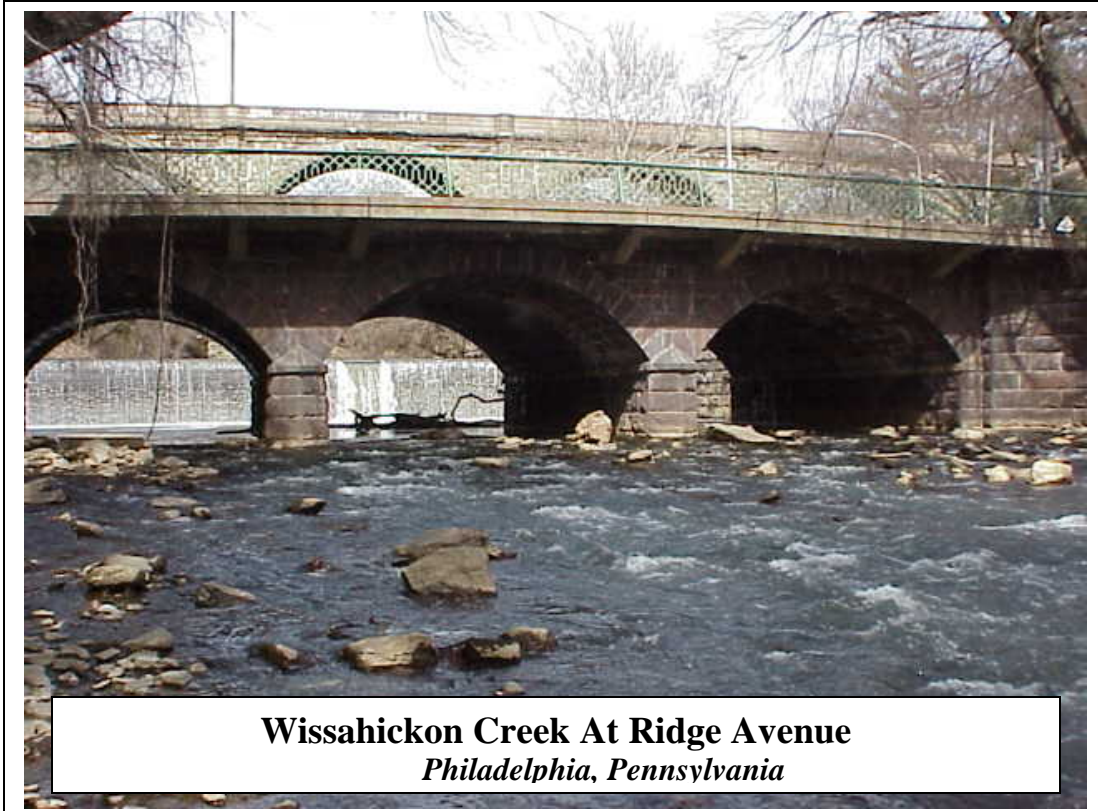


STORM WATER MANAGEMENT PROGRAM
National Pollution Discharge Elimination System (NPDES) Permit
No. PA 0054712
Covering the Period from July 1st, 2004 to June 30th, 2005



Submitted to:

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Water Quality Management

CITY OF PHILADELPHIA

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**STORM WATER MANAGEMENT PROGRAM
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
(NPDES) PERMIT NO. PA 0054712**

**ANNUAL REPORT
(Covering the Period from July 1st, 2004 to June 30th, 2005)**

INTRODUCTION

This Annual Report is submitted to the Pennsylvania Department of Environmental Protection (DEP or the Department), in accordance with requirements of the City of Philadelphia’s NPDES Storm Water Management Permit No. PA 0054712. This Report is a compilation of the progress made on the Storm Water Management Program, during the reporting period from July 1st, 2004 to June 30th, 2005.

A. LEGAL AUTHORITY

The City maintains adequate legal authority to enforce the Storm Water 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 Storm Water Management Program includes various ordinances, regulations, and policies enforced by City departments, many of them in place prior to the EPA Stormwater Regulation. The ordinances and regulations may be found at www.phila.gov.

B. SOURCE IDENTIFICATION

In the characterization of the storm sewer system, field surveys were conducted to identify stormwater discharge points and other potential sources of pollution. Geographic Information System (GIS) data layers were developed that are now used to produce maps that support many local and regional programs. During the reporting period, the City identified no new storm water outfalls, industries, or significant changes affecting the municipal separate storm sewer system.

- | |
|---|
| <p>GIS Layers</p> <ul style="list-style-type: none">• Stormwater Outfalls• Stormwater Inlets• Sewersheds• Watersheds• Land Uses• Population Density• Projected Growth• Runoff Coefficients• Structural Controls• Landfills• Public Land• Industries• Parcels |
|---|

1. Philadelphia Navy Yard Utility Transfer

Although PWD has not identified any new storm water outfalls, records review and field investigation of stormwater infrastructure at the Philadelphia Navy Yard has been through preliminary reconnaissance by an independent consultant. The infrastructure study is being conducted as part of a utility transfer agreement from the Navy Yard to the City. A summary of the preliminary reconnaissance was reported to PWD in June 2005 draft of the Water Utility System Transfer Plan. A review of existing records indicated a total of 82 outfalls. During field verification 60 of the 82 recorded outfalls and 57 unrecorded outfalls were identified. Of the 57 newly identified outfalls, 3 outfalls were abandoned, 18 were documented by the Navy leaving 36 outfalls undocumented. Once the report has been finalized, a GIS layer containing the recent outfall verifications will be submitted to PWD. Once the transfer of utilities has occurred, the increase in stormwater outfalls will be reflected in the associated Annual Report.

DISCHARGE CHARACTERIZATION

1. Introduction

Assessing the integrity of our waterways is integral to the long-term sustainability of our aquatic ecosystems. Thorough measurements of our aquatic communities and infrastructure allow to us determine whether or not a particular waterbody and the lands around it are headed toward improvement or degradation. The Philadelphia Water Department (PWD) considers such assessments a top priority and is committed to monitoring sites within and beyond Philadelphia County lines

The City of Philadelphia recognizes the potential impacts of discharges from stormwater, combined sewer overflows (CSO) and other discharges and conditions that affect drinking water and other designated uses of our waterways. To date, the City maintains a monitoring program developed in coordination with the Pennsylvania Department of Environmental Protection (Southeast Regional Office), integrating biomonitoring techniques with rigorous chemical and physical assessments.

From 1999 to 2005, the PWD Office of Watersheds has developed a comprehensive assessment strategy that provides both quantitative and qualitative information regarding the aquatic integrity of the watersheds entering the county of Philadelphia. To date, baseline assessments of five watersheds have been completed, with information being disseminated to state officials and to local partnerships through technical and public meetings and website development. In addition, comprehensive characterization reports (CCR) have been completed on the Darby-Cobbs and Tookany/Tacony-Frankford watersheds, with additional plans to finalize reports on the Wissahickon, Pennypack and Poquessing-Byberry watersheds.

In addition to PWD's comprehensive assessment strategy, the Office of Watersheds and Bureau of Laboratory Services are currently assisting the Pennsylvania Department of Environmental Protection in the development of biotic indices on fresh-water tidal systems in Southeast Pennsylvania. To date, baseline assessments have been completed on the tidal portions of the Pennypack, Poquessing, Tacony-Frankford and Darby-Cobbs Watersheds. Data is currently being amassed and disseminated to the southeastern regional office of the PADEP.

The following report will describe the various monitoring activities pertinent to Section C: Discharge Characterization that have been completed or initiated during the reporting period.

2. Tacony-Frankford Watershed

To meet the regulatory requirements and long-term goals of its stormwater, CSO and Source Water Protection programs, PWD has embraced a comprehensive watershed characterization program. This program assesses the current health of the watershed and pinpoints issues that need attention. Watershed health is evaluated by analyzing a combination of chemical, biological, and physical parameters. The following is an overview of the monitoring activities performed in the Tookany/Tacony-Frankford Watershed. For a complete report, refer to the *Tookany/Tacony-Frankford Watershed Comprehensive Characterization Report* (Philadelphia Water Department, August 2005).

a. Chemical Sampling

i. Fixed Interval Chemical Sampling

Bureau of Laboratory Services (BLS) staff collected surface water grab samples at eight (n=8) locations within Tookany/Tacony-Frankford Watershed for chemical and microbial analysis (Figure 1). Samples from sites TF620 and TF680 were combined for analysis and considered TF620. Sampling events were planned to occur at each site at weekly intervals for one month during three separate seasons. Actual sampling dates were as follows: "winter" samples collected 1/15/04, 1/22/04, 1/29/04, and 2/5/04; "spring" samples collected 4/21/04, 4/29/04, 5/6/04, and 5/13/04; "summer" samples collected 8/5/04, 8/12/04, 8/19/04 and 8/26/04. A total of 96 discrete samples, comprising 3552 chemical and microbial analytes, were collected and recorded during the 2004 assessment of the Tookany/Tacony-Frankford Watershed. To add statistical power, additional discrete water quality samples from PWD's wet-weather chemical sampling program were included in analyses when appropriate.

i. Wet Weather Targeted Sampling

Automated ISCO samplers were used to collect samples during nine runoff producing rain events in 2003 and 2004. Seven events took place in 2003 on 10/14/03, 5/2/03, 5/5/03, 5/7/03, 5/15/03, 7/10/03, and 9/23/03 and were monitored from four locations. Two events took place in 2004 on 7/7/04 and 8/30/04 and were monitored from six

locations (Figure 1). Samples from sites TF620 and TF680 were combined for analysis and considered TF620.

ii. Continuous Water Quality Sampling

Self-contained data logging continuous water quality monitoring Sondes (YSI Inc. Models 6600, 600XLM) were deployed between 3/20/2001 and 10/5/2004 at seven (n=7) sites within Tookany/Tacony-Frankford Watershed in order to collect Dissolved Oxygen (DO), pH, temperature, conductivity and depth data (Figure 1). Samples from sites TF620 and TF680 were combined for analysis and considered TF620. Sondes continuously monitored conditions and discretized the data in 15 min increments.

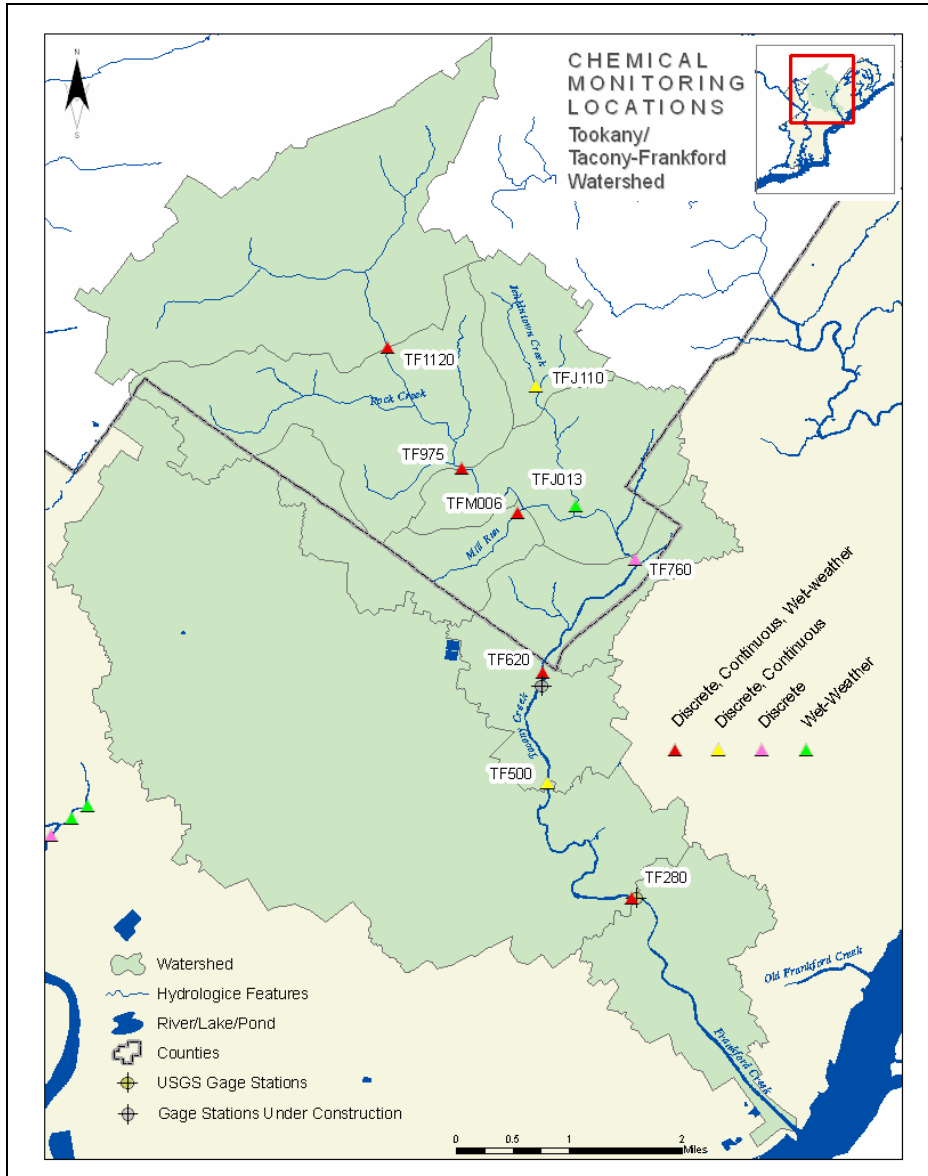


Figure 1: Chemical monitoring locations in the Tookany/Tacony-Frankford Watershed.

b. Biological Sampling

i. Benthic Macroinvertebrate Sampling

During 3/24/04 to 4/1/04, the Philadelphia Water Department conducted Rapid Bioassessment Protocols (RBP III) at twelve (n=12) locations within the Tookany/Tacony-Frankford Watershed (Figure 2).

ii. Fish Sampling

Between 6/2/04 and 6/16/04, PWD biologists conducted fish assessments at seven (n=7) locations within the Tookany/Tacony-Frankford Watershed (Figure 2). Fish were collected by electrofishing as described in EPA's Rapid Bioassessment Protocol V (RBP V) (Barbour *et al.*, 1999).

