT	TRANSFORMER	1	x				x		
SW-62	Phila. Fire Dept	2006-4	3/14/2007	RICH. I. RUBIN CO	230 S BROAD ST	TRANSFORMER	1	X				X		
SW-63	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	37TH & SANSOM	TRANSFORMER	1		x	x	x	x		
SW-64	Phila. Fire Dept	2007-2	7/30/2007	SPC CORP	26TH & PENROSE	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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SW-65	Phila. Fire Dept	2007-2	7/30/2007	SPC CORP	26TH & PENROSE	TRANSFORMER	1				X	X		
SW-67	Phila. Fire Dept	2006-4	12/19/2006	SUN CHEMICAL	3301 HUNTING PARK	Dry TRANSFORMER	1	X				X		
SW-68	Phila. Fire Dept	2006-4	12/19/2006	SUN CHEMICAL	3301 HUNTING PARK	Dry TRANSFORMER	1 2	X				X		
SW-69	Phila. Fire Dept	2006-3	3/14/2007	ATLANTIC BLDG	260 S BROAD ST	CAPACITORS	16				X	X		
SW-70	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK	#4 MELLON BANK CENTER	CAPACITORS	17				X		X	
SW-71	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITORS	2	X				X		
SW-72	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITORS	2	X				X		
SW-73	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITORS	2	X				X		
SW-74	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITORS	2	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-75	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITORS	2	X				X		
SW-76	Phila. Fire Dept	2011-1	1/18/2011	1500 WALNUT BLDG	15TH WALNUT ST	TRANSFORMERS	2	x				x		
SW-77	Phila. Fire Dept	2011-1	3/3/2011	Crowne Plaza	1800 MARKET	TRANSFORMERS	2	x				x		
SW-78	Phila. Fire Dept	2007-4	1/22/2008	MR GOODBUYS Shoprite Store	2301 OREGON AVE	TRANSFORMERS	2				X	X		
SW-79	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA CTRL UTIL BLDG	TRANSFORMERS	2		x	x	x	x		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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	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	Discon nected	Off Site	Opera ting	Closed	Aban doned /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	MARKE T & 30TH	TRANSFOR MERS	2		x	x	x	x		
SW-93	Phila. Fire Dept	2011-1	3/25/2011	SEPTA	RIDGE & FAIRMO UNT	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	CAPACITORS	20				X		X	
SW-98	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK	#4 MELLON BANK CENTER	CAPACITORS	22				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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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	
SW-101	Phila. Fire Dept	2007-3	7/11/2007	EASTERN PENNSYLVA NIA PSYCHIATRI C HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFOR MER	3	X				X		
SW-102	Phila. Fire Dept	2007-4	1/24/2008	LENAS BLDG Devon Self Storage	19TH & ALLEGH ENY	TRANSFOR MER	3				X		X	
SW-103	Phila. Fire Dept	2009-1	Does not exist	SEPTA	33RD. & MARKE T	TRANSFOR MER	3							
SW-104	Phila. Fire Dept	2010-1	1/6/2010	SEPTA	MARKE T & 15TH	TRANSFOR MER	3		x	x	x	x		
SW-105	Phila. Fire Dept	2011-1	2/18/2011	SEPTA	MARKE T & 25TH	TRANSFOR MER	3							
SW-106	Phila. Fire Dept	2011-1	2/18/2011	SEPTA	MARKE T & 31ST	TRANSFOR MER	3							

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
SW-111	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK Ritz Carlton	Broad & Chestnut Streets	CAPACITORS	4				X	X		
SW-112	Phila. Fire Dept	2007-4	1/22/2008	MR GOODBUYS Shoprite Store	2301 OREGON AVE	CAPACITORS	4			X				X
SW-113	Phila. Fire Dept	2011-1	3/3/2011	H and M	1530 CHESTNUT	TRANSFORMERS	4	x				x		
SW-114	Phila. Fire Dept	2007-3	11/23/2007	GOLDMAN PAPER	2201 E ALLEGHENY	TRANSFORMERS	4				X		X	
SW-115	Phila. Fire Dept	2007-4	1/25/2008	METHODIST HOSP	2301 S BROAD	TRANSFORMERS	4				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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
SW-121	Phila. Fire Dept	2007-2	7/11/2007	EASTERN PENNSYLVA NIA PSYCHIATRI C HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFOR MERS	6	X				X		
SW-122	Phila. Fire Dept	2007-2	7/11/2007	EASTERN PENNSYLVA NIA PSYCHIATRI C HOSPITAL (EPPI)	3200 HENRY AVE.	TRANSFOR MERS	6	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-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		
SW-126	Phila. Fire Dept	2006-2	8/7/2006	MELLON BANK	#4 MELLON BANK CENTER	TRANSFORMERS	6				X		X	
SW-127	Phila. Fire Dept	2010-2	6/18/2010	PHILA SCHOOL BOARD	17 & SPRING GARDEN (MASTERMAN)	TRANSFORMERS	4	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-128	Phila. Fire Dept	2010-4	12/20/2010	PHILA SCHOOL BOARD	22ND & LEHIGH (DOBBINS)	TRANSFORMERS	7	x				x		
SW-129	Phila. Fire Dept	2006-2	6/5/2006	MCP	3300 HENRY AVE.	CAPACITORS	8	X				X		
SW-130	Phila. Fire Dept	2007-2	8/18/2007	RITTENHOUSE PLAZA	19TH & WALNUT	RETROFILLED	[4]	X				X		
SW-131	Phila. Fire Dept	2006-3	11/16/2006	BROAD-NOBLE BLDG Commerce Bldg.	401 N BROAD ST	RETROFILLED	3	X				X		
SW-132	Phila. Fire Dept	2011-1	3/22/2011	CHILDRENS HOSPITAL	34TH & CIVIC CTR BLVD	RETROFILLED	2	x				x		
SW-133	Phila. Fire Dept	2011-1	Duplication of SW-132	CHILDRENS HOSPITAL	34TH & CIVIC CTR BLVD	RETROFILLED								
SW-134	Phila. Fire Dept	2007-4	1/18/2008	KENNEDY HOUSE[Condos]	1901 JFK BLVD	RETROFILLED		X				X		
SW-135	Phila. Fire Dept	2007-4	Duplicate Record	KENNEDY HOUSE	1901 JFK BLVD	RETROFILLED								

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
SW-144	Phila. Fire Dept	2007-4	1/23/2008	PHILA STREETS (BARTRAM TRANSFER STATION)	51 & GRAYS	RETROFILLED				X			X	
SW-145		2006-2	Blank Record											
SW-146	Phila. Fire Dept	2007-1	5/11/2007	PHILADELPHIA AIRPORT HILTON	4509 ISLAND AVE	RETROFILLED			X			X		
SW-147	Phila. Fire Dept	2007-1	5/22/2007	STREETS (NORTHWEST INCINERATOR	DOMINO & UMBRIA	RETROFILLED					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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
SW-148	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA TWA HANGER	RETROFILLED #30257 CERTIFICATION			x	x	x	x		
SW-149	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA TERM E	RETROFILLED #30276 & 30277 CERTIFICATION			x	x	x	x		
SW-150	Phila. Fire Dept	2011-1	1/6/2011	PHILA COMMERCE	PIA PAVILION E	RETROFILLED #30278 & 30279 CERTIFICATION			x	x	x	x		
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		

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	Discon nected	Off Site	Opera ting	Closed	Aban doned /not secure
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		
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/USGS Groundwater Monitoring Program

Background

The basis of PWD's CSO LTCPU wet weather source control strategy is the "capture" and infiltration of as much rainwater as possible with green stormwater infrastructure (GSI). The direct benefits of such an effort are a reduction of stormwater discharged directly to streams, as well as the increased recharge of stormwater to supplement groundwater resources. Increased infiltration, though advantageous in several respects, must be carefully planned and closely monitored to avoid unwanted impacts. Increasing groundwater levels in areas where the depth to water is shallow could result in the saturation of soils close to the surface, potentially causing basement flooding. In addition, building foundations could be impacted by rising groundwater levels.

The adaptive management approach being employed for the LTCPU is an iterative process strongly dependent on monitoring. In order to quantify the impact of this long-term effort on groundwater resources, it is necessary to monitor groundwater levels in Philadelphia. PWD has partnered with USGS to increase the geographic scope and frequency of groundwater monitoring in the Philadelphia region. A City-wide groundwater level monitoring network will provide long-term monthly data documenting current water levels and trends in groundwater elevations throughout the City, helping to track the impacts of widespread implementation of stormwater management practices (SMPs) and global climate change.

Data from the groundwater monitoring network will also be used to calibrate a Philadelphia groundwater model and update the USGS groundwater contour map of Philadelphia (Paulachok 1984). In addition to this City-wide, long term groundwater monitoring program, PWD is conducting site-scale monitoring to address the effectiveness of individual SMPs. The City-wide groundwater monitoring network and site-scale monitoring at GSI facilities provide complementary information regarding the effects of stormwater management practices at different spatial and temporal scales.

Methods

PWD and USGS identified existing wells that would be suitable for the network and obtained permission for site access. Once wells were identified and accessible, well condition and suitability for inclusion in the monitoring network were investigated by continuous water level monitoring and remote video camera inspection when accessible. Wells that met acceptance criteria were added to the monitoring network. After examining readily available information about existing wells, PWD elected to drill additional wells in order to provide better spatial distribution of wells in the monitoring network. USGS staff conduct groundwater observations monthly and upload water level data to the NWIS web server. PWD staff periodically download water level data from NWIS and summarize these data annually.

Well Network Establishment

Existing wells in the Philadelphia area were identified by USGS and PWD through digital and paper archives as well as through contacting representatives of other City agencies and large institutional landowners (*e.g.*, Philadelphia Fire Department, Philadelphia Department of Parks and Recreation, Philadelphia Gas Works, Southeastern Pennsylvania Transportation Authority, etc.). Priority was given to wells on publicly–owned or large institutional land uses in order to help ensure that wells would remain accessible in the future. The primary goal was to develop a network of wells with a spatial distribution and density sufficient to assess groundwater levels throughout the City of Philadelphia. Other criteria for establishment of the well network were:

- Sufficient density of wells in critical areas with a shallow water table
- No bias given to combined-sewered or separate-sewered areas
- Denser distribution of monitoring wells in the Northern Piedmont Ecoregion to reflect its more varied groundwater contours.

Wells that met acceptance criteria were assigned USGS location codes and added to the USGS well monitoring network and National Water Information System (NWIS) database. The well monitoring network contains 19 active sites that are monitored monthly. Additional sites are expected to be added once landowner access agreements are finalized or new wells are drilled.

Video Camera Inspection

The availability of well attribute information varied from well to well and in most cases the physical characteristics and condition of candidate wells to be added to the network was unknown. USGS staff perform remote video camera inspection, when possible, to determine physical characteristics such as screened intervals, total depth, depth to bottom of casing, and the location of potential water-bearing zones within the bore hole. Wells narrower than 4" diameter and wells with pumps or other plumbing could not accommodate the camera equipment and were not inspected with this method.

Continuous Water Level Monitoring

Monthly measurements are appropriate for monitoring long term trends in groundwater levels. However, it is important to verify that these monthly observations are representative of the unconfined aquifer and not influenced by anthropogenic activity or other conditions. USGS staff used data logging pressure transducers (LevelTroll model 500, In-Situ, Inc.) to conduct continuous water level monitoring in candidate wells. These sensors are vented to the surface of the well to provide atmospheric pressure correction. Continuous monitoring was carried out across all wells in the network to identify any aberrant trends, such as those that might be caused by local pumping operations. Sensors were deployed for three month periods on a rotating schedule with five wells actively monitored at a time. Wells that appear to be influenced by permanent pumping operations will be removed from the monitoring network (*e.g.*, permanent wells dewatering the stadiums). Wells that are temporarily affected by local, dewatering operations (*e.g.*, a short term construction site), will remain in the system, but data collected during the period when dewatering operations affected the well will not be used in estimates of current water levels and water level trends.

Routine Groundwater Observations

USGS staff conduct groundwater observations monthly at each well using a water sensor and graduated tape. Equipment is sterilized in 10% bleach solution prior to and after measurements are taken in order to prevent introducing or transferring contamination between wells. Well level measurements are converted to elevation above the North American Vertical Datum of 1988 (NAVD88) based upon the known elevation correction factor for each well. Water level data are recorded on site in field notebooks along with any pertinent field notes and then uploaded to the NWIS web server. PWD periodically downloads data from NWIS and summarizes these data annually.

Monitoring Well Locations

Currently the well monitoring network contains 19 active sites that are monitored monthly. (Table 1, Figure 1). PWD is in the process of drilling additional wells on City-owned property in order to meet spatial distribution and other well network criteria. Of the19 active wells, seven are located within the Middle Atlantic Coastal Plain Ecoregion, while the remaining 12 wells are located in the Northern Piedmont (Omernik 1987). As stated above, higher well density is required in the latter region to reflect the more complex geology and interactions with groundwater.

Table 1. PWD-USGS Groundwater Monitoring Well Network Locations

Site ID	Site Name	Lat.	Long.	Established	Observations
USGS-395342075102101	PH 12*	39.895	-75.172	10/22/1978	121
USGS-395353075151501	PH 1052	39.898	-75.254	3/7/2011	3
USGS-395408075104001	PH 63	39.902	-75.177	9/14/1954	21
USGS-395416075150301	PH 1053	39.904	-75.251	4/24/2003	3
USGS-395516075113901	PH 1051	39.921	-75.194	--	3
USGS-395656075100401	PH 136	39.949	-75.167	12/6/1978	21
USGS-395859075085401	PH 1042	39.983	-75.148	2/14/2011	7
USGS-395942075144301	MG 2164	39.995	-75.245	2/14/2011	17
USGS-400211075093701	PH 1050	40.036	-75.16	--	3
USGS-400217075142101	PH 540	40.038	-75.239	3/29/1948	6
USGS-400229075104601	PH 1043**	40.041	-75.179	2/14/2011	15
USGS-400308074592201	PH 397	40.052	-74.989	1/4/1979	21
USGS-400311075101301	PH 1040	40.053	-75.17	2/17/2011	17
USGS-400327075152201	PH 1044	40.057	-75.256	3/16/2011	11
USGS-400424075104901	PH 550	40.073	-75.18	--/--/1906	20
USGS-400512075033401	PH 1045	40.087	-75.059	7/18/2011	12
USGS-400516075033201	PH 1046	40.088	-75.059	7/18/2011	12
USGS-400524075042601	MG 2195	40.09	-75.074	--	1
USGS-400527075042801	MG 2193	40.091	-75.074	--	12
USGS-400527075042802	MG 2194	40.091	-75.074	--	12
USGS-400644074590801	PH 1041	40.112	-74.986	2/17/2011	16

* Former Philadelphia County observation well, destroyed by construction activity, will be replaced with new well in same location
** Philadelphia County observation well

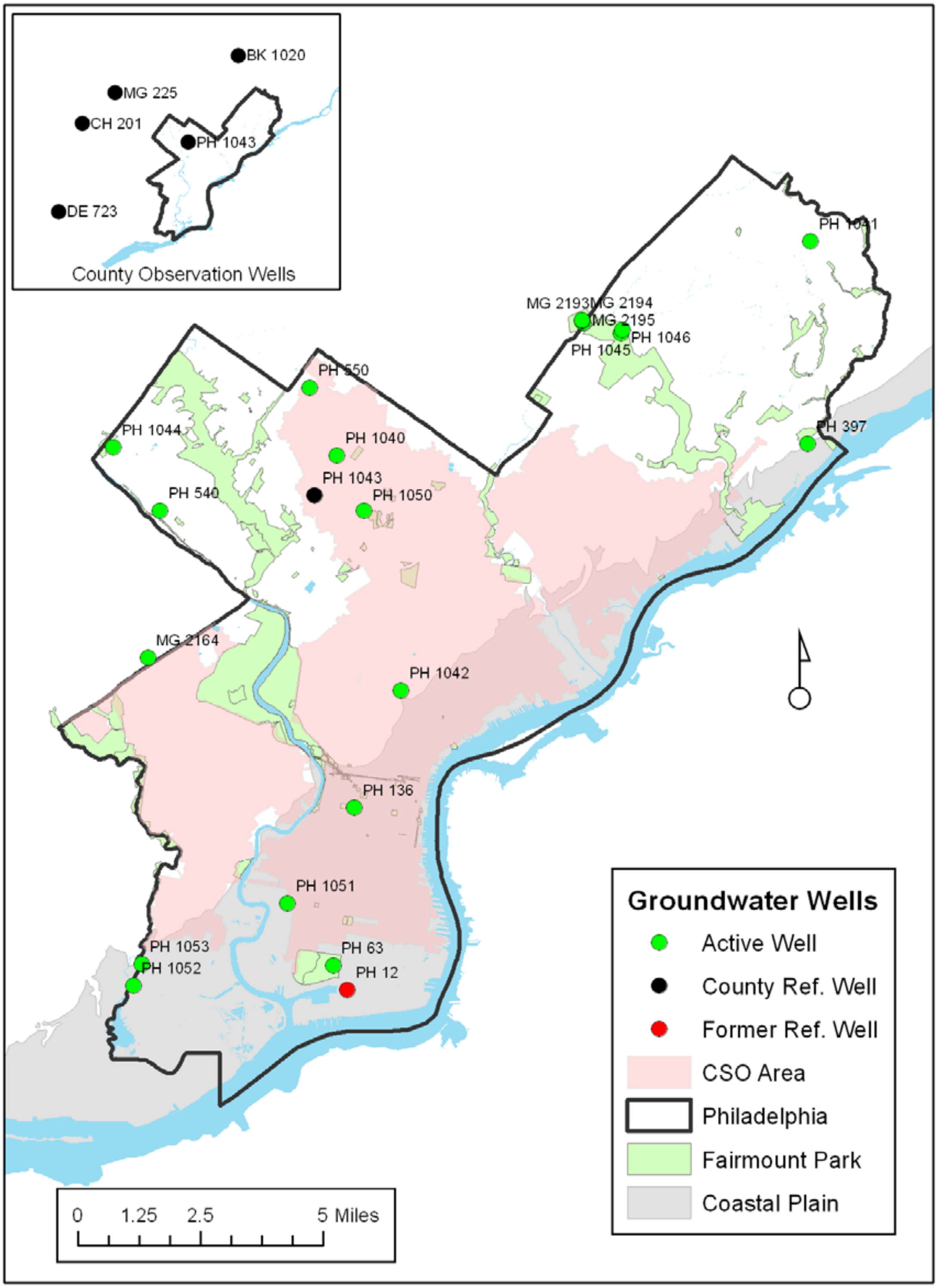


Figure 1. PWD-USGS Groundwater Monitoring Well Network Locations and (inset) County Reference Well Locations

Wells were also classified according to predominant underlying geology and type of sewer system, *i.e.*, CSO or separate-sewered (Table 2, Figure 1). Another consideration for siting new wells was the potential influence of buried utilities and historic creek beds. During the period of rapid expansion of Philadelphia's grid-like network of streets, historic streams were encased in large brick sewers and buried in order to level and prepare land for development. Recent groundwater mapping and modeling work suggests that these brick sewers strongly influence local groundwater elevations (Paulachok 1991, Maimone et al. 2011).

Table 2. PWD-USGS Groundwater Well Geology and Sewer System Type Classification

Site ID	Site Name	Sewer Type	Geology
USGS-395342075102101	PH 12	Separate	Trenton Gravel
USGS-395353075151501	PH 1052	Separate	Trenton Gravel
USGS-395408075104001	PH 63	Separate	Trenton Gravel
USGS-395416075150301	PH 1053	Separate	Trenton Gravel
USGS-395516075113901	PH 1051	CSO	Magothy Raritan Potomac
USGS-395656075100401	PH 136	CSO	Trenton Gravel
USGS-395859075085401	PH 1042	CSO	Pennsauken and Bridgeton Formation
USGS-395942075144301	MG 2164	Separate	Granitic Gneiss and Granite
USGS-400211075093701	PH 1050	CSO	Wissahickon Formation
USGS-400217075142101	PH 540	Separate	Wissahickon Formation
USGS-400229075104601	PH 1043	CSO	Wissahickon Formation
USGS-400308074592201	PH 397	Separate	Trenton Gravel
USGS-400311075101301	PH 1040	CSO	Wissahickon Formation
USGS-400327075152201	PH 1044	Separate	Wissahickon Formation
USGS-400424075104901	PH 550	CSO	Wissahickon Formation
USGS-400512075033401	PH 1045	Separate	Granitic Gneiss and Granite
USGS-400516075033201	PH 1046	Separate	Granitic Gneiss and Granite
USGS-400524075042601	MG 2195	Separate	Wissahickon Formation
USGS-400527075042801	MG 2193	Separate	Wissahickon Formation
USGS-400527075042802	MG 2194	Separate	Wissahickon Formation
USGS-400644074590801	PH 1041	Separate	Wissahickon Formation

USGS maintains at least one reference well in most Pennsylvania counties. Reference wells located in neighboring counties (Figure 1, Table 3) may be used as regional reference wells for data analyses. Continuous hourly data are collected at well DE 723 in Delaware County. Reference wells in Chester, Bucks and Montgomery Counties are not monitored continuously.

Table 3. Regional County Observation Wells

Site ID	Site Name	Lat.	Long.	Est.	Observations
USGS-400453075255601	CH 201 Chester County Observation Well	40.136	-75.351	06/19/1978	403
USGS-400808075210401	MG 225 Montgomery County Observation Well	40.199	-75.052	08/15/1956	133
USGS-401157075032001	BK 1020 Bucks County Observation Well	40.081	-75.432	04/13/1968	129
USGS-395512075293701	DE 723 Delaware County Observation Well	39.920	-75.493	1983	158

Data Analysis

USEPA (2009) published detailed guidance on statistical analysis of groundwater contaminant concentrations. In many of the examples, the same logic and techniques could apply to analysis of groundwater levels. In the case of the Philadelphia groundwater monitoring network, the goal is to understand if groundwater levels are changing over time, at either a single well or group of wells. The main statistical tests to be utilized are a) Seasonal Kendall Test, and b) ANOVA. The tests are briefly described below.

The Seasonal Kendall test performs the Mann-Kendall (MK) trend test for individual seasons of the year, where season is defined by the user. It then combines the individual results into one overall test for whether the dependent variable (*i.e.*, groundwater level) changes in a consistent direction (monotonic trend) over time. The magnitude (*i.e.*, slope) of the trend is also determined. The test is nonparametric, therefore non-normal data can be analyzed (Helsel *et al.* 2006). USEPA (2009) advises that at least 10-12 measurements are needed, whereas Helsel and Hirsch (2002) recommends that the product of number of years and number of seasons be greater than 25. Helsel *et al.* (2006) further caution that with more than 10 years of data, adjusted p-values should be calculated to account for the possibility of serial correlation. The Seasonal Kendall test can be applied to data from a single well, not multiple wells. To examine seasonal trends across multiple wells, the Covariance-Sum test is used (Lettenmaier 1988), which is essentially the execution of multiple seasonal Kendall tests and calculation of the covariances between them. To analyze regional trends over time from a group of wells, the Regional Kendall test can be applied. The Regional Kendall test essentially functions the same way as the Seasonal Kendall test, except the data is categorized by region rather than season.

An alternate method to analyze temporal trends on either a single well or group of wells is the analysis of variance (ANOVA). For a single well or group of wells with data subdivided by season, a one-way ANOVA would examine the significance of seasonality as a statistical factor. A two-way ANOVA would be applied to include location or region as a statistical factor. Either form of ANOVA assumes that the datasets are normally distributed with constant variance. Group residuals should be tested for normality and for equality of variance. If the data cannot be transformed to a normal distribution, the nonparametric Kruskal-Wallis test can be used instead to detect significance of the specified statistical factor (USEPA 2009).

Well Monitoring Data Summary

Well monitoring data were summarized from July 2011 to June 2012 (Tables 4-5). These data are presented as an update of the program status. Additional data analysis will be completed as part of the groundwater model calibration and groundwater map update reports. Groundwater trends will be analyzed further once a sufficient amount of data has been collected (See Data Analysis section).

Table 4. PWD-USGS Groundwater Monitoring Well Data 7/2011-6/2012, Depth to Water Level (Feet below Land Surface).

Site ID	J	A	S	O	N	D	J	F	M	A	M	J
395342075102101	11.83	11.74	10.81	10.71	11.30	11.04						
395408075104001	6.31	6.22	4.98	5.12	5.47	5.53	4.92	5.48	5.71	5.72	5.94	6.06
395656075100401	31.63	31.55	23.91	16.52	16.58	16.43	16.42	16.71	16.80	16.89	31.88	
395859075085401							8.77	9.18	9.39	9.50	9.65	9.50
395942075144301	16.93	14.82	10.52	11.92	12.17	11.33	11.81	12.30	11.56	13.66	14.32	14.09
400229075104601	16.55		12.41	14.77	15.17		15.00	15.35	15.82	16.46	16.12	15.97
400308074592201	7.50	7.55	3.83	4.49	4.84	4.71	3.17	3.84	4.46	5.57	6.41	7.21
400311075101301	12.35	12.10	8.68	9.83	9.83	9.00	9.10	9.31	9.97	10.70	11.17	10.91
400327075152201		73.14	51.03	53.33	54.33	51.11	52.67	53.03	55.09	56.05	57.45	58.75
400424075104901	18.63	19.29	12.34	14.55	15.90	15.31		16.55	17.41	18.27	18.76	18.80
400512075033401	37.1	36.02	36.02	34.97	35.11	33.20	34.04	34.82	34.91	36.20	36.60	36.59
400516075033201	28.55	27.29	27.29	26.00	26.90	26.10	25.70	26.11	27.02	28.09	28.86	29.21
400644074590801	17.73	21.25	18.51	19.30	17.43	15.71	15.61	16.92	20.55	18.48	19.50	17.72
395353075151501										15.1	15.43	15.65
395416075150301										8.6	9.01	8.82
395516075113901							28.2				28.35	28.28
400211075093701							13.9				13.96	14.22
400217075142101										22.20	22.94	23.84
400524075042601	17.7											
400527075042801	21.1	19.80	19.80	19.58	19.98	19.07	19.61	19.95	20.36	20.92	20.94	21.03
400527075042802	22.3	17.96	17.96	15.89	18.13	15.02	15.92	16.97	18.83	21.11	21.93	22.42

Table 5. Regional County Observation Well Data 7/2011-6/2012

Site ID	J	A	S	O	N	D	J	F	M	A	M	J
400453075255601	23.03	23.78	18.17	19.39	20.33	18.01	18.56	19.80	20.62	21.65	20.64	21.73
400808075210401	13.58	12.98		7.07		6.50		9.49		11.63	10.41	9.93
401157075032001	34.15	27.07		27.22		26.73		28.30		31.65	33.01	
395512075293701	7.12		5.16	6.10	6.28			5.77	6.71	6.95		7.44

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APPENDIX I – MONITORING LOCATIONS

Page

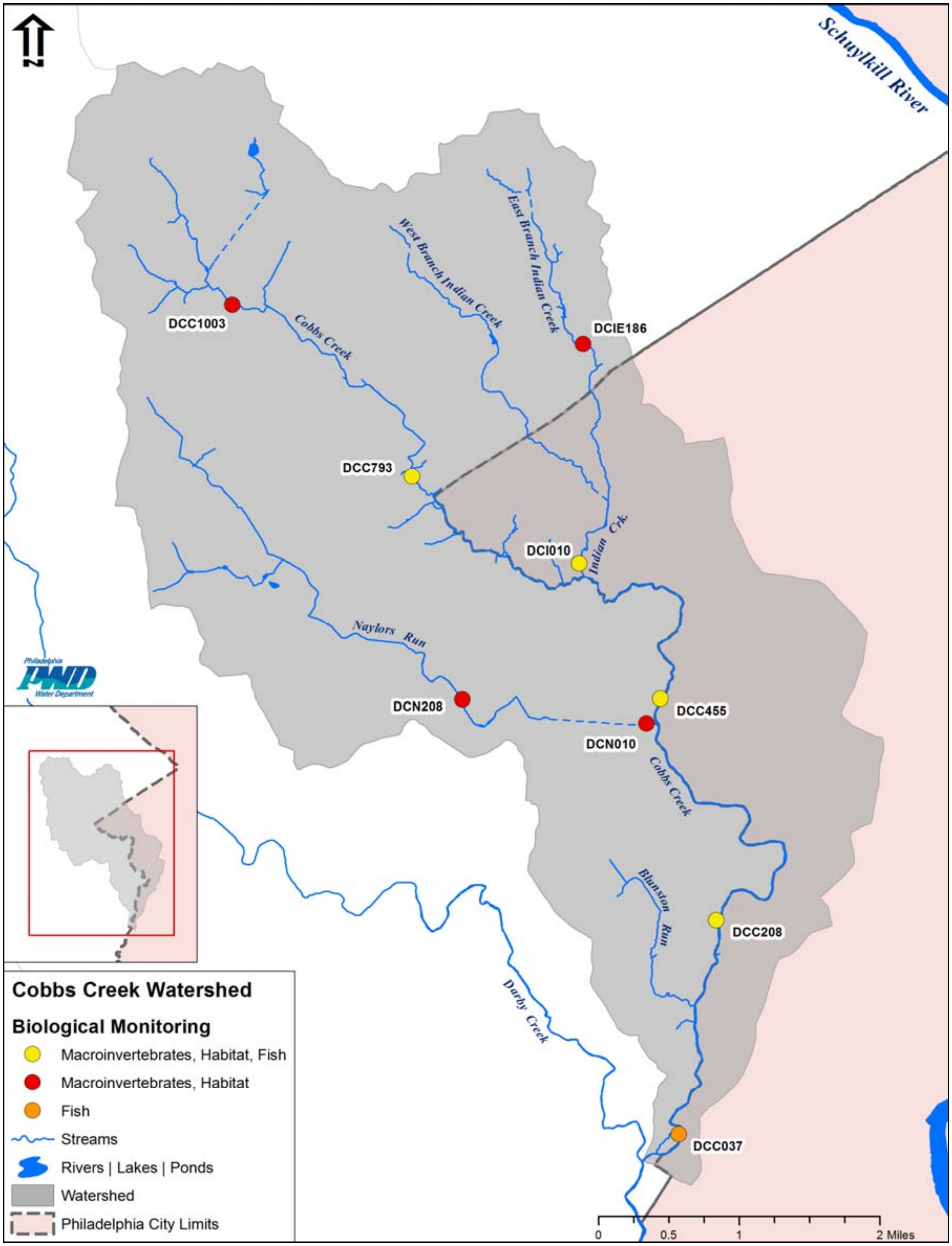

Figure - 1 Biological and Physical assessment locations in Cobbs Creek Watershed

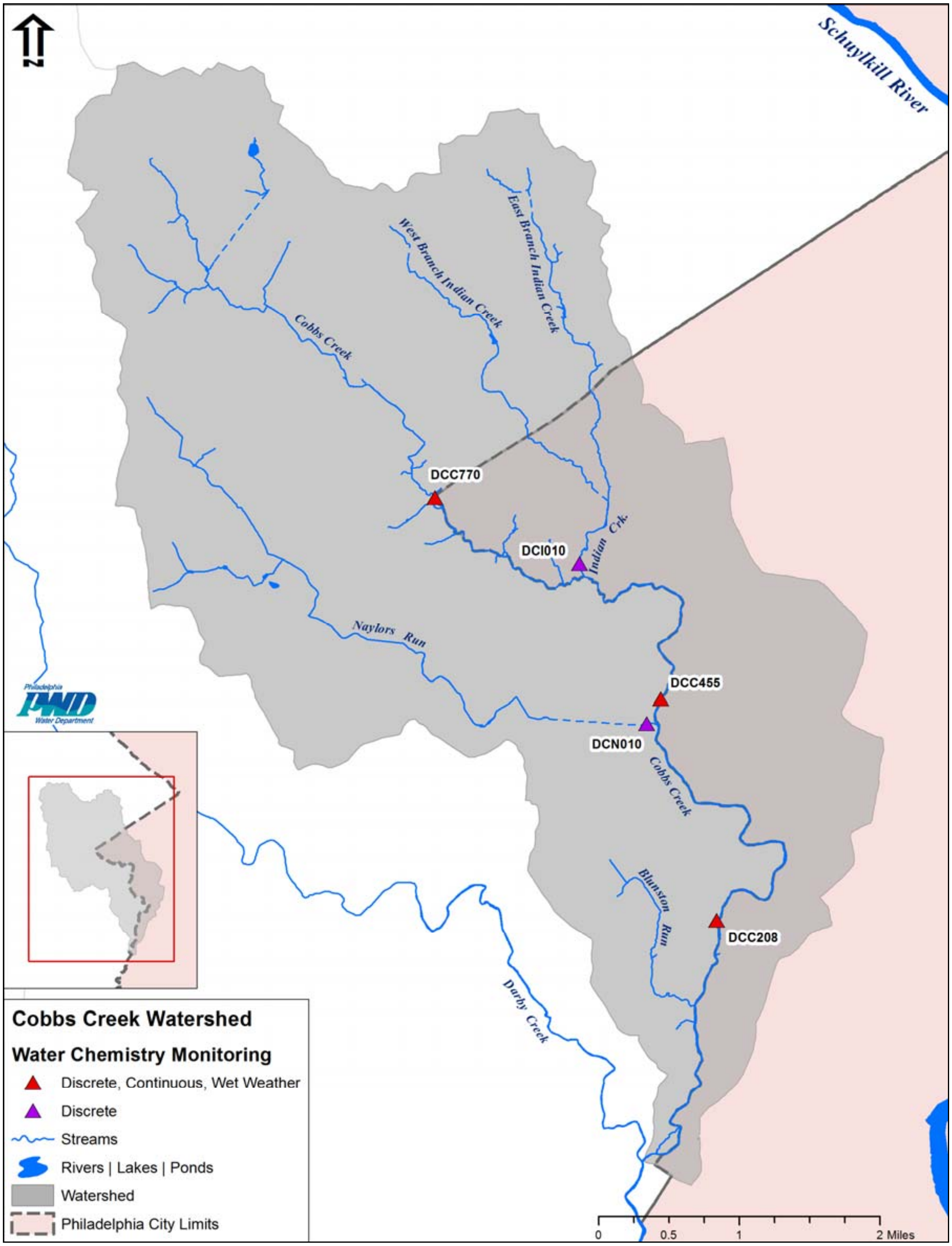

Figure - 2 Chemical monitoring locations in Cobbs Creek Watershed

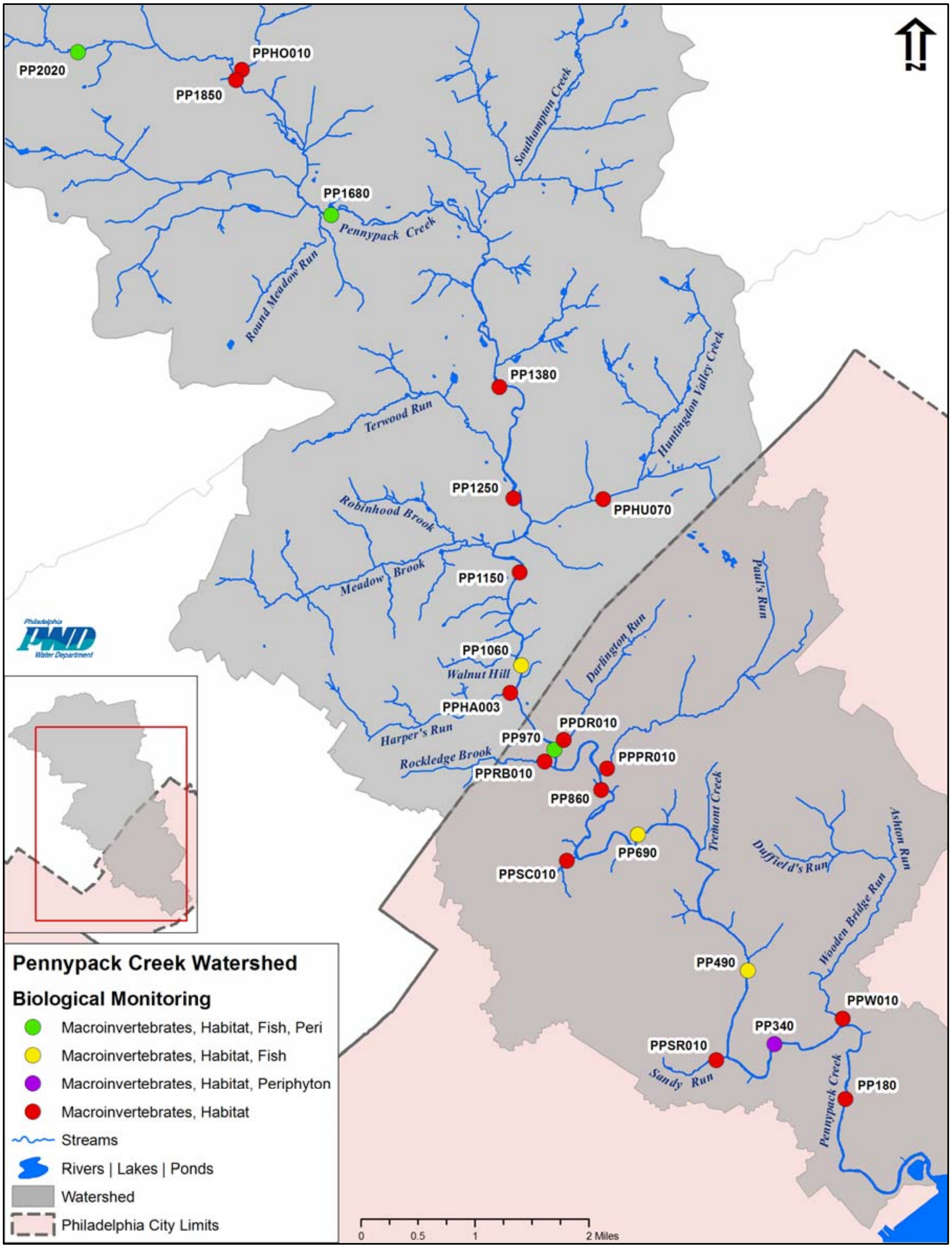

Figure - 3 Biological and Physical assessment locations in Pennypack Watershed

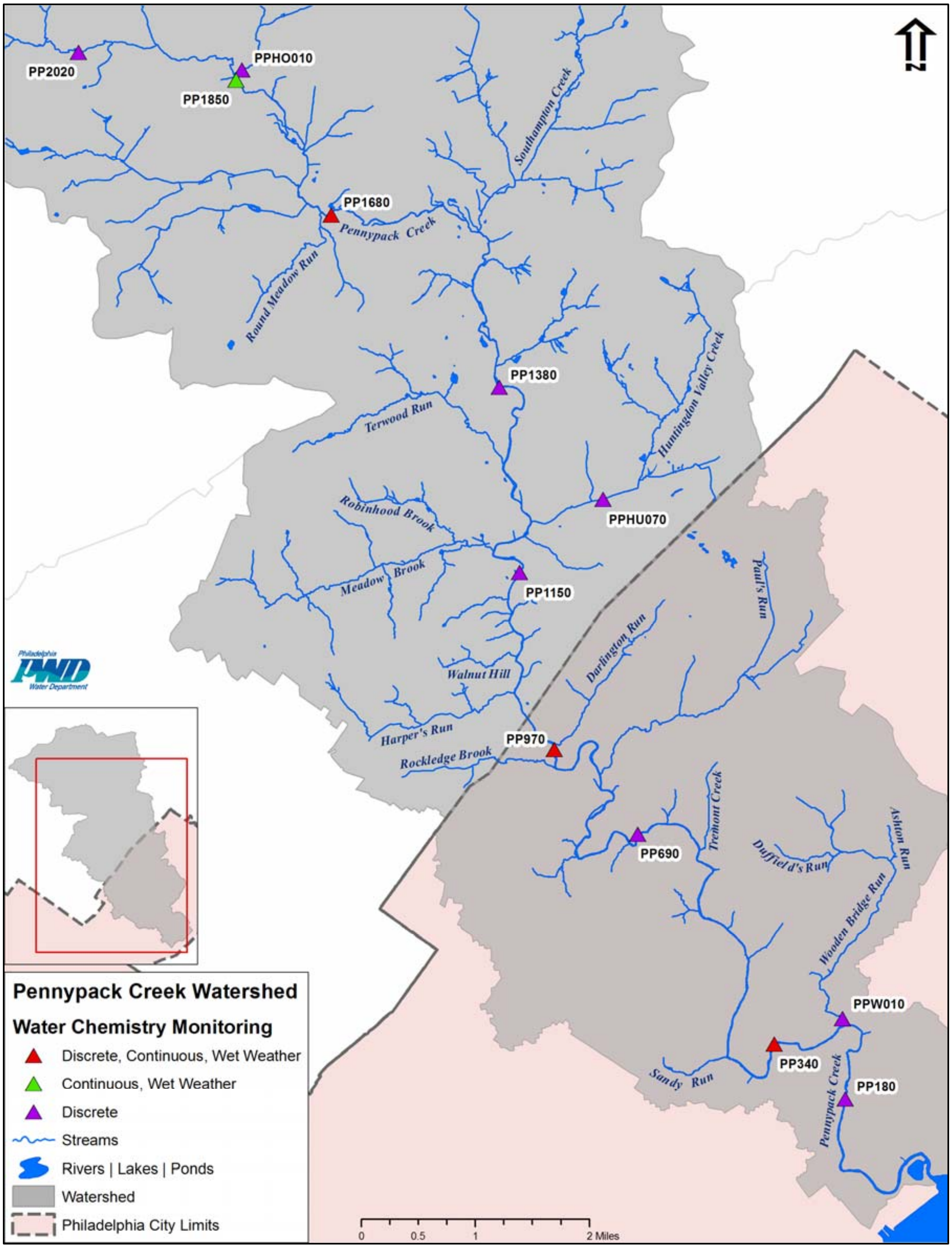

Figure - 4 Chemical monitoring locations in Pennypack Watershed

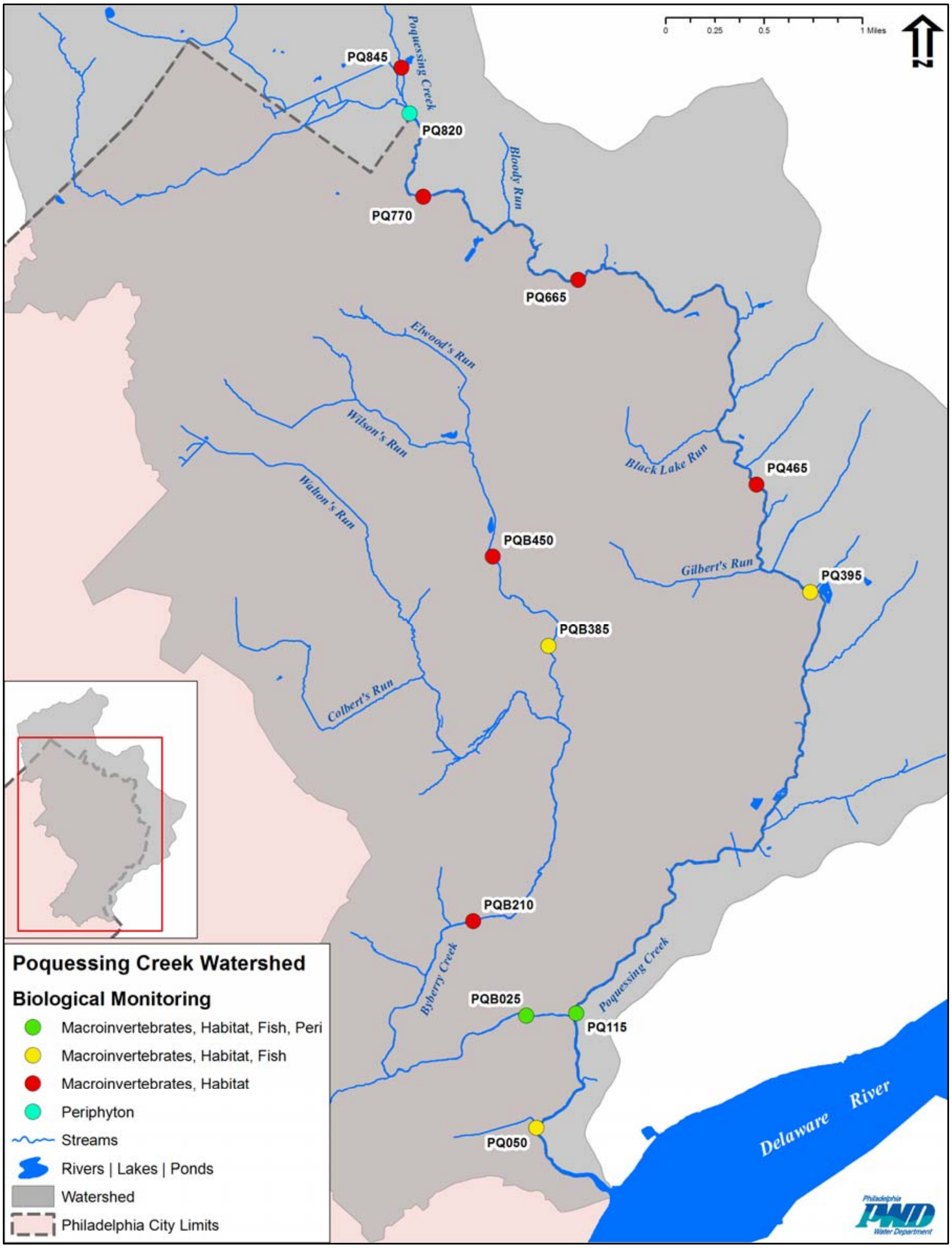

Figure - 5 Biological and Physical assessment locations in Poquessing-Byberry Watershed

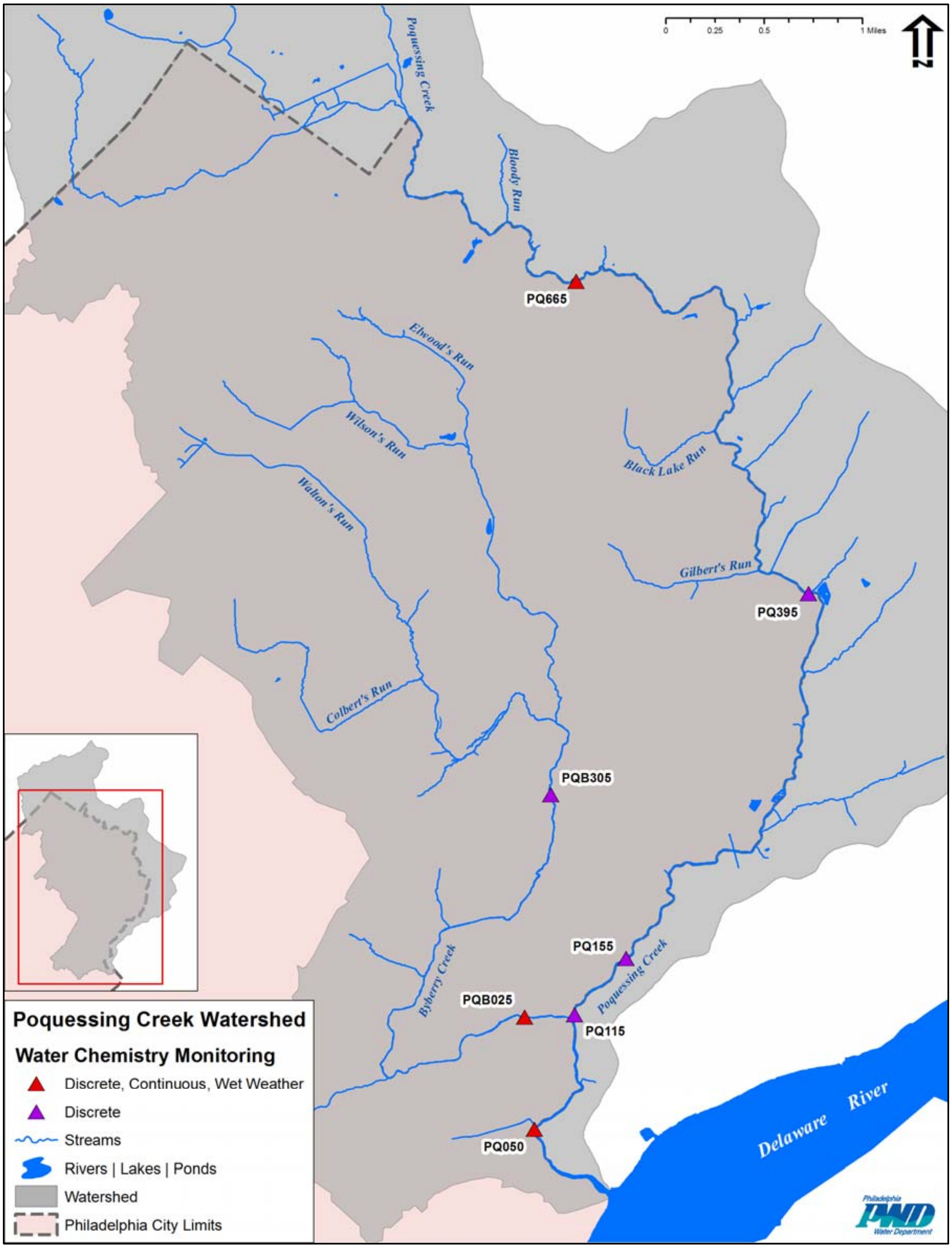

Figure - 6 Chemical monitoring locations in Poquessing-Byberry Watershed

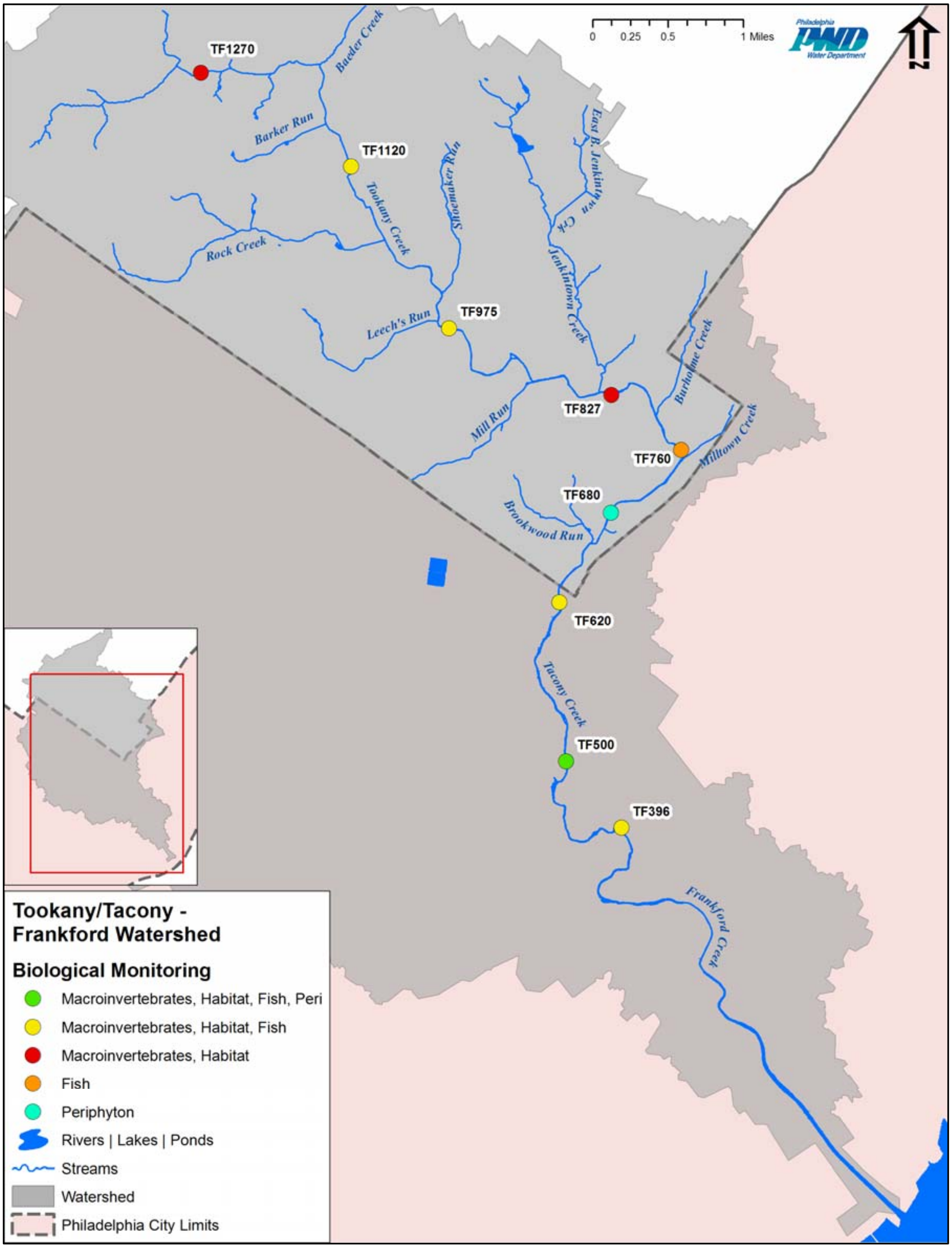

Figure - 7 Biological and Physical assessment locations in Tacony-Frankford Watershed

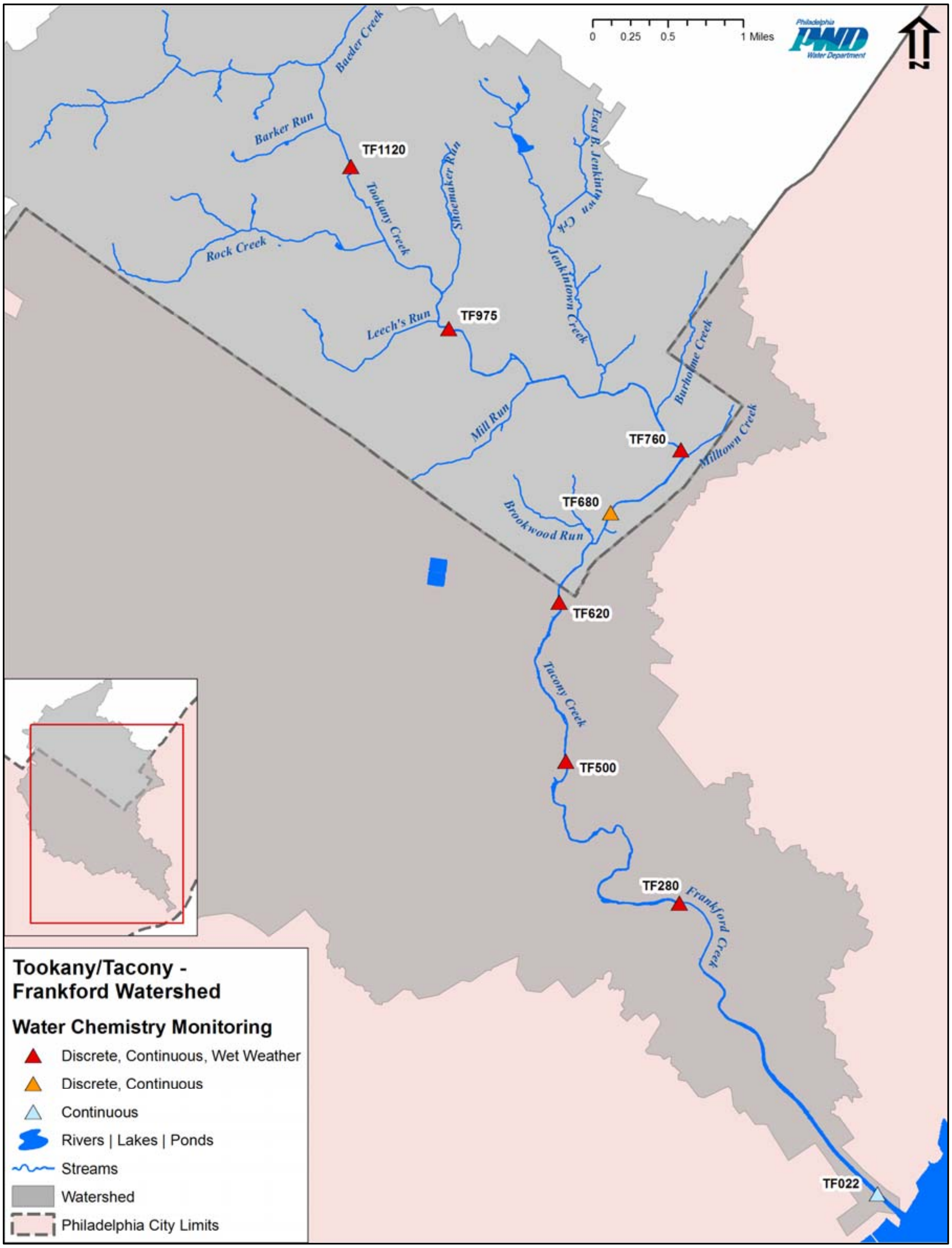

Figure - 8 Chemical monitoring locations in Tacony-Frankford Watershed

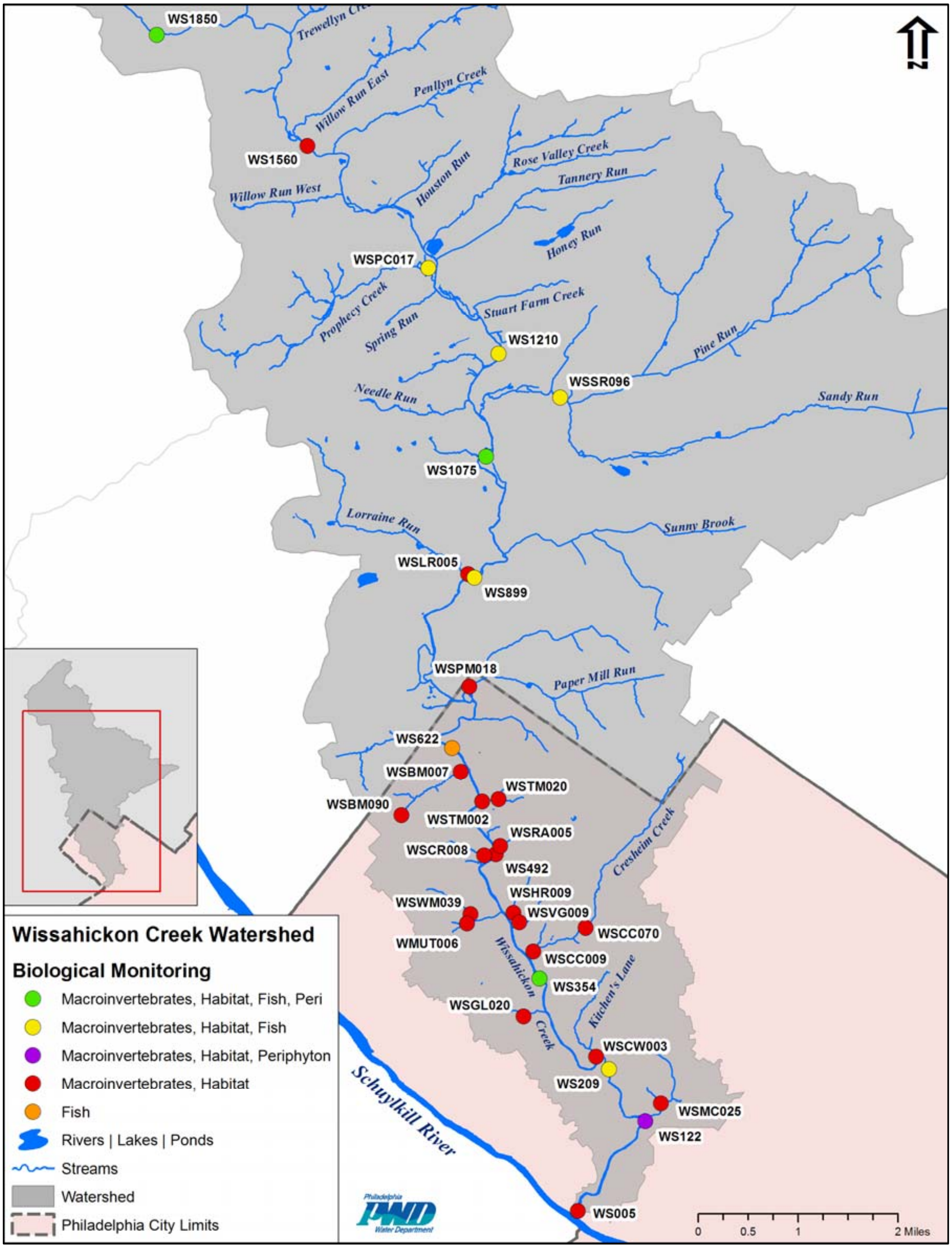

Figure - 9 Biological and Physical assessment locations in Wissahickon Watershed

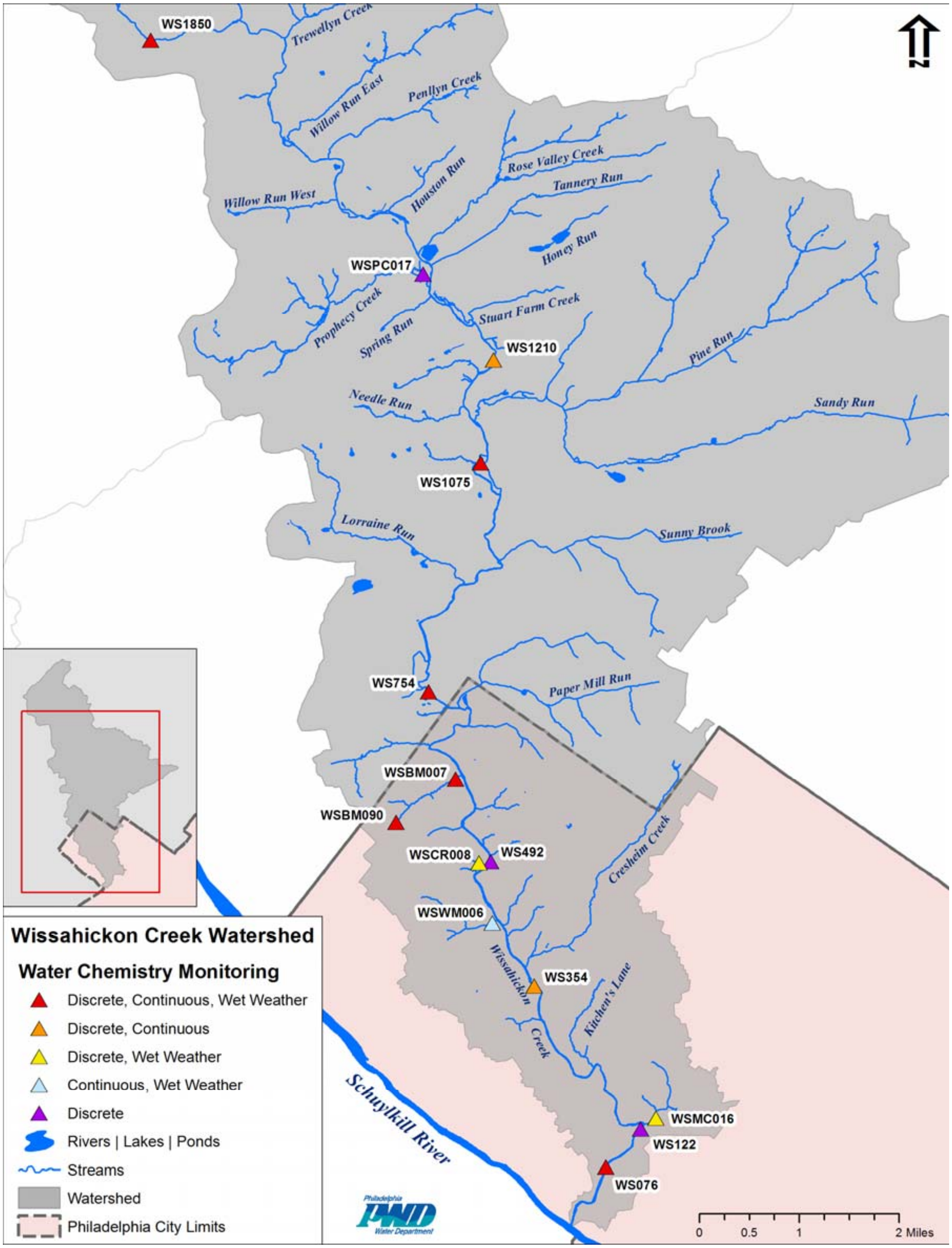

Figure - 10 Chemical monitoring locations in Wissahickon Watershed

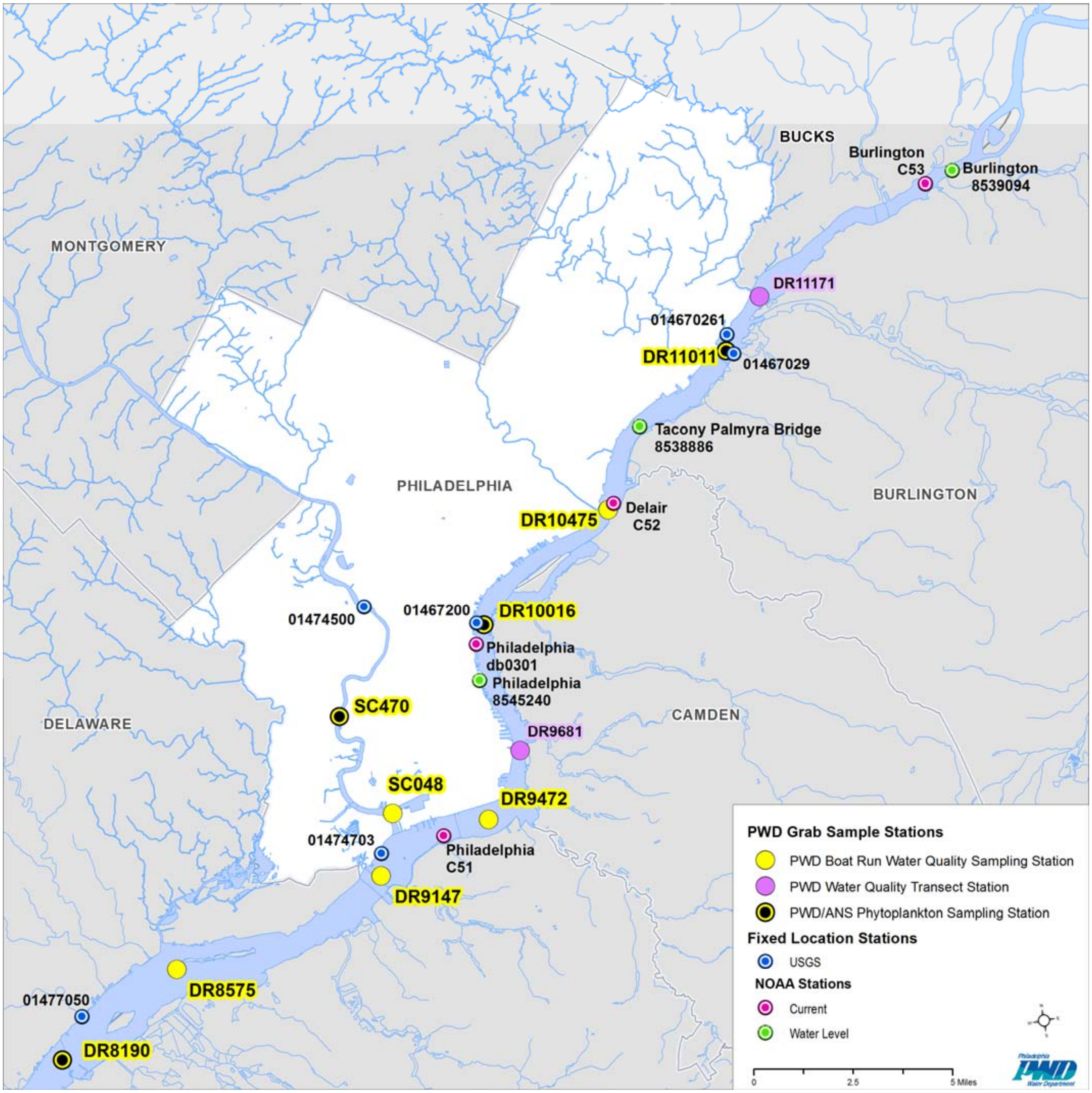

Figure - 11 Chemical monitoring locations in Delaware Estuary and Lower Schuylkill River Watershed

Table - 1 Water Quality Standards and Reference Values

Parameter	**Criterion**	**Water Quality Criterion or Reference Value**	**Source**
Alkalinity	Minimum	20 mg/L	PA DEP
Aluminum	Aquatic Life Acute Exposure Standard	750 ug/L	PA DEP
Aluminum	Aquatic Life Chronic Exposure Standard	87 ug/L (pH 6.5-9.0)	53FR33178
Chlorophyll a	Reference reach frequency distribution approach for Ecoregion IX, subregion 64, 75th percentile	3 ug/L, (Spectrophotometric) ***	EPA 822-B-00-019
Dissolved Cadmium	Aquatic Life Acute Exposure Standard	0.0043 mg/L*	PA DEP
	Aquatic Life Chronic Exposure Standard	0.0022 mg/L*	PA DEP
	Human Health Standard	0.010 mg/L*	PA DEP
Dissolved Chromium	Aquatic Life Acute Exposure Standard	0.015 mg/L*	PA DEP
	Aquatic Life Chronic Exposure Standard	0.010 mg/L*	PA DEP
Dissolved Copper	Aquatic Life Acute Exposure Standard	0.013 mg/L *	PA DEP
	Aquatic Life Chronic Exposure Standard	0.0090 mg/L *	PA DEP
	Human Health Standard	1000 mg/L	PA DEP
Dissolved Iron	Maximum	0.3 mg/L	PA DEP
Dissolved Lead	Aquatic Life Acute Exposure Standard	0.065 mg/L *	PA DEP
	Aquatic Life Chronic Exposure Standard	0.025 mg/L *	PA DEP
	Human Health Standard	50 mg/L	PA DEP
Dissolved Zinc	Aquatic Life Acute Exposure Standard	0.120 mg/L *	PA DEP
	Aquatic Life Chronic Exposure Standard	0.120 mg/L *	PA DEP
	Human Health Standard	5000 mg/L	PA DEP
Dissolved Oxygen	Average Min (August 1 to February 14)	5 mg/L	PA DEP
	Instantaneous Min (August 1 to February 14)	4 mg/L	PA DEP
	Average Min (February 15 to July 31)	6 mg/L	PA DEP
	Instantaneous Min (February 15 to July 31)	5 mg/L	PA DEP

Parameter	Criterion	Water Quality Criterion or Reference Value	Source
Fecal Coliform	Maximum	200/100mL (Swimming season) or 2000/100mL (Non-swimming season)	PA DEP
Fluoride	Maximum	2.0 mg/L	PA DEP
Iron	Maximum	1.5 mg/L	PA DEP
Manganese	Maximum	1.0 mg/L	PA DEP
NH3-N	Maximum	pH and temperature dependent	PA DEP
NO2-3-N	Nitrates – Human Health Consumption for water + organisms	2.9 mg/L ***	EPA 822-B-00-019
NO2 + NO3	Maximum (Public Water Supply Intake)	10 mg/L	PA DEP
Periphyton Chl-a		Ecoregion IX – 20.35 mg/m2	EPA 822-B-00-019
pH	Acceptable Range	6.0 - 9.0	PA DEP
TDS	Maximum	750 mg/L	PA DEP
Temperature		Varies w/ season. **	PA DEP
TKN	Maximum	0.675 mg/L ***	EPA 822-B-00-019
TN	Maximum	4.91 mg/L ***	EPA 822-B-00-019
TP	Maximum	140 ug/L ***	EPA 822-B-00-019
TSS	Maximum	25 mg/L	Other US states
Turbidity	Maximum	8.05 NTU ***	EPA 822-B-00-019

* - Water quality standard requires hardness correction; value listed is water quality standard calculated at 100 mg/L CaCO3 hardness

** - Additionally, discharge of heated wastes may not result in a change of more than 2°F during a 1-hour period.

*** - Ecoregion IX, subregion 64 seasonal median

APPENDIX 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	PAR800118	ACADEMY RECYCLING TORRESDALE FAC	8901 TORRESDALE AVENUE, PHILADELPHIA, PA 19154	PHILADELPHIA	DEC-04-2002	DEC-31-2007	4953	REFUSE SYSTEMS	MS4	PENNYPACK
4	PAR600034	ACER ENGINEERS INC	JIMMIES AUTO PARTS, PHILADELPHIA, PA 19137	PHILADELPHIA	FEB-26-1998	FEB-26-2001	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE
5	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
6	PAR600107	ALLEGHENY AUTO PARTS FAC	310-400 W ALLEGHENY AVE 19133	PHILADELPHIA	N/A	AUG-31-2014	5015	MOTOR VEHICLE PARTS, USED	MS4	FRANKFORD

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
7	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
8	PAR7000019	ALLIED TRANSPORT INDIANA AVE FAC	1801 W. INDIANA AVE, PHILADELPHIA, PA 19132	PHILADELPHIA	SEP-26-2011	SEP-30-2016	5171	PETROLEUM BULK STATIONS AND TERMINALS	CSO	DELAWARE
9	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
10	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
11	PAR600112	ARCA ADVANCED PROC N DELAWARE AVE FAC	4301 N DELAWARE AVE 19137	PHILADELPHIA	N/A	MAY-31-2015	5093	SCRAP AND WASTE MATERIALS	NON-CONTRIBUTING	DELAWARE
12	PAR230068	ARDEX LABS INC	2050 BYBERRY RD 19116	PHILADELPHIA	N/A	AUG-14-2003	2842	SPECIALTY CLEANING, POLISHING, AND SANITATION PREPARATIONS	MS4	BYBERRY

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
13	PAR230044	ASHLAND CHEM	2801 CHRISTOPHER COLUMBUS BOULEVARD, PHILADELPHIA, PA 19148	PHILADELPHIA	MAR-29-1996	MAR-29-2001	2821	PLASTICS MATERIALS, SYNTHETIC RESINS, AND NONVULCANIZ ABLE ELASTOMERS	CSO	DELAWARE
14	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
15	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
16	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
17	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
18	PAR600109	BLUE MOUNTAIN RECYCLING ELLSWORTH ST FAC	2904 ELLSWORTH ST 19146	PHILA	N/A	AUG-31-2014	5093	SCRAP AND WASTE MATERIALS	MS4	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
19	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
20	PAR200036	BUDD COMP	PHILADELPHIA PLANT, PHILADELPHIA, PA 19129	PHILADELPHIA	MAY-09-2000	MAY-09-2005	3465	AUTOMOTIVE STAMPINGS	MS4	SCHUYLKILL
21	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
22	PAR800159	CANADIAN PACIFIC PHILA NAVY YD FAC	LANGLEY AVE 19148	PHILADELPHIA	N/A	JUL-31-2014	4013	RAILROAD SWITCHING AND TERMINAL ESTABLISHMEN TS	NON-CONTRIBUTING	SCHUYLKILL
23	PAR600074	CARTEL AUTO PARTS W PASSYUNK AVE FAC	6330 W PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	N/A	OCT-31-2016	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE
24	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
25	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
26	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
27	PAR600114	CLEARFIELD RECYCLING PHILADELPHIA FAC	547 W. CLEARFIELD ST, PHILADELPHIA, PA 19133	PHILADELPHIA	MAR-28-2012	MAR-31-2017	5093	SCRAP AND WASTE MATERIALS	CSO	DELAWARE
28	PA0040991	CONOCO PHILLIPS CO	PHILADELPHIA TERMINAL, PHILADELPHIA, PA 19124	PHILADELPHIA	JUL-23-2009	JUL-31-2014	5171	PETROLEUM BULK STATIONS AND TERMINALS	MS4	TACONY
29	PAR800019	CROWLEY AMERICAN TRANS	TIOGA MARINE TERMINAL, PHILADELPHIA, PA 19134	PHILADELPHIA	SEP-11-1996	SEP-11-2001	4212	LOCAL TRUCKING WITHOUT STORAGE	CSO	DELAWARE
30	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
31	PAR200023	CROWN CORK & SEAL CO INC	9300 ASHTON RD 19136	PHILADELPHIA	N/A	JAN-26-2001	3411	METAL CANS	NON-CONTRIBUTING	PENNYPACK
32	PAR800088	CSX INTERMODAL	GREENWICH YARD, PHILADELPHIA, PA 19148	PHILADELPHIA	JUL-14-1998	JUL-14-2003	4011	RAILROADS, LINE-HAUL OPERATING	CSO	DELAWARE

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
33	PAR600092	DAVE S DELAWARE VALLEY TOWING PASSYUNK AVE FAC	6159 PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	N/A	N/A	N/A	N/A	MS4	SCHUYLKILL
34	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
35	PAR900005	DELAWARE VALLEY RECYCLING	3107 SOUTH 61ST STREET, PHILADELPHIA, PA 19153	PHILADELPHIA	JAN-26-1996	JAN-26-2001	4953	REFUSE SYSTEMS	NON-CONTRIBUTING	SCHUYLKILL
36	PAR600106	DELCO METALS N 2ND ST FAC	3053 N 2ND ST 19133	PHILA	N/A	JUL-31-2014	5093	SCRAP AND WASTE MATERIALS	CSO	FRANKFORD
37	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
38	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
39	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
40	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
41	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
42	PAG100018	EXELON GENERATION CO LLC	RICHMOND FAC 19137	PHILADELPHIA	N/A	OCT-31-2010	2211	BROADWOVEN FABRIC MILLS, COTTON	MS4	DELAWARE
43	PAR900025	EXELON RICHMOND GENERATING STA	3901 NORTH DELAWARE AVENUE, PHILADELPHIA, PA 19137	PHILADELPHIA	N/A	DEC-31-2016	4911	ELECTRIC SERVICES	NON-CONTRIBUTING	DELAWARE
44	PAR800113	FEDERAL EXPRESS CORP	3600 GRAYS FERRY AVENUE, PHILADELPHIA, PA 19146	PHILADELPHIA	JUN-10-2002	JUN-09-2007	4513	AIR COURIER SERVICES	CSO	SCHUYLKILL
45	PAR800131	FEDEX GROUND	TOWNSEND RD FAC, PHILADELPHIA, PA 19154	PHILADELPHIA	MAR-01-2005	FEB-28-2010	4215	COURIER SERVICES, EXCEPT BY AIR	MS4	POQUESSING
46	PAR600108	FIFTH STREET AUTO PARTS FAC	3105 N FIFTH ST 19133	PHILADELPHIA	N/A	AUG-31-2014	5015	MOTOR VEHICLE PARTS, USED	CSO	FRANKFORD
47	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
48	PAR800158	GREENWICH TERM S COL	3301 S COLUMBUS BLVD 19148	PHILADELPHIA	N/A	FEB-28-2014	4491	MARINE CARGO HANDLING	NON-CONTRIBUTING	DELAWARE
49	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
50	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
51	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
52	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
53	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
54	PAR130004	IMPERIAL METAL & CHEM	2050 BYBERRY ROAD, PHILADELPHIA, PA 19116	PHILADELPHIA	JUL-16-1996	JUL-16-2001	2796	PLATEMAKING AND RELATED SERVICES	MS4	POQUESSING
55	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
56	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
57	PA0058947	JDM MATERIALS	2750 GRANT AVE, PHILADELPHIA, PA 19114	PHILADELPHIA	JUN-20-2006	JUN-30-2011	3273	READY-MIXED CONCRETE	NON-CONTRIBUTING	PENNYPACK
58	PA0058955	JDM MATERIALS CO	BARTRAM BATCH PLANT, PHILADELPHIA, PA 19153	PHILADELPHIA	JUN-20-2006	JUN-30-2011	3273	READY-MIXED CONCRETE	NON-CONTRIBUTING	SCHUYLKILL
59	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
60	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
61	PAR200016	JOWITT & RODGERS STATE RD FAC	9400 STATE RD, PHILADELPHIA, PA 19114	PHILADELPHIA	OCT-02-2001	OCT-02-2006	3291	ABRASIVE PRODUCTS	MS4	DELAWARE

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
62	PAR210006	JOWITT & ROGERS COMP	9400 STATE RD 19114	PHILADELPHIA	N/A	SEP-18-2001	3291	ABRASIVE PRODUCTS	MS4	DELAWARE
63	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
64	PAR600110	KAN CO METALS BRIDGE	2275 BRIDGE ST 19137	PHILADELPHIA	N/A	MAY-31-2015	5093	SCRAP AND WASTE MATERIALS	CSO	FRANKFORD
65	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
66	PAR120025	KRAFT FOODS GLOBAL	12000 E ROOSEVELT BLVD, PHILADELPHIA, PA 19116	PHILADELPHIA	N/A	APR-30-2017	2051/2 052	BREAD AND OTHER BAKERY PRODUCTS/COO KIES AND CRACKERS	MS4	POQUESSING
67	PAR110048	KURZ HASTINGS INCORPORATED	10901 DUTTON ROAD, PHILADELPHIA, PA 19154	PHILADELPHIA	DEC-09-1998	DEC-09-2003	3999	MANUFACTURI NG INDUSTRIES, NOT ELSEWHERE CLASSIFIED	MS4	POQUESSING
68	PAR600115	KUUSAKOSKI PHILA ORTHODOX FAC	3150 ORTHODOX ST, PHILADELPHIA PA 19137	PHILADELPHIA	JUL-26-2011	JUL-31-2016	4953	REFUSE SYSTEMS	CSO	DELAWARE
69	PAR110042	L3 COMMUNICATI ONS ROOSEVELT BLVD FAC	13500 ROOSEVELT BOULEVARD, PHILADELPHIA, PA 191164299	PHILADELPHIA	MAY-22-2001	MAY-22-2006	3613	SWITCHGEAR AND SWITCHBOARD APPARATUS	MS4	POQUESSING

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
70	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
71	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
72	PAR600066	LKQ PENN MAR W PASSYUNK	PO BOX 5346, PHILADELPHIA PA 19153	PHILADELPHIA	N/A	JUL-31-2014	5015	MOTOR VEHICLE PARTS, USED	CSO	DELAWARE
73	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
74	PAR600057	MICHAEL MACHINO DBA	OSCARS AUTO PARTS/PASSYU NK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	APR-01-2005	MAR-31-2010	5015	MOTOR VEHICLE PARTS, USED	MS4	SCHUYLKILL
75	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
76	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
77	PAR600105	NDV RECYCLING N 2ND ST FAC	3630 N 2ND ST 19140	PHILADELPHIA	N/A	JUN-30-2014	5093	SCRAP AND WASTE MATERIALS	CSO	FRANKFORD
78	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
79	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
80	PA0026689	NORTHEAST WPCP	3900 RICHMOND STREET, PHILADELPHIA, PA 19137	PHILADELPHIA	JUL-07-2000	JUL-07-2005	4952	SEWERAGE SYSTEMS	MS4	TACONY
81	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
82	PA0058483	PAID POWER PLANT NCCW	PHILA NAVAL BUSINESS CENTER, PHILADELPHIA, PA 19112	PHILADELPHIA	NOV-02-2010	NOV-30-2015	9532	ADMINISTRATION OF URBAN PLANNING AND COMMUNITY AND RURAL DEVELOPMENT	CSO	DELAWARE
83	PA0012572	PAPERWORKS INDUSTRIES INC	5000 FLAT ROCK ROAD, PHILADELPHIA, PA 19127	PHILADELPHIA	JUN-18-2004	JUN-30-2009	2631	PAPERBOARD MILLS	NON-CONTRIBUTING	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
84	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
85	PAR600093	PENNSYLVANIA AUTO SALVAGE INC	4001 ASHLAND ST 19124	PHILADELPHIA	N/A	NOV-30-2011	N/A	N/A	MS4	FRANKFORD
86	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
87	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
88	PAR900024	PGW PASSYUNK PLANT	3100 W PASSYUNK AVE, PHILADELPHIA, PA 191455208	PHILADELPHIA	JUN-01-2006	MAY-31-2011	4925	MIXED, MANUFACTURE D, OR LIQUEFIED PETROLEUM GAS PRODUCTION AND/OR DISTRIBUTION	CSO	SCHUYLKILL
89	PA0058483	PHILA AUTH FOR INDUSTRIAL DEV	PHILA NAVAL BUSINESS CENTER 19112	PHILADELPHIA	N/A	NOV-30-2015	9532	ADMINISTRATIO N OF URBAN PLANNING AND COMMUNITY AND RURAL DEVELOPMENT	NON-CONTRIBUTING	DELAWARE

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
90	PA0012882	PHILA GAS WORKS RICHMOND PLT	3100 EAST VENANGO STREET, PHILADELPHIA, PA 191346192	PHILADELPHIA	MAR-29-2005	MAR-31-2010	4925	MIXED, MANUFACTURE D, OR LIQUEFIED PETROLEUM GAS PRODUCTION AND/OR DISTRIBUTION	CSO	DELAWARE
91	PAG100021	PHILA INTL AIRPORT PIPELINE RELOCATIOIN PROJ	8000 ESSINGTON AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	N/A	N/A	N/A	N/A	MS4	SCHUYLKILL
92	PA0026662	PHILA SOUTHEAST POTW	25 PATTISON AVENUE, PHILADELPHIA, PA 19148	PHILADELPHIA	JUL-07-2000	JUL-07-2005	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
93	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
94	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
95	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
96	PAR900013	PHILADELPHIA CITY WATER DEPT	NE/WPCP, PHILADELPHIA, PA 19137	PHILADELPHIA	OCT-07-2002	OCT-31-2007	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
97	PAR900019	PHILADELPHIA CITY WATER DEPT	SOUTHWEST WPC PLANT 19153	PHILADELPHIA	N/A	OVT-30-2007	4952	SEWERAGE SYSTEMS	NON-CONTRIBUTING	SCHUYLKILL
98	PA0054712	PHILADELPHIA MS4	1101 MARKET STREET, PHILADELPHIA, PA 19107	PHILADELPHIA	SEP-30-2005	SEP-30-2010	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
99	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
100	PA0244431	PHILADELPHIA NAVAL SHIPYARD	5195 SOUTH 19TH STREET 19112	PHILADELPHIA	N/A	JUL-31-2013	3731	SHIP BUILDING AND REPAIRING	NON-CONTRIBUTING	DELAWARE
101	PAR900020	PHILADEPHIA WATER DEPT	SE WPCP, PHILADELPHIA, PA 19148	PHILADELPHIA	OCT-07-2002	OCT-31-2007	4952	SEWERAGE SYSTEMS	CSO	DELAWARE
102	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
103	PA0011428	PLAINS PRODUCTS TERMINALS	1620 S 51ST ST, PHILADELPHIA, PA 19143	PHILADELPHIA	N/A	JUN-30-2014	2911	PETROLEUM REFINING	MS4	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRED DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
104	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
105	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
106	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
107	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
108	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
109	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
110	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
111	PAR800163	SAVAGE SVC E OREGON	52 E OREGON AVE 19148	PHILADELPHIA	N/A	AUG-31-2015	4321	TERMINAL AND JOINT TERMINAL MAINTENANCE FACILITIES FOR MOTOR FREIGHT TRANSPORTATI ON	CSO	DELAWARE
112	PAR800033	SEPTA	ALLEGHENY GARAGE, PHILADELPHIA, PA 19129	PHILADELPHIA	AUG-22-1996	AUG-22-2001	4111	LOCAL AND SUBURBAN TRANSIT	MS4	SCHUYLKILL
113	PAR800035	SEPTA	ROBERTS AVE FAC, PHILADELPHIA, PA 19129	PHILADELPHIA	FEB-01-2005	JAN-31-2010	4111	LOCAL AND SUBURBAN TRANSIT	MS4	SCHUYLKILL
114	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
115	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
116	PAR600025	SPC PENROSE AVE FAC	26TH STREET AND PENROSE AVENUE, PHILADELPHIA, PA 19145	PHILADELPHIA	JAN-28-2002	JAN-28-2007	5023	HOMEFURNISHI NGS	CSO	SCHUYLKILL
117	PAR600111	STEFFA METALS CHURCH ST FAC	2190 CHURCH ST 19124	PHILADELPHIA	N/A	SEP-30-2015	5015	MOTOR VEHICLE PARTS, USED	CSO	FRANKFORD
118	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
119	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
120	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
121	PA0011533	SUNOCO GIRARD POINT PROCESSING AREA	3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145	PHILADELPHIA	FEB-07-2006	FEB-28-2011	2911	PETROLEUM REFINING	CSO	SCHUYLKILL
122	PA0012629	SUNOCO, INC.-POINT BREEZE REFINERY	3144 PASSYUNK AVENUE 19145	PHILADELPHIA	N/A	JAN-31-2011	2911	PETROLEUM REFINING	NON-CONTRIBUTING	SCHUYLKILL

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
123	PAR120008	SWEET OVATIONS TOMLINSON RD FAC	1741 TOMLINSON RD, PHILADELPHIA, PA 19116	PHILADELPHIA	JUN-06-2011	JUN-30-2016	2033	CANND FRUITS, VEGETABLES, PRESERVES, JAMS, AND JELLIES	MS4	POQUESSING
124	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
125	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
126	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
127	PAR800148	TRANSRIVER PHILADELPHIA	3600 SOUTH 26TH ST 19145	PHILADELPHIA	N/A	JUL-31-2014	4212	LOCAL TRUCKING WITHOUT STORAGE	NON-CONTRIBUTING	SCHUYLKILL
128	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

	NPDES ID	FACILITY NAME	ADDRESS	COUNTY	PERMIT ISSUED DATE	PERMIT EXPIRE D DATE	SIC CODE	SIC DESC	CSO/SW AREA	RECEIVING WATERBODY
129	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 ESTABLISHMEN TS OF THE UNITED STATES POSTAL SERVICE.	MS4	POQUESSING
130	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
131	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
132	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
133	PAR700020	121 POINT BREEZE TERMINAL	6310 PASSYUNK AVE, PHILADELPHIA, PA 19153	PHILADELPHIA	OCT-25-2011	OCT-31-2016	5171	PETROLEUM BULK STATIONS AND TERMINALS	MS4	SCHULYKILL

Appendix K –

PWD Quarterly Dry Weather Water Quality Monitoring Program

Background

In 2009, the Philadelphia Water Department (PWD) initiated a dry weather water quality sampling program designed to work in tandem with the continuous data collection efforts of the PWD/USGS Cooperative Continuous Water Quality Monitoring Program. Grab samples are collected from 10 sites covering all six of Philadelphia County's watersheds on a quarterly basis by the staff of PWD's Bureau of Laboratory Services (BLS). Data collected through this program are most pertinent to Target A (Dry Weather Water Quality & Aesthetics) of PWD's Integrated Watershed Management Plan (IWMP) Strategy, as outlined in the following section.