Between 8/1/04 and 8/8/04, staff biologists completed fish assessments at two (n=2) tidal locations in the Tookany/Tacony-Frankford Watershed (Figure 2). Fish inhabiting tidal portions of the Tookany/Tacony-Frankford Watershed were collected with Smith-Root electrofishing apparatus mounted aboard a small aluminum-hulled jonboat.

iii. Algae Sampling

Between 8/17/2004 and 9/17/2004 replicate algae samples were collected from two (n=2) sites within the Tookany/Tacony-Frankford Watershed (Figure 2). Samples were collected on 6 occasions to determine the biomass of benthic algae in terms of chlorophyll a (chl *a*), spatial variation in biomass within and between sites, the scouring effects of high flows, and algal accrual rates following a high flow event.

c. Physical Monitoring

i. Habitat Assessment

Prior to benthic macroinvertebrate sampling procedures, habitat assessments at twelve (n=12) sites were completed based on the Environmental Protection Agency's *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* (Barbour *et al.*, 1999). Reference conditions were used to normalize the assessment to the "best attainable" condition.

ii. Habitat Suitability Index Modeling

A number of Habitat Suitability Index (HSI) models developed by the U.S. Fish and Wildlife Service (USFWS) were applied to data from Tookany/Tacony-Frankford Watershed. These models are being evaluated and refined to provide a scientific basis for reintroduction of native fish species if and where appropriate habitat can be identified.

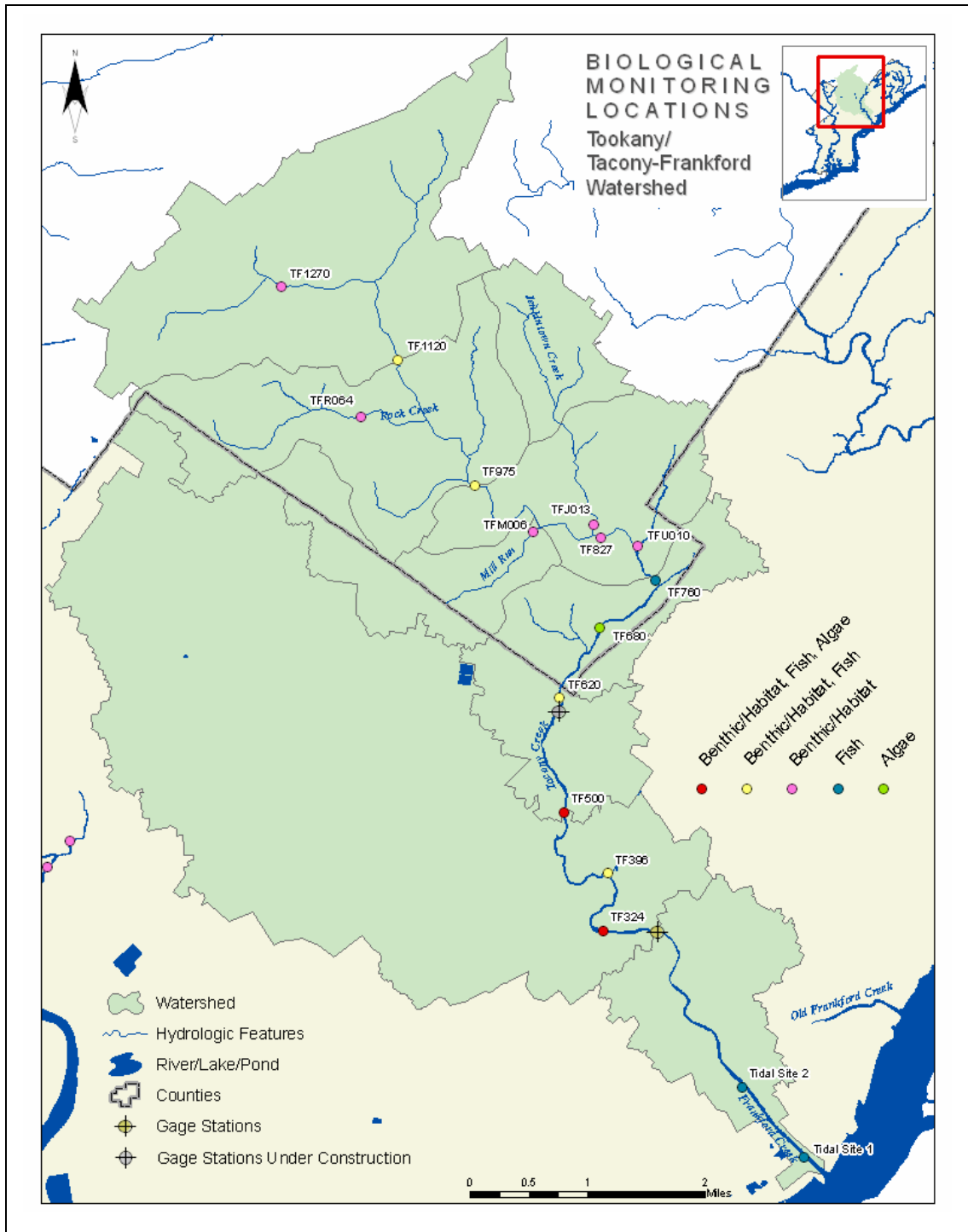


Figure 2: Biological monitoring stations in the Tookany/Tacony-Frankford Watershed

iii. Fluvial Geomorphological Studies

During the reporting period, Philadelphia Water Department staff conducted fluvial geomorphological (FGM) analysis on the Tookany/Tacony-Frankford Creek and its tributaries. Philadelphia Water Department staff traversed 30 miles of streams within the study area. This activity consisted of a team of environmental engineers and biologists walking the entire length of Tookany/Tacony-Frankford Creek and its tributaries and characterizing channel morphology, disturbance, stability, and habitat parameters. Additionally, Philadelphia Water Department staff surveyed cross sections of Tookany/Tacony-Frankford Creek to characterize the morphological features of the channel, provide a template for hydrologic and hydraulic modeling, and serve as a baseline for assessing channel bank and bed changes (erosion and sediment accretion). Approximately 4 cross sections were surveyed per mile (102 cross sections). Each cross section extended a minimum of 25' beyond the top of bank on both sides of the stream. Features surveyed included breaks in slope, bankfull stage, water surface and thalweg. Data acquired from the field work is currently being processed and modeled.

3. Wissahickon Watershed

Similar to that described for the *Tookany-Tacony-Frankford Watershed Comprehensive Characterization Report* (Philadelphia Water Department, August 2005), PWD has commenced a comprehensive watershed characterization program on the Wissahickon Creek Watershed. Data compiled during 2005-2006 will be used to develop technical documents pertinent to the creation of an integrated watershed management plan. The following outlines the various monitoring activities that have begun in the Wissahickon Watershed.

a. Chemical Sampling

i. Discrete Interval Sampling

A total of 12 samples were collected from each of ten (n=10) sites (Figure 3). Sample dates: Winter: 1/13/05, 1/20/05, 1/27/05 and 2/3/05; Spring: 4/21/05, 4/28/05, 5/5/05, and 5/12/05; Summer: 8/4/05, 8/11/05, 8/18/05, 9/1/05

ii. Wet Weather Sampling

One wet weather event was captured from ten (n=10) sites 7/7/05-7/9/05 (Figure 3). One additional wet weather event was captured in Monoshone Creek (WSMC016) and Radium Run (MCRR002) on 5/20/05.

iii. Continuous Water Quality Sampling

Sondes were deployed at six (n=6) sites, beginning 3/10/05 (Figure 3). Sondes will be deployed continuously until December 2005.

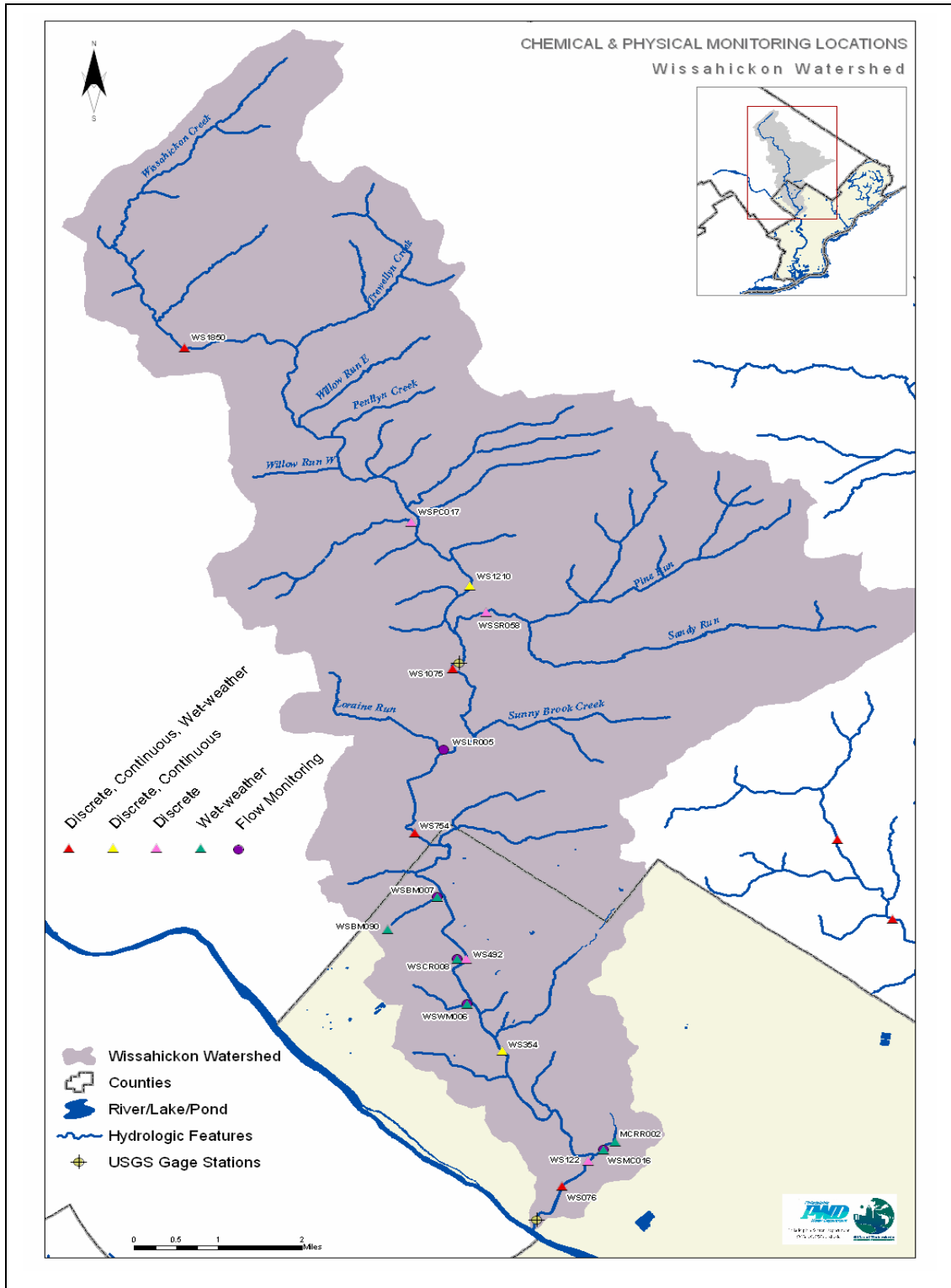


Figure 3: Chemical monitoring locations in the Wissahickon watershed.

b. Biological Sampling

i. Benthic Macroinvertebrate Sampling

Sampling occurred at thirty-two (n=32) sites, during the period 2/24/05-3/17/05 (Figure 4). Samples are preserved in alcohol and will be analyzed over the winter months.

ii. Fish Sampling

Sampling occurred at ten (n=10) sites during the period 6/1/05-6/17/05 (Figure 4). Reference sites in French Creek watershed (n=3) were sampled 6/22/05-6/30/05.

iii. Algae Sampling

Periphyton samples collected from four (n=4) sites 4/22/05 (Figure 4). PWD has discussed sharing of chemical and algae data with researchers from PADEP and Penn State University conducting a large-scale periphyton study in the Wissahickon Creek basin.

c. Physical Monitoring

i. Habitat Assessment

EPA methods were used to assess physical habitat at thirty-two (n=32) sites, concurrent with benthic macroinvertebrate sampling, during the period 2/24/05-3/17/05 (Figure 4).

ii. Habitat Suitability Index Modeling

Additional physical habitat data were collected at ten (n=10) sites concurrent with fish assessments, during the period 6/1/05-6/17/05 (Figure 4). Reference sites in French Creek watershed (n=3) were assessed 6/22/05-6/30/05.

iii. Fluvial Geomorphology Studies

Stream channel profiles were surveyed at 217 cross sections during the period December 2004 through June 2005. Infrastructure assessments are scheduled for mid-Autumn, when leaf canopy is reduced and GPS data acquisition is more reliable and accurate.

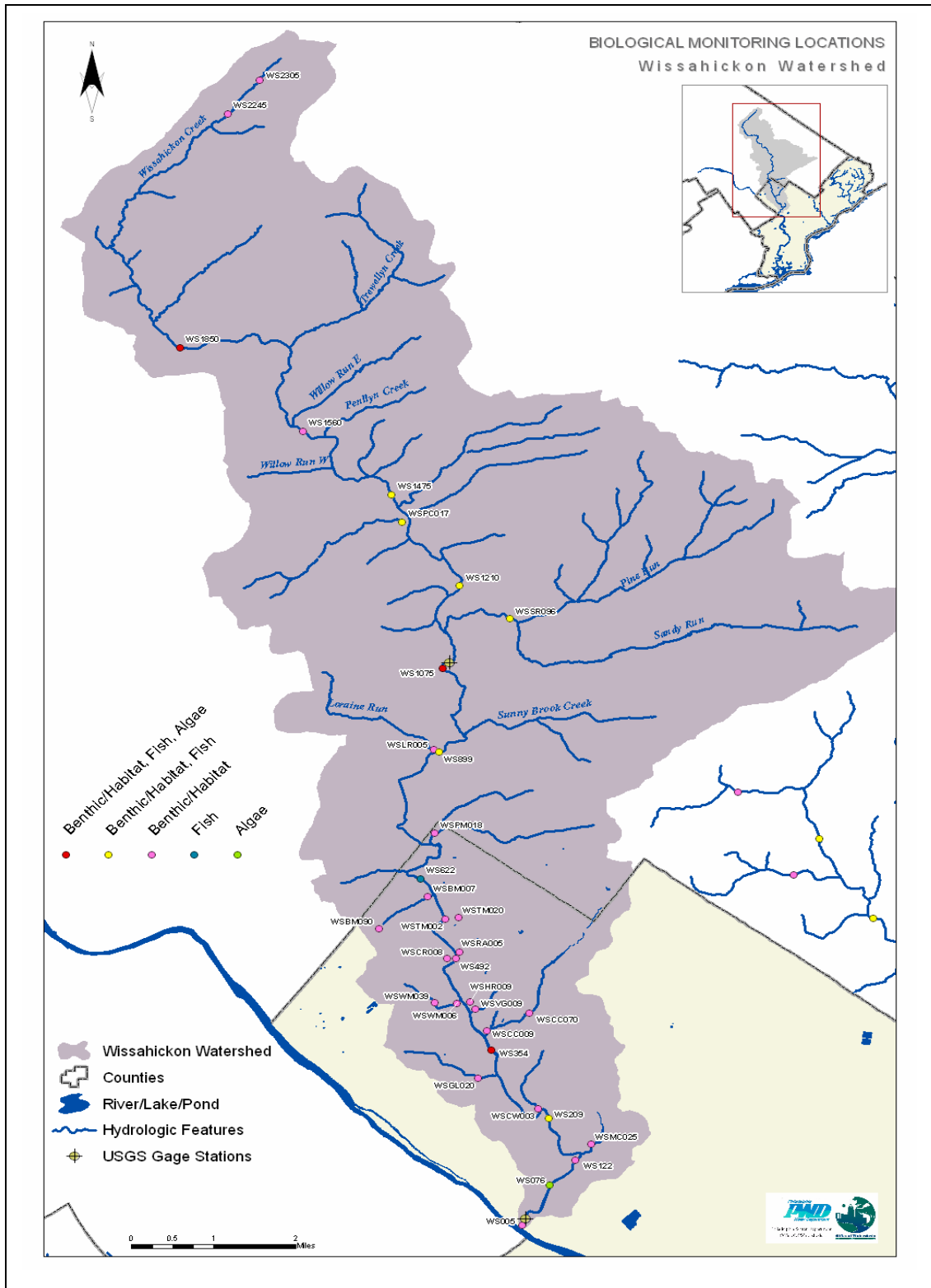


Figure 4: Biological monitoring stations in the Wissahickon watershed

d. Wissahickon TMDL Monitoring

i. Tributary Assessments

The Philadelphia Water Department has implemented a monitoring program to estimate sediment loads entering Wissahickon Creek via four (n=4) selected tributaries. These tributaries are: Monoshone Creek, Wisers Mill, Cathedral Run, and Bells Mill. This program is in compliance with the goal of the Wissahickon Creek Sediment TMDL, and the goal of NPDES PERMIT NO: PA0054712 (Condition D) to reduce sediment load and flow variability. This program has the dual objectives of quantifying the current sediment load originating in the City of Philadelphia discharging into Wissahickon Creek, as well as establishing a baseline to be contrasted with future sediment loads once Best Management Practices (BMPs) have been established.

Additionally, discharge measurements have been collected at one (n=1) site located in Lorraine Run in order to quantify the amount of water this tributary discharges into Wissahickon Creek. This information will be used to model the water quality in Wissahickon Creek based on different discharge scenarios.

ii. Flow Monitoring

Water level is being recorded at five (n=5) sites in 6 or 15 minute increments with a Sigma ultrasonic sensor or a Sigma pressure transducer. PWD staff is in the process of establishing rating curves relating discharge to recorded water level. Discharge is measured using a SonTek Flowtraker[®] during low and medium flow events and a Gurley pygmy meter during high flow events.

iii. Wet Weather Monitoring

Automated ISCO samplers are being used to collect samples. All site locations in the tributaries of the Wissahickon (see Figure 3), with the exception of Lorraine Run, are being monitored during wet weather events. Suspended sediment, nutrients, and metals are being analyzed with the focus on suspended sediment. One floating ISCO is currently being used to monitor all 4 sites. Two wet weather events have been captured on Monoshone Creek: 5/20/05 and 7/7/04 through 7/9/04. Wet weather monitoring will continue through 2006. Starting in 2006 stationary ISCOs will be placed at each monitoring location.

In order to estimate a total sediment load, bedload sediment samples will be collected in addition to suspended sediment samples. Bedload sediment samples will be collected during wet weather events using a Helley-Smith handheld bedload sampler. Total sediment will be related to discharge in order to create a sediment rating curve.

Bank pins will be placed in the four tributaries in segments representing poor, fair, good, and excellent bank stability. After wet weather events bank erosion will be measured in

order to calculate an erosion rate. This information will be helpful in assessing how much of the total sediment load can be attributed to bank erosion.

iv. Modeling Sediment Loads

The four selected tributaries for sediment monitoring will be modeled using cross section data already collected for FGM studies and water level data being collected. Measured discharge, total sediment, and bank pin data will be used to calibrate hydrologic and hydraulic models. The model will be used to estimate the sediment load of each tributary as well as understand the relative importance of each component of the sediment load (overland versus bank erosion). Once models of existing conditions are constructed and calibrated, the models can be used to evaluate proposed controls both in the watershed and in the stream itself. The hydrologic, hydraulic, sediment and water quality models are yet to be determined.

Lorraine Run will also be modeled in order to determine what effect different discharge scenarios will have on the water quality in Wissahickon Creek.

4. Schuylkill Watershed

From 3/1/05 to present, PWD staff biologists have been conducting various water quality monitoring activities in the tidal and non-tidal portions of the Schuylkill River to characterize water quality during periods of dry and wet weather. The following is an abbreviated activity description of work that is currently being conducting in this locality.

a. Water Quality Monitoring

i. Wet Weather Water Sampling

During the reporting period, staff biologists from the Philadelphia Water Department collected discrete water quality samples at four monitoring stations in the lower Schuylkill River, three stations located in the tidal reach and one station positioned in the non-tidal portion of the river (Figure 5).

Chemical samples were collected prior to a designated storm event (i.e., 0.5” inches of rain with 72 hours of dry weather beforehand) using a horizontal sampler. Subsequent samples were then collected 1 day, 2 days and 3 days following the rain event and immediately transported to the department’s laboratory for analyses. Chemical properties measured from the collection samples are displayed in Table 1. To date, two baseline samples and two completed wet weather events have been captured, with plans to continue monitoring through 2005-2006. Overall objectives of this study are to determine the impact and variation of runoff producing events in the tidal portion of the Schuylkill Drainage with respect to the upstream (non-tidal) and to ascertain any residual or continuing impacts from the recent 2005 oil spill in the Delaware River.

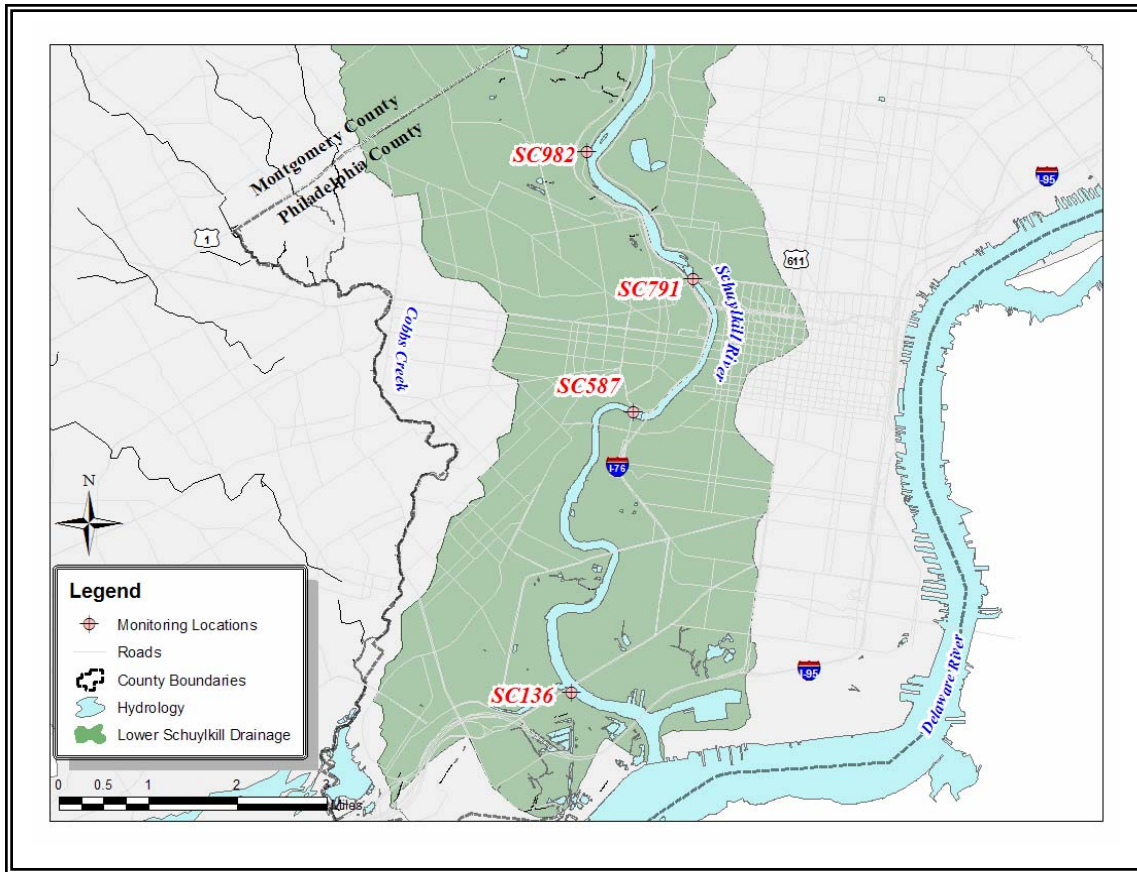


Figure 5: Wet weather monitoring stations in the lower Schuylkill River.

Table 1: Chemical parameters monitored in tidal and non-tidal portions of the Schuylkill River.

Categories	Parameters
Microbial	Fecal Coliform; <i>E. coli</i>
Nutrients	NO ₃ , NO ₂ , OPO ₄ , TKN, NH ₃ , TP
Total Metals	Cu, Zn, Pb, Cr, Cd, Al, Ca, Mg (Hardness)
Dissolved Metals	Cu, Zn, Cr, Cd
Hydrocarbons/VOCs	BTEX - BLS; EPA Method 529
	Oil & Grease/TPH; EPA Method 413.2/418
Field Measurements	pH, conductivity, DO, temperature

ii. Continuous Water Quality Monitoring

In addition to discrete chemical monitoring, PWD staff biologists deployed automated water quality monitors at two locations in the tidal Schuylkill River (Figure 6). Self-contained, data-logging continuous water quality monitoring Sondes (YSI Inc. Models 6600, 600XLM) were installed to measure various physiochemical properties and to identify spatial (i.e., upstream versus downstream) and temporal (i.e., seasonal) changes in the tidal reach during wet and dry weather. To date, a total 1440 hours of data

comprising four chemical attributes (i.e., dissolved oxygen, pH, conductivity and temperature) have been recorded. Operation and maintenance of these two stations through 2006 have already been planned.