The IWMP Target Strategy

IWMPs are designed to meet the goals and objectives of numerous water resources-related regulations and programs. Each IWMP results in a series of implementation recommendations that utilize adaptive management approaches to achieve measurable, watershed-wide benefits. By working with stakeholder groups to prioritize goals and evaluate options, PWD has learned that stakeholder priorities can at times differ from those identified by the data-driven problem identification process. This can present challenges in development and approval of a management alternative for watershed implementation. PWD has developed an approach that addresses what often emerges as a set of high-priority stakeholder concerns while simultaneously addressing the scientifically defined priorities.

By defining three distinct targets to meet the overall plan objectives, priorities identified by stakeholders can be addressed simultaneously with those identified through scientific data. Two of the targets were defined so they could be fully met through implementation of a limited set of options, while the third target would be best addressed through an adaptive management approach. In addition to the three targets, a fourth category has been developed to capture the more programmatic implementation options related to planning, outreach, reporting and continuation of the Watershed Partnership.

Targets are defined here as groups of objectives that each focus on a different problem related to the urban stream system. They can be thought of as different parts of the ultimate goal of fishable and swimmable waters through improved water quality, more natural flow patterns and restored aquatic and riparian habitat. Targets are specifically designed to help focus plan implementation. By defining these targets, and designing alternatives and an implementation plan to address the targets simultaneously, the plan will have a greater likelihood of success. It also achieves some of the objectives within a relatively short time frame, providing incentives to the communities and agencies involved in the restoration, as well as immediate benefits to the people living in the watershed. PWD's IWMP planning targets are defined below:

3 Targets of the IWMP

- Aesthetically appealing, accessible streams during dry weather
- Improved stream habitat for fish and macroinvertebrates
- Wet weather water quality that meets fishable and swimmable criteria

Program Support

A number of implementation options deemed appropriate for a given watershed are "programmatic" in nature. While these options may support achievement of Targets A, B, and/or C, implementation of these options alone would not result in achievement of a particular target. These "Program Support" associated options include items such as monitoring, reporting, feasibility studies, outreach/education, and continuation of the Watershed Partnership.

Target A: Dry Weather Water Quality and Aesthetics

Streams should be aesthetically appealing (look and smell good), accessible to the public, and an amenity to the community. Target A was defined with a focus on eliminating sources of sewage discharge and other pollution during dry weather, along with trash removal and litter prevention. Access and interaction with the stream during dry weather has the highest priority, because dry weather flows occur about 60-65% of the time during the course of a year. These are also the times when the public is most likely to be near or in contact with the stream. In dry weather, stream water quality should be similar to background concentrations in groundwater, particularly with respect to bacteria.

Figure 1. Eroded stream bank at Poquessing Creek

Target B: Healthy Living Resources

Improvements to the number, health, and diversity of benthic macroinvertebrate and fish species need to focus on habitat improvement and the creation of refuges for organisms to avoid high velocities during storms. Fluvial geomorphological studies, wetland and streambank restoration/creation projects, and stream modeling should be combined with continued biological monitoring to ensure that correct procedures are implemented to increase habitat heterogeneity within the aquatic ecosystem.

Improving the ability of an urban stream to support viable habitat and fish populations focuses primarily on the elimination or remediation of the more obvious impacts of urbanization on the stream. These include loss of riparian habitat, eroding and undercut banks, scoured streambed or excessive sediment deposits, channelized and armored stream sections, trash buildup, and invasive species. Thus, the primary tool to accomplish Target B is stream restoration.

Target C: Wet Weather Water Quality and Quantity

The third target is to restore water quality to meet fishable and swimmable criteria during wet weather. Improving water quality and flow conditions during and after storms is the most difficult target to meet in the urban environment. During wet weather, extreme increases in streamflow are common, accompanied by short-term changes in water quality. Where water quality and quantity problems exist, options may be identified that address both. Any stormwater management practice that increases infiltration or detains flow will help decrease the frequency of damaging floods; however, the size of such structures may need to be increased in areas where flooding is a major concern. (Reductions in the frequency of erosive flows and velocities will also help protect the investment in stream restoration made as part of Target B.)

Target C must be approached somewhat differently from Targets A and B. Full achievement of this target means meeting all water quality standards during wet weather, as well as elimination of flood-related issues. Meeting these goals will be difficult. It will be expensive and requires a long-term effort. A rational approach to achieve this target includes stepped implementation with interim goals for reducing wet weather pollutant loads and stormwater flows, along with monitoring for the efficacy of control measures.

Monitoring Locations

Water quality samples are taken at 10 USGS gage sites in the USGS/PWD Cooperative Monitoring Program (Figure 1). Site identification codes used by PWD’s Bureau of Laboratory Services (BLS)

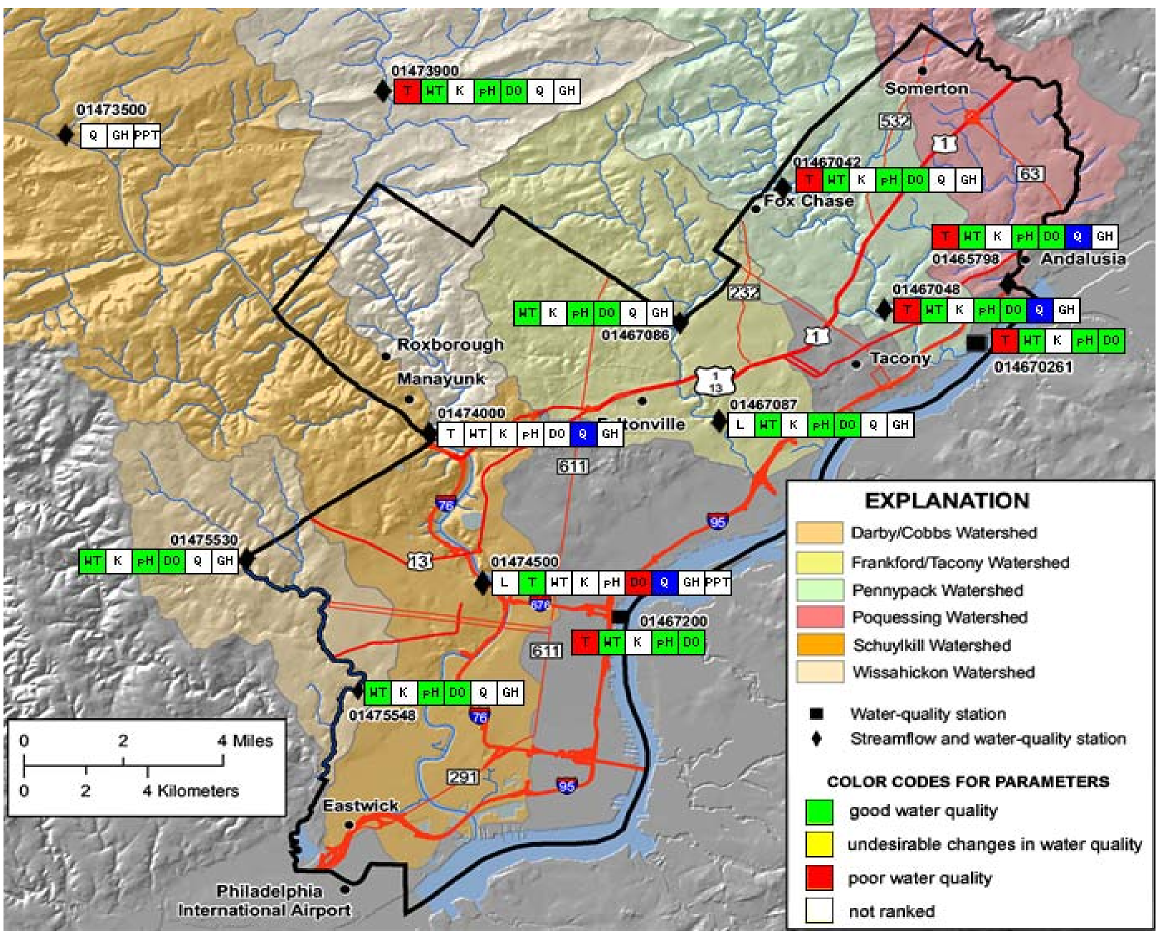

Figure 2. Philadelphia Water Quality Gage Stations as Viewed on Cooperative USGS-PWD Website (http://pa.water.usgs.gov/pwd/).

and rivermile-based site ID codes 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 discharge data being collected year-round at these sites for loading estimate purposes. Furthermore, grab sample results and field meter readings taken at the time of grab sampling may be invaluable when evaluating continuous water quality data from these USGS gages.

PWD is implementing a City-wide approach to dry weather water quality monitoring, rather than focusing on an individual watershed. Because a number of Green Stormwater Infrastructure (GSI) and other stormwater management projects are in the early stages of implementation, water quality benefits will only be observable over a period of several years. Gauging the success of such projects on a more immediate scale is best accomplished solely by hydrological analysis. Therefore, the strategic value of the widespread sampling approach is that as more GSI projects are completed over the coming years, the water quality data should gradually begin to reflect their positive environmental impacts.

Table 1. Monitoring Locations in the PWD/USGS Cooperative Program with Location IDs used by PWD Bureau of Laboratory Services and River Mile-Based Site IDs.

Description	USGS Gage #	BLS Location ID	Site ID
Cobbs Creek at US Rte. 1 (City Line Ave.)	01475530	COBB700	DCC770
Cobbs Creek at Mt. Moriah Cemetery	01475548	COBB355	DCC251
Schuylkill River at Fairmount Dam	01474500	SCHU154	SC825
Wissahickon Creek at Ft Washington (Rte. 73)	01473900	WISS500	WS1075
Wissahickon Creek at Ridge Ave.	01474000	WISS130	WS076
Tacony Creek at Castor Ave.	01467087	TACO250	TF280
Tacony Creek at Adams Ave.	01467086	TACO435	TF597
Pennypack Creek at Pine Rd.	01467042	PENN407	PP993
Pennypack Creek at Rhawn St.	01467048	PENN175	PP340
Poquessing Creek at Grant Ave.	01465798	POQU150	PQ050

Table 2. PWD/USGS Quarterly Dry Weather Grab Sample Dates

Sample date	Season	Recreational Use Season
30-Jun-09	summer	Swimming
02-Oct-09	fall	Non-Swimming
17-Dec-09	winter	Non-Swimming
11-Mar-10	spring	Non-Swimming
22-Jun-10	summer	Swimming
15-Sep-10	fall	Swimming
20-Dec-10	winter	Non-Swimming
29-Mar-11	spring	Non-Swimming
27-Jun-11	summer	Swimming
15-Sep-11	fall	Swimming
13-Dec-11	winter	Non-Swimming
20-Mar-12	spring	Non-Swimming
18-Jun-12	summer	Swimming

Quarterly Dry Weather Monitoring July 2009 – June 2012

Sample Collection Dates

This report summarizes cumulative results from 13 sets of quarterly grab samples that were collected from June 2009 through June 2012. Samples were categorized by season (winter, spring, summer, fall) as well as according to PA DEP seasonal recreational use water quality criteria for interpretation of microbial sample results (Non-Swimming season or Swimming season) (Table 2). PWD is not aware of any spills, discharges or unusual conditions that would cause misleading results in the water quality data from any of these grab samples.

Nutrient Analysis

The macronutrients phosphorus and nitrogen are essential to the growth and overall survival of all plants. However, when occurring in surplus they can be extremely detrimental to aquatic ecosystems, and in turn to the human population that utilizes these water bodies for drinking water and recreational activities such as fishing, boating, and swimming. Elevated nutrient concentrations in rivers and streams can most often be attributed to anthropogenic pollution sources. In these situations, the most common sources of both nutrients are runoff from fertilized lawns/farmland and wastewater discharge.

The most immediate result of excessive nutrient concentrations in any natural water body is excessive plant growth, seen in a variety of growth forms from suspended algae to aquatic macrophytes. As the first step in the process of eutrophication, this unnatural acceleration of aquatic plant growth can start a chain reaction leading to highly adverse effects to that ecosystem. For example, in small shallow streams, unnaturally high densities of algal periphyton can cause pronounced fluctuations in dissolved oxygen and pH and also adversely affect aquatic habitat by forming thick mats of filamentous algae or algal scums on stream substrates. Moreover, alteration of the algal community structure can lead to the proliferation of nuisance taxa, taste and odor problems in the drinking water supply, increased water treatment costs and, in rare cases, production of toxins (*e.g.*, from cyanobacteria blooms). As a result of these direct and indirect responses, streams and rivers can suffer severe impacts to both aquatic biodiversity and human recreational use.

It should be noted that several phosphorus-containing compounds, known as polyphosphates, can be found in the region's waterways, but they are naturally occurring and are present due to the geologic composition of the area. Furthermore, these polyphosphates pose little ecological threat as they are not present in a biologically available form. Only over long periods of time can these compounds be broken down into orthophosphates, which plants and algae can absorb and utilize for growth. Therefore, aside from the relatively minor contributions of the region's geology, the most significant source of orthophosphates in rivers and streams is human-generated pollution. It is for this reason that orthophosphates, along with nitrates, are included as components of this water quality monitoring program. These forms of N and P are readily available to stream producers.

Ammonia, present in surface waters as un-ionized ammonia gas (NH_3) or as ammonium ion (NH_4^+), is produced by deamination of organic nitrogen-containing compounds such as proteins, and also by hydrolysis of urea. In the presence of oxygen, ammonia is converted to nitrate (NO_3^-) by a pair of bacteria-mediated reactions, together known as the process of nitrification. Nitrification occurs quickly in oxygenated waters with sufficient densities of nitrifying bacteria, effectively reducing ammonia concentration, although at the expense of increased NO_3^- concentration. Ammonia is a primary form of nitrogen produced from excretory waste products and other organic material in sewage. Thus, presence of ammonia can be an indicator of sewage pollution. As ammonia is converted to nitrate in oxygenated streams, ammonia is a non-conservative pollution indicator that tends to decrease in concentration with increasing distance from the source of pollution. PA DEP water quality criteria for NH_3 reflect the relationship between stream pH, temperature, and ammonia dissociation. Ammonia toxicity is inversely related to hydrogen ion [H^+] concentration (*e.g.*, an increase in pH from 7 to 8 increases NH_3 toxicity by approximately an order of magnitude). At pH 9.5 and above, even background concentrations of NH_3 may be considered potentially toxic.

Ammonia may be introduced to streams through fertilizers, breakdown of natural organic material, stables and livestock operations, stormwater runoff, and in some cases from more serious anthropogenic sources of untreated sewage such as defective laterals, crossed/illicit connections, and sanitary sewer overflows (SSOs). PWD has established intensive field infrastructure trackdown, infrared photography, sewer camera monitoring, and dye testing programs to identify and correct these problems where and when they occur.

Nutrient Results

Nutrient data collected thus far at each of the sites are generally consistent with the data collected for Comprehensive Characterization Reports (CCRs) prepared for each of the respective watersheds. Five of 10 sites are not affected by treated wastewater discharges and had orthophosphate concentration less than the reporting limit, which was 0.1 mg/L for samples collected in July 2009 and 0.05 mg/L for the remaining 12 quarterly samples collected to date (Figure 3). 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

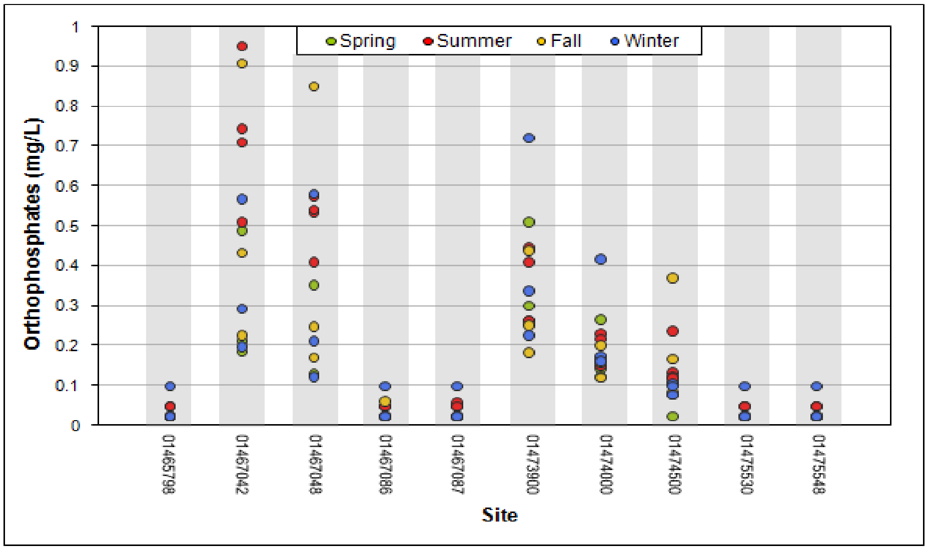

Figure 3. Orthophosphate concentration at 10 USGS gage stations, July 2009-June 2012

treated wastewater. Dilution effects were seen between upstream and downstream gages, particularly in the cases of Pennypack and Wissahickon Creeks. Though the Schuylkill River sampling station is downstream from several discharges of treated wastewater, nutrient concentrations are generally smaller than those observed from the Pennypack and Wissahickon Creeks, perhaps reflecting the Schuylkill station's much larger overall watershed size and accompanying dilution capacity.

Summary statistics for the orthophosphate samples, including results from the application of the PA DEP Chemistry Statistical Assessments protocol (PA DEP, 2007), are shown in Table 3. Exceedances were evaluated relative to the US EPA (2000) Subecoregion 64 guideline for orthophosphate of 0.02625 mg/L, *i.e.*, the median of the 25th percentile seasonal concentrations. Since the detection limit is greater than the guideline, all non-detected samples were considered "possible exceedances." The nonparametric statistical assessment results show that the locations at Pennypack and Wissahickon Creeks, and the Schuylkill River, failed to attain water quality consistent with this guideline. The other locations are classified as needing further evaluation due to the predominance of samples below the detection limit that are all possible exceedances.

Table 3. Orthophosphate Summary Statistics and Assessments. (Concentrations in mg/L)

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceedances	Possible Exceedances	Assessment
01465798	0.037	0.025	0.022	0.025	0.100	13	13	0	13	Needs more evaluation
01467042	0.494	0.486	0.271	0.186	0.953	13	0	13	0	Non-attaining
01467048	0.373	0.349	0.230	0.120	0.852	13	0	13	0	Non-attaining
01467086	0.039	0.025	0.022	0.025	0.100	13	12	1	12	Needs more evaluation
01467087	0.039	0.025	0.022	0.025	0.100	13	12	1	12	Needs more evaluation
01473900	0.353	0.302	0.149	0.181	0.723	13	0	13	0	Non-attaining
01474000	0.193	0.166	0.078	0.120	0.414	13	0	13	0	Non-attaining
01474500	0.131	0.111	0.087	0.025	0.367	13	2	11	2	Non-attaining
01475530	0.037	0.025	0.022	0.025	0.100	13	13	0	13	Needs more evaluation
01475548	0.037	0.025	0.022	0.025	0.100	13	13	0	13	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 4). 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 PA DEP Chemistry Statistical Assessment protocol (PA DEP, 2007), are shown in Table 4. Exceedances were evaluated relative to a) the PA DEP water quality standard for nitrite and nitrate of 10 mg/L, and b) the US EPA (2000) subecoregion 64 guideline for nitrite and nitrate of 0.995 mg/L, *i.e.*, the median of the 25th percentile seasonal concentrations. The nonparametric statistical assessment results show that with respect to the PA DEP standard, all locations were in attainment except the upstream Wissahickon gage. One exceedance at 12 mg/L was observed at that site, and more data is needed to make an evaluation. All sites failed to attain water quality consistent with the US EPA subecoregion-based guideline.

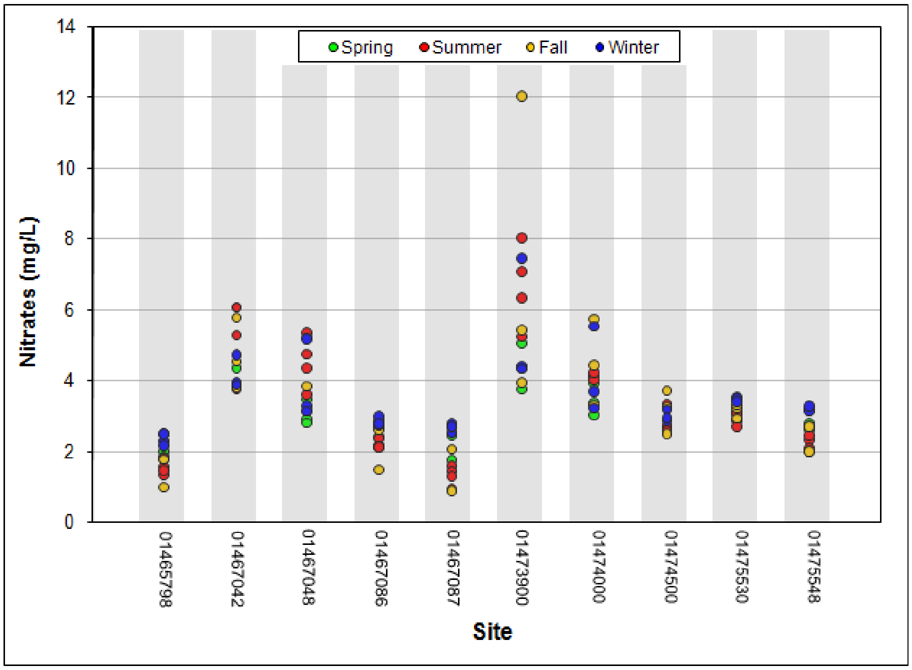

Figure 4. Nitrate concentration at 10 USGS gage stations, July 2009-June 2012

Table 4. Nitrate Summary Statistics and Assessments. Concentrations are in mg/L.

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceedances, PADEP	Exceedances, Subecoregion	PADEP Assessment	EPA Subecoregion Assessment
01465798	1.859	1.807	0.437	1.027	2.491	13	0	0	13	Attaining	Non-attaining
01467042	4.640	4.347	0.896	3.798	6.104	13	0	0	13	Attaining	Non-attaining
01467048	3.940	3.596	0.925	2.840	5.346	13	0	0	13	Attaining	Non-attaining
01467086	2.419	2.403	0.412	1.517	2.974	13	0	0	13	Attaining	Non-attaining
01467087	1.988	2.098	0.700	0.891	2.767	13	0	0	11	Attaining	Non-attaining
01473900	5.969	5.280	2.282	3.786	12.039	13	0	1	13	Needs more evaluation	Non-attaining
01474000	4.075	4.014	0.828	3.032	5.770	13	0	0	13	Attaining	Non-attaining
01474500	2.949	2.872	0.391	2.499	3.747	13	0	0	13	Attaining	Non-attaining
01475530	3.157	3.113	0.253	2.711	3.521	13	0	0	13	Attaining	Non-attaining
01475548	2.657	2.701	0.469	2.001	3.280	13	0	0	13	Attaining	Non-attaining

Quarterly dry-weather analysis of ammonia began in the fall of 2011, limiting the size of the current dataset to four results per location. PWD laboratory reporting limits for ammonia fluctuated based on the performance of lab analytical equipment with spiked and blank samples. Ammonia concentration detection limits were 0.5 mg/L for the fall 2011 sample set, and the subsequent three sample set results had detection limits of 0.1 mg/L. Ammonia concentration exceeded the detection limit in only 3 of the 40 samples: At the downstream Tacony site (01467087), concentrations of 0.289 mg/L and 0.189 mg/L were detected during spring and summer, respectively; at the downstream Pennypack site (01467048), a concentration of 0.108 mg/L was detected during the summer.

There were no observed violations of ammonia water quality criteria at any site during this limited period of dry-weather monitoring. With 37 of the 40 sample results characterized as non-detects due to laboratory reporting limits, ammonia criteria was calculated with corresponding temperature and pH values to determine if possible exceedances existed (i.e., the criteria fell below the detection limit). None of the non-detect samples had the potential to violate water quality criteria.

Microbial Analysis

Fecal indicator bacteria, found naturally in the gut of warm-blooded animals, can be used in detection of human or animal waste contamination in a body of water. While these bacteria themselves are generally harmless to humans, they are considered to be very reliable indicators of the presence of other, more serious fecal-borne pathogens such as viruses, protozoa and other bacteria. The extent to which a water body is contaminated with fecal indicator bacteria can indicate the likelihood that the water has been contaminated by human or animal wastes. In urban environments, the most likely dry weather pollution sources are domestic animals, wildlife and untreated sewage from improperly connected or leaking sanitary sewers.

PWD performs three fecal indicator bacteria tests, including fecal coliform, *Escherichia coli (E. coli.)*, and enterococci. The fecal coliform test covers a relatively wide subgroup of fecal-specific bacteria; however, it does include some species that are not necessarily fecal in origin. *E. coli*, on the other hand, is a single coliform species that is noteworthy due to the fact that it occurs only in the fecal matter of humans and other warm-blooded animals. This qualifies *E. coli* as an excellent indicator of human waste. The final coliform group tested, the enterococci, are significant in that they tend to mimic many enteric pathogens with their ability to thrive in saline conditions over a wide range of temperatures. This makes the enterococci test very useful in waterways that may have a marine influence, or in any 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 (colony forming unit) per 100mL. During the non-swimming season, this value increases to 2000 CFU/100mL.

While samples were collected on a quarterly basis and not within a 30-day period as required by PA DEP water quality criteria, results of microbial analyses from the six swimming season samples generally indicate fecal coliform geometric means greater than 200CFU/100mL (Table 5). The only exceptions were the downstream Wissahickon Creek and Schuylkill River gage sites, which each had fecal coliform geometric means less than 200 CFU/100mL, based on six 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 seven 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 six of the 10 sites. The enterococci geometric mean guideline was exceeded at eight of the 10 sites (Table 6).

Table 5. Fecal Coliform Geometric Mean Results and PA DEP Water Quality Recreational Use Criteria Achievement Status by Season

Gage	n	n, non-detects	Geometric mean (CFU/100 mL)	Season	Achieving Standard
1465798	7	1	56	non-swimming	Yes
1465798	6	0	507	swimming	No
1467042	7	1	28	non-swimming	Yes
1467042	6	0	330	swimming	No
1467048	7	0	305	non-swimming	Yes
1467048	6	0	2008	swimming	No
1467086	7	0	293	non-swimming	Yes
1467086	6	0	1350	swimming	No
1467087	7	0	202	non-swimming	Yes
1467087	6	0	659	swimming	No
1473900	7	0	46	non-swimming	Yes
1473900	6	0	324	swimming	No
1474000	7	1	18	non-swimming	Yes
1474000	6	0	175	swimming	Yes
1474500	7	1	26	non-swimming	Yes
1474500	6	2	74	swimming	Yes
1475530	7	1	99	non-swimming	Yes
1475530	6	0	359	swimming	No
1475548	7	0	82	non-swimming	Yes
1475548	6	0	1060	swimming	No

Table 6. *E. Coli* and Enterococci Geometric Mean Results and US EPA Recreational Use Water Quality Guideline Achievement

	n, non-detects		Geometric mean (CFU/100 mL)		Achieving Guideline	
Gage	**E. coli**	**Enterococci**	**E. coli**	**Enterococci**	**E. coli**	**Enterococci**
01465798	1	0	132	88	No	No
01467042	1	0	73	58	Yes	No
01467048	0	0	637	205	No	No
01467086	1	0	326	123	No	No
01467087	0	1	234	56	No	No
01473900	0	0	99	63	Yes	No
01474000	1	1	43	21	Yes	Yes
01474500	4	2	35	8	Yes	Yes
01475530	1	0	149	213	No	No
01475548	1	0	173	92	No	No

Results for all three microbial parameters were similar seasonally, with samples collected during spring and winter generally having smaller concentrations than fall and summer samples (Figures 5 through 7). Bacteria samples collected from 2009-2012 indicate a strong correlation between fecal coliform and *E. coli* (r = 0.93), and moderate yet significant correlations between fecal coliform and enterococci (r = 0.32), and *E. coli* and enterococci (r = 0.42) (Figures 8-10).

The small number of samples limits any conclusive statements for microbial parameters at this time, particularly in the case of fecal coliform where the number of results is further reduced by categorization according to swimming vs. non-swimming season. 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.

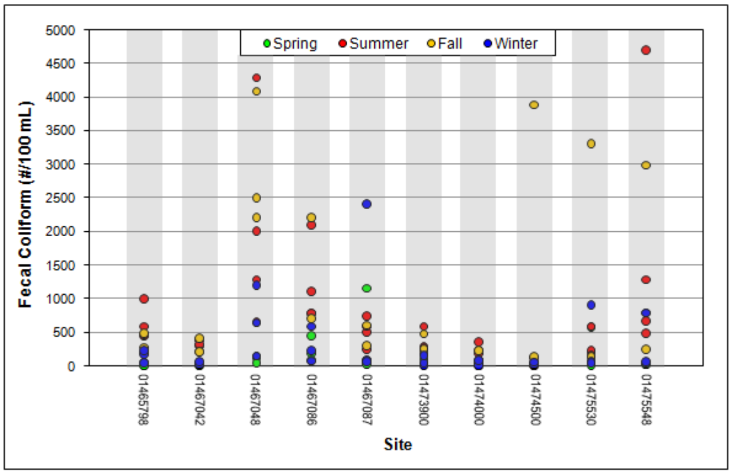

Figure 5. Fecal coliform results at 10 USGS gage stations, July 2009 - June 2012

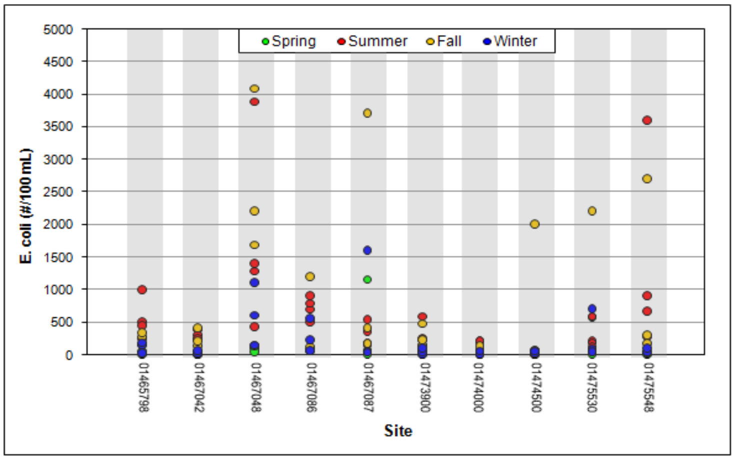

Figure 6. E. coli results at 10 USGS gage stations, July 2009 - June 2012

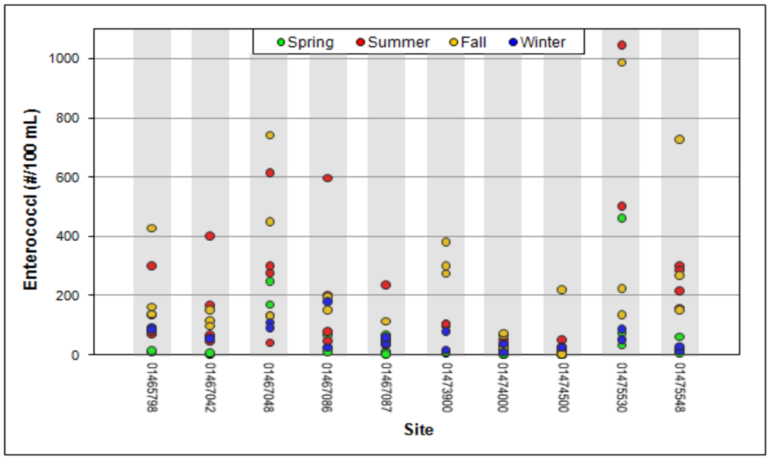

Figure 7. Enterococci results at 10 USGS gage stations, July 2009 - June 2012

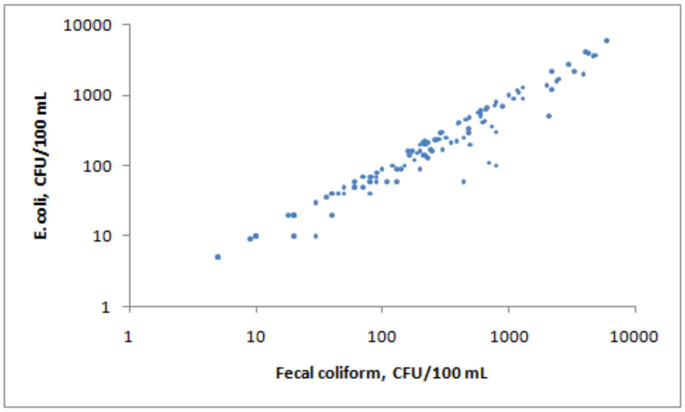

Figure 8. Scatterplot of 2009-2012 Data Correlating E. coli and Fecal coliform (x-y axes plotted in log10 scale)

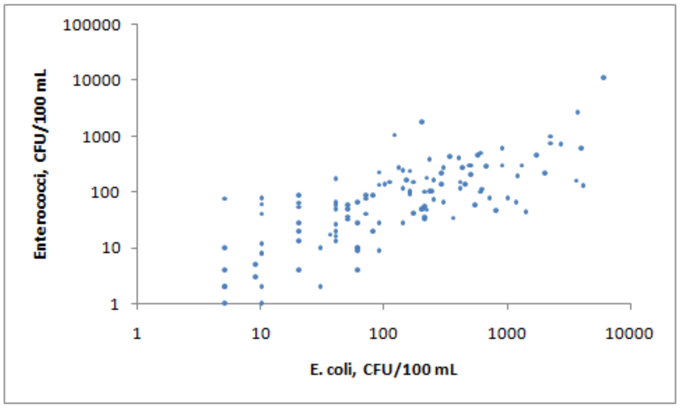

Figure 9. Scatterplot of 2009-2012 Data Correlating Enterococci and E. coli (x-y axes plotted in log10 scale)

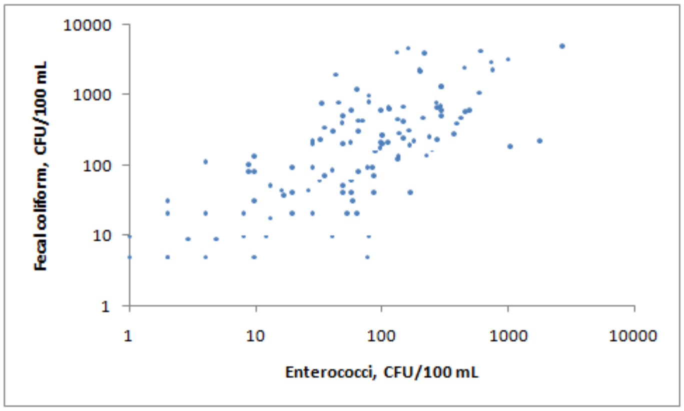

Figure 10. Scatterplot of 2009-2012 Data Correlating Enterococci and Fecal coliform (x-y axes plotted in log10 scale)

Physicochemical Analysis

In addition to nutrient and microbial analyses, a basic set of physicochemical parameters were also monitored as part of the discrete quarterly sampling program. These parameters (dissolved oxygen, pH, temperature, and specific conductance) were specifically chosen to coincide with those being measured by the USGS continuous water quality monitoring gages. These data can then be utilized as valuable field checks when analyzing continuous water quality data from USGS gages.

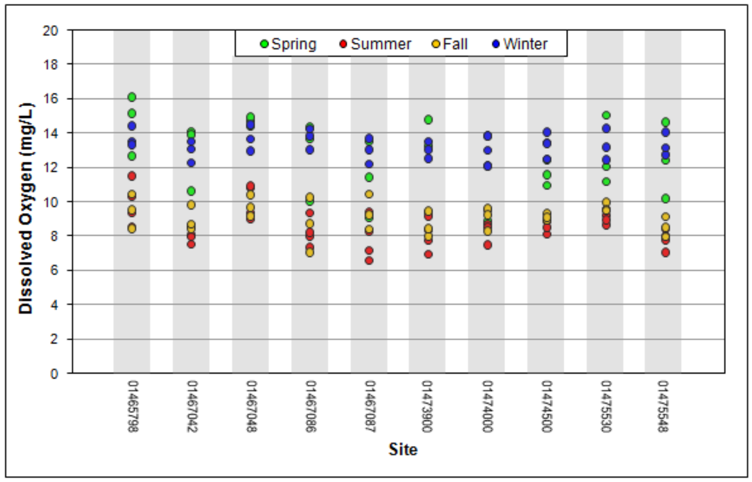

Figure 11. Dissolved oxygen results at 10 USGS gage stations, July 2009 – June 2012

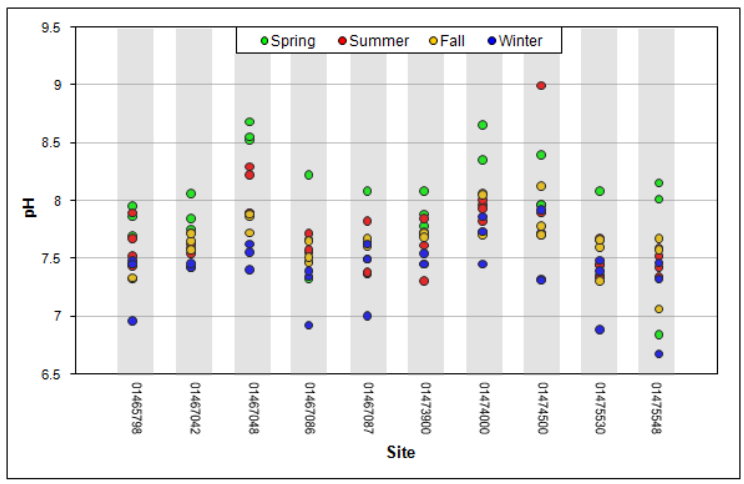

Figure 12. pH results at 10 USGS gage stations, July 2009 – June 2012

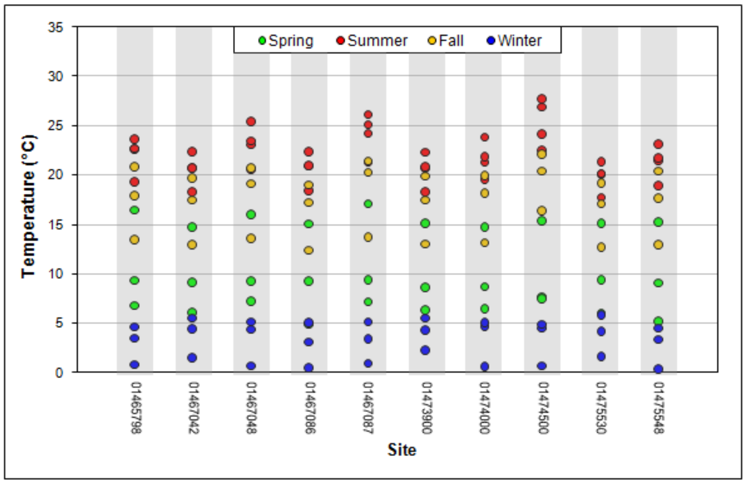

Figure 13. Temperature results at 10 USGS gage stations, July 2009 – June 2012

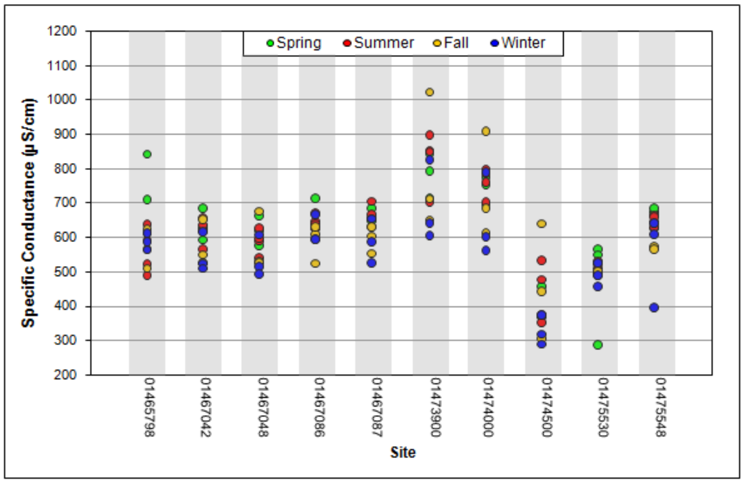

Figure 14. Specific conductance results at 10 USGS gage stations, July 2009 – June 2012

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Pennsylvania Department of Environmental Protection (PA DEP). (2007). Chemistry Statistical Assessments. Harrisburg, PA. 17 p.

United States Environmental Protection Agency (US EPA). (1986). Quality Criteria for Water. EPA 440/5/86/001. Washington, D.C. 447 p.

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Appendix L –

PWD-USGS Cooperative Water Quality Monitoring Program Annual Summary

Background

PWD and the United States Geologic Survey (USGS) have constructed and/or refurbished gaging stations in 10 locations throughout Philadelphia's watersheds. USGS staff is responsible for construction and maintenance of the gage structure, stream stage monitoring instruments, data communications, maintaining and verifying stage-discharge rating curves and pumping apparatus. PWD staff is responsible for installation and maintenance of continuous water quality instrumentation. Data collected through the PWD/USGS cooperative water quality monitoring program are disseminated through the USGS National Water Information System (NWIS) Web Interface (http://waterdata.usgs.gov/pa/nwis/nwis), as well as a website specifically dedicated to Philadelphia's watersheds (Figure 1).

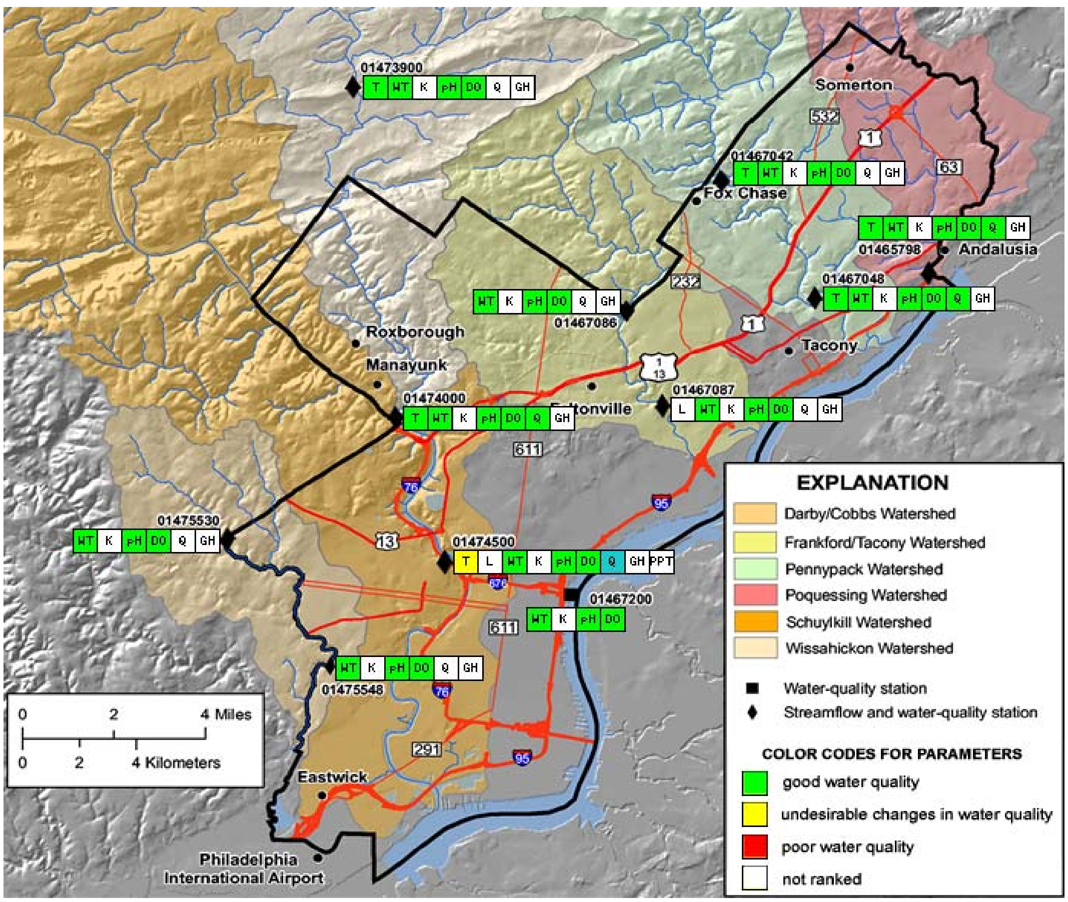


Figure 1. Philadelphia Water Quality Gauge Stations as Viewed on Cooperative USGS-PWD Website (http://pa.water.usgs.gov/pwd/).

Monitoring Locations

The PWD/USGS Cooperative Monitoring Program builds upon the widespread network of USGS gages that were formerly operated throughout Philadelphia. These gages are logically situated and/or have a continuous period of record, making them ideal for water quality monitoring purposes. Within a given watershed, downstream-most historic stations were chosen to represent water quality, as these streams flow through Philadelphia into the receiving waters (*i.e.*, the Schuylkill and Delaware Rivers).

Regarding upstream stations, three gages (Pennypack Creek at Pine Rd, Tacony Creek at Adams Ave, and Cobbs Creek at US Rte 1) are strategically located to monitor water quality of the streams as they enter Philadelphia (Figure 1). The upstream Wissahickon Creek monitoring station is located at Rte 73 in Fort Washington, which is approximately 3.7 river miles upstream of the City. This location was chosen due to its extensive period of record (Table 1). Upstream water quality is not measured in the Poquessing-Byberry Creek Watershed. The Schuylkill River gage is in an ideal location to provide data related to the Schuylkill River Fairmount Dam Fish Ladder Renovation Project and was equipped with water quality monitoring instrumentation upon project completion in early 2009.

This annual report summarizes water quality data from July 1, 2011 – June 30, 2012, excluding the period of December 2011 through February 2012, 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 2011 through March 2012. Due to routine maintenance such as cleaning and calibration, gages are periodically taken offline, usually for no more than the span of two hours, and do not collect data. In addition, the Schuylkill River gage (01474500) was closed for an extended period for fish ladder maintenance, from August 15 to October 5.

In order to summarize hydrologic conditions during the monitoring period, daily mean discharge was plotted along with the median of all daily flows for USGS gage 01474000 (Wissahickon Creek at Ridge Ave.). The period of record for this gage is 45 years. Generally speaking, summer and fall 2011 were wetter than average, with two major storm events, Hurricane Irene and Tropical Storm Lee, occurring in late August and early September, respectively. Spring 2012 was warmer and drier than average, providing ample opportunity for algal growth (Figure 2).

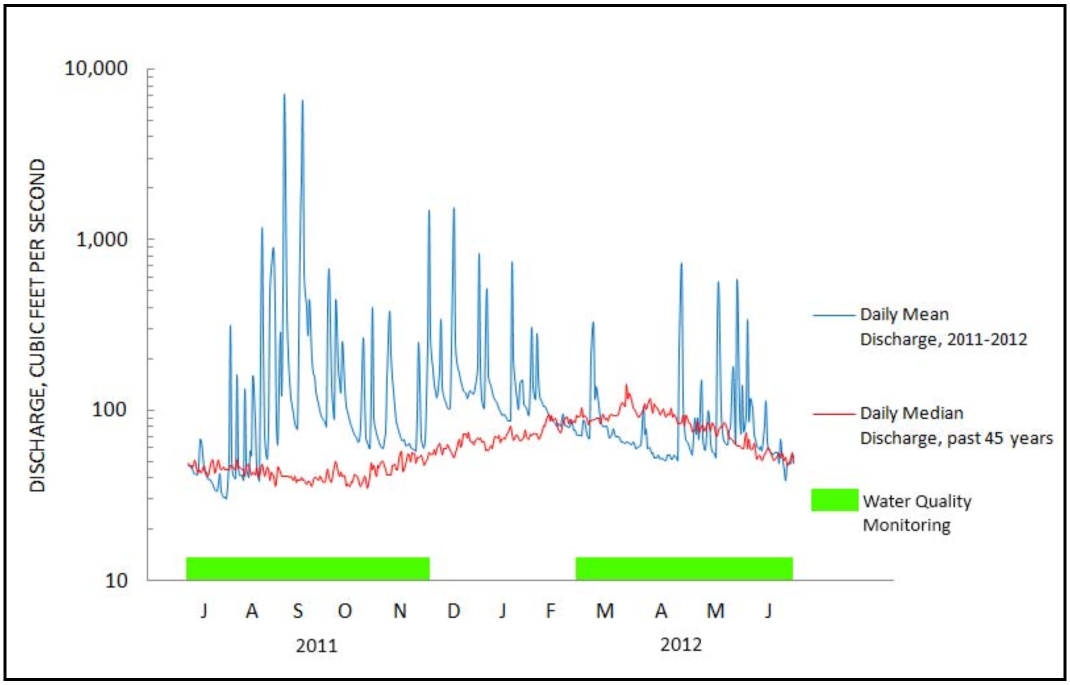


Figure 2. Daily mean flow July 1 2011-June 30 2012 and daily median flow for 45 years of record at USGS gage 01474000 (Wissahickon Creek at Ridge Ave.).

Table 1. PWD/USGS Cooperative Water Quality Monitoring Program Gages

Gage Number	Gage name	Flow Data Record
01465798	Poquessing Creek at Grant Avenue, Philadelphia, PA	July 1965 to Present
01467042	Pennypack Creek at Pine Road, Philadelphia, PA	August 1964 to September 1974; September 2007 to Present
01467048	Pennypack Creek at Lower Rhawn St Br., Philadelphia, PA	June 1965 to Present
01467086	Tacony Creek at County Line, Philadelphia, PA	October 1965 to September 1986; September 2005 to Present
01467087	Frankford Creek at Castor Ave, Philadelphia, PA	July 1982 to Present
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 10 USGS gages collecting data for multiple water quality parameters at half-hour intervals, a large amount of data are produced. PWD Office of Watersheds (OOW) staff has developed procedures for the processing and analysis of these data using Microsoft Excel and Access software, as well as R, a free software environment for statistical computing and graphics. Most aspects of the data processing and analysis have been automated with custom Visual Basic and R code.

OOW independently maintains databases of water quality and streamflow via automated regular retrievals of these data from USGS NWIS. On a monthly basis, the databases are queried and results for each gage are imported into MS Excel workbooks. If available, any field data collected during that period (*e.g.*, hand meter readings from field maintenance checks, water quality grab samples, etc.) are also imported. Once all required data have been entered, separate plots are produced for each parameter (dissolved oxygen, turbidity, pH, specific conductance, and temperature) to enable a subjective review of data quality.

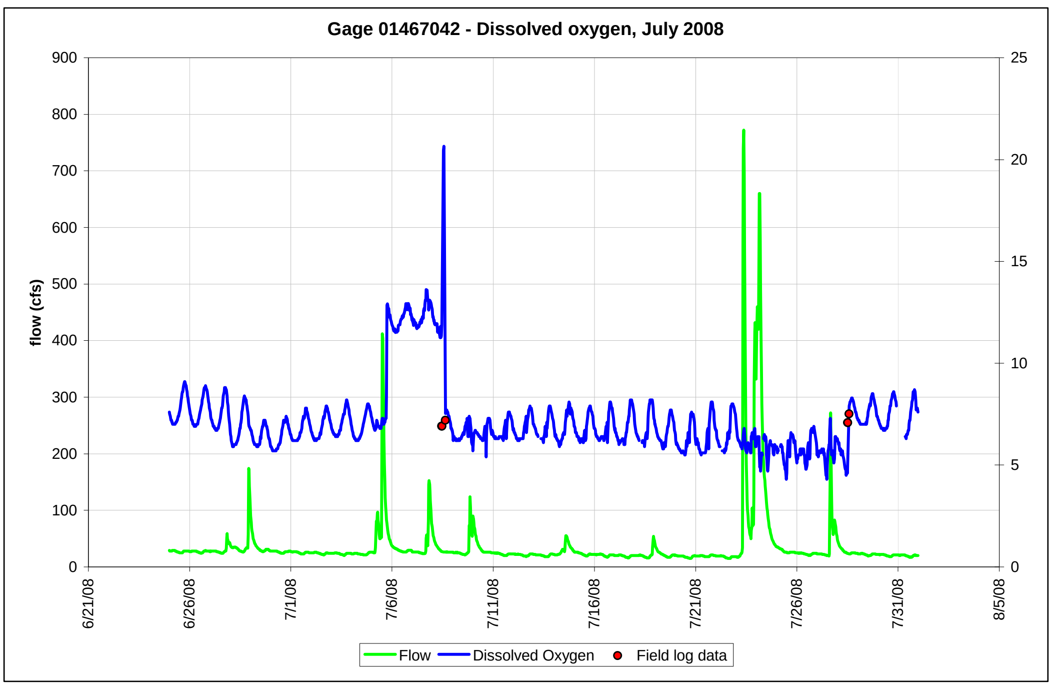


Figure 3. Example of an Excel-generated data processing/analysis plot; Gage 01467042, Dissolved Oxygen, July 2008.

These plots are examined and are the primary basis for the selection of good vs. questionable data for a given month. Intervals of questionable data are located and added to a table of "flagged" data for that particular parameter, which is then used to update the water quality database.

The final step of the procedure utilizes R, a statistical programming language and software environment. The R software code developed by OOW staff analyzes all of the water quality data in a database, as well as the good and questionable flags, and generates statistical and graphic results in a variety of forms. These include monthly plots for all data parameters for each site, showing accepted and questionable data, water quality criteria, grab sample data, and streamflow (Figure 4); assorted statistics including accepted and questionable data comparisons, monthly attainment percentages, and comparisons of wet and dry weather periods; and additional plots, including average dissolved oxygen (DO), percent DO saturation, and pH/percent DO saturation.

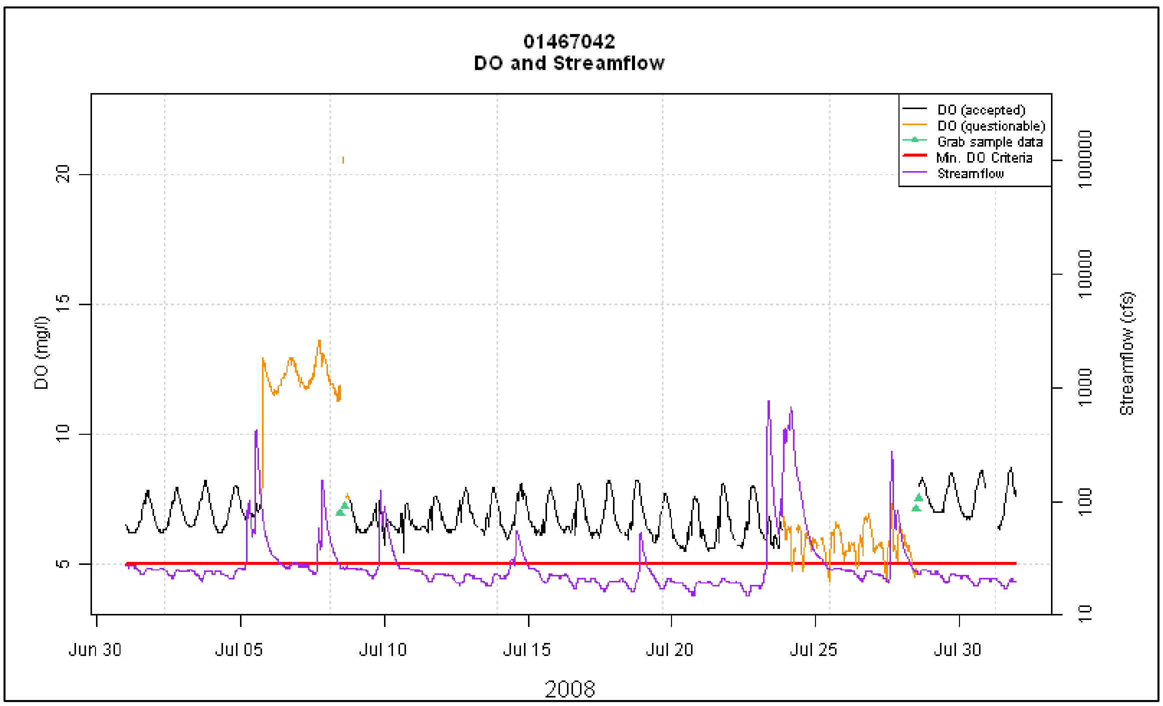


Figure 4. Example of an R-generated plot showing accepted and questionable data, and minimum water quality criteria; Gage 01467042, Dissolved Oxygen, July 2008.

Continuous Water Quality Monitoring Results Annual Summary, July 2011 - June 2012

Dissolved Oxygen

Background

Dissolved oxygen concentrations are a concern in several of Philadelphia's watersheds. Dissolved oxygen concentration is suppressed by high temperatures, respiratory activity of stream organisms, and nitrification and other oxidation reactions. Streams generally develop problems with dissolved oxygen due to water column BOD, sediment oxygen demand (SOD) and eutrophication due to increased nutrient concentration. These processes are inter-related, and physical conditions can also affect dissolved oxygen concentrations.

Designated Uses

Streams in the Philadelphia region are affected by ambient temperatures, which can be quite warm in the spring and summer months. For this reason, these streams cannot support natural self-sustaining populations of cold water fish. Different water quality criteria for dissolved oxygen and temperature are applied to different stream segments. Of the sites that were instrumented for water quality, the Wissahickon and Pennypack Creek gages (*i.e.*, 01473900, 01474000, 01467042, and 01467048) are each designated as a Trout Stocking Fishery (TSF) with conditions appropriate for maintenance of stocked trout over the period February 15 to July 31. Water quality criteria for dissolved oxygen are more stringent for these sites, with a daily instantaneous minimum criterion of 5 mg/L and daily mean criterion of 6 mg/L. Dissolved oxygen criteria for Warm Water Fisheries (WWF) are 4 mg/L and 5 mg/L, respectively. The Delaware River gage 01467200 dissolved oxygen criteria are defined by the Delaware River Basin Commission (DRBC) criteria for Zone 3 (DRBC, 2007) with a daily mean of 3.5 mg/L and a seasonal mean (April 1 to June 15, and September 16 to December 31) of 6.5 mg/L (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	3.5 mg/L
01467042	TSF*	5.0 mg/L	6.0 mg/L
01467048	TSF*	5.0 mg/L	6.0 mg/L
01467086	WWF	4.0 mg/L	5.0 mg/L
01467087	WWF	4.0 mg/L	5.0 mg/L
01467200	DRBC**	None	3.5 mg/L
01473900	TSF*	5.0 mg/L	6.0 mg/L
01474000	TSF*	5.0 mg/L	6.0 mg/L
01474500	WWF	4.0 mg/L	5.0 mg/L
01475530	WWF	4.0 mg/L	5.0 mg/L
01475548	WWF	4.0 mg/L	5.0 mg/L

*TSF criteria for DO only apply from February 15 - July 31. WWF criteria are applicable from August 1 – January 31.
**A seasonal mean criterion of 6.5 mg/L also applies from April 1 - June 15, and September 16 - December 31.

Results

Results were processed as follows for Table 3. The “total hours accepted data” are the total hours of data that were not flagged; that quantity divided by 24 yields the “total days accepted data.” The remainder of the table lists the percent of total hours of data that was flagged, and the percentages of accepted data that attained or failed to attain water quality standards were calculated.

Results were processed as follows for Table 4. If a single day contained at least one flagged measurement, the entire day was considered flagged for calculating the daily mean. Thus the “percent days flagged data” corresponds to the percentage of total days of data that contained at least one flag in a single day. Conversely, if none of the measurements in a single day were flagged, that day was considered one day of accepted data, and the total amount of accepted days was calculated. Finally, the percentages of accepted data that attained or failed to attain water quality standards were calculated.

Water quality at the downstream Tacony Creek site (gage 01467087) frequently failed to attain DO minimum and daily mean criteria. At all other sites, the DO minimum criteria were attained at least 97.3% of the time, and the daily mean criteria were attained at least

96.0% of the time. A more in-depth discussion of potential causes of DO problems at gage 01467087 is presented in the Monthly Results section. A notable portion of data recorded at the upstream Wissahickon Creek site (gage 01473900) was flagged as questionable; during September, flooding damaged the pump and resulted in inaccurate readings for much of the month.

Table 3. USGS Gage July 2011 - June 2012 Dissolved Oxygen Minimum Criterion Summary Results

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% days non-attaining	% hrs. attaining
01465798	WWF	6307.0	262.8	2.3	0.2	99.8
014670261*	DRBC	NA	NA	NA	NA	NA
01467042	TSF	6484.5	270.2	1.7	0.1	99.9
01467048	TSF	6266.0	261.1	5.0	0.0	100.0
01467086	WWF	6480.0	270.0	1.4	0.9	99.1
01467087	WWF	5579.0	232.5	10.2	9.1	90.9
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	5816.5	242.4	11.9	0.8	99.2
01474000	TSF	6247.0	260.3	3.6	0.0	100.0
01474500	WWF	5032.5	209.7	2.9	0.1	99.9
01475530	WWF	6549.5	272.9	0.8	0.0	100.0
01475548	WWF	6396.0	266.5	3.1	2.7	97.3

*No minimum DO criterion applies at gage 01467200

Table 4. USGS Gage July 2011 - June 2012 Dissolved Oxygen Daily Mean Criterion Summary Results

Gage number	Designated Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining
01465798	WWF	224.0	16.7	0.0	100.0
014670261	DRBC	248.0	9.1	0.0	100.0
01467042	TSF	236.0	14.2	0.0	100.0
01467048	TSF	239.0	13.1	0.0	100.0
01467086	WWF	258.0	5.8	1.2	98.8
01467087	WWF	207.0	14.8	14.5	85.5
01467200	DRBC	239.0	4.0	0.0	100.0
01473900	TSF	218.0	20.7	0.0	100.0
01474000	TSF	236.0	12.6	0.0	100.0
01474500	WWF	188.0	12.9	0.0	100.0
01475530	WWF	260.0	5.4	0.0	100.0
01475548	WWF	250.0	9.1	4.0	96.0

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	1787.5	74.5	2.0	8.0	Yes
014670261	DRBC	1815.0	75.6	0.5	8.5	Yes

pH

Background

pH has been identified as a parameter of potential concern for some of Philadelphia's watersheds, primarily because of algal effects on the dissolved inorganic carbon (DIC) composition of stream water. Algae take up CO_2 during photosynthesis and shift the composition of DIC toward the alkaline carbonates, resulting in occasional failure to attain maximum pH criteria at some sites (Table 6). pH fluctuations are typically observed concomitant with pronounced dissolved oxygen fluctuations, as detailed in the Monthly Results section.

At gage 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 attained or failed to attain criteria, and the percentages of daily minima and maxima that attained or failed to attain criteria.

Minimum pH criteria were attained at all gages for the reporting time frame The daily pH maximum criterion was exceeded on 13.3% of observed days at the Schuylkill River gage; the relatively high rate of exceedance occurred in concert with an observed algal bloom in the Schuylkill River in July. Algal blooms may also be responsible for daily maximum pH criterion exceedance at several sites (upstream Tacony, upstream Wissahickon, downstream Pennypack) during March.

Table 6. USGS Gage July 2011 - June 2012 pH Criteria Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	6365.0	265.2	1.4	0.0	0.0	0.0	0.0	100.0	100.0
014670261	6527.0	272.0	0.4	0.0	0.0	0.0	0.0	100.0	100.0
01467042	6483.5	270.1	1.8	0.0	0.4	0.0	0.0	100.0	99.6
01467048	6260.5	260.9	5.1	0.6	4.2	0.0	0.0	99.4	95.8
01467086	6464.5	269.4	1.7	1.4	8.1	0.0	0.0	98.6	91.9
01467087	6151.0	256.3	1.0	0.0	0.0	0.0	0.0	100.0	100.0
01467200	5926.0	246.9	0.8	0.0	0.0	0.0	0.0	100.0	100.0
01473900	6420.5	267.5	2.7	0.8	4.8	0.0	0.0	99.2	95.2
01474000	6025.0	251.0	7.0	0.0	0.0	0.0	0.0	100.0	100.0
01474500	4862.0	202.6	6.2	8.9	13.3	0.0	0.0	91.1	86.7
01475530	6549.5	272.9	0.8	0.1	1.1	0.0	0.0	99.9	98.9
01475548	6452.5	268.9	2.2	0.0	0.0	0.0	0.0	100.0	100.0

Turbidity

Background

Turbidity in Philadelphia's streams increases with increased flow as inorganic sediment and additional constituents of stormwater runoff are introduced to the stream or scoured/eroded from the stream channel. There are no numeric PA DEP water quality criteria for turbidity, so PWD Watershed management plans used a reference value for turbidity that was derived from EPA Guidance document EPA 822-B-00-023 (*i.e.*, 2.825 NTU). This value is surpassed more often in wet weather than in dry weather (Tables 82-83). Turbidity data has also been used to help investigate sediment loading and transport in the Wissahickon Creek Watershed for the Wissahickon Creek Sediment TMDL.

Results

Results were processed as follows for Table 7. The "total hours accepted data" are the total hours of data that were not flagged; that quantity divided by 24 yields the "total days accepted data." The remainder of the table lists the percentage of total hours of data that was flagged, and the percentages of accepted hours that either surpassed or fell below the maximum guideline.

Among the tributary sites, the maximum guideline was most frequently surpassed at the upstream Wissahickon Creek gage, and least frequently surpassed at the upstream Pennypack Creek gage.

Table 7. USGS Gage July 2011 - June 2012 Turbidity Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	5436.0	226.5	15.8	40.8	59.2
014670261	6525.5	271.9	0.4	95.0	5.0
01467042	5859.5	244.1	11.2	25.7	74.3
01467048	6083.0	253.5	7.8	31.2	68.8
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	5247.5	218.6	20.5	47.8	52.2
01474000	5318.5	221.6	17.9	26.5	73.5
01474500	4955.0	206.5	4.4	60.9	39.1
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 is 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. When significant changes in conductivity are observed during dry weather, it can be an indicator of anthropogenic influence or pollution in the stream; stations receiving inputs of treated wastewater generally had greater conductivity.

Results

There is no water quality standard for specific conductance. Table 8 merely illustrates the total hours of data that was not flagged and considered "accepted," the equivalent quantity in day-units, and the percentage of total hours of data that was flagged. More detailed results at each site are described in the Monthly Results section.

Table 8. USGS Gage July 2011 - June 2012 Specific Conductance Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	6365.5	265.2	1.4
014670261	6528.5	272.0	0.3
01467042	6482.5	270.1	1.8
01467048	6271.5	261.3	5.0
01467086	6481.0	270.0	1.4
01467087	6152.5	256.4	1.0
01467200	5926.5	246.9	0.8
01473900	6419.5	267.5	2.7
01474000	6242.5	260.1	3.7
01474500	5027.0	209.5	3.0
01475530	6549.5	272.9	0.8
01475548	6517.0	271.5	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. (Gage 01467200 is the exception and is 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, both Cobbs, both Tacony Creek, and the Schuylkill River gages (Table 10). Those six gages are all designated as WWF and have less stringent criteria.

Table 10. USGS Gage July 2011 - June 2012 Temperature Maximum Criteria Summary Results

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	6383.5	266.0	1.1	21.3	78.7
014670261	DRBC	6531.5	272.1	0.3	0.0	100.0
01467042	TSF	6482.0	270.1	1.8	37.1	62.9
01467048	TSF	6271.5	261.3	5.0	42.9	57.1
01467086	WWF	6481.0	270.0	1.4	21.5	78.5
01467087	WWF	6153.5	256.4	1.0	23.9	76.1
01467200	DRBC	5926.5	246.9	0.8	0.0	100.0
01473900	TSF	6394.5	266.4	3.1	36.7	63.3
01474000	TSF	6247.5	260.3	3.6	35.5	64.5
01474500	WWF	4950.5	206.3	4.5	31.7	68.3
01475530	WWF	6549.5	272.9	0.8	19.4	80.6
01475548	WWF	6516.0	271.5	1.3	22.4	77.6

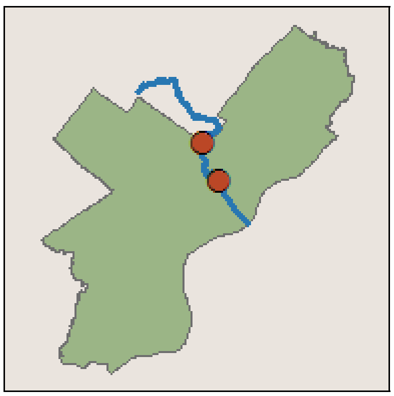
Monthly Results, July 2011 - June 2012

This section summarizes results at the monthly time scale. Results were processed in the same manner as in the previous section. Gages are grouped according to the type of sewer system that impacts water quality at the site.

Gages in Combined Sewer System Watersheds

The combined sewer system serves more than three-quarters of Philadelphia's residents and covers the oldest and densest parts of the city. Combined sewer outfalls affect the Tookany/Tacony-Frankford and Darby-Cobbs watersheds. (The Delaware and Schuylkill rivers also contain combined sewer outfalls but are detailed in a later section focused on large watersheds.) The gages in this section are subject to the deleterious effects of periodic combined sewer overflows during wet weather and snowmelt.

Tookany/Tacony-Frankford Creek (Gages 01467086 and 01467087)



Dissolved oxygen and pH

Dissolved oxygen concentrations were markedly worse between the upstream and downstream Tacony Creek gages. The monthly minima, percentage of hours the minimum criterion was not attained, and percentage of days the daily mean criteria was not attained were typically much worse at the downstream gage (Tables 11-14). For example, DO was particularly poor at the downstream Tacony Creek gage during May and June 2012; the minimum DO criterion was not attained throughout much of June (Figure 5). Poor DO was also observed in the same month at the upstream gage. However, the minimum criterion was usually attained at gage 01467086 (Figure 6). This difference likely reflects the additional stormwater runoff and sewage overflows that entered the creek between the two gages.

The lowest DO concentrations are typically seen in the period after storm events, reflecting both the immediate and lingering, oxygen-depleting effects of stormwater runoff and biochemical oxygen demand (BOD) entering the stream (Figure 7).

Diel DO fluctuations are suppressed for a few days following a storm event because the event either scours away algae or temporarily inhibits their growth. As dry weather continues, the algae recover and diel DO and pH fluctuations typically increase, sometimes resulting in non-attainment of pH maximum criteria, as observed at the upstream gage in March 2012 (Figure 8). Percent DO saturation extremes of 50% at night and over 150% in daylight were observed at gage 01467086 in March 2012, indicating high levels of algal activity (Figure 9; PAR is defined as photosynthetically active radiation). Diel DO fluctuations tended to increase with prolonged periods of sunlight, further indicating high levels of algal activity.

Interestingly, water quality at the downstream gage attained pH maximum criteria throughout the reporting period. A lower monthly mean pH was consistently observed at gage 01467087, along with generally less pronounced diel pH fluctuations, probably due to an increased buffering capacity at the downstream gage (Tables 15-16).

Table 11. Gage 01467086 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	WWF	742.0	30.9	0.3	4.1	95.9	2.7	12.7	6.63
Aug-11	WWF	742.5	30.9	0.2	0.1	99.9	3.6	9.3	6.76
Sep-11	WWF	720.0	30.0	0.0	0.0	100.0	6.3	11.7	8.36
Oct-11	WWF	734.0	30.6	1.3	0.0	100.0	7.1	13.6	9.94
Nov-11	WWF	720.0	30.0	0.0	0.0	100.0	7.4	15.7	10.80
Mar-12	WWF	694.0	28.9	0.1	0.0	100.0	5.8	17.8	10.94
Apr-12	WWF	671.0	28.0	0.1	1.1	98.9	3.1	15.5	9.65
May-12	WWF	681.5	28.4	2.1	1.5	98.5	2.2	12.3	7.27
Jun-12	WWF	617.5	25.7	8.1	1.5	98.5	2.5	13.7	7.92

Table 12. Gage 01467087 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	WWF	565.0	23.5	24.1	1.0	99.0	3.2	11.2	7.17
Aug-11	WWF	739.0	30.8	0.7	15.9	84.1	0.6	8.5	5.94
Sep-11	WWF	718.0	29.9	0.3	0.3	99.7	3.0	10.4	7.98
Oct-11	WWF	669.0	29.1	6.0	0.8	99.2	2.8	11.0	8.05
Nov-11	WWF	600.5	25.0	16.6	0.0	100.0	4.1	10.7	8.91
Mar-12	WWF	674.0	28.1	3.0	2.3	97.7	1.4	12.2	8.49
Apr-12	WWF	635.5	26.5	5.4	4.6	95.4	0.9	12.1	7.78
May-12	WWF	373.5	15.6	46.3	32.7	67.3	0.8	8.6	4.60
Jun-12	WWF	514.5	21.4	23.4	33.6	66.4	1.0	8.8	4.67

Table 13. Gage 01467086 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	WWF	29.0	6.5	3.4	96.6	4.8	7.7	6.71
Aug-11	WWF	30.0	3.2	0.0	100.0	5.7	7.9	6.74
Sep-11	WWF	30.0	0.0	0.0	100.0	7.1	9.7	8.36
Oct-11	WWF	28.0	9.7	0.0	100.0	8.0	11.8	10.00
Nov-11	WWF	30.0	0.0	0.0	100.0	8.5	12.3	10.80
Mar-12	WWF	27.0	6.8	0.0	100.0	8.3	13.5	10.85
Apr-12	WWF	27.0	3.6	0.0	100.0	7.2	11.2	9.75
May-12	WWF	26.0	10.3	3.8	96.2	4.9	9.4	7.24
Jun-12	WWF	25.0	10.7	4.0	96.0	4.9	9.6	7.91

Table 14. Gage 01467087 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	WWF	22.0	29.0	0.0	100.0	5.4	8.2	7.19
Aug-11	WWF	25.0	19.4	28.0	72.0	1.8	8.0	5.97
Sep-11	WWF	27.0	10.0	0.0	100.0	6.4	8.9	7.99
Oct-11	WWF	25.0	19.4	0.0	100.0	5.2	10.4	8.22
Nov-11	WWF	23.0	23.3	0.0	100.0	5.6	10.4	8.98
Mar-12	WWF	25.0	13.7	4.0	96.0	3.5	11.6	8.41
Apr-12	WWF	25.0	10.7	4.0	96.0	4.6	9.9	7.74
May-12	WWF	13.0	55.2	53.8	46.2	1.9	7.0	4.67
Jun-12	WWF	20.0	28.6	60.0	40.0	3.2	6.0	4.68

Table 15. Gage 01467086 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.8	7.77
Aug-11	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.3	8.8	7.33
Sep-11	704.5	29.4	2.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.2	7.42
Oct-11	734.0	30.6	1.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.5	7.61
Nov-11	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.7	7.71
Mar-12	694.0	28.9	0.1	11.5	58.6	0.0	0.0	88.5	41.4	7.4	9.5	8.14
Apr-12	671.0	28.0	0.1	1.4	14.3	0.0	0.0	98.6	85.7	7.1	9.1	7.84
May-12	681.5	28.4	2.1	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.36
Jun-12	617.5	25.7	8.1	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.8	7.63

Table 16. Gage 01467087 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.3	8.4	7.24
Aug-11	739.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.1	7.5	6.93
Sep-11	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.3	7.9	7.23
Oct-11	699.0	29.1	6.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.4	7.13
Nov-11	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.5	7.3	7.05
Mar-12	693.5	28.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.0	7.51
Apr-12	670.0	27.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.9	7.27
May-12	380.0	15.8	45.4	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.3	6.98
Jun-12	669.5	27.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	6.3	7.6	6.96

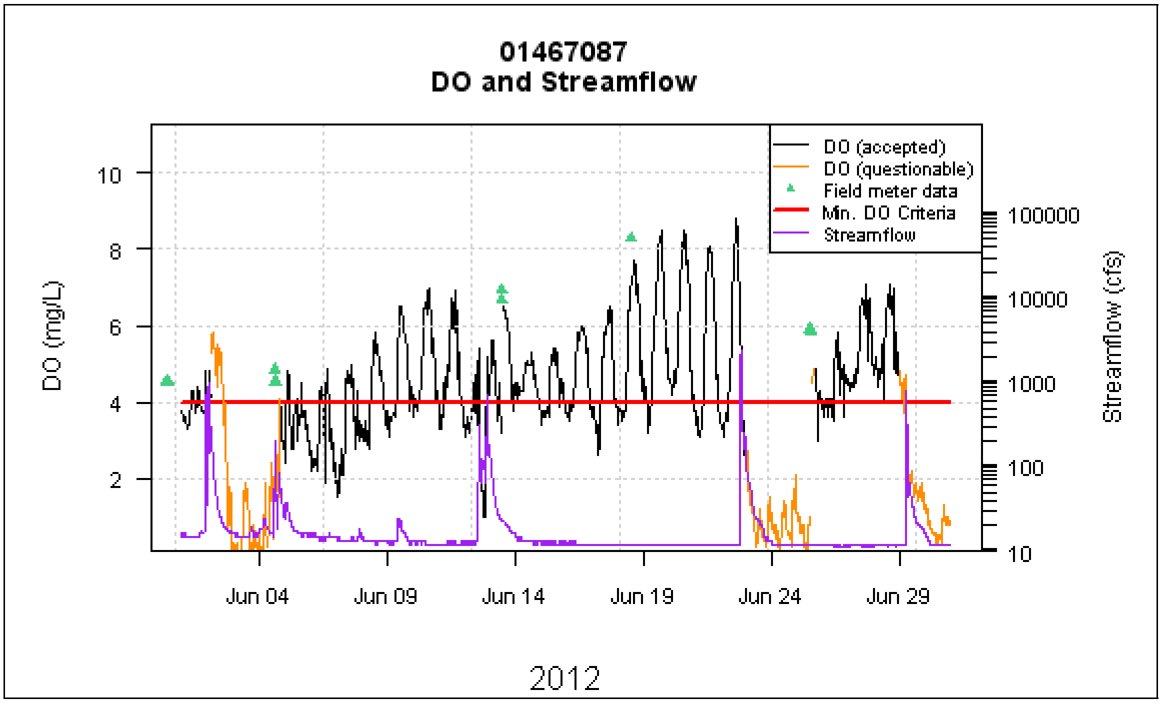


Figure 5. Gage 01467087, Dissolved Oxygen and Streamflow, June 2010.

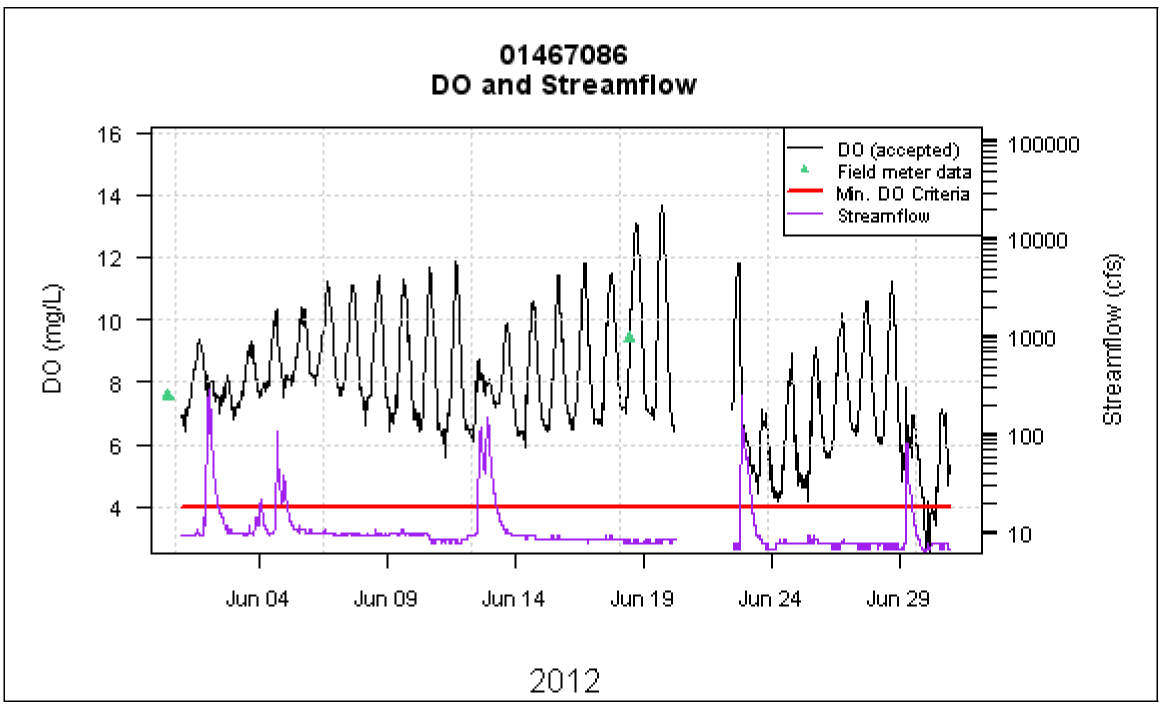


Figure 6. Gage 01467086, Dissolved Oxygen and Streamflow, June 2012.

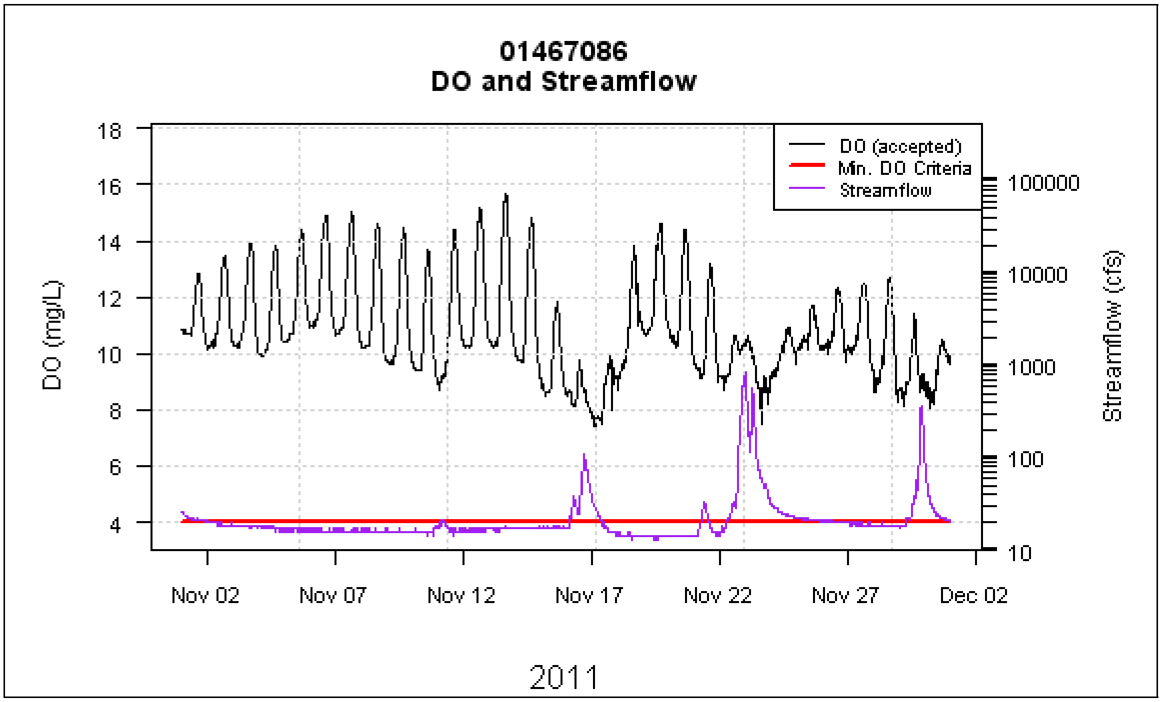


Figure 7. Gage 01467086, Dissolved Oxygen and Streamflow, November 2011.

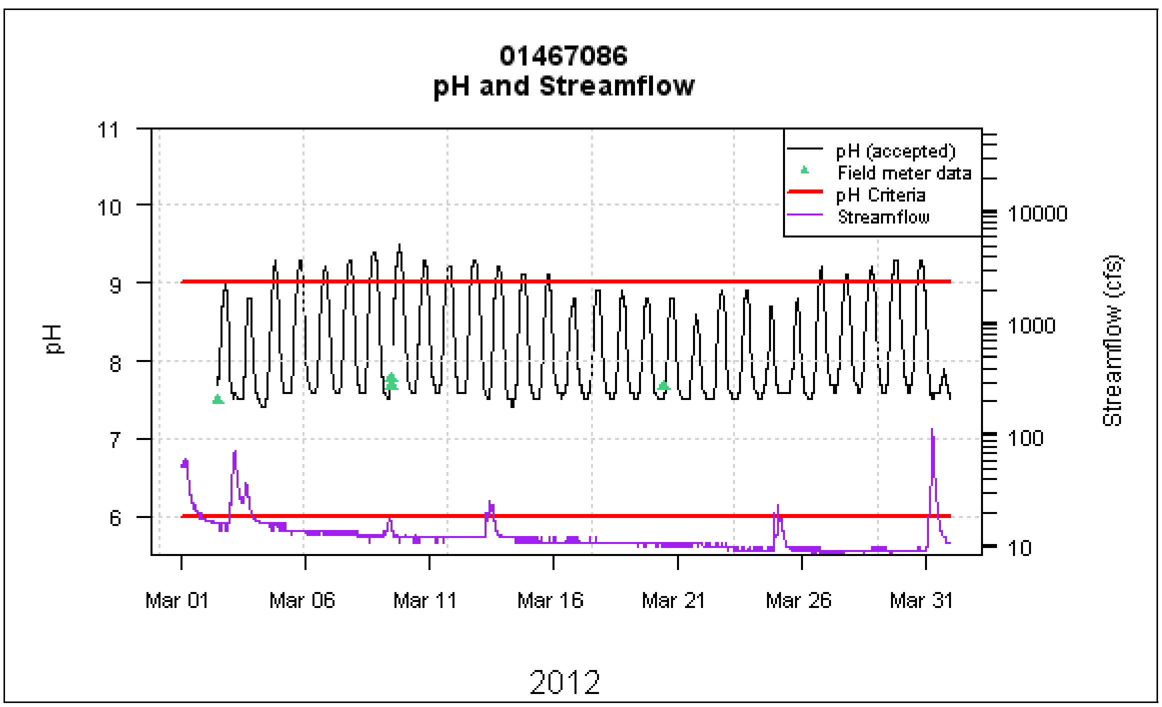


Figure 8. Gage 01467086, pH and Streamflow, March 2012.

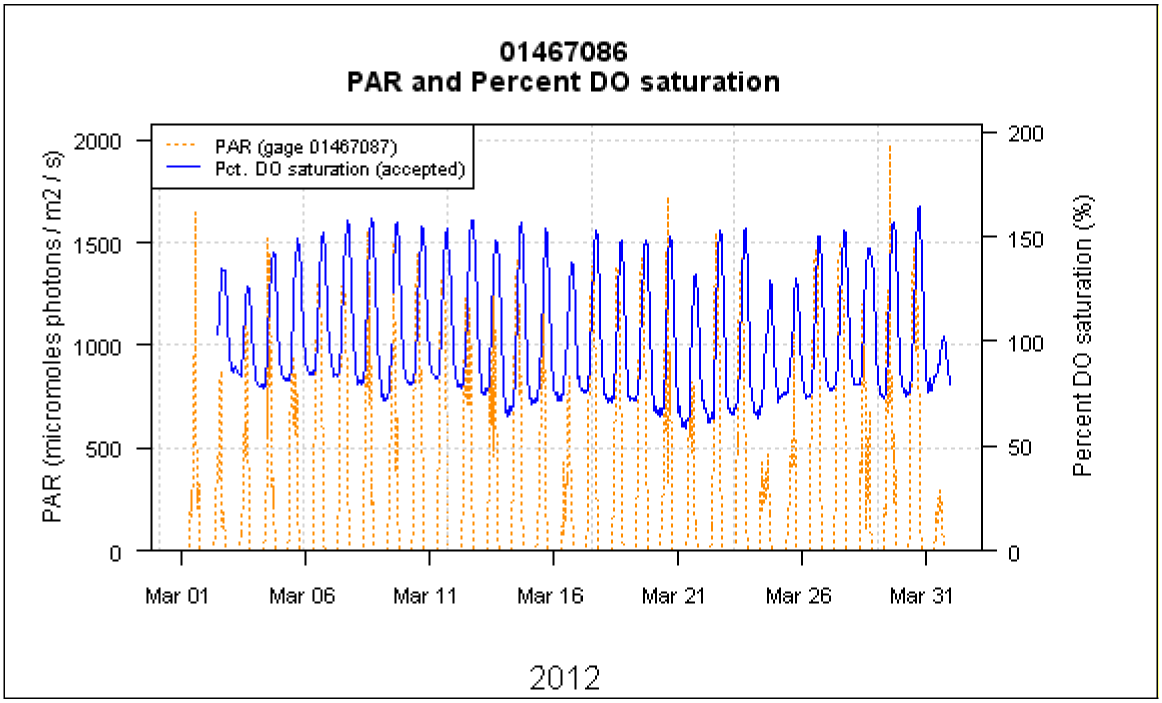


Figure 9. Gage 01467086, PAR and Percent Dissolved Oxygen Saturation, March 2012.

Specific Conductance

Specific conductance observations were usually consistent between the two gage sites (Tables 17-18). During the relatively wet month of August, low conductivity values correspond to rainwater diluting the mineral concentrations in the stream.

Table 17. Gage 01467086 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	70.0	738.0	608.45
Aug-11	742.5	30.9	0.2	71.0	645.0	405.37
Sep-11	720.0	30.0	0.0	47.0	666.0	526.12
Oct-11	734.0	30.6	1.3	183.0	1880.0	596.08
Nov-11	720.0	30.0	0.0	116.0	693.0	591.97
Mar-12	694.0	28.9	0.1	416.0	663.0	630.65
Apr-12	671.0	28.0	0.1	86.0	680.0	602.44
May-12	681.5	28.4	2.1	60.0	619.0	450.29
Jun-12	618.5	25.8	8.0	213.0	660.0	530.92

Table 18. Gage 01467087 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	81.0	759.0	596.80
Aug-11	740.0	30.8	0.5	41.0	646.0	346.45
Sep-11	718.0	29.9	0.3	53.0	671.0	503.33
Oct-11	700.0	29.2	5.9	228.0	1690.0	614.48
Nov-11	717.5	29.9	0.3	153.0	752.0	621.82
Mar-12	693.5	28.9	0.2	382.0	647.0	615.74
Apr-12	670.0	27.9	0.3	110.0	676.0	587.00
May-12	380.0	15.8	45.4	54.0	624.0	446.18
Jun-12	669.5	27.9	0.4	205.0	659.0	519.96

Temperature

Monthly mean temperatures observed at the downstream gage were typically higher than at the upstream gage. Consequently, a higher rate of temperature criteria exceedance was observed at the downstream gage in March, April and May. An anomaly occurred in November, when the upstream gage recorded slightly higher temperatures than the downstream gage. Exceedance rates were generally similar at the two gages, with the exception of the months of June and July, when exceedances occurred at the downstream gage only. Temperature criteria were attained from August through Nov 16 at both gages. (Tables 19-20).

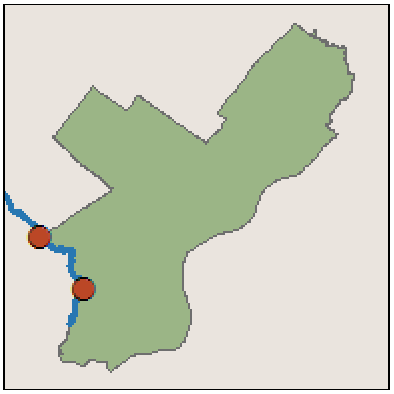
Table 19. Gage 01467086 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.3	742.0	30.9	19.9	30.1	24.88
WWF	1-Aug	15-Aug	0.0	100.0	0.0	360.0	15.0	17.6	27.6	22.5
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	14.4	22.5	18.97
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	5.6	18.7	13.96
WWF	16-Oct	31-Oct	0.0	100.0	2.2	375.5	15.6			
WWF	1-Nov	15-Nov	0.0	100.0	0.0	360.0	15.0	5.8	14.6	10.33
WWF	16-Nov	30-Nov	63.5	36.5	0.0	360.0	15.0			
WWF	1-Mar	31-Mar	83.9	16.1	0.3	694.0	28.9	3.6	20.6	11.82
WWF	1-Apr	15-Apr	70.4	29.6	13.3	312.0	13.0	8.6	22.6	13.55
WWF	16-Apr	30-Apr	49.3	50.7	0.3	359.0	15.0			
WWF	1-May	15-May	23.4	76.6	13.5	311.5	13.0	13.1	26.3	18.63
WWF	16-May	31-May	22.4	77.6	3.6	370.0	15.4			
WWF	1-Jun	15-Jun	0.0	100.0	13.3	312.0	13.0	15.1	28.1	21.09
WWF	16-Jun	30-Jun	0.0	100.0	14.9	306.5	12.8			

Table 20. Gage 01467087 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	2.6	97.4	0.3	742.0	30.9	22.2	32.5	26.47
WWF	1-Aug	15-Aug	0.0	100.0	0.1	359.5	15.0	18.6	29.1	23.42
WWF	16-Aug	31-Aug	0.0	100.0	0.9	380.5	15.9			
WWF	1-Sep	15-Sep	0.0	100.0	0.3	359.0	15.0	15.0	22.4	19.58
WWF	16-Sep	30-Sep	0.0	100.0	0.3	359.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	5.8	19.0	14.36
WWF	16-Oct	31-Oct	0.0	100.0	11.2	341.0	14.2			
WWF	1-Nov	15-Nov	0.0	100.0	0.3	359.0	15.0	7.1	15.3	10.23
WWF	16-Nov	30-Nov	57.7	42.3	0.4	358.5	14.9			
WWF	1-Mar	31-Mar	87.9	12.1	0.4	693.5	28.9	5.3	19.8	12.28
WWF	1-Apr	15-Apr	94.8	5.2	13.8	310.5	12.9	10.5	22.2	14.3
WWF	16-Apr	30-Apr	53.7	46.3	0.1	359.5	15.0			
WWF	1-May	15-May	37.6	62.4	13.5	311.5	13.0	14.2	27.3	18.57
WWF	16-May	31-May	83.2	16.8	82.2	68.5	2.9			
WWF	1-Jun	15-Jun	0.0	100.0	13.9	310.0	12.9	17.0	29.3	22.69
WWF	16-Jun	30-Jun	1.0	99.0	0.1	359.5	15.0			

Cobbs Creek (Gages 01475530 and 01475548)



Dissolved oxygen and pH

The pattern of dissolved oxygen and pH values between the upstream (01475530) and downstream (01475548) Cobbs Creek gages is likely due to greater algal activity at the downstream gage. During March and April—key months for algal growth—higher pH was observed at the downstream gage (Tables 25-26). Algae remove CO_2 during photosynthesis, raising pH by shifting the dissolved inorganic carbon (DIC) balance toward alkaline carbonates. Furthermore, the diel fluctuations in DO were more pronounced at the downstream gage during these months (Figures 10-11). A third indicator of increased algal activity at 01475548 is the supersaturation of oxygen caused by photosynthesis. During March, the upstream gage recorded peak DO saturation levels around 120% during the day, while the downstream gage recorded peak DO saturation levels approaching 150% (Figures 12-13).

A faulty thermistor at 01475548 was the cause of some flagged data in March; this affected all parameters to varying extents.

Table 21. Gage 01475530 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	WWF	742.5	30.9	0.2	0.0	100.0	5.4	9.1	7.02
Aug-11	WWF	744.0	31.0	0.0	0.0	100.0	6.0	9.3	7.79
Sep-11	WWF	719.0	30.0	0.1	0.1	99.9	3.0	11.5	8.68
Oct-11	WWF	731.5	30.5	1.7	0.0	100.0	7.3	12.3	9.37
Nov-11	WWF	690.5	28.8	4.1	0.0	100.0	8.1	12.9	10.39
Mar-12	WWF	694.0	28.9	0.1	0.0	100.0	7.4	14.0	10.41
Apr-12	WWF	672.0	28.0	0.0	0.0	100.0	6.6	12.3	9.48
May-12	WWF	695.0	29.0	0.1	0.0	100.0	6.2	10.4	8.17
Jun-12	WWF	670.0	27.9	0.3	0.0	100.0	6.0	10.1	7.87

Table 22. Gage 01475548 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	WWF	623.0	26.0	16.3	1.4	98.6	3.3	10.9	6.99
Aug-11	WWF	742.5	30.9	0.2	17.9	82.1	1.3	9.4	5.83
Sep-11	WWF	719.5	30.0	0.1	0.0	100.0	4.8	12.6	8.47
Oct-11	WWF	740.5	30.9	0.5	0.0	100.0	5.8	12.0	9.14
Nov-11	WWF	719.0	30.0	0.1	0.0	100.0	6.2	13.5	10.22
Mar-12	WWF	665.5	27.7	4.2	0.0	100.0	7.1	16.4	11.20
Apr-12	WWF	672.0	28.0	0.0	0.0	100.0	6.0	13.2	9.66
May-12	WWF	694.5	28.9	0.2	4.0	96.0	1.9	11.6	7.47
Jun-12	WWF	665.0	27.7	1.0	0.8	99.2	3.8	10.0	6.40

Table 23. Gage 01475530 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	WWF	29.0	6.5	0.0	100.0	6.5	7.7	7.02
Aug-11	WWF	31.0	0.0	0.0	100.0	7.1	8.7	7.79
Sep-11	WWF	29.0	3.3	0.0	100.0	7.9	9.8	8.69
Oct-11	WWF	28.0	9.7	0.0	100.0	8.0	11.5	9.36
Nov-11	WWF	27.0	10.0	0.0	100.0	8.7	11.4	10.46
Mar-12	WWF	27.0	6.8	0.0	100.0	8.9	12.3	10.36
Apr-12	WWF	28.0	0.0	0.0	100.0	7.8	10.3	9.48
May-12	WWF	28.0	3.4	0.0	100.0	7.2	9.3	8.18
Jun-12	WWF	26.0	7.1	0.0	100.0	7.0	8.6	7.85

Table 24. Gage 01475548 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	WWF	23.0	25.8	0.0	100.0	5.4	8.3	7.03
Aug-11	WWF	30.0	3.2	26.7	73.3	2.2	8.4	5.87
Sep-11	WWF	29.0	3.3	0.0	100.0	7.1	9.6	8.49
Oct-11	WWF	28.0	9.7	0.0	100.0	6.8	11.6	9.12
Nov-11	WWF	29.0	3.3	0.0	100.0	7.2	11.5	10.23
Mar-12	WWF	25.0	13.7	0.0	100.0	9.1	13.2	11.09
Apr-12	WWF	28.0	0.0	0.0	100.0	7.6	10.9	9.66
May-12	WWF	28.0	3.4	7.1	92.9	3.2	9.5	7.47
Jun-12	WWF	25.0	10.7	0.0	100.0	5.6	8.3	6.42

Table 25. Gage 01475530 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.8	7.42
Aug-11	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.0	7.46
Sep-11	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.48
Oct-11	731.5	30.5	1.7	1.1	6.5	0.0	0.0	98.9	93.5	7.0	10.9	7.49
Nov-11	690.5	28.8	4.1	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.0	7.48
Mar-12	694.0	28.9	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.63
Apr-12	672.0	28.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.2	7.45
May-12	695.0	29.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.7	7.32
Jun-12	670.0	27.9	0.3	0.2	3.6	0.0	0.0	99.8	96.4	7.0	9.5	7.71

Table 26. Gage 01475548 pH Criteria Summary Results by Month

Month	total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	673.0	28.0	9.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.5	7.59
Aug-11	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.2	7.23
Sep-11	719.5	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.5	8.6	7.43
Oct-11	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.1	7.37
Nov-11	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.0	7.33
Mar-12	670.0	27.9	4.0	0.0	0.0	0.0	0.0	100.0	100.0	7.3	9.0	8.06
Apr-12	672.0	28.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.80
May-12	694.5	28.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.3	7.47
Jun-12	665.0	27.7	1.0	0.0	0.0	0.0	0.0	100.0	100.0	6.3	8.1	7.26

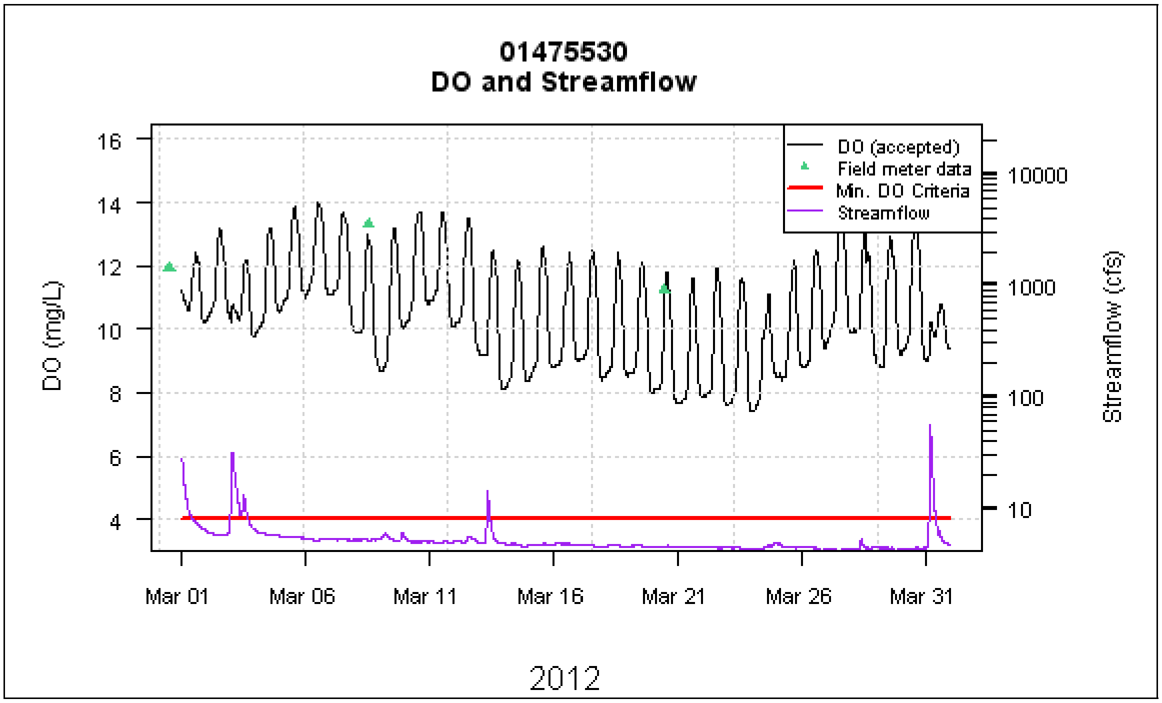


Figure 10. Gage 01475530, Dissolved Oxygen and Streamflow, March 2012.

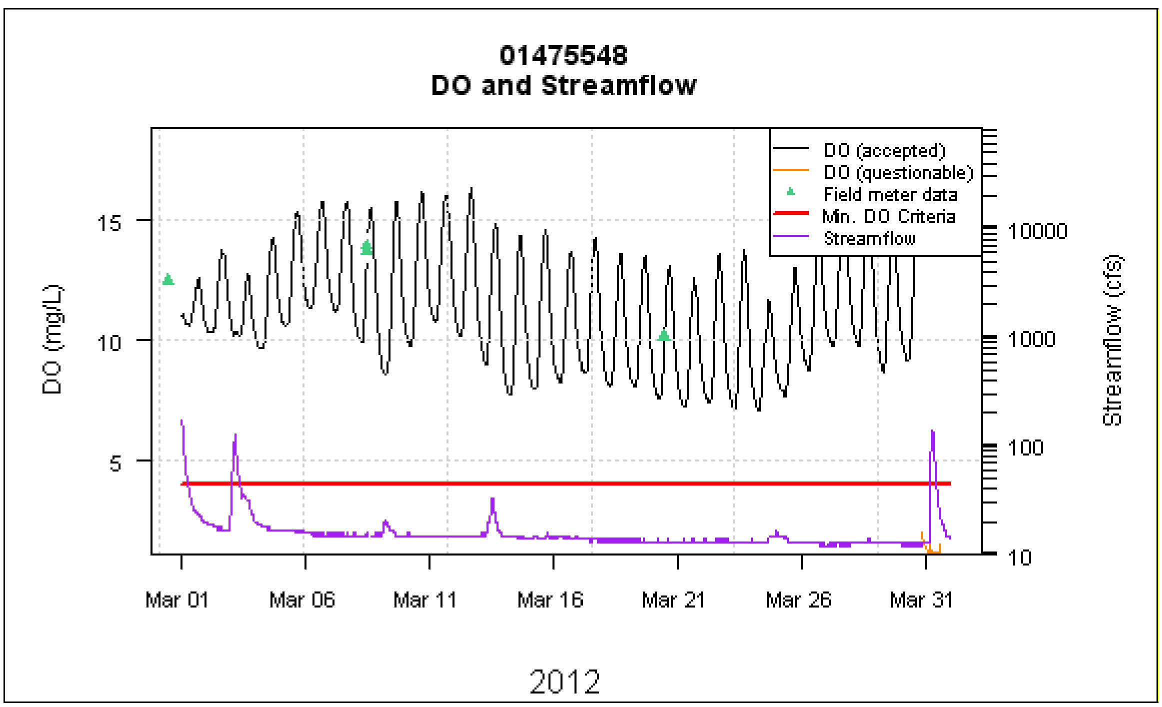


Figure 11. Gage 01475548, Dissolved Oxygen and Streamflow, March 2012.

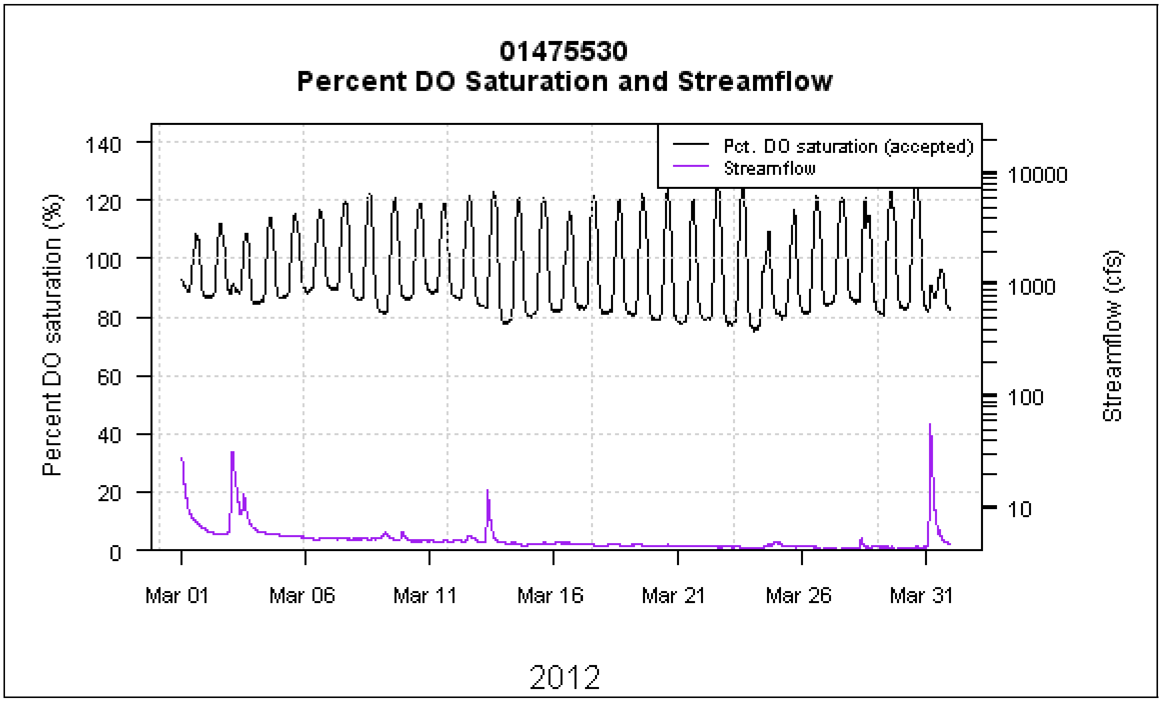


Figure 12. Gage 01475530, Percent DO Saturation and Streamflow, March 2012.

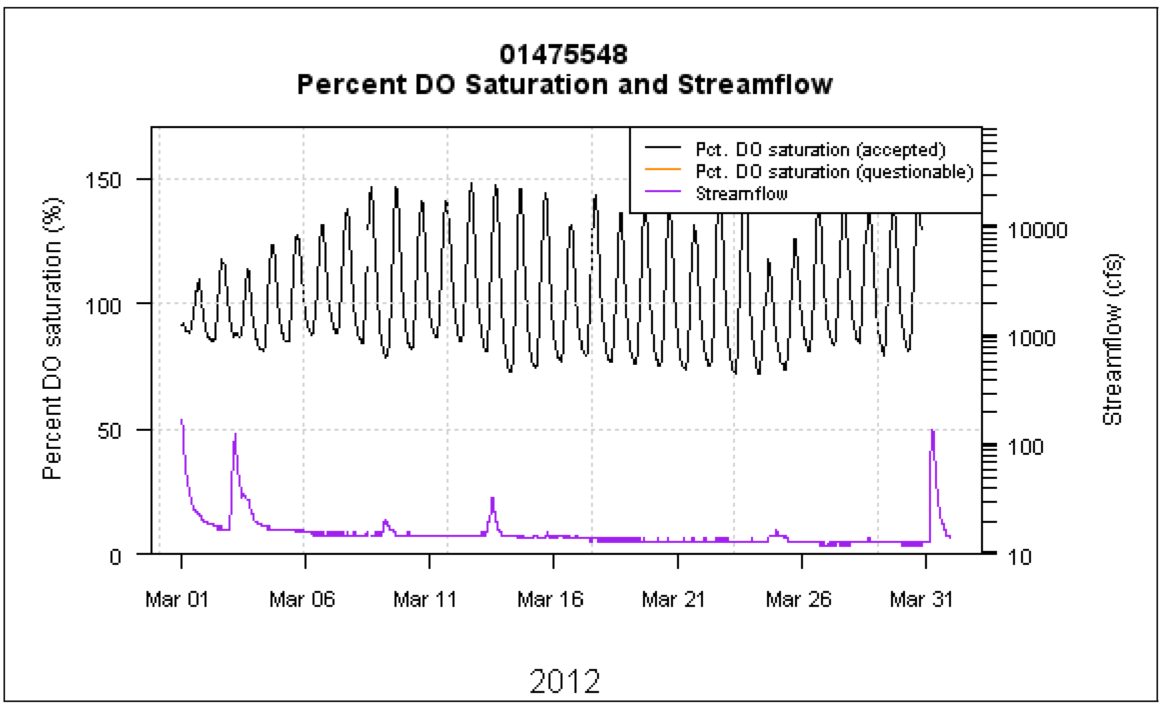


Figure 13. Gage 01475548, Percent DO Saturation and Streamflow, March 2012.

Specific Conductance

Specific conductance observations were similar to those observed in Tacony Creek, with the exception of consistently higher conductance observed at the downstream gage 01475548 (Tables 27-28, Figures 14-15).

Table 27. Gage 01475530 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	82.0	560.0	461.85
Aug-11	744.0	31.0	0.0	38.0	527.0	342.50
Sep-11	719.0	30.0	0.1	44.0	535.0	398.43
Oct-11	731.5	30.5	1.7	97.0	1400.0	487.77
Nov-11	690.5	28.8	4.1	91.0	580.0	501.25
Mar-12	694.0	28.9	0.1	181.0	524.0	489.68
Apr-12	672.0	28.0	0.0	95.0	719.0	476.74
May-12	695.0	29.0	0.1	77.0	505.0	402.04
Jun-12	670.0	27.9	0.3	54.0	719.0	449.26

Table 28. Gage 01475548 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	741.5	30.9	0.3	90.0	698.0	595.74
Aug-11	744.0	31.0	0.0	80.0	624.0	401.32
Sep-11	719.5	30.0	0.1	76.0	651.0	499.30
Oct-11	740.5	30.9	0.5	141.0	988.0	562.95
Nov-11	719.0	30.0	0.1	119.0	657.0	564.76
Mar-12	666.0	27.8	4.2	135.0	657.0	615.38
Apr-12	672.0	28.0	0.0	86.0	676.0	560.70
May-12	694.5	28.9	0.2	78.0	614.0	459.47
Jun-12	665.0	27.7	1.0	103.0	633.0	491.76

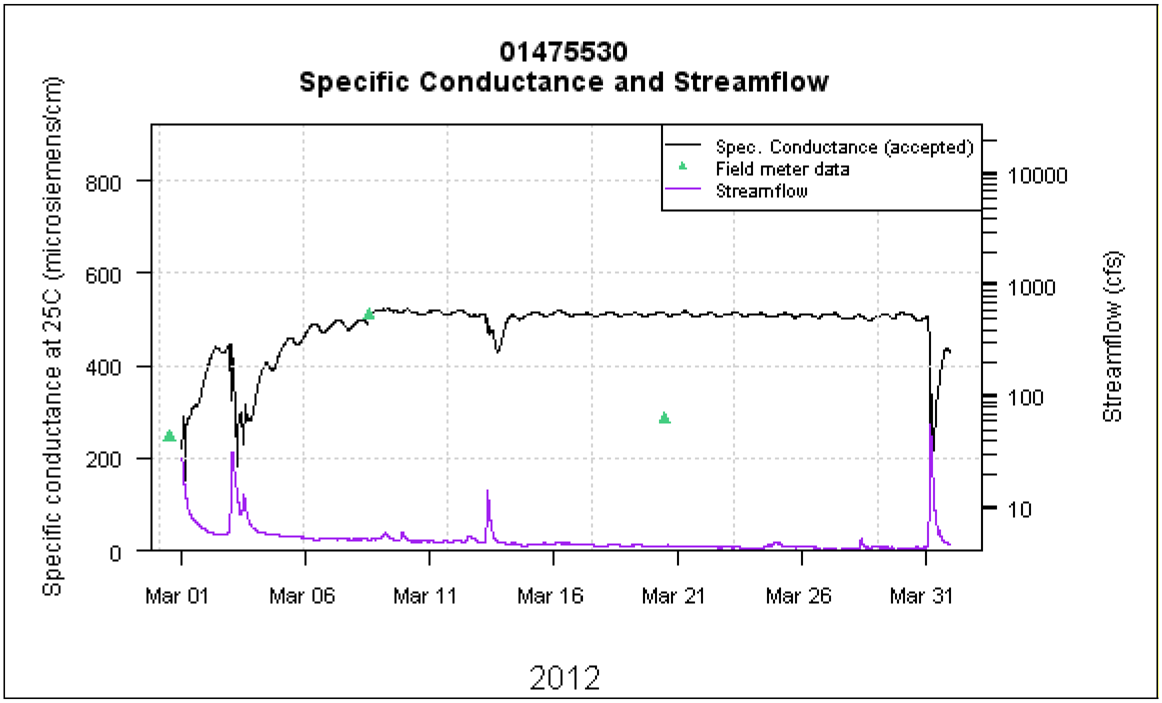


Figure 14. Gage 01475530, Specific Conductance and Streamflow, March 2012.

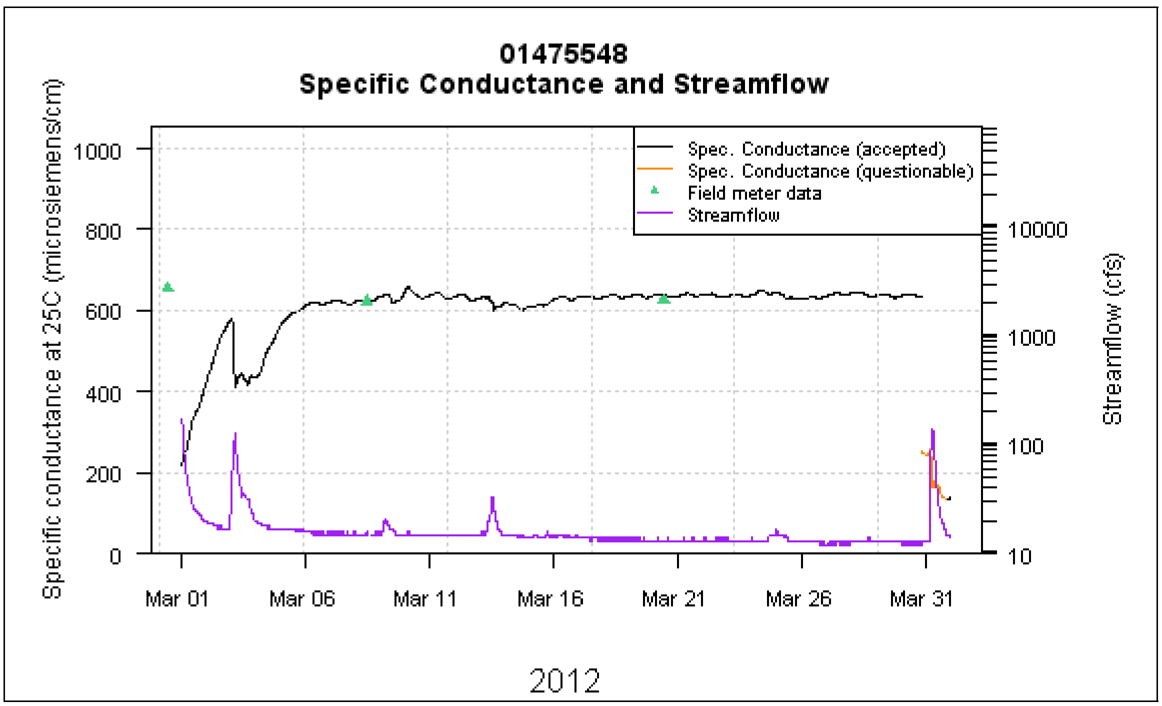


Figure 15. Gage 01475548, Specific Conductance and Streamflow, March 2012.

Temperature

As was also observed in Tacony Creek, slightly higher temperatures were recorded at the downstream gage in Cobbs Creek, resulting in more frequent exceedance of temperature maximum criteria at the downstream gage in November, March, April and May (Tables 29-30).

Table 29. Gage 01475530 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.2	742.5	30.9	18.8	28.8	23.38
WWF	1-Aug	15-Aug	0.0	100.0	0.0	360.0	15.0	17.3	26.2	21.76
WWF	16-Aug	31-Aug	0.0	100.0	0.0	384.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.3	359.0	15.0	14.3	21.7	18.74
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	3.1	349.0	14.5	4.4	19.2	13.80
WWF	16-Oct	31-Oct	0.0	100.0	0.4	382.5	15.9			
WWF	1-Nov	15-Nov	0.0	100.0	0.0	360.0	15.0	6.3	14.5	10.47
WWF	16-Nov	30-Nov	63.7	36.3	8.2	330.5	13.8			
WWF	1-Mar	31-Mar	83.8	16.2	0.3	694.0	28.9	4.2	19.1	11.52
WWF	1-Apr	15-Apr	65.7	34.3	13.3	312.0	13.0	8.5	20.8	13.10
WWF	16-Apr	30-Apr	44.3	55.7	0.0	360.0	15.0			
WWF	1-May	15-May	8.0	92.0	13.3	312.0	13.0	12.7	25.3	17.88
WWF	16-May	31-May	11.1	88.9	0.3	383.0	16.0			
WWF	1-Jun	15-Jun	0.0	100.0	13.6	311.0	13.0	14.9	28.1	20.20
WWF	16-Jun	30-Jun	0.0	100.0	0.3	359.0	15.0			

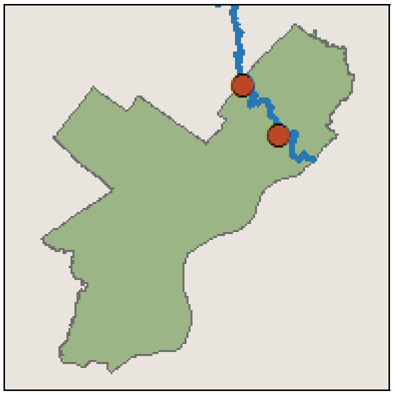
Table 30. Gage 01475548 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.3	741.5	30.9	20.7	30.4	25.16
WWF	1-Aug	15-Aug	0.0	100.0	0.0	360.0	15.0	18.8	28.0	23.00
WWF	16-Aug	31-Aug	0.0	100.0	0.0	384.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.1	359.5	15.0	15.2	23.4	19.88
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.8	357.0	14.9	5.2	19.6	14.33
WWF	16-Oct	31-Oct	0.0	100.0	0.1	383.5	16.0			
WWF	1-Nov	15-Nov	0.0	100.0	0.3	359.0	15.0	6.4	14.8	10.48
WWF	16-Nov	30-Nov	64.7	35.3	0.0	360.0	15.0			
WWF	1-Mar	31-Mar	83.3	16.7	4.4	665.5	27.7	3.9	19.9	11.80
WWF	1-Apr	15-Apr	80.6	19.4	13.3	312.0	13.0	9.2	21.7	13.77
WWF	16-Apr	30-Apr	49.4	50.6	0.0	360.0	15.0			
WWF	1-May	15-May	22.1	77.9	13.3	312.0	13.0	13.6	27.4	19.17
WWF	16-May	31-May	36.9	63.1	0.4	382.5	15.9			
WWF	1-Jun	15-Jun	0.0	100.0	13.8	310.5	12.9	16.2	27.9	21.65
WWF	16-Jun	30-Jun	0.0	100.0	1.5	354.5	14.8			

Gages in Separate Sewer System Watersheds

Gages in the Pennypack, Wissahickon and Poquessing watersheds are situated in the separate sewer system areas of Philadelphia. Although these sites are not affected by combined sewer overflows, discharge of untreated stormwater runoff from stormwater outfalls can negatively affect water quality.

Pennypack Creek (Gages 01467042 and 01467048)



Dissolved oxygen and pH

Both the upstream (01467042) and downstream (01467048) gages of Pennypack Creek showed pronounced diel fluctuations in dissolved oxygen and pH as a result of algal activity. These patterns are most evident during dry weather periods, when algal growth is able to excel because of abundant sunshine and a lack of storm events that might otherwise scour the algal population.

At both upstream and downstream Pennypack Creek gages, 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 7 mg/L during April (Figures 16-17).

In March, maximum daily pH fluctuations of approximately 1.5 units were observed (Figures 18-19). Maximum pH criteria exceedance occurred, mainly at the downstream gage. It would be reasonable to conclude that if not for periodic interruptions of algal activity due to rainfall, those extreme fluctuations and chronic pH criteria exceedance would likely occur through the entire season.

Algal communities in the area of both gages recover quickly after storm events, as seen in April 2012 (Figures 16-17). Prior to the storm event in April 2012, both DO and pH showed the typical pronounced fluctuations indicative of strong algal activity. This stopped abruptly with the storm, when much of the algae was likely scoured away and overcast conditions likely inhibited further growth, as indicated by the PAR data at 01467048 for April 2012 (Figure 20). However, within 3-4 days of the conclusion of the rainfall and the return of sunny conditions, fluctuations of DO and pH resumed, indicative of high algal density. This not only demonstrates the resilience of the algal population in this ecosystem, but also a likely abundance of nutrients that allows regrowth to occur so quickly.

Table 31. Gage 01467042 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	TSF	742.0	30.9	0.3	0.7	99.3	4.6	9.3	7.00
Aug-11	TSF	720.5	30.0	3.2	0.0	100.0	6.1	9.7	7.69
Sep-11	TSF	676.0	28.2	6.1	0.0	100.0	7.5	11.5	8.66
Oct-11	TSF	727.5	30.3	2.2	0.0	100.0	7.7	11.4	9.30
Nov-11	TSF	718.0	29.9	0.3	0.0	100.0	7.9	11.9	9.97
Mar-12	TSF	693.5	28.9	0.2	0.0	100.0	6.2	17.0	10.70
Apr-12	TSF	667.5	27.8	0.7	0.0	100.0	5.5	13.8	9.53
May-12	TSF	692.0	28.8	0.6	0.0	100.0	5.9	9.8	7.82
Jun-12	TSF	668.5	27.9	0.5	0.0	100.0	5.8	10.1	7.81

Table 32. Gage 01467048 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	TSF	742.5	30.9	0.2	0.0	100.0	5.0	13.4	7.86
Aug-11	TSF	643.5	26.8	13.5	0.0	100.0	5.9	11.8	8.01
Sep-11	TSF	534.5	22.3	25.8	0.0	100.0	7.8	12.7	9.11
Oct-11	TSF	734.5	30.6	1.3	0.0	100.0	8.4	12.1	9.89
Nov-11	TSF	718.0	29.9	0.3	0.0	100.0	8.8	13.0	10.74
Mar-12	TSF	692.5	28.9	0.4	0.0	100.0	6.8	17.0	11.30
Apr-12	TSF	662.0	27.6	1.5	0.0	100.0	6.4	13.9	10.19
May-12	TSF	692.0	28.8	0.6	0.0	100.0	6.3	11.2	8.44
Jun-12	TSF	669.0	27.9	0.4	0.0	100.0	5.6	11.9	8.24

Table 33. Gage 01467042 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	TSF	30.0	3.2	0.0	100.0	6.4	7.8	7.03
Aug-11	TSF	24.0	22.6	0.0	100.0	6.7	8.5	7.68
Sep-11	TSF	19.0	36.7	0.0	100.0	8.1	10.0	8.82
Oct-11	TSF	24.0	22.6	0.0	100.0	8.3	10.8	9.33
Nov-11	TSF	29.0	3.3	0.0	100.0	8.4	11.0	9.98
Mar-12	TSF	27.0	6.8	0.0	100.0	8.3	12.7	10.57
Apr-12	TSF	26.0	7.1	0.0	100.0	7.3	10.8	9.50
May-12	TSF	26.0	10.3	0.0	100.0	6.4	9.0	7.77
Jun-12	TSF	25.0	10.7	0.0	100.0	6.5	8.6	7.83

Table 34. Gage 01467048 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	TSF	30.0	3.2	0.0	100.0	6.3	8.9	7.88
Aug-11	TSF	24.0	22.6	0.0	100.0	7.1	8.9	8.00
Sep-11	TSF	20.0	33.3	0.0	100.0	8.1	10.4	9.10
Oct-11	TSF	28.0	9.7	0.0	100.0	8.9	11.7	9.95
Nov-11	TSF	29.0	3.3	0.0	100.0	9.2	11.8	10.74
Mar-12	TSF	26.0	10.2	0.0	100.0	8.7	13.4	11.2
Apr-12	TSF	24.0	14.3	0.0	100.0	8.2	11.1	10.29
May-12	TSF	26.0	10.3	0.0	100.0	7.1	9.7	8.40
Jun-12	TSF	26.0	7.1	0.0	100.0	7.0	9.1	8.27

Table 35. Gage 01467042 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hours max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.68
Aug-11	720.5	30.0	3.2	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.1	7.52
Sep-11	676.0	28.2	6.1	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.50
Oct-11	727.5	30.3	2.2	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.9	7.49
Nov-11	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.7	7.43
Mar-12	693.5	28.9	0.2	0.4	3.4	0.0	0.0	99.6	96.6	7.4	9.1	7.90
Apr-12	667.5	27.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.5	7.65
May-12	692.0	28.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.7	7.40
Jun-12	668.5	27.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.0	7.58

Table 36. Gage 01467048 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.9	7.68
Aug-11	649.0	27.0	12.8	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.6	7.47
Sep-11	534.5	22.3	25.8	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.6	7.64
Oct-11	734.5	30.6	1.3	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.4	7.67
Nov-11	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.61
Mar-12	692.5	28.9	0.4	5.6	37.9	0.0	0.0	94.4	62.1	7.4	9.3	8.09
Apr-12	662.0	27.6	1.5	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.7	7.86
May-12	692.0	28.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.9	7.46
Jun-12	669.0	27.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.6	7.72

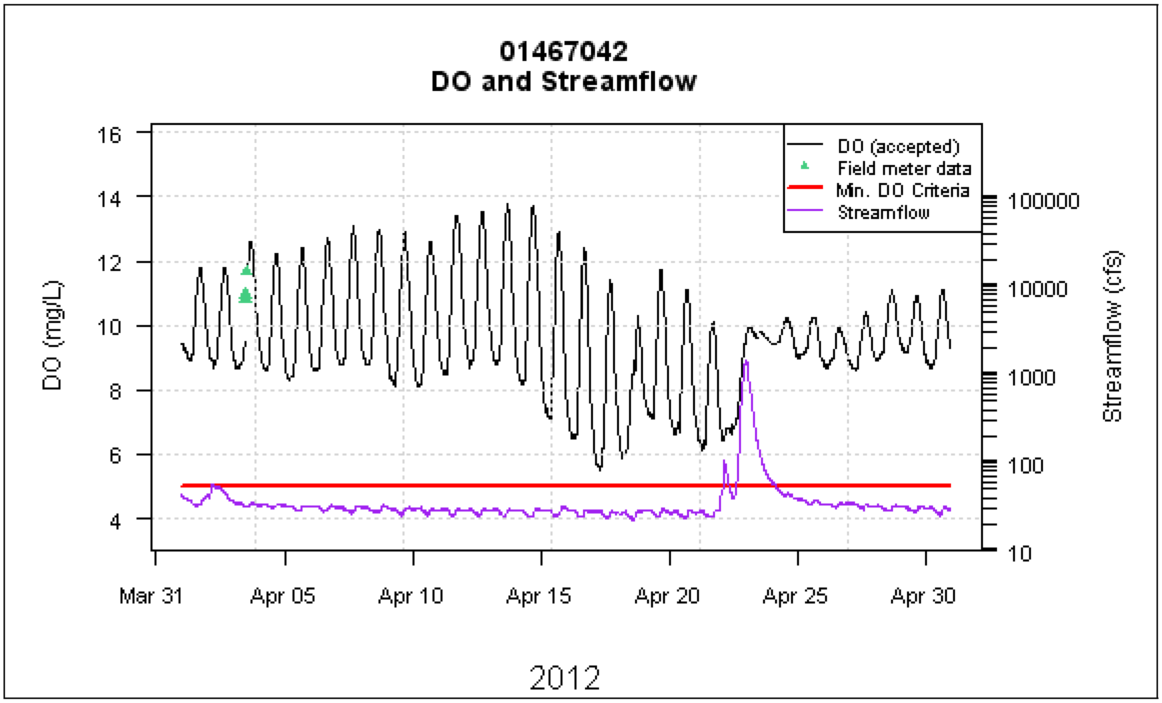


Figure 16. Gage 01467042, Dissolved Oxygen and Streamflow, April 2012.

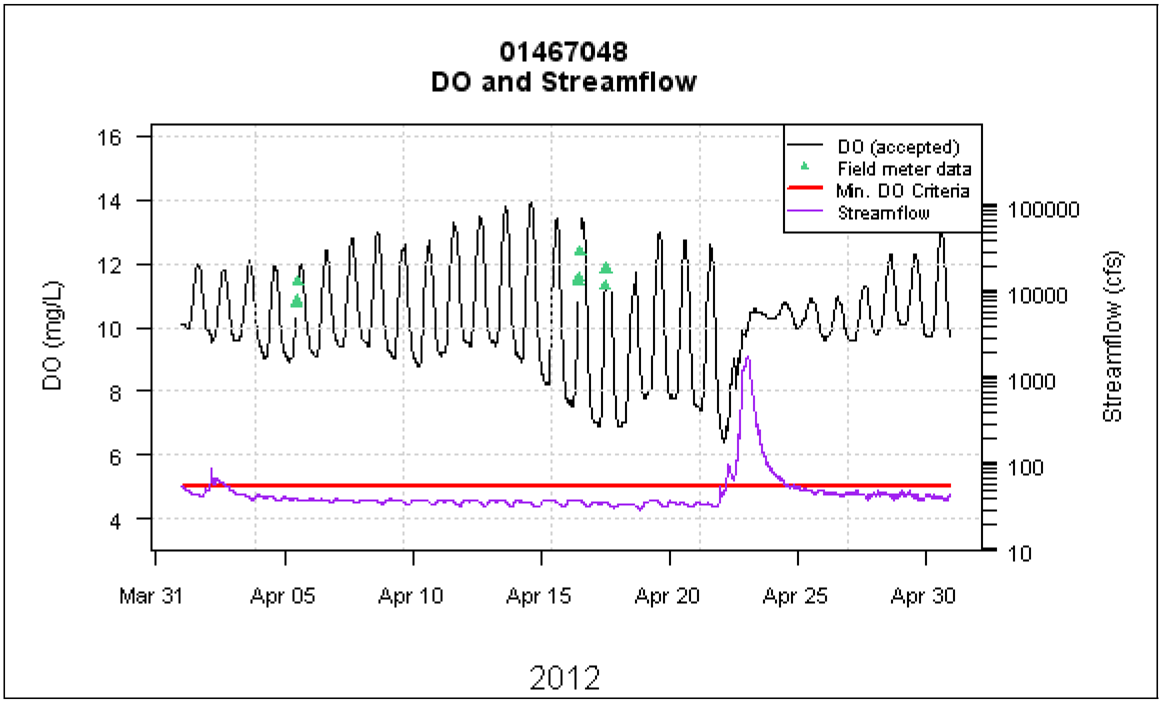


Figure 17. Gage 01467048, Dissolved Oxygen and Streamflow, April 2012.

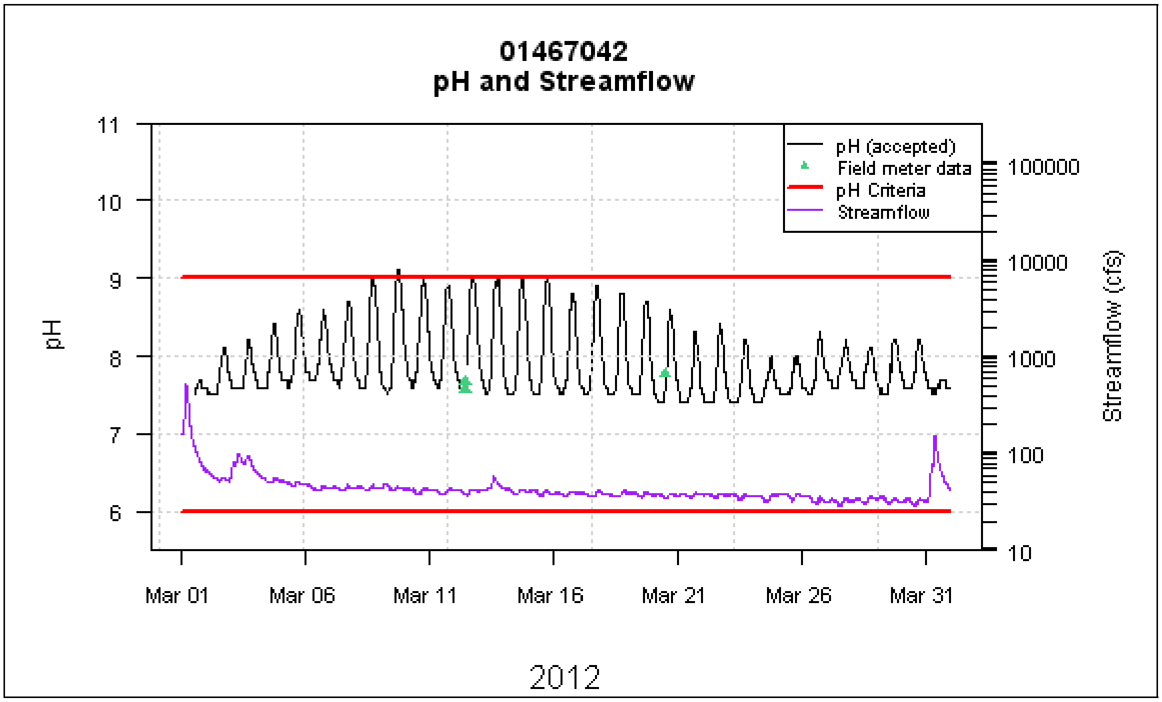


Figure 18. Gage 01467042, pH and Streamflow, March 2012.

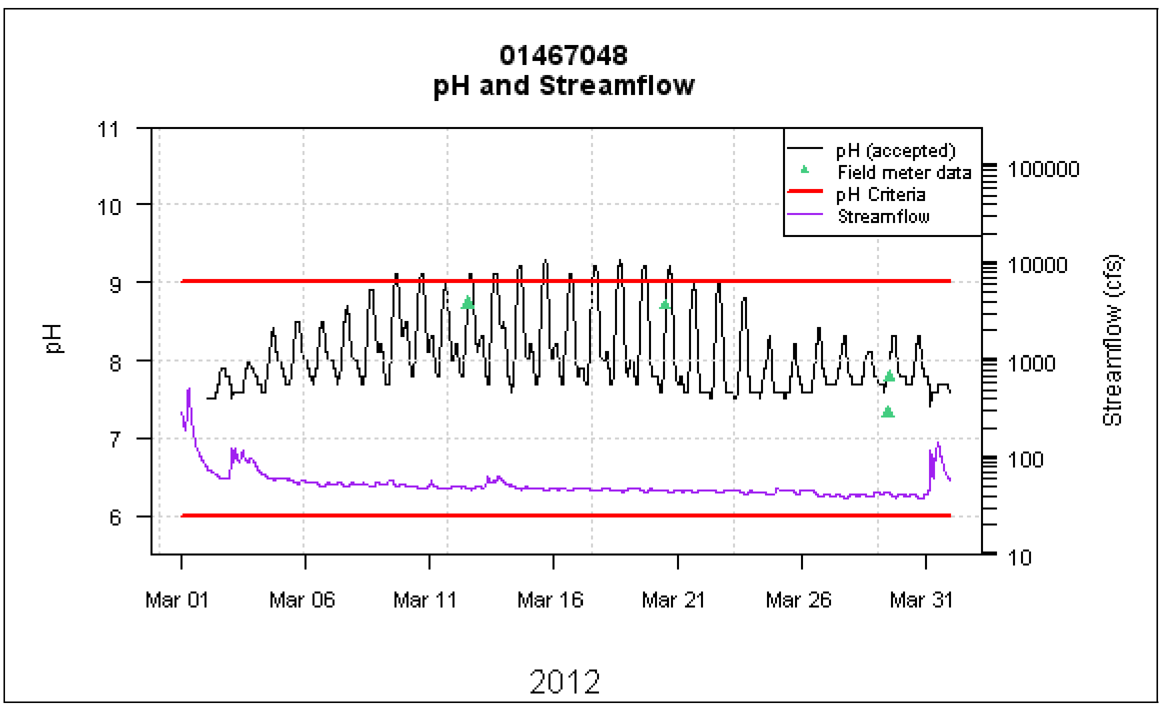


Figure 19. Gage 01467048, pH and Streamflow, March 2012.

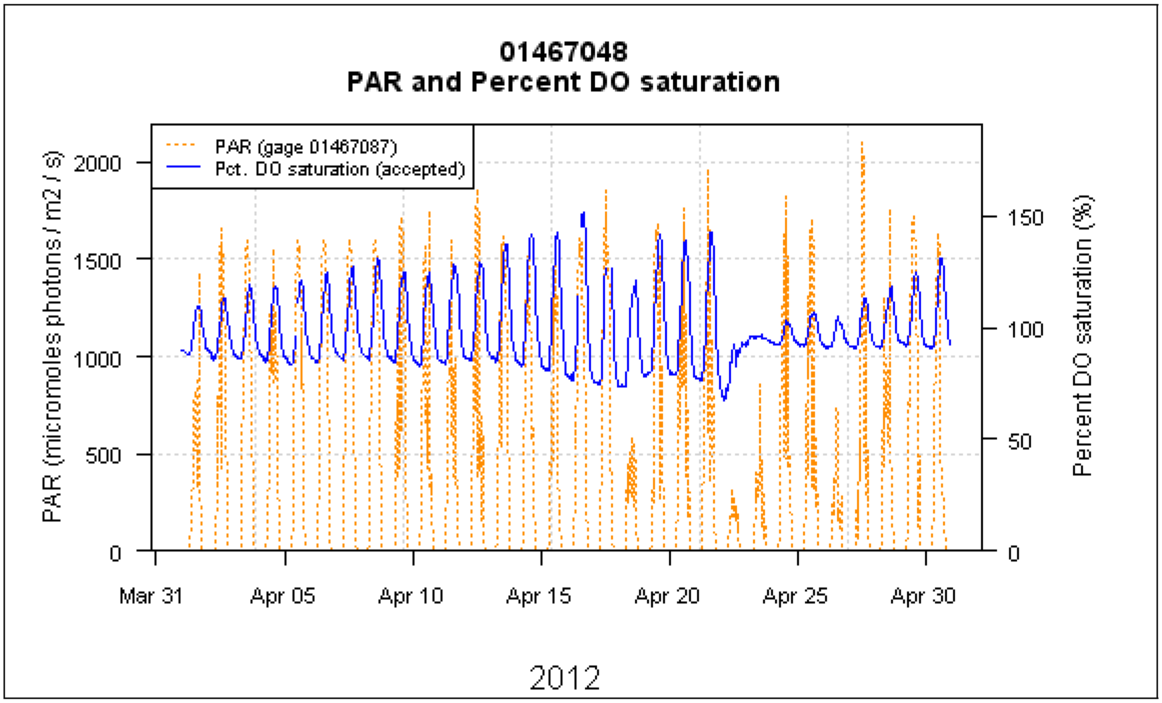


Figure 20. Gage 01467048, PAR and Percent Dissolved Oxygen Saturation, April 2012.

Turbidity

Turbidity data at the Pennypack Creek gages tend to reflect streamflow conditions. When there is high flow (*i.e.*, during and after storms), increases in turbidity are common and expected, as sediment in the creek bed is resuspended and particles present in runoff enter the stream. A cursory comparison of turbidity plots from the upstream gage (01467042) reveals that the frequent storms in August 2011 corresponded with elevated turbidity, while the mostly dry month of March 2012 corresponded with low turbidity (Figures 21-22). These two months represent the extremes of turbidity data for the upstream gage, with August 2011 having the highest monthly mean and percentage of hours above the maximum guideline, and March 2012 having the lowest monthly mean and percentage of hours above the maximum guideline (Table 37).

Table 37. Gage 01467042, Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-11	739.5	30.8	0.6	20.2	79.8	0.0	1330.0	22.52
Aug-11	597.5	24.9	19.7	59.2	40.8	0.0	330.0	26.93
Sep-11	477.5	19.9	33.7	55.7	44.3	0.0	290.0	23.23
Oct-11	661.5	27.6	11.1	26.8	73.2	0.0	53.0	3.45
Nov-11	657.5	27.4	8.7	23.1	76.9	0.0	130.0	5.48
Mar-12	692.5	28.9	0.4	2.3	97.7	0.0	8.7	0.73
Apr-12	643.5	26.8	4.2	8.4	91.6	0.2	170.0	2.79
May-12	618.0	25.8	11.2	32.2	67.8	0.0	260.0	6.16
Jun-12	593.0	24.7	11.8	9.9	90.1	0.0	11.0	1.47

Table 38. Gage 01467048, Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	24.5	75.5	0.0	500.0	7.75
Aug-11	649.0	27.0	12.8	64.7	35.3	0.1	350.0	27.34
Sep-11	512.5	21.4	28.8	34.0	66.0	0.0	460.0	16.46
Oct-11	634.0	26.4	14.8	33.8	66.2	0.2	53.0	3.82
Nov-11	718.0	29.9	0.3	22.9	77.1	0.1	160.0	5.91
Mar-12	692.0	28.8	0.4	20.6	79.4	0.3	27.0	2.16
Apr-12	639.0	26.6	4.9	16.8	83.2	0.0	230.0	5.78
May-12	692.0	28.8	0.6	41.3	58.7	0.4	250.0	11.44
Jun-12	638.0	26.6	5.1	15.7	84.3	0.0	74.0	2.12

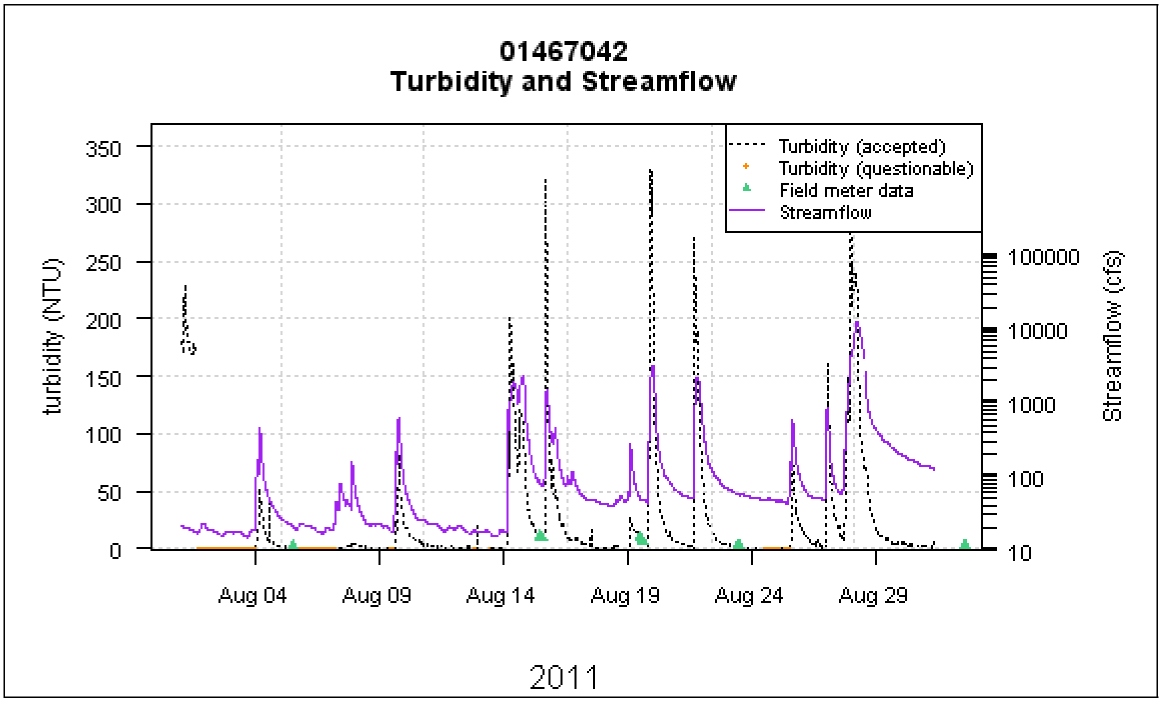


Figure 21. Gage 01467042, Turbidity and Streamflow, August 2011.

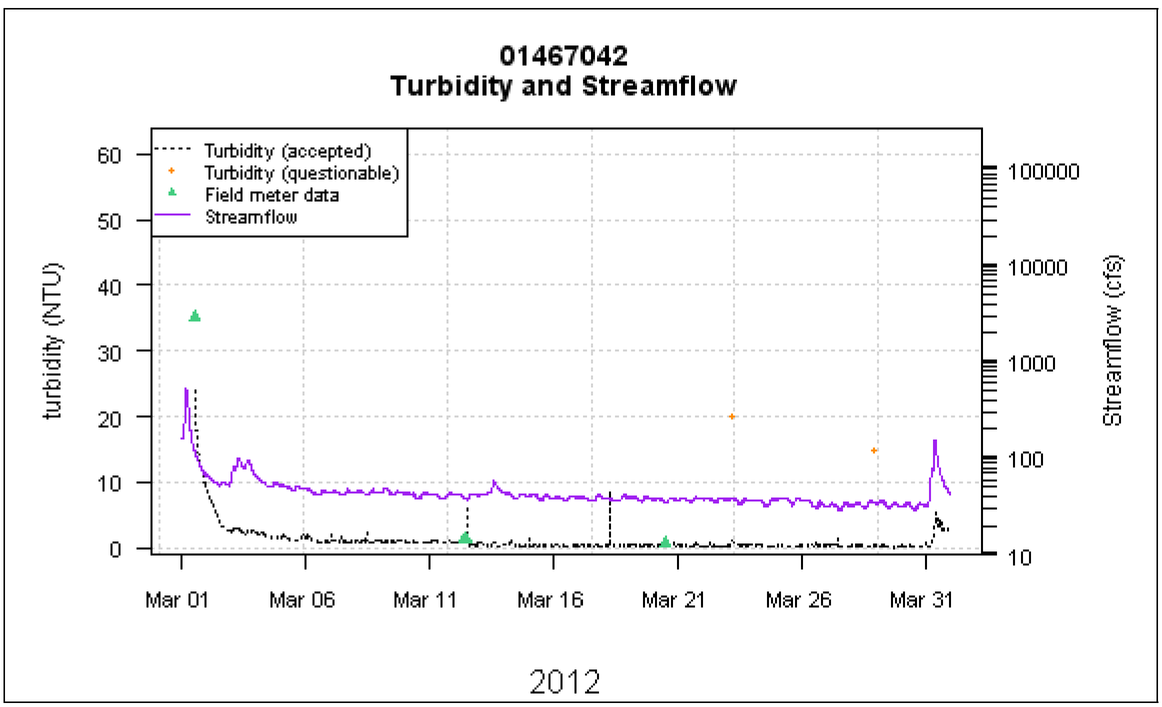


Figure 22. Gage 01467042, Turbidity and Streamflow, March 2012.

Specific Conductance

Specific conductance data were similar to other Philadelphia area streams.

Table 39. Gage 01467042 Specific Conductance Summary Results by Month

Month	Total hours accepted data	Total days accepted data	Percent hours flagged data	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	113.0	748.0	600.00
Aug-11	720.5	30.0	3.2	62.0	643.0	421.42
Sep-11	676.0	28.2	6.1	54.0	572.0	459.26
Oct-11	727.5	30.3	2.2	253.0	1020.0	527.11
Nov-11	716.0	29.8	0.6	138.0	721.0	540.85
Mar-12	693.5	28.9	0.2	541.0	657.0	607.21
Apr-12	667.5	27.8	0.7	128.0	700.0	590.72
May-12	692.0	28.8	0.6	176.0	617.0	490.02
Jun-12	668.5	27.9	0.5	301.0	695.0	584.07

Table 40. Gage 01467048 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	118.0	696.0	543.59
Aug-11	649.0	27.0	12.8	56.0	544.0	349.06
Sep-11	534.5	22.3	25.8	94.0	579.0	479.96
Oct-11	734.5	30.6	1.3	272.0	961.0	522.50
Nov-11	718.0	29.9	0.3	119.0	741.1	539.29
Mar-12	692.5	28.9	0.4	424.0	647.0	605.15
Apr-12	662.0	27.6	1.5	134.0	661.0	570.93
May-12	692.0	28.8	0.6	87.0	594.0	454.60
Jun-12	669.0	27.9	0.4	249.0	662.0	539.33

Temperature

Temperature data showed variable attainment of maximum temperature criteria (Tables 41-42). The main periods that exceeded maximum criteria were July and November 2011, and March-June 2012. Spring and early summer months are always subject to major air temperature fluctuations, and reliably predicting average stream temperatures during these periods is difficult at best. Maximum criteria for the summer months, for example, do not take into account natural summer temperature peaks. Above normal air temperatures are the likely cause of high stream temperature exceedance rates in July 2011 and June 2012; it is also worth noting that the high exceedance rate in March 2012 corresponds with unseasonably warm air temperatures in Philadelphia. As a result, in-stream temperatures exceeded the criteria for most of March at both gages (Figures 23-24).

Table 41. Gage 01467042 Temperature Summary Results by Maximum Criteria Period

Des. Use	Date range start	Date range end	Percent hours exceedance	Percent hours attaining	Percent hours flagged data	Total hours accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	79.2	20.8	0.3	742.0	30.9	19.9	29.7	24.53
TSF	1-Aug	15-Aug	0.0	100.0	1.1	356.0	14.8	18.0	26.9	22.43
TSF	16-Aug	31-Aug	0.0	100.0	5.1	364.5	15.2			
TSF	1-Sep	15-Sep	0.0	100.0	9.3	326.5	13.6	14.7	22.1	19.14
TSF	16-Sep	30-Sep	0.0	100.0	2.9	349.5	14.6			
TSF	1-Oct	15-Oct	0.0	100.0	1.7	354.0	14.8	6.1	18.6	14.3
TSF	16-Oct	31-Oct	0.0	100.0	2.9	373.0	15.5			
TSF	1-Nov	15-Nov	0.0	100.0	0.3	359.0	15.0	6.6	14.4	10.64
TSF	16-Nov	30-Nov	67.9	32.1	0.8	357.0	14.9			
TSF	1-Mar	31-Mar	83.6	16.4	0.4	693.5	28.9	4.4	19.2	11.67
TSF	1-Apr	15-Apr	79.0	21.0	14.0	309.5	12.9	9.0	21.3	13.69
TSF	16-Apr	30-Apr	51.0	49.0	0.6	358.0	14.9			
TSF	1-May	15-May	17.6	82.4	14.0	309.5	12.9	13.2	26.0	18.61
TSF	16-May	31-May	51.9	48.1	0.4	382.5	15.9			
TSF	1-Jun	15-Jun	29.2	70.8	13.5	311.5	13.0	15.4	26.8	21.16
TSF	16-Jun	30-Jun	53.2	46.8	0.8	357.0	14.9			

Table 42. Gage 01467048, Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	93.1	6.9	0.2	742.5	30.9	21.7	31.8	25.73
TSF	1-Aug	15-Aug	5.4	94.6	0.6	358.0	14.9	18.8	29.2	23.30
TSF	16-Aug	31-Aug	0.0	100.0	24.2	291.0	12.1			
TSF	1-Sep	15-Sep	0.0	100.0	51.3	175.5	7.3	15.0	22.8	19.45
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	6.0	18.8	14.24
TSF	16-Oct	31-Oct	0.0	100.0	2.5	374.5	15.6			
TSF	1-Nov	15-Nov	0.0	100.0	0.5	358.0	14.9	6.5	14.3	10.19
TSF	16-Nov	30-Nov	56.0	44.0	0.0	360.0	15.0			
TSF	1-Mar	31-Mar	84.1	15.9	0.5	692.5	28.9	4.4	20.3	11.87
TSF	1-Apr	15-Apr	91.0	9.0	13.9	310.0	12.9	9.7	21.9	14.00
TSF	16-Apr	30-Apr	51.4	48.6	2.2	352.0	14.7			
TSF	1-May	15-May	27.1	72.9	13.8	310.5	12.9	13.7	27.5	19.25
TSF	16-May	31-May	59.8	40.2	0.7	381.5	15.9			
TSF	1-Jun	15-Jun	45.2	54.8	13.9	310.0	12.9	16.4	29.5	22.16
TSF	16-Jun	30-Jun	65.3	34.7	0.3	359	15.0			

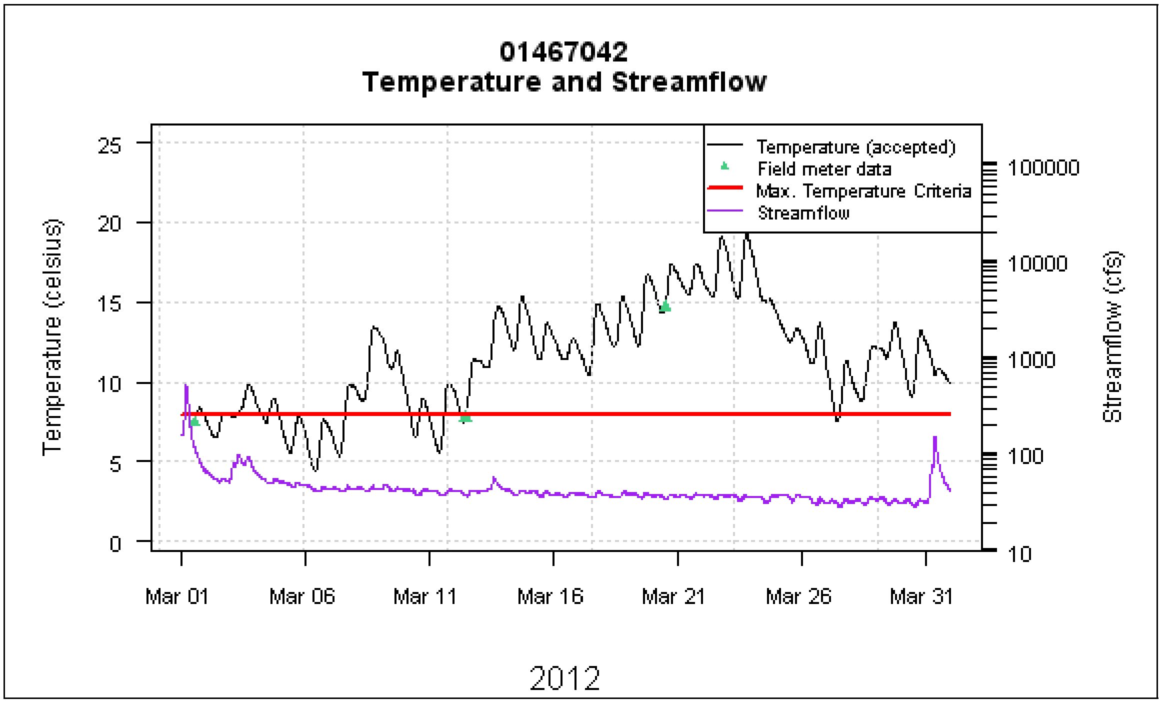


Figure 23. Gage 01467042, Temperature and Streamflow, March 2012.

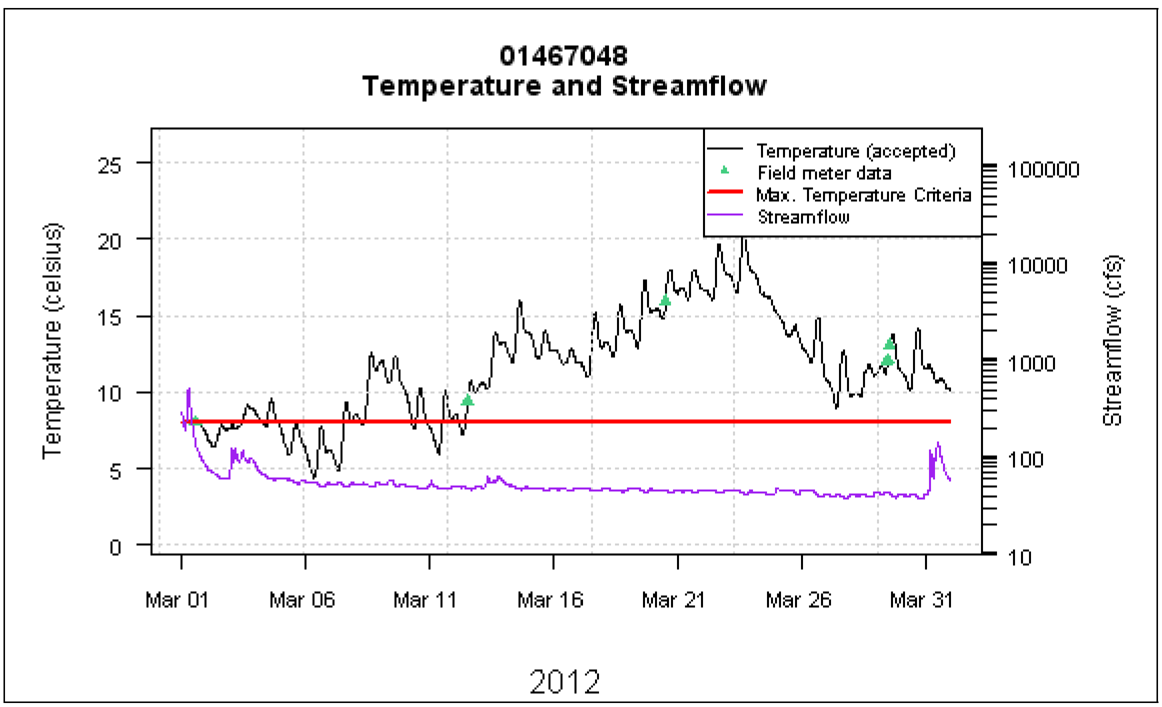
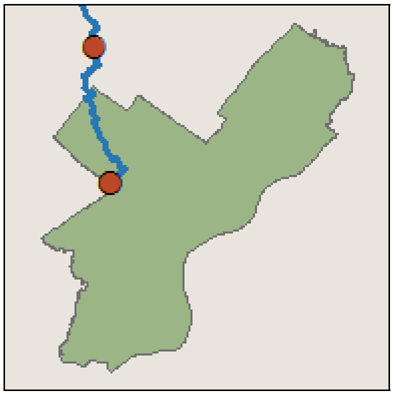


Figure 24. Gage 01467048, Temperature and Streamflow, March 2012.

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 2012, dissolved oxygen is seen fluctuating from 20 to 6.6 mg/L in a single day/night period (Figure 25), with pH ranging from approximately 7.5 to 9.1 at the same time (Figure 26). Nearly half the days in March exceeded pH maxima, a direct result of algal activity (Table 47). A contributing factor for the number of exceedances is the fact that March 2012 was a particularly dry month, and therefore provided a very long period for algal growth, uninterrupted by cloudy weather and scouring storm events.