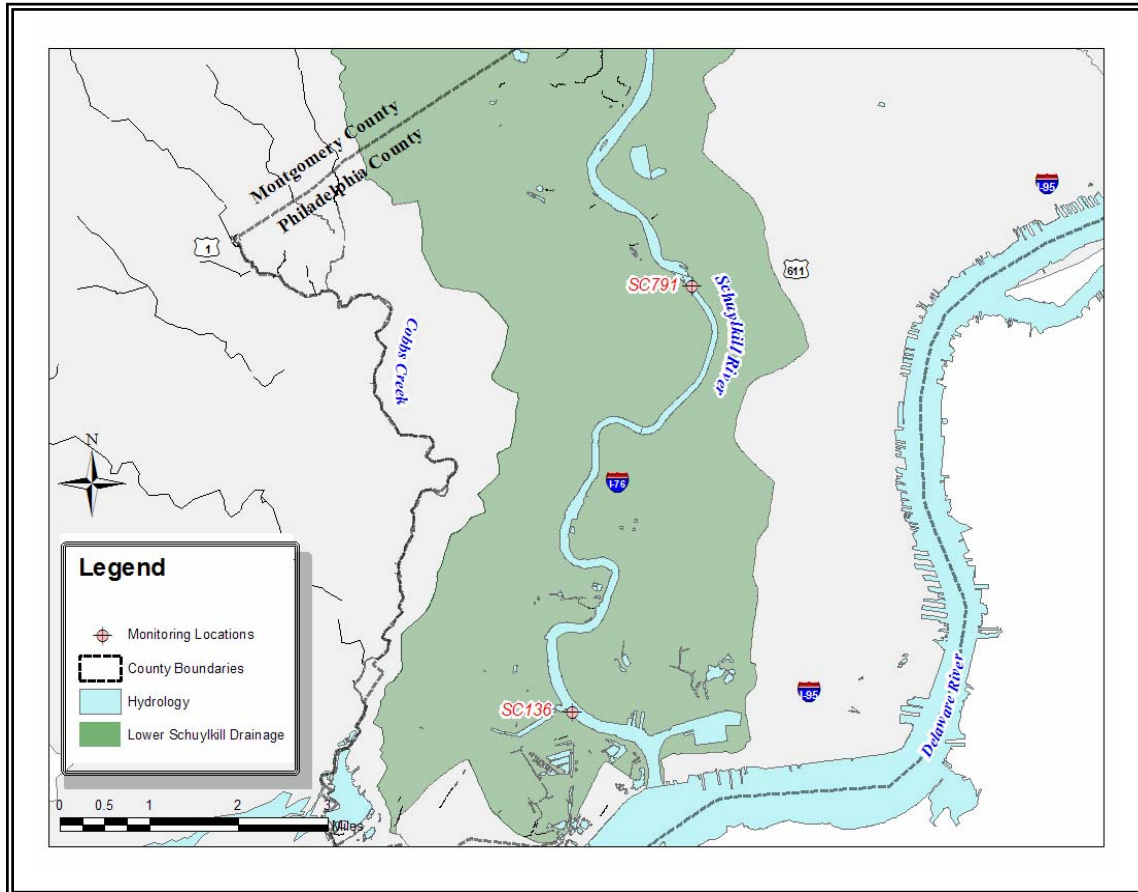


Figure 6: Continuous water quality monitoring stations in the tidal Schuylkill River.

b. Biological Monitoring

During 2004-2005, PWD scientists performed multiple electrofishing surveys on the Schuylkill River from Flatrock Dam downstream to the confluence with the Delaware River (Figure 7). The overall objectives of this program are to assess the relative health of the resident and migratory fish assemblage in the lower Schuylkill River and to relate the utilization of the Fairmount fish ladder by migratory fish species with their presence in the river. During the 2004 sampling season, a total of 3028 fish, representing 31 different species, were identified and assessed for individual health. Data from the 2005 monitoring season is currently being analyzed and will be available in the next permit cycle. In addition, under water video survey from the Fairmount fish ladder was used to determine relative abundance of migratory species. During the three month monitoring season, a total of 6438 fish, representing 26 species, were identified in 2004. Data from the 2005 monitoring season is currently being analyzed.

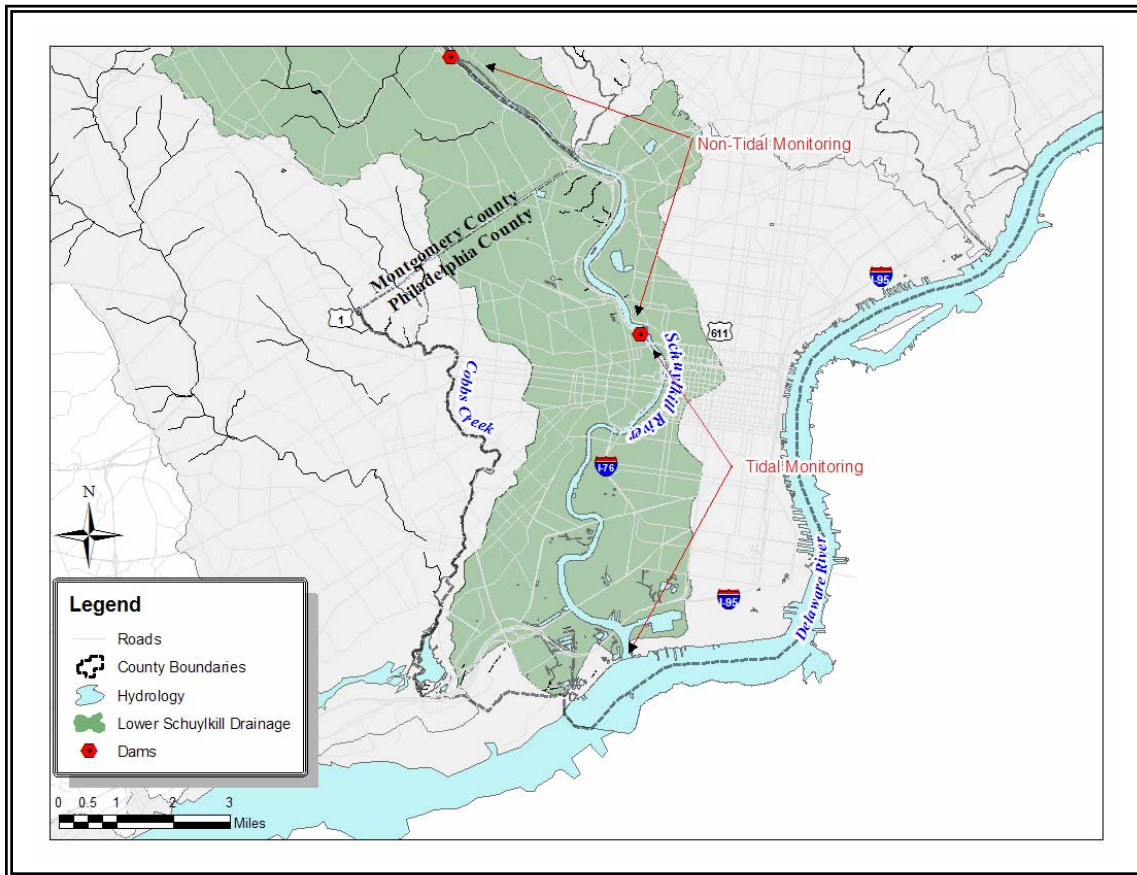


Figure 7: Tidal and non-tidal fish monitoring locations in the lower Schuylkill River.

5. Manayunk Canal

a. Manayunk Canal Aeration Project

PWD is piloting the use of surface aeration in the Manayunk canal in the Lower Schuylkill subwatershed to enrich the canal water with oxygen and provide a measure of safety against fish kills. During summer, algae and decomposing organic matter frequently accumulate in the canal. Along with warmer water temperatures and periodic inputs of untreated stormwater, algae blooms may result in severe oxygen stress for the canal's fish and other aquatic life. One floating surface aeration device has been installed underneath Cotton Street Bridge. Preliminary DO monitoring in pre-dawn hours suggests that the aeration device creates a zone of greater oxygen concentration which may serve as a “safe zone” for fish during periods when DO concentrations are less than ideal. A second device will be installed in the near future

i. Continuous Water Quality Monitoring

A YSI EDS extended deployment Sonde water quality monitoring instrument was deployed at Cotton Street Bridge upstream of the influence of the surface aeration device to measure ambient water quality in the canal (Figure 8). DO probe readings from a sampling grid in the greater DO “plume” downstream will be compared to this data to assess the reaeration rate achieved by this equipment under different scenarios.

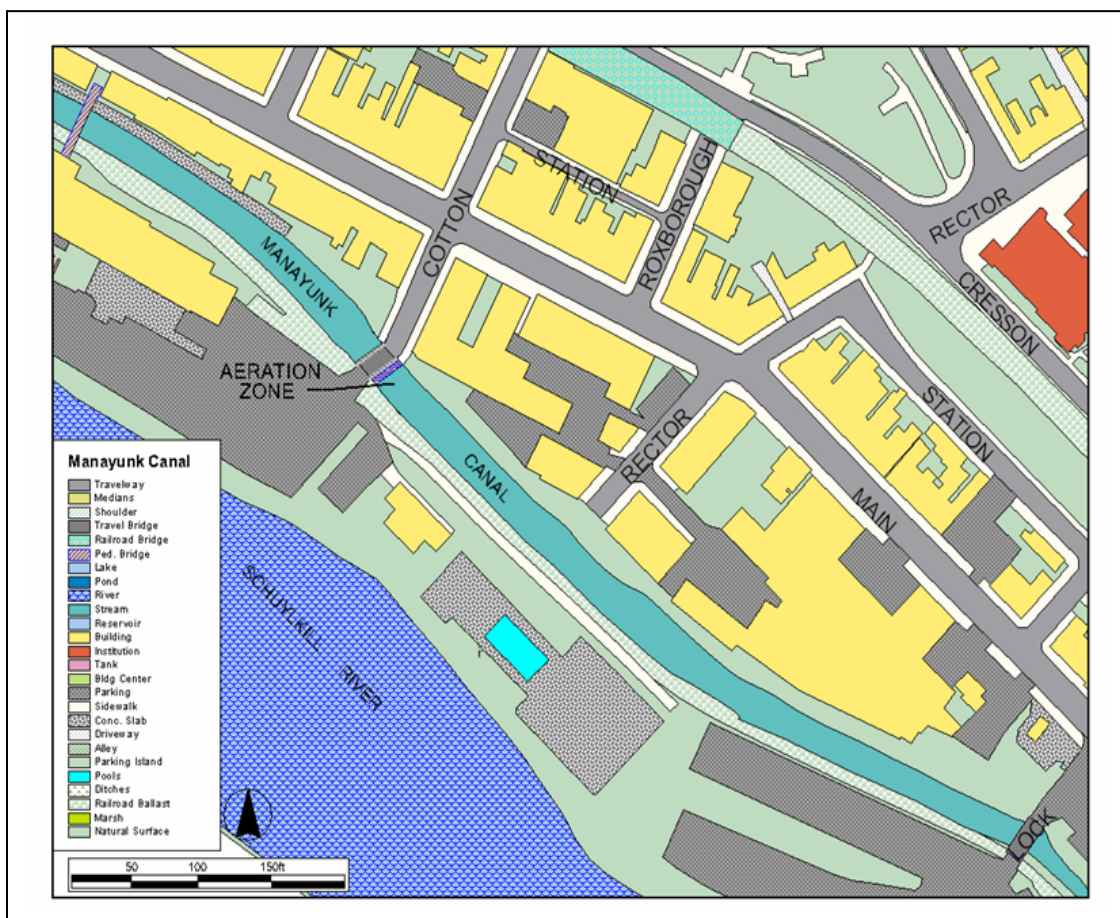


Figure 8: Location of aeration project in the Manayunk Canal.

6. PWD and USGS Cooperative Water Quality Monitoring Program

During the reporting period, the Philadelphia Water Department and the United States Geologic Survey (USGS) embarked on a program to construct and/or refurbish gauging stations in nine locations throughout the six watersheds. Stage, discharge and continuous water quality monitoring (i.e., pH, dissolved oxygen, conductivity and temperature) will be recorded at the City’s upstream boundary and furthest downstream non-tidal location during 15 minute intervals and disseminated on the USGS’s public website. To date, one historical gauge station has been restored and one operational station has been upgraded

with water quality monitoring instrumentation. Plans to resurrect two additional sites during Fiscal Year (FY) 2006 are currently in the construction phase. Data from the refurbished gauge stations will be used to characterize water quality during baseflow conditions and during wet weather events. Figure 9 shows the locations of current and planned USGS gauges in the six watersheds.