Table 43. Gage 01473900 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	TSF	742.5	30.9	0.2	4.4	95.6	4.3	12.4	7.31
Aug-11	TSF	613.5	25.6	17.5	0.7	99.3	3.2	11.5	7.29
Sep-11	TSF	341.5	14.2	52.6	0.0	100.0	6.3	11.8	7.94
Oct-11	TSF	628.5	26.2	15.5	0.0	100.0	6.4	13.3	8.94
Nov-11	TSF	687.5	28.6	4.5	0.0	100.0	7.5	16.1	10.14
Mar-12	TSF	692.0	28.8	0.4	0.0	100.0	5.3	20.0	11.25
Apr-12	TSF	669.0	27.9	0.4	1.6	98.4	4.2	15.7	9.30
May-12	TSF	592.0	24.7	14.9	0.0	100.0	6.0	11.4	7.78
Jun-12	TSF	669.5	27.9	0.4	0.0	100.0	5.6	12.1	8.11

Table 44. Gage 01474000 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	TSF	742.5	30.9	0.2	0.0	100.0	5.6	11.8	8.22
Aug-11	TSF	709.0	29.5	4.7	0.0	100.0	7.0	11.2	8.50
Sep-11	TSF	620.0	25.8	13.9	0.0	100.0	7.6	13.0	9.39
Oct-11	TSF	728.5	30.4	2.1	0.0	100.0	8.5	12.5	10.13
Nov-11	TSF	717.0	29.9	0.4	0.0	100.0	9.8	13.2	11.12
Mar-12	TSF	609.5	25.4	12.3	0.0	100.0	8.0	17.8	11.77
Apr-12	TSF	668.0	27.8	0.6	0.0	100.0	6.7	14.9	10.51
May-12	TSF	691.5	28.8	0.6	0.0	100.0	7.3	12.1	9.03
Jun-12	TSF	669.0	27.9	0.4	0.0	100.0	5.7	12.7	9.03

Table 45. Gage 01473900 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	TSF	29.0	6.5	0.0	100.0	6.6	7.8	7.29
Aug-11	TSF	23.0	25.8	0.0	100.0	6.4	8.2	7.34
Sep-11	TSF	12.0	60.0	0.0	100.0	7.5	8.2	7.91
Oct-11	TSF	25.0	19.4	0.0	100.0	7.6	9.7	8.98
Nov-11	TSF	23.0	23.3	0.0	100.0	8.1	11.3	9.98
Mar-12	TSF	27.0	6.8	0.0	100.0	8.3	13.8	11.20
Apr-12	TSF	26.0	7.1	0.0	100.0	6.8	10.6	9.29
May-12	TSF	21.0	27.6	0.0	100.0	6.9	8.7	7.77
Jun-12	TSF	25.0	10.7	0.0	100.0	7.2	8.9	8.07

Table 46. Gage 01474000 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	TSF	30.0	3.2	0.0	100.0	7.5	8.8	8.23
Aug-11	TSF	28.0	9.7	0.0	100.0	7.8	9.1	8.51
Sep-11	TSF	24.0	20.0	0.0	100.0	8.6	10.6	9.41
Oct-11	TSF	29.0	6.5	0.0	100.0	8.7	12.3	10.16
Nov-11	TSF	28.0	6.7	0.0	100.0	10.0	11.9	11.12
Mar-12	TSF	22.0	24.0	0.0	100.0	9.1	14.5	11.66
Apr-12	TSF	25.0	10.7	0.0	100.0	8.3	11.6	10.45
May-12	TSF	23.0	20.7	0.0	100.0	7.9	10.3	9.02
Jun-12	TSF	25.0	10.7	0.0	100.0	7.6	9.7	9.07

Table 47. Gage 01473900 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.3	7.69
Aug-11	739.5	30.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.2	7.54
Sep-11	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.2	7.59
Oct-11	628.5	26.2	15.5	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.3	7.64
Nov-11	690.0	28.8	4.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.5	7.56
Mar-12	692.0	28.8	0.4	7.4	44.8	0.0	0.0	92.6	55.2	7.4	9.3	8.12
Apr-12	669.0	27.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.7	7.87
May-12	691.5	28.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.1	7.54
Jun-12	669.5	27.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.3	7.74

Table 48. Gage 01474000 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.5	8.08
Aug-11	709.0	29.5	4.7	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.5	7.83
Sep-11	538.0	22.4	25.3	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.7	7.89
Oct-11	588.0	24.5	21.0	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.6	8.00
Nov-11	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.4	8.05
Mar-12	609.5	25.4	12.3	0.0	0.0	0.0	0.0	100.0	100.0	7.9	9.0	8.37
Apr-12	667.5	27.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.9	8.22
May-12	692.0	28.8	0.6	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.5	8.02
Jun-12	669.0	27.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.8	8.24

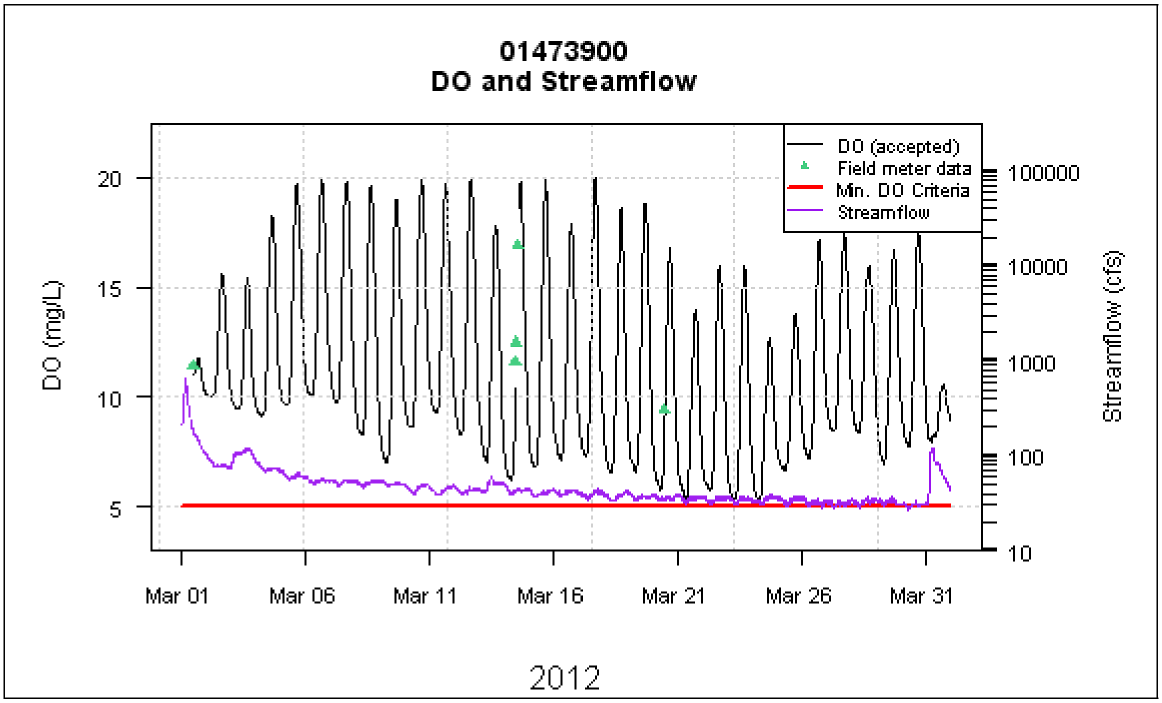


Figure 25. Gage 01473900, Dissolved Oxygen and Streamflow, March 2012.

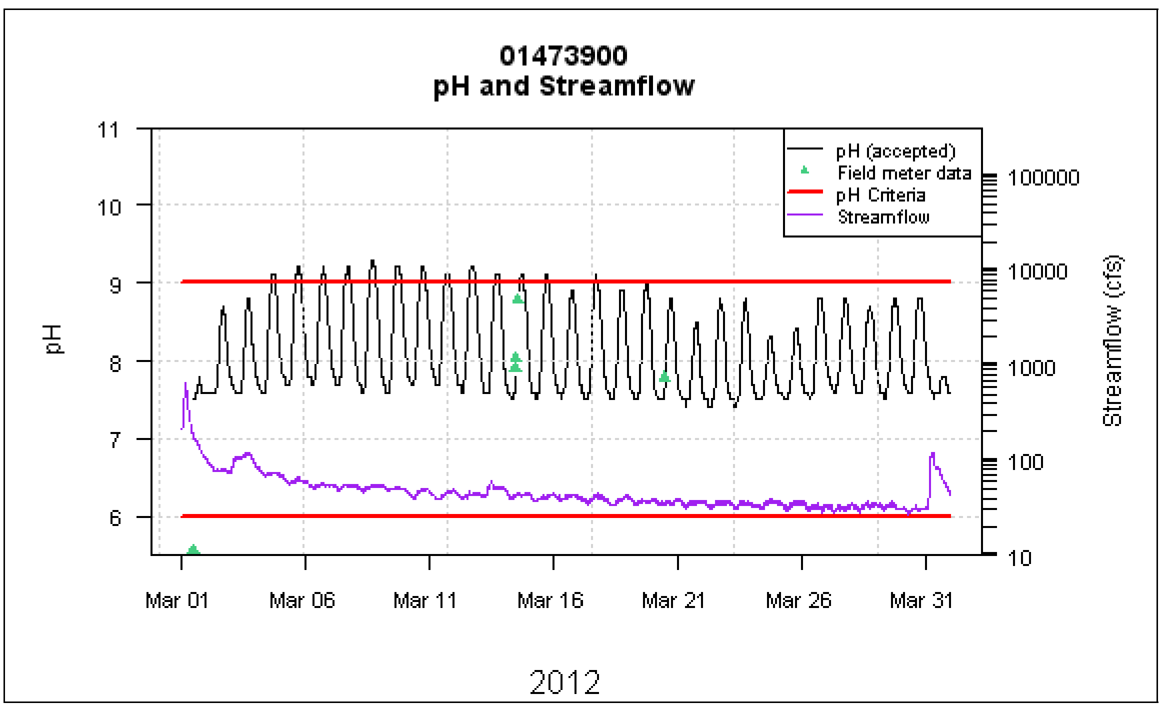


Figure 26. Gage 01473900, pH and Streamflow, March 2012.

Turbidity

Turbidity at this site, as with most of Philadelphia's streams, increases drastically with increased flow from rainfall. During the wet months of August and September 2011, turbidity averaged well above the guideline (Tables 48-49). However, during dry periods between storm events, turbidity quickly decreased. A number of sizeable storm events during August (Figure 27) resulted in sharp increases in stream turbidity. However, those levels decreased rapidly afterward as streamflow returned to normal. Such is the case with nearly all storm-related high turbidity events in Philadelphia's streams.

Table 49. Gage 01473900 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	39.3	60.7	0.2	240.0	6.69
Aug-11	505.5	21.1	32.1	74.4	25.6	0.9	660.0	33.69
Sep-11	537.5	22.4	25.3	68.7	31.3	0.3	500.0	49.18
Oct-11	628.5	26.2	15.5	24.3	75.7	0.0	290.0	4.84
Nov-11	442.0	18.4	38.6	25.8	74.2	0.2	130.0	8.37
Mar-12	417.0	17.4	40.0	96.0	4.0	2.6	19.0	3.96
Apr-12	628.0	26.2	6.5	40.3	59.7	1.3	82.0	3.73
May-12	588.0	24.5	15.5	66.1	33.9	0.4	140.0	10.31
Jun-12	611.0	25.5	9.1	6.9	93.1	0.3	31.0	1.46

Table 50. Gage 01474000 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	19.7	80.3	0.0	210.0	4.57
Aug-11	677.0	28.2	9.0	51.0	49.0	0.0	720.0	25.35
Sep-11	202.0	8.4	71.9	76.2	23.8	0.0	590.0	53.06
Oct-11	408.0	17.0	45.2	44.6	55.4	0.0	250.0	8.57
Nov-11	717.0	29.9	0.4	25.8	74.2	0.3	200.0	7.75
Mar-12	607.5	25.3	12.6	2.0	98.0	0.0	23.0	1.19
Apr-12	520.0	21.7	22.6	15.2	84.8	0.0	220.0	5.41
May-12	692.5	28.9	0.5	30.3	69.7	0.0	400.0	9.25
Jun-12	664.5	27.7	1.1	10.2	89.8	0.0	46.0	1.26

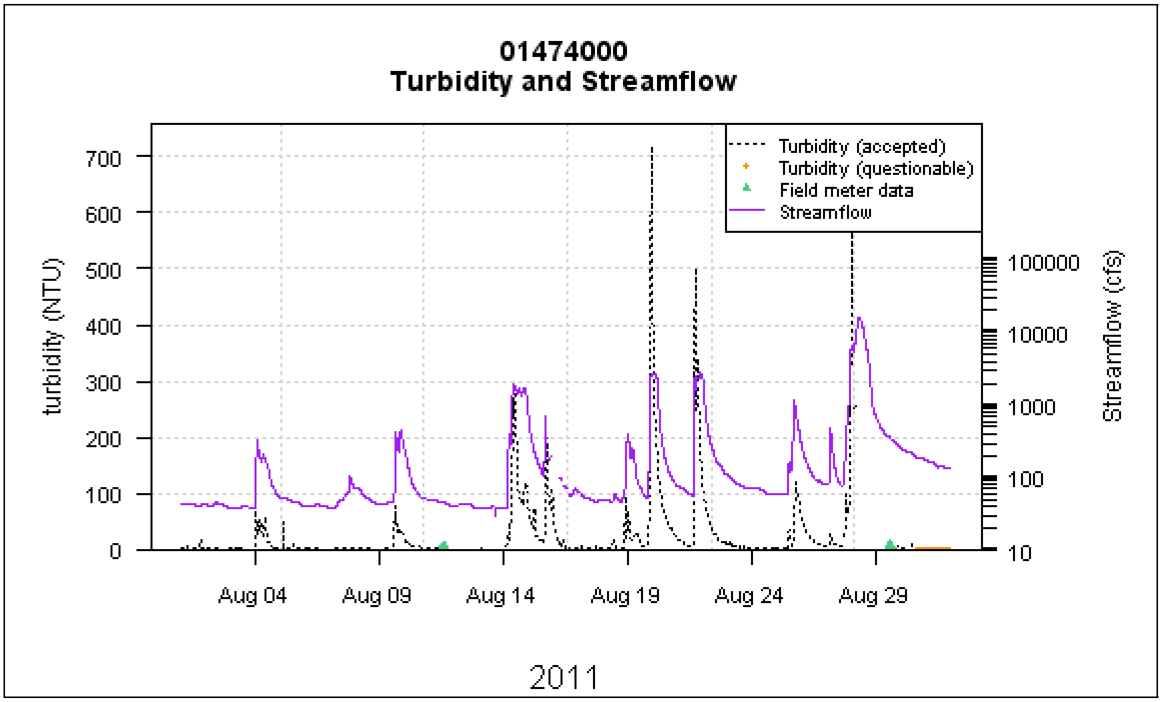


Figure 27. Gage 01473900, Turbidity and Streamflow, August 2011.

Specific Conductance

Specific conductance data at the Wissahickon Creek gage site generally follow the established pattern in other Philadelphia streams: Runoff from rain events dilutes the stream and decreases conductivity. However, an interesting reversal occurred on October 30, 2011, during an unseasonable snowstorm. Conductivity increased in conjunction with streamflow (Figure 28), most likely due to the application of road salt (sodium chloride) that washed into Wissahickon Creek. During that same month, two other storms of comparable size have the expected effect of diluting the stream.

Table 51. Gage 01473900 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	742.0	30.9	0.3	223.0	1120.0	852.07
Aug-11	739.5	30.8	0.6	94.0	909.0	583.33
Sep-11	718.5	29.9	0.2	92.0	745.0	568.91
Oct-11	628.5	26.2	15.5	257.0	750.0	638.68
Nov-11	690.0	28.8	4.2	193.0	787.0	642.13
Mar-12	691.5	28.8	0.5	668.0	870.0	821.71
Apr-12	669.0	27.9	0.4	192.0	1030.0	847.43
May-12	691.0	28.8	0.7	163.0	873.0	647.10
Jun-12	669.5	27.9	0.4	404.0	973.0	786.90

Table 52. Gage 01474000 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	742.5	30.9	0.2	294.0	894.0	738.17
Aug-11	709.0	29.5	4.7	85.0	726.0	481.73
Sep-11	616.5	25.7	14.4	40.0	685.0	539.41
Oct-11	728.5	30.4	2.1	308.0	1020.0	615.36
Nov-11	717.0	29.9	0.4	158.0	755.0	626.08
Mar-12	608.5	25.4	12.4	737.0	845.5	781.8
Apr-12	667.5	27.8	0.7	207.0	842.0	733.21
May-12	692.0	28.8	0.6	190.0	770.0	591.07
Jun-12	669.0	27.9	0.4	362.0	832.0	714.12

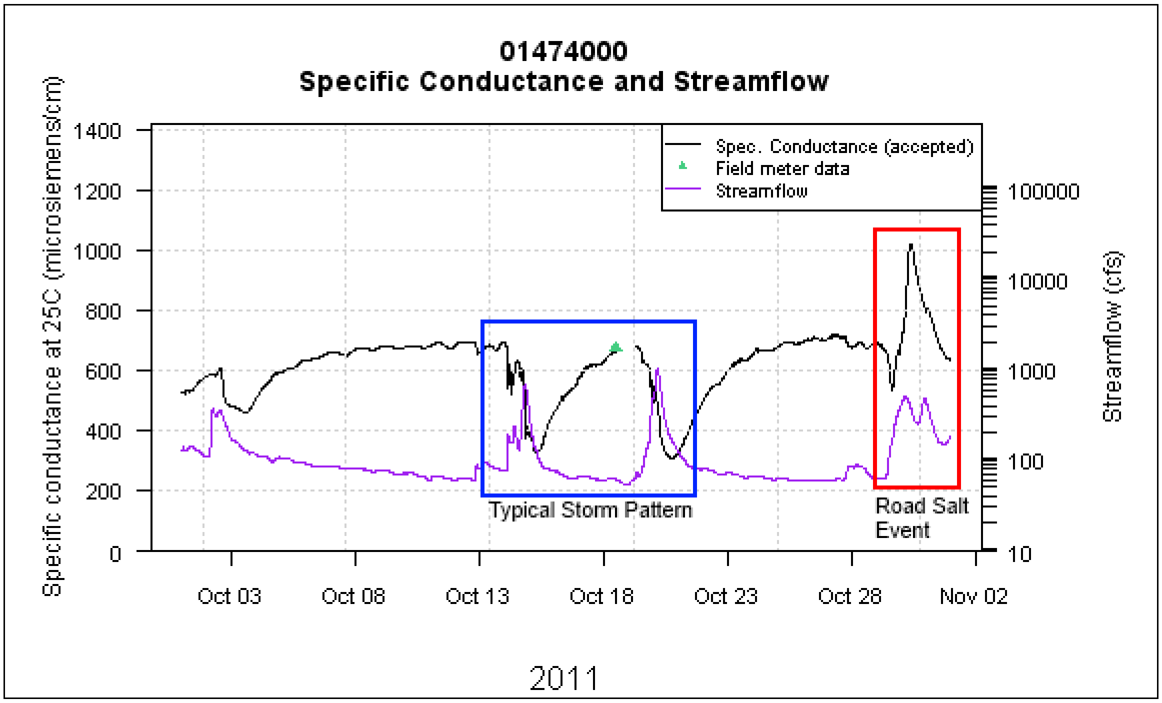


Figure 28. Gage 01474000, Specific Conductance and Streamflow, October 2011.

Temperature

Temperature trends and exceedance rates in Wissahickon Creek Watershed were similar to those observed in Pennypack Creek (Tables 52-53, Figures 29-30).

Table 53. Gage 01473900 Temperature Summary Results by Month by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	77.9	22.1	0.5	740.5	30.9	19.9	29.9	24.47
TSF	1-Aug	15-Aug	0.0	100.0	0.1	359.5	15.0	18.5	26.8	22.50
TSF	16-Aug	31-Aug	0.0	100.0	1.0	380	15.8			
TSF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	15.0	22.6	19.59
TSF	16-Sep	30-Sep	0.0	100.0	0.8	357.0	14.9			
TSF	1-Oct	15-Oct	0.0	100.0	0.6	358.0	14.9	11.9	18.8	15.41
TSF	16-Oct	31-Oct	0.0	100.0	30.1	268.5	11.2			
TSF	1-Nov	15-Nov	0.0	100.0	11.9	317.0	13.2	7.0	14.6	11.03
TSF	16-Nov	30-Nov	71.3	28.7	1.3	355.5	14.8			
TSF	1-Mar	31-Mar	84.5	15.5	0.6	691.5	28.8	4.6	19.7	11.85
TSF	1-Apr	15-Apr	77.2	22.8	14.2	309.0	12.9	9.1	21.8	13.75
TSF	16-Apr	30-Apr	51.5	48.5	0.4	358.5	14.9			
TSF	1-May	15-May	19.4	80.6	14.3	308.5	12.9	13.5	25.0	18.52
TSF	16-May	31-May	48.8	51.2	0.5	382.0	15.9			
TSF	1-Jun	15-Jun	21.6	78.4	13.8	310.5	12.9	15.6	26.5	20.81
TSF	16-Jun	30-Jun	46.4	53.6	0.4	358.5	14.9			

Table 54. Gage 01474000 Temperature Summary Results by Month by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	85.5	14.5	0.2	742.5	30.9	20.8	28.8	24.74
TSF	1-Aug	15-Aug	0.0	100.0	0.6	358.0	14.9	18.5	26.4	22.42
TSF	16-Aug	31-Aug	0.0	100.0	8.6	351.0	14.6			
TSF	1-Sep	15-Sep	0.0	100.0	0.1	359.5	15.0	14.8	22.2	18.8
TSF	16-Sep	30-Sep	0.0	100.0	27.9	259.5	10.8			
TSF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	5.8	18.9	14.00
TSF	16-Oct	31-Oct	0.0	100.0	4.0	368.5	15.4			
TSF	1-Nov	15-Nov	0.0	100.0	0.4	358.5	14.9	7.1	13.5	10.18
TSF	16-Nov	30-Nov	57.5	42.5	0.4	358.5	14.9			
TSF	1-Mar	31-Mar	85.8	14.2	12.4	609.5	25.4	5.2	18.6	11.80
TSF	1-Apr	15-Apr	75.4	24.6	14.2	309.0	12.9	9.3	19.3	13.26
TSF	16-Apr	30-Apr	45.9	54.1	0.42	358.5	14.9			
TSF	1-May	15-May	8.1	91.9	13.8	310.5	12.9	13.7	25.0	18.37
TSF	16-May	31-May	49.2	50.8	0.4	382.5	15.9			
TSF	1-Jun	15-Jun	21.1	78.9	13.8	310.5	12.9	15.8	25.4	20.81
TSF	16-Jun	30-Jun	47.1	52.9	0.4	258.5	14.9			

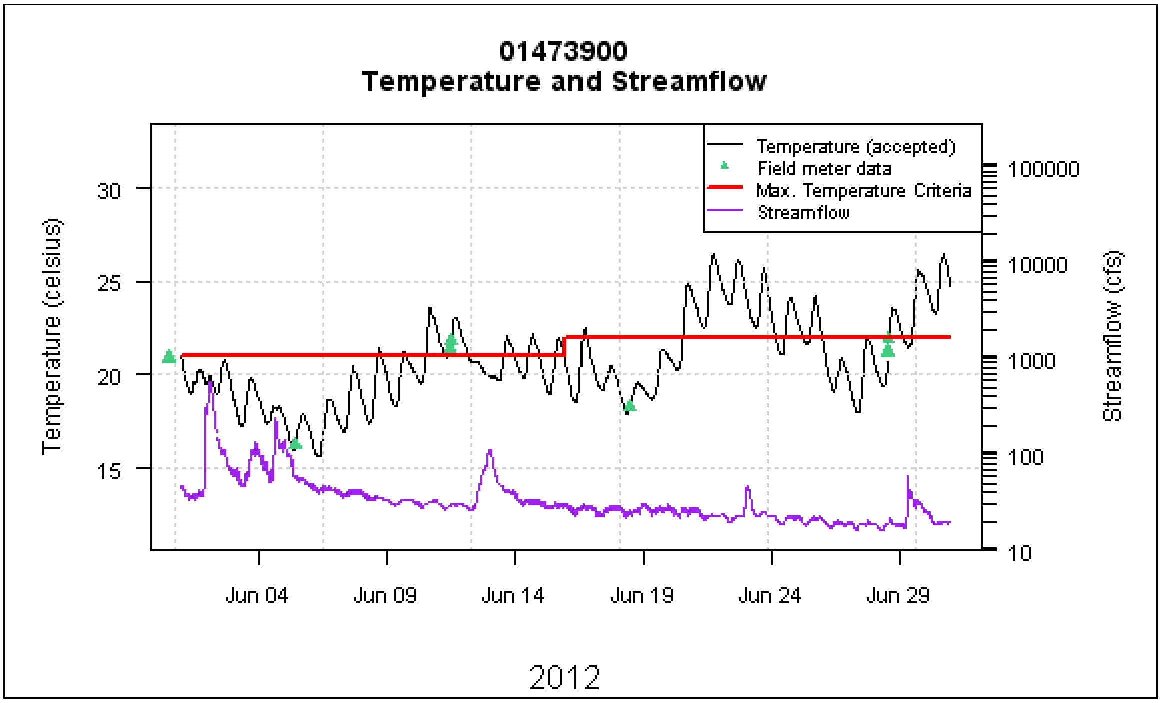


Figure 29. Gage 01473900, Temperature and Streamflow, June 2012.

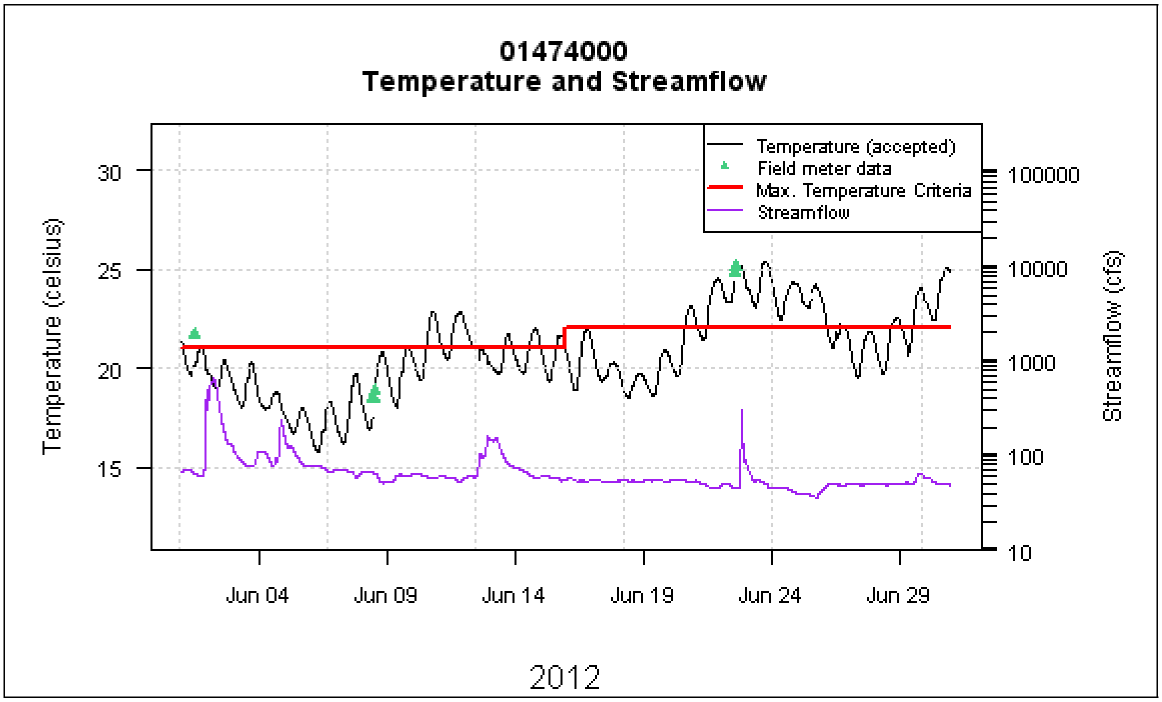
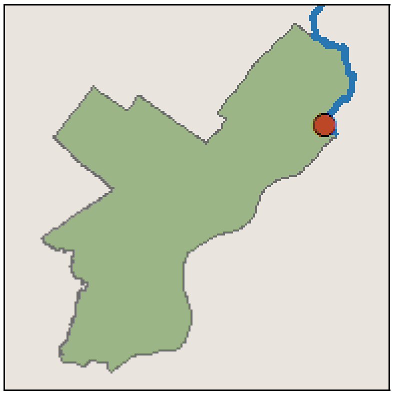


Figure 30. Gage 01474000, Temperature and Streamflow, June 2012.

Poquesssing Creek (Gage 01465798)



Dissolved oxygen and pH

Dissolved oxygen and pH at this gage site were well within acceptable ranges and almost never fell below the minimum DO criterion or exceeded the pH maximum criterion (Tables 55-57). Data collected from Poquessing Creek did exhibit classic signs of algal activity, as indicated by diel fluctuations in both DO and pH (Figure 31).

As seen with previous sites, the algal activity and related diel fluctuations in DO and pH are only suppressed by storm events. These suppressions, however, are only very temporary. Given an adequate period of uninterrupted algal growth, such as occurred in April 2012 (Figure 32), one can expect steadily increasing DO and pH fluctuations. April was the only month during which the minimum DO criterion was not fully attained at 01465798; the pH standard was never exceeded.

Table 55. Gage 01465798 Dissolved Oxygen Min. Criteria Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	WWF	740.0	30.8	0.5	0.0	100.0	4.4	12.8	7.34
Aug-11	WWF	740.5	30.9	0.5	0.0	100.0	4.2	11.1	7.33
Sep-11	WWF	714.5	29.8	0.8	0.0	100.0	4.6	13.6	8.44
Oct-11	WWF	652.5	27.2	12.3	0.0	100.0	6.9	12.2	9.33
Nov-11	WWF	709.5	29.6	1.5	0.0	100.0	6.8	12.9	10.06
Mar-12	WWF	584.0	24.3	16.0	0.0	100.0	4.1	16.0	10.69
Apr-12	WWF	666.0	27.8	0.9	1.6	98.4	2.6	13.6	9.12
May-12	WWF	688.5	26.7	1.1	0.0	100.0	4.1	11.4	7.75
Jun-12	WWF	667.5	27.8	0.7	0.0	100.0	4.4	12.7	7.70

Table 56. Gage 01465798 Dissolved Oxygen Mean Criteria Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	WWF	27.0	12.9	0.0	100.0	6.5	8.4	7.31
Aug-11	WWF	28.0	9.7	0.0	100.0	6.1	8.5	7.32
Sep-11	WWF	25.0	16.7	0.0	100.0	6.9	10.2	8.45
Oct-11	WWF	21.0	32.3	0.0	100.0	8.0	10.1	9.12
Nov-11	WWF	26.0	13.3	0.0	100.0	7.6	11.4	9.99
Mar-12	WWF	22.0	24.0	0.0	100.0	8.8	12.6	10.61
Apr-12	WWF	24.0	14.3	0.0	100.0	6.9	10.5	9.26
May-12	WWF	22.0	24.1	0.0	100.0	6.1	8.9	7.71
Jun-12	WWF	23.0	17.9	0.0	100.0	6.4	8.7	7.65

Table 57. Gage 01465798 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.5	8.6	7.24
Aug-11	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.2	7.40
Sep-11	714.5	29.8	0.8	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.3	7.50
Oct-11	705.5	29.4	5.2	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.0	7.50
Nov-11	714.5	29.8	0.8	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.8	7.39
Mar-12	584.0	24.3	16.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.5	7.44
Apr-12	666.0	27.8	0.9	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.9	7.35
May-12	688.5	28.7	1.1	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.6	7.23
Jun-12	667.5	27.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.3	7.32

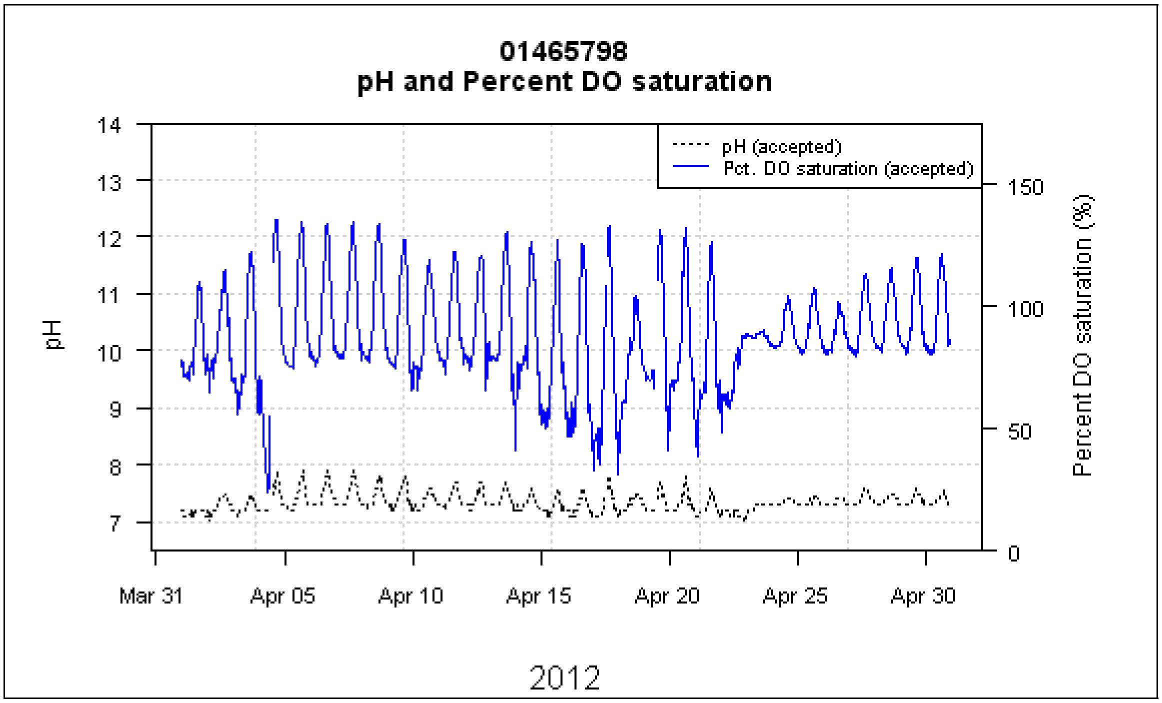


Figure 31. Gage 01465798, pH and Percent DO Saturation, April 2012.

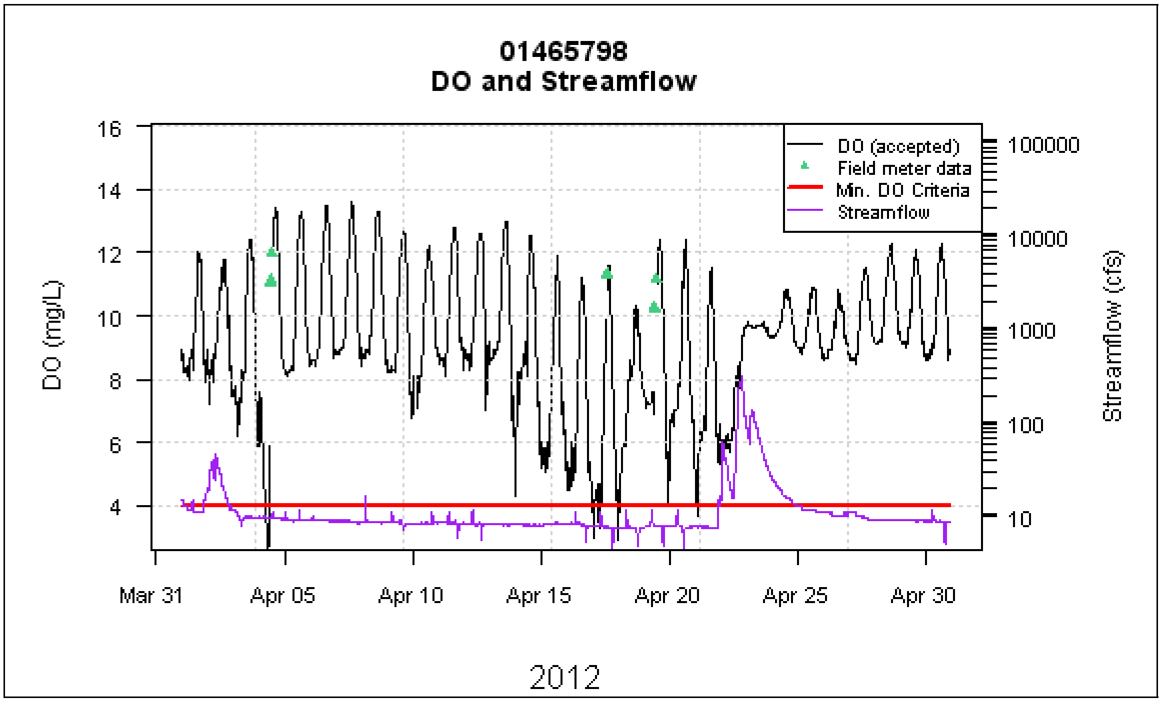


Figure 32. Gage 01465798, DO and Streamflow, April 2012.

Turbidity

High turbidity levels during August and September are likely reflective of the influence of Hurricane Irene and Tropical Storm Lee.

Table 58. Gage 01465798 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-11	712.5	29.7	4.2	28.7	71.3	0.0	190.0	7.46
Aug-11	633.5	26.4	14.9	73.1	26.9	0.4	310.0	19.63
Sep-11	368.5	15.4	48.8	71.6	28.4	0.0	240.0	22.44
Oct-11	570.0	23.8	23.4	32.0	68.0	0.0	320.0	5.33
Nov-11	557.5	23.2	22.6	48.0	52.0	0.0	1070.0	17.85
Mar-12	583.5	24.3	16.0	5.8	94.2	0.1	22.0	1.07
Apr-12	666.0	27.8	0.9	39.3	60.7	0.2	180.0	5.17
May-12	652.5	27.2	6.3	53.6	46.4	0.6	830.0	17.88
Jun-12	570.0	23.8	15.2	22.0	78.0	0.0	36.0	2.33

Specific Conductance

Specific conductance data were similar to other Philadelphia streams.

Table 59. Gage 01465798 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	731.0	30.5	1.7	38.0	734.0	531.36
Aug-11	740.5	30.9	0.5	59.0	555.0	342.59
Sep-11	714.5	29.8	0.8	72.0	644.0	477.39
Oct-11	714.0	29.8	4.0	150.0	915.0	522.53
Nov-11	715.5	29.8	0.6	96.0	682.0	560.00
Mar-12	584.0	24.3	16.0	422.0	675.0	635.40
Apr-12	666.0	27.8	0.9	109.0	659.0	592.92
May-12	688.5	28.7	1.1	70.0	621.0	441.55
Jun-12	667.5	27.8	0.7	182.0	661.0	518.96

Temperature

Temperature exceedance rates observed in Poquessing Creek were similar to those in other WWF designated-use creeks (*e.g.*, Tacony and Cobbs Creeks).

Table 60. Gage 01465798 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.2	99.8	0.5	740.0	30.8	20.5	31.2	24.94
WWF	1-Aug	15-Aug	0.0	100.0	0.7	357.5	14.9	18.6	28.8	22.85
WWF	16-Aug	31-Aug	0.0	100.0	0.3	383.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	1.1	356.0	14.8	14.8	23.2	19.91
WWF	16-Sep	30-Sep	0.0	100.0	0.4	358.5	14.9			
WWF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	5.6	19.4	14.33
WWF	16-Oct	31-Oct	0.0	100.0	5.5	363.0	15.1			
WWF	1-Nov	15-Nov	0.0	100.0	0.7	357.5	14.9	6.2	14.7	10.17
WWF	16-Nov	30-Nov	58.9	41.1	0.6	358.0	14.9			
WWF	1-Mar	31-Mar	93.2	6.8	16.1	584.0	24.3	5.4	20.8	12.59
WWF	1-Apr	15-Apr	76.3	23.7	14.0	309.5	12.9	9.1	22.7	13.76
WWF	16-Apr	30-Apr	50.8	49.2	1.0	356.5	14.9			
WWF	1-May	15-May	20.7	79.3	14.2	309.0	12.9	13.0	27.2	18.65
WWF	16-May	31-May	26.9	73.1	1.2	379.5	15.8			
WWF	1-Jun	15-Jun	0.0	100.0	14.2	309.0	12.9	15.6	28.7	21.46
WWF	16-Jun	30-Jun	0.0	100.0	0.4	358.2	14.9			

Gages in Large Watersheds

Schuylkill River (Gage 01474500)

Dissolved oxygen and pH

DO water quality criteria were almost always attained at this location (Tables 61-62). pH criteria were exceeded in July, most likely due to an algal bloom observed by PWD staff, as well as in April (Table 63). Supersaturated DO conditions were observed concomitant with pH above 9.0 for much of July (Figure 33), indicating high algal activity.

On August 15, the sonde at the Schuylkill River gage was removed to protect the device from possible damage due to storms (*i.e.*, Hurricane Irene and Tropical Storm Lee). The gage resumed data collection on October 5; it was offline for several days subsequent in October for maintenance. As of October 18, 2011, the water quality monitoring device has been relocated from within the Fairmount fish ladder exit chamber to a new external location. The old location was subject to episodes of turbulence caused by impingement of debris on the fish ladder exit chamber trash screens.

Table 61. Gage 01474500 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-11	WWF	740.5	30.9	0.5	0.7	99.3	3.4	20.0	9.97
Aug-11*	WWF	344.5	14.4	53.7	0.0	100.0	4.7	12.0	7.20
Sep-11**	WWF	-	-	-	-	-	-	-	-
Oct-11*	WWF	507.0	21.1	31.9	0.0	100.0	9.5	12.5	10.34
Nov-11	WWF	717.5	29.9	0.3	0.0	100.0	10.6	12.3	11.70
Mar-12	WWF	580.0	24.2	21.9	0.0	100.0	9.2	13.9	11.72
Apr-12	WWF	716.5	29.9	0.5	0.0	100.0	7.9	17.8	12.07
May-12	WWF	738.0	30.8	0.8	0.0	100.0	7.3	10.7	8.60
Jun-12	WWF	717.0	29.9	0.4	0.0	100.0	6.5	9.7	8.42

*Limited data collected due to removal/maintenance of sonde
**No data collected due to removal of sonde

Table 62. Gage 01474500 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Min.	Max.	Mean
Jul-11	WWF	27.0	12.9	0.0	100.0	5.4	15.9	10.00
Aug-11*	WWF	13.0	58.1	0.0	100.0	5.9	8.4	7.27
Sep-11**	WWF	-	-	-	-	-	-	-
Oct-11*	WWF	18.0	41.9	0.0	100.0	9.7	12.3	10.38
Nov-11	WWF	29.0	3.3	0.0	100.0	10.8	12.2	11.72
Mar-12	WWF	19.0	38.6	0.0	100.0	9.7	13.0	11.67
Apr-12	WWF	28.0	6.7	0.0	100.0	9.1	14.9	12.09
May-12	WWF	26.0	16.1	0.0	100.0	7.6	10.2	8.62
Jun-12	WWF	28.0	6.7	0.0	100.0	7.2	9.3	8.42

*Limited data collected due to removal/maintenance of sonde
**No data collected due to removal of sonde

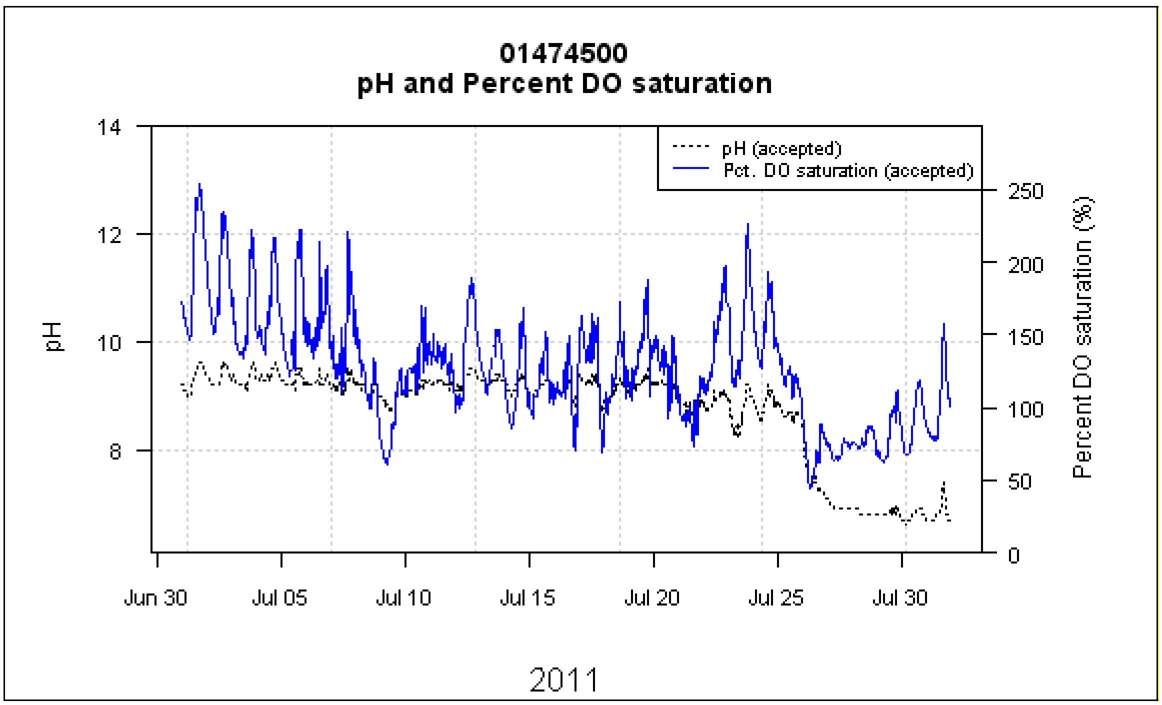


Figure 33. Gage 01474500, pH and Percent Dissolved Oxygen Saturation, July 2011.

Table 63. Gage 01474500 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	740.0	30.8	0.5	56.4	74.2	0.0	0.0	43.6	25.8	6.6	9.6	8.70
Aug-11*	258.0	10.8	65.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.1	7.48
Sep-11**	-	-	-	-	-	-	-	-	-	-	-	-
Oct-11*	507.0	21.1	31.9	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.1	7.91
Nov-11	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.3	8.01
Mar-12	487.0	20.3	34.5	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.6	8.07
Apr-12	716.5	29.9	0.5	2.2	16.7	0.0	0.0	97.8	83.3	7.4	9.2	8.32
May-12	738.0	30.8	0.8	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.0	7.58
Jun-12	717.0	29.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.5	7.70

*Limited data collected due to removal/maintenance of sonde
**No data collected due to removal of sonde

Temperature

Table 64. Gage 01474500 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	5.1	94.9	0.5	740.0	30.8	25.3	32.3	28.35
WWF	1-Aug*	15-Aug	0.0	100.0	4.3	344.5	14.4	23.2	30.2	26.68
WWF	16-Aug**	31-Aug	-	-	-	-	-			
WWF	1-Sep**	15-Sep	-	-	-	-	-	-	-	-
WWF	16-Sep**	30-Sep	-	-	-	-	-			
WWF	1-Oct*	15-Oct	0.0	100.0	40.0	216.0	9.0	7.6	17.0	14.35
WWF	16-Oct	31-Oct	0.0	100.0	24.2	291.0	12.1			
WWF	1-Nov	15-Nov	0.0	100.0	0.0	360.0	15.0	8.2	11.3	9.48
WWF	16-Nov	30-Nov	32.4	67.6	0.7	357.5	14.9			
WWF	1-Mar	31-Mar	99.9	0.1	34.3	489.0	20.4	7.2	18.9	13.97
WWF	1-Apr	15-Apr	100.0	0.0	0.6	358.0	14.9	11.6	20.5	14.48
WWF	16-Apr	30-Apr	56.6	43.4	0.4	358.5	14.9			
WWF	1-May	15-May	56.8	43.2	0.7	357.5	14.9	13.8	25.4	19.77
WWF	16-May	31-May	42.8	57.2	0.9	380.5	15.9			
WWF	1-Jun	15-Jun	0.0	100.0	0.4	358.5	14.9	18.2	28.6	23.35
WWF	16-Jun	30-Jun	0.0	100.0	0.4	358.5	14.9			

*Limited data collected due to removal/maintenance of sonde
**No data collected due to removal of sonde

Turbidity

Table 65. Gage 01474500 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-11	718.5	29.9	3.4	100.0	0.0	3.2	11.0	5.59
Aug-11*	344.0	14.3	53.8	53.9	46.1	0.7	22.0	3.78
Sep-11**	-	-	-	-	-	-	-	-
Oct-11*	507.0	21.1	31.9	41.5	58.5	0.6	16.0	3.34
Nov-11	717.5	29.9	0.3	47.1	52.9	0.7	180.0	10.21
Mar-12	579.5	24.1	22.0	66.8	33.2	0.8	14.0	3.10
Apr-12	707.5	29.5	1.7	29.6	70.4	0.0	33.0	3.58
May-12	692.5	28.9	6.9	62.7	37.3	0.0	130.0	8.15
Jun-12	717.0	29.9	0.4	78.5	21.5	1.4	71.0	7.32

*Limited data collected due to removal/maintenance of sonde
**No data collected due to removal of sonde

Specific Conductance

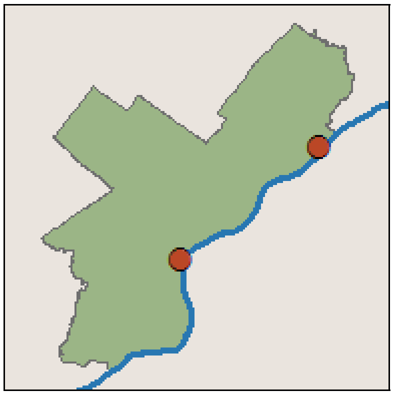
The Schuylkill River generally exhibits intermediate conductance, lower than the small Philadelphia tributary streams described elsewhere in this report, but greater than that observed in the Delaware River. Observed differences are likely due to geology and preponderance of anthropogenic sources in the respective watersheds.

Table 66. Gage 01474500 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	738.0	30.8	0.8	329.0	568.0	498.48
Aug-11*	344.0	14.3	53.8	262.0	541.0	406.40
Sep-11**	-	-	-	-	-	-
Oct-11*	506.0	21.1	32.0	315.0	470.0	367.97
Nov-11	717.5	29.9	0.3	155.0	412.0	347.41
Mar-12	579.0	24.1	22.1	403.0	501.0	457.81
Apr-12	716.0	29.8	0.6	252.0	560.0	472.49
May-12	738.0	30.8	0.8	221.0	478.0	368.56
Jun-12	717.0	29.9	0.4	218.0	461.0	354.05

*Limited data collected due to removal/maintenance of sonde
**No data collected due to removal of sonde

Delaware River (Gages 01467200 and 014670261)



Dissolved oxygen and pH

The DRBC DO daily mean criteria for Zones 2 and 3 were attained at both gages for the entire reporting period (Tables 67-68). In addition, both gages met pH criteria for the reporting period (Tables 69-70).

In 2012, the collection of data at gage 01467200 began March 26. Thus, data for that month is incomplete for that location.

Table 67. Gage 01467200 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Jul-11	DRBC	31.0	0.0	0.0	100.0	4.1	7.3	6.11	3.6	7.6
Aug-11	DRBC	30.0	3.2	0.0	100.0	3.9	7.3	5.54	3.5	7.5
Sep-11	DRBC	29.0	3.3	0.0	100.0	7.2	8.1	7.61	7.0	8.3
Oct-11	DRBC	30.0	3.2	0.0	100.0	7.6	9.5	8.76	7.2	9.7
Nov-11	DRBC	29.0	3.3	0.0	100.0	9.7	10.9	10.59	9.4	11.1
Mar-12*	DRBC	3.0	89.6	0.0	100.0	10.3	10.4	10.36	9.9	10.7
Apr-12	DRBC	28.0	0.0	0.0	100.0	7.4	10.1	9.22	7.2	10.8
May-12	DRBC	27.0	6.9	0.0	100.0	6.6	8.1	7.42	6.2	8.8
Jun-12	DRBC	26.0	7.1	0.0	100.0	5.7	8.0	6.93	4.5	8.8

*2012 data collection began March 26

Table 68. Gage 014670261 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Jul-11	DRBC	26.0	16.1	0.0	100.0	5.5	8.8	7.38	4.8	9.7
Aug-11	DRBC	28.0	9.7	0.0	100.0	5.8	8.4	6.82	4.9	9.2
Sep-11	DRBC	29.0	3.3	0.0	100.0	7.6	8.9	8.18	7.4	9.2
Oct-11	DRBC	31.0	0.0	0.0	100.0	8.4	10.5	9.51	8.1	10.8
Nov-11	DRBC	29.0	3.3	0.0	100.0	10.6	11.7	11.23	10.3	11.8
Mar-12	DRBC	26.0	10.2	0.0	100.0	9.5	12.4	11.34	8.4	12.6
Apr-12	DRBC	23.0	17.9	0.0	100.0	7.6	10.7	9.83	6.9	11.2
May-12	DRBC	25.0	13.8	0.0	100.0	6.4	9.1	7.95	5.6	9.4
Jun-12	DRBC	25.0	10.7	0.0	100.0	6.1	8.4	7.49	4.9	9.0

Table 69. Gage 01467200 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.4	7.18
Aug-11	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.4	7.09
Sep-11	719.5	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.4	7.16
Oct-11	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.5	7.30
Nov-11	713.5	29.7	0.9	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.6	7.40
Mar-12*	130.5	5.4	81.2	0.0	0.0	0.0	0.0	100.0	100.0	7.5	7.8	7.64
Apr-12	672.0	28.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.7	7.43
May-12	694.0	28.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.2	7.02
Jun-12	637.0	26.5	5.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.4	7.18

*2012 data collection began March 26

Table 70. Gage 014670261 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-11	741.5	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.4	7.55
Aug-11	734.0	30.6	1.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.37
Sep-11	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.5	7.34
Oct-11	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.3	7.7	7.53
Nov-11	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.4	7.9	7.67
Mar-12	695.0	29.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.8	8.5	8.12
Apr-12	670.0	27.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.7	8.4	8.08
May-12	694.0	28.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.8	7.36
Jun-12	667.0	27.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.7	7.33

Temperature

Temperature criteria for the Delaware River were almost never exceeded at either gage.

Table 71. Gage 01467200 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Jul	31-Jul	0.0	100.0	0.0	744.0	31.0	22.9	29.3	26.30
DRBC	1-Aug	31-Aug	0.0	100.0	0.1	743.5	31.0	19.6	29.4	25.48
DRBC	1-Sep	30-Sep	0.0	100.0	0.1	719.0	30.0	17.6	21.7	19.59
DRBC	1-Oct	31-Oct	0.0	100.0	0.5	740.5	30.9	11.0	19.3	15.26
DRBC	1-Nov	30-Nov	0.0	100.0	0.9	713.5	29.7	8.3	11.1	9.30
DRBC	26-Mar	31-Mar	0.0	100.0	81.2	130.5	5.4	12.4	13.5	12.88
DRBC	1-Apr	30-Apr	0.0	100.0	0.0	672.0	28.0	12.1	15.8	13.76
DRBC	1-May	31-May	0.0	100.0	0.2	694.5	28.9	14.0	23.6	18.25
DRBC	1-Jun	30-Jun	0.0	100.0	5.2	637	26.5	21.0	25.8	23.25

Table 72. Gage 014670261 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Jul	31-Jul	0.2	99.8	0.3	742.0	30.9	22.8	30.2	26.62
DRBC	1-Aug	31-Aug	0.0	100.0	1.0	736.5	30.7	19.4	29.7	25.08
DRBC	1-Sep	30-Sep	0.0	100.0	0.1	719.0	30.0	16.9	22.2	19.43
DRBC	1-Oct	31-Oct	0.0	100.0	0.0	744.0	31.0	9.7	18.9	14.77
DRBC	1-Nov	30-Nov	0.0	100.0	0.2	718.5	29.9	7.8	10.2	8.97
DRBC	1-Mar	31-Mar	0.0	100.0	0.0	695.0	29.0	5.7	14.9	10.38
DRBC	1-Apr	30-Apr	0.0	100.0	0.2	670.5	27.9	11.9	16.7	13.85
DRBC	1-May	31-May	0.0	100.0	0.4	693.5	28.9	13.4	23.9	18.44
DRBC	1-Jun	30-Jun	0.0	100.0	0.5	668.5	27.9	19.8	26.6	23.02

Specific Conductance

The Delaware River exhibits much lower conductivity than the small Philadelphia tributary streams described elsewhere in this report. This is likely caused by differences in geology and fewer anthropogenic sources in the less-developed Delaware River watershed.

Table 73. Gage 01467200 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	1488.0	31.0	0.0	126.0	234.0	172.60
Aug-11	1487.0	31.0	0.1	102.0	256.0	197.59
Sep-11	1438.0	30.0	0.1	97.0	204.0	150.85
Oct-11	1481.0	30.9	0.5	114.0	211.0	168.61
Nov-11	1427.0	29.7	0.9	149.0	243.0	211.99
Mar-12*	261.0	5.4	81.2	211.0	250.0	227.88
Apr-12	1344.0	28.0	0.0	229.0	290.0	257.87
May-12	1389.0	28.9	0.2	116.0	249.0	178.72
Jun-12	1274.0	26.5	5.2	176.0	246.0	204.15

*2012 data collection began March 26

Table 74. Gage 014670261 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-11	1482.0	30.9	0.4	101.0	254.0	178.85
Aug-11	1472.0	30.7	1.1	107.0	249.0	196.59
Sep-11	1438.0	30.0	0.1	92.0	271.0	163.94
Oct-11	1488.0	31.0	0.0	115.0	312.0	180.13
Nov-11	1437.0	29.9	0.2	152.0	300.0	215.93
Mar-12	1390.0	29.0	0.0	200.0	321.0	238.13
Apr-12	1341.0	27.9	0.2	171.0	327.0	259.52
May-12	1386.0	28.9	0.4	104.0	244.0	174.37
Jun-12	1335.0	27.8	0.7	163.0	247.0	198.14

Turbidity

Turbidity guidelines at 014670261 were most frequently exceeded during March and April (Table 75). Gage 01467200 turbidity results are not available.

Table 75. Gage 014670261 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-11	738.0	30.8	0.8	93.2	6.8	1.6	43.0	6.90
Aug-11	735.0	30.6	1.2	94.9	5.1	1.8	170.0	15.53
Sep-11	719.0	30.0	0.1	100.0	0.0	3.4	150.0	18.56
Oct-11	744.0	31.0	0.0	100.0	0.0	3.7	53.0	9.99
Nov-11	718.5	29.9	0.2	98.1	1.9	1.6	49.0	7.56
Mar-12	693.0	28.9	0.3	87.5	12.5	1.5	33.0	4.78
Apr-12	670.0	27.9	0.3	85.4	14.6	1.4	28.0	5.49
May-12	695.0	29.0	0.1	99.7	0.3	2.6	33.0	8.92
Jun-12	669.0	27.9	0.4	97.5	2.5	1.7	66.0	8.86

Wet Weather and Dry Weather Results

Annual Summary, July 2009 - June 2010

Water quality data was also categorized as wet or dry for the purpose of evaluating weather effects on water quality, and specifically the incidence of non-attainment of water quality criteria. A wet weather condition was defined as rainfall greater than 0.05 inches in the preceding 72 hours, as measured at the nearest PWD rain gage.

In general, more frequent non-attainment of DO criteria was observed in wet weather due to the tendency of storm events to decrease DO via the introduction of stormwater runoff and BOD (Tables 76-79). The turbidity maximum guideline was also usually more frequently surpassed in wet weather (Tables 82-83). Conversely, the pH maximum criterion was more frequently exceeded in dry weather due to the effect of algal growth (Tables 80-81). Temperature criteria were also more likely to be exceeded in dry weather conditions (Tables 86-87).

Table 76. USGS Gage July 2011 - June 2012 Dissolved Oxygen Minimum Criterion Summary Results During Wet Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining
01465798	WWF	3688.0	153.7	5.6	0.1	99.9
01467042	TSF	3994.0	166.4	1.1	0.1	99.9
01467048	TSF	3677.0	153.2	4.5	0.0	100.0
01467086	WWF	3854.5	160.6	1.0	0.9	99.1
01467087	WWF	3002.0	125.1	22.3	13.6	86.4
01467200*	DRBC	N/A	N/A	N/A	N/A	N/A
01473900	TSF	3308.0	137.8	17.0	0.5	99.5
01474000	TSF	3710.0	154.6	5.0	0.0	100.0
01474500	WWF	2650.0	110.4	3.1	0.2	99.8
01475530	WWF	3695.5	154.0	0.9	0.01	99.99
01475548	WWF	3958.5	164.9	3.3	4.4	95.6
014670261*	DRBC	N/A	N/A	N/A	N/A	N/A

*No minimum DO criterion applies at these locations.

Table 77. USGS Gage July 2011 - June 2012 Dissolved Oxygen Minimum Criterion Summary Results During Dry Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining
01465798	WWF	2619.0	109.1	2.3	0.2	99.8
01467042	TSF	2490.5	103.8	0.1	0.0	100.0
01467048	TSF	2589.0	107.9	3.5	0.0	100.0
01467086	WWF	2625.5	109.4	0.2	0.9	99.1
01467087	WWF	2604.0	108.5	1.6	4.0	96.0
01467200*	DRBC	N/A	N/A	N/A	N/A	N/A
01473900	TSF	2508.5	104.5	3.9	1.2	98.8
01474000	TSF	2537.0	105.7	1.4	0.0	100.0
01474500	WWF	2026.0	84.4	2.6	0.0	100.0
01475530	WWF	2854.0	118.9	0.2	0.0	100.0
01475548	WWF	2437.5	101.6	2.4	0.0	100.0
014670261*	DRBC	N/A	N/A	N/A	N/A	N/A

*No minimum DO criterion applies at these locations.

Table 78. USGS Gage July 2011 - June 2012 Dissolved Oxygen Daily Mean Criterion Summary Results During Wet Weather

Gage number	Designated Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining
01465798	WWF	143.0	5.9	0.0	100.0
01467042	TSF	156.0	0.6	0.0	100.0
01467048	TSF	142.0	4.7	0.0	100.0
01467086	WWF	148.0	1.3	2.0	98.0
01467087	WWF	114.0	25.0	25.4	74.6
01467200	DRBC	141.0	0.0	0.0	100.0
01473900	TSF	125.0	19.4	0.0	100.0
01474000	TSF	145.0	5.8	0.0	100.0
01474500	WWF	105.0	2.8	0.0	100.0
01475530	WWF	144.0	0.7	0.0	100.0
01475548	WWF	153.0	3.8	7.8	92.2
014670261	DRBC	150.0	0.7	0.0	100.0

Table 79. USGS Gage July 2011 - June 2012 Dissolved Oxygen Daily Mean Criterion Summary Results During Dry Weather

Gage number	Designated Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining
01465798	WWF	100.0	1.0	0.0	100.0
01467042	TSF	94.0	1.1	0.0	100.0
01467048	TSF	98.0	3.0	0.0	100.0
01467086	WWF	99.0	0.0	1.0	99.0
01467087	WWF	100.0	1.0	6.0	94.0
01467200	DRBC	87.0	0.0	0.0	100.0
01473900	TSF	97.0	2.0	0.0	100.0
01474000	TSF	94.0	3.1	0.0	100.0
01474500	WWF	77.0	3.8	0.0	100.0
01475530	WWF	110.0	0.0	0.0	100.0
01475548	WWF	90.0	1.1	0.0	100.0
014670261	DRBC	101.0	0.0	0.0	100.0

Table 80. USGS Gage July 2011 - June 2012 pH Criteria Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	3742.5	155.9	4.2	0.0	0.0	0.0	0.0	100.0	100.0
01467042	3993.0	166.4	1.1	0.0	0.0	0.0	0.0	100.0	100.0
01467048	3671.5	153.0	4.7	0.6	3.4	0.0	0.0	99.4	96.6
01467086	3854.5	160.6	1.0	0.9	5.9	0.0	0.0	99.1	94.1
01467087	3547.0	147.8	8.2	0.0	0.0	0.0	0.0	100.0	100.0
01467200	3614.5	150.6	0.03	0.0	0.0	0.0	0.0	100.0	100.0
01473900	3818.0	159.1	4.2	0.4	2.7	0.0	0.0	99.6	97.3
01474000	3498.5	145.8	10.4	0.0	0.0	0.0	0.0	100.0	100.0
01474500	2563.5	106.8	6.3	3.4	6.3	0.0	0.0	96.6	93.7
01475530	3695.5	154.0	0.9	0.1	1.1	0.0	0.0	99.9	98.9
01475548	3967.0	165.3	3.1	0.0	0.0	0.0	0.0	100.0	100.0
014670261	3855.5	160.6	0.1	0.0	0.0	0.0	0.0	100.0	100.0

Table 81. USGS Gage July 2011 - June 2012 pH Criteria Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	2622.5	109.3	2.2	0.0	0.0	0.0	0.0	100.0	100.0
01467042	2490.5	103.8	0.1	0.1	0.8	0.0	0.0	99.9	99.2
01467048	2589.0	107.9	3.5	0.6	3.7	0.0	0.0	99.4	96.3
01467086	2610.0	108.8	0.8	2.2	8.0	0.0	0.0	97.8	92.0
01467087	2637.5	109.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0
01467200	2311.5	96.3	0.0	0.0	0.0	0.0	0.0	100.0	100.0
01473900	2602.5	108.4	0.3	1.4	5.9	0.0	0.0	98.6	94.1
01474000	2526.5	105.3	1.8	0.0	0.0	0.0	0.0	100.0	100.0
01474500	2025.5	84.4	2.6	17.1	22.9	0.0	0.0	82.9	77.1
01475530	2854.0	118.9	0.2	0.2	0.7	0.0	0.0	99.8	99.3
01475548	2485.5	103.6	0.4	0.0	0.0	0.0	0.0	100.0	100.0
014670261	2671.5	111.3	0.1	0.0	0.0	0.0	0.0	100.0	100.0

Table 82. USGS Gage July 2011 - June 2012 Turbidity Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	3351.0	139.6	14.2	54.4	45.6
01467042	3647.5	152.0	9.6	39.3	60.7
01467048	3607.0	150.3	6.4	50.6	49.4
01467086*	N/A	N/A	N/A	N/A	N/A
01467087*	N/A	N/A	N/A	N/A	N/A
01467200*	N/A	N/A	N/A	N/A	N/A
01473900	3025.0	126.0	24.1	58.8	41.2
01474000	3266.5	136.1	16.4	42.1	57.9
01474500	2631.0	109.6	3.8	66.5	33.5
01475530*	N/A	N/A	N/A	N/A	N/A
01475548*	N/A	N/A	N/A	N/A	N/A
014670261	3854.5	160.6	0.2	94.6	5.4

*Turbidity not continuously monitored at this location

Table 83. USGS Gage July 2011 - June 2012 Turbidity Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	2085.0	86.9	22.2	18.8	81.2
01467042	2212.0	92.2	11.3	3.3	96.7
01467048	2476.0	103.2	7.7	3.0	97.0
01467086*	N/A	N/A	N/A	N/A	N/A
01467087*	N/A	N/A	N/A	N/A	N/A
01467200*	N/A	N/A	N/A	N/A	N/A
01473900	2222.5	92.6	14.8	32.8	67.2
01474000	2052.0	85.5	20.2	1.7	98.3
01474500	1968.0	82.0	5.4	51.4	48.6
01475530*	N/A	N/A	N/A	N/A	N/A
01475548*	N/A	N/A	N/A	N/A	N/A
014670261	2671.0	111.3	0.1	95.4	4.6

*Turbidity not continuously monitored at this location

Table 84. USGS Gage July 2011 - June 2012 Specific Conductance Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	3747.0	156.1	4.1
01467042	3992.0	166.3	1.1
01467048	3682.5	153.4	4.4
01467086	3854.5	160.6	1.0
01467087	3547.5	147.8	8.2
01467200	3615.5	150.6	0.0
01473900	3818.0	159.1	4.2
01474000	3710.5	154.6	5.0
01474500	2649.0	110.4	3.1
01475530	3695.5	154.0	0.9
01475548	4035.5	168.1	1.4
014670261	3856.0	160.7	0.1

Table 85. USGS Gage July 2011 - June 2012 Specific Conductance Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	2618.5	109.1	2.3
01467042	2490.5	103.8	0.1
01467048	2589.0	107.9	3.5
01467086	2626.5	109.4	0.2
01467087	2638.5	109.9	0.3
01467200	2311.0	96.3	0.02
01473900	2601.5	108.4	0.3
01474000	2532.0	105.5	1.6
01474500	2022.5	84.3	2.8
01475530	2854.0	118.9	0.2
01475548	2481.5	103.4	0.6
014670261	2672.5	111.4	0.1

Table 86. USGS Gage July 2011 - June 2012 Temperature Maximum Criteria Summary Results During Wet Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	3748.0	156.2	4.0	17.6	82.4
01467042	TSF	3991.5	166.3	1.1	29.5	70.5
01467048	TSF	3682.5	153.4	4.4	38.0	62.0
01467086	WWF	3854.5	160.6	1.0	16.0	84.0
01467087	WWF	3547.5	147.8	8.2	17.8	82.2
01467200	DRBC	3615.5	150.6	0.0	0.0	100.0
01473900	TSF	3807.0	158.6	4.5	29.2	70.8
01474000	TSF	3713.5	154.7	4.9	29.4	70.6
01474500	WWF	2650.0	110.4	3.1	24.5	75.5
01475530	WWF	3695.5	154.0	0.9	13.4	86.6
01475548	WWF	4030.5	167.9	1.6	16.4	83.6
014670261	DRBC	3858.0	160.8	0.1	0.04	99.96

Table 87. USGS Gage July 2011 - June 2012 Temperature Maximum Criteria Summary Results During Dry Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	2635.5	109.8	1.7	26.6	73.4
01467042	TSF	2490.5	103.8	0.1	49.4	50.6
01467048	TSF	2589.0	107.9	3.5	50.0	50.0
01467086	WWF	2626.5	109.4	0.2	29.5	70.5
01467087	WWF	2639.5	110.0	0.3	33.8	66.2
01467200	DRBC	2311.0	96.3	0.02	0.0	100.0
01473900	TSF	2587.5	107.8	0.8	47.7	52.3
01474000	TSF	2534.0	105.6	1.5	44.5	55.5
01474500	WWF	2025.5	84.4	2.6	31.9	68.1
01475530	WWF	2854.0	118.9	0.2	27.2	72.8
01475548	WWF	2485.5	103.6	0.4	32.2	67.8
014670261	DRBC	2673.5	111.4	0.02	0.0	100.0

References

Delaware River Basin Commission, 2007. Delaware River Basin Water Code: 18 CFR Part 410 (With Amendments Through September 27, 2006). West Trenton, NJ.

Appendix M –

PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments

PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments

Background

Since 1999, the Philadelphia Water Department (PWD) has been using benthic macroinvertebrate sampling and instream physical habitat assessments in order to characterize watershed conditions and track trends in watershed health. Assessments are performed by the staff of PWD's Bureau of Laboratory Services (BLS) using PADEP Instream Comprehensive Evaluation (ICE) methods (PADEP 2009a). As benthic invertebrates may be exposed to both short and long-duration stressors, data collected through this program are pertinent to all targets of PWD's Integrated Watershed Management Plan (IWMP) Strategy.

Assessment Study Design

In recent years, agencies tasked with evaluating water quality have attempted to incorporate statistical sampling designs, or a "probabilistic" approach, to selecting sampling sites (Paulsen 2008, Borsuk *et al*. 2001) rather than relying on fixed sites. Statistical sampling design is particularly important when the goal of monitoring is to make an estimate of the percentage of waters affected by pollution. Another advantage of probabilistic study design is that the assessment units are distributed over a larger geographic area. When monitoring efforts are directed at individual watersheds on a rotating basis, as has been the case with PWD programs, the possibility arises that larger scale 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.

The current PWD monitoring strategy is intended to be a compromise, recognizing the benefits of collecting data from randomly selected sites but also the importance of maintaining a consistent monitoring effort at selected locations over time. This plan is based on a similar monitoring program 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

Common Acronyms Used in This Report

IBI - Index of Biotic Integrity, a biological assessment tool to indicate the capability of a stream to support a healthy aquatic community.
ICE - Instream Comprehensive Evaluation, a protocol to survey and evaluate wadeable streams.
PTV - Pollution Tolerance Values, a numeric measure of an organism's ability to withstand environmental degradation.
EPT - Ephemeroptera + Plecoptera + Trichoptera, the common names for pollution-sensitive mayflies, stoneflies and caddisflies.

compromise approach (Table 1) will achieve some of the benefits of a randomized approach, while providing periodic re-evaluation of our watersheds required to inform the watershed planning process and comply with environmental mandates.

Table 1. PWD Proposed Wadeable Streams Assessments Schedule

Period	Monitoring Activity (number of samples)
2011	USGS gage samples (8); Randomly selected sites (16)
2012	Cobbs Creek Assessment (6*); USGS gage samples (9); Random (10)
2013	Tookany/Tacony Creek (10*) USGS gage samples (9); Random (6)
2014	Wissahickon Creek Tributaries (11) USGS gage samples (9); Random (5)
2015	Wissahickon Creek (12*) USGS gage samples (9); Random (4)
2016	Pennypack Creek Tributaries
2017	Pennypack Creek
2018	Poquessing Creek

* Number of monitoring sites excludes 2 USGS gage sites in target watershed

Stream Conditions

This report summarizes results from samples that were collected between March 4 and April 4, 2011. Hydrologic conditions were wetter than average during February, March and April 2011. PWD is not aware of any spills, discharges or unusual conditions that would tend to cause misleading results.

Methods

Benthic Macroinvertebrate Sample Collection

Using the PADEP Instream Comprehensive Evaluation (ICE) protocol (PADEP 2009a), macroinvertebrate samples were collected by placing a handheld D-frame net (500µm) at the downstream portion of a riffle. Stream substrate directly upstream of the D-frame net was then disturbed for approximately one minute to a depth of approximately 10 cm as substrate allowed. This procedure was repeated at other riffle locations of variable flow within the 100-m reach such that the sample at each station was a composite of six riffle samples. Composited samples from each biological monitoring location were then preserved in 95% ETOH (ethyl alcohol) and returned to the laboratory in polyethylene containers.

Benthic Macroinvertebrate Laboratory Procedures

Benthic macroinvertebrate samples were processed according to PADEP ICE protocols (PADEP 2009a). Each composited sample was placed into an 18 x 12 x 3.5-inch pan marked with 28 four-square-inch grids. Four grids were randomly selected by drawing numbers. All Material was extracted from the selected grids using a four-square-inch circular "cookie cutter," and placed into another identical empty pan. From this second pan, organisms were picked from randomly selected grids or "plugs" until a minimum of 200, but not more than 240, individuals were subsampled. This procedure was a misinterpretation of the actual technique, which stipulates a count of 200 (+/- 20%) individuals. When picking either the four initial "plugs" or

Table 2. PADEP ICE Protocol Habitat Metrics

Habitat Parameter	Description
Instream Cover (Fish)	Mix of boulder, cobble or other stable habitat
Epifaunal Substrate	Length/width of riffles; characterization of boulders, gravel, cobble
Embeddedness	Presence/absence of fine sediment around boulders, gravel, cobble
Velocity/Depth Regimes	Presence/absence of four velocity/depth regimes
Channel Alteration	Degree of channelization or dredging
Sediment Deposition	Measure of sediment deposits, degree of change at the bottom
Frequency of Riffles	Occurrence of riffles and distance between riffles
Channel Flow Status	Degree to which water fills the available channel
Condition of Banks	Stability of streambanks and presence of erosion or bank failure
Bank Vegetative Protection	Percentage of streambank surface covered by vegetation
Grazing or Other Disruptive Pressure	Degree to which vegetation disrupted by grazing or mowing
Riparian Vegetative Zone Width	Width of riparian zone and determination of impact on vegetation by human activities

additional plugs results in subsampling more than 240 individuals, the PADEP ICE protocol outlines a procedure for redistributing the subsample into a clean, gridded pan and “back counting” grids until a subsample consisting of 200 (+/-20%) is obtained. Invertebrates were identified under magnification, with taxonomic classification following PADEP guidelines (2009b).

Habitat Assessment

After collecting benthic invertebrates, biologists surveyed habitat features at the assessment station and recorded scores for 12 habitat attributes according to the PADEP ICE protocol (PADEP 2009a) (Table 2). Biologists completed the survey independently and then discussed the interpretation of individual habitat attribute scores, averaging individual scores when necessary.

Data Analysis

Benthic macroinvertebrate and habitat data were compiled in a Microsoft Access database and queries were used to calculate scoring metrics. Individual metric standardized scores and the PADEP Index of Biotic Integrity (IBI) were calculated (PADEP 2009b) (Table 3). Habitat scores were compared to habitat assessment results from a reference site in the French Creek watershed, last assessed by PWD in 2008.

Table 3. PADEP IBI Metrics and Metric Standardization Values

Metric	Standardization Value
Total Taxa Richness	33
EPT Taxa Richness (PTV 0-4)	19
Beck's Index, version 3	38
Hilsenhoff Biotic Index	1.89
Shannon Diversity	2.86
Percent Sensitive Individuals (PTV 0-3)	84.5

Monitoring Locations

Assessments were performed at eight USGS gage sites and 16 randomly chosen sites from PWD's watershed assessment site network between 3/4/2011 and 4/4/2011 (Figure 1, Tables 4-5). USGS stream gaging stations are used as long term monitoring points at which streamflow and continuous water chemistry data are collected (detailed in the PWD/USGS Cooperative Water Quality Monitoring Program appendix). Water chemistry grab sampling for nutrient and bacterial parameters is also conducted at these USGS gage stations on a quarterly basis (detailed in the PWD Quarterly Dry Weather Water Quality Monitoring Program appendix). Combining different forms of monitoring at the same station allows for better integration of information and may enable more sophisticated analyses in the future.

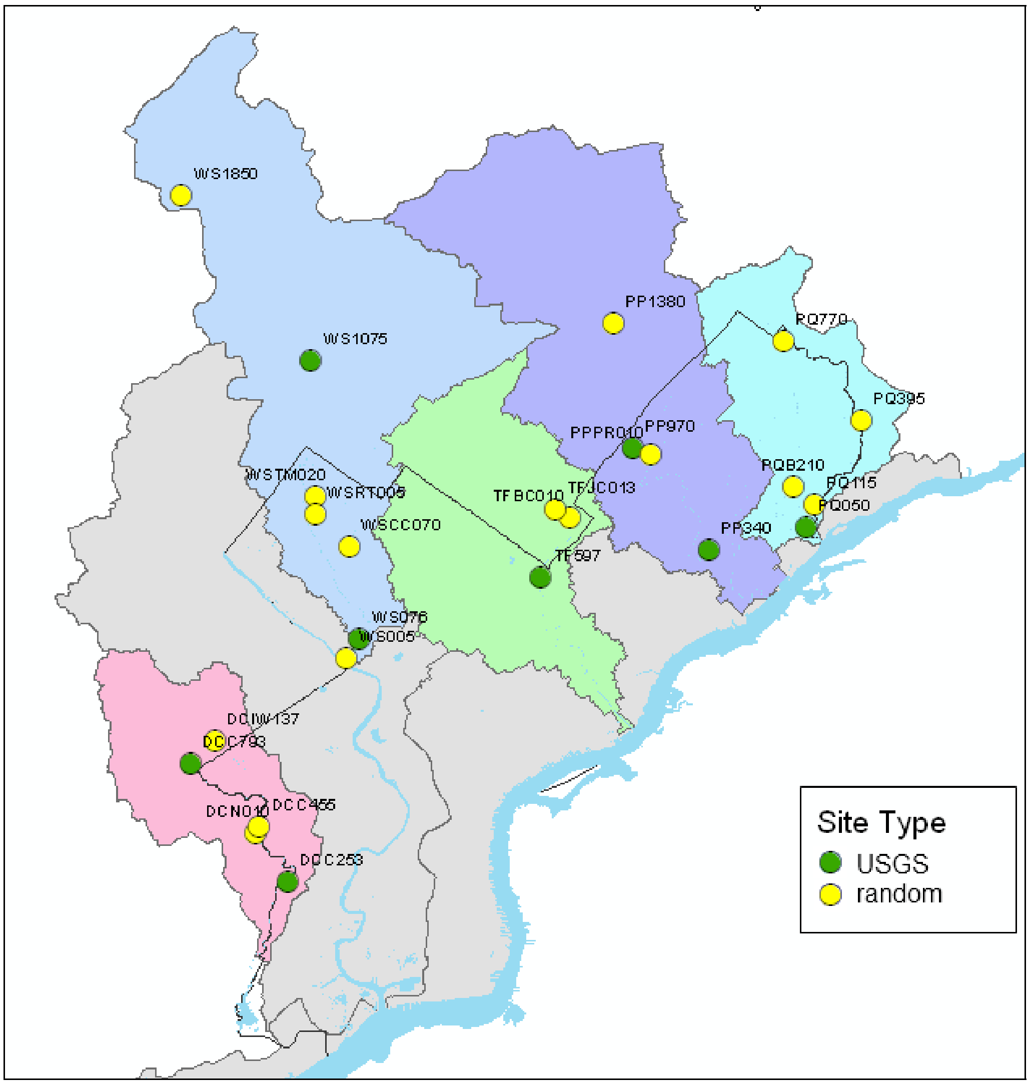


Figure 1. PWD Wadeable Streams Assessment Locations - Spring 2011

Table 4. PWD-USGS Cooperative Monitoring Program Monitoring Locations

Site ID	USGS Gage	Site Description	Drainage Area (mi^2)
DCC253	01475548	Cobbs Creek at Mount Moriah Cemetery	19.89
DCC793	01475530	Cobbs Creek at City Line Ave.	4.60
PP340	01467048	Pennypack Creek at Pine Rd.	49.84
PP970	01467042	Pennypack Creek at Pine Rd.	39.34
PQ050	01465798	Poquessing Creek at Holy Family College	21.67
TF597	01467086	Tacony Creek below Adams Ave. Bridge	16.59
WS076	01474000	Wissahickon Creek at Ridge Ave.	63.22
WS1075	01473900	Wissahickon Creek at Ft. Washington	40.44

Table 5. Randomly Selected Monitoring Locations - Spring 2011

Site ID	Site Description	Drainage Area (mi^2)
DCC455	Cobbs Creek near CCCEEC	12.95
PP1380	Pennypack Creek at Creek Rd.	24.46
PQ115	Poquessing Creek at Red Lion Rd Bridge	13.49
PQ395	Poquessing Creek at Franklin Mills Mall	10.22
PQ770	Poquessing Creek at Ina and Stevens Rd.	5.50
PQB210	Byberry Creek at Churchill Ln.	5.82
WS005	Wissahickon Creek downstream of Ridge Ave. Dam	63.48
WS1850	Wissahickon Creek at Swedesford Rd.	7.71
WSTM020	Thomas Mill Run South Branch	0.09
WSRT005	Unnamed tributary to Wissahickon near Rex Ave. Bridge	0.26
WSCC070	Cresheim Creek near McCallum St. Bridge	2.04
PPPR010	Paul's Run at Verree Rd. Park Entrance	2.60
TFJC013	Jenkintown Creek at Beryl Rd.	1.78
TFBC010	Burholme Creek at Tookany Creek Parkway	0.64
DCIW137	Indian Creek West Branch at Manoa and Wiltshire	1.26
DCN010	Naylor's Run at Walnut Park by CCEEC	4.59

Because 2011 was the first year in which PWD employed its strategy of monitoring a combination of randomly selected sites, watershed-specific sites and USGS-PWD gage sites, it is perhaps more instructive to analyze the first year's data by grouping the mainstem and tributary sites (Tables 6-7). Future reports will benefit from a history of monitoring at the long-term USGS gage sites.

Table 6. Mainstem Monitoring Locations - Spring 2011

Site ID	Site Description	Drainage Area (mi^2)
DCC253	Cobbs Creek at Mount Moriah Cemetery	19.89
DCC793	Cobbs Creek at City Line Ave.	4.60
PP340	Pennypack Creek at Pine Rd.	49.84
PP970	Pennypack Creek at Pine Rd.	39.34
PQ050	Poquessing Creek at Holy Family College	21.67
TF597	Tacony Creek below Adams Ave. Bridge	16.59
WS076	Wissahickon Creek at Ridge Ave.	63.22
WS1075	Wissahickon Creek at Ft. Washington	40.44
DCC455	Cobbs Creek near CCCEEC	12.95
PP1380	Pennypack Creek at Creek Rd.	24.46
PQ115	Poquessing Creek at Red Lion Rd Bridge	13.49
PQ395	Poquessing Creek at Franklin Mills Mall	10.22
PQ770	Poquessing Creek at Ina and Stevens Rd.	5.50
PQB210	Byberry Creek at Churchill Ln.	5.82
WS005	Wissahickon Creek downstream of Ridge Ave. Dam	63.48
WS1850	Wissahickon Creek at Swedesford Rd.	7.71

Table 7. Tributary Monitoring Locations - Spring 2011

Site ID	Site Description	Drainage Area (mi^2)
WSTM020	Thomas Mill Run South Branch	0.09
WSRT005	Unnamed tributary to Wissahickon near Rex Ave. Bridge	0.26
WSCC070	Cresheim Creek near McCallum St. Bridge	2.04
PPPR010	Paul's Run at Verree Rd. Park Entrance	2.60
TFJC013	Jenkintown Creek at Beryl Rd.	1.78
TFBC010	Burholme Creek at Tookany Creek Parkway	0.64
DCIW137	Indian Creek West Branch at Manoa and Wiltshire	1.26
DCN010	Naylor's Run at Walnut Park by CCEEC	4.59

Benthic Macroinvertebrate Monitoring Results - Spring 2011

A combined total of 5,362 benthic macroinvertebrates from 37 taxa were collected from the 24 sampling sites. Although the study sampling method is not intended to be quantitative, some information about benthic invertebrate densities may be inferred from the number of "plugs" required to obtain a 200 +/- 20% individual subsample. Thirteen of the 24 sites required more than the minimum number of 4 plugs. Five of these 13 sites (PPPR010, WS076, WSCC070, WS005, and DCN010) required more than 16 plugs, with site WS076 requiring the most at 25.