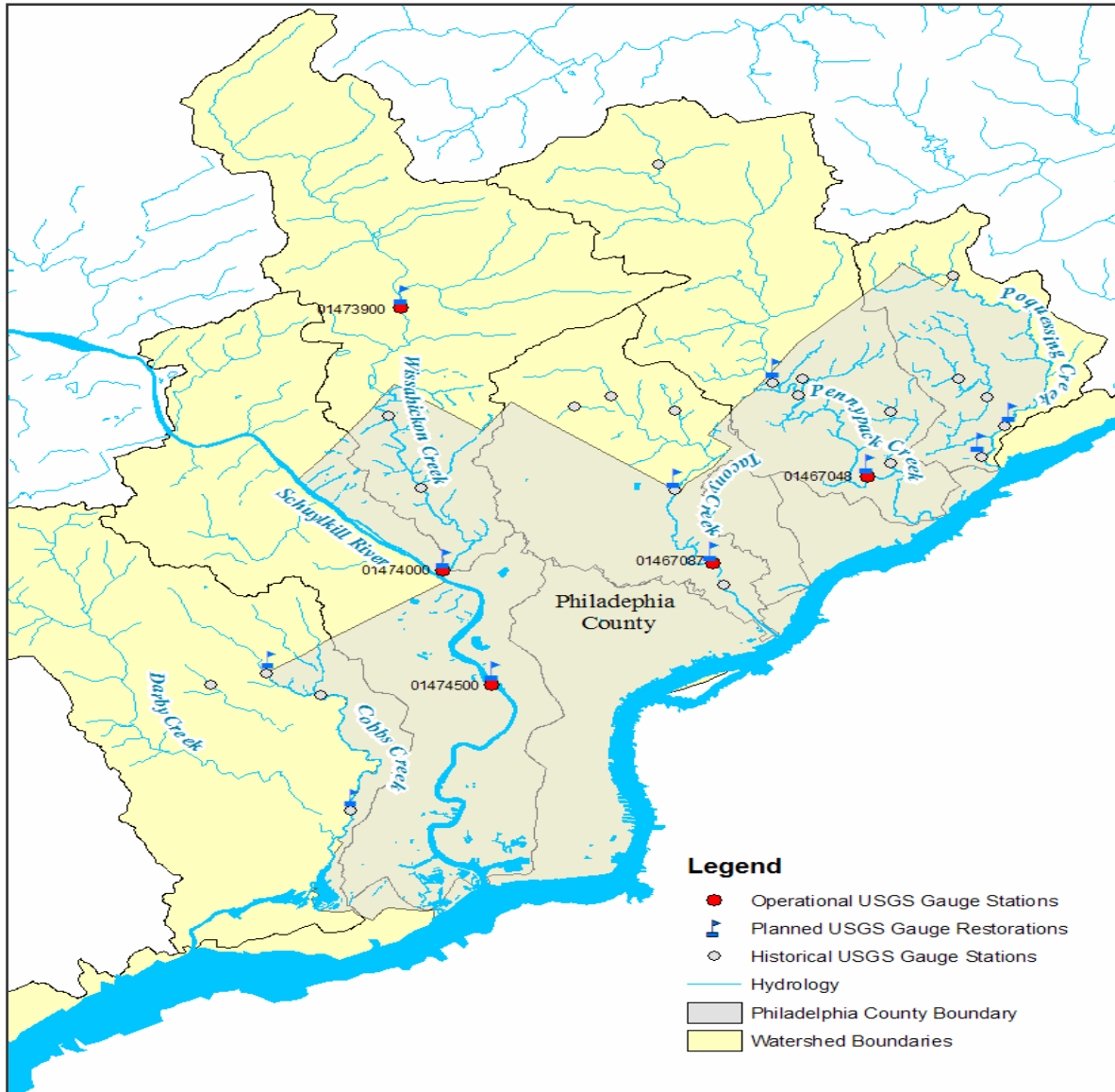


Figure 9: Locations of planned USGS-PWD gauge stations and associated water quality upgrades.

C. MANAGEMENT PROGRAMS

The City maintains a stormwater management program in accordance with 40 CFR 122.26(d) (2) (iv). A summary of the program components, any changes made during the past fiscal year and an assessment of the effectiveness of these programs is provided in this section.

1. Maintenance of Structural Controls

a. City-owned structural controls (Mingo Creek Surge Basins)

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.

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 retrofitting the basin to improve water quality. It was determined 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.

b. Privately owned structural controls

The City reviews plans for proposed stormwater structural controls, as a part of the subdivision review process. During the reporting period, 29 new structural control systems were reviewed (Table 2). Maintenance requirements will be evaluated based on experience with existing structural controls. The City is evaluating the process for incorporating maintenance schedules into the plan review process in conjunction with the Act 167 Stormwater Management Plan process.

Table 2: Structural control systems reviewed during Fiscal Year 2005 as part of the subdivision review process.

Watershed	Type	DATE	Applicant	AREA (acres)	Volume (ft ³)
Pennypack	SURFACE	Sep-04	VILLAGES OF PINE VALLEY (nee REDEEMER RETIREMENT) (basin 1)	15	139945
Pennypack	SURFACE	Sep-04	VILLAGES OF PINE VALLEY (nee REDEEMER RETIREMENT) (basin 1)	5	83051
Schuylkill	BIORETENTION	Sep-04	EAST FALLS PARKING	1	2454
Monoshone/Wissahickon	SUBMERGED	Sep-04	XTL INCORPORATED	3	21393
Wissahickon	SUBMERGED	Oct-04	WOODMERE ART MUSEUM	3	
Wissahickon	SURFACE	Nov-04	PHILADELPHIA TEXTILE (Pond 2)	14	97520
Tacony	SUBMERGED	Nov-04	GERMANTOWN SETTLEMENT SCHOOL		
Wissahickon	SUBMERGED	Jan-05	SUMMIT GREENE (aka 683 SUMMIT AVENUE)	2	6073
Poquessing	SURFACE	Jan-05	CHANCELLOR'S COURT (nee PHILMONT AVENUE RESIDENCES)	2	14239
Poquessing	SUBMERGED	Feb-05	BYBERRY CONDOMINIUMS	1	3564
Wissahickon	SUBMERGED	Feb-05	CHESTNUT HILL COLLEGE	< 1	962
Poquessing-Byberry	SURFACE	Mar-05	LAWLER DIRECT	6	19512
Tacony		Mar-05	PHILIP MURRAY HOUSE II		
Wissahickon	SURFACE	Mar-05	VALLEY GREEN MEWS (nee TRADITIONS AT HENRY)	5	21900
Pennypack	SUBMERGED	Apr-05	CREEKVIEW CONDOMINIUMS (north basin)	1	
Pennypack	SUBMERGED	Apr-05	CREEKVIEW CONDOMINIUMS (south basin)		
Poquessing-Byberry	SURFACE	Apr-05	2811 CHARTER ROAD	10	
Monoshone/Wissahickon	SUBMERGED	May-05	XTL INCORPORATED	4	21393
Tacony	SURFACE	Jun-05	SAFEGUARD SELF-STORAGE	2	6201
Schuylkill	SUBMERGED	Jul-05	RENFREW CENTER (new lot)		5684
Schuylkill	SUBMERGED	Jul-05	RENFREW CENTER (existing lot)		1529
Schuylkill	SUBMERGED	Jul-05	JEHOVAH'S WITNESS		
Pennypack	SUBMERGED	Jul-05	WAWA		
Schuylkill	SUBMERGED	Jul-05	5800 WOODLAND	2	12375
Schuylkill	SUBMERGED	Jul-05	SAVE-A-LOT	2	6000
Schuylkill	SURFACE	Jul-05	WILLIAM PENN CHARTER SCHOOL	3	
Tacony	SUBMERGED	Aug-05	INGLIS GARDENS	2	
Pennypack	SURFACE	Aug-05	SUMMER HILL ESTATES	13	94457
Poquessing	SEEPAGE	Aug-05	3138 MECHANICSVILLE ROAD		

i. Existing Maintenance Agreements

Evaluations for both flood management and pollution control considerations are made with respect to each submitted plan and based on experience with existing structural controls. During the reporting period, the City did not identify existing privately owned structural controls in violation of the City's Storm Water Sewer Ordinance.

ii. Documentation of Existing Conditions

The City completed reconnaissance of privately owned structural controls with the use of global positioning and digital photography equipment during FY 2002. The data will be used to support further study of the impact of the controls for flood control purposes, as well as the potential for improved water quality control. The stormwater best management practice (SWBMP) reconnaissance effort is summarized as follows:

- 106 SWBMP surface structural control locations were identified and visited.
- 126 SWBMP surface structural control basins were field documented (several sites have multiple basins).
- 42 SWBMP submerged structural control locations were identified (submerged structures are oversized pipes with restricting pipe connections to storm sewers). Ten percent were visited and field documented.

One thousand one hundred thirty digital pictures of the basins have been taken to establish a baseline for reference, and to provide documentation. The pictures have been used favorably on several occasions to review conditions in preparation for discussions with property owners. Global Positioning System (GPS) readings were taken at each site, and locations were added to the GIS mapping for analytical uses. An electronic file for each site has been created that records the field documentation collected at each location and basin visited from which the City may recall related information on privately owned structural controls. Figure 9 is a sample data sheet completed for one of the basins. The GPS data was used to provide a City overview of each basin location in relation to specific watershed areas as shown in Figure 10.

During the reporting period, this database of privately owned structural controls was shared with both the Philadelphia Health Department and the Pennsylvania Department of Environmental Protection for use in determining site visit locations. The intent of the site visits was to test any mosquito larvae present at the control structures for infection with West Nile Virus. Both Departments were provided electronic and hard copies of the database.



SWBMP – Privately Owned Surface Structural Controls

SITE REFERENCE # 019-006-PQ (1)

SITE NAME: Carousel Station

LOCATION: 301 Byberry Road

Outlets to: Poquessing Creek

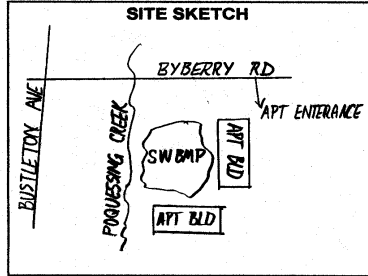
FIELD VISIT

Date: 28 June 99
Time: 11:05 to 11:30AM
Weather: 80s
Cloudy sky

Field Crew:
CDM = N.Maxin/C.Arnold
PWD = D.Knuth/C.Stavrou

SITE STATISTICS

Design Review Date: Mar 86
Site Area: 4 acres
Site Volume: 33229 CF
Designer: GRAVLIN



PICTURES (*.jpg)

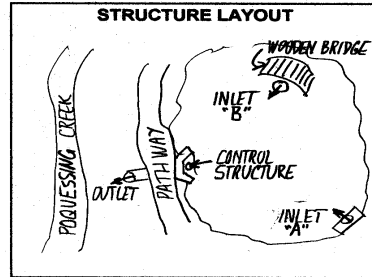
1. INA1 – Inlet A #1
2. INA2 – Inlet A #2
3. INB1 – Inlet B #1
4. FA1 – Flow Area #1
5. CS1 – Control Structure #1

GPS (Global Positioning)

R062815C – Inlet
R062815B – Control Structure
R062815A – Edge of Basin

STRUCTURE

Facility Type: Dry Surface Detention Basin
Embankments: Sloping field with low grass swale walls
Basin: Grass lined
Plant Growth: None
Fencing: None
of Inlets: 2
Outlet Control: 3' high concrete wall with winged support foundation
Opening covered by perforated semi-circular grate
100 yr. Flood spills over top of structure
Outlet Orifice = about 10" diameter



MAINTENANCE ASSESSMENT

- Basin dry, no signs of water or wet areas
- Embankments and Basin: all grass neatly mowed. No signs of erosion. Some stone revetment at control structure inlet.
- Control structure was clear free of debris or weeds
- Inlet #1 clear flow in/no erosion/grass growing at inlet
- Inlet #2 under a small wooden bridge with large rocks
- Outlet from Control Structure – grassy area with no observed erosion or debris.

NOTES:

- Security guard to apartment complex quickly arrived to inquire who we were and the purpose of our visit
- Guard mentioned that the stream routinely floods backing up and flooding the basin area during heavy rains



SWBMP – Privately Owned Surface Structural Controls

Figure 9: Sample data sheet for field inspections of privately owned structural controls.

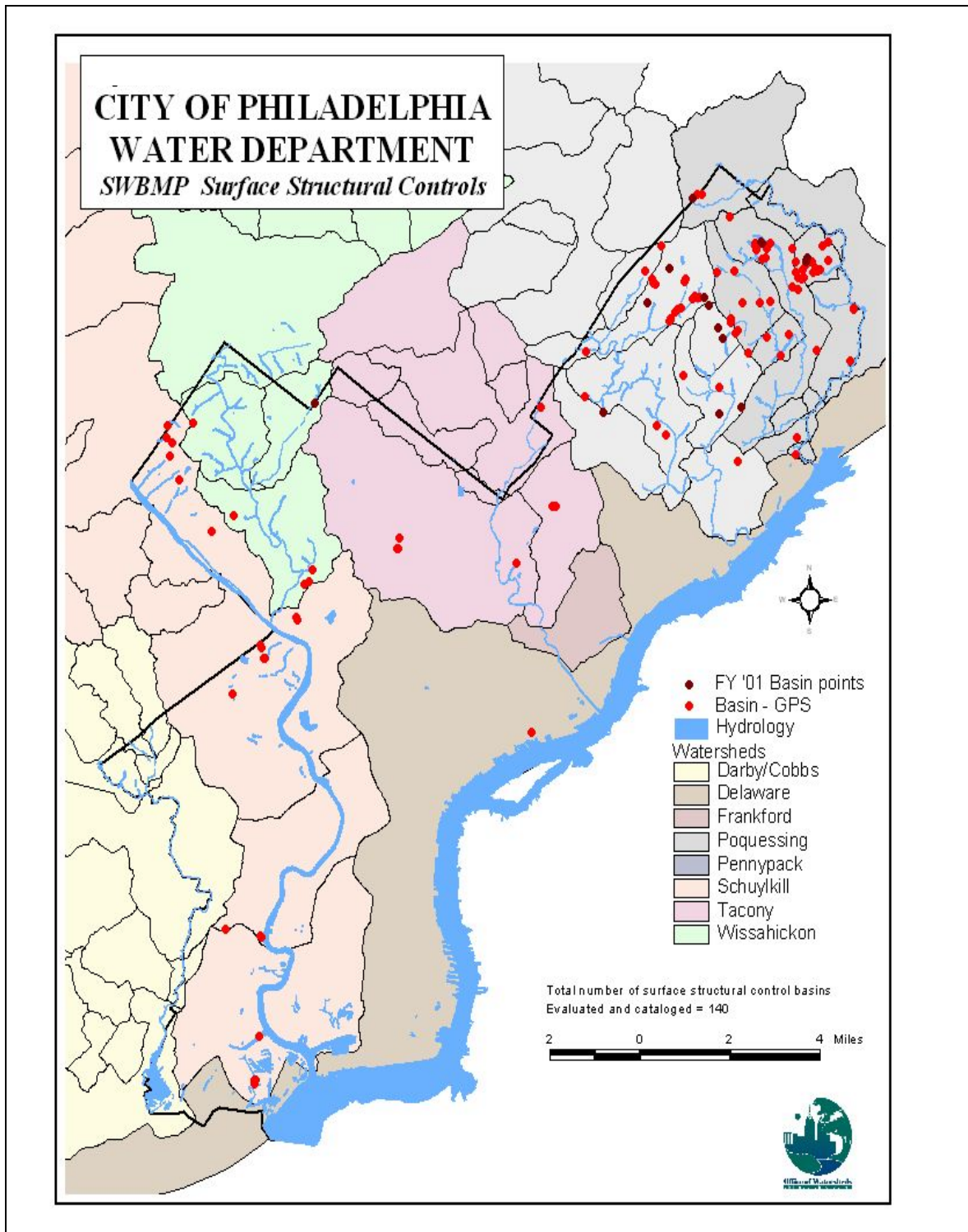


Figure 10: Surface structural controls identified within Philadelphia County

2. New Development Plan Review

a. Introduction

The City reviews drainage plans for new development as a part of the subdivision review process. The Development Planning and Zoning Division within the Philadelphia City Planning Commission reviews all site plans and land subdivisions within the City of Philadelphia. This includes examining site development plans to determine compliance with the Philadelphia Code regarding street layout, topographic and geo-technical conditions, lot sizes, drainage requirements, vehicular and pedestrian circulation, as well as the final landscaping plan.