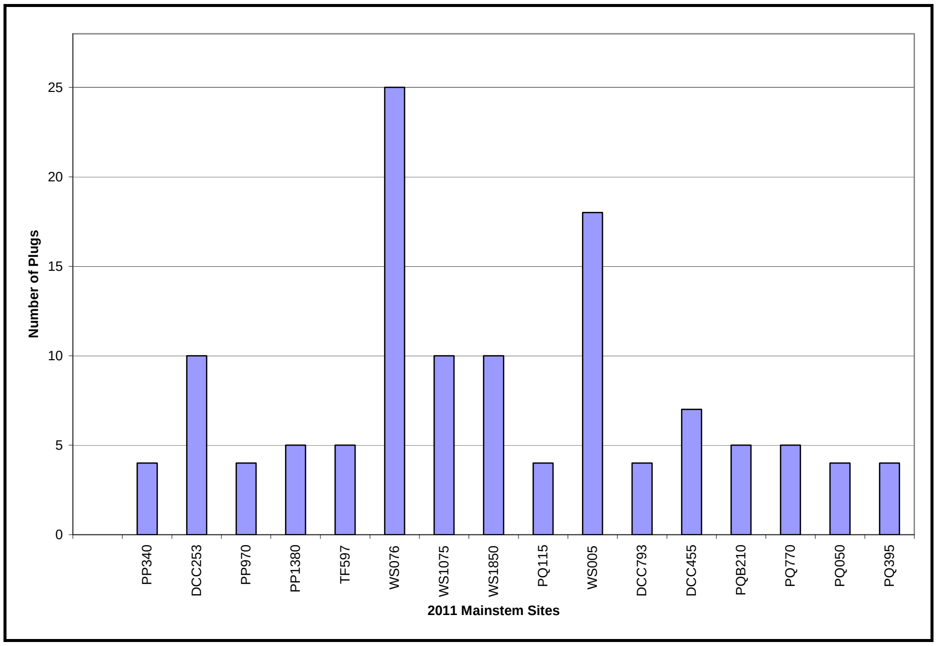


Figure 2. Number of Plugs Required Per 2011 Mainstem Site

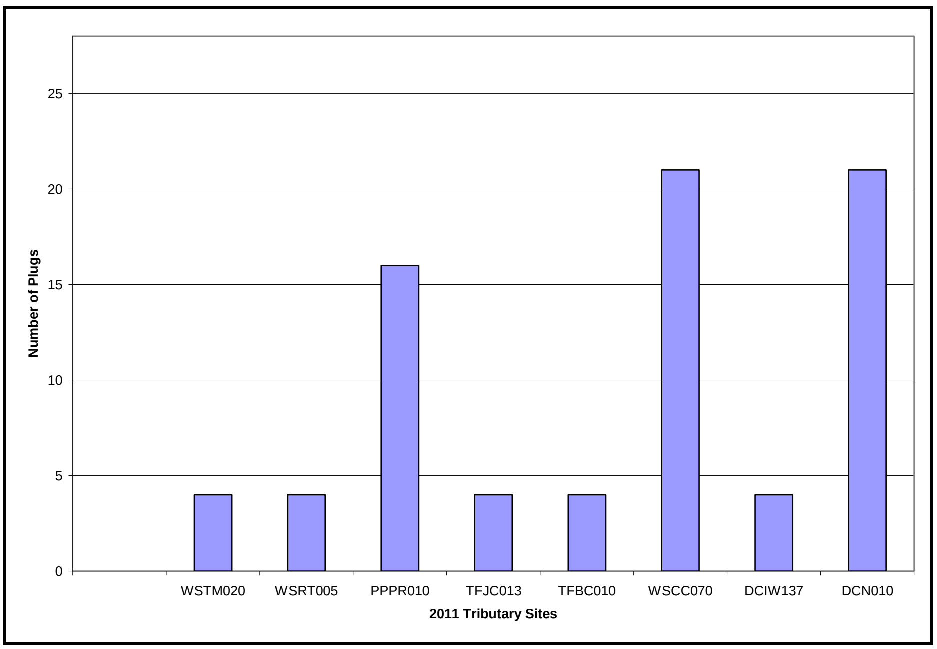


Figure 3. Number of Plugs Required Per 2011 Tributary Site

Mainstem Assessment Site Results - Spring 2011

A total of 3,575 individual macroinvertebrates were collected from the randomly selected mainstem assessment sites (WS005, WS076, WS1075, WS1850, PP340, PP970, PP1380, TF597, DCC253, DCC455, DCC793, PQB210, PQ050, PQ115, PQ395, and PQ770) during the 2011 PWD benthic macroinvertebrate survey. When compared to the PADEP IBI, all mainstem assessment sites were classified as impaired. Not one of the mainstem sites achieved 63% comparability to the IBI for attaining the designated use (Figure 4). All sites fell far below 50% comparability, meaning that they are not meeting the Aquatic Life Use (ALU) designation. Percent comparability ranged from 14% to 31%. All mainstem sites were characterized by low taxa richness, low or absent modified EPT taxa, and elevated Hilsenhoff Biotic Index scores (Table 8, Figures 5-8).

Table 8. PADEP IBI Metric Scores for Mainstem Monitoring Locations

Site ID	Taxa Richness	EPT richness (PTV 0-4)	% Sensitive individuals	Beck's Index	HBI	Shannon Index	IBI score
PP340	13	1	2.33	1.00	5.75	1.41	25.3
DCC253	13	0	4.05	1.00	6.11	1.61	24.1
PP970	13	1	0.45	0.00	5.79	1.12	22.6
PP1380	13	2	2.28	1.00	5.48	1.25	25.8
TF597	11	1	1.69	1.00	5.90	0.80	20.2
WS076	10	1	0.00	0.00	7.17	1.36	19.7
WS1075	10	0	1.42	0.00	6.19	1.14	19.8
WS1850	11	1	0.00	0.00	6.73	1.40	21.3
PQ115	11	1	0.83	1.00	5.89	0.95	21.0
WS005	10	1	0.00	0.00	5.98	0.64	17.9
DCC793	10	3	7.42	4.00	5.58	1.04	31.3
DCC455	13	1	2.82	0.00	5.89	1.26	23.8
PQB210	6	0	0.00	0.00	6.00	0.85	16.2
PQ770	7	1	1.27	0.00	5.86	0.77	17.7
PQ050	8	1	0.00	0.00	5.97	0.27	14.8
PQ395	7	1	0.44	1.00	5.95	0.49	16.1

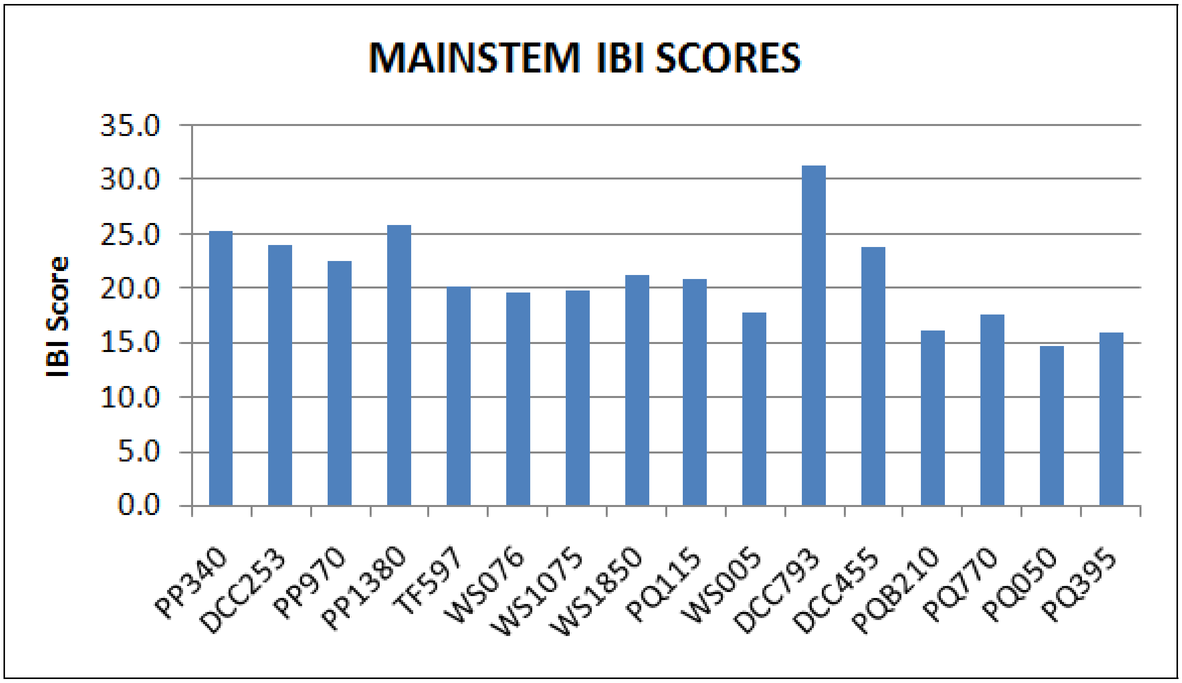


Figure 4. Mainstem Assessment Sites Standardized IBI Scores

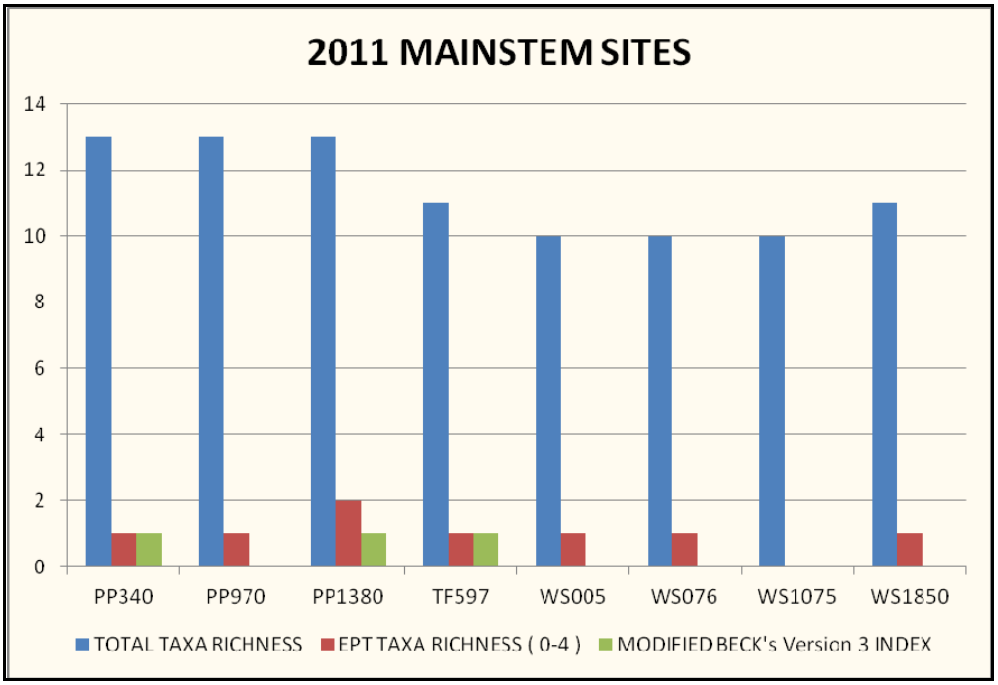


Figure 5. PADEP IBI Metric Scores for Mainstem Monitoring Locations- Spring 2011

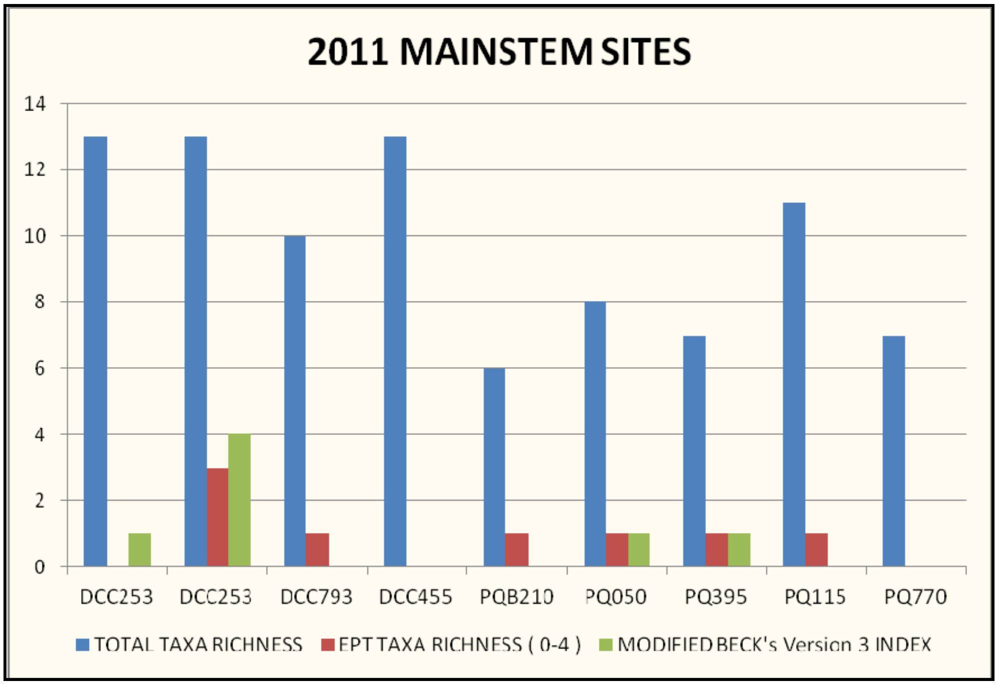


Figure 6. PADEP IBI Metric Scores for Mainstem Monitoring Locations- Spring 2011

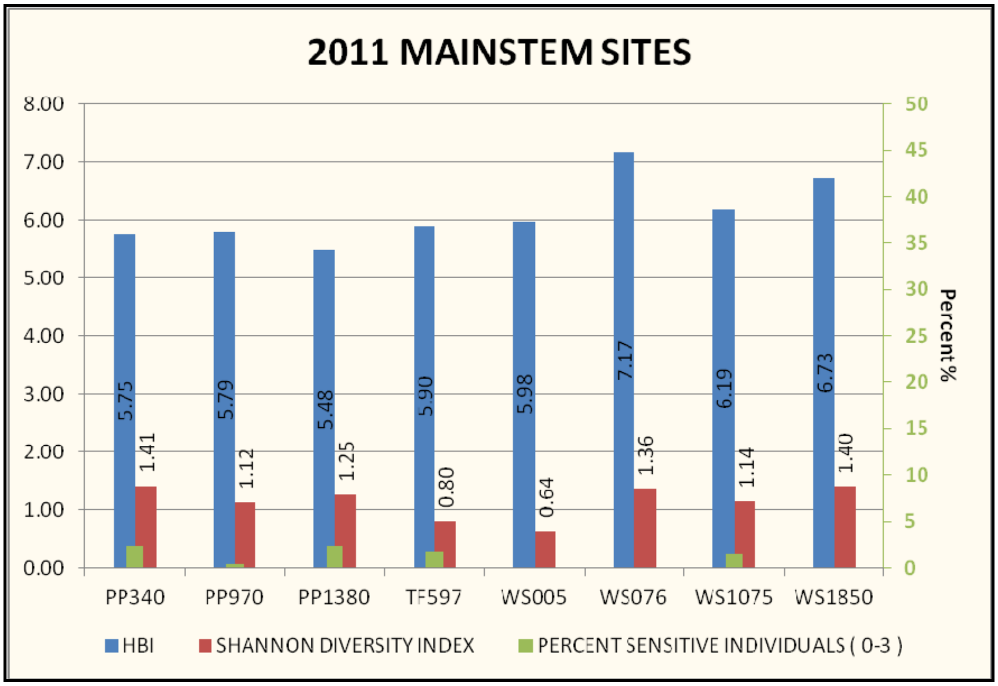


Figure 7. PADEP IBI Metric Scores for Mainstem Monitoring Locations- Spring 2011

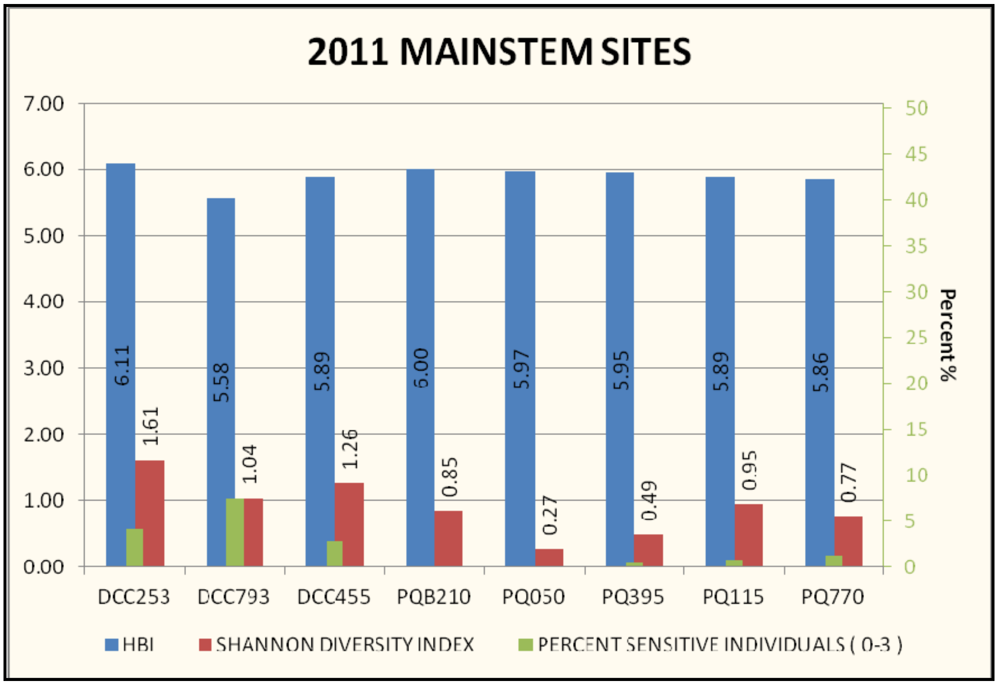


Figure 8. PADEP IBI Metric Scores for Mainstem Monitoring Locations- Spring 2011

Out of the 16 mainstem sites assessed, very sensitive taxa (pollution tolerance value ≤2) were present at only 7 sites (PP340, PP1380, DCC253, TF597, PQ115, DCC793 and PQ395). The most common very sensitive taxon was *Ancyronyx* (Coleoptera; Elmidae) which has a pollution tolerance value of 2, and was the main reason six of the 7 sites (PP340, PP1380, DCC253, TF597, PQ115 and PQ395) contained a sensitive taxon with a score of 2 or less. These six sites only contained one *Ancyronyx* individual within the subsample. Ancyronyx was not found at site DCC793, but this sample had the highest Beck's Index score (4) due to the presence of *Glossosoma* (Trichoptera; Glossosomatidae), which has a pollution tolerance value of zero. Site DCC793 also contained one Ephemerellidae species (family-level PTV of 2). Overall diversity was very low at mainstem sites.

The Shannon Diversity Index scores for mainstem sites ranged from 0.27 to1.61, compared to the IBI metric standardization value of 2.86. The mainstem site with the greatest diversity was DCC793 (SDI=1.61), with taxa richness (n=10), EPT taxa richness (n=4), HBI (5.58) and percent comparability (31.3%) to the IBI metric standardization values. The average HBI for all mainstem sites was 6.02, and individual site HBI values ranged from 5.48 to 7.1. This community composition and tolerance metric generally increases with increasing ecosystem stress, resulting in increasing dominance of pollution-tolerant organisms. Mainstem scores for the Percent Sensitive Individuals metric (PTV = 0 to 3) ranged from 0% to 7.42% and fell below the PADEP IBI standardization value of 84.5%.

In addition to metrics used to classify sites as being impaired with respect to regional or statewide reference conditions, additional attributes of macroinvertebrate community structure were also addressed. With regard to trophic structure (*i.e.*, the distribution of feeding strategies), generalist feeders (78.71%) and filterers (12.62%) dominated at all mainstem assessment sites (Figure 9). Specialized feeders were absent or found in low abundance. Scrapers composed only 5.01% of all mainstem taxa. The scrapers in question were not sensitive insect larvae but rather aquatic snails and *Stenelmis* (Coleoptera; Elmidae). Other functional feeding groups, predators (2.99%) and shredders (0.67%), were observed in the mainstem macroinvertebrate assessment but to a much lesser extent. Analysis of the aquatic trophic structure can indicate stressors such as sedimentation/siltation and eutrophication, and it may identify food resource limitations. However, it cannot distinguish between the interactions of the two factors.

The proportion of moderately tolerant individuals at all mainstem sites averaged 87.96%, with a range of 59.8% to 98.3%. The site that had the greatest proportion of moderately tolerant taxa was site PQ050, with 98.3% dominance directly related to a large number of Chironomidae (95.34%) found within the sorted sample. Overall, Chironomids (47.06% to 95.34%) were the dominant taxon at all mainstem assessment locations. The proportional dominance of Chironomids is evidence of increasingly homogenous community assemblages within the selected monitoring sites. Chironomids and other pollution-tolerant, generalist species increase in proportional dominance with increased disturbance due to the loss of optimal habitat conditions for less tolerant, more specialized species (Figure 10).

Tolerant taxa accounted for 6.27% of all taxa on the mainstem and the proportion of tolerant taxa at each monitoring site ranged from 0%-34.8%. Intolerant taxa were poorly represented at mainstem sites, as they accounted for only 5.51% of all taxa collected. The highest proportion of intolerant taxa was collected at site PP1380 (18.26%) due to seven of its 13 taxa having a pollution tolerance value between 2 and 4. Sensitive taxa (pollution tolerance values ≤ 3) were collected at all of the mainstem sites except sites WS076, WS1850, WS005, PQB210 and PQ050 (Table 9). Site DCC793 had the most sensitive taxa with n=3, with the most sensitive taxon *Glossosoma* (Trichoptera: Glossosomatidae) collected at this site. This taxon was unique to the mainstem sites, but was also found at a nearby tributary site DCIW137 within the same Cobbs Creek watershed. *Antocha* (Diptera: Tipulidae, PTV=3) was found at 10 sites and was the most commonly collected sensitive taxon at the mainstem sites.

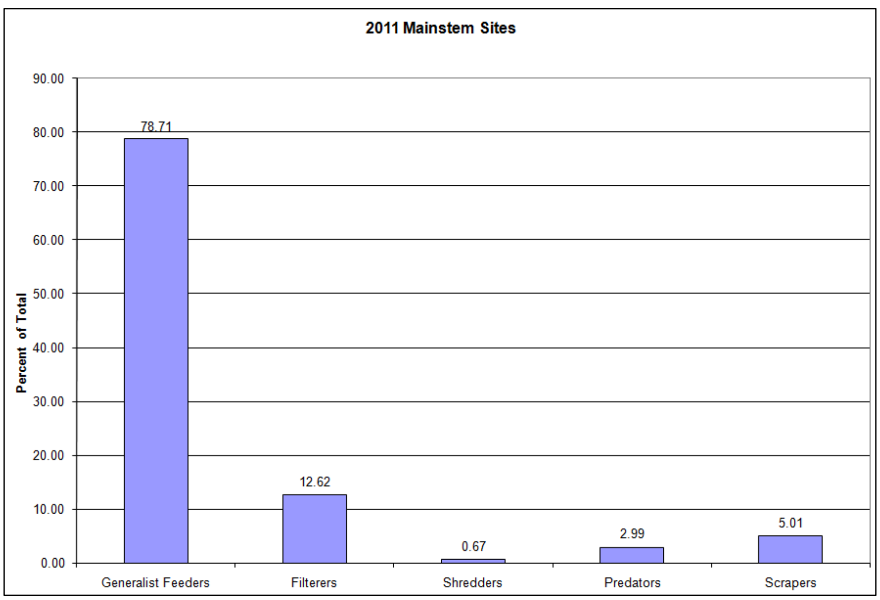


Figure 9. Distribution of Feeding Groups at Mainstem Assessment Locations – Spring 2011

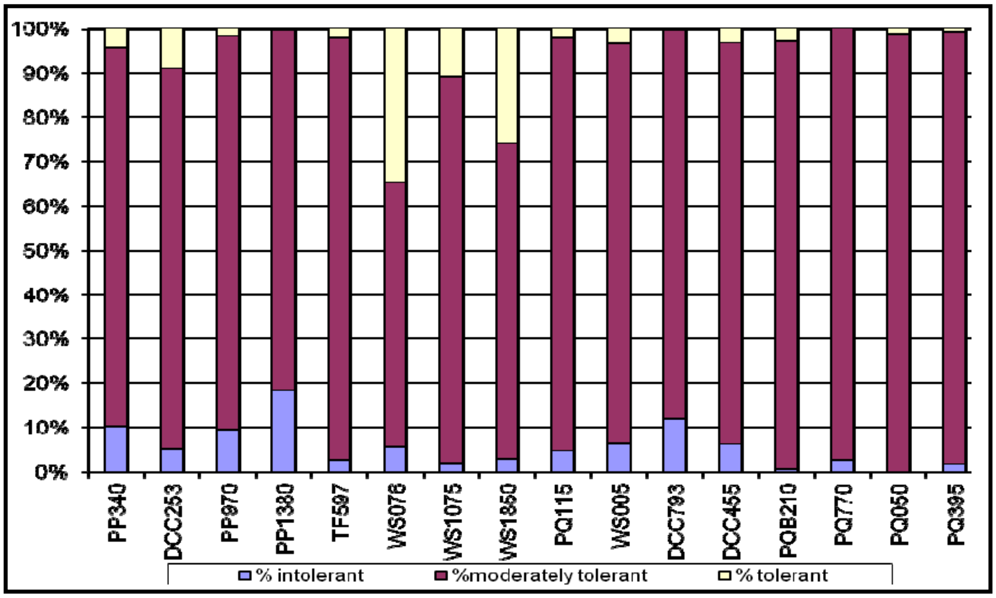


Figure 10. Distribution of Tolerant, Moderately Tolerant and Intolerant Taxa at Mainstem Assessment Sites – Spring 2011

Table 9. Sensitive Taxa Collected from Mainstem Sites

Site	Order	Family	Genus	HBI
DCC253	Diptera	Tipulidae	*Antocha*	3
DCC253	Coleoptera	Elmidae	*Ancyronyx*	2
DCC455	Diptera	Tipulidae	*Antocha*	3
DCC793	Trichoptera	Glossosomatidae	*Glossosoma*	0
DCC793	Ephemeroptera	Ephemerellidae	sp	2
DCC793	Diptera	Tipulidae	*Antocha*	3
PP340	Diptera	Tipulidae	*Antocha*	3
PP340	Coleoptera	Elmidae	*Ancyronyx*	2
PP970	Diptera	Tipulidae	*Antocha*	3
PP1380	Diptera	Tipulidae	*Antocha*	3
PP1380	Coleoptera	Elmidae	*Ancyronyx*	2
TF597	Diptera	Tipulidae	*Antocha*	3
TF597	Coleoptera	Elmidae	*Ancyronyx*	2
PQ115	Diptera	Tipulidae	*Antocha*	3
PQ115	Coleoptera	Elmidae	*Ancyronyx*	2
PQ395	Coleoptera	Elmidae	*Ancyronyx*	2
PQ770	Diptera	Tipulidae	*Antocha*	3
WS1075	Diptera	Tipulidae	*Antocha*	3

Tributary Assessment Sites - Spring 2011

In 2011, a total of 1,787 individuals from 29 taxa were collected from the tributary sites WSTM020, WSRT005, TFJC013, TFBC010, PPPR010, WSCC070, DCIW137 and DCN010. When compared to the PADEP IBI , all tributary assessment sites were classified as impaired. No tributary site achieved 63% comparability to the IBI for attaining their designated use (Figure 11). Percent comparability was poor, ranging from 13.5% to 39.8%. Poor comparability can be attributed to the fact that all sites scored well below reference standards for all six individual PADEP IBI metrics. No tributary site approached the level of biodiversity set by the PADEP metric reference standard.

Taxa richness was poor for tributary sites (n=6 to n=14) compared to the IBI standardization value (n=33). Modified EPT taxa richness was also very poor in comparison to the IBI metric standardization value, as tributary sites ranged from n=0 to n=3. Of the eight sites assessed, very sensitive taxa (pollution tolerance value ≤2) were present in subsamples from only three sites (WSTM020, WSRT005, and DCIW137).

Site WSTM020 had the highest Beck's Index score (BI= 6) mostly due to the presence of *Dolophilodes* (Trichoptera: Philopotamidae) and *Diplectrona* (Trichoptera: Hydropsychidae), which have a pollution tolerance value of zero (PVT=0). *Dolophilodes* was also found at WSRT005 (BI = 3). Another EPT taxon, the Nemourid stonefly *Amphinemura* (Plecoptera: Nemouridae), was unique to WSTM020 and WSRT005 within the Wissahickon Creek Watershed. Site DCIW137 also had a Beck's Index score (BI = 3) due to the presence of *Glossosoma* (Trichoptera: Glossosomatidae). (Table 10, Figure 12)

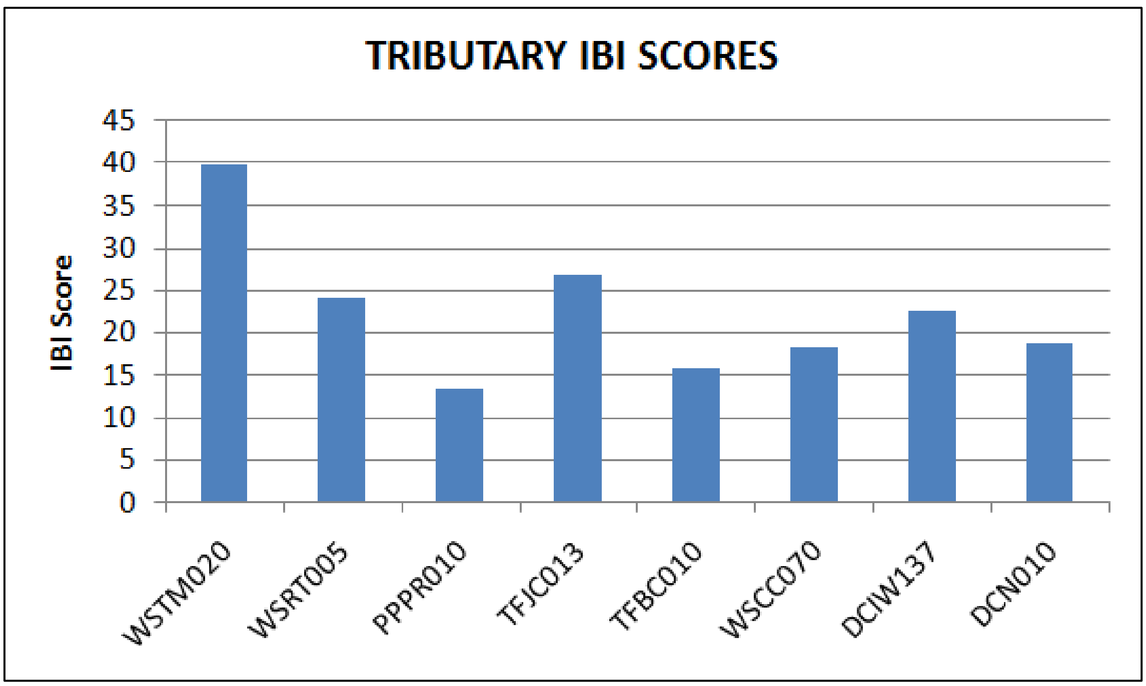


Figure 11. Tributary Assessment Sites PADEP IBI Total Scores – Spring 2011

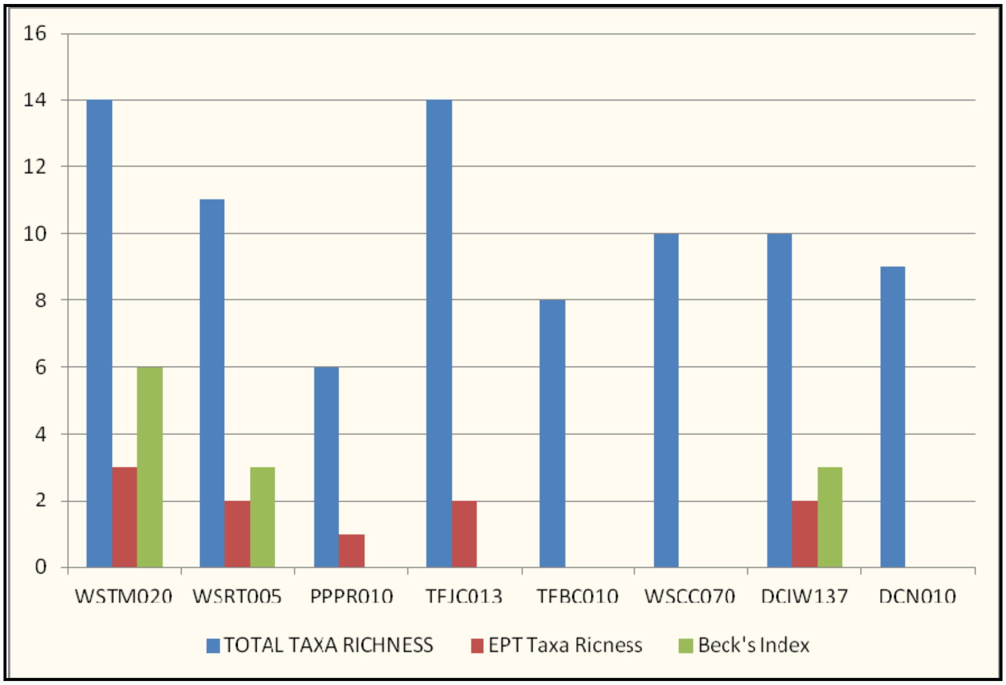


Figure 12. PADEP IBI Metric Scores for Tributary Assessment Locations- Spring 2011

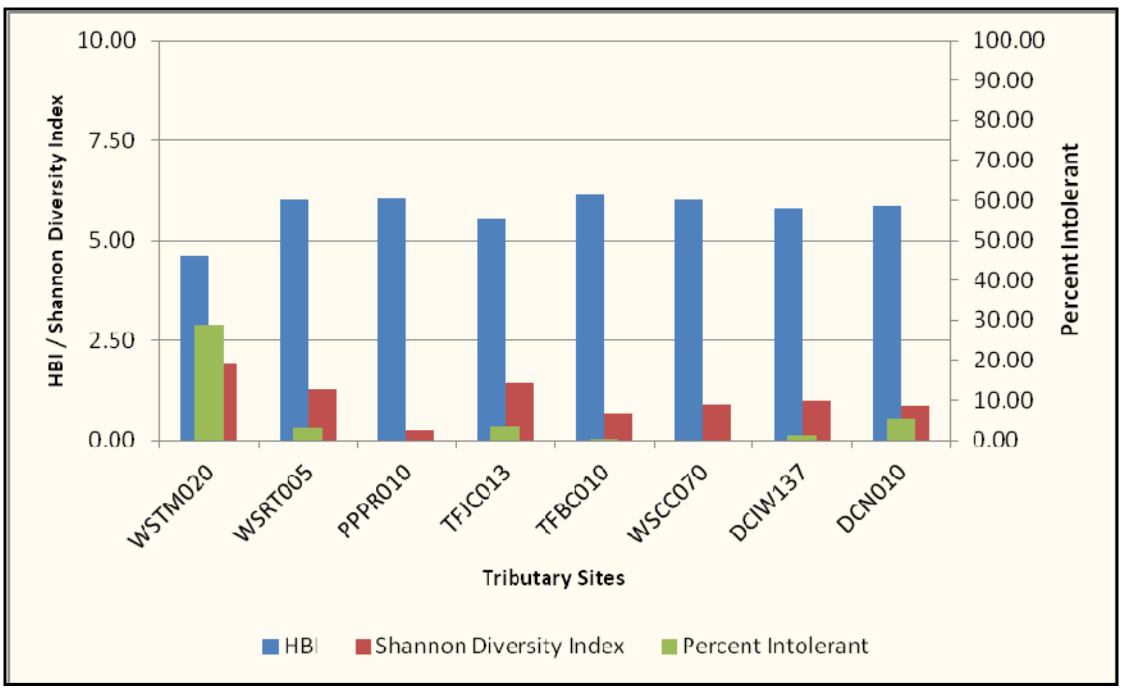


Figure 13. PADEP IBI Metric Scores for Tributary Assessment Locations- Spring 2011

Table 10. PADEP ICE Metric Scores for Tributary Monitoring Locations

Site ID	Taxa Richness	EPT richness (PTV 0-4)	% Sensitive individuals	Beck's Index	HBI	Shannon Index	IBI score
WSTM020	14	3	28.82	6.00	4.59	1.91	39.8
WSRT005	11	2	3.11	3.00	6.01	1.29	24.4
PPPR010	6	1	0.00	0.00	6.05	0.26	13.5
TFJC013	14	2	3.38	0.00	5.57	1.44	27.0
TFBC010	8	0	0.44	0.00	6.14	0.68	16.0
WSCC070	10	0	0.00	0.00	6.01	0.90	18.5
DCIW137	10	2	1.26	3.00	5.79	0.99	22.8
DCN010	9	0	5.29	0.00	5.86	0.85	19.0

Diversity was also very low among tributary sites as it was on the mainstem sites. The Shannon Diversity Index scores for tributary sites ranged from 0.26 to1.91, compared to the IBI standardization value of 2.86. The tributary site with the highest diversity was WSTM020 (SDI=1.91), which had a taxa richness (n=14), EPT taxa richness (n=3), HBI (4.59) and percent comparability (39.8%) to IBI metric standardization values. Sites PPPR010, TFBC010 and DCN010 had comparably low levels of diversity with SDI scores of 0.26, 0.68, and 0.85 respectively.

The Hilsenhoff Biotic Index (HBI) is a metric used to determine the overall pollution tolerance of a site's benthic macroinvertebrate community. Oriented toward the detection of organic pollution, HBI scores can range from zero (very sensitive) to 10 (very tolerant). The HBI values for subsamples collected from the tributary sites ranged from 4.59 to 6.14 (Table 10). Average taxa richness and HBI of tributary sites were 10.3 and 5.75, respectively. Benthic assemblages for all tributary sites except WSTM020 were dominated by Chironomidae (non-biting midges) and percent contribution by dominant taxon ranged from 45.78% to 95.28%. Site WSTM020, located in the Wissahickon Creek watershed, was dominated by *Baetis* (Ephemeroptera: Baetidae) at 30.57%. This site also had the lowest percentage of Chironomids at 28.40%. WSRT005 also had high relative abundance of Baetidae (44.89%), slightly less than the more abundant Chironomidae larvae at 45.78%.

The dominance of the benthic macroinvertebrate communities within the tributary assessment sites by midges indicate that a stressor (or stressors) is limiting the ability of other taxa to survive. The net-spinning caddisflies (Hydropsychidae) were the most numerically abundant taxa after Chironomidae. These taxa are reliable indicators of organic or nutrient pollution, as their abundance indicates elevated levels of suspended organic matter on which they feed. The detrimental effects of urbanization on water and instream habitat quality are also reflected in the low proportion of intolerant taxa (proportion of sensitive taxa/all taxa) collected from tributary sites. The relative proportion of sensitive taxa at each site ranged from 0% to 28.82%, compared to the PADEP IBI metric standardization value of 84.5%. Sites PPPR010 and WSCC070 lacked intolerant taxa completely. In general, site WSTM020 was found to be the least degraded site, having the best metric scores of all the tributary sites in taxa richness, EPT taxa richness, Beck's Index, and Shannon Diversity Index metrics, as well as the greatest overall comparability to the PADEP IBI (39.8%)

Feeding measures comprise functional feeding groups and provide information on the balance of feeding strategies in the benthic community (Barbour *et al*., 1999). The trophic composition of macroinvertebrate communities within the tributary sites was skewed toward generalist feeding gatherers (80.58%) and filterers (13.09%) (Figure 14). Scrapers (2.57%), omnivores (0%), predators (1.23%) and shredders (2.52%) were very rare within the assessed monitoring sites, indicating simplification of the food web structure and loss of ecosystem functions.

Generalist feeders (62.88% to 97.17%) and moderately tolerant individuals (60.70% to 97.60%) dominated the benthic assemblage at all tributary sites. Intolerant taxa were absent or found in very low abundance in the tributary assessment, composing only 8.70% of all taxa collected in tributary sites. Specialized feeders were also absent or found in low abundance. These more specialized feeding groups are usually more sensitive to perturbation than generalist feeders. The unbalanced feeding structure could suggest that the watershed has an overabundance of fine particulate organic matter (FPOM) and/or reduced retention of coarse particulate organic matter (CPOM) such as leaf litter and detritus, or that nutrient enrichment has altered the periphyton community favoring large filamentous green algae and thick brown algal scums. Limitation of food sources hinders the ability of specialized feeders to flourish and ultimately reduces the diversity and abundance of predator species. Tolerance/intolerance measures are intended to be representative of relative sensitivity to perturbation and may include numbers of pollution tolerant and intolerant taxa or percent composition (Barbour *et al*., 1999). Moderately tolerant individuals (88.8%) dominated the macroinvertebrate assemblages at the eight tributary sites (Figure 15).

Sensitive taxa (Table 11) were poorly represented (8.7 %), and their rarity suggests a response to watershed wide perturbation, such as water quality degradation. Other potential explanations for the rarity of sensitive taxa are habitat degradation caused by fine sediment delivered to the stream channel via bank erosion or stormwater runoff and changes in seasonal base flow and temperature that tend to accompany urbanization.

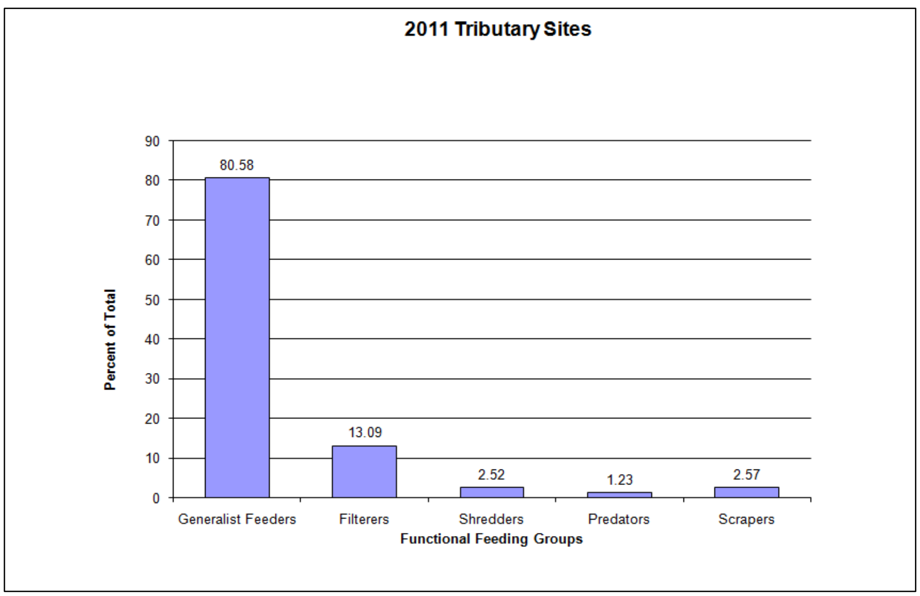


Figure 14. Percentage Distribution of Feeding Groups Among 2011 Mainstem Monitoring Locations

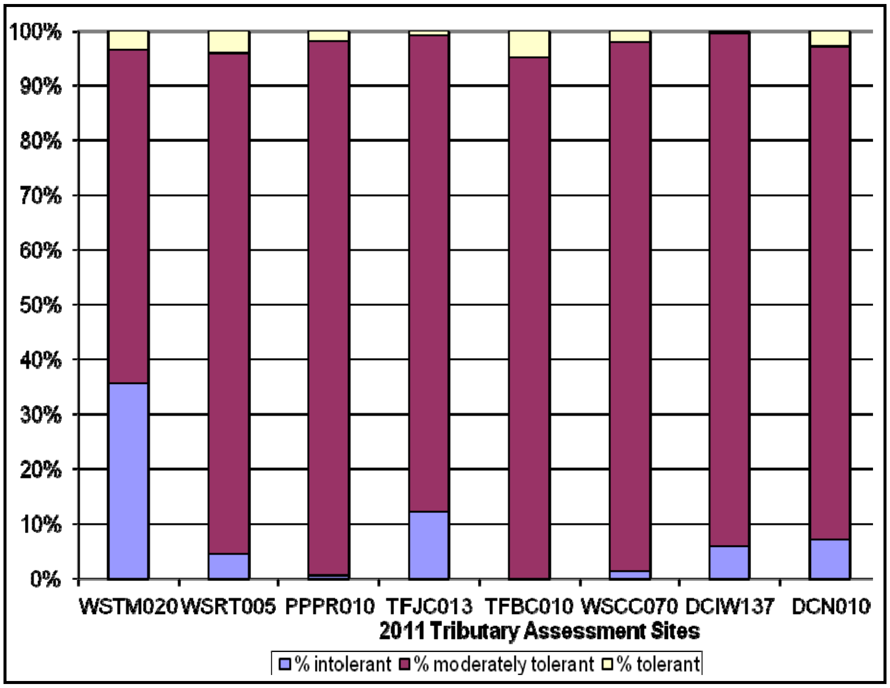


Figure 15. Distribution of Tolerant, Moderately Tolerant and Intolerant Taxa at Tributary Assessment Sites – Spring 2011

Table 11. Sensitive Taxa Collected from Tributary Sites

Site	Order	Family	Genus	HBI
WSTM020	Trichoptera	Philopotamidae	*Dolophilodes*	0
WSTM020	Trichoptera	Hydropsychidae	*Diplectrona*	0
WSTM020	Plecoptera	Nemouridae	*Amphinemura*	3
WSRT005	Trichoptera	Philopotamidae	*Dolophilodes*	0
WSRT005	Plecoptera	Nemouridae	*Amphinemura*	3
DCIW137	Trichoptera	Glossosomatidae	*Glossosoma*	0
DCIW137	Diptera	Tipulidae	*Antocha*	3
TFBC010	Diptera	Tipulidae	*Antocha*	3
DCN010	Diptera	Tipulidae	*Antocha*	3
TFJC013	Diptera	Tipulidae	*Antocha*	3
TFJC013	Trichoptera	Uenoidae	*Neophylax*	3

Table 12. 2011 Benthic Macroinvertebrate Taxa List

Order	Family	Genus
Amphipoda	Crangonyctidae	*Crangonyx*
Amphipoda	Gammaridae	*Gammarus*
Bivalvia	Corbiculidae	*Corbicula*
Coleoptera	Elmidae	*Ancyronyx*
Coleoptera	Elmidae	*Stenelmis*
Coleoptera	Psephenidae	*Ectopria*
Coleoptera	Psephenidae	*Psephenus*
Diptera	Ceratopogonidae	*Dasyhelea*
Diptera	Chironomidae	spp
Diptera	Empididae	*Hemerodromia*
Diptera	Psychodidae	*Pericoma*
Diptera	Psychodidae	*Psychoda*
Diptera	Simuliidae	*Simulium*
Diptera	Tipulidae	*Antocha*
Diptera	Tipulidae	*Molophilus*
Diptera	Tipulidae	*Tipula*
Ephemeroptera	Baetidae	*Baetis*
Ephemeroptera	Ephemerellidae	sp
Ephemeroptera	Heptageniidae	*Stenacron*
Gastropoda	Ancylidae	sp
Gastropoda	Physidae	sp
Gastropoda	Pleuroceridae	sp
Hirudinea	n/a	n/a
Isopoda	Asellidae	*Caecidotea*
Lepidoptera	Pyralidae/Crambidae	*Petrophila*
Nematomorpha	n/a	n/a
Oligochaeta	n/a	n/a
Plecoptera	Nemouridae	*Amphinemura*
Trichoptera	Glossosomatidae	*Glossosoma*
Trichoptera	Hydropsychidae	*Cheumatopsyche*
Trichoptera	Hydropsychidae	*Diplectrona*
Trichoptera	Hydropsychidae	*Hydropsyche*
Trichoptera	Hydroptilidae	*Leucotrichia*
Trichoptera	Philopotamidae	*Chimarra*
Trichoptera	Philopotamidae	*Dolophilodes*
Trichoptera	Uenoidae	*Neophylax*
Tricladida	Planariidae	sp

Physical Habitat Monitoring Results - Spring 2011

Habitat impairments such as hydrologic extremes (*i.e.*, low base flow and accentuated flow during storm events), physical obstructions, and sedimentation/siltation appear to be the major environmental stressors on the aquatic ecosystem. Accumulation of sediment in the interstitial spaces of riffles has been shown to limit available habitat and possibly smother benthic invertebrate life stages (Runde and Hellenthal, 2000). No mainstem site received an optimal score for embeddedness or sediment deposition for habitat (Table 13, Figures 16-17). Six of the 16 mainstem assessment sites received a poor score for embeddedness. Five sites received marginal scores and four were classified as low suboptimal. Four sites scored poorly for sediment deposition. Ten sites scored in the marginal category, while only two sites scored in the suboptimal range. The Byberry Creek site PQB210 had the worst habitat scores of all mainstem sites, while the uppermost Wissahickon Creek site WS1850 had the best scores for all mainstem sites.

Table 13. Physical Habitat Assessment Scores for all Assessment Sites - Spring 2011

Site ID	Instream	Epifaunal	Embed	Veldep	Chanalt	Seddep	Riffreq	Chanflo	Bankcond	Vegpro	Graze	Ripveg	Total Score
PQ395	10	7.5	6	11	15	6	7.5	8	4	12.5	16	15	118.5
PQ050	6.5	6.5	10	11	12	5	10	11	10	15	16	10	123
PQ115	6	6	5	11	6.5	7	8	11	5.5	9	6.5	6	87.5
PQB210	5	5	5	6	7	4	8	7.5	4	7.5	14	7	80
PQ770	11.5	10	11	11.5	15	9	11	10	12	15	16	15	147
WS1850	16	16	14	16	16	13	16	16	14	16	16	16	185
WS1075	10	10	5	11	15	5	5	16	10	16	17	16	136
WSTM020	18	18.5	17	16	19	16	19.5	16	16	19	19	19	213
WS005	6	6	5	14	5	12	5	13.5	6	6	11	5	94.5
DCC793	15	13.5	11	14	16	10	14	10	11	12	16	14	156.5
DCIW137	10	10	12.5	9	8.5	10	11	12.5	14	16	7	6.5	127
DCN010	3.5	6	5	6.5	3.5	11	16	7.5	12	16	14.5	12	113.5
DCC455	8.5	14	11	11	14.5	7.5	6	11	12	15	15	15	140.5
DCC253*	8	11	5	11	6	5	11.5	12	9.5	13	13.5	9	114.5
WSCC070	10	15	9	13	9	9.5	16	9.5	10	11	16	15.5	143.5
WSRT005	16	16	15	14	15	9.5	18	9.5	11	16	15.5	15	170.5
PPPR010	8.5	10	10	11	15	9	15	9.5	5	15	16	16	140
PP1380	11	11	10	12	16	6.5	10	13	10	16	16	16	147.5
PP970	16	16	10	16	16	10	16	13	10	14.5	14	13.5	165
TF597	6	10	6	11	10	7	8.5	14	11	14	16	15	128.5
TFBC010	6	8.5	9.5	11	11	5	8	9	7.5	11	10	9	105.5
TFJC013	10	11.5	10	11	9.5	11	13	14.5	12.5	11	6	6	126
PP340	10	11	5	13.5	13.5	6	11	12.5	12	16	16	15	141.5
WS076	10	10	8.5	14	5	8.5	5	16	10	10	16	9.5	122.5

*For DCC253, data from nearby site DCC251 were considered.

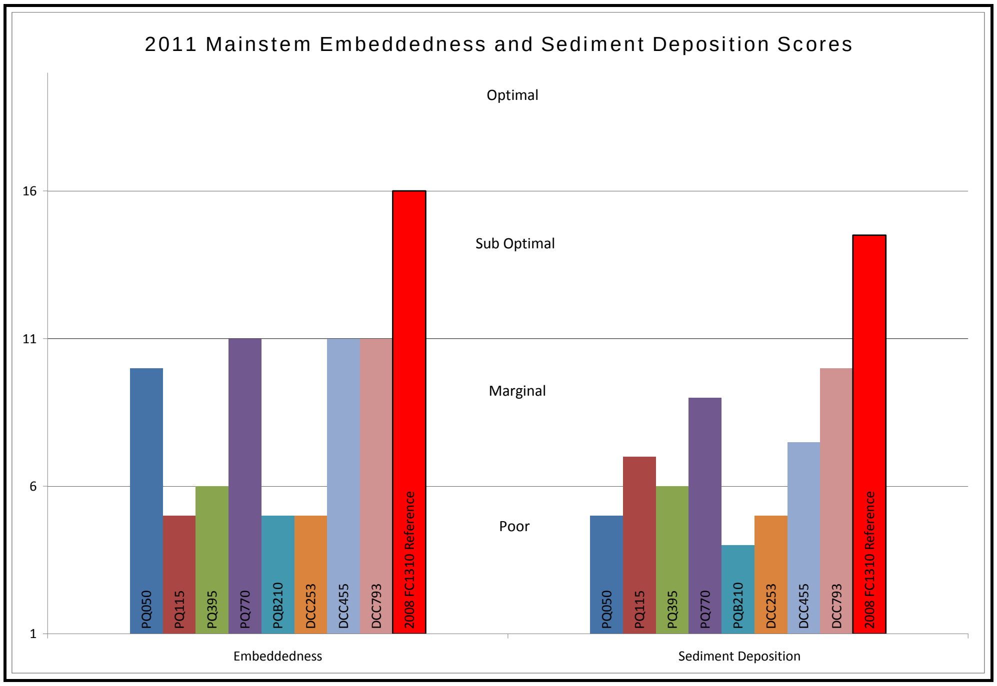


Figure 16. Embeddedness and Sediment Deposition Scores for Mainstem Assessment Sites - Spring 2011

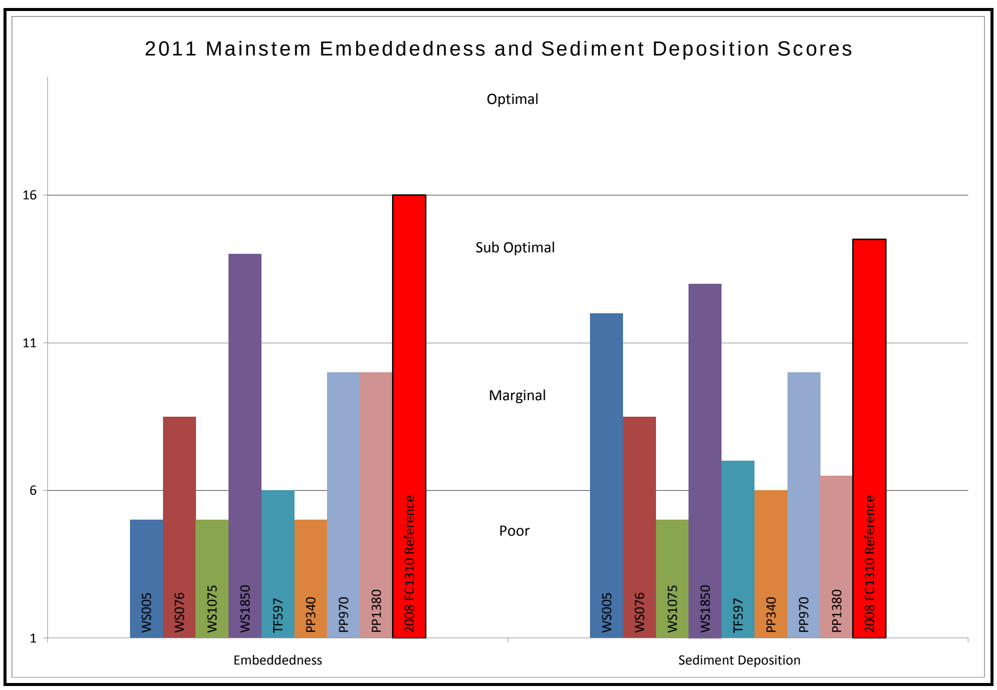


Figure 17. Embeddedness and Sediment Deposition Scores for Mainstem Assessment Sites - Spring 2011

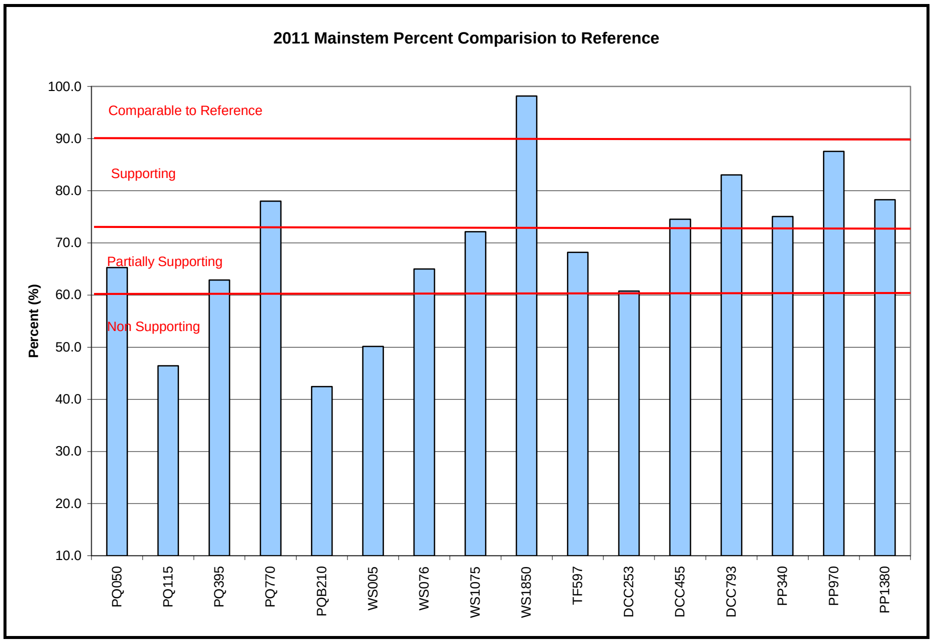


Figure 18. Mainstem Physical Habitat Assessment Scores Compared to Reference Site - Spring 2011

Of the eight tributary habitat assessment sites, DCN010 received the lowest habitat score. Habitat scores for all 12 scoring parameters ranged from high marginal to high optimal (Figure 19). Site WSTM020, located within the Wissahickon Creek watershed, was the only site to receive all optimal scores for habitat.

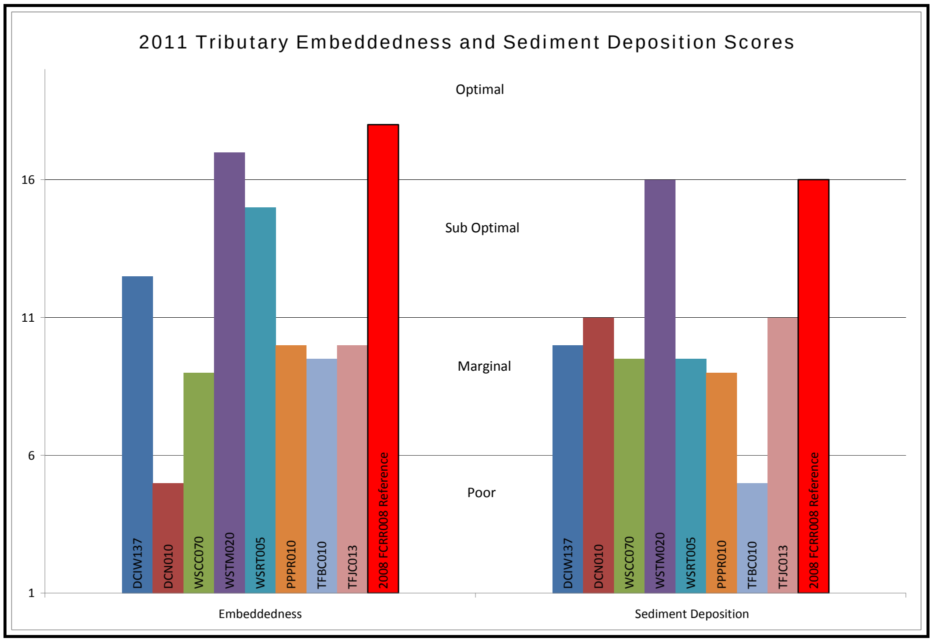


Figure 19. Embeddedness and Sediment Deposition Scores for Tributary Sites - Spring 2011

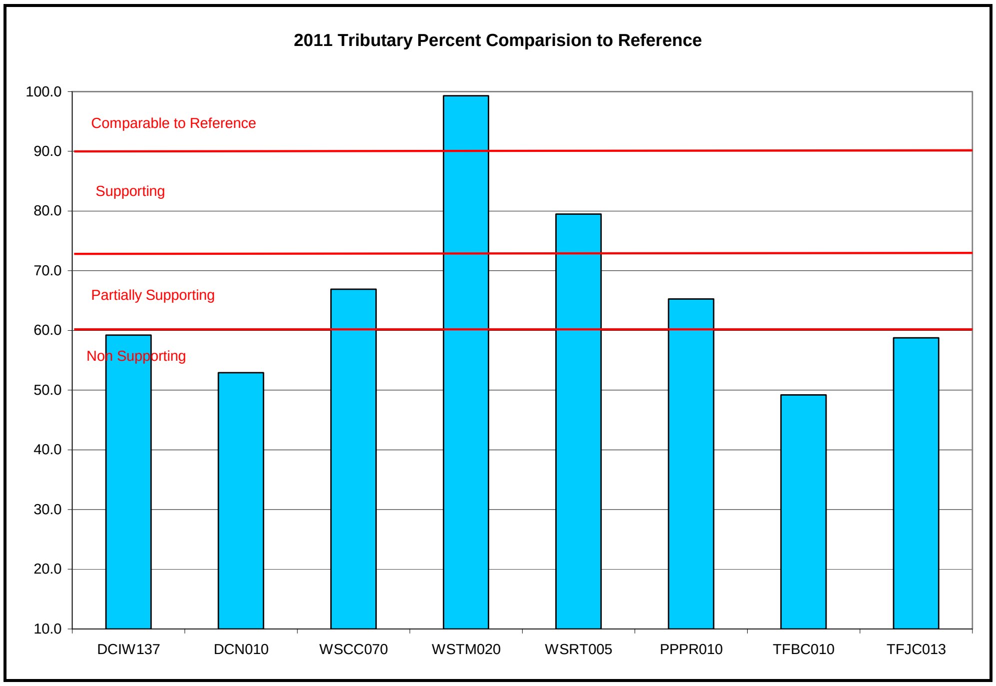


Figure 20. Tributary Physical Habitat Assessment Scores Compared to Reference Site - Spring 2011

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APPENDIX N - DEFECTIVE LATERAL GROUP QUARTERLY REPORTS

Page

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from July 1, 2011 to September 30, 2011)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

November 10, 2011

DLC Program Update
3rd 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 July 1, 2011 and ending September 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.

Eight (8) sites intercepting flow are listed below.

1. CFD-01 Plymouth St. west of Pittsville St.
2. CFD-02 Pittsville St. south of Plymouth St.
3. CFD-03 Elston St. east of Bouvier St.
4. CFD-04 Ashley St. west of Bouvier St.
5. CFD-05 Cheltenham Ave. east of 19th St.
6. CFD-06 Verbena St. south of Cheltenham Ave.
7. CFD-07 Cheltenham Ave. east of 7th St.
8. CFD-08 7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	7	2	0
CFD-02	5	1	0
CFD-03	4	0	0
CFD-04	4	0	0
CFD-05	6	0	0
CFD-06	5	0	0
CFD-07	63	8	0
CFD-08	63	14	0

The most recent fecal sample value was 1630 fecal colonies per 100 ml. at the outfall on July 5, 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	3	0	0
MFD-02	3	0	0

The most recent fecal sample value was 1300 fecal colonies per 100 ml. at the outfall on September 14, 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 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 20000 fecal colonies per 100 ml. at the W-068-05 outfall on September 14, 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 600 fecal colonies per 100 ml. at the S-058-01 outfall, 3400 fecal colonies per 100 ml. at the S-059-01 outfall, 107000 fecal colonies per 100 ml. at the S-059-02 outfall, 4700 fecal colonies per 100 ml. at the S-059-03 outfall, 15182 fecal colonies per 100 ml. at the S-059-04 outfall, 420 fecal colonies per 100 ml. at the S-059-05 outfall, all on September 26, 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	4	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	64	11	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-091-04	1	0	0
P-091-06	0	0	4
P-091-08	1	0	0

Outfall #	Complete Tests	Cross-Connections	Abatements
P-091-09	149	5	0
P-100-04	45	0	0
P-104-10	0	0	2
P-105-03	2	1	2
P-109-02	9	0	0
P-113-06	151	0	0
Q-106-05	128	0	0
Q-106-12	166	0	0
Q-110-06	1	0	0
Q-110-11	5	0	2
Q-110-14	2	0	2
Q-113-09	24	0	0
Q-115-12	1	0	2
Q-119-01	6	0	0
S-046-09	4	0	2
T-080-02	5	0	0
W-076-08	5	0	0
W-076-10	(5)	0	0
W-077-02	65	4	6

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-091-09
- W-077-02

4. Continue to perform property testing within the following outfalls.

- P-091-03
- P-091-06
- P-091-09
- P-091-12
- P-113-06
- Q-106-05
- Q-106-12
- Q-115-12
- S-046-09
- T-079-01
- T-091-09
- W-076-01
- W-086-03

Table 1
DLC Program Summary
July 1, 2011 to September 30, 2011

Complete Tests:

- 44,983 Complete tests have been performed under the DLC program
- **766 Complete tests were performed this past quarter**
- 1 Complete test was performed in outfall P-091-04
- 1 Complete test was performed in outfall P-091-08
- 149 Complete tests were performed in outfall P-091-09
- 45 Complete tests were performed in outfall P-100-04
- 2 Complete tests were performed in outfall P-105-03
- 9 Complete tests were performed in outfall P-109-02
- 151 Complete tests were performed in outfall P-113-06
- 128 Complete tests were performed in outfall Q-106-05
- 166 Complete tests were performed in outfall Q-106-12
- 1 Complete test was performed in outfall Q-110-06
- 5 Complete tests were performed in outfall Q-110-11
- 2 Complete tests were performed in outfall Q-110-14
- 24 Complete tests were performed in outfall Q-113-09
- 1 Complete test was performed in outfall Q-115-12
- 6 Complete tests were performed in outfall Q-119-01
- 4 Complete tests were performed in outfall S-046-09
- 5 Complete tests were performed in outfall T-080-02
- 1 Complete test was performed in outfall W-068-05
- 5 Complete tests were performed in outfall W-076-08
- (5) Complete tests were performed in outfall W-076-10
- 65 Complete tests were performed in outfall W-077-02

Cross-Connections Found:

- 1,147 Cross-connections have been identified under the DLC program
- **10 Cross-connections were identified this past quarter**
- 5 Cross-connections were identified in outfall P-091-09
- 1 Cross-connection was identified in outfall P-105-03
- 4 Cross-connections were identified in outfall W-077-02

Abatements:

- 1,141 Abatements have been performed under the DLC program
- **22 Abatements were performed this past quarter**
- 4 Abatements were performed in outfall P-091-06
- 2 Abatements were performed in outfall P-104-10
- 2 Abatements were performed in outfall P-105-03
- 2 Abatements were performed in outfall Q-110-11
- 2 Abatements were performed in outfall Q-110-14
- 2 Abatements were performed in outfall Q-115-12
- 2 Abatements were performed in outfall S-046-09
- 6 Abatements were performed in outfall W-077-02

Outfall/Manhole Screening and Sampling:

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

- 20 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 17 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, 2011 to September 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	7/5/2011	10:55	Outfall: 7th & Cheltenham	84	10	0.40	1630	
T-088-01	7/5/2011	11:00	Outfall: 7th & Cheltenham @ Bridge	84	10	0.39	970	
W-060-01	9/14/2011	10:00	Outfall: Monastery Lane	5'-0"x4'-4"		0.16	1300	
W-068-05	9/14/2011	10:30	Outfall: Lincoln & Morris	90		0.21	20000	
S-058-01	9/26/2011	9:50	Outfall: Domino Lane	54		0.24	600	
S-059-01	9/26/2011	10:10	Outfall: Parker	60		0.21	3400	
S-059-02	9/26/2011	10:30	Outfall: Fountain	42		0.17	107000	
S-059-03	9/26/2011	10:40	Outfall: Wright	42		0.15	4700	
S-059-04	9/26/2011	10:55	Outfall: Leverington	51		0.16	15182	
S-059-05	9/26/2011	11:00	Outfall: Leverington (east)	4'-0"x2'-8"		0.31	420	
S-059-09	9/26/2011		Outfall: Green Lane	36	NF			
B. Permit Inspection Program								
T-080-02	7/5/2011	10:05	Manhole: Newtown Ave. & Comly St.	30	180	0.89	83000	
T-089-01	7/5/2011	10:25	Outfall: Passmore St. & Newtown Ave.	36	4.2	0.93	>60000	
W-076-10	7/7/2011	11:05	Outfall: Valley Green Rd. & Wolcott Dr.	42	180	0.74	31000	
W-077-02	7/11/2011	10:47	Outfall: Cresheim Valley & Lincoln Drs.	66	300	1.02	22000	
W-076-14	7/13/2011	11:10	Outfall: Hartwell La. & Cherokee St.	57	360	0.85	220	
W-084-02	7/13/2011	11:40	Outfall: Bells Mill Rd. & Lykens La.	48	2	0.89	<10	
Q-101-13	7/18/2011	9:45	Outfall: Brook La. & Stevenson St.	18	NF			Damp in outfall path, no sample
Q-101-16	7/18/2011	9:50	Outfall: Brook La. & Rowena Dr.	18	0.6	0.56	37000	
Q-106-12	7/18/2011	10:25	Outfall: Morrell Ave. & Ashfield La.	30	120	0.94	4400	
Q-106-09	7/28/2011	10:50	Manhole: 2 manholes before outfall on Churchill La.	21	NF			
Q-106-10	7/28/2011	11:05	Manhole: second manhole before outfall on Glenbrook Pl.	18	0.25			Flow too small to sample
Q-110-11	7/28/2011	11:20	Outfall: Comly & Tara Rds.	60	NF			Wet trail in outfall, no sample
Q-115-07	8/2/2011	10:40	Outfall: Academy & Torrey Rds.	24	0.54	0.48	>60000	
Q-113-10	8/2/2011	11:20	Manhole: Dedaker & Foster Sts. (on Dedaker)	18	0.48	0.28	>60000	
P-091-01	8/24/2011	10:55	Outfall: Sandyford Ave. & Brous St.	36	600	0.67	94000	No access to outfall channel, sampled from pool ~ 5 ft. in front of channel
P-099-01	8/24/2011	11:40	Outfall: Tabor Ave. & Stanwood St.	5'-0"x6'-6"	900	<0.2	8400	
P-100-14	8/30/2011	11:15	Manhole: Holme Ave. & Longford St. (first manhole after Longford)	42	7	0.78	2000	Construction at bridge at outfall
P-099-03	8/30/2011	12:10	Outfall: Tustin & Bustleton Aves.	7'-0"x6'-6"	1800	0.92	>60000	
T-097-01	9/19/2011	11:10	Outfall: Cheltenham Ave. & Vernon Rd.	42	60	0.32	12000	
T-097-02	9/19/2011	11:15	Outfall: Cheltenham Ave. & Vernon Rd.	24	150	0.16	8100	

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
12679	Biscayne	Dr	Q-115-12	02-12-2011		06-15-2011	
02316	Solly	Ave	P-091-06	03-23-2011		07-29-2011	
02596	Cranston	Rd	S-046-09	04-16-2011		09-01-2011	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments

Table 4

Spills to Storm Sewers and/or Receiving Waters

July 1, 2011 to September 30, 2011

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
07/05/11		Shurs Lane and Main Street Schuylkill River	3011	Sewage	07/06/11	Industrial Waste unit investigated a reported discharge. Storm sewers found clear. Issue thought to be related to algae growth.
07/09/11	S-059-04	337 Leverington Avenue Manayunk Canal	3009	Sewage	07/10/11	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing approximate <1 gpm discharge from FAI. Removed debris from manhole. Disinfected and flushed gutter and inlet (with dechlorination).
08/12/11		East bank of Cobbs Creek - approximately 300 yards south of intersection of 63rd Street and Marshall Road Cobbs Creek	3011	Sewage	08/12/11	Industrial Waste unit investigated a reported discharge at a PWD sewer lining contract site (Work No. S-40518-RD). Approximately < 1gpm of sewage was found leaking from an air bleeder valve on one of the flow diversion pipes. The PWD contract inspectors were notified and they directed the contractor to take corrective action.

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, 2011 to December 31, 2011)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

February 14, 2012

DLC Program Update
4th 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 October 1, 2011 and ending December 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.

Eight (8) sites intercepting flow are listed below.

1. CFD-01 Plymouth St. west of Pittsville St.
2. CFD-02 Pittsville St. south of Plymouth St.
3. CFD-03 Elston St. east of Bouvier St.
4. CFD-04 Ashley St. west of Bouvier St.
5. CFD-05 Cheltenham Ave. east of 19th St.
6. CFD-06 Verbena St. south of Cheltenham Ave.
7. CFD-07 Cheltenham Ave. east of 7th St.
8. CFD-08 7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	11	0	0
CFD-02	9	2	0
CFD-03	11	1	0
CFD-04	9	1	0
CFD-05	9	0	0
CFD-06	8	0	0
CFD-07	60	13	0
CFD-08	60	9	0

The most recent fecal sample value was 4200 fecal colonies per 100 ml. at the outfall on October 18, 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 1300 fecal colonies per 100 ml. at the outfall on November 14, 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 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 20000 fecal colonies per 100 ml. at the W-068-05 outfall on November 14, 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, 3300 fecal colonies per 100 ml. at the S-059-01 outfall, 81000 fecal colonies per 100 ml. at the S-059-02 outfall, 6100 fecal colonies per 100 ml. at the S-059-03 outfall, 24000 fecal colonies per 100 ml. at the S-059-04 outfall, 1900 fecal colonies per 100 ml. at the S-059-05 outfall, all on December 13, 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	12	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	60	1	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	24	0	0
P-091-06	1	0	0
P-091-09	40	1	5

Outfall #	Complete Tests	Cross-Connections	Abatements
P-092-02	3	0	0
P-105-06	1	0	0
Q-106-05	5	0	0
Q-106-12	1	0	0
Q-107-07	1	0	0
Q-110-17	1	0	0
Q-115-12	1	0	0
T-079-01	667	14	7
T-089-04	(3)	0	0
W-077-02	1	0	1
W-084-03	17	1	1

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-091-09
- T-079-01

4. Continue to perform property testing within the following outfalls.

- P-090-02
- P-105-03
- Q-106-12
- S-046-06
- T-079-01
- W-048-03

Table 1
DLC Program Summary
October 1, 2011 to December 31, 2011

Complete Tests:

- 45,743 Complete tests have been performed under the DLC program
- **760 Complete tests were performed this past quarter**
- 24 Complete tests were performed in outfall P-090-02
- 1 Complete test was performed in outfall P-091-06
- 40 Complete tests were performed in outfall P-091-09
- 3 Complete tests were performed in outfall P-092-02
- 1 Complete test was performed in outfall P-105-06
- 5 Complete tests were performed in outfall Q-106-05
- 1 Complete test was performed in outfall Q-106-12
- 1 Complete test was performed in outfall Q-107-07
- 1 Complete test was performed in outfall Q-110-17
- 1 Complete test was performed in outfall Q-115-12
- 667 Complete tests were performed in outfall T-079-01
- (3) Complete tests were performed in outfall T-089-04
- 1 Complete test was performed in outfall W-077-02
- 17 Complete tests were performed in outfall W-084-03

Cross-Connections Found:

- 1,163 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-091-09
- 14 Cross-connections were identified in outfall T-079-01
- 1 Cross-connection was identified in outfall W-084-03

Abatements:

- 1,155 Abatements have been performed under the DLC program
- **14 Abatements were performed this past quarter**
- 5 Abatements were performed in outfall P-091-09
- 7 Abatements were performed in outfall T-079-01
- 1 Abatement was performed in outfall W-077-02
- 1 Abatement was performed in outfall W-084-03

Outfall/Manhole Screening and Sampling:

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

- 3 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, 2011 to December 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	10/18/2011	10:35	Outfall: 7th & Cheltenham	84	10	0.25	4200	
T-088-01	10/18/2011	10:45	Outfall: 7th & Cheltenham @ Bridge	84	10	0.26	4500	
W-060-01	11/14/2011	11:05	Outfall: Monastery Lane	5'-0"x4'-4"		0.16	1300	
W-068-05	11/14/2011	11:35	Outfall: Lincoln & Morris	90		0.21	20000	
S-058-01	12/13/2011	10:45	Outfall: Domino Lane	54		0.24	18	
S-059-01	12/13/2011	11:05	Outfall: Parker	60		0.17	3300	
S-059-02	12/13/2011	10:25	Outfall: Fountain	42		0.18	81000	
S-059-03	12/13/2011	10:30	Outfall: Wright	42		0.16	6100	
S-059-04	12/13/2011	10:50	Outfall: Leverington	51		0.24	24000	
S-059-05	12/13/2011	10:55	Outfall: Leverington (east)	4'-0"x2'-8"		0.31	1900	
S-059-09	12/19/2011		Outfall: Green Lane	36	0.6			Flow too small to sample
B. Permit Inspection Program								
P-113-03	10/18/2011	10:00	Outfall: Northeast Ave. & Gorman St.	36	NF			Some puddles in channel but dry
W-060-09	11/7/2011	12:10	Outfall: Daniel & Hermit Sts.	2'-6"	10	0.24	<100	
S-051-08	11/8/2011	9:50	Outfall: 4015 Main St. (across from Arthur Ashe Complex)	9'-0"x7'-0"	54000	0.18	9180	

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
02316	Solly	Ave	P-091-06	03-23-2011		07-29-2011	
02596	Cranston	Rd	S-046-09	04-16-2011		09-01-2011	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments

Table 4

Spills to Storm Sewers and/or Receiving Waters

October 1, 2011 to December 31, 2011

Date	**Outfall**	**Address**	**Source Code**	**Material Involved**	**Completion Date**	**Remarks**
10/09/11	S-024-01	500 University Avenue Schuylkill River	3009	Sewage	10/10/11	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate <1 gpm discharge from manhole to street / inlet. Disinfected and flushed street and inlet (with dechlorination).
10/15/11	C-14	61st Street and Baltimore Avenue Cobbs Creek	3011	Sewage	10/17/11	Industrial Waste unit investigated a reported discharge at a PWD sewer lining contract site (Work No. S-40518-RD). A blocked regulator was causing a minor periodic discharge. The PWD contract inspector was notified and they directed the contractor to take corrective action.
10/15/11	S-075-07	9022 Buttonwood Place Schuylkill River	3009	Sewage	10/15/11	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge.
10/17/11	P-090-02	Barnes and Loney Streets Sandy Run	3009	Sewage	10/17/11	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge.
10/30/11	W-060-10	Lincoln Drive and Wissahickon Avenue Wissahickon Creek	3009	Sewage	10/30/11 11/05/11	Sewer Maintenance unit twice flushed 15" diameter sanitary sewer causing approximate 55 gpm discharge from manhole to ground / street / inlet. Manhole repaired and reset to grade.
12/07/11	S-046-06	4422 Wissahickon Avenue Schuylkill River		Sewage	12/08/11	Sewer Maintenance unit setup bypass pump and flushed 12" diameter sanitary sewer causing approximate <1 gpm discharge from manhole # S046-06-S2070 to ground during wet weather. Affected area cleaned.
12/14/11	W-075-01	Henry Avenue and Seffert Street Wissahickon Street	3009	Sewage	12/14/11	Industrial Waste unit investigated a reported discharge. No problem found. Issue thought to be related to groundwater.

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, 2012 to March 31, 2012)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

May 15, 2012

DLC Program Update
1st Quarter 2012

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning January 1, 2012 and ending March 31, 2012.

The body of this report will describe the recent activities of the City during the past quarter within the Priority Outfall areas and at other significant outfalls on the Stormwater Priority Outfall List. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,830 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1.	CFD-01	Plymouth St. west of Pittsville St.
2.	CFD-02	Pittsville St. south of Plymouth St.
3.	CFD-03	Elston St. east of Bouvier St.
4.	CFD-04	Ashley St. west of Bouvier St.
5.	CFD-05	Cheltenham Ave. east of 19th St.
6.	CFD-06	Verbena St. south of Cheltenham Ave.
7.	CFD-07	Cheltenham Ave. east of 7th St.
8.	CFD-08	7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	8	1	0
CFD-02	7	1	0
CFD-03	7	0	0
CFD-04	4	0	0
CFD-05	6	0	0
CFD-06	5	1	0
CFD-07	17	4	0
CFD-08	17	2	0

The most recent fecal sample value was 5400 fecal colonies per 100 ml. at the outfall on January 3, 2012.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	6	0	0
MFD-02	6	0	0

The most recent fecal sample value was >6000 fecal colonies per 100 ml. at the outfall on January 3, 2012.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was >6000 fecal colonies per 100 ml. at the W-068-05 outfall on January 3, 2012.

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 27 fecal colonies per 100 ml. at the S-058-01 outfall, 1800 fecal colonies per 100 ml. at the S-059-01 outfall, >6000 fecal colonies per 100 ml. at the S-059-02 outfall, 4600 fecal colonies per 100 ml. at the S-059-03 outfall, 510 fecal colonies per 100 ml. at the S-059-04 outfall, >6000 fecal colonies per 100 ml. at the S-059-05 outfall, all on March 12, 2012.

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	21	0	2

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	18	2	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	21	0	0
P-091-09	1	0	1
Q-106-05	1	0	0

Outfall #	Complete Tests	Cross-Connections	Abatements
Q-106-12	1	0	0
S-046-06	1	1	0
T-079-01	503	15	19
T-096-01	163	3	0
W-077-02	16	0	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- S-046-06
- T-079-01
- T-096-01

4. Continue to perform property testing within the following outfalls.

- P-091-06
- P-091-09
- P-113-06
- Q-106-12
- S-046-09
- T-079-01
- T-096-01

Table 1
DLC Program Summary
<u>January 1, 2012 to March 31, 2012</u>

Complete Tests:

- 46,451 Complete tests have been performed under the DLC program
- **708 Complete tests were performed this past quarter**
- 21 Complete tests were performed in outfall P-090-02
- 1 Complete test was performed in outfall P-091-09
- 1 Complete test was performed in outfall Q-106-05
- 1 Complete test was performed in outfall Q-106-12
- 1 Complete test was performed in outfall S-046-06
- 503 Complete tests were performed in outfall T-079-01
- 1 Complete test was performed in outfall T-088-01
- 163 Complete tests were performed in outfall T-096-01
- 16 Complete tests were performed in outfall W-077-02

Cross-Connections Found:

- 1,182 Cross-connections have been identified under the DLC program
- **19 Cross-connections were identified this past quarter**
- 1 Cross-connection was identified in outfall S-046-06
- 15 Cross-connections were identified in outfall T-079-01
- 3 Cross-connections were identified in outfall T-096-01

Abatements:

- 1,175 Abatements have been performed under the DLC program
- **20 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-091-09
- 19 Abatements were performed in outfall T-079-01

Outfall/Manhole Screening and Sampling:

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
January 1, 2012 to March 31, 2012

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	1/3/2012	9:54	Outfall: 7th & Cheltenham	84	60	0.31	5400	
T-088-01	1/3/2012	10:01	Outfall: 7th & Cheltenham @ Bridge	84	60	0.29	2500	
W-060-01	1/3/2012	11:10	Outfall: Monastery Lane	5'-0"x4'-4"		0.15	>6000	
W-068-05	1/3/2012	10:38	Outfall: Lincoln & Morris	90	150	0.35	>6000	
S-058-01	3/12/2012	10:05	Outfall: Domino Lane	54		0.24	27	
S-059-01	3/12/2012	10:25	Outfall: Parker	60		0.16	1800	
S-059-02	3/12/2012	10:50	Outfall: Fountain	42		0.28	>6000	
S-059-03	3/12/2012	11:00	Outfall: Wright	42		0.16	4600	
S-059-04	3/12/2012	11:25	Outfall: Leverington	51		0.24	510	
S-059-05	3/12/2012	11:30	Outfall: Leverington (east)	4'-0"x2'-8"		0.31	>6000	
S-059-09	3/12/2012	11:20	Outfall: Green Lane	36	NF			
B. Permit Inspection Program								

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments

Table 4

Spills to Storm Sewers and/or Receiving Waters

January 1, 2012 to March 31, 2012

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
02/02/12	W-060-01	6000 Henry Avenue (below overpass) Wissahickon Creek		Sewage	02/16/12	Sewer Maintenance unit investigated report of approximate <1 gpm discharge to ground surface. Bypass pump setup. Access road constructed. Buried sanitary and storm manholes raised to grade. Excavate and replace 20 feet of 10" diameter terra cotta sanitary sewer pipe.
02/06/12		Pumping Station #796 (Philadelphia Naval Business Center / 13th and Admiral Streets)		Sewage	02/06/12	Construction unit identified minor sewage leak to ground surface. Contractor excavated 30" diameter ductile iron force main and found the source of the leak. Sewage pumped from excavation to nearby sanitary sewer. Repair clamp installed. Permanent repair scheduled to be completed in mid May.
02/07/12	S-051-08	326 Roxborough Avenue Schuylkill River	3009	Sewage	02/07/12	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge and W/C.
02/10/12	Q-106-13	Red Lion and Calera Roads Byberry Creek	3009	Sewage	02/11/12	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate <1 gpm discharge.
02/15/12		3001 Castor Avenue (adjacent to Northeast WPCP facility)		Sewage sludge	02/15/12	Northeast plant and contractor personnel quickly responded to damaged 10" diameter PVC sludge line. Sludge flowed along plant access road and over retaining wall into parking lot of private property. Parking lot and private storm inlet cleaned.
02/23/12		11500 Roosevelt Boulevard (I. Rice and Company / Building D) (unnamed tributary of Byberry Creek)	3011	Sewage	03/05/12	Industrial Waste and Sewer Maintenance units investigated an approximate <1 gpm discharge from a private manhole. Plumber hired by company identified damaged private sewer. Repairs were scheduled to be completed on 3/5/12.
03/22/12	S-052-04	Cresson and New Queen Streets Schuylkill River		Sewage	03/27/12	Sewer Maintenance unit investigated report of high water in sanitary sewer. Bypass pump setup. Remove debris from manhole invert. Repaired wall of 4' diameter storm sewer. Contractor excavated and replaced 10 feet of 8" diameter terra cotta sanitary sewer pipe.

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, 2012 to June 30, 2012)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

August 14, 2012

DLC Program Update
2nd Quarter 2012

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning April 1, 2012 and ending June 30, 2012.

The body of this report will describe the recent activities of the City during the past quarter within the Priority Outfall areas and at other significant outfalls on the Stormwater Priority Outfall List. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,830 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1. CFD-01 Plymouth St. west of Pittsville St.
2. CFD-02 Pittsville St. south of Plymouth St.
3. CFD-03 Elston St. east of Bouvier St.
4. CFD-04 Ashley St. west of Bouvier St.
5. CFD-05 Cheltenham Ave. east of 19^{th} St.
6. CFD-06 Verbena St. south of Cheltenham Ave.
7. CFD-07 Cheltenham Ave. east of 7th St.
8. CFD-08 7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	9	0	0
CFD-02	12	1	0
CFD-03	9	3	0
CFD-04	10	0	0
CFD-05	12	4	0
CFD-06	9	3	0
CFD-07	11	3	0
CFD-08	9	0	0

The most recent fecal sample value was 290 fecal colonies per 100 ml. at the outfall on April 4, 2012.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	8	1	0
MFD-02	8	0	0

The most recent fecal sample value was 190 fecal colonies per 100 ml. at the outfall on April 4, 2012.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,744 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 7600 fecal colonies per 100 ml. at the W-068-05 outfall on April 4, 2012.

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 144 fecal colonies per 100 ml. at the S-058-01 outfall on June 11, 2012, 3400 fecal colonies per 100 ml. at the S-059-01 outfall on June 11, 2012, >60000 fecal colonies per 100 ml. at the S-059-02 outfall on June 19, 2012, 3600 fecal colonies per 100 ml. at the S-059-03 outfall on June 11, 2012, 7900 fecal colonies per 100 ml. at the S-059-04 outfall on June 25, 2012, 5700 fecal colonies per 100 ml. at the S-059-05 outfall on June 25, 2012.

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	10	1	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	12	4	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	724	25	3
P-113-06	1	0	0

Outfall #	Complete Tests	Cross-Connections	Abatements
Q-106-12	1	0	0
Q-110-14	1	0	0
Q-110-17	24	1	0
S-046-09	1	0	0
T-079-01	21	0	3
T-089-04	(1)	0	0
T-096-01	17	(1)	0
W-077-02	1	0	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-090-02
- Q-110-17
- T-096-01

4. Continue to perform property testing within the following outfalls.

- P-090-02
- T-079-01
- T-096-01
- S-046-09
- P-091-06
- P-113-06
- P-091-09
- Q-115-12
- Q-114-12
- Q-121-05
- P-100-05

Table 1
DLC Program Summary
April 1, 2012 to June 30, 2012

Complete Tests:

- 47,241 Complete tests have been performed under the DLC program
- **790 Complete tests were performed this past quarter**
- 724 Complete tests were performed in outfall P-090-02
- 1 Complete test was performed in outfall P-113-06
- 1 Complete test was performed in outfall Q-106-12
- 1 Complete test was performed in outfall Q-110-14
- 24 Complete tests were performed in outfall Q-110-17
- 1 Complete test was performed in outfall S-046-09
- 21 Complete tests were performed in outfall T-079-01
- (1) Complete test was performed in outfall T-089-04
- 17 Complete tests were performed in outfall T-096-01
- 1 Complete test was performed in outfall W-077-02

Cross-Connections Found:

- 1,206 Cross-connections have been identified under the DLC program
- **24 Cross-connections were identified this past quarter**
- 25 Cross-connections were identified in outfall P-090-02
- 1 Cross-connection was identified in outfall Q-110-17
- (1) Cross-connection was identified in outfall S-046-06
- (1) Cross-connection was identified in outfall T-096-01

Abatements:

- 1,181 Abatements have been performed under the DLC program
- **6 Abatements were performed this past quarter**
- 3 Abatements were performed in outfall P-090-02
- 3 Abatements were performed in outfall T-079-01

Outfall/Manhole Screening and Sampling:

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

- 1 outfall inspection was made as part of the Permit Inspection Program this past quarter
- 1 outfall sample was taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
April 1, 2012 to June 30, 2012

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (# per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	4/4/2012	10:15	Outfall: 7th & Cheltenham	84	54000	0.35	290	
T-088-01	4/4/2012	10:20	Outfall: 7th & Cheltenham @ Bridge	84	54000	0.35	64	
W-060-01	4/4/2012	11:30	Outfall: Monastery Lane	5'-0"x4'-4"	12	<0.1	190	
W-068-05	4/4/2012	11:10	Outfall: Lincoln & Morris	90	900	0.29	7600	
S-058-01	6/11/2012	9:55	Outfall: Domino Lane	54	1200	0.33	144	
S-059-01	6/11/2012	10:20	Outfall: Parker	60	600	0.22	3400	
S-059-02	6/19/2012	9:45	Outfall: Fountain	42	60	0.19	>60000	
S-059-03	6/11/2012	11:00	Outfall: Wright	42	300	0.12	3600	
S-059-04	6/25/2012	8:55	Outfall: Leverington	51	300	0.17	7900	
S-059-05	6/25/2012	9:00	Outfall: Leverington (east)	4'-0"x2'-8"	60	0.22	5700	
S-059-09	6/11/2012	11:40	Outfall: Green Lane	36	NF			
B. Permit Inspection Program								
W-076-13	4/25/2012	11:40	Manhole: Wise's Mill Rd. & Henry Ave.	27	300	0.29	23000	Basin level was high. Sampled from manhole infront of drop. Some mixing was inevitable.

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

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, 2012 to June 30, 2012

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
04/01/12	W-060-01	6000 Henry Avenue (below overpass) Wissahickon Creek	3009	Sewage	04/01/12	Sewer Maintenance unit setup bypass pump and flushed 10" diameter sanitary sewer and removed debris from manhole invert causing approximate <1 gpm discharge to ground surface from manhole # W060-01-S0025. Affected area cleaned.
04/17/12	P-091-08	Rowland Avenue and Lansing Street (behind baseball field) Pennypack Creek	3009	Sewage	04/18/12	Sewer Maintenance unit flushed 12" diameter sanitary sewer and removed debris from manhole invert causing approximate <1 gpm discharge. Affected area cleaned.
05/23/12	P-116-01	11000 Rennard Street Huntingdon Valley Creek	3009	Sewage	05/23/12	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge.
06/22/12	S-052-05	27 Osborn Street Schuylkill River	3009	Sewage	06/22/12	Industrial Waste unit investigated a reported minor sewage leak to gutter flowing into inlet # 58595. A defective septic tank was identified. Customer Service unit to serve property with Notice of Defect (NOD).
06/26/12	S-046-06	4422 Wissahickon Avenue (rear) Schuylkill River		Sewage	06/26/12	Sewer Maintenance unit setup bypass pump and flushed 12" diameter sanitary sewer and drop manhole causing approximate <1 gpm discharge from manhole # S046-06-S2070 to ground surface. Affected area cleaned.
06/28/12	P-116-02	10928 Nandina Court Huntingdon Valley Creek	3009	Sewage	06/28/12	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge. Affected area cleaned.

Source Codes:

3009 - Spill to Storm Sewer

3011 - Spill to Receiving Stream

Streets Department
1401 JFK Blvd. 7th Floor
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(215) 686-5460

City of Philadelphia

Streets Department

Winter 2011 – 2012

Snow and Ice Operations Plan

November 22, 2011

Honorable Michael A. Nutter, Mayor
Richard Negrin, Managing Director
Rina Cutler, Deputy Mayor, Transportation & Utilities
Clarena I. W. Tolson, Streets Commissioner
Carlton Williams, Deputy Commissioner
Steve Buckley, Deputy Commissioner
Michael Zaccagni, Deputy Commissioner
Kevin Koch, Chief Highway Engineer

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Snow & Ice Removal Operations Plan

Plan Summary

Philadelphia, like many other northeastern cities in the United States, often faces winter storms that bring potentially dangerous accumulations of ice, sleet, freezing rain, and snow.

In order to provide roadway conditions that are safe for traffic on primary, secondary, and tertiary (residential) streets throughout the entire City of Philadelphia, the Streets Department has prepared a Snow and Ice Removal Operations Plan outlining the City's response to adverse winter weather conditions. This document outlines procedures and responsibilities for responding to winter weather emergencies

The goal of the Plan is to ensure a continuity of City services by reducing, if not eliminating, the occasions when the City government will have to close or reduce City services due to severe winter weather, particularly with regards to curbside trash collection. The chief objective for the City in all severe winter weather is to allow all Philadelphians to return to their normal daily activities as quickly as possible.

The Plan prioritizes route systems, indicates the appropriate distribution of resources, and identifies the duties and responsibilities of all personnel engaged in the response. Also, the Plan delineates necessary linkages with other City departments and agencies including but not limited to, the Office of Fleet Management and the Office of Emergency Management.

In addition, the Plan outlines areas requiring planning before, during, and after a winter weather storm, understanding that the severity of storms and the resulting conditions vary depending on many environmental factors, the plan allows for flexibility in the department's response. A matrix (see: Chart A, page 2) indicating the storm type with a brief description and resources required to respond to the emergency is provided. An in depth description of resources required to respond to each storm type is provided in subsequent sections of the plan.

Chart A - RESOURCE DEPLOYMENT WINTER 2011 / 2012

POST STORM FORECAST: ABOVE FREEZING TEMPERATURES

	STORM TYPE	HIGHWAY DIVISION	SANITATION DIVISION	NEIGHBORHOOD OPERATIONS	BRINE APPLICATION *	CONTRACTORS	LIFT SETS
1	SLEET / FREEZING RAIN	X			X		
2	1 - 3 INCHES OF SNOW	X		Partial clearing focusing on higher terrain (15 routes)	X		
3	3 - 6 INCHES OF SNOW	X		Partial clearing focusing on higher terrain	X	X	
4	ABOVE 6 INCHES OF SNOW	X	X	Partial clearing focusing on higher terrain	X	X	X
5	ABOVE 12 INCHES OF SNOW	X	X	Full Deployment (121 routes)	X	X	X

POST STORM FORECAST: BELOW FREEZING TEMPERATURES

	STORM TYPE	HIGHWAY DIVISION	SANITATION DIVISION	NEIGHBORHOOD OPERATIONS	BRINE APPLICATION *	CONTRACTORS	LIFT SETS
6	SLEET / FREEZING RAIN	X		Partial clearing focusing on higher terrain (15 routes)	X	X	
7	1 - 3 INCHES OF SNOW	X		Partial clearing focusing on higher terrain	X	X	
8	3 - 6 INCHES OF SNOW	X	X	Partial clearing focusing on higher terrain	X	X	
9	ABOVE 6 INCHES OF SNOW	X	X	Partial clearing focusing on higher terrain	X	X	X
10	ABOVE 12 INCHES OF SNOW	X	X	Full Deployment (121 routes)	X	X	X

* For pre-storm forecasts of rain to snow, brine will not be pre-applied. It will wash away.

Essential Staff

A. Purpose

The Streets Department is the primary response agency for the City in winter weather events such as snow and ice storms. As such, it is essential the Department maintain an adequate workforce in such emergencies.

B. Definitions

Weather Event – Includes all weather emergencies as declared by the Managing Director's Office, in consultation with the Mayor's Office, and any weather event that requires the mobilization of staff to maintain clear roadways.

***Essential Staff* – All Department employees and any employees assigned to Streets Department Operations during a weather event are deemed essential, and must report to work unless otherwise instructed by the appropriate supervisor. (see: Streets Order No. 100 – Change #6, page 5)**

C. Policy Statement

When a weather emergency occurs, all personnel, as determined essential by the appropriate supervisor, will be required to report to their assigned functions. Since there are significant differences in the size and severity of weather events, those employees required to report may vary from event to event. When possible, employees will be notified by the appropriate supervisor/manager as to their status prior to an event. However, since such notification is not feasible in all situations, employees should report for duty unless otherwise instructed.

During weather events all employees should monitor local news broadcasts for information, and should contact their work location to obtain direction on their work status.

Employees who are not instructed to report for duty during a weather event shall be authorized to utilize accrued vacation, comp, or AL leave during weather events. Employees not engaged in storm operations may be required to report to work, at the discretion of their supervisor, if the nature of their regular work assignments has become critical.

Employees may be assigned shift work as required by the event response plan.

D. Responsibilities

Streets Commissioner – Will serve as incident commander for snow and ice operations: supervise the logistical response of the Streets Department to winter storm events, and consult with the Managing Director and Deputy Mayor for Transportation regarding the declaration of a Snow Alert, or the declaration of a Snow Emergency and the activation of the Emergency Operations Center (EOC).

The decision to activate the EOC will be made by the Deputy Mayor for Transportation, the Deputy Mayor for Public Safety, and the Managing Director.

The Streets Commissioner will contact the Philadelphia School District and the Philadelphia Archdiocese regarding winter storm events.

Chief Highway Engineer – will develop and maintain a comprehensive snow plan that defines required staffing levels during weather events, and identifies specific job positions and functions. Direct all field operations during winter weather events.

Supervisors – will maintain a list of employees, and notify those employees assigned to snow operations as required by this policy. Supervisors are to grant leave time only as prescribed in this policy statement, or in the event of extraordinary circumstances.

Human Resource Division – will distribute the Essential Staff Policy to all employees prior to the winter season.

Residential Snow Coordinator –under direction of the Chief Highway Engineer, coordinate all residential snow activity.

Field Staff - All personnel, including all supporting departments, will be under the direction of the Streets Department personnel. In the interest of public safety, all personnel will report directly to Streets Department supervisors, and will not be released until directed by the Chief Highway Engineer. All are expected to be in place, on time, and ready to perform the duties for which they have been trained. Exceptions will be at the Streets Commissioner's and Managing Director's discretion.

Department of Streets
Office of the Commissioner
City of Philadelphia

October 2, 2006

Streets Order No. 100 – Change #6

Subject: Essential Staff Policy

General

The City of Philadelphia Streets Department's mission is to maintain clean and safe streets. The Department delivers a number of City services that are critical to maintaining public health and safety in our communities. These essential services include, but are not limited to, maintaining all traffic control devices and street lighting, the safe operation and maintenance of our roads and bridges, timely and consistent removal of trash and debris, and during winter weather events the plowing and salting of City streets. In the performance of such functions, it is essential that employees of the Department report to work on time when scheduled to provide services to the public. Since each division has varying needs, each division head is responsible for implementing staffing policies to effectively manage the number of employees required for duty on a mandatory basis, to insure that these essential services are delivered and that public health and safety are maintained in communities at all times.

To maintain the essential services identified above, employee leave may be cancelled as determined necessary by the division head. In addition, employees assigned to essential services are required to continue their assignments until properly relieved.

Winter Weather Events

During a winter weather event, all Streets Department employees are expected to report to work at their regularly scheduled time unless notified to report to a different location and/or at a different time. All employees with a valid Pennsylvania Commercial Driver's License (CDL) shall be considered essential during a winter weather event. Any employee holding a valid Pennsylvania Driver's License will be considered essential if notified of such by the Department. During an event, the times and location of reporting may vary significantly depending upon the nature of the event. The Department will notify, in a timely manner, essential employees whose starting time and location are modified. However, all employees should monitor weather conditions and are expected to report for duty during winter weather events or snow emergencies.

Since there are significant variations in the time, nature and intensity of events, the assignments of employees will vary. Some employees may be excused from reporting during an event. Those employees excluded from reporting shall be granted exemptions on a case by case basis provided their assigned function will not be required as dictated by the event, and if the Department Head, or designee, grants such exception.

Compliance

The Streets Department can not successfully deliver core services without the participation of its entire team. Due to the critical nature and importance of the work to be performed, an employee who does not work his or her assigned hours may be subject to disciplinary action up to and including discharge.

Goals

The Streets Department is the lead City agency for development and implementation of Philadelphia's snow and ice removal program. The goal of the program is to maintain safe egress for citizens throughout the duration of a storm and to return the City to normal operations as soon as possible after the event has ceased. The Department works closely with other City agencies to clear and make safe more than 2,500 miles of streets and roadways. This allows businesses and City agencies to maintain their normal operations during most events. Significant resources in the form of vehicles, materials, and staff are dedicated to the operation. As in similar emergency response plans, priority is given to major thoroughfares, our primary route system; however, the plan also addresses the needs of all streets within the City limits.

Sanitation serivce is a critical function for the citizens of Philadelphia, as such an important component of the plan is to maintain trash and recycling collections. To minimize the need to mobilize the Sanitation fleet, and the subsequent cessation of this service, the current plan augments the Streets Department's current resources with a reserve snow fighting fleet of vehicles from various departments. The Streets Department and supporting agencies are committed to provide the most efficient and effective snow and ice removal operations as possible and are continually evaluating new methods and processes.

Scope

The Roadway System

There is a network of approximately 2,575 miles of City and State roads within the boundaries of the City of Philadelphia. The responsibility for maintaining these roadways during winter storms is split among the Pennsylvania Department of Transportation (PennDOT), the Streets Department, and the Fairmount Park Commission. Of the 360 miles of state roads, PennDOT maintains 50 miles of limited access state highways, including I-95 and I-76. The remaining 310 miles are state roads that the State contracts with the City for snow and ice removal. This amounts to a total of 2,525 miles of City and State roads that the City maintains.

The Fairmount Park Commission removes snow and ice from 35 miles of Park roads, including Lincoln Drive, Kelly Drive and Martin Luther King Drive. Snow and ice removal on the remaining 2,490 miles of City streets is the responsibility of the Streets Department. The Highway Division maintains general responsibility for the organization and deployment of City forces during winter storm operations. In storms of large accumulation, the Sanitation Division will be mobilized to supplement the snow removal effort with vehicles outfitted with plows. Finally, private contractors supplement City forces in storms of significant magnitude.

In order to provide effective service during winter storms, the City's streets are divided into primary, secondary, and tertiary route systems. The primary route system encompasses 665 miles, including 110 miles of Snow Emergency Routes. The secondary route system includes another 700 miles of streets (both systems exclude the roadway maintained by the Fairmount Park Commission). The balance of City streets falls into the tertiary street system, covering approximately 1,125 miles of streets, 25 miles of which are private streets where the residents contract for private snow removal.

Route Priority

When a Snow Emergency is declared, Snow Emergency *and Primary* Routes become the first priority for snow removal efforts. *The Snow Emergency route System is clearly marked and consists of the major street network within the City.* Primary routes include major access roads through the central business district, and in and out of neighborhoods. The majority of primary routes encompass major and minor arterials, which serve the highest traffic volumes and distribute traffic throughout the City.

The secondary route system, which includes other streets that primarily convey traffic within neighborhoods, is the second focus of snow removal efforts. Most SEPTA routes fall within the boundaries of the primary and secondary route system.

The tertiary system includes most local residential streets. These streets are cleared based upon storm type as defined in this document.

The primary and secondary route systems are salted as soon as significant moisture has accumulated on roadways, thereby minimizing travel conditions that are potentially dangerous. Plowing begins when there is such a sufficient buildup of snow that salting is no longer effective. Plowing and salting will occur on local and residential streets as defined in this document. Reserve and active snow fighting equipment will be deployed when conditions warrant.

Residential streets that are inaccessible for snow and ice removal efforts due to illegally parked vehicles *can* not be treated until those vehicles are removed by the owner, or ticketed and subsequently towed.

Snow Emergency Declaration

The Mayor, Managing Director, Deputy Mayor for the Public Safety, Deputy Mayor for Transportation, Deputy Managing Director of Emergency Management (DMD-EM) and the Commissioner of Streets will determine if a declaration of a Snow Emergency is necessary.

A snow emergency declaration allows curb to curb plowing on designated snow emergency routes (see: Section 2 for Snow Emergency Route Listings). No parking is allowed on snow emergency routes during a snow emergency. The Philadelphia Parking Authority and Police Department are responsible for ticketing and towing vehicles parked on snow emergency routes.

Winter Weather Action Outline

Snow and ice removal operations are divided into three elements:

Planning

The Deputy Commissioner for Transportation, the Chief Highway Engineer and the Deputy Commissioner of Sanitation, under direction of the Streets Commissioner, are responsible for developing a comprehensive winter response plan. The planning activity will include all other support departments such as Fleet, Fairmount Park, Water and others. Planning will encompass continuing communications with the Office of Fleet Management to ensure that vehicles are properly maintained and outfitted for salting and snow removal. Further, the plan includes periodic reviews of the Snow and Ice Operations and the route structures.

During this phase, responsibilities are outlined, key positions are identified, and crews are trained. In addition, materials are requisitioned, received, and stockpiled; equipment is repaired and readied, and snow routes and route maps are reviewed and revised as needed.

Operations

The operations phase begins when the forecast is for temperatures consistent with snow, ice, sleet or freezing rain, with at least a 50 percent chance of precipitation. Highway Districts and the Residential Snow Coordinator are notified of the possibility of precipitation.

The Highway Division directs all snow removal efforts undertaken by the Streets Department. The Division operates under the supervision of the Chief Highway Engineer, and is divided into six regional Highway Districts, supervised by District Highway Engineers. District Highway Engineers and the Residential Snow Coordinator, in consultation with the Snow Headquarters, located at the Bridge Maintenance Office at Whitaker Avenue and Luzerne Street, direct winter weather operations.

The 6 Highway District yards are at the following locations:

Highway District 1 --	48th Street and Park side Avenue
Highway District 2 --	63rd Street and Essington Avenue
Highway District 3 --	22nd Street and York Street
Highway District 4 --	Stenton Avenue and Sylvania Street
Highway District 5 --	Whitaker Avenue and Luzerne Street
Highway District 6 --	State Road and Ashburner Street

The 6 Residential District Headquarters are at the following locations:

District 1 --	3033 63rd St. (63rd St. & Eastwick Ave.) - trailer
District 2 --	3033 63rd St. (63rd St. & Eastwick Ave.) - trailer
District 3 --	4501 G St. (G & Ramona Ave.)
District 4 --	4501 G St. (G & Ramona Ave.)
District 5 -- & Snow Headquarters	4040 Whitaker Ave. (Whitaker & Luzerne)
District 6 --	8401 State Road (State & Ashburner)

Resources are deployed as needs dictate, however, operations generally follow a set pattern. Once the storm arrives and precipitation is falling creating icy or snow-covered streets, salting operations begin. Salt trucks are deployed to cover the route structure. Salting will continue until it is no longer necessary or has become ineffective.

As snow continues to fall and build up on the streets, plows are deployed to the routes. Plowing will continue until the streets are passable and safe for use by vehicular traffic. At this time, individual complaints are addressed.

Cleanup and Assessment

Following each storm, the snow removal equipment is cleaned; spreaders and plows are removed and stored; personnel are released from snow duty; and final reports are submitted. At this time, after action reviews are undertaken.

Participating Organizations – Assignments & Responsibilities

Assignments and Reporting Structure

All personnel involved in winter weather operations will be under the direction of Streets Department. ***Once deployed to snow operations, they will be relieved from their respective daily assignments and will not be released, except for emergency, to their respective operating departments without approval of Streets Department snow headquarters.***

Streets Department

The Streets Commissioner is the incident commander for all winter weather operations The Highway Division coordinates the citywide program for snow removal from the City street system and is directly responsible for salting and plowing the primary, secondary, and tertiary route structures. In addition, the Chief Highway Engineer is responsible for the supervision and organization of all snow removal efforts. With the approval of the Streets Commissioner, the Chief Highway Engineer is responsible for mobilizing necessary plowing and lifting operations. These operations may require the cessation of normal Sanitation Division operations under certain conditions, and the conversion of Sanitation vehicles for plow operations. However, the Department's goal is to minimize the impact on Sanitation operations and avoid the delay or interruption of curbside collection services. In addition, private contractors may be called in to supplement the efforts as conditions dictate. Sanitation personnel, Highway personnel and contractors are responsible for plowing under the direction of the Highway Division.

Fairmount Park Commission

The Fairmount Park Commission maintains a portion of the roadways in and around the Park system, the Benjamin Franklin Parkway and some residential grids.

Office of Fleet Management

The Office of Fleet Management is responsible for the maintenance and repair of all vehicles in the City's fleet is responsible for opening fuel sites (see: Fuel Site Locations Table) during winter weather events, providing and installing chains, and where necessary, assisting with the installation of plows, with the exception of the Sanitation Division, which installs chains and plows on compactors.

Fuel Site Locations

LOCATION	SITE #	DEPARTMENT	FUEL TYPE	NORMAL DAYS AND HOURS OF OPERATION**
24TH & WOLF	2	POLICE 1 dist.	NO LEAD	7DAYS-24 HOURS
11TH & WHARTON	3	POLICE 3&4dist.	NO LEAD	7DAYS-24 HOURS
R 8200 ENTERPRISE	5	WATER	DIESEL AND NO LEAD	RESTRICTED (GATE) MON-FRI 7:30AM - 3PM
INTERNATIONAL AIRPORT	6	COMMERCE	DIESEL AND NO LEAD	MON-FRI 8:00 AM -3:30P M
51ST & GRAYS	7	STREETS	DIESEL	MON-FRI 7:00 AM - 3:30 PM
55TH & PINE	8	POLICE 18 dist.	NO LEAD	7DAYS-24 HOURS
61ST & THOMPSON	9	POLICE 19 dist.	NO LEAD	7DAYS-24 HOURS
25TH & TASKER	11	SCHOOL	DIESEL AND NO LEAD	MON-FRI 7:00 AM - 3:30 PM
GIRARD & MONTGOMERY	13	POLICE 26 dist.	NO LEAD	7DAYS-24 HOURS
21ST & PENNSYLVANIA	14	POLICE 9 dist.	NO LEAD	7DAYS-24 HOURS
26TH & GLENWOOD	15	STREETS	DIESEL AND NO LEAD	MON-FRI 7:00 AM - 10:00 PM
7800 PENROSE	17	WATER	DIESEL AND NO LEAD	MON-FRI 6:00 AM - 6:00 PM
R 3900 RICHMOND	18	WATER	DIESEL AND NO LEAD	RESTRICTED (GATE) MON-FRI 7:00AM - 3PM
DELAWARE & WHEATSHEAF	19	STREETS	DIESEL AND NO LEAD	MON-FRI 6:00 AM - 5:00 PM
100 E. HUNTING PARK	21	FLEET	DIESEL AND NO LEAD	7DAYS-24 HOURS
29TH & CAMBRIA	23	WATER	DIESEL AND NO LEAD	MON-FRI 8:00 AM - 4:30 PM
22ND & HUNTING PARK	24	POLICE 39 dist.	NO LEAD	7DAYS-24 HOURS
HARBINSON & LEVICK	25	POLICE 15 dist.	NO LEAD	7DAYS-24 HOURS
BROAD & CHAMPLOST	26	POLICE 35 dist.	NO LEAD	7DAYS-24 HOURS
GERMANTOWN & HAINES	28	POLICE 14 dist.	NO LEAD	7DAYS-24 HOURS
RIDGE & CINNAMINSON	29	POLICE 5 dist.	NO LEAD	7DAYS-24 HOURS
DOMINO & UMBRIA	31	STREETS	DIESEL AND NO LEAD	MON-FRI 7:00 AM - 11:00 PM
STATE & ASHBURNER	32	FLEET	DIESEL AND NO LEAD	M0N-FRI 7:00 AM - 11:00 PM
ACADEMY & REDLION	33	POLICE 8 dist.	NO LEAD	7DAYS-24 HOURS
BUSTLETON & BOWLER	34	POLICE 7 dist.	NO LEAD	7DAYS-24 HOURS
17TH & MONTGOMERY	35	POLICE 22&23dist.	NO LEAD	7DAYS-24 HOURS
GERMANTOWN & CARPENTER	38	FIRE	DIESEL AND NO LEAD	7DAYS-24 HOURS
3RD & SPRING GARDEN	39	FIRE	NO LEAD	7 DAYS-24 HOURS
FOX & ABBOTTSFORD	40	WATER	DIESEL AND NO LEAD	MON-FRI. 7:00-AM - 5:00 PM
4040 WHITAKER	41	STREETS	DIESEL AND NO LEAD	MON-FRI 6:00AM - 11:30 PM

	28TH & THOMPSON	43	FIRE eng. 34	DIESEL	7 DAYS-24 HOURS
	COTTMAN & LORETTA	44	FIRE eng. 71	DIESEL	7 DAYS-24 HOURS
	8205 ROOSEVELT BLVD	45	FIRE eng. 18	DIESEL	7 DAYS-24 HOURS
	711 S BROAD	46	FIRE eng. 01	DIESEL	7 DAYS-24 HOURS
	4TH & SNYDER	47	FIRE eng. 53	DIESEL	7 DAYS-24 HOURS
	CHAMONIUX & FORD ROAD	48	FAIRMOUNT PARK	DIESEL AND NO LEAD	MON-FRI 7:00 AM - 3:30 PM
	63RD & LANCASTER	49	FIRE eng. 54	DIESEL	7 DAYS-24 HOURS
	48TH & PARKSIDE	50	STREETS	DIESEL	MON-FRI 7:00 AM - 6:00 PM
	10TH & CHERRY	51	FIRE eng. 20	DIESEL	7 DAYS-24 HOURS
	4TH & GIRARD	52	FIRE eng. 29	DIESEL	7 DAYS-24 HOURS
	82ND & TINICUM	53	FIRE eng. 69	DIESEL	7 DAYS-24 HOURS
	52ND & WILLOWS	54	FIRE eng. 68	DIESEL	7 DAYS-24 HOURS
	FOULKROD & DARRAH	56	FIRE eng. 14	DIESEL	7 DAYS-24 HOURS
	BUSTLETON & BOWLER	57	FIRE eng. 62	DIESEL	7 DAYS-24 HOURS
	812 HENDRIX	58	FIRE eng. 58	DIESEL	7 DAYS-24 HOURS
	CHELTEN & BAYTON	59	FIRE eng. 19	DIESEL	7 DAYS-24 HOURS
	3031 GRAYS FERRY	60	FIRE eng. 47	DIESEL	7 DAYS-24 HOURS
	BELGRADE & ONTARIO	61	FIRE eng. 28	DIESEL	7 DAYS-24 HOURS
	13TH & SHUNK	62	FIRE eng. 49	DIESEL	7 DAYS-24 HOURS
	24TH & RITNER	65	FIRE eng. 60	DIESEL	7 DAYS-24 HOURS
R	NORTHEAST AIRPORT	67	COMMERCE	DIESEL	RESTRICTED MON-FRI. 7:30 AM - 3:30 PM
	ACADEMY & COMLY	68	FIRE eng. 22	DIESEL	7 DAYS-24 HOURS
	RIDGE & CINNAMINSON	69	FIRE eng. 39	DIESEL	7 DAYS-24 HOURS
R	7790 DUNGAN RD	70	POLICE	NO LEAD	RESTRICTED
	PARK & CAMBRIA	71	FIRE eng. 50	DIESEL	7 DAYS-24 HOURS
	5931 OLD YORK ROAD	72	FIRE eng. 51	DIESEL	7 DAYS-24 HOURS
	43RD & MARKET	73	FIRE eng. 05	DIESEL	7 DAYS-24 HOURS
	BELGRADE & HUNTINGDON	74	FIRE eng. 06	DIESEL	7 DAYS-24 HOURS
	5332 RISING SUN AVE	75	FIRE eng. 61	DIESEL	7 DAYS-24 HOURS
R	BYBERRY & WOODHAVEN	95	SCHOOL	DIESEL	RESTRICTED
R	BROAD & LEHIGH	96	SCHOOL	DIESEL	RESTRICTED
R	OGONTZ & OLNEY	97	SCHOOL	DIESEL	RESTRICTED
R	63RD & PASSYUNK	98	SCHOOL	DIESEL	RESTRICTED
	3033 S 63RD ST	80	STREETS	DIESEL	7 DAYS-24 HOURS

TOTAL NUMBER OF SITES IS SIXTY FOUR (64)

"R" = RESTRICTED TO VEHICLES ASSIGNED TO THE DEPARTMENT ONLY !!!!

** NORMAL HOURS OF OPERATION ARE SUBJECT TO CHANGE IN AN EMERGENCY

site list #11

revised 03/18/10

Managing Director's Office

The Managing Director, in consultation with the Mayor, has the authority to declare a snow emergency and if necessary close City offices. This plan should limit, if not eliminate, the need to enforce any closures during snow events.

When a snow emergency is declared the Managing Director's Office is responsible for coordinating the citywide response to the emergency. Streets Department personnel, along with personnel from other departments, participate in the staffing of the Emergency Operations Center, located at 3rd and Spring Garden Streets in the Fire Administration Building, and in other coordinated efforts as necessary.

Police Department

Police Department support is required to support existing parking regulations. Police will ticket vehicles identified as impeding snow removal efforts including, but not limited to, vehicles parked on corner radii and double-parked vehicles. Police officers will stop all private entities placing snow in previously cleared streets. During declared snow emergencies, Police support will ensure snow emergency routes are clear.

Other City Departments

The tertiary route structure is maintained by the following City Departments under the direction of the Residential Snow Coordinator.

Streets Department
Water Department
Public Property
Recreation
Fairmount Park
Managing Director's Office
Licenses & Inspections
Prison's Department

Snow Fighting Equipment Inventory

Streets Department 2011/2012 Fleet Summary

Listed below is the Streets Department's fleet inventory for snow operations. Due to the age of the fleet and the challenges facing the Office of Fleet Management, we have concerns about the reliability of the equipment. Winter operations place a great strain on aging vehicles, and equipment availability will have a significant impact on the Department's ability to effectively respond to weather events. With projected downtime, the City will be challenged to field a full complement of equipment to cover all routes.

The result of insufficient equipment will be slow response time, particularly on residential streets. To address this issue, in part, the Streets Department has lease agreements to provide supplemental equipment for both large and residential streets. The Department also continues to work closely with the Managing Director's Office to identify interdepartmental equipment that can supplement the inventory.

All departments are required to provide a full complement of necessary vehicles for snow operations for clearing the roadway system.

Streets Dept. Snow Vehicles	
Highway Salt	88
Loaders, Highway, Backhoe	21
Loaders, Highway, Articulated	13
Compactors	248
Total:	370

Departmental Snow Vehicles	
Assigned to Residential	106
Brine, MDO (CLIP)	2
Brine, Highway	4
Total:	112

Other Departments (not assigned to Residential):	70
Total Snow Equipment Inventory:	**552**

Route Designations and Treatment

The primary and secondary route systems are divided into 148 specific routes. Salting and/or plowing of these routes will continue until the routes are deemed passable and safe for vehicular traffic.

The tertiary street system is covered in a grid pattern determined by each District Highway Engineer and the Residential Snow Coordinator. These streets are salted/plowed as storm type dictates (see Chart A, page 2). Grids are assigned and the plows attempt to clear all streets in that grid. Streets that are blocked by parked cars or other obstructions will not be treated until the obstruction is removed. Double-parked vehicles or vehicles parked on corner radii will be ticketed and towed by Police to permit snow removal efforts.

All tertiary grids will not be treated during every storm. The City's topography will primarily dictate the specific areas that will be treated during every storm type. Storm severity will dictate the expansion of treatment in the tertiary network. Regional commerce, public health, mass transit issues, and time of year will guide these decisions.

Snow and ice on the tertiary street system will be cleared to provide one passable lane for each direction that the specific streets can accommodate. Residential efforts are designed to allow access to the primary and secondary route system and mass transit.

In the event of major storm accumulations, specific business corridors within the Highway Districts are targeted for snow removal upon completion of primary, secondary and tertiary routes.

Use of Salt and Other De-icing Materials

Salt (sodium chloride) or a brine solution of the same chemical, or in extreme situations, sand or other abrasives, will be spread on Philadelphia's roadway network to ensure safety for the traveling public.

Salt brine is a liquid containing a 23 per cent sodium chloride solution. Applied at rates of 30 gallons per lane mile, this treatment should effectively melt the first 2 inches of snow before re-application is necessary. The treatment can also be applied before storms begin. The Department will utilize this program in the Northwest and Northeast sections of the city, areas that typically have greater accumulations. It should provide greater service delivery at a reduced cost, especially in the higher elevation areas of the City.

Storm Types and Response

There are ten (10) basic storm types that require different responses as outlined below.

<u>POST STORM FORECAST: Above Freezing Temperatures</u>

Storm Type		Deployment of Fleet
1	**Sleet/Freezing Rain**	City salt truck deployment and primary and secondary routes only.
2	**1 to 3 inches of snow**	City salt truck deployment on primary and secondary routes. Partial residential deployment in limited areas of higher elevation. If cold temperatures are forecast, limited plowing may occur. (No contractors).
3	**3 to 6 inches of snow**	City and contractor salt truck deployment on primary and secondary routes. Partial residential deployment in limited areas of higher elevation. A snow lifting will be deployed in the central business district.
4	**Above 6 inches of snow**	As above, plus the declaration of a "snow emergency." Sanitation compactors will plow the primary and secondary route system. Additional contractor equipment will be deployed to clear intersections and the lifting operation will be expanded to outlying commercial corridors.
5	**Above 12 inches of Snow**	As above, plus a full residential neighborhood operation will be deployed across the City.

<u>POST STORM FORECAST: Borderline and Below Freezing Temperatures</u>

Storm Type		Deployment of Fleet
6	**Sleet/Freezing Rain**	City salt trucks deployed on primary and secondary routes only. Partial residential deployment in limited areas of higher elevation.
7	**1 to 3 inches of snow**	City salt truck deployment on primary and secondary routes. Salting operation for tertiary streets may occur once the primary and secondary network is complete. This operation will be performed by primary and secondary route vehicles that can navigate smaller streets. Partial residential deployment in limited areas of higher elevation. If cold temperatures are forecast, limited plowing may occur.
8	**3 to 6 inches of snow**	As above, plus a snow lifting will be deployed in the central business district.
9	**Above 6 inches of Snow**	As above, plus the declaration of a snow emergency. Sanitation compactors will plow the primary and secondary route system. Additional contractor vehicles will help clear snow and additional lifting operations may be deployed in neighborhoods with smaller tertiary streets upon completion of outlying commercial corridors.
10	**Above 12 inches of Snow**	As above, plus a full residential neighborhood operation will be deployed across the City. Additional contractor vehicles will be utilized.

Weather Forecasting Services

The City of Philadelphia will, in addition to monitoring local national weather forecasts for our metropolitan region and maintaining contact with local media forecasts, contract with independent private weather service contractors to ensure that forecasts are made specific to our needs. The city recognizes that there are unique geographic differences within our boundaries, and expects detail in our contracted services to assist in deployment decisions.

Storm Operations

Storm Conditions

Philadelphia's geographic position contributes substantially to the forecasting uncertainties that it faces. Due to our location, with the mountains to our west and the Atlantic Ocean to our east, forecasters usually must watch storm systems for as long as possible before determining if they are going to hit Philadelphia or be deflected to the east or west. In addition, there are literally thousands of types of winter storms - each storm combines a number of factors that lends to its uniqueness.

The Streets Department must be prepared to deal with these planning uncertainties, as well as uncertainties that occur during the storm. For example, the Blizzard of March 1993 was originally forecasted as a 3" storm. It mushroomed into a major storm of upwards of 12 inches, including sleet and freezing rain. The unexpected change in forecast made it more difficult for the Streets Department to mobilize the most effective response to react to a storm of such magnitude.

There are several other variables that affect the Department's timely response to storm events. These variables are briefly outlined below. Each of the variables listed may have a significant impact on the Department's response. Proper planning and the development of appropriate procedures, combined with some level of operational flexibility is a priority to develop the most appropriate, effective response possible, given the existing conditions.

Storms may fail to materialize at the forecasted hour. Conversely, storms may stall, thereby increasing the duration of the event and the amount of accumulation. These factors increase the expense associated with responding to a storm and the chance of work force fatigue.

During a storm, the type of precipitation may change. Different types of precipitation require different responses. For example, plowing may be hampered as ice accumulates on the top of the snow, creating a hard crust.

The time of the year also impacts the Department's response to storms. In the late fall and early spring months when the temperature is warmer, it may be possible to fight a storm of four to five inch accumulation with salt alone. In colder months, plowing would be necessary.

If two or more severe storms occur in rapid succession, the Department's response may be affected. Response to the initial event may be expanded in anticipation of the subsequent storm.

Low temperatures increase the amount of salt necessary to melt off precipitation.

Winds can create havoc during storms. Although light breezes help to dry roadways following storms, stronger winds may hamper snow fighting efforts by drifting snow across cleared roadways.

Significant elevation differences exist between the southern portion of the City and the areas in the northeast and northwest. In the northeast and northwest, snow frequently accumulates to greater depths.

The Department's Snow and Ice Operations Plan presents a flexible framework providing effective response to all types of storms.

It is the goal of the City of Philadelphia that for the majority of the winter weather events that typically affect this city, that we will have, depending on storm type and response protocol, all routes identified in these response protocols clear within 24 hours of the fall of the last flake. Storms outside of the protocol upper limits may lead to significant adjustments in this time line.

Storm Types 1, 2 & 3

Deployment

Streets Department

Chief Highway Engineer

- Notifies District Highway Engineers of mobilization time
- Notifies Residential Snow Coordinator of mobilization time
- Notifies Highway Division Snow Headquarters, located at the Bridge Maintenance Yard – 4010 Whitaker Avenue, personnel to report at specified deployment time
- Notifies Office of Fleet Management of mobilization decision

Highway District Engineers
- Notify Maintenance Supervisors to assemble salting staff
- Notify spotters to report at specified deployment time

Highway District Maintenance Supervisors
- Notify personnel to report at specified deployment time

Residential Snow Coordinator
- Notifies personnel identified in Sections 4.6 & 4.8 of partial residential deployment

Office of Fleet Management
- Will open garages for Fleet maintenance support and fueling sites for duration of event

Fairmount Park Commission
- Responsible to activate operation for salting Park road system and Benjamin Franklin Parkway

<u>Operations</u>

Highway Districts

Spotters monitor street conditions. Salt trucks are loaded and positioned at the start of an assigned route. As street surfaces accumulate sufficient moisture for effective salting, spotters notify Maintenance Supervisors to begin salting activity. Spotters will provide route condition reports to their district headquarters on two (2) hour intervals. District headquarters will compile this data and forward to Highway Division Snow Headquarters.

Residential Districts

Spotters monitor street conditions. Trucks are positioned at the start of an assigned route. Treatment of the street surface begins upon notification from the Residential Snow Coordinator. Spotters will provide route condition reports to their district headquarters on two (2) hour intervals. District headquarters will compile this data and forward it to the Residential Snow Coordinator, who in turn summarizes the information and forwards it to Highway Division headquarters.

Highway Division Snow Headquarters

Snow Headquarters will:
- Inform Highway Districts of weather forecasts
- Monitor, through Highway Districts, the status of all salting operations

- Maintain a log of all service calls for snow and ice related activities
- Monitor weather conditions and forecasts. Analyze the data and forward it to the appropriate parties
- Analyze reports from the field and make changes to future operations where required
- Forward emergency calls from Police and Fire Departments to Highway Districts
- Maintain Snow Route Status Report
- Order commodities as required to maintain an adequate supply at all Districts

Office of Fleet Management

- Repair vehicles as necessary
- Report vehicle down time to Snow Headquarters

Fairmount Park Commission

- Treat Park road system and Benjamin Franklin Parkway as required by conditions

<u>Cessation of Operations</u>

Highway Districts

- District Engineers release spotters to regularly assigned duties. District Engineers collect route inspection information.

Residential Districts

- Release spotters and drivers to their respective departments. Forward all reports to Residential Snow Coordinator who, in turn, forwards them to Highway Division Snow Headquarters. Supervise the cleaning and redeployment of residential snow equipment.

Highway Division Snow Headquarters

- Compile final report on personnel, equipment utilized and material usage and forward to Streets Commissioner.
- Estimate cost of event

Office of Fleet Management

- Compile final report on equipment costs and return to normal Fleet repair activities

Fairmount Park Commission
- Compile final report on personnel and equipment utilized
- Return to normal Park maintenance activities

Storm Types 6, 7, & 8

Same as response 1, 2 & 3, except the following additions:

Deployment

Streets Department

Chief Highway Engineer
- Notifies District Highway Engineers and Residential Snow Coordinator of decision to salt/plow tertiary system (Note: Storm type 6 only, partial to full residential deployment depending on event specifics).
- Will advise everyone for potential of multiple shifts

Residential Snow Coordinator
- Notifies personnel identified in Sections 4.6 & 4.8 of partial to full residential deployment

Storm Types 4, 5, 9 & 10

Deployment

Streets Department

Chief Highway Engineer
- Notifies District Highway Engineers of initial mobilization time for salting operations and subsequent mobilization time for plowing operation. Advises district that Sanitation, contractor equipment and residential roadway treatment will occur
- Notifies Highway Division Snow Headquarters, personnel to report at specified deployment time.
- Notifies Assistant Chief Highway Engineer (Construction) to order contractor support equipment at specified time
- Notifies Residential Snow Coordinator of mobilization time
- Notifies Deputy Commissioner for Sanitation for full deployment of Sanitation resources, both for plowing primary and secondary routes
- Notifies Office of Fleet Management of mobilization decisions

- If applicable, orders snow melters and support equipment (See Snow Melting Section)
- Advises all involved of anticipated number of shifts

Assistant Chief Highway Engineer (Construction)

- Contact private sector vendors and orders equipment for each highway district. Assistant Chief Highway Engineer advises of deployment time and likelihood of deployment duration
- Advises contractors of lifting set (if any) requirements

Highway District Engineers

- Notify Maintenance Supervisors to deploy their staff at specified time
- Notify spotters to report at specified time
- Notify inspection staff for contracted equipment to report at specified time
- Are advised that residential street system snow removal has been activated

Residential Snow Coordinator

- Notifies personnel identified in Sections 4.6 & 4.8 of residential deployment

Highway District Maintenance Supervisors

- Notify personnel to report at specified deployment time

Streets Department - Sanitation Division

Deputy Commissioner-Sanitation

- Mobilizes plows for primary/secondary route system at six Sanitation yards at specified time.
- Notify Chief of Operations to designate a Sanitation representative for Highway Division Snow Headquarters
- Notify division management of deployment times and subsequent suspension of curbside collections

Office of Fleet Management

- Will deploy sufficient resources to support fleet maintenance activities for duration of winter weather event

- Will open fuel sites for duration of event
- Will support Sanitation Division of Streets Department during plow and chain mounting for Sanitation compactors and support equipment

Fairmount Park Commission

- Responsible to activate operations for salting/plowing road system and Benjamin Franklin Parkway

Office of the Managing Director

- Will issue declaration of snow emergency
- Will activate the city's Emergency Operations Center located at the Fire Administration Building 3rd and Spring Garden Streets.

Operations

Streets Department

Highway Division

- Spotters monitor street conditions
- District Highway Engineers assign inspection staff to contract salting vehicles
- Salt trucks are loaded & positioned at the start of an assigned route. As street conditions accumulate sufficient moisture for salt to be effective, spotters notify districts to begin salting operation. Salt will be applied prior to plowing operations or until no longer effective.
- Plowing operations will begin at 2" accumulation and continue until routes are clear
- Chief Highway Engineer directs Residential Snow Coordinator to begin tertiary street plowing/salting when needed.
- Highway District Engineers direct Sanitation plowing commencement
- All spotters & inspectors will provide route condition reports on two (2) hour intervals. Each district headquarters will compile this information & forward to Highway Division Snow Headquarters
- Highway District Engineers will insure that all routes are salted upon completion of plowing efforts
- Highway District Engineers will direct snow lifting/melting operations within their respective district.

Residential Snow Districts

- Spotters monitor street conditions. Trucks are positioned at the start of an assigned route. Treatment of the street surface begins upon notification from the Residential Snow Coordinator. Spotters will provide route condition reports to their district headquarters on two (2) hour intervals. District headquarters will compile this data and forward it to the Residential Snow Coordinator, who in turn summarizes the information and forwards it to Highway Division Snow Headquarters.

Sanitation Division

- Sanitation Assistant Chiefs of Operation and District Managers direct Sanitation Operations and report progress to Highway District Engineers.
- At the Highway District Engineers direction, they will adjust on-street operations for specified route assignments
- Progress reports are to be provided at two (2) hour intervals to Highway District Sanitation Coordinator
- Managers will insure that all vehicles are manned at shift change. Personnel will not be released without replacement

Highway Division Snow Headquarters

Snow Headquarters will:

- Inform Highway Districts of weather forecasts
- Monitor, through Highway Districts, the status of all salting operations
- Maintain a log of all service calls for snow and ice related activities
- Monitor weather conditions & forecasts. Analyze the data & forward it to the appropriate parties
- Analyze reports from the field & make changes to future operations where required
- Forward emergency calls from Police and Fire Departments to Highway Districts
- Maintain Snow Route Status Report
- Order commodities as required to maintain an adequate supply at all Districts
- Snow Headquarters will provide Emergency Operations Center (EOC) reports every two hours detailing manpower and equipment deployed, route conditions, weather updates and identified trouble spots

Office of Fleet Management (OFM)

- OFM will provide necessary manpower & garage space as need to support storm type

- OFM will supply vehicle status reports to Highway Division Snow Headquarters, the Managing Director's Office and Emergency Operations Center on an hourly basis

Fairmount Park Commission
- Treat Park road system and Benjamin Franklin Parkway as required by conditions

Cessation of Operations

Streets Department

Highway Division

- Highway District Engineers will release all equipment to their respective departments for regularly assigned duties. Highway District Engineers will release all personnel to their regularly assigned duties.
- District Maintenance Supervisors will insure salt truck operators return unused material to stockpiles and wash truck beds, augers and spinners.
- Highway District Engineers will compile final contractor billing information
- All storm related information on personnel, equipment deployed, contract support & material used will be compiled by each district and forwarded to Snow Headquarters.

Residential Districts

- Release spotters and drivers to their respective departments. Forward all reports to Residential Snow Coordinator who in turn forwards them to Highway Division Snow Headquarters. Supervise the cleaning and redeployment of residential snow equipment.

Sanitation Division

- Sanitation Division will dismount plows, remove chains and ready fleet for return to normal collection/cleaning activities

Highway Division Snow Headquarters

- Compile final report on all elements deployed for specific storm type
- Forward report to Streets Commissioner and EOC

- Compile cost estimate for event
- Direct highway districts post storm clean up deployment

Office of Fleet Management (OFM)

- OFM to compile final report on equipment repair costs and vehicle status and return to normal fleet repair activities

Fairmount Park Commission

- Compile final report on personnel and equipment utilized
- Return to normal Park maintenance activities

Office of the Managing Director

- End snow emergency declaration and close EOC

Snow Removal Support Personnel Assignments

The following functions will be performed by Streets Department personnel not directly involved with the operation of snow fighting equipment:

Bridge Maintenance Unit

The Bridge Maintenance Unit will remove snow on the sidewalks of the City's bridges as well as removing snow from the 17 stairways in Manayunk. Highway maintenance district yard personnel and Sanitation area personnel will be called to assist with this effort as dictated by storm type.

Highway maintenance district personnel and Sanitation area personnel

Highway maintenance district personnel and Sanitation area personnel, as dictated by storm type, will be provided hand snow removal equipment and will clear snow from curb ramps and open city inlets to allow melting snow access to the drainage system. Snow will also be cleared from areas surrounding fire hydrants.

All City Departments

All City departments will be responsible for removing snow on the sidewalks abutting their facilities.

Highway Division Support Personnel

Highway Division support personnel will continue snow removal support functions as part of their daily work activities after Sanitation workers return to regular trash collection. Snow removal equipment will supplement these efforts as it becomes available.

PWD Support (Philadelphia Water Department)

During major events, PWD crews will be dispatched to clear snow at inlets to prevent intersection flooding.

Police Department Support

The Philadelphia Police Department will enforce existing ordinance/regulations prohibiting the discharge of snow back onto city streets. Private plow contractors caught in the act of plowing snow from private property onto city streets risk fine and/or forfeiture of equipment.

SWEEP Support (Streets & Walkways Education and Enforcement Program)

SWEEP Officers will, beginning in commercial corridors, enforce sidewalk clearance - Ordinance 10-719. Upon completion, enforcement will expand to schools, hospitals, etc., culminating in residential inspection.

Public Relations and Education

PPA and Major Media Notification

PPA will use the local major media and community newspapers to ensure that notification of the Department's plan is timely as well as effective.

Key communications tools include:

- Issuing of press releases/advisories
- Posting information on Streets Department's website including list of FAQs, snow tips and status of departmental services as appropriate. Suggested snow tips will include:
    - "Park car as far away from the corner as possible. Cars parked too close to the corner limit the turning radius of snow equipment."
    - "Obstructions, such as, illegally parked cars affect our ability to plow effectively."
    - For effective snow and ice management partnership, City and citizens need to work together.
- Posting information on community websites/list serves
- Posting information on the City's Government Access Cable Channel 64
- Utilizing OIT to distribute announcements via Lotus Notes email

Notification System

The Department will again utilize a voice mail messaging system to reach essential personnel during snow alerts. The system is designed to contact employees on each designated shift and to confirm receipt of the voice mail message. The system will not only reduce the time spent making individual telephone calls, it will also enable supervisors to alert essential personnel, in a timely manner, to report for work.

When appropriate, messages will also be distributed to inform residents on the status of services.

311/Streets Department Communication Protocols for Snow Events

During storm events, all snow related inquiries will be accepted by 311, however, formal service requests will not be taken until 311 is notified by the Chief Highway Engineer that the event is officially declared over. During the event, 311 will advise the public of the level of deployment and let citizens know if their street is to be serviced depending on the level of service as defined by "SnowCAT". After the event is ended, 311 will resume taking complaints from the public and the requests will be forwarded to the Streets Department for response within 24 hours.

Customer Affairs

Residents are also able to call the Streets Department's Customer Affairs Unit at 215-686-5560 for information. When appropriate, "updated" advisories regarding the status of services will be pre-recorded on the Customer Affairs' voice mail system.

Responding to Citizens' Complaints

- Delegation – Service requests are, as always, delegated from the centralized system to operational units for appropriate action.
- Tabulation – Information can be gathered from the Customer Affairs Unit's computerized system to provide a post-storm picture of complaints.
- Planning – This information can be further utilized to plan appropriately and change plans for future snow events.

School Closure Policy

When inclement weather is present or anticipated that may impact schools opening or closing early, Streets, SDP, MDO, and MDO/OEM will conference to determine appropriate action relating to storm conditions.

Post Season Survey/Spring Maintenance

Beginning February 15 of each year and continuing through April 15th, bi-weekly, weather permitting, sweeps will be made of Philadelphia road network, identifying defects for the upcoming Spring repair season. Streets Department personnel, as well as those involved with residential inspection, will perform this task.

Operational Guidelines - Snow Fighting in Philadelphia

Material Resources

Salt inventory is dictated by several factors: storage capacity (including salt domes at secure, satellite locations throughout the city), availability of product, and environmental concerns. A salt dome is located at each of the six Highway District Yards

The Department orders salt as the inventory is depleted to maintain maximum capacity throughout the winter, as the budget allows. Initial salt orders are placed against purchase orders cut from a blanket purchase order under the Commonwealth of Pennsylvania's contract.

Subsequent product is obtained from the City of Philadelphia's citywide rock salt contract. This contract provides for a primary and secondary vendor, and has language that includes the product specification, testing procedures, delivery locations, quantities and requirements, weight certifications, and liquidated damages. This contract is normally utilized only after the Streets Department has fulfilled its obligation under State contract requirements.

Requisitioning

The District Supervisor keeps an up-to-date inventory of the materials used for snow and ice removal during the winter months. S/he notifies the Administrative Officer (AO) as orders need to be placed. An overall salt inventory for all six Districts is maintained by the AO.

At the end of the winter season, the Chief Highway Engineer, the Director of Planning & Analysis, and the Budget Officer review the remaining salt inventory to determine the necessary amount of salt needed to meet the following year's requirements. Accordingly, the State is notified of our estimated quantities, as is the Procurement Department for use in developing contracts for the following year. For the 2003, 2004, 2005 and 2006 seasons, the Streets Department had an average salt usage of 46,722 tons.

Salting Policy

The Highway Division endeavors to maximize every application of de icing salt in order to maintain the safest roads possible in the most economical way while protecting the environment. The policy includes:

Personnel Training: The Streets Department is committed to providing continuing personnel training to ensure that staff is well equipped to perform their jobs effectively.

Equipment: The Streets Department and Office of Fleet Management should update and replace equipment in an economically responsible manner.

Calibration of Spreaders: Regardless of whether automatic or manual controls are used, they should be calibrated before the snow season starts. Poorly maintained and uncalibrated controls are responsible for excessive salt use.

Use of Automatic Controls: The use of automatic controls is recommended for spreaders to make sure the correct amount of salt is being spread at all times.

Adequate Covered Storage: Storage facilities are vital to any winter operation. They must have sufficient capacity and good cover preferably under roof. Stock piles should be covered to prevent loss of materials and to protect the environment

Proper maintenance procedures should be followed around storage areas. Outside stockpiles should be properly shaped and should be on impermeable pads. There must also be proper drainage to keep the salt dry and protect the surrounding area. A method for disposal or retention of the leached salt should be in place.

Safeguarding the Environment: Salt and de-icing materials should be used in a manner that safeguards the environment. If misused, de-icing can pollute. If improperly used or stored it can get into wells or ground water. Excessive salt use can be damaging to certain plants and trees when runoff leaves sodium chloride in the soil.

Application: The application of salt alone depends on the type of precipitation, temperature, and snowfall intensity. When there is adequate frozen precipitation on the pavement (non plowable depth), and the temperature is above 25 degrees Fahrenheit, straight salt is optimized. Below 25 degrees Fahrenheit, a mixture of salt and abrasives will be used. The initial treatment of the roadway before plowing operations begin is to reduce ice or snow bonding to the pavement. Salt application rates range from 200 to 800 pounds per two-lane mile, depending on the storm conditions. Salt can be applied in a windrow or full width, which is sometimes necessary. Brine, formed by salt and water, will run to other parts of the road and be spread by traffic. Plowing operations should be timed to allow maximum melting. Salt reaction time is usually 20 to 30 minutes. (Reaction time increases as temperature decreases.)

Equipment Resources

Certain specialized equipment is required to support the snow and ice removal plan; specifically, snow plows, salt spreaders, and snow loaders. Much of this equipment is available within the Department. Additional equipment is obtained through contract and is provided by other operating departments and the City's reserve fleet.

Spreaders: Spreaders include tailgate and V-box spreaders are used to apply salt or sand, which are the primary de-icing chemicals used for fighting winter storms. Application rates are set for various conditions following Salt Institute guidelines.

Plows: Plows are mounted on Highway Division dump trucks and Sanitation Division compactors of the Streets Department, as well as equipment in supporting departments for residential plowing once accumulation predictions are for 4" or more snow.

Contract Equipment: City equipment is supplemented by the use of private sector contracted equipment for significant weather events. This equipment is used to assist clearing snow and ice from the primary/secondary network, as well as hauling snow from the CBD.

Residential Equipment: The Office of Fleet Management has provided a dedicated fleet of reserve equipment for fighting snowstorms in the residential network. This is supplemented by active reserve pieces from various city departments.

Footbridge/Sidewalk Clearance Protocol: Bridge Maintenance employees of the Streets Department are dispatched after each event ends to clear snow from pre-determined footbridges and from the sidewalks of bridges in the CBD.

Communication: All vehicles will be equipped with either radios or cell phones for communication during the events.

Winter Maintenance Facilities: The six Highway Division maintenance facilities serve, along with Snow Headquarters, located in the Bridge Maintenance Yard, as the bases of all snow removal operations. During significant events, they are supplemented by Sanitation area facilities. Salt is stored at the six Highway Division yards.

Operation and Safety: Equipment will be operated in a safe, effective manner by trained, properly licensed, operators. Winter is the season when equipment fails to start, personnel take shortcuts, traction is poor, visibility is poor, and other motorists may not see the operators of other vehicles. All drivers and crews should make required checks prior to and during the use of equipment to ensure safe operations are maintained. Pre and post trip inspections are mandatory.

Personnel Resources

All Streets Department personnel are subject to reporting to duty during snow and ice storms. Failure to notify the supervisor of the inability to work during a storm is grounds for disciplinary action. Please see the Essential Staff Policy in Section

The Highway Division is responsible for overall coordination of snow and ice control preparations. Supervisors are responsible for providing the direction required for effective snow and ice control.

Clothing: The lack of proper clothing is a direct cause of most frostbite occurrences, falls, and in many cases is a factor in equipment accidents. All crews are urged to dress for the possibility that they may be stranded without heat for several hours. It is contemplated that within two hours assistance will be provided to any crew experiencing difficulty.

Communications: On street communications are maintained by inspectors and spotters, who are in constant communication with the Highway and Sanitation Districts and Snow Headquarters.

Personnel Notification Lists (and equipment and other assignments) are included in this manual. Phone trees are to be initiated as necessary at the beginning of a snow alert.

Reporting Procedures

Status Reports: District Highway Engineers will be responsible for maintaining contact with all supervisors and operators in their districts and reporting on the progress of the field personnel to the Snow Headquarters. District Highway Engineers or their designee will make their first report one hour after notification of the snow alert and will continue to make reports every two hours throughout the duration of the snow removal operations.

Accident Reports: The following are the responsibilities of the driver if an accident should occur during snow removal operations:

- Check for injury to persons, never admit liability , call 911 immediately for medical emergencies and state that there is a medical emergency;
- Obtain identification of the other vehicle and driver;
- Notify Police immediately either through radio dispatcher or by telephone. Do not leave the scene of an accident except in cases where physical harm is threatened. If physical harm is threatened, relocate then notify the police;
- Notify supervisor by radio or telephone immediately;

- Forms 77-501 (Employee Accident/Incident Information) and 77-502 (Citizen Accident Information) should be carried in every vehicle and thoroughly completed at the scene of any accident then forwarded to either a supervisor or directly onto Form 82-S-87 (Traffic Accident Report);

- Employee should not sign statements, suggest any settlement or volunteer information about the accident except as noted above. All other requests for statements or signatures should be forwarded to the City of Philadelphia's Risk Management Department;

Non-Municipal Employees contracted for snow removal operations should follow all of the directives listed above except completion of Form 82-S-7 which should be completed by the City on duty supervisor;

Training

Requirements and Timelines: Training will be held for all personnel involved in snow removal as needs determine. Snow plow training for Highway Division and Sanitation Division personnel is part of on-going CDL training. Residential training is an intensive effort that will take place in November of each year for required personnel.

Field Inspection Procedure

Spotters/inspectors will report on actual roadway conditions on two-hour intervals. Reports will include surface condition, material application, plow progress, and problem locations. Conditions which have prevented the removal of snow and ice, such as illegally parked cars, abandoned cars, vehicles stuck in snow, etc. will be noted for follow-up removal efforts. Spotters/inspectors will file field reports with their respective coordinators after each event.

Primary/Secondary - Spotters/inspectors are to report on the condition of the network, with a focus on identifying areas that are particularly troublesome for immediate follow-up.

Residential - Spotters/inspectors, as well as the residential navigators, are to report on residential conditions, noting streets that will require follow-up work due to problems encountered during the initial effort.

Frequency of Report & Detail - Reports are to be made every two hours to the district managers and forwarded to Snow Headquarters. Detail to include whether road is passable, snow covered, salted, plowed or bare pavement. Conditions are coded and noted on inspector's reports.

Expectations - It is the city's expectation that the road network be at least passable, no longer than 12 hours after the last flake has fallen.

Policy on Snow Plowed into Street

As noted in the Philadelphia Code, Chapter 9, Section 601 (4) (f), Chapter 9, Section 404 and Chapter 10, Section 720, snow is not permitted to be plowed or shoveled onto City streets. Enforcement and penalties are described in the respective chapters.

Police Department Responsibility - Police Department personnel are to stop private contractors from plowing snow off of parking lots and driveways into city streets.

Streets Department Responsibility - SWEEP Officers will be dispatched to warn residents about throwing snow in the streets, as well as enforcing the 6-hour timeline to have your sidewalk shoveled to a minimum of a 36-inch path.

Communication

Internal - Communication of on-street activity during winter weather events will occur at two-hour intervals. Spotters and inspectors will report to their respective coordinators route conditions and any identified trouble spots on their assigned routes. Operators will report any mechanical problems to both their headquarters and the Office of Fleet Management. All district coordinators will forward the two-hour updates to Highway Division Snow Headquarters, where the information will be compiled.

External - Highway Division Snow Headquarters will disseminate all information concerning winter weather events to external sources. Route progress reports, street conditions, equipment and personnel deployed, and materials used will be included in these reports. For major events, this information will be forwarded at two-hour intervals to the Emergency Operations Center.

Section 2

Snow Emergency Routes

2. - Snow Emergency Routes

2.1 Snow Declaration

The Mayor, through the Managing Director, has the authority to issue a Snow Emergency Declaration for significant events. This declaration implements parking regulations on dedicated snow emergency routes.

2.2 Citizen Responsibility

Citizens are required to remove their vehicles from snow emergency routes.

2.3 Inspector Responsibility

Inspectors are required to report locations where cars have not been moved and to ensure that designated routes are plowed completely curb to curb.

2.4 Police / Parking Authority Support and Timelines

Police Tow Squad and Parking Authority tow vehicles will remove vehicles from snow emergency routes. Towing will begin at the designated snow emergency starting time and continue as necessary until the declaration is lifted.

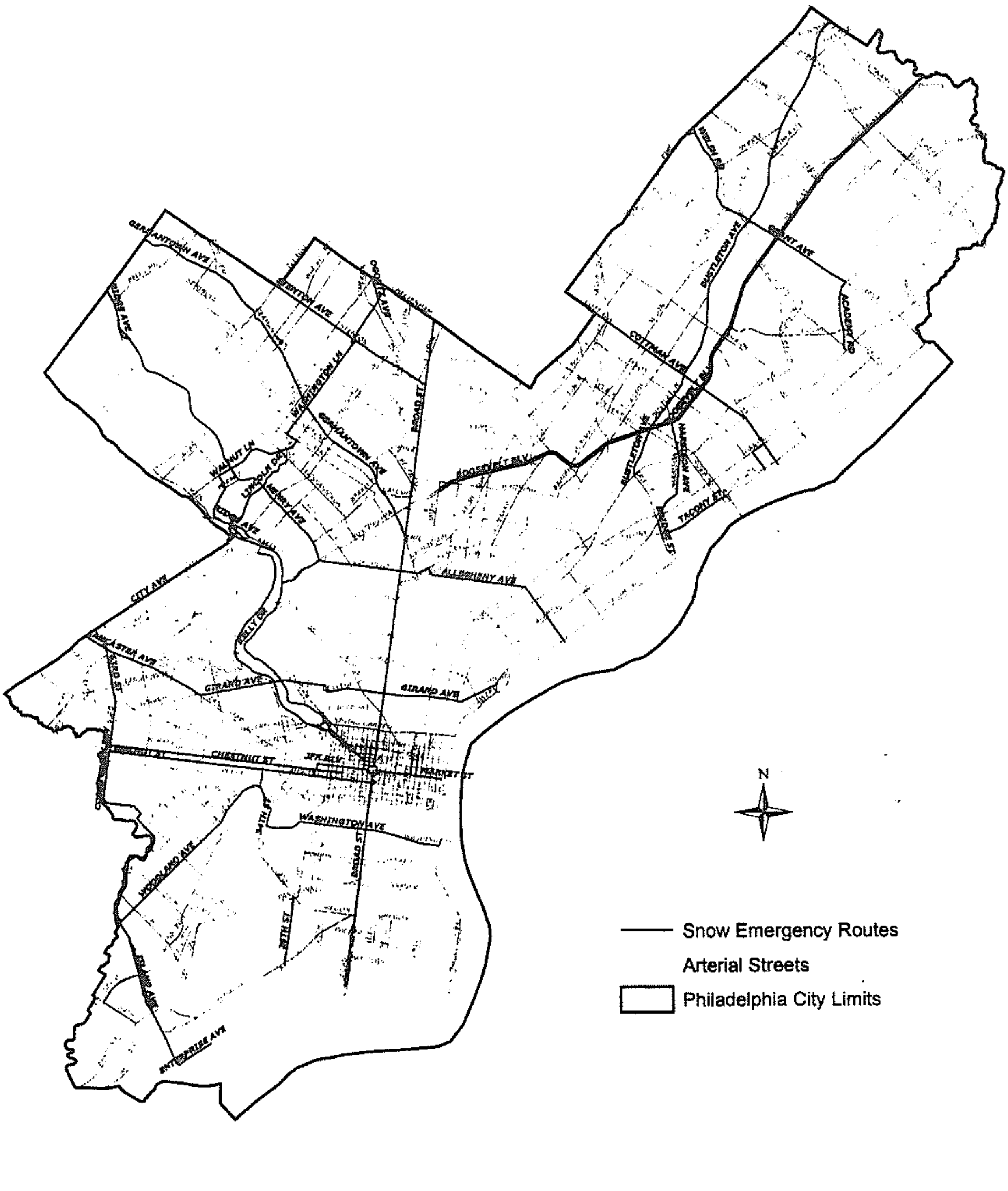
2.5 Record Keeping

Police Department and the Parking Authority personnel will keep records of the location of the relocated vehicles.

2.6 Snow Emergency Routes

Reference Map and Route Table

CITY OF PHILADELPHIA
Snow Emergency Routes



Snow Emergency Routes

Arterial Streets

Philadelphia City Limits

10/20/2010

City of Philadelphia
Snow Emergency Routes

ON	FROM	FROM_HUNDRED	TO	TO_HUNDRED
06TH ST	I-676 OFF RAMP	300 N	MARKET ST	UNIT BLOCK
07TH ST	MARKET ST	UNIT BLOCK	I-676 ON RAMP	300 N
15TH ST	I-676 OFF RAMP	300 N	MARKET ST	UNIT BLOCK
16TH ST	MARKET ST	UNIT BLOCK	I-676 ON RAMP	300 N
20TH ST	CHESTNUT ST	UNIT BLOCK	MARKET ST	UNIT BLOCK
26TH ST	I-676 ON/OFF RAMPS	2500 S	PENROSE AVE	3800 S
34TH ST	UNIVERSITY AVE	1100 S	GRAYS FERRY AVE	1100 S
38TH ST	WALNUT ST	200 S	UNIVERSITY AVE	200 S
63RD ST	CITY AVE	2100 N	WALNUT ST	100 S
ACADEMY RD	FRANKFORD AVE	9100	GRANT AVE	9400
ALLEGHENY AVE	HUNTING PARK AVE	2900 W	I-95 ON/OFF RAMPS	2800 E
BEN FRANKLIN PKWY	ART MUSEUM CIRCLE	2300	16TH ST	1600
BRIDGE ST	HARBISON AVE	2100	I-95 ON RAMP	2300
BROAD ST	CHELTENHAM AVE	7200 N	I-95 ON/OFF RAMPS	3800 S
BUSTLETON AVE	FRANKFORD AVE	5200	ROOSEVELT BLVD	6300
BUSTLETON AVE	ROOSEVELT BLVD	UNIT BLOCK	COUNTY LINE	UNIT BLOCK
CHESTNUT ST	COBBS CREEK PKWY	6200	20TH ST	2000
CITY AVE	CITY BOUNDARY	7700	I-76 ON RAMPS	3800
COBBS CREEK PKWY	WALNUT ST	200	WOODLAND AVE	2100
COTTMAN AVE	I-95 OFF RAMP	5000	FILLMORE ST	UNIT BLOCK
ENTERPRISE AVE	ISLAND AVE	8400	I-95 ON/OFF RAMPS	8200
GIRARD AVE	LANCASTER AVE	4700W	I-95 ON/OFF RAMPS	800 E
GERMANTOWN AVE	BROAD ST	UNIT BLOCK	NORTHWESTERN	UNIT BLOCK
GRANT AVE	WELSH RD	1300 E	ACADEMY RD	3000 E
GRAYS FERRY AVE	34TH ST	3300	WASHINGTON AVE	2600
HARBISON AVE	BRIDGE ST	5200	ROOSEVELT BLVD	6500
HENRY AVE	CATHEDRAL RD	8500	HUNTING PARK AVE	3000
HUNTING PARK AVE	HENRY AVE	3000 W	KELLY DR	3300
ISLAND AVE	WOODLAND AVE	2200	ENTERPRISE AVE	4000
KELLY DR	LINCOLN DR	4600	ART MUSEUM CIRCLE	2300
LANCASTER AVE	CITY AVE	6300	GIRARD AVE	4800
LINCOLN DRIVE	RIDGE AVE	3600	WISSAHICKON AVE	5900
MARKET ST	SCHUYLKILL AVE	2300	I-95 ON RAMP	100
OGONTZ AVE	WASHINGTON LN	7400	CHELTENHAM AVE	8000
POPLAR ST	WEST COLLEGE AVE	2500	GIRARD AVE	2400
PRINCETON AVE	TORRESDALE AVE	4700	I-95 ON/OFF RAMPS	5000
RIDGE AVE (NORTH)	NORTHWESTERN AVE	9100	CATHEDRAL RD	8600
RIDGE AVE (SOUTH)	WALNUT LN	5600	CITY AVE ON RAMP	4500
ROOSEVELT BLVD	09TH ST	800 W	CITY BOUNDARY	16000 E
SCHUYLKILL AVE	MARKET ST	UNIT BLOCK	WALNUT ST	100
SEDGLEY AVE	ALLEGHENY AVE	1000 W	ALLEGHENY AVE	900 W
STENTON AVE	NORTHWESTERN AVE	9600	BROAD ST	1400
TACONY ST/STATE RD	BRIDGE ST	5200	TACONY-PALMYRA BRIDGE	6300
TORRESDALE AVE	COTTMAN AVE	7200	PRINCETON AVE	7100
UNIVERSITY AVE	38TH/39TH ST	300/400	34TH ST	600
WALNUT LN	WAYNE AVE	400 W	RIDGE AVE	500
WALNUT ST	BROAD ST	1400	COBBS CREEK PKWY	6200
WASHINGTON AVE	GRAYS FERRY AVE	2600	CHRISTOPHER COLUMBUS BLVD	UNIT BLOCK
WASHINGTON LN	WAYNE AVE	200 W	OGONTZ AVE	2000 E
WAYNE AVE	WALNUT LN	6100	WASHINGTON LN	6200
WELSH RD	CITY BOUNDARY	UNIT BLOCK	GRANT AVE	1100
WEST COLLEGE AVE	POPLAR ST	900	GIRARD AVE	900
WEST RIVER DRIVE	ART MUSEUM CIRCLE	2300	FALLS BRIDGE	2700
WISSAHICKON AVE	LINCOLN DR	6000	WALNUT LN	6000
WOODLAND AVE	COBBS CREEK PKWY	7200	UNIVERSITY AVE	3800

Section 3

Snow/Plow Routes

3. - Snow / Plow Routes

3.1 A sample plow route is attached.
A complete set of routes as described in the plan is available on the Streets Intranet site @
ftp://170.115.28.16/Maps/Highways/Snow/

Highway Snow Operations (Map Location)

Go to the Streets Department's intranet site
http://streetsweb.phila.gov/

Select "Streets GIS"
http://streetsweb.phila.gov/streets_gis.html

Select "Divisional Maps"
ftp://170.115.28.16/Maps

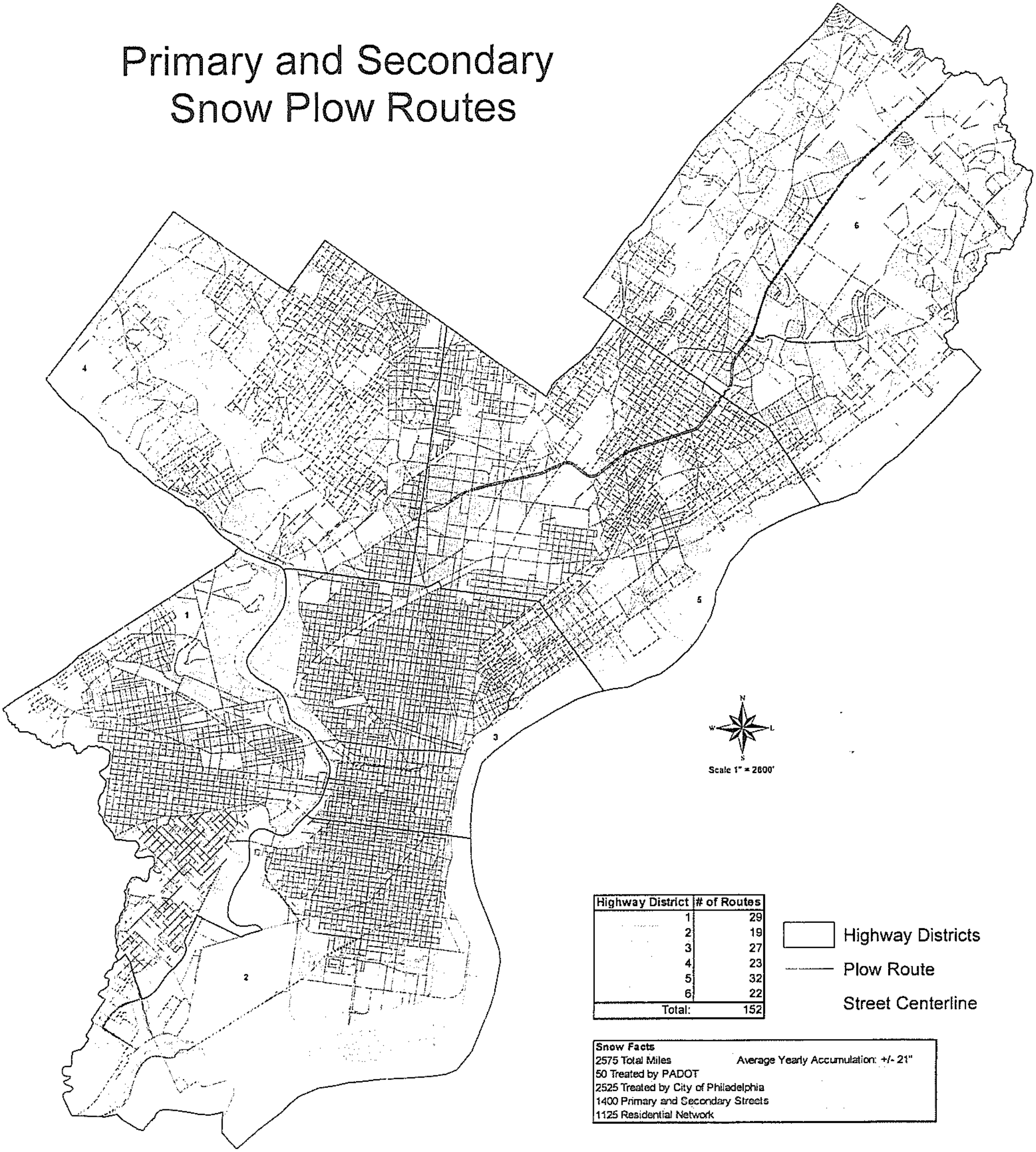
Select "Highways"
ftp://170.115.28.16/Maps/Highways/

Select "Snow"
ftp://170.115.28.16/Maps/Highways/Snow/

Select "Snow Maps"
ftp://170.115.28.16/Maps/Highways/Snow/Snow%20Maps/

Select:
"Directory Overviews"
"Directory Plow Trip Paks"

Primary and Secondary Snow Plow Routes



Highway District	# of Routes
1	29
2	19
3	27
4	23
5	32
6	22
Total:	152

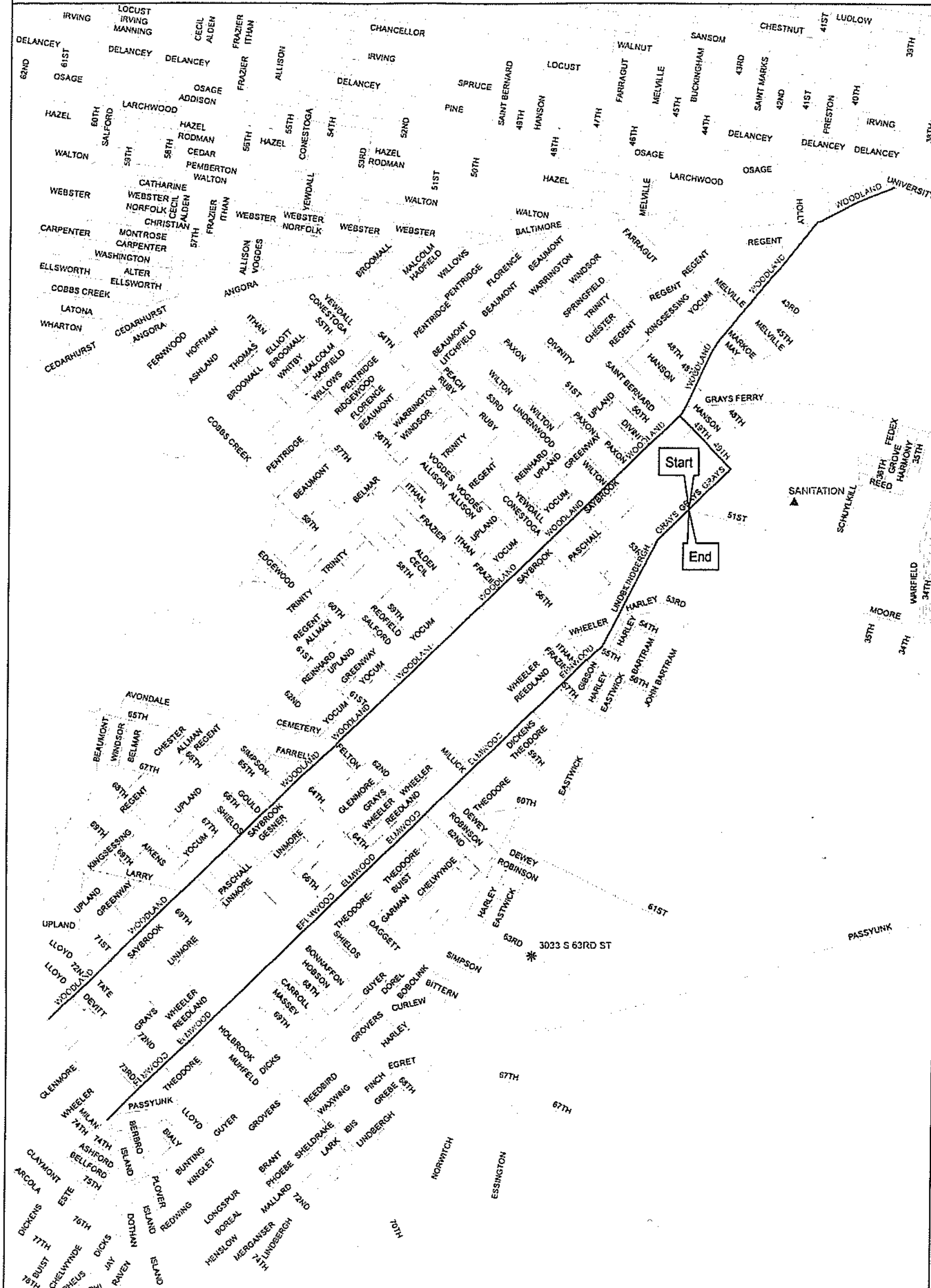
Snow Facts
2575 Total Miles — Average Yearly Accumulation: +/- 21"
50 Treated by PADOT
2525 Treated by City of Philadelphia
1400 Primary and Secondary Streets
1125 Residential Network

1st Highway District Plow Route 05

N

Plow Route
Travel Route

✳ Highway Maintenance Yard
4804 PARKSIDE AVE
▲ Sanitation Maintenance Yard



City Miles	State Miles	Total Route Miles	Number of Plows = 2	Highway Field Office 215-685-0168
Plow 6.55	Plow 5.52			Highway Yard Office 215-685-0170
Travel 0	Travel 0	12.07	Estimated Time for Completion 3 hrs	Sanitation Office 215-685-2601