In addition, the Division performs functions required by the National Environmental Policy Act, such as conducting environmental analyses of all City projects utilizing federal funding. These environmental reviews include the analysis of actions taken to conserve energy; preserve historic structures and sites; protect water resources; prevent air, water, and noise pollution; monitor hazardous materials, and implement erosion controls for federally-funded development projects in the City.

The Development Division is also responsible for the implementation of the Wissahickon Watershed Ordinance. This ordinance places development controls on environmentally sensitive sites in the Wissahickon Watershed area of Northwest Philadelphia. Plans for construction within designated flood plain areas must also be submitted to the Division for review. This review process is designed to help developers better understand and comply with federal, State, and local environmental regulations.

b. Stormwater Drainage Plan Review

Plans are continually reviewed by PWD in both the conceptual and final phase. At the request of the developer a development review meeting is arranged with PWD to discuss the project proposal during which stormwater management requirements are covered in detail. In particular, concepts are discussed for flood control and water quality provisions. Plans in the final submittal phase follow a more formal PWD review process. A list of reviewed final drainage plans was provided in Table 2. Submerged plan types include infiltration as a plan component and therefore control a portion of each storm event for water quality purposes. The pollution control potential of proposed drainage plans is evaluated on a case-by-case basis.

c. Stormwater Ordinance

During FY 2005 PWD drafted stormwater regulations per the authority delegated under 14-1603.1 of the Philadelphia Code and Charter. The stormwater regulations are currently being reviewed by City departments as well as undergoing scrutiny of the development community. Specific criteria addressed in the regulations are requirements to provide non-structural site design, groundwater recharge, water quality, channel protection and flood controls for all development exceeding 15,000 square feet of earth

disturbance. The regulations also recognize the need to distinguish between new development and redevelopment projects. Redevelopment has traditionally been overlooked under existing policy since there is little to no change between the pre-development and post-development conditions in terms of runoff. The requirements for redevelopment projects may be exempted based upon a 20% reduction in directly connected impervious cover between the pre-development and post-development condition. The Regulations are expected to be adopted by the end of summer 2005 with an effective date of January 2006.

Along with the stormwater regulations PWD also identified the need for a Stormwater Management Guidance Manual (Manual). Organizational meetings and outline development took place in the second half of FY 2005. Adoption of the stormwater regulations will coincide with the release of the Manual by the end of summer 2005.

d. Act 167 Watershed Stormwater Management Plans

The City of Philadelphia partnered with Delaware County in developing the Act 167 Stormwater management plan for the Darby and Cobbs creeks watershed. Technical guidance and support was provided during the structuring of a Stormwater management plan that addresses new development and redevelopment stormwater impacts to receiving waters. As part of the management plan a model ordinance was created specifying restrictions to stormwater runoff quantity, quality and peak flow based upon a change in the percent impervious land cover and/or the area of earth disturbed during a construction activity. Calculations of the infiltration volumes and water quality volumes based upon impervious area are presented. Watershed modeling was performed across the Darby-Cobbs sub-watersheds to assess management districts for minimizing peak attenuation. The implementation of Act 167 stormwater management plan and ordinance enables the municipalities to meet requirements of Phase II communities included under MS4 permitting. The City of Philadelphia signed and adopted the Darby and Cobbs Creeks Watershed Stormwater Management Plan in May 2005.

The model ordinance developed with Delaware County was used as a basis for developing an ordinance for citywide acceptance. Adoption of the Philadelphia Stormwater Regulation addresses key management criteria outlined under Act-167 stormwater management plans, such as addressing redevelopment, requiring infiltration, water quality and channel protection and revising localized flooding controls. PWD is currently leading a similar Act-167 planning effort on the Tacony-Frankford Watershed, with an expected completion date of FY 2006.

3. Park Systems

Philadelphia's Fairmount Park is a unique urban park system comprising over 9,200 acres of diverse neighborhood and regional parks that encompasses one-tenth of the land in Philadelphia. Over half of the park system is comprised of natural areas - stream corridors, woodlands, meadows and wetlands - that serve as important ecosystems in the midst of one of America's most populous cities. These natural areas present unique

opportunities for urban ecological restoration, environmental education and community stewardship.

The principle mission of the Natural Lands Restoration and Environmental Education Program (NLREEP) is to undertake ecosystem restoration in seven watershed and estuary parks. To achieve this, in 1998 the Park partnered with the Patrick Center for Environmental Research at the Academy of Natural Sciences of Philadelphia (ANSP) to work with Park staff and interested community members and organizations to formulate restoration goals, conduct an assessment of park conditions, identify sites where restoration is needed and can be effective and develop recommended restoration activities for these sites.

The scope of the ANSP's work included:

- Developing goals and guiding principles for the restoring of the park's natural areas.
- Compiling and examining historical information on plants and animals of the Fairmount Park system from taxonomic collections, published literature and other sources.
- Mapping vegetation type and disturbance from aerial photography, floristic surveys and ground surveys.
- Conducting surveys to identify birds, reptile, amphibians, fish, aquatic macroinvertebrates, mollusks and several groups of terrestrial insects.
- Assessing the physical and biological conditions of all streams.
- Compiling data from various sources using a Geographic Information System (GIS) linked to databases on the flora and fauna of the parks and proposed restoration sites.

In addition, the Fairmount Park Commission (FPC) and the ANSP organized a series of public meetings to interact with stakeholders and to provide a base of support for restoration. Over 20 public meetings were held throughout the park system over a three-year period. At the meetings, the project team provided an overview of the environmental health of each park and reviewed drafts of the preliminary and final lists of recommended restoration sites and actions. The meetings included a question and answer session that enabled attendees to learn more about their park's ecosystems and provide feedback to the project team.

In an effort to further involve community members in the restoration planning process, and to augment the technical information about the park system's natural environments, Natural Lands Restoration and Environmental Education Program (NLREEP) undertook a 'community mapping' initiative in each park. Community mapping is the process of actively engaging residents of the neighborhoods adjacent to the parks to help the project team better understand how the park is used, both currently and historically. The purposes of community mapping were:

- To increase the effectiveness of restoration activities within the parks.
- To increase the FPC staff awareness of the community's use of the parks.

- To increase the community's understanding of the park's natural areas.
- To better inform decision-making about which restoration activities should occur and where.

The community mapping initiatives involved interested neighbors, led by FPC staff, in walks through sections of each park. Participants noted human impacts on the park by mapping key indicators of abuse such as trash, graffiti and invasive vegetation, as well as positive uses such as picnicking, sledding and fishing. Specific results were provided to the ANSP to aid in the selection of potential restoration sites and activities. A general overview of the way the park is used, as determined by the mapping exercises, was shared with community members at the public meetings.

The result of the ANSP's inventory and assessment work and the community mapping process was the preparation of Natural Lands Restoration Master Plan for each park. The master plans contain a total of 452 recommended high-priority restoration sites in the seven parks. The types of restoration activities proposed in the plans include:

- Controlling exotic invasive plants and replanting with species native to Philadelphia County.
- Increasing the width of riparian and forest edge buffers.
- Reducing the amount of mowed area, where the areas are not currently used for active recreation.
- Management of meadows, including periodic mowing to control tree growth.
- Constructing new and restoring/expanding existing wetlands.
- Removing or modifying existing dams.
- Reopening ('daylighting') existing covered and channelized streams.
- Stabilizing streambanks using bioengineering techniques.
- Repairing gullies and installing small check dams, brush piles and other methods to control erosion.
- Constructing berms and buffer strips to control storm flow off of impervious surfaces and mown areas.
- Reintroducing fish, butterfly and other animal species not currently represented in the parks.
- Controlling access to reduce trash dumping and damage by vehicles.

During the reporting period, The Fairmount Park Commission (FPC) and PWD have established an exciting and mutually beneficial partnership to further their shared goals to protect and improve the City's natural resources.

To ensure a safe and top quality drinking water supply, and to strive toward fishable, swimmable and enjoyable rivers and streams, PWD has implemented watershed protection and planning programs for the Schuylkill River, and its tributary, the Wissahickon Creek and the Delaware River and its tributaries, the Poquessing, Pennypack, Tacony and Cobbs Creeks.

To support this mission, PWD has and will undertake a variety of projects in Fairmount Park. FPC and PWD agree that the design and implementation of these projects should comprise the following components which exemplify FPC's and PWD's shared environmental and community values, including:

- woodlands aesthetics
- planting, cultivating and preserving native plant species
- use of natural materials to treat stormwater
- clean, unobstructed creeks and drainage rights-of-way
- safety improvements
- community environmental education

In July, 2004, a new division – the Environment, Stewardship & Education Division (ES&ED) - was created within Fairmount Park. The NLREEP staff was absorbed into the new division, in addition to stewardship and environmental education staff that were already working in other Park divisions. The ES&ED continues to implement projects similar to those done under NLREEP.

From the inception of NLREEP through June 2005, Fairmount Park has implemented \$4.8 million worth of contract restoration projects on over 250 sites, totaling over 280 acres. Work completed includes: planting trees, shrubs and herbs (101,900 plants); stream channel restoration (6 sites, 940 feet); major erosion gully repair (2); wetland creation (2); infiltration berm construction (5); lake edge improvement (1); meadow creation (14 sites, 45 acres); large-scale clean-up and trash removal (2); extensive site work to correct stormwater problems at a Park horse stable (1); invasive plant control (100+ sites); and installation of gates (47) and guide rails (17,664 feet) to protect natural areas.

In the same period 64,552 volunteers led by Park staff contributed 157,394 hours to complete 3,305 projects in Park natural areas. Work completed includes: planting trees, shrubs and herbs (32,646); maintaining trees (25,352); and removing trash (39,842), tires (1556) and recyclables (1616 buckets).

Since July 2004, PWD has cost-shared the operating costs of FPC's ES&ED at a present level of \$450,000 per year.

4. Operation and Maintenance of Public Roadways

a. Deicing Practices

The City monitors deicing practices in a manner consistent with its comprehensive snow emergency management procedures. A copy of the procedures was included in the 1996 annual report. On average, the City deices 1,300 street miles per storm. The FY 2005 winter season resulted in the application of approximately 30,200 tons of deicing salt.