Fall 2007

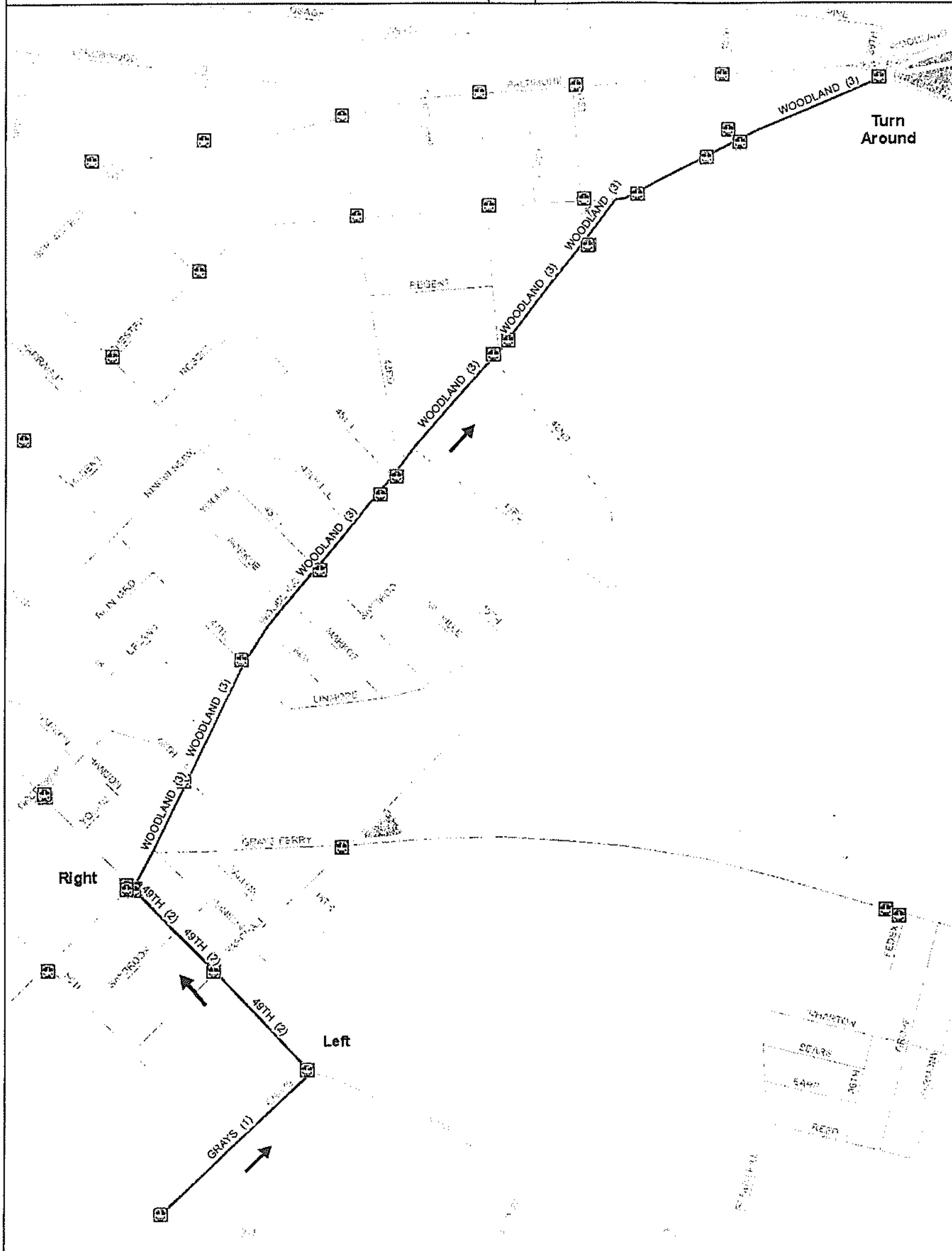
Highway District 1 Plow Route 05

Plow Route ═══ Travel Route Page 1 of 4

N

SEPTA Bus Stops

Curb Islands



ROUTE	RECORD_ID	ON	FROM	TO	ACTION	TURN	COMMENTS
1plow05	1	GRAYS AVE.	51ST ST.	49TH ST.	P	L	STARTS AT SANITATION YARD
1plow05	2	49TH ST.	GRAYS AVE.	WOODLAND AVE.	P	R	
1plow05	3	WOODLAND AVE.	49TH ST.	UNIVERSITY	P	TA	

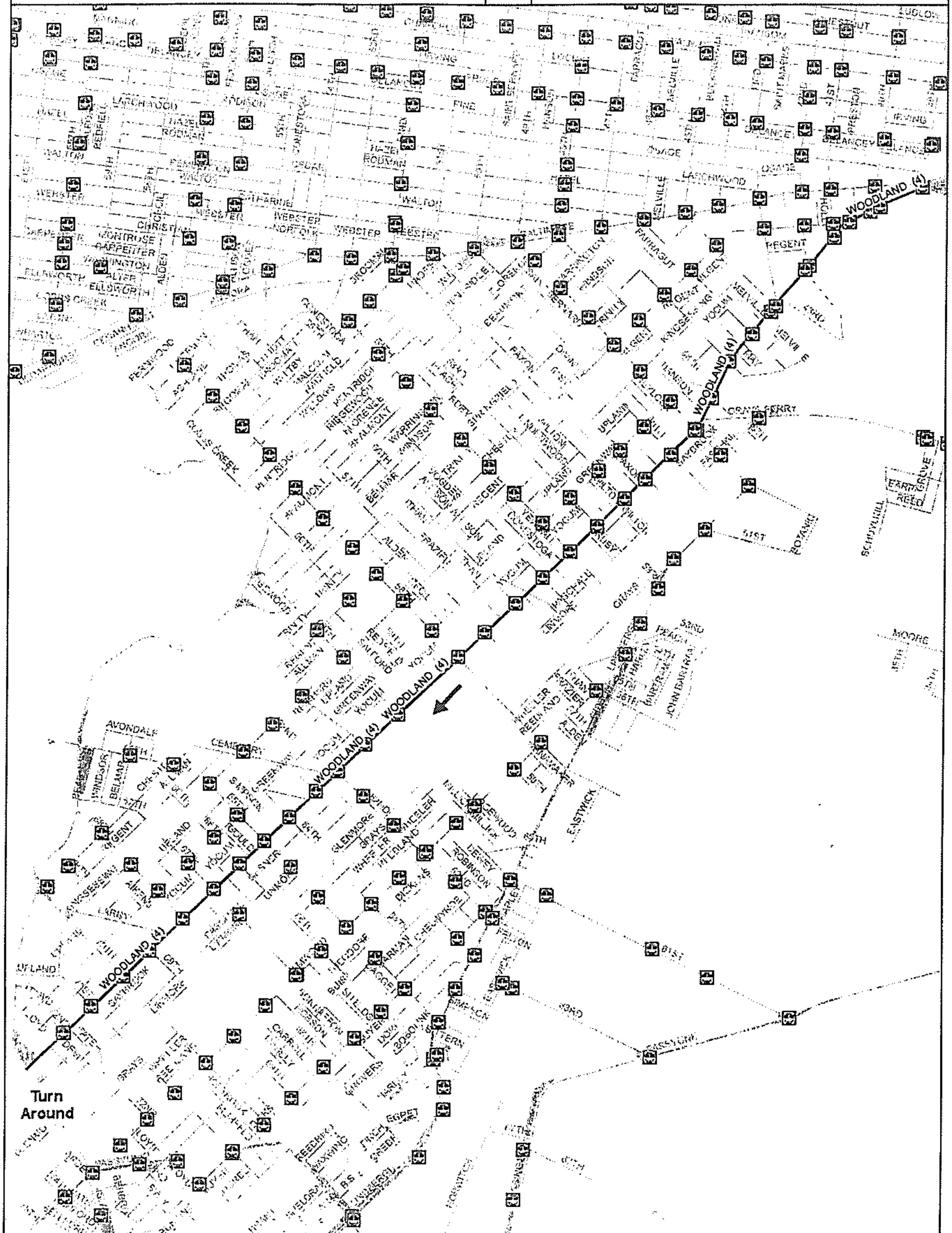
Highway District 1 Plow Route 05

Plow Route — Travel Route —

N

SEPTA Bus Stops

Curb Islands



ROUTE	RECORD_ID	ON	FROM	TO	ACTION	TURN	COMMENTS
1plow05	4	WOODLAND AVE.	UNIVERSITY	ISLAND AVE.	P	TA	

Highway District 1 Plow Route 05

Plow Route ══ Travel Route Page 3 of 4

N

SEPTA Bus Stops

Curb Islands

ROUTE	RECORD_ID	ON	FROM	TO	ACTION	TURN	COMMENTS
1plow05	5	WOODLAND AVE.	ISLAND AVE.	49TH ST.	P	R	
1plow05	6	49TH ST.	WOODLAND AVE.	GRAYS AVE.	P	R	
1plow05	7	GRAYS AVE.	49TH ST.	LINDBERGH BLVD.	P	S	
1plow05	8	LINDBERGH BLVD.	GRAYS AVE.	ELMWOOD AVE.	P	R	
1plow05	9	ELMWOOD AVE.	LINDBERGH BLVD.	ISLAND AVE.	P	TA	

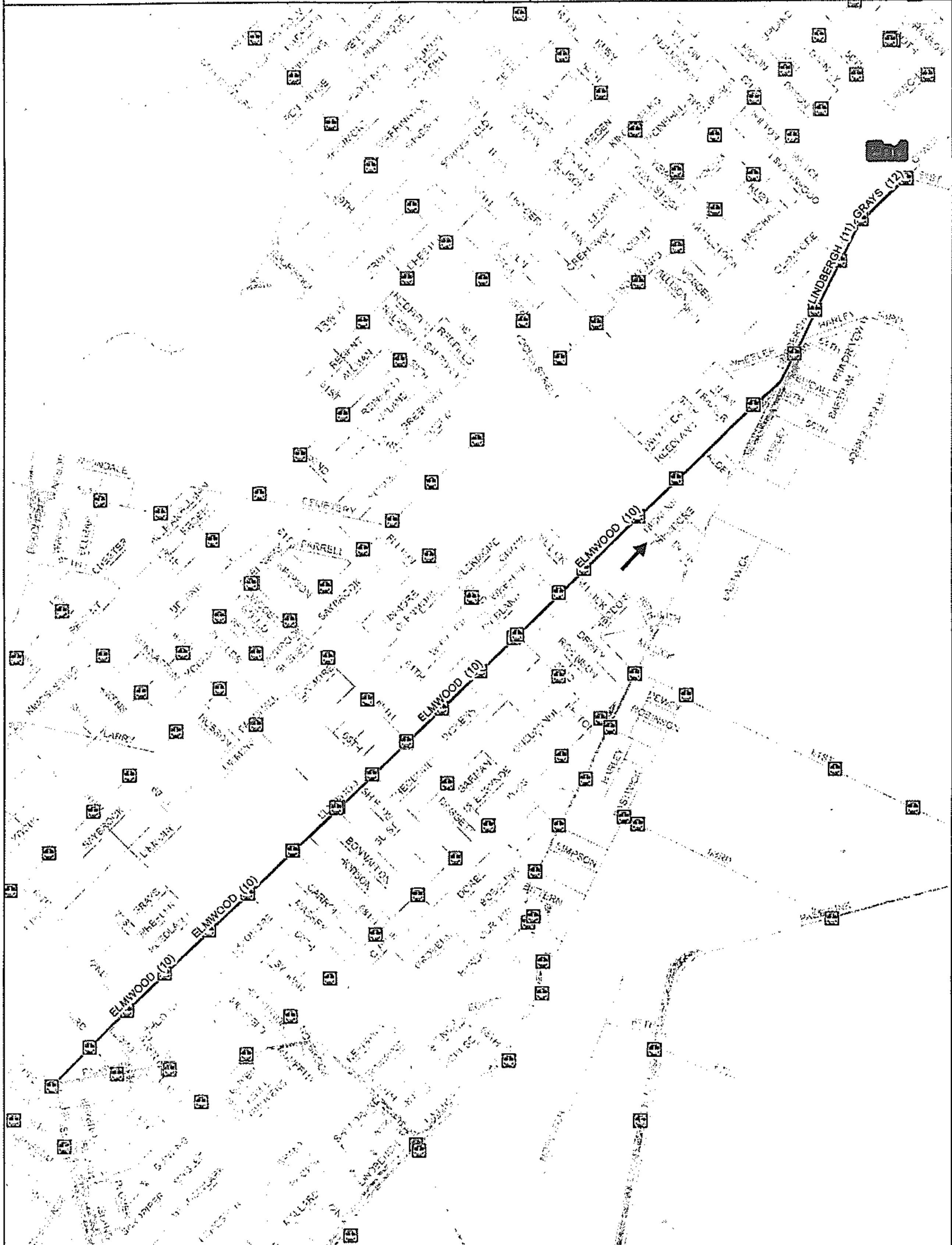
Highway District 1 Plow Route 05

Plow Route | Travel Route | Page 4 of 4

N

SEPTA Bus Stops

Curb Islands



ROUTE	RECORD_ID	ON	FROM	TO	ACTION	TURN	COMMENTS
1plow05	10	ELMWOOD AVE.	ISLAND AVE.	LINDBERGH BLVD.	P	S	
1plow05	11	LINDBERGH BLVD.	ELMWOOD AVE.	GRAYS AVE.	P	S	
1plow05	12	GRAYS AVE.	LINDBERGH BLVD.	51ST	P	E	

Section 4

Key Information

Section 4.1

Key Contacts

EMERGENCY TELEPHONE NUMBERS

FUNCTION:	TELEPHONE NO.
MUNICIPAL RADIO	215-686-4514
EMERGENCY OPERATIONS CENTER (Streets Dept. Reps)	215-686-1113 or 14
FAX NUMBER	215-686-1117
POLICE DEPT. TOWING SERVICE COORDINATOR	215-685-9134
(Lieutenant McWilliams)	215-439-0990
SEPTA STAFF REPRESENTATIVES	
Control Center (street closings, detours, etc)	215-580-8570
Ron Hopkins - Chief Officer - Control Center	215-580-8051
Aleta Washington - Director - Bus Operations	215-580-8667
Storm Center (only open during snow emergencies)	215-580-8481 thru 580-8488
STREETS COMMISSIONER	
Clarena I. W. Tolson	215-686-5460
HIGHWAY DIVISION SNOW HEADQUARTERS	215-685-9827 thru 685-9832
SANITATION DIVISION SNOW HEADQUARTERS	215-686-0492/0493
FACSIMILE MACHINES	
Highway Division Administration	215-686-5062 or 5064
Highway Division Snow Headquarters	215-685-9827

TELEPHONE AND RADIO CALL NUMBERS

Name	Title	Cell Number	Office Phone	Radio No.	Frequency
Clarena Tolson	Commissioner	906-9903	686-5460	1	F1 & F2
Steve Buckley	Deputy Commissioner, Transportation	215-900-5310	686-2142	5	no radio
Carlton Williams	Deputy Commissioner, Sanitation	906-7715	686-5470	2	F1 & F2
Kevin Koch	Chief Highway Engineer	520-0259	686-5498	4	F1 & F2
Steve Lorenz	Asst. Chief Highway Engineer	215-906-2142	686-5498	2401	F1 & F2
Nancy Sen	Residential Coordinator	906-1388	686-5507	7	F1 & F2
Madeleine Antinucci	Construction Engineer 2	267-825-4856	686-5505	2450	F1 & F2
David Lawrence	Bridge Maint. Engineer		685-9828	2403	F1
Steve DeShields	Asphalt Operations Supervisor	906-4728	685-9821	2405	F1
Donald Carlton	Acting. Sanitation Collection Admin.	906-9115	686-5550	200	F1 & F2
Paul Dixon	Operations Assistant Administrator	906-6927	686-5459	201	F1 & F2
Edward Kenny	Operations Assistant Administrator	906-4408	686-5189	202	F1 & F2
Jackie Cooper	Special Operations Assistant	906-8810	686-7818		F1 & F2
Joel Watson	Special Projects	906-4922	686-5084		
Sanitation Snow Headquarters			686-0492/0493		
EOC -Street Represenatitives					
Michelle Knox	(EOC) Administrative Officer	906-6575	686-5558		
Frank Leo	(EOC) Program Coordinator	301-3634	686-5520		F1 & F2
Fleet Support					
James Muller		906-7014	686-1825		
Chris Cocci		906-4228	685-9801		
Thomas Finley		906-3839	685-1853		
Raymond Fabrizio		906-4350	685-4177		
Dennis Sroczyk		200-3844	685-9800		
Joseph Gissinger		520-7754	685-9119		

STREETS DEPARTMENT
RADIO CALL NUMBER LISTING

NAME	TITLE	RADIO #	FREQUENCY
TOLSON, Clarena	Commissioner, Streets	1	F1 & F2
WILLIAMS, Carlton	Deputy Commissioner, Sanitation	2	F1 & F2
MONTANEZ, Richard	Chief Traffic Engineer, Traffic & Street Lighting	3	F 1 & F2
KOCH, Kevin	Chief Highway Engineer, Highways	4	F1 & F2
BUCKLEY, Stephen	Deputy Commissioner, Transportation	5	no radio
ANTINUCCI, Madeleine	Construction Engineer II, Highways	2450	F1 & F2
BONANNO, Salvatore	Construction Project Tech. III, 2nd Hwy.	253	F1
BROCKINGTON, Byron	Dist. Supv., Area 3C, Sanitation	2301	F2
BROWN, Joanne	Dist. Supv., Area 5L, Sanitation	2501	F2
BROWN, Nate	Highway Ops. Asst. Mgr. (Acting)	2412	F1
CARLTON, Donald	Chief of Operations, Sanitation	200	F1 & F2
CARRINGTON, Charles	Dispatcher, Area 6, Sanitation	2600	F2
CLARKE, Brian	Dist. Supv., Area 6B, Sanitation	2602	F1
COOPER, Jackie	Spec. Ops. Assistant, Sanitation	210	F2
CROMWELL, Terry	Dist. Supv. Area 4G, Sanitation	2402	F2
DACHOWSKI, Frank	Highway District Engineer, 3 & 4	240	F1 & F2
BUNDY, Greg	St. Repair Supv., 2nd Highway	221	F1
DeSHIELDS, Stephen	Highway Ops.Manager	2405	F1
DIXON, Paul	Sanitation Ops. Asst. Admin., Area 1, 2, 3	202	F2
DONADIO, Dionne	Dist. Supv. CWC, Santitation	2703	F2
EGLETON, Darryl	St. Repair Supv., 3rd Highway	231	F2
FRANCIS, Ron	Constructin Project Tech III, 6th Hwy	263	F2
GETTY, John	Highway District Engineer, 1 & 2	210	F2
GUESS, Willie	Dist. Supv., CWC, Sanitation	2702	F2
HESPER, Paul	St. Repair Supv., 6th Highway	261	F1
HOWELL, Garry	Sanitation Ops. Asst. Admin., Area 4, 5, 6	203	F2
KRAMER, Thomas	Dispatcher, Area 1, Sanitation	2100	F2
LAWRENCE, David	Bridge Maint. Ops. Engineer, Highways	2403	F2
LEO, Frank	Program Coordinator, Sanitation	209	F1 & F2
LORCH, William	Dist. Supv., CWC, Sanitation	2701	F2
LORENZ, Stephen	Asst. Chief Highway Engineer	2401	F 1 & F2
MATTHEWS, Michael	Dist. Supv., Area 6A, Sanitation	2601	F2
McKENDRICK, Iyenda	Dispatcher, Area 4, Sanitation	2400	F2
MELLETT, Martin	Disct. Supv., Area 1B, Sanitation	2102	F2
MENDOZA, Pablo	Dist. Supv., Area 3F, Sanitation	2302	F2
MILLER, Ernest	Street Crew Chief II, Hwys CMU	2407	F1
MORRIS, Gwen	Dispatcher, Area 5, Sanitation	2500	F2
MURPHY, John	Highway District Engineer, 5 & 6	250	F1 & F2
PANKEY, Steve	Dist. Supv., Area 1A, Sanitation	2101	F2
POPE, Steven	Dispatcher, Area 6, Sanitation	2600	F2
ROBERTSON, William	Construction Project Tech III, 4th Hwy.	243	F1
RODGERS, Darcella	Dispatcher, Area 2 & 3, Sanitation	2200	F1
RUDDEROW, Brian	Construction Project Tech III, 1st Hwy.	213	F1
SCOTT, Faruq	Dist. Supv., Area 6L, Sanitation	2302	F1
SEN, Nancy	Residential Coordinator	7	F1 & F2
SMITH, William	Dist. Supv., Area 2D, Sanitation	2202	F2
THOMAS, Latees	St. Repair Supv., 5th Highway	251	F1 & F2
TABER, James	Construction Project Tech. III, 3rd Hwy.	233	F1
THOMAS, Latees	St. Repair Supv., 5th Highway	251	F1 & F2
WARREN, Keith	Ops. Asst. Admin., CWC, NWT, SWEEP, NWT	202	F2
WEST, Thomas	Dist. Supv., Area 2B, Sanitation	2201	F2
WHARTON, Mark	Dispatcher, CWC, Sanitation	2700	F2
WHITE, Kenneth	Dist. Supv., Area 4M, Sanitation	2402	F2
WHITE, Bill	Construction Engineer I, Highways	260	F1
WILLIAMS, Kevin	St. Repair Supv., 4th Hwy.	241	F1
YATES, Paul	Construction Project Tech. III, 5th Hwy.	253	F1

STREETS DEPARTMENT
RADIO CALL NUMBER LISTING

NAME	TITLE	RADIO #	FREQUENCY
YOUNG, Victor	St. Repair Supv., 1st Hwy.	211	F1
ZUCCARO, Joseph	Dist. Supv., Area 5F, Sanitation	2502	F2

Section 4.2

Highway Division
Snow Equipment Operators

1st Hwy. Snow Assignments 2011 / 2012

Truck #	Type	Tons	Operator	Vehicle Unit	Radio #	Plow	AVL	Calcium Tank	Comments
970071	Crew Cab	7	C. Wilson	1st	216	Y		Y	
995123	Crew Cab	7	R. Hill	1st	218	Y		N	
015033	Crew Cab	7	J. Miller	1st	214	N	Y	N	
015034	Crew Cab	7	R. Daniels	1st	212	N		N	
075168	Crew Cab	7		1st		Y			
025024	Crew Cab	7	H. Sprewell	1st	212A	Y	Y	N	
005546	TandemCC	17		1st		Y	N		
015036	Crew Cab	7	A. Gilliard	CMU	2448	Y		N	
	Crew Cab	7	T. McFarland	CMU		Y		Y	
035337	Tri-Axle	20	M. Smith	CMU	SS2-5	Y	Y	N	Wing Plow
035357	Tri-Axle	20	W. McFadden	CMU	SS-520	Y	Y	N	
960185	Tri-Axle	20	L. Guisburg	CMU	SS-419	Y	Y	N	
	Tandem	17		CMU		N	N	N	
095274	Loader		A. Mosley	1st	N	N		N	
005171	Loader		W. Kelly	1st	N	N		N	
970391	Pick-up		J. Hill	1st	211A	Y		N	D. Stroud nav f/ Thomas
127014	Escape		V. Young	1st	211	N		N	

2nd Hwy. Snow Assignments 2011 / 2012

Truck #	Type	Tons	Operator	Vehicle Unit	Radio #	Plow	AVL	Calcium Tank	Comments
970070	Crew Cab	7	W. Lowman	2nd	224	Y		Y	
970072	Crew Cab	7	K. Bynum	2nd	228	Y		N	
015015	Crew Cab	7		2nd	227	Y	Y	N	
015028	Crew Cab	7	Mansur-Abdul-Muizz	2nd	225	Y		N	
015039	Crew Cab	7		2nd	222	Y	Y	N	
075169	Crew Cab	7		2nd		Y			
005548	C/C Tandem	17	L. Maziarz	2nd	229	Y	Y	N	
015029	Crew Cab	7	P. Riggs	CMU		Y	N	N	
035355	Tri-Axle	20	C. Webb	CMU	SS-412	Y	Y	Y	Wing Plow
035338	Tri-Axle	20	A. Johnson	CMU	SS-522	Y	Y	N	
075174	Tri-Axle	20	T Tolbert	CMU	SS-1172	Y	Y	N	
025051	Tri-Axle	20	I. Morris	CMU	SS-612	Y	Y	N	
	Tandem	17		CMU		N	N	N	
	Tandem	17		CMU		Y/UB	N	N	
075331	Loader		K. Dixon	2nd	N	N		N	
970380	Loader		T. Sapp	2nd	N	N		N	
	C/C Pick-up			BMU					
	Pick-up		D. White	2nd	221A	Y		N	
980165	Explorer		G. Bundy	2nd	221	N		N	

3rd Hwy. Snow Assignments 2011 / 2012

Truck #	Type	Tons	Operator	Vehicle Unit	Radio #	Plow	AVL	Calcium Tank	Comments
025271	Crew Cab	7		3rd	234	Y		Y	
970073	Crew Cab	7		3rd	238	Y		Y	
015038	Crew Cab	7	G. Maxwell	3rd	239	Y	Y	N	
075170	Crew Cab	7		3rd	237	Y			
005547	Tandem	17		3rd	235	Y	Y	N	
005583	Tandem	17	E. Browning	3rd	236	Y			
990125	Crew Cab	7		3rd		Y		N	
105014	Crew Cab	7	K. Brown	CMU	LS-2	Y	Y		
075176	Tri-Axle	20	R. Smalls	CMU	SS-1170	Y	Y	Y	
015021	Tri-Axle	20	A. Clements	CMU	SS0-07	Y	Y	N	
015022	Tri-Axle	20		CMU	SS5-23	Y	Y	Y	
015020	Tri-Axle	20	N. Coney	CMU	SS3-13	Y	Y	N	
960184	Tri-Axle	20	J. Hughes	CMU	SS4-12	Y	Y	N	
	Tandem	17	G. Lark	CMU		Y	N	N	
000053	D/S Tri-axle	30	C. Heath	CMU	SS-003	N	N	N	
970366	Loader		G. Palmer	3rd	N	N		N	
025117	Loader		A. Williamson	3rd	N	N		N	
	Pick-up			3rd					
950295	Explorer		D. Egelton	3rd					

4th Hwy. Snow Assignments 2011/2012

Truck #	Type	Tons	Operator	Vehicle Unit	Radio #	Plow	AVL	Calcium Tank	Comments
970074	Crew Cab	7	E. Mack	4th	244	Y		Y	
970077	Crew Cab	7		4th	242	Y		Y	Traffic
015014	Crew Cab	7	K. Jones	4th	245	Y		N	
015027	Crew Cab	7	J.E. Gary	4th	246	Y		N	
015040	Crew Cab	7	M. Kennedy	4th	248	Y	Y	N	
025025	Crew Cab	7	J. Balsley	4th	249	Y	Y	N	
075167	Crew Cab	7	D. Kent	4th		Y			
005543	Tandem	17	J. Jones	4th	247	Y	Y	N	
995125	Crew Cab	7	N. Alderman	3rd	LS-4				
000054	D/S Tri-Axle	20	J. Savage	CMU	SS-004	N	N	N	
075177	Tri-Axle	20	R. Morris	CMU	SS-1169	Y	Y	N	
960182	Tri-Axle	20	J. Roundtree	CMU	SS-421	Y	Y	N	Wing Plow
960183	Tri-Axle	20		CMU	SS-631	Y	Y	Y	
960179	Tri-Axle	20	J. Montgomery	CMU	SS-700	Y	Y	N	
035356	Tri-Axle	20	M. Parrish	CMU	SS-625	U/B	N	N	
970379	Loader			CMU	N	N		N	
005172	Loader		K. Padgett	4th	N	N		N	B. Miles nav f/ Pegese
065056	Pick-up		G. Johnson	4th					
127010	Escape		K. Williams	4th	241	N		N	

5th Hwy. Snow Assignments 2011/2012

Truck #	Type	Tons	Operator	Vehicle Unit	Radio #	Plow	AVL	Calcium Tank	Comments
970078	Crew Cab	7		5th	257	Y		Y	
995126	Crew Cab	7	D. Kinsey	4th	256	Y		Y	
995124	Crew Cab	7		5th		Y		Y	
015017	Crew Cab	7		BMU	N	Y		N	BMU
015037	Crew Cab	7	R. Powell	5th	2510	Y	Y	N	
025022	Crew Cab	7	S. Pronchick	5th	259	Y	Y	Y	BMU
005544	Tandem	17	C. Queen	5th	252	Y	Y	Y	
995122	Crew Cab	7	G. Broughton	CMU	2442	Y		Y	
995120	Crew Cab	7	W. Fuller	CMU		Y			
035354	Tri-Axle	20	J. Johns	CMU	SS-27	Y	Y	N	
035335	Tri-Axle	20	A. DeLoatch	CMU	SS2-17	Y	Y	N	Wing Plow
035336	Tri-Axle	20	P. Pettet	CMU	SS1-3	Y	Y	N	Wing Plow
960180	Tri-Axle	20	M. Benezet	CMU	SS-420	Y	Y	Y	
960181	Tri-Axle	17	K. Hill	CMU	SS-632	Y		Y	
075261	Trac.Trailer	35	L. Mosley	CMU	2445	N	N	N	
005173	Loader		S. Cartledge	5th	N	N		N	
075332	Loader		F. Turco	5th	N	N		N	
055150	Pick-Up C/C		L. Thomas	5th	254	Y		N	
				5th	251	N		N	
Office				5th					

6th Hwy. Snow Assignments 2011/2012

Truck #	Type	Tons	Operator	Vehicle Unit	Radio #	Plow	AVL	Calcium Tank	Comments
970079	Crew Cab	7	T. McCarthy	6th	265	Y		Y	
995127	Crew Cab	7		6th	266	Y		Y	
015035	Crew Cab	7	K. Pollock	6th	264	N	Y	N	
025023	Crew Cab	7	G. Young	6th	262	N	Y	N	
005545	Tandem	17	T. Morgan	6th	267	N	Y	N	
970080	Crew Cab	7	J. Stinson	CMU	LS1	Y		N	
960177	Tri-Axle	20		CMU	SS6-29	Y	Y	Y	
960178	Tri-Axle	20	H. Taltoan	CMU	SS4-18	Y	Y	Y	
035358	Tri-Axle	20	L. Pina	CMU	SS3-12	Y	Y	Y	Wing Plow
960186	Tri-Axle	20	C. Cox	CMU	SS-630	Y	Y	Y	
025050	Tri-Axle	20		CMU	SS6-24	Y	Y	N	Wing Plow
075175	Tri-Axle	20	D. Bowers	CMU	SS-1171	Y	Y	N	Wing Plow
876840	Trac-Trailer	20	D. Newman	CMU	2444	N		N	
980092	Trac-Trailer	20	C. Johnson	CMU	2446	N		N	
025118	Loader		G. Roznowski	6th	N	N		N	6th Hwy
055167	Loader		S. Flanagan	6th	N	N		N	
	C/C Pick-up		J. Brennan	BMU					
960156	back Hoe			6th					
127011	Escape		P. Hesper	6th	261	N		N	

Bridge Yard Snow Assignments 2011-2012

Truck#	Type	Operator	Unit	Radio #	Plow	AVL	Cal Tank	Name	Comments
	Lift-gate		BMU	N	N		N		Utility (brooms, blowers, personnel, etc.)
	Stake-body		BMU	N	N		N		Utility (brooms, blowers, personnel, etc.)
	Van		BMU	N	N		N		Utility (brooms, blowers, personnel, etc.)
	Van		BMU	N	N		N		Utility (brooms, blowers, personnel, etc.)
	Van		BMU	Y	N		N		Sometimes used for spotting in place of 005087
	Van		BMU	N	N		N		Sometimes used for spotting in place of 005087
	Crew cab Pick-up		BMU	Y	N		N		Used to plow footways
	Crew cab Pick-up		BMU	Y	Y	Y	N		
	Crew cab Pick-up		BMU	Y	Y	Y	N	R Brockenbrough and D Davis	2nd Residential Brockenborough w/ D. Davis as Nav
	Crew cab Pick-up		BMU	Y	N		N	J Brennen	6th Residential w/J. Brennen
127008	Escape		BMU	Y	N		N	M. McCann	6th Hwy District
	Explorer		BMU	Y	N		N		Inspector w/ contractors
005094	Explorer		BMU	Y	N		N	A. Mielich	2nd Hwy District
005095	Explorer		BMU	Y	N		N	W Gallagher	6th Hwy District
005170	Low-boy Dump Body		BMU	N	N		N		Used for salting in 5th Dist
015017	Crew Cab		BMU	N	Y		N		

Brine Assignments 2011-2012

Truck#	Location	Gals	Operator	Unit	Radio	Comments
970036	State Rd.	1250	C. Cox	CMU	Brine 6-2	Contact J. Carson
89R377	State Rd	2750	?? ??	CMU	Brine 6-1	Contact J. Carson
970272	State Rd	300	M. Palmer	CMU	Brine 6-3	Contact P. Hesper
970269	State Rd	300	??		Brine 6-4	Contact J. Carson
025118	State Rd	Loader 6th Hwy	S. Flanagan	6th Hwy Yard		Contact J. Carson
970039	Domino Ln	1250	M. Benezet	CMU	Brine 4-2	
	Domino Ln			CMU	Brine 4-1	
	Domino Ln			CMU/4th	Brine 4-3	
970275	Domino Ln	300	D. Myrie	CMU/3rd	Brine 4-4	
	Domino Ln	Backhoe 4th Hwy	D. Gallagher	CMU		Contact S. DeShields
095275	Domino Ln	Loader CMU	D. Gallagher	CMU		
	Domino Ln		J. Ferraro	PWD		
025118	State Rd	Loader 6th Hwy	S. Flanagan	6th Hwy Yard		
	Domino Ln	Alternative Loader		4th		Contact M. Antinucci
	Fairmount Pk	300	J. Bryen	Fairmount Pk		Contact C. Palmer
*	Fairmount Pk	1250	V. Moffett	Fairmount Pk		Contact F. Hubbard

Brine Maker	State Rd		A. Bucci	CMU		Contact S. DeShields
Brine Maker	State Rd		H. DeLuca	BMU		Contact W. Gallagher
Brine Maker	Domino Ln		D. Gallagher	CMU		Contact S. DeShields
Brine Maker	Domino Ln		C. Palmer	BMU		Contact W. Gallagher
Vector Unit	State Rd		C. Cooper	PWD		
Snow Melter	4040 Whitaker Ave		L. Mosley	CMU		Operator
Snow Melter	4040 Whitaker Ave		D. Gallagher	CMU		Operator
Snow Melter	4040 Whitaker Ave		R. Presel	CMU		Helper
Snow Melter	4040 Whitaker Ave		W. Nater	CMU		Helper
Snow Melter	4040 Whitaker Ave			CMU		Hwy Ops Mngr

In the event of a call out for the Brine Operation, please contact one of the below persons to call in operators and brine makers:

Ernest Miller- 215-685-9817/9913 (office) 267-825-4784(cell)

Steve DeShields 215-685-9821/9822 (office) 215-906-4728 (cell)

* Also Operates Salt/Plow Routes

Section 4.3

Sanitation Plow Operations

CITYWIDE CLEANING
Snow Plow Inventory

Number of Quick Hitch Plows	22
Number of Vehicles Assigned	11
Number of Vehicles Available	11
Sets of Chains	18

23 Sets 2TT881	SPREADERS
55 sets chains 20yrd	QG2845 -CAM no longer use
18 sets 20yrd	QG2008

VEHICLES FOR SNOW REMOVAL

Shift Start ____________ Shift End ____________

Date

CWC		Vehicle Types					Plow Type		Status	Down Time	Down Time	Transfers	Transfers	Plow Count in Yard: Pin / Q-Hitch / P-Angle / U-Body
	Vehicle	Open Bulk	20YD Compactor	20YD (HD) Compactor	25YD Compactor	32 YD Compactor	Pin	Q-hitch	Up / Dn	In	Out	in from Area	out to Area	
Totals			5	4										Reason for being down
1	005064		x											
2	005071		x											
3	005076		x											
4	005077		x											
5	005078		x											
6	025067			X										
7	025071			X										
8	065043			X										
9	065046			X										
10														
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12														
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AREA 1
Snow Plow Inventory

Number of Plow Blades (Regular)	34
Number of Plow Blades	1
Number of Plow Blades Ice	2
Number of Plow Blades Available	33
Number of Vehicles assigned	33
Number of Vehicles available	33
Number of Chains available	80 Sets (160 chains)

MAIN PLOW MOUNTING CREW

PLOWS
MARVIN OVERTON
MARK ASBERRY

CHAINS
TONY COLLINS
PAUL LEWIS
HENRY WILLIAMS
DAVID BURGESS
JOSEPH EZEKIEL

DRIVERS
DWIGHT ANDREWS
ZACHARY WILLIAMS
ANDREW DURER

Shift Start ____________

VEHICLES FOR SNOW REMOVAL

Shift End ____________

Date / /

CREATED 03/30/06

AREA 1		Vehicle Types					Plow Type Needed		Vehicle Status	Down Time In	Down Time Out	Transfers in from Area	Transfers out to Area	Plow Count in Yard			
	Vehicle	Open Bulk	20YD Compacter	20YD (HD) Compacter	25YD Compacter	32YD Compacter	Pin	Q-hitch	Up / DN					Pin	Q-Hitch	P-Angle	U-Body
															33	0	0
Totals	37	0	2	24	11	0	0	33	1/DN					Reason for being down			
1	O25064		X					X									
2	O25065		X					X									
3	O15069			X				X									
4	O15071			X				X									
5	O45080			X				X									
6	O45081			X				X									
7	O35126				X			X									
8	O25211				X			X						cannot use frame is cracked			
9	O25214				X			X									
10	995016				X			X									
11	995058				X			X									
12	995060				X			X									
13	995063				X			X									
14	985005				X			X									
15	960012			X				X									
16	960013			X				X									
17	960033			X				X									
18	960034			X				X									
19	960060			X				X									
20	O75037			X				X									
21	O75041			X				X									
22	O75055			X				X									
23	O75048				X			X									
24	O95238			X				X									
25	O95239			X				X									
26	O95240			X				X									
27	O95244			X				X									
28	O95248			X				X									
29	O95251			X				X									
30	O75068			X				X						No Plow Frame			
31	O65042			X				X									
32	O65045			X				X									
33	O65047			X				X									
34	O65048			X				X									
35	O65051			X				X									
36	O95012				X			X						No Plow Frame			
37	O95009				X			X						No Plow Frame			

AREA #2

Snow Plow Inventory

Number of Plow Blades (Quick's) :	20
Number of Plow Blades (Fiber's Glass) :	0
Number of Plow Blades (PIN's) :	1
Number of Plow Blades Available :	20
Vehicles Assigned :	18
CHAINS SETS NEW :	39
CHAINS SETS OLD :	113

Shift Start ____________

VEHICLES FOR SNOW REMOVAL

Shift End ____________

Date / /

CREATED 03/30/06

AREA 2		Vehicle Types					Plow Type Needed		Vehicle Status	Down Time	Down Time	Transfers	Transfers	Reason for being down
	Vehicle	Open Bulk	20YD Compacter	20YD (HD) Compacter	25YD Compacter	32YD Compacter	Pin	Q-hitch	Up / DN	In	Out	in from Area	out to Area	
Totals	18	0	1	17	0		1	16						
1	005065		x				x							
2	960066			x										
3	960078			x				X						
4	015068			X				X						
5	015073			X				X						
6	015078			X				X						
7	015082			X				X						
8	015083			X				X						
9	025070			X				X						
10	025072			X				X						
11	025074			X				X						
12	035350			X				X						
13	035351			X				X						
14	035353			X				X						
15	075057			X				X						
16	095252			x				X						
17	065182			X				X						
18	065049			X				X						

Plow Count in Yard			
Pin	Q-Hitch	P-Angle	U-Body
1	16	0	0

AREA #3

Snow Plow Inventory

Number of Plow Blades (Quick's) :	13
Number of Plow Blades (Fiber's Glass) :	10
Number of Plow Blades (PIN's) :	0
Number of Plow Blades Available :	23
Vehicles Assigned :	35
CHAINS SETS NEW :	59
CHAINS SETS OLD :	24

VEHICLES FOR SNOW REMOVAL

Shift Start ______________ Shift End ______

Date 9/14/2011

Plow Count in Yard		
Pin	Q-Hitch	F-GLASS
	13	10

AREA 3		Vehicle Types					Plow Type Needed			Status	Down Time	Down Time	Transfers	Transfers	
	Vehicle	Open Bulk	20YD Compacter	20YD (HD) Compacter	25 YD Compacter	Radio Number	Pin	Q-hitch	F-GLAS	Up / DN	In	Out	in from Area	out to Area	Reason for being down
Totals	27	0	2	35	3			13	10						
1	035128				X	2381		X							
2	960048			X		2382		X							
3	960059			X		2383		X							
4	960068			X		2331		X							
5	960075			X		2332		X							
6	015062			X		2324		X							
7	015063			X		2335		X							
8	015066			X		2336		X							
9	015067			X		2337		X							
10	035131			X		2338		X							
11	035330			X		2339		X							
12	035331			X		2340		X							
13	035332			X		2341		X							
14	035334			X		2342									
15	035348			X		2343									
16	035349			X		2344									
17	035352			X		2345									
18	075053			X		2346			X						
19	075060			X		2347			X						
20	085133			X		2348			X						
21	085135			X		2349			X						
22	085137			X		2350			X						
23	085144			X		2351			X						
24	085150			X		2352			X						
25	095242			X		2353			X						
26	095245			X		2354			X						
27	095247			X		2355			X						
28	095249			X		2356									
29	095250			X		2357									
30	005069		X			2358									
31	005070		X			2359									
32	015080			X		2360									
33	045082			X		2361									
34	065185			X		2362									
35	065186			X		2364									
36															
37															
38															
39															
40															

AREA 4

Snow Plow Inventory

Number of Plow Blades (Quick)	31
Number of Plow Blades (Pin)	0
Number of Plow Blades Ice	0
Number of Plow Blades Available	33
Number of Vehicles assigned	43
Number of Vehicles availabe	25
Number of Vehicles down	8
Number of P-Angle	1

VEHICLES FOR SNOW REMOVAL

Shift Start ______________ Shift End ______________

Date: 1/25/11

AREA 4		Vehicle Types					Plow Type Needed		Status	Down	Down	Transfers	Transfers	Plow Count in Yard			
	Vehicle	Open Bulk	20YD Compacter	20YD (HD) Compacter	25 YD Compacter	Radio Number	Pin	Q-hitch	Up / DN	Time In	Time Out	in from Area	out to Area	Pin	Q-Hitch	P-Angle	U-Body
														2	31	0	0
Totals	43		2	29	15		1	38						Reason for being down			
1	005067		X			2464		X									
2	005068		X			2413		X									
3	960030			X		2441		X						Trans Leak			
4	960037			X		2440		X									
5	960053			X		2443		X									
6	960054			X		2466		X									
7	960057			X		2444		X									
8	960063			X		2445		X									
9	015061			X		2446		X						PM List			
10	015081			X		2447		X									
11	025073			X		2448		X									
12	035125				x	2465		X						Air Value			
13	045077			X		2478		X									
14	985004				x	2479		X									
15	995005				X	2452		X									
16	995008				X	2458								No Plow Frame			
17	995011				X	2451		X									
18	995017				X	2450		X									
19	995021				X	2461		X						PM List			
20	995044				X	2459		X									
21	995046				X	2457		X						Oil Leak At Vendor			
22	995057				X	2453		X									
23	995062				X	2444		X									
24	025212				X	2455		X						NO PLOW FRAME			
25	92R121			x		2454	X							NO PLOW FRAME			
26	92R122			X		2431								Drop Off			
27	075038			X		2438											
28	075040			X		2462		X									
29	075043			X		2469		X									
30	075044			X		2449		X									
31	075050				X	2463		X									
32	085129			x		2468		X									
33	085131			X				X									
34	085132			X				X									
35	085138			X				X						Trans At Vendor			
36	085145			X				X									
37	085146			X				X						PM List			
38	085149			X				X						PM List			
39	085152			X				X									
40	085154			X				X									
41	085155			X				X									
42	O95004				X									NO PLOW FRAME			
43	095015				X									NO PLOW FRAME			
44																	
45																	
46																	
47																	
48																	
49																	

AREA 5

Snow Plow Inventory

Number of Plow Blades (PIN)	0
Number of Plow Blades (QH)	28
Number of Plow Blades Ice	0
Number of Plow Blades available	36
Number of Vehicles assigned	36
Number of Vehicles available	36
Number of Vehicles down	0
Number of chains	107 sets

Shift Start ______

VEHICLES FOR SNOW REMOVAL

Shift End ______

Date: 9/2011

CREATED 02-20-03

Plow Count in Yard			
Pin	Q-Hitch	P-Angle	U-Body
1	39		

AREA 5		Vehicle Types					Plow Type Needed		Status	Down	Down	Transfers	Transfers	
	Vehicle	Open Bulk	20YD Compacter	20YD (HD) Compacter	25 YD Compacter	Radio Number	Pin	Q-hitch	Up / DN	Time In	Time Out	in from Area	out to Area	
Totals	40	1	0	31	8		1	39						Reason for being down
1	895469	X				2518	X							
2	960036			X		2544		X						
3	960040			X				X						
4	960047			X		2572		X						
5	960049			X		2573		X						
6	960052			X		2548								
7	015064			X		2575		X						
8	015065			X		2551		X						
9	015072			X		2549		X						
10	015074			X		2540		X						
11	015075			X		2541		X						
12	025239			X		2554		X						
13	025240			X		2555		X						
14	045074			X		2546		X						
15	045078			X		2513		X						
16	045079			X		2514		X						
17	065044			X		2569		X						
18	075039			X		2566		X						
19	075042			X		2577		X						
20	075054			X		2550		X						
21	075058			X		2569		X						
22	075059			X		2580		X						
23	075061			X		2585		X						
24	075062			X		2545		X						
25	075073			X		2564		X						
26	085136			X		2562		X						
27	085140			X		2547		X						
28	085147			X		2584		X						
29	085148			X		2561		X						
30	085151			X		2553		X						
31	995009				X	2571		X						
32	995047				X	2579		X						
33	995048				X	2581								
34	995049				X	2558		X						
35	995050				X	2582		X						
36	995051				X	2549		X						
37	995052				X	2583		X						
38	025213				X	2584		X						
39	095236			X		2560		X						
40	095237			X		2557		X						

AREA # 6

Snow Plow Inventory

Snow Plow Inventory

Number of Plow Blades (Regular)		28	
Number of Plow Blades		28	
Number of Plow Blades Ice		0	
Power Angle		0	
Number of Plow Blades Available		28	
Number of Vehicles assigned	→ { 34 Quick Hitch }		66
	{ 9 Pin Hitch }		0
Number of Vehicles availabe	→ {34 Quick Hitch }		47
	{ 9 Pin Hitch }		0
Number of Vehicles down	0		

SET OF CHAINS	152
SETS OF SPREADERS	112

VEHICLES FOR SNOW REMOVAL

Shift Start ______ Shift End ______

Date 9-13-11

CREATED 02/20/03

AREA 6

Plow Count in Yard

Pin	Q-Hitch	P-Angle	U-Body
0	27	0	0

	Vehicle	Vehicle Types: Open Bulk	20YD Compacter	20YD (HD) Compacter	25 YD Compacter	32 YD Compacter	Plow Type Needed: Pin	Q-hitch	Status Up / DN	Down Time In	Down Time Out	Transfers in from Area	Transfers out to Area	Reason for being down
Totals	39	0	10	10	9	0	0	27						
1	045072		X					X						
2	045073		X					X						
3	045075		X					X						
4	045076		X					X						
5	025241		X					X						
6	025242		X					X						
7	015070		X											
8	015076		X					X						
9	015077		X					X						
10	015079		X					X						
11	995006				X			X						
12	995007				X			X						
13	995022				X			X						
14	995024				X			X						
15	995045				X									
16	995054				X			X						
17	995055				X			X						
18	960061			X				X						
19	960074			X				X						
20	075036			X				X						
21	075045			X				X						
22	075063			X				X						

Shift Start ______ **VEHICLES FOR SNOW REMOVAL** Shift End ______

Date 9-13-11

CREATED 02/20/03

AREA 6		Vehicle Types					Plow Type		Status	Down	Down	Transfers	Transfers	Plow Count in Yard			
		Open	20YD	20YD (HD)	25 YD	32 YD	Needed			Time	Time	in from	out to	Pin	Q-Hitch	P-Angle	U-Body
	Vehicle	Bulk	Compacter	Compacter	Compacter	Compacter	Pin	Q-hitch	Up / DN	In	Out	Area	Area	0	27	1	0
Totals	39	0	10	10	9	0	0	27						Reason for being down			
23	075064			X				X									
24	075065			X				X									
25	075066			X				X									
26	075067			X				X									
27	075047				X			X									
28	075049				X			X									
29	085142			X				X									
30,	065183			can't use													
31	065184			can't use													
32	075030				can't use												
33	075031				can't use												
34	075032				can't use												
35	075033				can't use												
36	075034				can't use												
37	075035				can't use												
38	085153				can't use												
39	075173				can't use												
40																	
41																	
42																	
43																	
44																	

Section 4.4

Residential Street System

Deployment Maps/Support Staff/ Spotters

11/16/2011

RESIDENTIAL SNOW OPERATIONS

Office Location & Phone List 2011-2012

Residential Snow Operations HQ

LOCATION: Bridge Maintenance Bldg, 4040 Whitaker Avenue
PHONE: 215-685-9814 or 685-9835 Email: StreetsREsSnowHq@Phila

RESIDENTIAL Coordinator: Nancy Sen Rich Montanez
CELL: 215-906-1388 215-834-5294

HQ Reports: William Walter

HQ Staff: Oneather Kent-Fulton, Lynn Genetti, Audrey Powell

Operations/Spotter Mgr: Dave Perri 215-313-5358, Robin Geller-Helms, Christopher Renfro

1st Highway Residential Operations

REPORTING LOCATION: 2nd Highway Maint. Yard (Trailer near Dome) - 3033 63rd St (63rd & Eastwick)
NOTE: *Enter trailer door marked "1st Residential" Operations*
PHONE: 215-685-4243 Email: SnowRes1/Streets/Phila

RESIDENTIAL MANAGERS: Michelle Brisbon Jonathan Chapman
CELL: 215-906-9724 215-796-2344

2nd Highway Residential Operations

REPORTING LOCATION: 2nd Highway Maint. Yard (Trailer near Dome) - 3033 63rd St (63rd & Eastwick)
NOTE: *Enter trailer door marked "2nd Residential" Operations*
PHONE: 215-685-4244 Email: SnowRes2/Streets/Phila

RESIDENTIAL MANAGERS: Kristin Del Rossi Frank Morelli
CELL: 215-475-2440 215-520-2269

3rd Highway Residential Operations

REPORTING LOCATION: Traffic Sign & Signal Shop - 4501 G Street (G & Ramona)
PHONE: 215-685-3957 Email: SnowRes3/Streets/Phila

RESIDENTIAL MANAGERS: Patrice Nuble (after Nov 30th) Tony Moreland Roger Tenant
CELL: 267-886-6037 215-906-5263 215-200-4631

4th Highway Residential Operations

REPORTING LOCATION: **Traffic Sign & Signal Shop - 4501 G Street (G & Ramona)**
(DOMINO TRAILER CLOSED — SALT DISPENSED ONLY)
PHONE: 215-685-3956 Email: SnowRes4/Streets/Phila

RESIDENTIAL MANAGERS: Michael Faulkner Lucille Mac Millan
CELL: 215-906-7416 267-886-6033

5th Highway Residential Operations

REPORTING LOCATION: Highway Garage Bldg, Asphalt Conference Room, 2nd Floor, 4040 Whitaker Avenue
PHONE: 215-685-9817 267-964-7742 Email: SnowRes5/Streets/Phila

RESIDENTIAL MANAGERS: Jerrell Flint Michael Matela
CELL: 215-906-9372 215-964-7742

6th Highway Residential Operations

REPORTING LOCATION: Streets Training Center, 8401 State Road -- (State & Ashburner)
PHONE: 215-685-8105 Email: SnowRes6/Streets/Phila

RESIDENTIAL MANAGERS: Shawn McKeown James Gartland
CELL: 216-906-6828 215-906-9150

RESIDENTIAL OFFICE SUPPORT ASSIGNMENTS				
	11/8/2011			
Team	Duty	EmployeeName	EmployeeDepartmentName	EmployeeWorkLocation
1st Residential Office				
A	Res Mgr	BRISBON, MICHELLE	Streets Department	Transportation & Planning
B	Res Mgr	CHAPMAN, JONATHAN	Streets Department	Traffic
A	Office-Phones	CLYDE, CHARLOTTE	Streets Department	Transportation & Planning
B	Office-Phones	BROWN, CHARESE	Streets Department	Admin - Payroll
A	Office-Data	BIRRELL, ROBERT	Streets Department	Transportation & Planning
2nd Residential Office				
A	Res Mgr	DEL ROSSI, KRISTIN	Streets Department	Traffic
B	Res Mgr	MORELLI, FRANK	Streets Department	Survey Division
A	Office-Phones	ATIF, ALI	Streets Department	Transportation & Planning
B	Office-Phones	BURDEN, MATTHEW	Streets Department	Admin-Budget
A	Office-Data	BROWN-JACKSON, ANGELA	Streets Department	Admin-Commissioners Ofc
3rd Residential Office				
A	Res Mgr	MORELAND, TONY	Streets Department	Hwy Construction
A	Res Mgr	NUBLE, PATRICE L (after nov 30)	Streets Department	Traffic
B	Res Mgr	TENANT, ROGER	Licenses and Inspections	Construction
A	Office-Phones	FLOMO, MARY	Streets Department	Traffic
A	Office-Data	MILLS-ROBINSON, BETTY	Streets Department	Hwy Construction
B	Office-Data	BROWN, NICOLE E	Streets Department	Admin - Payroll
A & B	Trucks	KENT, JOSEPH	Streets Department	Traffic
4th Residential Office				
A	Res Mgr	FAULKNER, MICHAEL	Streets Department	Street Lighting
B	Res Mgr	MACMILLAN, LUCILLE	Streets Department	Traffic
A	Office-Phones	BANKS, LISA	Streets Department	Street Lighting
B	Office-Phones	DRUMWRIGHT, ROBERT	Streets Department	Admin - Safety
A	Office-Data	GORDON, CLAUDIA	Streets Department	Transportation & Planning
A & B	Trucks	VENZIALE, JEFFREY	Streets Department	Traffic
5th Residential Office				
A	Res Mgr	FLINT, JERRELL A	Streets Department	Surveys -City Plans
B	Res Mgr	MATELA, MICHAEL R	Streets Department	IT
A	Office-Phones	CARTER, LYNNE	Streets Department	Sanitation-Solid Resources
B	Office-Phones	MCNEIL, GLORIA	Streets Department	Surveys -City Plans
A	Office-Data	WEBB, MICHELLE	Streets Department	Survey-TEPS
6th Residential Office				
A	Res Mgr	MCKEOWN, SHAWN J	Streets Department	Hwy ROW Unit
B	Res Mgr	GARTLAND, JAMES	Streets Department	Hwy ROW Unit
A	Office-Phones	MCKEE, MARGOT	Streets Department	Transportation & Planning
A	Office-Data	MORGAN, MARGUERITE J	Streets Department	Admin - Accounting
B	Office-Data	SMITHA, MATHEW	Streets Department	TEPS
A & B	Trucks	MARCELLINO, DOMENIC C	Streets Department	Admin - Training
Reserve Residential Office				
	Office-Data	FELDER, DONNA	Streets Department	Admin - Training
	Office-Data	ELIAS, ANJU	Water Department	1101 Market
	Office-Data	ELIAS, LILLY	Water Department	1101 Market
Residential Headquarters				
A	Office -HQ	KENT-FULTON, ONEATHER	Streets Department	Transportation & Planning
A	Office -HQ	GENETTI, LYNN	Streets Department	Transportation & Planning
A	Office -HQ	SACOUTO, ANTONIO B	Streets Department	IT
A	Office -HQ	POWELL-KINSEY, AUDREY	Streets Department	Transportation & Planning
B	Office -HQ	RENFRO, CHRISTOPHER	Streets Department	Surveys-Bridges
B	Office -HQ	BROWN, ROXANNE	City Treasurer	MSB - 6th Floor, RM 640

RESIDENTIAL SPOTTERS

11/7/2011

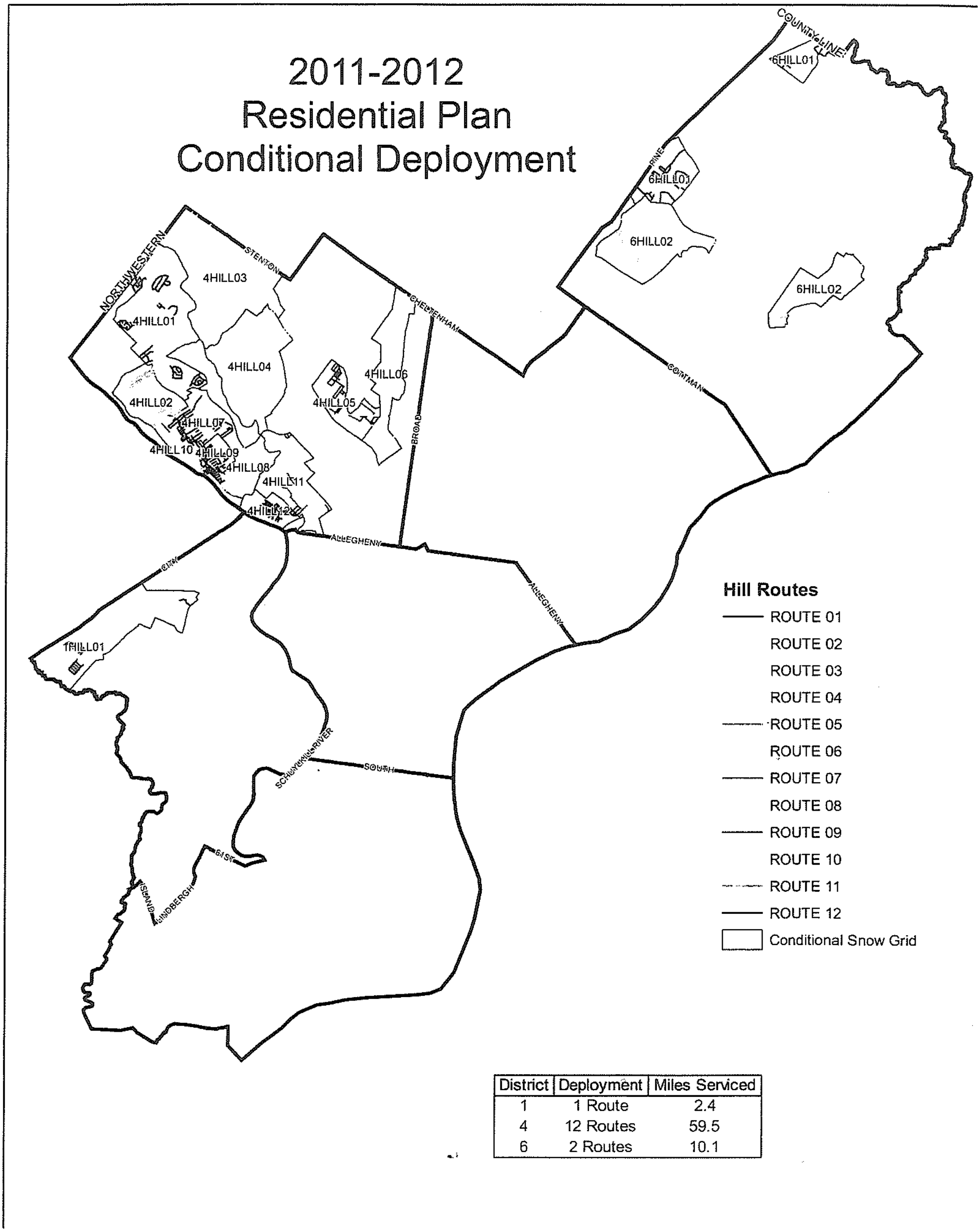
Team	EmployeeName	Department	WorkLocation	Vehicle#
	1ST RESIDENTIAL			
A & B	LAFOREST, LOUIS	Streets Department	Surveys-4th	TBD
A & B	BAILEY, COLLEEN	Water Department	Construct-PWD Surveys	080113
A & B	TATUM, TIMOTHY	Water Department	Inlet Cleaning-Fox St	TBD
A & B	ROSS, MICHAEL	Licenses and Inspections	C & T Fire Inspector	TBD
A & B	LOVETT, GARY	Water Department	Construct-PWD Surveys	990072
	2ND RESIDENTIAL			
A & B	HEATH, VINCENT	Water Department	Construct-PWD Surveys	080008
A & B	RAWLINGS, ATOY	Water Department	Construct-PWD Surveys	990093
A & B	SCHAFFER, HENRY	Water Department	Baxter Operations - IWU	070049
A & B	LOSKIEWICTZ, JOSEPH	Water Department	Construction	TBD
A & B	GILL, SUNIL	Streets Department	Traffic	TBD
	3RD RESIDENTIAL			
A & B	BRADY, JOHN	Water Department	Construction	TBD
A & B	SELBY, GARRETT	Water Department	Water Public Affiars	TBD
A & B	HENRY, MORRIS	Water Department	Construction	TBD
A & B	FLAVILLE, MICHAEL G	Water Department	Sewer Maint-Fox St	TBD
A & B	JONES, KEVIN	Water Department	Inlet Cleaning-Fox St	TBD
A & B	DAVENPORT, CHRISTOPHER	Streets Department	Survey Division	TBD
	4TH RESIDENTIAL			
A & B	SEGERS, DERRICK	Water Department	1101 Market	TBD
A & B	SCHMIDT, NATHAN J	Water Department	NE Plant - Lewis St	TBD
A & B	ALI, KASIM	Streets Department	Traffic	TBD
A & B	DLUGOSZ, DAVID	Streets Department	Traffic	TBD
A & B	MATTIOLI, LOU	Water Department	Baxter Operations - IWU	070044
A & B	O"NEILL, THEODORE	Water Department	29th Meter Shop	080122
A & B	WRIGHT, EDWARD C	Streets Department	9th Survey	TBD
	5TH RESIDENTIAL			
A & B	TRAN, TRIDUNG	Water Department	Baxter Operations - IWU	070049
A & B	MCANANEY, FRANCIS J	Streets Department	Surveys-5th	TBD
A & B	BURKE, DANIEL P	Streets Department	Surveys-5th	TBD
A & B	HARLEY, JAMES	Water Department	NE Plant - Lewis St	TBD
A & B	CINCIRUK, NICHOLAS	Streets Department	TEPS	TBD
A & B	MATTHEW, BOBBY	Streets Department	Transportation & Planning	TBD
A & B	DELCASALE, NICHOLAS	Water Department	Construction	990078
	6TH RESIDENTIAL			
A & B	GORDON, JOHN	Water Department	Baxter Operations - IWU	TBD
A & B	BELL, FRANCIS J	Streets Department	Hwy ROW Unit	TBD
A & B	CERRONE, JOSEPH	Water Department	Baxter Operations - IWU	TBD
A & B	GONSIEWSKI, ROBERT	Water Department	Baxter Operations - IWU	TBD
A & B	KULP, NICHOLAS	Streets Department	TEPS	TBD
A & B	BOWERS, JUSTIN	Water Department	Baxter Operations - IWU	TBD
A & B	JONES, DUANE	Water Department	Construction	070034

RESIDENTIAL INSPECTORS - FOR RESIDENTIAL PIPEN*/SKID STEER OPERATIONS ONLY

* Snow Equipment Contract includes pipens with narrow (73") buckets; for use in narrow residential network. Regular pipens will be inspected by Highway Primary Operations personnel.

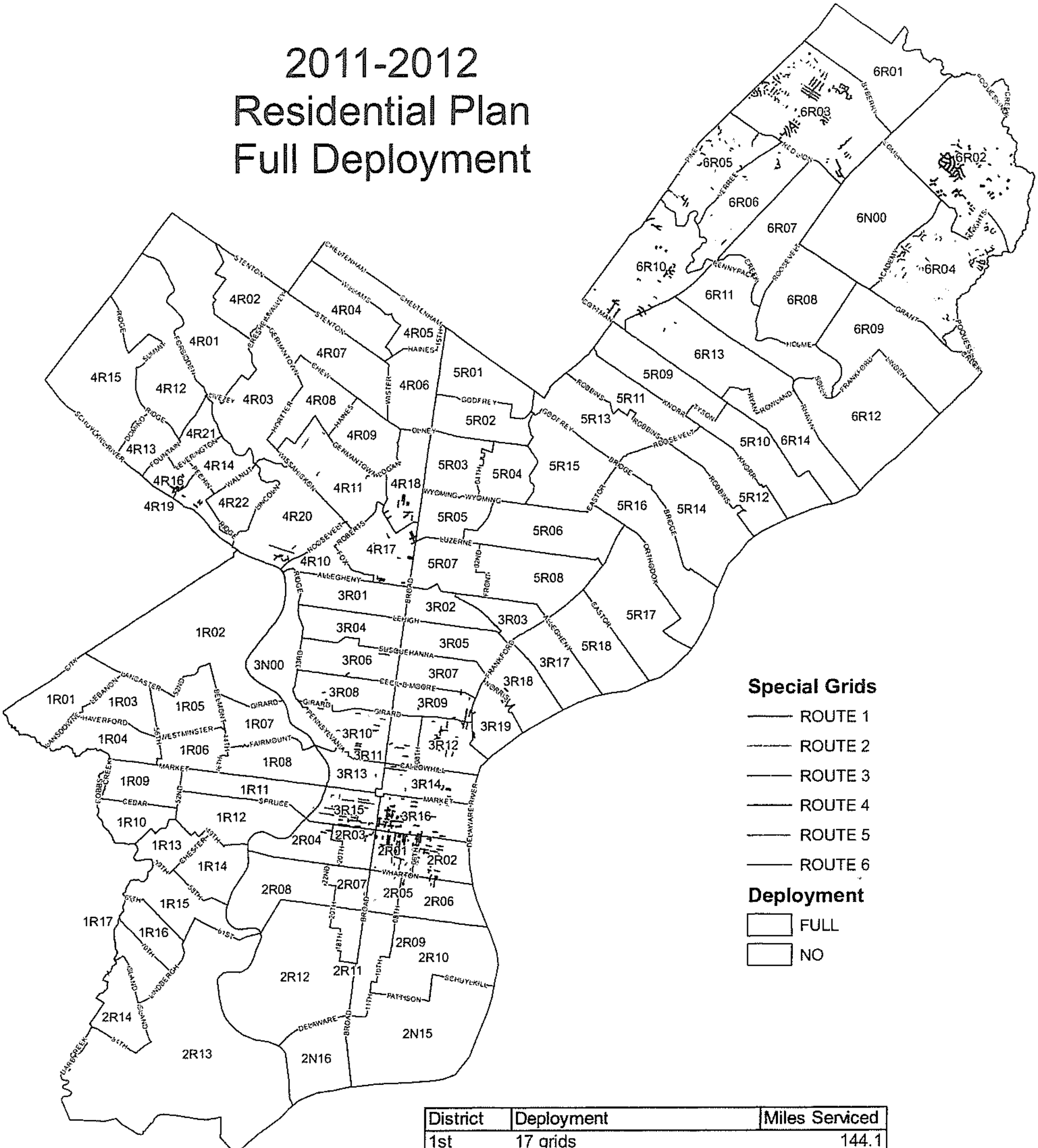
Team	EmployeeName	Department	WorkLocation	ehicleNumb
	1ST RESIDENTIAL			
A & B	FOX, JAMES	Water Department	Construct-PWD Surveys	000142
A & B	BURKE, MICHAEL	Water Department	Construct-PWD Surveys	TBD
	2ND RESIDENTIAL			
A & B	HENDERSON, DOMINIC	Streets Department	Traffic	960572
A & B	WILLIAMS, JOHN O	Water Department	1101 Market-Training	TBD
A & B	JACOBSON, STEFAN	Water Department	1101 Market	TBD
A & B	CARABALLO, RICHARD	Water Department	SE Plant	TBD
A & B	DOMENICK, EDWARD	Streets Department	TEPS	TBD
	3RD RESIDENTIAL			
A & B	KEELEY, CARRIE	Water Department	Baxter Operations - IWU	070048
A & B	ANDERSON, JOHN	Water Department	Construct-PWD Surveys	990052
A & B	HAMPTON, BYRON L	Water Department	Sewer Maint-Fox St	TBD
	4TH RESIDENTIAL			
A & B	KONSTANTINIDIS, STEVE	Water Department	Construction	TBD
A & B	MASON, WILL	Water Department	Construct-PWD Surveys	080112
A & B	WEISS, JEFFREY	Water Department	Construct-PWD Surveys	080013
	5TH RESIDENTIAL			
A & B	PINKNEY, VINCENT	Water Department	Construct-PWD Surveys	990092
	6TH RESIDENTIAL			
A & B	ISSAC, ELIAS	Streets Department	Transportation & Planning	TBD
A & B	SCHOFIELD, EVAN	Water Department	Baxter Operations - IWU	080074
A & B	FULLER, CHARLES	Streets Department	Surveys-4th	TBD

2011-2012
Residential Plan
Conditional Deployment



District	Deployment	Miles Serviced
1	1 Route	2.4
4	12 Routes	59.5
6	2 Routes	10.1

2011-2012
Residential Plan
Full Deployment



District	Deployment		Miles Serviced
1st	17 grids		144.1
2nd	14 grids + 3 gators		117.9
3rd	19 grids + 5 gators		197.2
4th	22 grids + 4 gators		206.3
5th	18 grids		253.8
6th	14 grids + 6 pickup		213.5
Summary	104 grids + 12 gators + 6 pickup		
Total		122	1132.8

Residential Snow Operations (Map Location)

Go to the Streets Deptment's intranet site
http://streetsweb.phila.gov/

Select "Streets GIS"
http://streetsweb.phila.gov/streets_gis.html

Select "Divisional Maps"
ftp://170.115.20.25/GIS_ftp/Maps

Select "Highways"
ftp://170.115.20.25/GIS_ftp/Maps/Highways/

Select "Residential Snow"
ftp://170.115.20.25/GIS_ftp/Maps/Highways/ResidentialSnow/

Select Overviews
ftp://170.115.20.25/GIS_ftp/Maps/Highways/ResidentialSnow/Overviews/

Select "hwy_ResidentialDeploymentCombined(2panel)2010.pdf"
ftp://170.115.20.25/GIS_ftp/Maps/Highways/ResidentialSnow/Overviews/hwy_ResidentialDeploymentPlan2011.pdf

Section 4.5

Residential Street System

Snow Fighting Vehicles

- Conditional Hill Deployment
- Full Deployment

2011 2012 Residential Truck List

Conditional Deployment - Residential Streets - (15 routes)

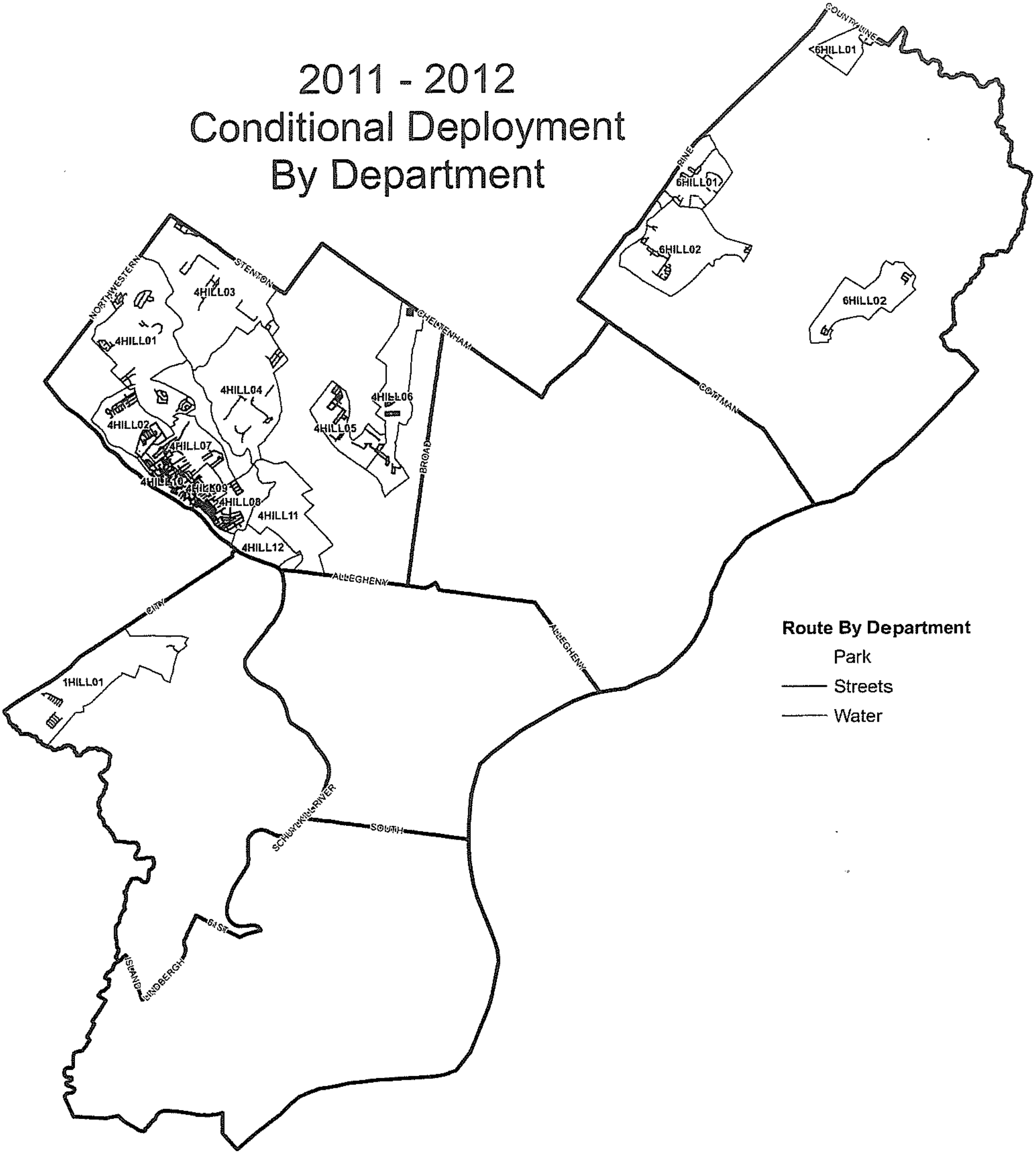
11/3/2011

#	Category	Res. Dist	Vehicle	CDL	Hill Route	Comment	Use	Dept Location	Make	Model	Type	Plow	Salt
1	AR-PWD	1	000183	Yes	1Hill01	Overbrook (1R12 for full)	AR	Water-SM-49th St	FL	FL-70	Dump	FM	TGS
2	AR-PWD	4	000181	Yes	4Hill01	Andorra (5R05 for full)	AR	Water-Fox-SM	FL	FL-70	Dump	FM	TGS
3	AR-Traffic	4	085242	No	4Hill02	Roxborough (4R20 for full)	AR	Streets - Traffic	Ford	F350	4x4 Pickup	FM	V-Box
4	AR-PWD	4	000182	Yes	4Hill03	Chestnut Hill (5R15 for full)	AR	Water-Fox-SM	FL	FL-70	Dump	FM	TGS
5	AR-PWD	4	000175	Yes	4Hill04	West Mt. Airy (5R01 for full)	AR	Water-Inlet Cleaning	FL	FL-70	Dump	FM	TGS
6	DR	4	065096	No	4Hill05	Wister/East Germantown (4R01 for full)	DR	Fleet	Ford	F350	pickup	FM	V-Box G
7	AR-Traffic	4	960162	No	4Hill06	West Oak Lane/Ogontz (5R13 for full)	AR	Fleet	Ford	F350	4x4 Pickup	FM	V-Box
8	AR-Traffic	4	085246	No	4Hill07	Manyunk (NE) (4R21 for full)	AR	Streets - Traffic	Ford	F350	4x4 Pickup	FM	V-Box
9	DR	4	970268	No	4Hill08	Manyunk (South) (4R19 for full)	DR	Fleet	Ford	F250 (4	Pickup	FM	V-box E
10	AR-Traffic	4	085247	No	4Hill09	Manyunk (Central) (4R04 for full)	AR	Streets - Traffic	Ford	F350	4x4 Pickup	FM	V-Box
11	AR-Traffic	4	085255	No	4Hill10	Manyunk (NW) (4R22 for full)	AR	Streets - Traffic	Ford	F350	4x4 Pickup	FM	V-Box
12	AR-Park	4	085270	No	4Hill11	Wissahickon (4R12 for full)	DP	Park	Ford	F350	4x4 Pickup	FM	V-Box
13	AR-Park	4	085265	No	4Hill12	East Falls (1R07 for full)	DP	Park	Ford	F350	4x4 Pickup	FM	V-Box
14	AR-PWD	6	000177	Yes	6Hill01	Bustleton (6R01 for full)	AR	Water-Lardners PT	FL	FL-70	Dump	FM	TGS
15	AR-PWD	6	000174	Yes	6Hill02	Fox Chase (6R03 for full)	AR	Water-Lardners PT	FL	FL-70	Dump	FM	TGS

Supplement to Primary Operation - (6 trucks)

#	Category	Hwy Dist	Vehicle	CDL	Supplement Route	Comment	Use	Dept Location	Make	Model	Type	Plow	Salt
1	AR-PWD	2	970021	Yes	2PSYard01	2nd Hwy Primary Supplementary Truck(3R10)	AR	Water-Mnt-29th st	FL	FL-70	Dump	FM	TGS
2	AR-PWD	2	000180	Yes	2PSYard02	2nd Hwy Primary Supplementary Truck(5R04)	AR	Water-Fox-SM	FL	FL-70	Dump	FM	TGS
3	AR-PWD	3	000176	Yes	3PSYard01	3rd Hwy Primary Supplementary Truck(6R07)	AR	Water-Lardners PT	FL	FL-70	Dump	FM	TGS
4	AR-PWD	3	000173	Yes	3PSYard02	3rd Hwy Primary Supplementary Truck(6R10)	AR	Water-Lardners PT	FL	FL-70	Dump	FM	TGS
5	AR-PWD	3	000179	Yes	3PSYard03	3rd Hwy Primary Supplementary Truck(6R11)	AR	Water-Lardners PT	FL	FL-70	Dump	FM	TGS
6	AR-Park	4	015058	Yes	4PSYard01	4th Hwy Primary Supplementary Truck (3R09)	AR	Park	Ford	F550	3 YD dump	FM	VBG

2011 - 2012
Conditional Deployment
By Department



2011 2012 Residential Truck List - FULL DEPLOYMENT

dist	Vehicle	CDL	Grid Assigned	Dept Location	Make	Model	Type	Plow	Salt
			1st Residential						
1	025193	No	1R01	MDO-Clip	Ford	F-350	4x4 Pickup	FM	V-box G
1	085243	No	1R02	Park	Ford	F350	4x4 Pickup crewcab	FM	V-Box
1	085253	No	1R03	Park	Ford	F350	4x4 Pickup crewcab	FM	V-Box
1	995089	No	1R04	Park	Ford	F150	pickup	FM	V-box G
1	065099	No	1R05	Park	Ford	F350	4x4 Pickup crewcab	FM	V-box H
1	085271	No	1R06	Park	Ford	F350	4x4 Pickup crewcab	FM	V-Box
1	085265	No	1R07	Park	Ford	F350	4x4 Pickup crewcab	FM	V-Box
1	085266	No	1R08	Park	Ford	F350	4x4 Pickup crewcab	FM	V-Box
1	025191	No	1R09	MDO-Clip	Ford	F-350	4x4 Pickup	FM	V-box G
1	010097	No	1R10	Water-SW Plant	Ford	F250	4x4 Pickup	FM	V-Box
1	010094	No	1R11	Water-SE Plant	Ford	F250	4x4 Pickup	FM	NA
1	000183	Yes	1R12	Water-SM-49th St	FL	FL-70	6 Yd Dump	FM	TGS
1	110006	Yes	1R13	Water-SW Plant		F350	Pickup	FM	VBE
1	010096	No	1R14	Water-SE Plant	Ford	F250	4x4 Pickup	FM	VBE
1	006456	No	1R15	Streets-Moffo	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
1	085237	No	1R16	Streets-Moffo	Ford	F350	4x4 Pickup crewcab	FM	V-Box
1	010095	No	1R17	Water-SE Plant	Ford	F250	4x4 Pickup	FM	NA
	6 per shift	Extra Navigators assigned for extra Contractor Pickups							
	2	pipen inspectors assigned							

2011 2012 Residential Truck List - FULL DEPLOYMENT

dist	Vehicle	CDL	Grid Assigned	Dept Location	Make	Model	Type	Plow	Salt
			2nd Residential						
2	115006	No	2G01	Streets - Hwy Constr		Ranger			VBE
2	005439	No	2G02	Streets - 1st Yard	Ford	F250	4x4 Pickup crewcab	FM	V-box H
2	115001	No	2G03	Streets - Hwy Constr		Ranger			VBE
2	065089	No	2R01	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-box H
2	085258	No	2R02	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	085239	No	2R03	Streets-Moffo	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	085241	No	2R04	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	110001	Yes	2R05	Water-SE Plant		F350	Pickup	V	VBE
2	085256	No	2R06	Streets-Moffo	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	110002	No	2R07	Water-SW Plant		F350	Pickup	V	VBE
2	110003	No	2R08	Water-SW Plant		F350	Pickup	V	VBE
2	085251	No	2R09	Pub Prop	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	085240	No	2R10	Pub Prop	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	085250	No	2R11	Pub Prop	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	025126	Yes	2R12	Pub Prop	FL	FL-80	5Yd v-box	FM	V-BOX
2	080037	No	2R13	Water-SE Plant	Ford	F350	4x4 Pickup crewcab	FM	V-Box
2	010099	No	2R14	Water-SW Plant	Ford	F250	4x4 Pickup	FM	V-Box
	5/4 per shift	Extra Navigators assigned for extra Contractor Pickups							
	5	pipen inspectors assigned							

2011 2012 Residential Truck List - FULL DEPLOYMENT

dist	Vehicle	CDL	Grid Assigned	Dept Location	Make	Model	Type	Plow	Salt
			3rd Residential						
3	Vacant	No	3G01	Vacant-Contractor					
3	Vacant	No	3G02	Vacant-Contractor					
3	Vacant	No	3G03	Vacant-Contractor					
3	Vacant	No	3G04	Vacant-Contractor					
3	Vacant	No	3G05	Vacant-Contractor					
3	005459	No	3R01	Rec	Ford	F250	4x4 Pickup crewcab	FM	MINI
3	065095	No	3R02	Rec	Ford	F350	4x4 Pickup	FM	V-box H
3	Vacant	No	3R03	Vacant-Contractor					
3	110004	Yes	3R04	Water-Flow Control-Fox St		F350	Pickup	FM	VBE
3	Vacant	No	3R05	Vacant-Contractor					
3	010093	No	3R06	Water-Fox-SM	Ford	F250	4x4 Pickup	FM	V-Box
3	005164	No	3R07	Streets - Linestriping	Ford	F150	4x4 Pickup	FM	N/A
3	015058	Yes	3R08	Park	FORD	F550	3 YD dump	FM	VBG
3	960162	No	3R09	Streets - Traffic	Ford	F350	4x4 Pickup crewcab	FM	V-Box
3	015092	No	3R10	Park	FORD	F250	PICKUP 4X4,CREW CAB	FM	VBG
3	005469	No	3R11	Streets - St Lite	Ford	F150	4x4 Pickup	FM	N/A
3	Vacant	No	3R12	Vacant-Contractor					
3	005472	No	3R13	Streets - Traffic	Ford	F150	4x4 Pickup	FM	N/A
3	950295	No	3R14	Streets - 3rd Yard	FORD	F250	PICKUP 4X4 SPREADER/PLOW	FM	VBG
3	010098	No	3R15	Water-SW Plant	Ford	F250	4x4 Pickup	FM	V-Box
3	015143	No	3R16	MDO-Clip	Ford	F250	4x4 Pickup crewcab	FM	V-box G
3	045166	No	3R17	MDO-Clip	GMC	2500	4x4 Pickup	FM	V-box H
3	010091	No	3R18	Water-Fox-SM	Ford	F250	4x4 Pickup	FM	V-Box
3	005468	No	3R19	Streets-CMU Mail Truck	Ford	F150	4x4 Pickup	FM	N/A
	5 per shift	Extra Navigators assigned for extra Contractor Pickups							
	3	pipen inspectors assigned							