The increase in the tons of deicing salt used is a derivative of Mayor Street’s initiative to deice neighborhood streets in addition to main thoroughfares.

b. Salt Storage

There are six municipal salt storage areas in the city, all of which have been covered to prevent precipitation from coming in contact with the salt. In Figure 11 below, the relative locations of City salt storage locations have been provided:

- 1st Highway District - 48th & Parkside
- 2nd Highway District - 7th & Pattison
- 3rd Highway District - 21st & York
- 4th Highway District - Stenton & Sylvania
- 5th Highway District - Whitaker & Luzerne
- 6th Highway District - State & Ashburner

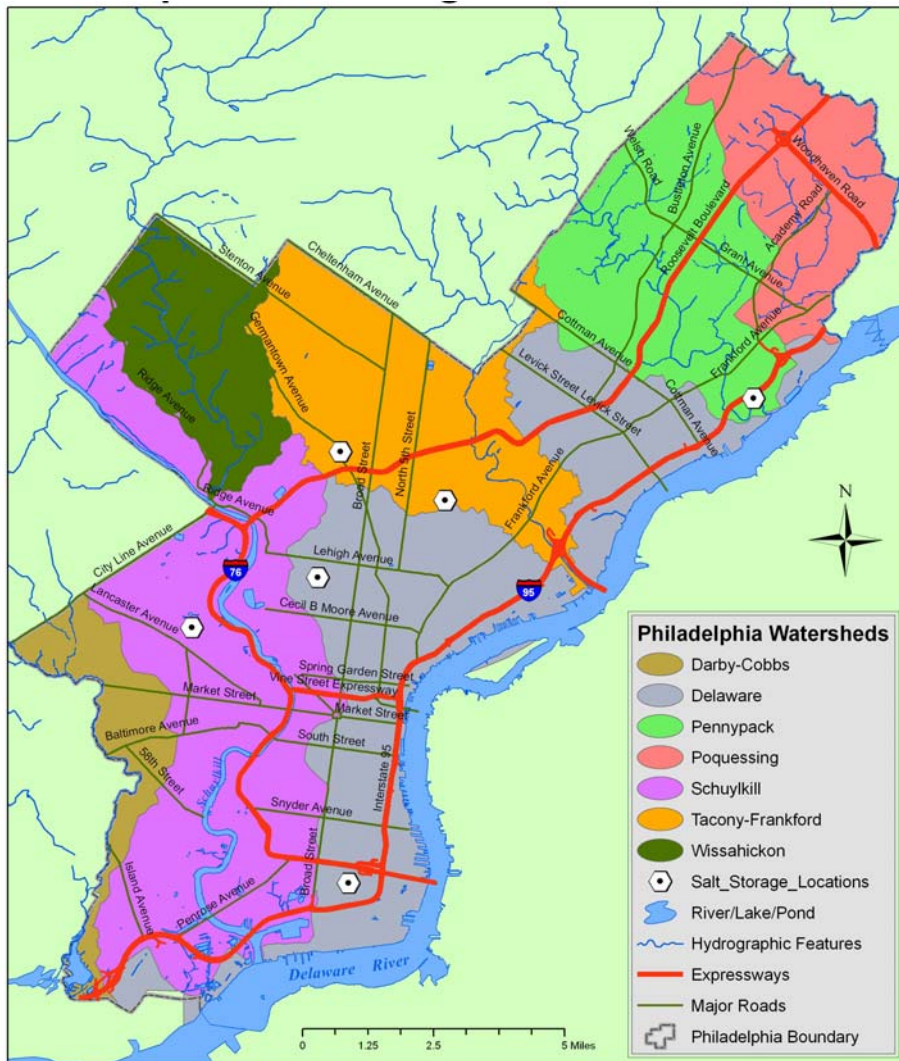


Figure 11: City of Philadelphia Salt Storage Locations.

c. Street Cleaning Practices

The city maintains a number of programs by which solid and floatable materials are prevented from entering area waterways.

i. Streets Department Land Management

The City works toward its goal of daily street cleaning in commercial areas and annual street cleaning in residential areas. Approximately 494 street miles (17% of city streets) are mechanically cleaned daily. 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 over 1800 litter baskets throughout the city. The Philadelphia More Beautiful Committee (PMBC), organizes volunteers for 10,000 block clean-ups coordinated through 5,000 volunteer block captains.

ii. Community Service Crews

The Center City District is a coordinated program of public and private investment has re-energized Center City and urban neighborhoods. In 2001 the Center City District (CCD) marked the completion of ten years of service. Seven days a week uniformed Community Service Representatives and street cleaning crews have served as a friendly and highly visible sign of the business community's partnership with the City of Philadelphia.

The goal of the CCD is a clean, safe well-managed Center City so that Philadelphia can successfully compete as an attractive location for business, entertainment, shopping and living. The neighborhood districts have similar goals that address the quality of life on neighborhood streets. The CCD was authorized to provide security, cleaning, and promotional services that supplement, but do not replace, basic services provided by the City of Philadelphia and property owners. The CCD remains focused on the basics – **clean, safe, and attractive**.

iii. Water Department Skimming Vessel

PWD's desire to improve public awareness of an individual's contribution to coastal aesthetics— notably in the Delaware and Schuylkill Rivers—and to improve water quality and aesthetics of surrounding parks and recreational areas recommended the use of a skimming vessel to remove debris from targeted reaches of the tidal portions of these two rivers. PWD evaluated skimmer vessel technology types, models, and vendors, based on critical decision points such as material handling, vessel speed, mobile off-loading, seaworthiness, and O&M, and capital and life-cycle costs. PWD determined that the Rover 12 - a 40ft, container type, debris vessel, was the vessel capable of safely and efficiently servicing these rivers. PWD purchased this vessel at a cost of \$525,000. The vessel was delivered on June 28th, 2005 and will be in operation during FY 2006.

iv. Manayunk Canal Boom Installation Project

PWD is committed to reducing accumulation of trash in Philadelphia's waterways. In fall 2002, PWD initiated a floatables collection partnership with Manayunk Development Corporation (MDC). Office of Watersheds and Flow Control employees installed an oil spill boom across the Manayunk Canal at Lock St. This boom collects floating debris at Lock Street Bridge, near the canal's former lock # 49 location. Lock Street Bridge was chosen because it is the downstream-most point on the canal that is easily accessible for cleaning. The boom was installed partially under the bridge in order to reduce its aesthetic impact while still allowing for optimal trash accumulation.

Trash is removed by MDC and PWD's Waterways Restoration Unit (WRU). The boom is cleaned weekly by one or more MDC employees who remove debris from shore or from Lock St. Bridge with long-handled nets. Intensive cleaning is performed by WRU and involves the use of heavy equipment or entering the canal with wader boots to remove all man-made trash and large woody debris that cannot be collected during routine cleaning. Results remain satisfactory. Trash accumulation in the lower locks area as well as the contribution of Manayunk canal trash to the Schuylkill River have been drastically reduced or eliminated. Approximately 1 year of data describing the amount and types of trash removed from the boom suggests that most of the trash volume consists of food and beverage containers, though construction debris and natural materials may make up the bulk of materials removed by WRU. PWD also contacted a construction firm and a local food business that were identified as having dumped trash in the canal, leading to corrective measures in both cases.

As a very visible element of the area's stormwater infrastructure, the Manayunk canal serves as an excellent resource for public education. PWD is designing a sign for the canal that will explain the role of the boom and other restoration projects in protecting the Schuylkill river, for many do not realize that stormwater infrastructure is directly connected to natural water bodies. Debris collected in storm drains is not usually visible, leading to the perception that storm drains may be used for dumping. Large accumulations of trash in the canal's boom illustrate this connection. Furthermore, it is usually obvious to bystanders that the majority of trash collected is discarded food and beverage containers - items that could be properly disposed of in trash cans rather than dumped into storm drains.

Results, thus far, have been satisfactory. Trash accumulation in the lower locks area as well as the contribution of Manayunk canal trash to the Schuylkill River have been drastically reduced or eliminated. Prior to boom installation, PWD's inlet cleaning unit targeted many of the approximately twenty large stormwater outfalls that discharge to the Manayunk Canal. Between 10/28/02 and 2/25/03, PWD Inlet cleaning staff cleaned 690 inlets, removing 140.61 tons of debris from the canal's stormshed.

v. Waterways Restoration Unit

The FPC and PWD initiated an exciting partnership that will improve the environmental quality of our precious City parks and streams.

The FPC has assumed responsibility for over 200 acres of land dedicated to the City for stormwater management purposes - land that was, up until now, a mowing and landscaping maintenance burden for the Water Department. The FPC will use this land to further its vision of developing “watershed parks,” creating natural connections between neighborhoods and existing park areas.

In exchange, the Water Department is fielding a Waterways Restoration Unit – a crew 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 will also restore eroded streambanks and streambeds around outfall pipes and remove sanitary debris at these outfalls. The Waterways Restoration Unit will work in partnership with the FPC staff and the various Friends of the Parks groups to maximize resources and the positive impacts to our communities. This partnership focuses on the core strengths of our two agencies. The FPC will continue to improve landscape management of the City’s parks and dedicated lands, while the Water Department will focus its efforts on water quality improvements, a mandate it has under its state and federal water quality related permits.

Work requests are currently generated through a number of agencies and mechanisms, although all projects are funneled through the PWD’s Office of Watersheds (OOW), which forward the work to the PWD’s Customer Information System for tracking and work order development. It is anticipated that clean up and restoration requests will be generated by the following groups and agencies:

- General Public
- Fairmount Park Commission
- PWD Office of Watersheds
- PWD sponsored Watershed Partnerships
- City and elected officials
- Waterways Restoration Unit reconnaissance work and field forms

In Fiscal Year 2005 a total of 702 tons of debris from 115 sites over 29 days was removed from Philadelphia’s streams and waterways. This is an increase from FY 2004 with 276 tons of debris removed from 169 sites over a course of 35 days. A summary of the sites visited and detailed description of the debris removed is presented below in Table 3.

Table 3: Waterways Restoration Team FY 2005

Date	Sites Visited (#)	Sites Requiring > 1day (#)	Debris Removed				No. of Partner Projects (#-Partner)
			By Weight (tons)	Cars (#)	Tires (#)	Shopping Carts (#)	
July 04	10	1	86	-	4	3	1- MDC
Aug. 04	9	2	43	-	10	21	2- MDC, FPC
Sept 04	12	2	59	-	2	2	1 – FPC
Oct. 04	12	4	47.5	-	15	7	1- FPC
Nov. 04	5	2	70.5	-	-	1	2- MDC, FPC
Dec. 04	9	-	22.8	-	12	1	-
Jan. 05	6*	3	85.97	1	40	1	-
Feb. 05	9	2	15.14	2	177	7	2- FPC, MDO
Mar. 05	7	1	31.74	-	95	20	4 - FPC, MDO, Police, F&BC
Apr. 05	9	3	30.43	-	95	55	3 – FPC, MDO, FOMP
May 05	14	5	94.65	8	45	12	6 – MDC, FPC, FOMP, FOPP, Police, Streets
June 05	13	3	115	-	20	2	2 – FOPC, FPC
Total	115	29	702	11	515	132	

*Snow removal detail

d. Inlet Cleaning Practices

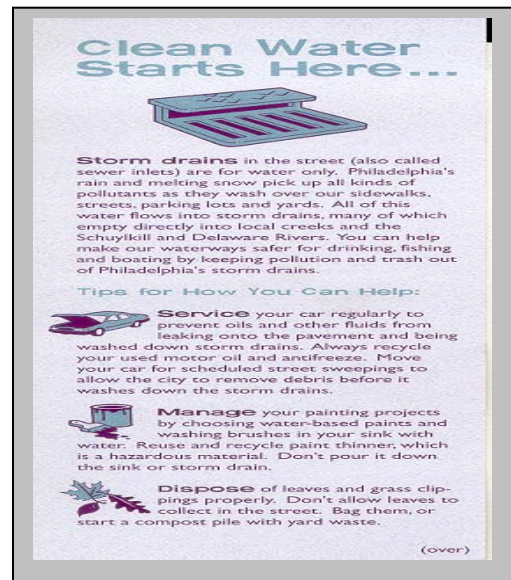
i. Routine Maintenance

The City maintains all City-owned storm sewer inlets, including scheduled cleaning of trapped inlet catch basins. The trapped catch basins are designed to capture solids that otherwise would discharge to the receiving waterbody. During the reporting period the City cleaned 81,588 inlets and collected 9,030 tons of debris.

ii. Public Awareness

The City promotes, develops, and implements inlet litter reduction programs, in an attempt to keep inlets free from litter and improve the quality of stormwater discharges. Figure 12 depicts an educational pamphlet that has been disseminated to the public.

Figure 12: Inlet Cleaning Pamphlet



5. Flood Management and Flood Control Devices

a. Land Development Review

The City reviews proposals for land development in accordance with City Code 14-1606. This code section insures that structures, built within the floodplain, are located a minimum of one foot above the 100 year flood elevation.

b. Structural Controls Review

The City evaluates new structural drainage controls for both flood management and pollution control considerations, based on experience with existing structural controls. During the reporting period, the City did not identify existing privately owned structural controls in violation of the City's Storm Sewer Discharge Ordinance.

c. Philadelphia Flooding Study

During the past year, the Philadelphia Region experienced several large rainfall events the resulted in street and basement flooding. Several neighborhoods in South and West Philadelphia were particularly affected. During the past year, PWD has been developing several detailed Hydrologic and Hydrology Models in these neighborhoods to better determine the causative factors and examine several possible alternatives that may abate/eliminate future flooding if similar events are experienced. PWD has developed a storm flood relief program dedicated to addressing the issues of flooding.

6. Municipal Waste, Treatment, and Disposal Facilities

During the reporting period, the City did not identify any operating or closed landfills, storage or disposal facilities for municipal waste in the separate storm sewer areas.

7. Pesticide, Herbicide and Fertilizer Controls

Golf courses comprise a major land use within the Schuylkill River watershed. Golf course management techniques, particularly with regard to pesticide application, turf management, and water use significantly impact the quality and quantity of runoff leaving a golf course and entering nearby streams and rivers. To address this concern, the Philadelphia Water Department holds an annual Golf Course Certification workshop through the Audubon Cooperative Sanctuary Program (ACSP). The ACSP is a voluntary education and certification program whose purpose it is to educate, provide conservation assistance to and positively recognize golf course managers for improving environmental management practices and conservation efforts as they pertain to outreach and education, wildlife and habitat management, chemical use reduction and safety, water conservation, and water quality management. The annual workshop introduces golf course managers to the certification program and provides detailed information on key components of the certification process and important principles of environmentally responsible

management. Currently, PWD has held three annual workshops in different parts of the Schuylkill River watershed.

The City also adheres to the Integrated Pest Management protocol in the application of pesticides. Educational materials are made available to private pesticide users through the Department of Health inspectors. More detailed inquiries regarding application of pesticides are referred to the State Department of Agriculture.