2011 2012 Residential Truck List - FULL DEPLOYMENT

dist	Vehicle	CDL	Grid Assigned	Dept Location	Make	Model	Type	Plow	Salt
			4th Residential						
4	960154			Streets - 4th Yard					
4	115004	No	4G01	Streets - Hwy Constr		Ranger			VBE
4	115005	No	4G02	Streets - Hwy Constr		Ranger			VBE
4	Vacant	No	4G03	Vacant-Contractor					
4	Vacant	No	4G04	Vacant-Contractor					
4	Vacant	No	4R01	Vacant-Contractor					
4	085268	No	4R02	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	065098	No	4R03	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	085247	No	4R04	Streets - Traffic	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	085264	No	4R05	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	085261	No	4R06	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	005165	No	4R07	Streets - Traffic	Ford	F150	4x4 Pickup	FM	N/A
4	005166	No	4R08	Streets - St. Lite	Ford	F150	4x4 Pickup	FM	N/A
4	Vacant	No	4R09	Vacant-Contractor					
4	995041	No	4R10	Streets - Traffic	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	080035	No	4R11	Water-29th Facilities	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	085270	No	4R12	Park	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	005478	No	4R13	MDO-Clip	Ford	F250	4x4 Pickup crewcab	FM	V-box G
4	115002	No	4R14	Streets - Asphalt		Ranger			VBE
4	085249	No	4R15	Streets - St. Lite	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBE
4	115003	No	4R16	Streets - Hwy Constr		Ranger			VBE
4	080034	No	4R17	Water-29th Facilities	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	005167	No	4R18	Streets - St. Lite	Ford	F150	4x4 Pickup	FM	N/A
4	085246	No	4R19	Streets - Traffic	Ford	F350	4x4 Pickup crewcab	V	V-Box
4	085242	No	4R20	Streets - Traffic	Ford	F350	4x4 Pickup crewcab	FM	V-Box
4	970268	No	4R21	Streets - Traffic	Ford	F250	4x4 Pickup	FM	V-box E
4	085255	No	4R22	Streets - Traffic	Ford	F350	4x4 Pickup crewcab	V	V-Box
	4 per shift	Extra Navigators assigned for extra Contractor Pickups							
	3	pipen inspectors assigned							

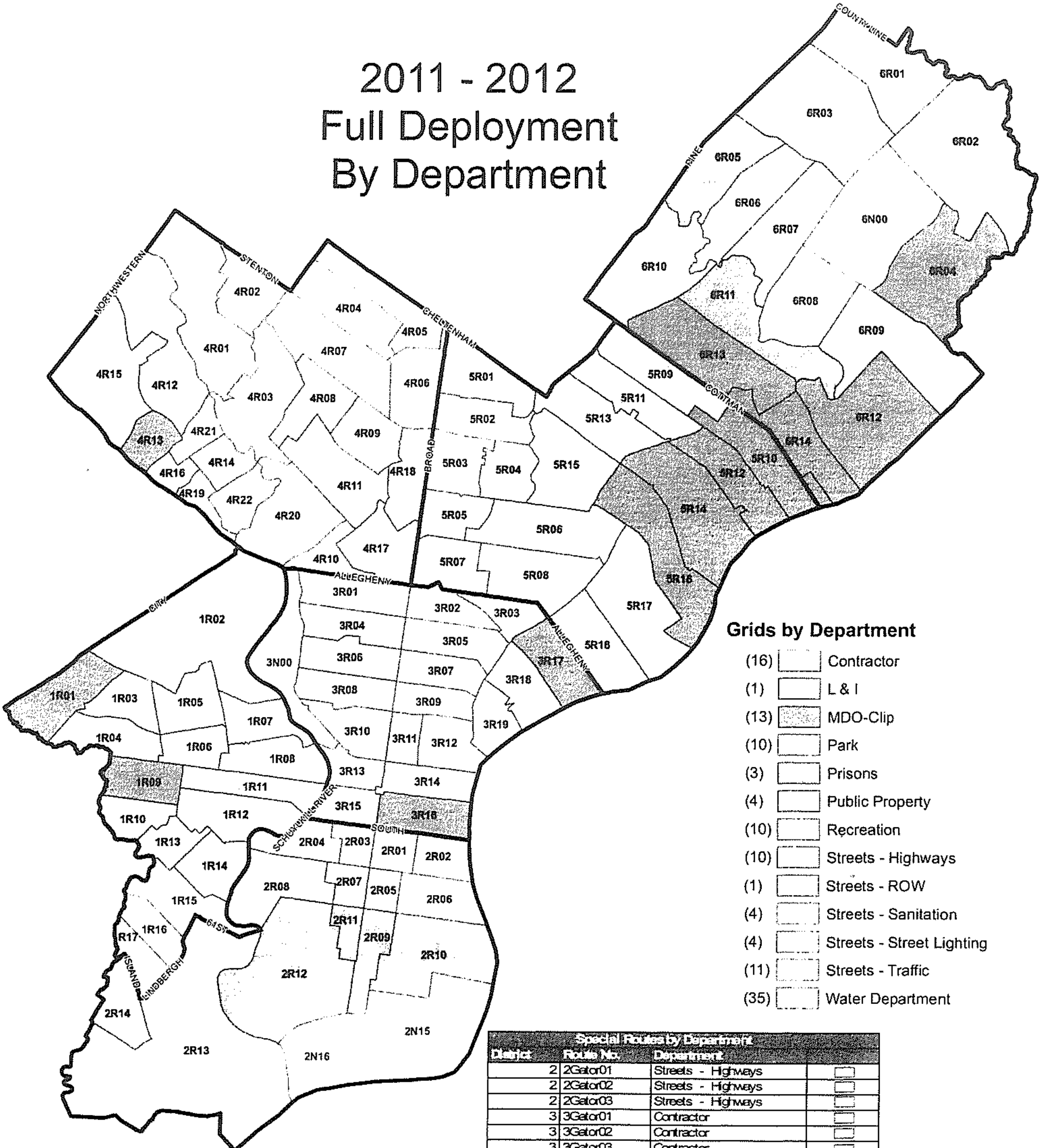
2011 2012 Residential Truck List - FULL DEPLOYMENT

dist	Vehicle	CDL	Grid Assigned	Dept Location	Make	Model	Type	Plow	Salt
			5th Residential						
5	000175	Yes	5R01	Water-Inlet Cleaning	FL	FL-70	6 Yd Dump	FM	TGS
5	085238	No	5R02	Rec	Ford	F350	4x4 Pickup crewcab	FM	V-Box
5	995235	No	5R03	Streets - Traffic	FORD	F250	PICKUP 4X4 SPREADER/PLOW	FM	VBG
5	000180	Yes	5R04	Water-Fox-SM	FL	FL-70	6 Yd Dump	FM	TGS
5	000181	Yes	5R05	Water-Fox-SM	FL	FL-70	6 Yd Dump	FM	TGS
5	080032	No	5R06	Water-BLS Lab/Juniata&Castor	Ford	F350	4x4 Pickup crewcab	FM	V-Box
5	000060	No	5R07	Water-Mnt-29th st	Ford	F450	2 Yd Dump	FM	VBE
5	Vacant	No	5R08	Vacant-Contractor					
5	000062	No	5R09	Water-Shut off-29th St	Ford	F450	2 Yd Dump	FM	VBE
5	025186	No	5R10	MDO-Clip	Ford	F-350	4x4 Pickup	FM	V-box G
5	000061	No	5R11	Water-Mnt-29th st	Ford	F450	2 Yd Dump	FM	VBE
5	025189	No	5R12	MDO-Clip	Ford	F-350	4x4 Pickup	FM	V-box G
5	080033	No	5R13	Water- Delaware Pumping (state/torresdale)	Ford	F350	4x4 Pickup crewcab	FM	V-Box
5	065088	No	5R14	MDO-Clip	Ford	F350	4x4 Pickup crewcab	FM	V-box H
5	000182	Yes	5R15	Water-Fox-SM	FL	FL-70	6 Yd Dump	FM	TGS
5	045168	No	5R16	MDO-Clip			pickup	FM	NA
5	970021	Yes	5R17	Water-Mnt-29th st	FL	FL-70	6 Yd Dump	FM	TGS
5	110005	Yes	5R18	Water-NE Plant		F350	Pickup	FM	VBE
	4 per shift	Extra Navigators assigned for extra Contractor Pickups							
	1	pipen inspectors assigned							

2011 2012 Residential Truck List - FULL DEPLOYMENT

dist	Vehicle	CDL	Grid Assigned	Dept Location	Make	Model	Type	Plow	Salt
			6th Residential						
6	Vacant	No	6Pickup01	Vacant-Contractor					
6	080036	No	6Pickup02	Water-Lardners PT	Ford	F350	4x4 Pickup crewcab	FM	V-Box
6	085267	No	6Pickup03	Prisons	FORD	F350	SPREADER/PLOW	FM	VBE
6	Vacant	No	6Pickup04	Vacant-Contractor					
6	085252	No	6Pickup05	Streets-ROW	Ford	F350	Pickup 4X4	FM	V-Box
6	085259	No	6Pickup06	Prisons	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBE
6	000177	Yes	6R01	Water-Lardners PT	FL	FL-70	6 Yd Dump	FM	TGS
6	000173	Yes	6R02	Water-Lardners PT	FL	FL-70	6 Yd Dump	FM	TGS
6	000174	Yes	6R03	Water-Lardners PT	FL	FL-70	6 Yd Dump	FM	TGS
6	045167	No	6R04	MDO-Clip	GMC	2500	4x4 Pickup	FM	V-box H
6	085248	No	6R05	Prisons	Ford	F350	4x4 Pickup crewcab	FM	V-Box
6	Vacant	No	6R06	Vacant-Contractor					
6	000176	Yes	6R07	Water-Lardners PT	FL	FL-70	6 Yd Dump	FM	TGS
6	950308	No	6R08	Streets - Traffic	Ford	F250	4x4 Pickup	FM	N/A
6	010092	No	6R09	Water-Lardners PT	Ford	F250	4x4 Pickup	FM	NA
6	000179	Yes	6R10	Water-Lardners PT	FL	FL-70	6 Yd Dump	FM	TGS
6	970040	Yes	6R11	L&I	FL	FL-70	Hooklift	FM	V-BOX
6	045169	No	6R12	MDO-Clip	GMC	2500	4x4 Pickup	FM	V-box H
6	045170	No	6R13	MDO-Clip	GMC	Sierra	4x4 Pickup	FM	VBH
6	025188	No	6R14	MDO-Clip	Ford	F-350	4x4 Pickup	FM	V-box G
	3 per shift	Extra Navigators assigned for extra Contractor Pickups							
	3	pipen inspectors assigned							

2011 - 2012
Full Deployment
By Department



Special Routes by Department

District	Route No.	Department	
2	2Gator01	Streets - Highways	
2	2Gator02	Streets - Highways	
2	2Gator03	Streets - Highways	
3	3Gator01	Contractor	
3	3Gator02	Contractor	
3	3Gator03	Contractor	
3	3Gator04	Contractor	
3	3Gator05	Contractor	
4	4Gator01	Streets - Highways	
4	4Gator02	Streets - Highways	
4	4Gator03	Contractor	
4	4Gator04	Contractor	
6	6Pickup01	Contractor	
6	6Pickup02	PWD	
6	6Pickup03	Prisons	
6	6Pickup04	Contractor	
6	6Pickup05	Streets - ROW	
6	6Pickup06	Prisons	

Map Modified November 4 2011

Section 4.6

Residential Street System
Route Personnel (Drivers & Navigators)

- Conditional Hill Deployment
- Full Deployment

Conditional Hill Deployment Assignments - Residential Hill Routes

Hill Route	Shift	Duty	EmployeeName	Department	Work Location
1st Residential - Conditional Hill Routes - Drivers & Navigators					
1Hill01	A	Driver	PHILLIPS, LAWRENCE	Water Department	Sewer Maint-49th St
1Hill01	A	Navigator	BRODIE JR, LIONEL	Water Department	Sewer Maint-49th St
1Hill01	B	Driver	BURTON, ZACHARY E	Water Department	Sewer Maint-49th St
1Hill01	B	Navigator	WARRICK, R	Water Department	Sewer Maint-49th St
4th Residential - Conditional Hill Routes - Drivers & Navigators					
4Hill01	A	Driver	MILLER, EDWIN	Water Department	Sewer Maint-Fox St
4Hill01	A & B	Navigator	BOND, JAMES	Water Department	Sewer Maint-Fox St
4Hill01	B	Driver	BALL JR, REUBEN	Water Department	Sewer Maint-Fox St
4Hill02	A & B	Driver & Navigator	HEATH, JAMAL	Streets Department	Traffic
4Hill02	A & B	Driver & Navigator	SCOTT, GREGORY	Streets Department	Traffic
4Hill03	A	Driver	MIDDLETON, THOMAS	Water Department	Sewer Maint-Fox St
4Hill03	A	Navigator	DEAN, RONNIE	Water Department	Sewer Maint-Fox St
4Hill03	B	Driver	HACKNEY, KEITH	Water Department	Sewer Maint-Fox St
4Hill03	B	Navigator	BLACKSHEAR, KEVIN	Water Department	Sewer Maint-Fox St
4Hill04	A	Driver	COOPER, GARRETT	Water Department	Inlet Cleaning-Fox St
4Hill04	A	Navigator	SIMPKINS, SHAWN	Water Department	Inlet Cleaning-Fox St
4Hill04	B	Driver	SUBER, RUSSELL	Water Department	Inlet Cleaning-Fox St
4Hill04	B	Navigator	JAROSZEWSKI, MARK	Water Department	Inlet Cleaning-Fox St
4Hill05	A	Driver	VARGHESE, THAMPAN	Streets Department	Street Lighting
4Hill05	A	Driver & Navigator	BROWN, CLARENCE	Streets Department	Street Lighting
4Hill05	B	Driver	CAHILL, EDWARD W	Streets Department	Street Lighting
4Hill05	B	Navigator	RYBAKOWSKI, THOMAS	Streets Department	Street Lighting
4Hill06	A & B	Driver & Navigator	DIXON, GEORGE	Streets Department	Street Lighting
4Hill06	A & B	Driver & Navigator	DIXON, TOM	Streets Department	Street Lighting
4Hill07	A & B	Driver & Navigator	CARR, DENNIS	Streets Department	Traffic
4Hill07	A & B	Driver & Navigator	DAVIS, RECHI E	Streets Department	Traffic
4Hill08	A & B	Driver & Navigator	SANDERS, RICHARD	Streets Department	Traffic
4Hill08	A & B	Driver & Navigator	ANDREWS, ROBERT	Streets Department	Traffic
4Hill09	A & B	Driver & Navigator	SHERMAN, NATHANIEL E	Streets Department	Traffic
4Hill09	A & B	Driver & Navigator	GRANT, LANCE	Streets Department	Traffic
4Hill10	A & B	Driver & Navigator	HOCKADAY, DEVIN	Streets Department	Traffic
4Hill10	A & B	Driver & Navigator	MORALES, JOSE	Streets Department	Traffic
4Hill11	A & B	Driver & Navigator	MAKO, JAMES	Fairmount Park Commission	Park
4Hill12	A & B	Driver & Navigator	O'BRIEN, DAN	Fairmount Park Commission	Park
6th Residential - Conditional Hill Routes - Drivers & Navigators					
6Hill01	A	Navigator	WHITAKER, CURTIS	Water Department	Sewer Maint-Lardner
6Hill01	B	Navigator	DENNIS, PHILIP	Water Department	Sewer Maint-Lardner
6Hill02	A	Navigator	KEY JR, JOHN	Water Department	Sewer Maint-Lardner
6Hill02	A & B	Driver	QUATTLEBUM, JUDY	Water Department	Sewer Maint-Lardner
6Hill02	B	Navigator	CRUZ, ANGELO	Water Department	Sewer Maint-Lardner

Conditional Hill Deployment Assignments - Residential Trucks for Highway Yards						
Hill Truck ID	**Hwy Yard**	**Shift**	**Duty**	**EmployeeName**	**Department**	**Work Location**
Residential Drivers & Navigators for 2nd Highway Yard						
2PSYard01	2nd - 63rd St.	A	Driver	SPENNATO JR, NEAL	Water Department	Sewer Maint-Fox St
2PSYard01	2nd - 63rd St.	A & B	Navigator	ROSALES, RICARDO	Water Department	Sewer Maint-Fox St
2PSYard01	2nd - 63rd St.	B	Driver	SANDERS, AARON	Water Department	Sewer Maint-Fox St
2PSYard02	2nd - 63rd St.	A	Driver	DUNCAN, DERRELL	Water Department	Sewer Maint-Fox St
2PSYard02	2nd - 63rd St.	A	Navigator	SANDERS JR, JOSEPH	Water Department	Sewer Maint-Fox St
2PSYard02	2nd - 63rd St.	B	Driver	CLARK, CURTIS	Water Department	Sewer Maint-Fox St
2PSYard02	2nd - 63rd St.	B	Navigator	FASSETT, BRUCE	Water Department	Sewer Maint-Fox St
Residential Drivers & Navigators for 3rd Highway Yard						
3PSYard01	3rd - 21st & York	A	Navigator	LAPORTE, CHARLES J	Water Department	Sewer Maint-Fox St
3PSYard01	3rd - 21st & York	A & B	Driver	WHITE, JEREMIAH	Water Department	Sewer Maint-Fox St
3PSYard01	3rd - 21st & York	B	Navigator	RAYNER, RONALD	Water Department	Sewer Maint-Fox St
3PSYard02	3rd - 21st & York	A	Driver	SHANNON, GERALD	Water Department	Inlet Cleaning-Fox St
3PSYard02	3rd - 21st & York	B	Driver	CAMPBELL, MICHAEL J	Water Department	Inlet Cleaning-Fox St
3PSYard02	3rd - 21st & York	B	Navigator	PETTET, PAUL	Water Department	Inlet Cleaning-Fox St
3PSYard03	3rd - 21st & York	A	Driver	PROCOPIO, RENATO	Water Department	Inlet Cleaning-Fox St
3PSYard03	3rd - 21st & York	A & B	Navigator	REID, DARRYL	Water Department	Inlet Cleaning-Fox St
3PSYard03	3rd - 21st & York	B	Driver	WRIGHT, HAROLD	Water Department	Inlet Cleaning-Fox St

Full Deployment Assignments - Residential Routes

11/7/2011

Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
1st RESIDENTIAL - ROUTE DRIVERS & NAVIGATORS					
1R01	A	Driver	ROLLINS, JERMAINE	Mayor's Office of Community Services	Anti Graffiti
1R01	A	Navigator	ALEXANDER, AARON	Mayor's Office of Community Services	CLIP
1R01	B	Driver	ADAMS, JOHN	Mayor's Office of Community Services	Anti Graffiti
1R01	B	Navigator	GARRICK, BENJAMIN	Mayor's Office of Community Services	GAT
1R02	A & B	Driver & Navigator	WILDER, CARNELL	Recreation Department	Southern Grounds
1R03	A & B	Driver & Navigator	GOODWIN, JOHN	Recreation Department	FDR Park
1R04	A & B	Driver & Navigator	WILLIAMS, KHALIL	Recreation Department	Southern Grounds
1R05	A & B	Driver & Navigator	WARFIELD, WILLIAM	Recreation Department	FDR Park
1R06	A & B	Driver & Navigator	MOORE, JOHN	Fairmount Park Commission	DISTRICT #8
1R07	A & B	Driver & Navigator	PETERSON, JOHN	Fairmount Park Commission	Park
1R08	A & B	Driver & Navigator	DORSEY, DEVERICK	Fairmount Park Commission	DISTRICT #8
1R09	A	Driver	TURRENTINE JUSTIN	Mayor's Office of Community Services	GAT
1R09	A	Navigator	JEFFREYS, LAMONT	Mayor's Office of Community Services	
1R09	B	Navigator	WILSON, MILES	Mayor's Office of Community Services	63rd & Passyunk Ave
1R09	B	Navigator	WILLIAMS, CHARLES	Mayor's Office of Community Services	CLIP
1R10	A	Driver	JOHNSON, JOETTA A	Water Department	Sewer Maint-49th St
1R10	A	Navigator	MURPHY, HASHIM A	Water Department	Sewer Maint-49th St
1R10	B	Driver	SPENCE JR, THERMON	Water Department	Inlet Cleaning-Fox St
1R10	B	Navigator	MERRELL-MILLER, BRENDA	Water Department	Inlet Cleaning-Fox St
1R11	A	Driver	INDAN, STEVEN	Water Department	SE Plant
1R11	A	Navigator	MONTS, DONALD	Water Department	SE Plant
1R11	B	Driver	WILSON, ROBERT	Water Department	Inlet Cleaning-Fox St
1R11	B	Navigator	JOHNSON, LORENZO	Water Department	Inlet Cleaning-Fox St
1R12	A	Driver	BURTON, ZACHARY E	Water Department	Sewer Maint-49th St
1R12	A	Navigator	DANIEL, JAMES	Water Department	Sewer Maint-49th St
1R12	B	Driver	PHILLIPS, LAWRENCE	Water Department	Sewer Maint-49th St
1R12	B	Navigator	BURTON, BERNARD	Water Department	Sewer Maint-49th St
1R13	A	Driver	GOODMAN, LAWRENCE	Water Department	Sewer Maint-49th St
1R13	A	Navigator	STINNEY, JEROME	Water Department	Sewer Maint-49th St
1R13	B	Driver	PUGH, DERRICK	Water Department	Inlet Cleaning-Fox St
1R13	B	Navigator	CROMWELL, ROMAINE	Water Department	Inlet Cleaning-Fox St
1R14	A	Driver	BROWN, GLORIA	Water Department	SE Plant
1R14	A	Navigator	WILLIAMS, LEROY	Water Department	SE Plant
1R14	B	Driver	MCBETH, JERRY	Water Department	Inlet Cleaning-Fox St
1R14	B	Navigator	CROSS JR, DONALD	Water Department	Inlet Cleaning-Fox St
1R15	A	Driver	RUSSELL, CALVIN	Streets Department	Sanitation CFM
1R15	A	Navigator	SMITH, DOUGLAS	Streets Department	Sanitation CFM
1R15	B	Driver	GIBSON, DAMON	Streets Department	Sanitation A1
1R15	B	Navigator	ROBINSON, KEVIN	Streets Department	Sanitation CFM
1R16	A	Driver	RICE, CHARLES RAY	Streets Department	Sanitation CFM
1R16	A	Navigator	CHRISTY, ALBERT	Streets Department	Sanitation A1
1R16	B	Driver	MYRIE, DELROY	Streets Department	Sanitation A1
1R16	B	Navigator	CLARK, NICHOLAS	Streets Department	Sanitation CFM
1R17	A	Driver	MICHI, HERBERT	Water Department	SE Plant
1R17	A	Navigator	RIVERA, JIMMIE	Water Department	SE Plant
1R17	B	Driver	PROCOPIO, RENATO	Water Department	Inlet Cleaning-Fox St
1R17	B	Navigator	GIBBS, DOMINICK	Water Department	Inlet Cleaning-Fox St
Extra Personnel - Departments to Substitute as Needed					
1R Reserve	A & B	Driver	HERRINGTON, CHARLES	Streets Department	Sanitation A1
1R Reserve	A & B	Driver	SCRUGGS, JAMES	Streets Department	Sanitation A1
1R Reserve	A & B	Driver	SPEIGHTS, SAMUAL	Streets Department	Sanitation A1
1st RESIDENTIAL - EXTRA NAVIGATORS FOR EXTRA CONTRACTOR PICKUPS (CALLED IN AS NEEDED)					
1R Contractor	A	Extra Navigator	WHITE, STANTON	Streets Department	Sanitation A1
1R Contractor	A	Extra Navigator	PORTER, JOSEPH	Streets Department	Sanitation A1
1R Contractor	A	Extra Navigator	WALKER, MELVIN	Streets Department	Sanitation A1
1R Contractor	A	Extra Navigator	MULLINGS, NORMAN	Streets Department	Sanitation A1
1R Contractor	A	Extra Navigator	WILLIAMS, HENRY T	Streets Department	Sanitation A1
1R Contractor	A	Extra Navigator	JACKSON, ANTONIO	Streets Department	Sanitation Sweep
1R Contractor	B	Extra Navigator	MCFARLAND, SHARIF	Streets Department	Sanitation A1
1R Contractor	B	Extra Navigator	RUTLEDGE, JEROME	Streets Department	Sanitation A1
1R Contractor	B	Extra Navigator	VERDELL, WILLIAM	Streets Department	Sanitation A1
1R Contractor	B	Extra Navigator	TALINGTON, ISIAH	Streets Department	Sanitation A1
1R Contractor	B	Extra Navigator	SCOTT, KIM	Water Revenue	Water Revenue-MSB
1R Contractor	B	Extra Navigator	CHAVIS, BRIAN	Streets Department	Sanitation Sweep

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
2nd RESIDENTIAL - ROUTE DRIVERS & NAVIGATORS					
2Gator01	A & B	Driver	GOODMAN, JEROME L	Streets Department	Hwy-CMU
2Gator01	A & B	Navigator	BRESLIN, MICHAEL	Streets Department	Hwy-CMU
2Gator02	A	Driver	WILLIAMS, CHARLES	Streets Department	Sanitation A2
2Gator02	A	Navigator	GARNER, YVONNE D	Streets Department	Sanitation Sweep
2Gator02	B	Driver	WORTHINGTON, KEVIN	Streets Department	Sanitation A2
2Gator02	B	Navigator	TALINGTON, TYRONE	Streets Department	Sanitation A2
2Gator03	A & B	Driver	MOORE, ELTON	Streets Department	Hwy-CMU
2Gator03	A & B	Navigator	JOHNSON, ROBERT	Streets Department	Hwy-CMU
2R01	A & B	Driver & Navigator	DREWERY, DWIGHT	Recreation Department	DISTRICT #7
2R02	A & B	Driver & Navigator	FORTUNE, MELVIN	Fairmount Park Commission	DISTRICT #7
2R03	A	Driver	CHEA, WESSEH	Streets Department	Sanitation CFM
2R03	A	Navigator	HUMPHREY, BERNADINE	Streets Department	Sanitation A2
2R03	B	Driver	MCCOY, RICARDO	Streets Department	Sanitation A2
2R03	B	Navigator	KOEHNLEIN, JOHN	Streets Department	Sanitation CFM
2R04	A & B	Driver & Navigator	RIOS, JANET	Recreation Department	DISTRICT #7
2R05	A	Driver	MCCLOUD, THOMAS	Water Department	SE Plant
2R05	A	Navigator	BLAGMON, CLAUDE	Water Department	SE Plant
2R05	B	Driver	ROCKMORE, TERREN	Water Department	Inlet Cleaning-Fox St
2R05	B	Navigator	WALTON, RICARDO	Water Department	Inlet Cleaning-Fox St
2R06	A	Driver	MAYO, WILLIAM	Streets Department	Sanitation CFM
2R06	A	Navigator	KIRBY, JEFFREY	Streets Department	Sanitation A2
2R06	B	Driver	DOUMBIA, MOUSSA	Streets Department	Sanitation A2
2R06	B	Navigator	HICKS, ANTOINE	Streets Department	Sanitation A2
2R07	A	Driver	BAXTER, CLIFTON	Water Department	Sewer Maint-49th St
2R07	A	Navigator	FLINT, JUSTIN	Water Department	Sewer Maint-49th St
2R07	B	Driver	THOMPSON, JEFFREY	Water Department	Inlet Cleaning-Fox St
2R07	B	Navigator	WARRICK, R	Water Department	Sewer Maint-49th St
2R08	A	Driver	ALEXANDER, CALVIN	Water Department	Sewer Maint-49th St
2R08	A	Navigator	GREEN, DWIGHT	Water Department	Sewer Maint-49th St
2R08	B	Driver	GILLIAM SR, LARRY	Water Department	Inlet Cleaning-Fox St
2R08	B	Navigator	WILLIAMSON, JAMES	Water Department	Sewer Maint-49th St
2R09	A	Driver	SMITH, WILLIAM A	Public Property	Building Services
2R09	A	Driver & Navigator	BIELAWSKI, THOMAS	Public Property	Building Services
2R09	B	Driver	WALKER, WILLIAM	Public Property	Facilities Mgmt
2R10	A	Driver	SMITH, RICHARD	Public Property	Building Services
2R10	A & B	Driver & Navigator	LUPTAK, DANIEL	Public Property	Building Services
2R10	B	Driver	BREHM, NICK	Public Property	
2R11	A	Driver	FISCHER, ROBERT	Public Property	
2R11	A & B	Driver & Navigator	WEST III, JAMES	Public Property	Building Services
2R11	B	Driver	FORD, MARK	Public Property	
2R12	A	Driver	BUTLER SR, CALVIN	Public Property	Building Services
2R12	A & B	Driver & Navigator	KALAPARMAMBATH, JOY	Public Property	Building Services
2R12	B	Driver	MURPHY, JAMES	Public Property	
2R13	A	Driver	PHARO, MICHAEL	Water Department	SE Plant
2R13	A & B	Navigator	CORDANO, ALFRED	Water Department	SE Plant
2R13	B	Driver	BROWN, ANTHONY	Water Department	Inlet Cleaning-Fox St
2R13	B	Navigator	PETTET, PAUL	Water Department	Inlet Cleaning-Fox St
2R14	A	Driver	MARTORANO	Water Department	Sewer Maint-49th St
2R14	A	Navigator	BRODIE JR, LIONEL	Water Department	Sewer Maint-49th St
2R14	B	Driver	GEDDES, ALBERT	Water Department	Inlet Cleaning-Fox St
2R14	B	Navigator	WATSON, R	Water Department	Sewer Maint-49th St
2nd RESIDENTIAL - EXTRA NAVIGATORS FOR EXTRA CONTRACTOR PICKUPS (CALLED IN AS NEEDED)					
2R Contractor	A	Extra Navigator	TYSON, CHRISTOPHER	Streets Department	Sanitation Sweep
2R Contractor	A	Extra Navigator	WAITES, JOHN M	Streets Department	Sanitation Sweep
2R Contractor	A	Extra Navigator	HOUSTON, SERENE	Streets Department	Sanitation Sweep
2R Contractor	A	Extra Navigator	DAVIS, ANNETTE	Streets Department	Sanitation Sweep
2R Contractor	A	Extra Navigator	OVERTON, KURTIS	Streets Department	Sanitation Sweep
2R Contractor	B	Extra Navigator	LONDON, CASSANDRA	Streets Department	Sanitation Sweep
2R Contractor	B	Extra Navigator	SPROWAL, DAWN	Streets Department	Sanitation A3
2R Contractor	B	Extra Navigator	WASHINGTON, WARREN	Streets Department	Sanitation A2
2R Contractor	B	Extra Navigator	PHELPS-WASHINGTON, JAVESE M	Streets Department	Sanitation Sweep

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
3rd RESIDENTIAL - ROUTE DRIVERS & NAVIGATORS					
3Gator01	A	Navigator	WALKER-FRAZIER, ODESA	Water Revenue	MSB-Concourse
3Gator02	A	Navigator	BLAIR, TAMIKA	Water Revenue	MSB-Concourse
3Gator03	A	Navigator	BARLOW JR, OTIS	Water Revenue	MSB-Concourse
3Gator04	A	Navigator	MCMILLIAN, MICHELLE	Streets Department	Sanitation Sweep
3Gator04	B	Navigator	SANDERS, REGINA	Streets Department	Sanitation A3
3Gator05	A	Navigator	KYAW, NAN	Streets Department	Surveys -City Plans
3Gator05	B	Navigator	WELLS, JOHANE	Water Revenue	MSB-Concourse
3R01	A & B	Driver & Navigator	KENNEDY, SPENCER	Recreation Department	25th & Sedgley
3R02	A & B	Driver & Navigator	MILLER, JOSEPH	Recreation Department	Northern Grounds
3R03	A	Navigator	WELCH, STEVEN	Streets Department	Admin - Accounting
3R03	B	Navigator	BURNS, WHITNEY	Streets Department	Admin - Payroll
3R04	A	Driver	COOPER, GARRETT	Water Department	Inlet Cleaning-Fox St
3R04	A	Navigator	JAROSZEWSKI, MARK	Water Department	Inlet Cleaning-Fox St
3R04	B	Driver	SIMPKINS, SHAWN	Water Department	Inlet Cleaning-Fox St
3R04	B	Navigator	SUBER, RUSSELL	Water Department	Inlet Cleaning-Fox St
3R05	A	Navigator	MCFARLAND, OMAR	Streets Department	Sanitation A3
3R05	B	Navigator	DRAKE, JEFFREY	Streets Department	Admin - Payroll
3R06	A	Driver	DAWSON, DARREN	Water Department	Sewer Maint-Fox St
3R06	A	Navigator	BENTLEY, SHARRON	Water Department	Sewer Maint-Fox St
3R06	B	Driver	DUNCAN, DERRELL	Water Department	Sewer Maint-Fox St
3R06	B	Navigator	FASSETT, BRUCE	Water Department	Sewer Maint-Fox St
3R07	A & B	Driver	BARR, KEVIN	Streets Department	Hwy-CMU
3R07	A & B	Navigator	NATER, WILLIAM	Streets Department	Hwy-CMU
3R08	A & B	Driver & Navigator	HIGHTOWER, FREDERICK	Recreation Department	25th Sedgley
3R09	A	Driver	SANDERS, RICHARD	Streets Department	Traffic
3R09	A & B	Navigator	YOUNG, RODRICK	Streets Department	Traffic
3R09	B	Driver	PERRY, JONTHAN	Streets Department	Sanitation A3
3R10	A & B	Driver & Navigator	O'BRIEN, DAN	Fairmount Park Commission	Park
3R11	A & B	Driver	ANDREWS, ROBERT	Streets Department	Traffic
3R11	A & B	Navigator	STAID, DENNIS	Streets Department	Street Lighting
3R12	A	Navigator	PARIS, GAY	Water Revenue	Water Revenue-MSB
3R12	B	Navigator	INGRAM, HAROLD	Water Revenue	MSB-Concourse
3R13	A	Driver	PHINIZY, EARL G	Streets Department	Traffic
3R13	A & B	Navigator	SULLIVAN, JAMEL	Streets Department	Traffic
3R13	B	Driver	QUAIL JR, ANTHONY	Streets Department	Sanitation A3
3R14	A & B	Driver	HEARD, ELMER	Streets Department	Traffic
3R14	A & B	Navigator	SHAW, JANET	Streets Department	Hwy-CMU
3R15	A	Driver	COUNCIL, ERIC	Water Department	Sewer Maint-49th St
3R15	A	Navigator	FASSETT, SETH	Water Department	Sewer Maint-49th St
3R15	B	Driver	BLAKLEY, JESSE	Water Department	Inlet Cleaning-Fox St
3R15	B	Navigator	TAYLOR, BRYAN	Water Department	Inlet Cleaning-Fox St
3R16	A	Driver	HEARNS, ALVERETTA	Mayor's Office of Community Services	MSB 9th Floor
3R16	A	Driver	WEEKS, REGINALD	Licenses and Inspections	CLIP
3R16	B	Driver	SMITH, FRANCES	Mayor's Office of Community Services	ESAU
3R16	B	Navigator	SQUIRE, KENNY	Mayor's Office of Community Services	4000 N. American St
3R17	A	Driver	BALDWIN, ROBERT	Mayor's Office of Community Services	CLIP
3R17	A	Navigator	HIGGINS, MARTIN	Licenses and Inspections	CLIP
3R17	B	Navigator	BAKER, YVETTE A	Mayor's Office of Community Services	4600 Luzurne
3R18	A	Driver	SPENNATO JR, NEAL	Water Department	Sewer Maint-Fox St
3R18	A	Navigator	RAYNER, RONALD	Water Department	Sewer Maint-Fox St
3R18	B	Driver	HARRIS, CARL	Water Department	Sewer Maint-Fox St
3R18	B	Navigator	SANDERS JR, JOSEPH	Water Department	Sewer Maint-Fox St
3R19	A	Driver	CLARK, JOVAN	Streets Department	Sanitation A5
3R19	A & B	Navigator	BROCKINGTON, WILLIAM C	Streets Department	Hwy-CMU
3R19	B	Driver	LEGAGNEAR, RICHARDSON	Streets Department	Sanitation A5

Full Deployment Assignments - Residential Routes

11/7/2011

Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
Extra Personnel - Departments to Substitute as Needed					
3R Reserve	A & B	Driver	KNOX, DORTAY	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Driver	JACKSON RICHARD A	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Driver	FLANAGAN, STEFAN	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Driver	DEAN, RONNIE	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Driver	BESS, BRIAN	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Navigator	WOODALL, MALIK	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	REID, DARRYL	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Navigator	TAYLOR, ANDREW	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	MAHONEY, GLENN	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Navigator	MORGAN, RASHAE	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Navigator	KLETZMAN, LESLIE	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Navigator	ROBINSON, STEVE	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	HALL, CHARLES	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	CORE, RONALD	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	MARCELLINO, MARIE	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	STURDIVANT, WILLIAM	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	BOYER, OOM	Water Department	Sewer Maint-Fox St
3R Reserve	A & B	Navigator	WRIGHT, HAROLD	Water Department	Inlet Cleaning-Fox St
3R Reserve	A & B	Navigator	PILOSKY, BARRY	Water Department	Sewer Maint-Fox St
3rd RESIDENTIAL - EXTRA NAVIGATORS FOR EXTRA CONTRACTOR PICKUPS (CALLED IN AS NEEDED)					
3R Contractor	A	Extra Navigator	MOORE, KAREEM	Streets Department	Sanitation A3
3R Contractor	A	Extra Navigator	MOORE, STEPHANIE	Water Revenue	MSB-Concourse
3R Contractor	A	Extra Navigator	WILSON, RODNEY	Streets Department	Sanitation A3
3R Contractor	A	Extra Navigator	SMITH, LARNSELL	Streets Department	Sanitation Sweep
3R Contractor	A	Extra Navigator	BOONE, ELROY	Streets Department	Sanitation A3
3R Contractor	B	Extra Navigator	HAWKINS, LORETTA	Streets Department	Sanitation Sweep
3R Contractor	B	Extra Navigator	JOYNER, RENEE	Streets Department	Sanitation Sweep
3R Contractor	B	Extra Navigator	GORDY, ANTHONY	Streets Department	Sanitation Sweep
3R Contractor	B	Extra Navigator	PERLOTE, STEPHANIE	Streets Department	Sanitation Sweep
3R Contractor	B	Extra Navigator	DAWSON, BASHIR	Streets Department	Sanitation A3

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
4th RESIDENTIAL - ROUTE DRIVERS & NAVIGATORS					
4Gator01	A & B	Driver	LARUE, EARL	Streets Department	Street Lighting
4Gator01	A & B	navigator	BEATTY, JUANITA	Streets Department	Traffic
4Gator02	A	Driver	FRED SR, JOEL	Streets Department	Traffic
4Gator02	A & B	Navigator	SPURILL, EDENA	Streets Department	Traffic
4Gator02	B	Driver	WESCOTT, ANGELA	Streets Department	Sanitation A5
4Gator03	A & B	Navigator	CARR, DENNIS	Streets Department	Traffic
4Gator04	A & B	Navigator	DAVIS, RECHI E	Streets Department	Traffic
4R01	A	Navigator	MOORE, JOHN	Streets Department	Traffic
4R01	B	Navigator	COLLINS, KHALEF	Streets Department	9th Survey
4R02	A & B	Driver & Navigator	WILLIAMS, SAM	Recreation Department	Mallery
4R03	A & B	Driver & Navigator	GRANER, MARTIN	Recreation Department	Awbury
4R04	A	Driver	VARUGHESE, KURIEN	Streets Department	Traffic
4R04	A & B	Navigator	HUTCHINSON, CARL	Streets Department	Traffic
4R04	B	Driver	HOLLAND, KENNETH	Streets Department	Sanitation A4
4R05	A & B	Driver & Navigator	JOHNSON, RAYMOND	Recreation Department	22nd & Sedgley
4R06	A & B	Driver & Navigator	ROMANOWSKI, MIKE	Recreation Department	DISTRICT #3
4R07	A & B	Driver & Navigator	GRANT, LANCE	Streets Department	Traffic
4R07	A & B	Driver & Navigator	SHERMAN, NATHANIEL E	Streets Department	Traffic
4R08	A & B	Driver & Navigator	VARGHESE, THAMPAN	Streets Department	Street Lighting
4R08	A & B	Navigator	RYBAKOWSKI, THOMAS	Streets Department	Street Lighting
4R09	A & B	Navigator	APOINTE, ERIC	Streets Department	Traffic
4R10	A	Driver	BUCKNER, CURTIS	Streets Department	Traffic
4R10	A & B	Navigator	SIMMONS, ANTOINETTE	Streets Department	Traffic
4R10	B	Driver	COLLINS, WILLIAM	Streets Department	Sanitation A4
4R11	A	Driver	TAYLOR, SAMUEL	Water Department	29th Facilities Mgmt
4R11	A	Navigator	WELDON, RICHARD	Water Department	29th Facilities Mgmt
4R11	B	Driver	KEENAN, ROBERT	Water Department	29th Facilities Mgmt
4R11	B	Navigator	WILLIAMS, RONALD	Water Department	29h Cambria
4R12	A & B	Driver & Navigator	MAKO, JAMES	Fairmount Park Commission	Park
4R13	A	Driver	BUNDY, JEFFREY	Licenses and Inspections	Richmond & Lewis
4R13	A	Driver & Navigator	JEWELL, JESSE	Mayor's Office of Community Services	
4R13	B	Driver	LONDON, TIMOTHY	Licenses and Inspections	Batement Unit
4R13	B	Navigator	RUIZ, DAVID	Licenses and Inspections	Clean and Seal
4R14	A & B	Driver	APPLING, ANTHONY	Streets Department	Hwy-CMU
4R14	A & B	Navigator	BRUNSON, MELVIN D	Streets Department	Hwy-CMU
4R15	A & B	Driver & Navigator	CAHILL, EDWARD W	Streets Department	Street Lighting
4R15	A & B	Driver & Navigator	BROWN, CLARENCE	Streets Department	Street Lighting
4R16	A	Driver	BAKER, ANTHONY	Streets Department	Street Lighting
4R16	A & B	Navigator	WEISS, RITCHIE	Streets Department	Traffic
4R16	B	Driver	FELIX, NISSAGE	Streets Department	Sanitation A4
4R17	A	Driver	BURROUGHS, MARVIN	Water Department	29th Facilities Mgmt
4R17	A	Navigator	SMITH, STEVEN	Water Department	29th Facilities Mgmt
4R17	B	Driver	SAMPSON, HOWARD	Water Department	29th Facilities Mgmt
4R17	B	Navigator	WEBSTER, LEONARD	Water Department	29th Facilities Mgmt
4R18	A	Driver & Navigator	DIXON, GEORGE	Streets Department	Street Lighting
4R18	A & B	Driver & Navigator	DIXON, TOM	Streets Department	Street Lighting
4R18	B	Driver	HALL, DAVID	Streets Department	Sanitation A6
4R19	A & B	Driver	DONAPEL, MICHAEL JR	Streets Department	Traffic
4R19	A & B	Navigator	LOKO, AVESSOU	Streets Department	Traffic
4R20	A	Driver	HEATH, JAMAL	Streets Department	Traffic
4R20	A & B	Navigator	SCOTT, GREGORY	Streets Department	Traffic
4R20	B	Driver	WILSON, ANTHONY	Streets Department	Sanitation A4
4R21	A	Driver	WHITMORE, RAHEEM	Streets Department	Traffic
4R21	A & B	Navigator	VARON, ANTHONY	Streets Department	Traffic
4R21	B	Driver	MCGRIFF, DARIN	Streets Department	Sanitation A4
4R22	A	Driver & Navigator	HOCKADAY, DEVIN	Streets Department	Traffic
4R22	A & B	Driver & Navigator	MORALES, JOSE	Streets Department	Traffic
4R22	B	Driver	ROSS, WILLIAM	Streets Department	Sanitation A3
Extra Personnel - Departments to Substitute as Needed					
4R Reserve	A & B	Driver	SCHAEFER, MARK	Fairmount Park Commission	Park
4R Reserve	A & B	Driver & Navigator	MCKEOWN, ANTHONY	Mayor's Office of Community Services	GAT
4TH RESIDENTIAL - EXTRA NAVIGATORS FOR EXTRA CONTRACTOR PICKUPS (CALLED IN AS NEEDED)					
4R Contractor	A	Extra Navigator	CHAPMAN, RANDY	Streets Department	Sanitation Sweep
4R Contractor	A	Extra Navigator	BINGHAM SR, GREGORY L	Streets Department	Sanitation Sweep
4R Contractor	A	Extra Navigator	WOODS, DAWN	Streets Department	Sanitation Sweep

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
4R Contractor	A	Extra Navigator	EVANS, ERIC	Streets Department	Sanitation A4
4R Contractor	B	Extra Navigator	LATIMORE, ERIC	Streets Department	Traffic
4R Contractor	B	Extra Navigator	SIMS, ANTHONY	Streets Department	Sanitation Sweep
4R Contractor	B	Extra Navigator	CARTER, RONALD	Streets Department	Traffic
4R Contractor	B	Extra Navigator	PAYNE, DAVID	Streets Department	Traffic

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
5th RESIDENTIAL - ROUTE DRIVERS & NAVIGATORS					
5R01	A	Driver	THOMAS, GREGORY	Water Department	Inlet Cleaning-Fox St
5R01	A	Navigator	CLARK, DANIEL	Water Department	Inlet Cleaning-Fox St
5R01	B	Driver	WILCOX, RALPH	Water Department	Inlet Cleaning-Fox St
5R01	B	Navigator	CARRUTH, MICHAEL	Water Department	Inlet Cleaning-Fox St
5R02	A & B	Driver & Navigator	WILLIS, GERALD	Recreation Department	DISTRICT #3
5R03	A	Driver	BEST, DELAIN	Streets Department	Traffic
5R03	A & B	Navigator	COULTER, ALLEN	Streets Department	Traffic
5R03	B	Driver	LACEY, PAUL	Streets Department	Surveys-2nd
5R04	A	Driver	WHITE, JEREMIAH	Water Department	Sewer Maint-Fox St
5R04	A	Navigator	GROBES, RONALD	Water Department	Sewer Maint-Fox St
5R04	B	Driver	SANDERS, AARON	Water Department	Sewer Maint-Fox St
5R04	B	Navigator	ROSALES, RICARDO	Water Department	Sewer Maint-Fox St
5R05	A	Driver	MILLER, EDWIN	Water Department	Sewer Maint-Fox St
5R05	A	Navigator	BOND, JAMES	Water Department	Sewer Maint-Fox St
5R05	B	Driver	THOMAS, DANIEL	Water Department	Sewer Maint-Fox St
5R05	B	Navigator	NEWTON, WILLIAM	Water Department	Sewer Maint-Fox St
5R06	A	Driver	CROSS, TOMMY	Water Department	Sewer Maint-Fox St
5R06	A	Navigator	HALL, JOSEPH	Water Department	Sewer Maint-Fox St
5R06	B	Driver	MOON, JAMES	Water Department	Sewer Maint-Fox St
5R06	B	Navigator	WEEKS, JONATHAN	Water Department	Sewer Maint-Fox St
5R07	A	Driver	OSBORN, KEVIN	Water Department	29h Cambria
5R07	A	Navigator	HALL, ADAM	Water Department	29h Cambria
5R07	B	Driver	MIZELLE, ANTHONY	Water Department	29th Cambria
5R07	B	Navigator	LEWIS, IKIEM	Water Department	29th Meter Shop
5R08	A	Navigator	PRESLEY, PATRICE	Streets Department	Admin - Personnel
5R08	B	Navigator	BARMORE, ERIC	Streets Department	Surveys-2nd
5R09	A	Driver	GILES JR, EMMIT A	Water Department	29th Cambria
5R09	A	Navigator	ROBINSON, JAMES	Water Department	29th cambria
5R09	B	Driver	DOUGLAS, PERSALL	Water Department	29th Cambria
5R09	B	Navigator	MCCRAY, DAMARCUS	Water Department	29th Meter Shop
5R10	A	Driver	BEUTTENMULLER, MICHAEL	Mayor's Office of Community Services	CLIP
5R10	A	Driver	MARUNICH, MATTHEW	Mayor's Office of Community Services	CLIP
5R10	B	Driver	JACOBY, LUKE	Mayor's Office of Community Services	Richmond & Lewis
5R10	B	Navigator	GONZALEZ, DANILO D	Mayor's Office of Community Services	GAT
5R11	A	Driver	CAHILL, JOHN	Water Department	29th Cambria
5R11	A	Navigator	NAST, BOB	Water Department	29th Cambria
5R11	B	Driver	JORDAN, DARNELL	Water Department	29th Meter Shop
5R11	B	Navigator	BRYANT, JOHN	Water Department	29th Meter Shop
5R12	A	Driver	PEACOCK, JAMES C JR.	Mayor's Office of Community Services	CLIP
5R12	A	Navigator	MARCELEWSKI, JOSEPH	Mayor's Office of Community Services	GAT
5R12	B	Driver	HILL, BRIAN	Mayor's Office of Community Services	Anti Graffiti
5R12	B	Navigator	BRICKLEY, BRENT	Licenses and Inspections	CLIP
5R13	A	Driver	PIOTROWICZ, PAUL	Water Department	Water Pumping
5R13	A	Navigator	HAMSKI, FRANCIS	Water Department	Water Pumping
5R13	B	Driver	ADDESIO, ANTHONY	Water Department	Water Pumping
5R13	B	Driver	JOHNSON, GREGORY D	Water Department	Water Pumping
5R14	A	Navigator	WADE, RICHARD	Licenses and Inspections	
5R14	A & B	Driver	FARNON, TIMOTHY	Mayor's Office of Community Services	4000 N. American St
5R14	B	Navigator	LAI, RICKY	Mayor's Office of Community Services	CLIP
5R15	A	Driver	MIDDLETON, THOMAS	Water Department	Sewer Maint-Fox St
5R15	A	Navigator	COYLE, MICHAEL	Water Department	Sewer Maint-Fox St
5R15	B	Driver	HACKNEY, KEITH	Water Department	Sewer Maint-Fox St
5R15	B	Navigator	BLACKSHEAR, KEVIN	Water Department	Sewer Maint-Fox St
5R16	A	Navigator	HORVAY, KEVIN	Mayor's Office of Community Services	CLIP
5R16	A & B	Driver	HILL, EDWARD	Mayor's Office of Community Services	CLIP
5R16	B	Navigator	KENNY, KEVIN P	Mayor's Office of Community Services	GAT
5R17	A	Driver	DILLON, EDWARD	Water Department	29th Cambria
5R17	A	Navigator	WATSON JR, BILLY W	Water Department	29th Clearfield
5R17	B	Driver	GRAVES III, HARRY	Water Department	29th Cambria
5R17	B	Navigator	MORGAN, EARL	Water Department	29th Meter Shop
5R18	A	Driver	HUBBARD, MIKE	Water Department	NE Plant - Lewis St
5R18	A	Navigator	CAMPBELL, MICHAEL J	Water Department	NE Plant - Lewis St
5R18	B	Driver	RENFER, KENNETH	Water Department	NE Plant - Lewis St
5R18	B	Navigator	KELLETT, THOMAS	Water Department	NE Plant - Lewis St

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
Extra Personnel - Departments to Substitute as Needed					
5R Reserve	A & B	Driver	NELSON, SEAN	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Driver	BALL JR, REUBEN	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Driver	GREEN, EVELYN	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Driver	WATSON, CARL	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Driver	BROWN, CHARLES	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Driver	MCILHENNY, MICHAEL	Streets Department	Sanitation A5
5R Reserve	A & B	Driver	RODGERS JR, EDWARD J	Water Department	Water Pumping
5R Reserve	A & B	Driver	PAONE JR, VINCENT	Water Department	Water Pumping
5R Reserve	A & B	Driver	JONES, JOSEPH E	Water Department	Water Pumping
5R Reserve	A & B	Driver	HINES, JAMES	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Driver	TAYLOR, ERIC	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Driver	CLARK, CURTIS	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Navigator	BESS, KEVIN	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Navigator	MILLS, MICHAEL	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Navigator	Cruz Jr., Edward	Water Department	Sewer Maint-Fox St
5R Reserve	A & B	Navigator	FORD, BARRY D	Water Department	29th Meter Shop
5R Reserve	A & B	Navigator	THOMPSON, LAWRENCE	Water Department	Inlet Cleaning-Fox St
5R Reserve	A & B	Navigator	DELISI, PETER	Water Department	Water Pumping
5R Reserve	A & B	Navigator	CAULLEY, RANDOLPH	Water Department	Inlet Cleaning-Fox St
5R Reserve	A & B	Navigator	LEWTINE, MICHAEL	Water Department	Water Pumping
5R Reserve	A & B	Navigator	EDDOWER, JOHN	Water Department	Water Pumping
5R Reserve	A & B	Navigator	BENNETT, DENIELLE	Mayor's Office of Community Services	CLIP
5R Reserve	A & B	Navigator	LAPORTE, CHARLES J	Water Department	Sewer Maint-Fox St
5th RESIDENTIAL - EXTRA NAVIGATORS FOR EXTRA CONTRACTOR PICKUPS (CALLED IN AS NEEDED)					
5R Contractor	A	Extra Navigator	PAYNE, WILLIAM G II	Streets Department	Sanitation A5
5R Contractor	A	Extra Navigator	SCOTT, JUNEAU	Streets Department	Sanitation A5
5R Contractor	A	Extra Navigator	THORNTON, JAMES	Streets Department	Sanitation A5
5R Contractor	A	Extra Navigator	WEEDON, GARY	Streets Department	Sanitation A5
5R Contractor	B	Extra Navigator	WEBB, DIANE	Water Revenue	MSB-Concourse
5R Contractor	B	Extra Navigator	WILSON, DENNIS	Streets Department	Sanitation A6
5R Contractor	B	Extra Navigator	MCCAIN, WILLIAM	Streets Department	Sanitation A6
5R Contractor	B	Extra Navigator	BIGGS, CRAIG	Streets Department	Sanitation A5

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
6th RESIDENTIAL - ROUTE DRIVERS & NAVIGATORS					
6pickup01	A & B	Navigator	SHIELDS, KEVIN	Streets Department	Traffic
6pickup02	A	Driver	BROWN, LINWOOD	Water Department	Sewer Maint-Lardner
6pickup02	A	Navigator	MUNDEN, CHRISTOPHER	Water Department	Sewer Maint-Lardner
6pickup02	B	Driver	QUATTLEBUM, JUDY	Water Department	Sewer Maint-Lardner
6pickup02	B	Navigator	ALTARE, RICHARD	Water Department	Sewer Maint-Lardner
6pickup03	A	Driver & Navigator	MELLON, JOSEPH	Prison System	Transportation
6pickup03	A	Driver & Navigator	BITTING, FRANCIS	Prison System	Transportation
6pickup03	B	Driver & Navigator	OHARA, DAVID	Prison System	Transportation
6pickup03	B	Driver & Navigator	QUINONES, JUAN	Prison System	Transportation
6pickup04	A & B	Navigator	BROWN, JOHN H	Streets Department	Admin - Training
6pickup05	A	Driver	MEYERS, ANDRE	Streets Department	Sanitation A6
6pickup05	A & B	Navigator	COX, WILLIAM	Streets Department	Hwy ROW Unit
6pickup05	B	Driver	CAHILL, JOHN	Streets Department	Hwy ROW Unit
6pickup06	A	Driver & Navigator	BOHL, THOMAS A	Prison System	Transportation
6pickup06	A	Driver & Navigator	DOUGLAS, DARRYL	Prison System	Transportaiton
6pickup06	B	Driver & Navigator	WISINSKI, KEVIN	Prison System	Transportation
6pickup06	B	Driver & Navigator	CLARK, SHAWN	Prison System	Transportation
6R01	A	Driver	GASKIN, ATIBA E	Water Department	Sewer Maint-Lardner
6R01	A	Navigator	STEVENSON, ROBERT	Water Department	Sewer Maint-Lardner
6R01	B	Driver	STEVENSON, MARY	Water Department	Inlet Cleaning-Fox St
6R01	B	Navigator	HEATH, CHARLES	Water Department	Sewer Maint-Lardner
6R02	A	Driver	LUCKEY, ORIN	Water Department	Sewer Maint-Lardner
6R02	A	Navigator	STEWART, RAYMOND	Water Department	Sewer Maint-Lardner
6R02	B	Driver	HUTCHINSON, WADDELL	Water Department	Inlet Cleaning-Fox St
6R02	B	Navigator	NELSON, AMED	Water Department	Sewer Maint-Lardner
6R03	A	Driver	HARP, CURTIS	Water Department	Sewer Maint-Lardner
6R03	A	Navigator	KEY JR, JOHN	Water Department	Sewer Maint-Lardner
6R03	B	Driver	CAMPBELL, MICHAEL J	Water Department	Inlet Cleaning-Fox St
6R03	B	Navigator	GREEN, MARK	Water Department	Sewer Maint-Lardner
6R04	A	Driver	LYNCH, THOMAS	Mayor's Office of Community Services	GAT
6R04	A & B	Navigator	JOHNS, MICHAEL	Mayor's Office of Community Services	Richmond & Lewis
6R04	B	Driver	LUSTICK, ANDREW	Mayor's Office of Community Services	Anti Graffiti
6R05	A	Driver & Navigator	DESIDERO, ERIC	Prison System	Transportation
6R05	A	Driver & Navigator	PIOTROWICZ, STEVE	Prison System	Transportaiton
6R05	B	Driver & Navigator	TETROWSKI, STEVE	Prison System	Transportation
6R05	B	Driver & Navigator	SCHUELTER, WESLEY	Prison System	Transportation
6R06	A	Navigator	CHARLESTON, JOEL	Water Revenue	Water Revenue-MSB
6R06	B	Navigator	DAGOSTINO JR, JAMES	Water Revenue	Water Revenue-MSB
6R07	A	Driver	QUATTLEBAUM, RODNEY	Water Department	Sewer Maint-Lardner
6R07	A	Navigator	WASHINGTON, MARTICE	Water Department	Sewer Maint-Lardner
6R07	B	Driver	PORTER, WAYNE	Water Department	Inlet Cleaning-Fox St
6R07	B	Navigator	CHERRY, DONALD	Water Department	Sewer Maint-Lardner
6R08	A	Driver	HAWKINS, ALBERT M	Streets Department	Traffic
6R08	A & B	Navigator	TATE, KEITH	Streets Department	Traffic
6R09	A	Driver	BUTLER, ALTON	Water Department	Sewer Maint-Lardner
6R09	A	Navigator	CRUZ, ANGELO	Water Department	Sewer Maint-Lardner
6R09	B	Driver	DENNIS, PHILIP	Water Department	Sewer Maint-Lardner
6R09	B	Navigator	LEWIS, RODNEY	Water Department	Sewer Maint-Lardner
6R10	A	Driver	KIETT, KEVIN F	Water Department	Sewer Maint-Lardner
6R10	A	Navigator	WHITAKER, CURTIS	Water Department	Sewer Maint-Lardner
6R10	B	Driver	SHANNON, GERALD	Water Department	Inlet Cleaning-Fox St
6R10	B	Navigator	ATKINS, RONALD	Water Department	Sewer Maint-Lardner
6R11	A	Navigator	THORN, LINDORA	Licenses and Inspections	4000 N. American St
6R11	A & B	Driver	DENNISON, KYLE	Licenses and Inspections	Clean and Seal
6R11	B	Navigator	BROWN, NATHANIEL	Licenses and Inspections	Clean and Seal
6R12	A & B	Driver	DERENZIS, DANIEL	Mayor's Office of Community Services	CLIP
6R12	A & B	Driver & Navigator	MCPEAK, JAMES	Mayor's Office of Community Services	CLIP
6R13	A	Navigator	PENN, WILLIAM	Mayor's Office of Community Services	CLIP
6R13	A & B	Driver	MCCALL, CONNEL S	Mayor's Office of Community Services	Holmesburg
6R13	B	Navigator	HORVAY, JOHN	Mayor's Office of Community Services	CLIP
6R14	A	Navigator	BURTON, MATTHEW	Mayor's Office of Community Services	CLIP
6R14	A & B	Driver	ANDRISO, CHRISTOPHER	Mayor's Office of Community Services	GAT
6R14	B	Navigator	CHECO, FABIAN	Mayor's Office of Community Services	CLIP

Full Deployment Assignments - Residential Routes					
		11/7/2011			
Route Assignment	Team	Duty	EmployeeName	Department	WorkLocation
Extra Personnel - Departments to Substitute as Needed					
6R Reserve	A & B	Driver	SMITH, ALVIN	Streets Department	Sanitation A6
6R Reserve	A & B	Driver	ALLEYNE, MARQUITA	Streets Department	Sanitation A6
6R Reserve	A & B	Driver	LAMBERT, DEMETRI	Streets Department	Sanitation A6
6R Reserve	A & B	Driver	MOUHTAFIL, ABDERRAHIM	Streets Department	Sanitation A6
6th RESIDENTIAL - EXTRA NAVIGATORS FOR EXTRA CONTRACTOR PICKUPS (CALLED IN AS NEEDED)					
6R Contractor	A	Extra Navigator	JONES, MIKE	Streets Department	Sanitation A6
6R Contractor	A	Extra Navigator	STEVENS, MICHAEL D	Streets Department	Sanitation A6
6R Contractor	A	Extra Navigator	LITTLES, CHARLES	Streets Department	Sanitation A6
6R Contractor	B	Extra Navigator	WHITERS, CASSANDRA	Streets Department	Sanitation Sweep
6R Contractor	B	Extra Navigator	COWAN SR, TYRONE	Streets Department	Sanitation Sweep
6R Contractor	B	Extra Navigator	HIGGINBOTHAM, SYDNEY HAWKINS	Streets Department	Sanitation Sweep

Section 4.7

Other Departmental Snow Fighting Equipment (not assigned to Residential Operations)

Departmental Snow Trucks

Pickups & Dumps with No Specific Residential Assignment (skid steers not included)

	Vehicle	Dept	mfr	model	veh desc	plow	salt
CLIP							
	025069	10	FLINE	FL80	TRUCK,COMPACTOR 20HD	FM	NA
	025190	10	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBE
	025192	10	FORD	F350	PICKUP 4X4,W/PLOW	FM	BRINE
	025233	10	DODGE	DAKOTA	PICKUP 4X4,CREW CAB	TA	NA
	025234	10	DODGE	DAKOTA	PICKUP 4X4,CREW CAB	TA	NA
	025235	10	DODGE	DAKOTA	PICKUP 4X4,CREW CAB	TA	NA
	025236	10	DODGE	DAKOTA	PICKUP 4X4,CREW CAB	TA	NA
	025237	10	DODGE	DAKOTA	PICKUP 4X4,CREW CAB	TA	NA
	025238	10	DODGE	DAKOTA	PICKUP 4X4,CREW CAB	FM	Snow X
	045168	10	GMC	SIERRA	PICKUP 4X4 SPREADER/PLOW	FM	VBH
Police							
	005440	11	FORD	F250	PICKUP 4X4 CREW CAB W/PLOW	FM	NA
	005473	11	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
	035379	11	GMC	SIERRA	PICKUP 4X4,W/PLOW	FM	NA
	035380	11	GMC	SIERRA	PICKUP 4X4,W/PLOW	FM	NA
	045171	11	GMC	SIERRA	PICKUP 4X4,W/PLOW	FM	NA
	045172	11	GMC	SIERRA	PICKUP 4X4,W/PLOW	FM	NA
	085245	11	FORD	F350	PICKUP 4X4,W/PLOW	FM	NA
	085254	11	FORD	F350	PICKUP 4X4,W/PLOW	FM	NA
Streets							
	015052	12	FORD	F350	TRUCK,UTILITY	FM	NA
	015053	12	FORD	F350	TRUCK,UTILITY	FM	NA
	015318	12	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
	995040	12	FORD	F250	PICKUP 4X4,W/PLOW	FM	NA
	995041	12	FORD	F250	PICKUP 4X4 SPREADER/PLOW	FM	VBE
	960162	12	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBE
Fire							
	015042	13	FORD	F250	PICKUP 4X4,W/PLOW	FM	NA
	085244	13	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBE
Health							
	025125	14	FLINE	FL70	TRUCK,HOOKLIFT MULTI	FM	NA
	970422	14	FORD	F250	PICKUP 4X4,W/PLOW	FM	NA
Recreation							
	005454	16	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
	005458	16	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
	015059	16	FORD	F550	TRUCK,DUMP	FM	NA
	025055	16	FLINE	FL80	TRUCK,COMPACTOR 20HD	FM	NA

Departmental Snow Trucks

Pickups & Dumps with No Specific Residential Assignment (skid steers not included)

Vehicle	Dept	mfr	model	veh desc	plow	salt
Fairmount Park						
005463	17	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
005464	17	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
005465	17	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
005466	17	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
005467	17	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
005475	17	FORD	F150	PICKUP 4X4,W/PLOW	FM	NA
015041	17	FORD	F250	PICKUP 4X4,W/PLOW	FM	NA
015044	17	FORD	F250	PICKUP 4X4,SPREADER	FM	VBG
015056	17	FORD	F550	TRUCK,DUMP 3 CU YD	FM	VBG
015057	17	FORD	F550	TRUCK,DUMP 3 CU YD	FM	VBG
015141	17	FORD	F250	PICKUP 4X4 CREW SPREADER/PLOW	FM	VBG
015336	17	FORD	F550	TRUCK,DUMP 3 CU YD	FM	NA
025049	17	FLINE	FL80	TRUCK,COMPACTOR 20HD	FM	NA
025127	17	FLINE	FL80	TRUCK,HOOKLIFT MULTI	FM	VBH
025270	17	FLINE	FL70	TRUCK,DUMP/AIR PLOW	FM	TGS
025272	17	FLINE	FL70	TRUCK,DUMP	FM	TGS
065090	17	FORD	F350	PICKUP 4X4 CREW SPREADER/PLOW	FM	VBH
065091	17	FORD	F350	PICKUP 4X4 CREW SPREADER/PLOW	FM	VBH
065092	17	FORD	F350	PICKUP 4X4 CREW SPREADER/PLOW	FM	VBH
065093	17	FORD	F350	PICKUP 4X4 CREW SPREADER/PLOW	FM	VBH
065100	17	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBH
065101	17	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBH
065102	17	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBH
085260	17	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBE
085263	17	FORD	F350	PICKUP 4X4 CREW SPREADER/PLOW	FM	VBE
905627	17	INTL	4900	TRUCK,DUMP 5 CU YD	FM	TGS
970033	17	FLINE	FL70	TRUCK,HOOKLIFT MULTI	FM	VBH
970034	17	FLINE	FL70	TRUCK,HOOKLIFT MULTI	FM	VBH
970035	17	FLINE	FL70	TRUCK,HOOKLIFT MULTI	FM	VBH
970037	17	FLINE	FL70	TRUCK,HOOKLIFT MULTI	FM	VBH
970075	17	FLINE	FL70	TRUCK,CREW DUMP 5 CU YD	FM	TGS
970076	17	FLINE	FL70	TRUCK,CREW DUMP 5 CU YD	FM	TGS
055005	22	FORD	F450	TRUCK,STAKE BODY	FM	NA

Departmental Snow Trucks

Pickups & Dumps with No Specific Residential Assignment (skid steers not included)

	Vehicle	Dept	mfr	model	veh desc	plow	salt
Water Department							
	060012	28	GMC	SIERRA	PICKUP 4X4 SPREADER/PLOW	FM	VBE
	060016	28	GMC	SIERRA	PICKUP 4X4 SPREADER/PLOW	FM	VBE
	080038	28	FORD	F250	PICKUP 4X4 SPREADER/PLOW	FM	VBE
	970270	28	FORD	F250	PICKUP 4X4 SPREADER/PLOW	FM	VBE
	970271	28	FORD	F250	PICKUP 4X4,W/PLOW	FM	NA
	970274	28	FORD	F250	PICKUP 4X4,W/PLOW	FM	NA
	970276	28	FORD	F250	PICKUP 4X4,W/PLOW	FM	NA
	000178	28	FLINE	FL70	TRUCK,DUMP 5 CU YD	FM	TGS
	970023	28	FLINE	FL70	TRUCK,DUMP 5 CU YD	FM	TGS
	970025	28	FLINE	FL70	TRUCK,DUMP 5 CU YD	FM	TGS
Library							
	085257	52	FORD	F350	PICKUP 4X4 SPREADER/PLOW	FM	VBE

Section 5

Snow Lifting
Accounting Procedures

5. - Snow Lifting Accounting Procedures

Snow Lifting Records

1. **Forms Required**
   a. Snow Equipment Rental 77-298
   b. Snow Contract Labor Record 77-298 (previously done on Form 77-299)

2. **Snow Equipment Rental Form (77-298)**
   a. The District Engineer will be responsible for recording the following information for each piece of equipment assigned to their location on the yellow copy of form 77-298, the contractor will record the same information on the manila copy of form 77-298.
      1. Highway District
      2. Contractor
      3. Who notified you
      4. Day of the week
      5. Time called
      6. Type of equipment ordered
      7. Operation to be performed by the equipment
      8. Where the equipment is to be assigned

   b. The contractor will assign the equipment and the operator as directed by the Streets Department, and record the license number of the equipment, and the name and address of the operator on the manila copy of form 77-298. The form will be given to his operator to be used as his assignment and time record.
   c. The District Engineer will give the yellow copy of form 77-298 to his inspector assigned to the operation. The inspector will be told to report at the designated time and location for the start of operations. The inspector will sign-in the equipment assigned to him on the yellow copy of form 77-298, recording the following information:
      1. Equipment license number
      2. Contractor's employee name
      3. Contractor's employee address
      4. Starting time

The contractor's operator will indicate on the manila copy of form 77-298 the <u>Time Started.</u>

d. The inspector will call his District Engineer at hourly intervals and inform him of the progress being made. When the assignment is completed the inspector and the contractor's operator will each note Time Stopped on their form 77-298.

e. The City of Philadelphia will pay only for the operating time for the contractor's equipment. Stand-by time or lost time will be entered under "Penalty Time" and an explanation of the cause under "Penalty Remarks". When additional assignments are given to the inspector, he will complete "Location From To" on form 77-298. He will give this information to the contractor's operator, who will note this added assignment on his copy of form 77-298.

f. Whenever the contractor replaces a piece of equipment, or replaces an operator, the contractor will initiate a new form 77-298. The inspector at the worksite will then prepare a new form 77-298 (yellow copy) to cover the replacement. Procedures will then proceed as previously outlined.

g. When a form 77-298 is completed, the city inspector will sign his copy (yellow copy) and the contractor's operator copy (manila copy). The inspector's copy of the form will be returned at the end of his tour of duty to his District Engineer.

h. When a form 77-298 is completed, the contractor's operator will sign his copy (manila copy) and the city inspector's copy (yellow copy). The operator's copy of the form will be returned to his employer.

i. The reverse side of form 77-298 can be used for remarks or explanations of unusual situations. On forms 77-298 containing the time record for dump trucks the city inspector will note on the reverse side the following information:
   1. The time the dump truck leaves the work location to unload
   2. The time the dump truck returns to the work location from unloading.

j. When the District Engineer receives the city inspector's forms, his personnel will enter on each line the "Total Working Hours". This is the number of hours at the site (start-finish) less the "penalty time" lost. Appropriate travel time will be added for each piece of equipment.

k. The District Engineer will check the city inspector's form (yellow copies) and will then forward them to the Administrative Office, Highway Division, Department of Streets.

l. The contractor will use his copies of the form 77-298 to prepare his invoice, in triplicate, will be drawn on the Accounting Division, Office of the Director of Finance, Room 1330 Municipal Services Building, and sent directly to Administrative Office, Highway Division, Department of Streets for pre-auditing. The invoice will contain the following information and will be submitted for each 24 hour period:
   1. Contractor's name and address
   2. Purchase Order number
   3. Number of pieces, kind and class of equipment in operation

4. Location of operations, i.e.: streets on which equipment operated
5. Dates and hours of work at specified rate per hour for
    a. Equipment with operator
        Regular time
        Premium Time
    b. Foreman
        Regular time
        Premium Time
    c. Laborers
        Regular time
        Premium Time
    d. Travel time for equipment only (rate times the standard level travel time allowed)

m. The Administrative Office, Highway Division, Department of Streets will summarize the form 77-298 (yellow copy) and prepare a receiving report (form 71-20) in the usual manner for each 24 hour period. The receiving report and supporting form 77-298 (yellow copy) will be forwarded to the Accounting Division, Office of the Director of Finance, Room 1300 Municipal Services Building.

n. The Accounting Division, Office of the Director of Finance will check the 77-298 forms (yellow copies) and the contractor's invoice against each other to determine the accuracy of the invoice.

o. Time calculations for equipment and personnel will be based on full 15-minute periods. For example, a piece of equipment operating for 4 hours and 27 minutes will be paid for 4 ½ hours.

3. **Contractor Labor-Snow Emergency Form (77-298)**
    a. Procedures applicable to "Snow Equipment Rental", form 77-298 are also applicable to "Contract Labor – Snow Emergency", form 77-298 except as indicated below.
    b. The contractor's foreman will maintain the contractor's time record for the foreman and the labor crew.
    c. The attached sample illustrates the use of form 77-298.

4. **The Chief Highway Engineer will terminate Snow lifting operations.**

Section 6

Snow Removal
Cost Accounting Procedures

6. - Snow Removal Cost Accounting Procedures

Snow and Salting Cost Accounting Procedures

A. Purpose

The Purpose of this procedure is to (1) provide a means for determining the cost of plowing and salting city streets and legislative routes within the city street system, and (2) provide a method for allocating these costs to both legislative routes and city streets.

B. Scope

The use of the forms described in this procedure shall apply to ALL agencies involved during snow and salting operations. Since the methods of attaching snow and ice storms vary, the accounting for costs will be compiled separately. The Fairmount Park Commission shall report to the Department of Streets the cost of plowing and salting the Kelly Drive (Legislative Route #67292).

C. Definitions

1. Light snow requiring only de-icing techniques shall be considered <u>Salting Operations</u>

2. Snow operations shall include storms of such magnitude that plowing and de-icing operations are necessary.

3. The Snow Season will extend from October to April of the following year.

D. Cost Accounting Policies

1. The cost of snow emergency headquarters and agencies outside the Department of Streets (other than Fairmount Park) shall be allocated to snow. Show headquarters is normally opened when storm conditions require plowing operations. Even though there is preliminary salting, the entire cost will be allocated to Snow Operations. However, if only salting is required, the cost of snow headquarters and that of other agencies will be allocated to Salting Operations.

2. The ratio of State and City costs shall be calculated by comparing the sum of the City and State plow miles in Snow Operations. For salting, the ratio shall be computed by applying the percentage of City and State salt route miles to the tons of salt required for each route. Plow miles and salt route miles shall be the product of the linear mileage and the number of cuts or passes made by the vehicle.

3. For Streets Department, the labor cost will be the actual hourly labor cost for each employee. The vehicle cost will be the average hourly operational cost of a vehicle by type as determined by PennDOT. The Accounting Section of the Department of Streets will supply these costs.

4. Standby time prior to plowing or salting will be charged at the district City - State ratio of the actual storm.

    a. In the event that standby personnel are not used, the cost will be shared in the ratio of existing City-State miles or roadway.

    b. For snow, this ratio shall be City 58.6%, State 41.4%; for salting operations City 66.5%, State 33.5%. These ratios are subject to change when snow and salt routes are revised.

5. The cost of snow removal on legislative routes is not chargeable to PennDOT since $2.5 million is paid to the City on an annual basis for this service.

E. Forms

The following forms will be used in conjunction with this procedure. Instructions for the use of these forms are described in the body of the procedures.

77-307 Rev. 4/71, 77-307A - Report on Snow Plowing / Salting
77-360 = Salting Report

Time and Costing Snow and Salting Operations, formerly recorded on forms 77-308 Rev. 8/98 and 77-308A, are now recorded in the Snow Stor Information System (SSIS), a MS Access database designed by the IT unit of the Streets Department.

F. Snow Operations

All personnel reporting for snow duty will sign in on the approved time sheet for their department or agency. Prior to leaving the yard the inspector will receive Form # 77-307 Rev. 4/71 which will delineate the route.

Each District prior to the snow season will type on Form 77-307 Rev. 4/71 the following information:

1. Legislative route number if the street segment is part of the State highway system.
2. The street that is to be plowed or salted.
3. The "from – to" limits of plowing or salting.
4. The mileage of the street segment.
5. The route number or letter.

The inspector (plowing) or the truck driver (salting) will complete the following items:

6. The date and day of the week.
7. The operation, plowing or salting, day or night
8. Driver's name
9. Truck number
10. The number of cuts or passes required
11. Time reported for duty
12. Time started plowing/salting
13. Time finished plowing/salting

If the inspector/driver works on more than one route, items (12) and (13) are to be completed for the time spent on the route – NOT THE TOTAL TIME. Item (11) is time reported for duty and will not change even though the route may change.

14. Any delays in route
15. Cause of delay
16. The inspector/driver will sign his name to the report

The inspector supervisor in district will calculate item (17) Total Miles plowed for each segment, total all miles plowed and determine the City and State shares, item (18).

19. Will be used during salting operations

The Highway district office will then determine the ratio of City and State plow miles for each route, and by summing the routes, the district ratio.

The time of ALL personnel combating a storm will be accounted for in the SSIS (previously tracked on form 77-308 rev. 8/72).
The District or Area Office completes this information as follows:

1. Organization – 5th Highway, Area 2, Water Department, etc.
2. Condition
3. Date personnel called in and released
4. Time personnel called in and released
5. Employee name

6. Employee number
7. Function – the particular function the person was performing (e.g.: plow driver, inspector plow, auto repair, install chains, etc.)
8. Vehicle number – if applicable
9. Hours – the district office will enter the actual number of hours worked in the appropriate column (regular, time and a half, double time)
10. Vehicle cost – the hourly operating cost multiplied by the operating hours. The Accounting Section will supply these costs.

The Sanitation Area office will complete items #1 through #10.

The following items (#11 through #13) will be completed by the Highway District Office or the Chief Highway Engineer for those not assigned to a particular district:

11. Salt – this section is used only for Salt Operations. It is the district breakdown of City-State salt used, cost of salt used, and the percentage.
12. Plow miles – the district breakdown of City-State plow miles and percentage.
13. Percentage breakdown of Labor and Vehicle costs. The percentage of City-State expense is calculated by multiplying the ratio of City-State plow miles or salt by the labor and vehicle expense.

During severe storms when contractor personnel are called to augment City personnel, it is the responsibility of the Highway District Engineers to insure that the contractors submit the following necessary information required when invoicing the City:

1. Number of pieces, kind and class of equipment in operation
2. Number of foremen, operators, laborers, regular hours worked, premium hours worked, hourly rates
3. Location of operations (e.g.: streets on which equipment operated)
4. Dates and hours of work at specified hourly rates

At the time invoices are received by Highway District Offices it will be the responsibility of each Highway District Engineer to call and discuss with the Accounting Officer the cost applicable to the State as per existing agreements between the Commonwealth of Pennsylvania and the City of Philadelphia with respect to snow plowing and salting operations.

G. Salting Operations

Since the rate of salt expended on a street varies by such factors as the type of spreader and size and speed of vehicle, the use of miles salted by itself is not an indication of the labor required to complete a route. Therefore, for Salting Operations, the City - State ratio will be used and defined in Section "D".

Personnel called-in to combat an ice storm will sign in on the authorized sign-in sheet for the Highway yard. The streets repair supervisor will issue the salt truck operator Form # 77-307 rev. 4/71, which delineates the route. The equipment operator will complete the form as described under Snow Operations, and will note in column (10) the number of passes necessary for each street segment. Upon completion of the route the operator will sign the form and return it to the streets repair supervisor.

The streets repair supervisor will perform the following tasks:

1. Issue form 77-307 rev. 4/71 to the equipment operator before he starts the route
2. Complete items (17), (18) and (19) which are the City-State mileage and the salt used for the route.
3. Complete form 77-360, which is self-explanatory for each load of salt that leaves the yard.
4. Complete SSIS information as described under Snow Plowing for each person in his district.

The streets repair supervisor will then forward Forms 77-307 rev. 4/71 and 77-360 to the Assistant Chief Engineer Maintenance who will calculate the labor, equipment and material cost and the City-State ratio.
Time sheets, salting reports, time and cost reports, and route reports shall be filed together chronologically by storm in the office of the Assistant Chief Engineer Maintenance. These records will be held for four (4) years and then disposed according to the Records Retention Schedule.

H. Responsibilities

1. Accounting Section Streets Department

a. The Accounting Section will determine the average fringe rates to be applied to labor, retrieve PennDOT vehicle rates, and distribute the information to all divisions of the Streets Department.

b. SSIS will accumulate the cost of each snow and ice storm. The Accounting Section will prepare any cost reports required by PennDOT on a schedule determined by PennDOT.

2. Sanitation Division Streets Department

a. Each Sanitation District will be responsible for accurately entering all necessary data in SSIS and marking the storm data complete. All data must be in the system within 24 hours of the close of each storm.

b. Time sheets and supporting data will be kept in the Area office. These will be filed chronologically by date of storm for every snow season. Records will be kept for four (4) years after the snow season.

c. Sanitation Headquarters will summarize the payroll cost of each storm and submit these costs to the Budget Officer within two (2) days after the storm.

3. Highway District Offices

a. For Snow Operations the Highway district office will calculate the plow miles for each route on Form # 77-307 rev. 4/71 and determine the City / State ratio for each route and the district as a whole.

b. For Snow Operations the District Office and Yards will be responsible for accurately entering all necessary data in SSIS and marking the storm data complete. All data must be in the system within 24 hours of the close of each storm.

c. The Chief Engineer of Highways will determine the City-wide ratio from the separate districts and apply this ratio to the cost of snow headquarters and other agencies. He will then forward information to the Accounting Officer.

d. The Chief Engineer of Highways will submit a written report of the Highway snow labor cost to the Budget Officer no later than two (2) days after the storm.

e. For Salting Operations the street repair supervisor will forward form 77-360 and form 77-307 to the office of the Assistant Chief Engineer Maintenance.

f. After Salting Operations the office of the Assistant Chief Engineer Maintenance will be responsible for accurately entering all necessary data in SSIS and marking the storm data complete. All data must be in the system within 24 hours of the close of each storm, and inform the Chief Highway Engineer and the Accounting Officer of the information available.

g. The Assistant Chief Engineer Maintenance will submit a written report of salting costs within two (2) days of the storm.

4. Other Agencies

a. When other agencies are involved in snow or salting operations, they will submit the required SSIS information to the Chief Highway Engineer immediately after the storm. The labor cost for these agencies will be the actual wage rates for the employees assigned to snow duty. SSIS will add fringe benefits and overhead.

I. Conclusion

The system described herein provides a standard system for allocating the cost of snow and salting operations. Deviations from the system will be authorized only when the Chief Highway Engineer, the Accounting Officer and Budget Officer agree to the change.

APPENDIX P – MINGO CREEK SURGE BASIN 2012 DEWATERING PICTURES

Figure P-1

Figure P-2

Figure P-3

Figure P-4

Figure P-5

Figure P-6

Figure P-7

Figure P-8

Figure P-9

Figure P-10

Figure P-11

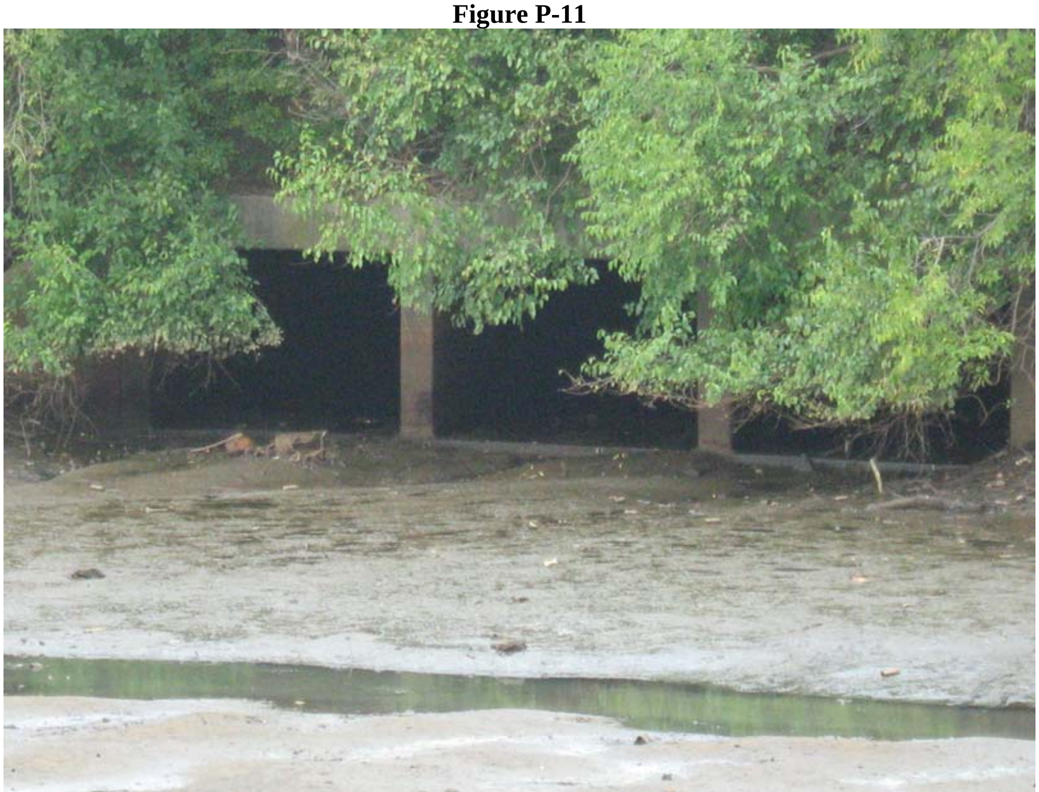


Figure P-12

Figure P-13

Figure P-14

Figure P-15

Figure P-16

Figure P-17

Figure P-18

Figure P-19

Figure P-20

Figure P-21

Figure P-22