The City in conjunction with the Clean Water Action group has developed an Integrated Pest Management (IPM) plan for residents of the City, which proposes alternatives to chemical pesticides. Included in this plan is a resolution adopted by the Board of Health for the use of IPM principles and the developing of literature for the public.

8. Animal Waste and Code Enforcement

The City distributes educational material and regulates animal waste disposal, including enforcement of leash laws and clean up of pet waste. "Operation Scoop", the City's initiative for residents to clean up after pets, is designed to achieve greater compliance among pet owners to keep the City streets clean. This program is promoted through educational literature, and enforced through Code Warnings and Code Violation Notices if necessary.



Figure 13: Manayunk Canal Animal Waste Pilot Program

9. Household Hazardous Waste (HHW) Collection

The City encourages proper disposal of household hazardous waste through the distribution of educational material developed by the Streets Department Sanitation Division. During FY 2005 eight events were scheduled, with 3,365 residents participating and 332,289 pounds of household hazardous waste collected for proper disposal or recycling (Table 4).

The Streets Department launched the "Read the Label First Campaign", and public service announcements promoting HHW collection and recycling.

The Inter-County Agreement, approved by City Council in 1999 and renewed in April 2001, forms the framework for the City and Bucks, Chester, Delaware, and Montgomery counties to coordinate HHW program efforts. The City and the Counties have jointly selected a publicity consultant and HHW vendor to oversee drop-off events. City and county residents now participate in any of the local events.

The Counties have jointly instituted a regional hotline number, 215-238-9991. Program information is disseminated via the hotline number, print and radio advertisements, public service announcements, brochures, neighborhood waste collection sites, posters placed on sanitation trucks, and bill stuffers. Residents may obtain additional information by calling 215-686-5560. Information on the City's program and the regional program is also provided on the Streets Department's Web Page at www.phila.gov/streets.

Table 4: Fiscal Year 2005 HHW Program Participation and Quantities

Collection Event	Date	Number of Participants	Quantity Accepted (lbs)
State Road and Ashburner (Thurs)	07/24/03	588	50,361
Ridge and Sedgley	9/6/03	231	15,152
63rd Street (HHW and computers)	10/25/03	235	27,432
Delaware and W heatsheaf	11/08/03	467	39,227
State Road and Ashburner	4/17/04	891	80,828
Domino and Umbria (HHW)	6/12/04	953	70,716
Domino and Umbria (computers)	6/12/04	n/a	37,900
Propane Pick-up at Sanitation Yards	09/16/03	n/a	980
Total FY 2005		3,365	332,289

10. Recycling

Based upon data supplied by the Streets Department, fiscal year 2005's Total Residential Recycling Tonnage equaled 40,290 tons.

11. Used Oil and Toxic Material Disposal

The City facilitates proper disposal of used oil and toxic materials through the distribution of educational material and information, as a part of the Household Hazardous Waste Program, in coordination with the City's Recycling Office. Information is provided in the form of public announcements, educational brochures, and fact sheets, available through public-private partnerships, neighborhood hazardous waste collections, hotline numbers, and the Streets Department's Web Page at <http://www.phila.gov/streets>.

12. On-lot Disposal Systems

The Philadelphia Department of Public Health evaluates applications and plans for approval, then issues permits for new on-lot sewage disposal systems and for repairs or modifications to existing systems. Remediation of a malfunctioning on-lot sewage disposal system is generally initiated on complaint driven basis (Figure 14). Program activities pertaining to system maintenance and the reduction and prevention of malfunctions are directed through distribution of educational materials, staff training and counseling by staff of on-lot system owners.

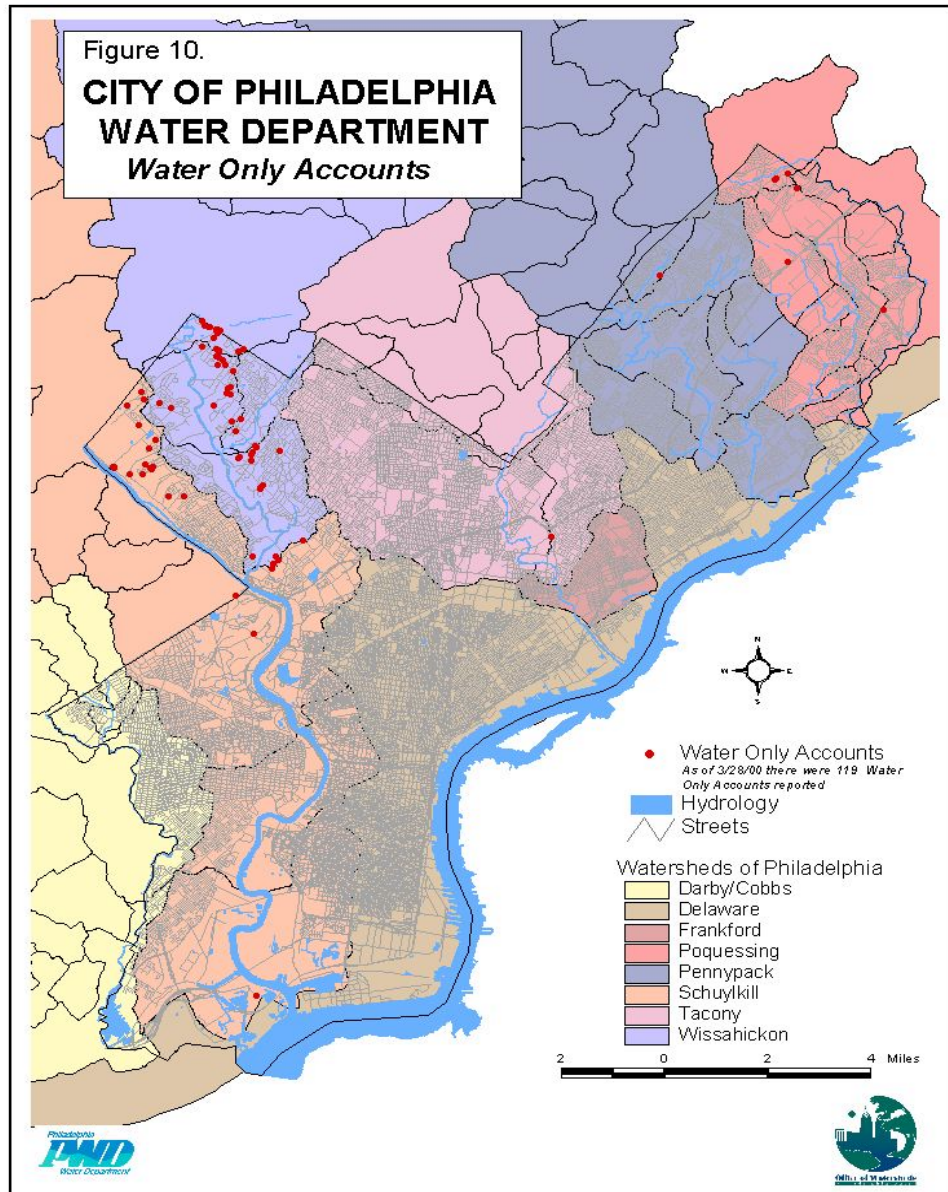


Figure 14: Location of on-lot sewage disposal systems in Philadelphia County.

13. Sanitary Infiltration and Inflow (I/I) Controls

In FY 2005, the City continued to implement its infrastructure monitoring, maintenance, and sewer replacement programs to reduce sanitary I/I (Table 5).

Table 5: Summary of temporary flow monitor deployments during report period.

Location	Monitor Name	Installation Period	Status	Monitor Type
Shurs Lane Chamber	shurs	7/1/2003 - 6/2/2004	Removed	level
Towpath Manayunk Canal	47	7/1/2003 - 6/30/2004	Currently deployed	flow
Marshall Street & Blue Grass Road	70	7/1/2003 - 6/30/2004	Currently deployed	flow
Grant Avenue	72	7/1/2003 - 6/30/2004	Currently deployed	flow
Deerpath Road	75	7/1/2003 - 6/30/2004	Currently deployed	flow
Jefferson Smurfit Property	80	7/1/2003 - 6/30/2004	Currently deployed	flow
Locust Street and 24 th Street	83	7/1/2003 - 6/30/2004	Currently deployed	flow
Sansom Street and 24 th Street	84	7/1/2003 - 6/30/2004	Currently deployed	flow
Lebanon Avenue & Flanders Street	85	7/1/2003 - 6/30/2004	Currently deployed	flow
Gaul Street	gaul	7/1/2003 - 6/30/2004	Currently deployed	level
Chew Avenue	chew	7/1/2003 - 6/30/2004	Currently deployed	level
51st & Overbrook	over	7/1/2003 - 6/30/2004	Currently deployed	level
Ann Street	ann	7/1/2003 - 6/30/2004	Currently deployed	level

The PWD temporary sewer flow-monitoring program continued during fiscal year 2005 with the deployment of five sanitary sewer flow monitoring sites providing data suitable for RDII analysis. RDII analysis and dry weather flow characterization was continued for these five sanitary sewer flow monitoring sites (three in the NE sewer district, two in the SW sewer district). Temporary flow monitors were deployed at three combined sanitary and stormwater sewer locations in the SW sewer district. In addition, deployment of five level only monitoring sites continued during this period.

14. Spill Prevention and Response

a. Spill Response

The City contains and responds to spills that may discharge to the municipal separate storm sewer system in accordance with guidelines developed by the Philadelphia Local Emergency Planning Committee and the Office of Emergency Management. A copy of the plan was included in the 1996 annual report.

b. Alternatives

The City's on scene spill response program has been amplified to include an environmental protection aspect. Alternative means of clean up and disposal were investigated and educational material provided to response personnel. A copy of the plan was also included in the 1996 annual report.

15. Watershed Technology Center

During FY 2005, PWD decided to further develop the existing Watershed Technology Center from separate partnership-based web pages into a fully integrated website. A

conceptual plan was developed and the new “Watershed Information Center” was launched in July 2005. The Center is a regional resource of Southeastern Pennsylvania watershed-related information that centrally locates technical, management, and administrative tools and capabilities to support those involved in watershed planning. The Watershed Information Center is located at www.PhillyRiverInfo.org and www.SoutheastPaRiverInfo.org. Information on the site is organized by watershed and by the Philadelphia Water Department program that generated the information. PWD is still developing and adding content to the website. The Department is also refining the homepage to include more interactive capabilities, a search function, and discussion boards.

Included as part of the Watersheds Technology Center is Philly RiverCast; an online resource for forecasting water quality on the Schuylkill River between Flatrock and Fairmount Dams (Figure 15).

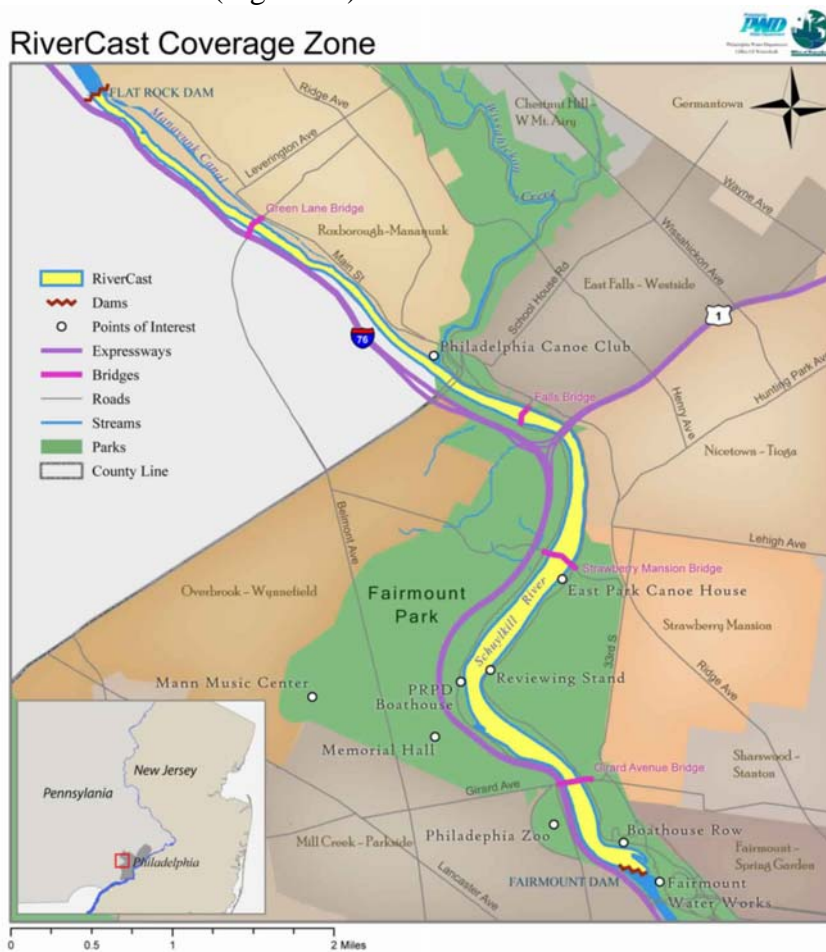


Figure 15: RiverCast Coverage Zone between Flatrock and Fairmount Dams

The water quality rating is based upon continuous collection of water quality parameter data that is correlated to potential pathogen levels. This online tool provides the public with a general safety measure for water recreation along this portion of the Schuylkill River (Figure 16). Philly RiverCast is located at <http://www.phillyrivercast.com/>

PHILLY RIVERCAST A Daily Forecast of Schuylkill River Water Quality in Philadelphia

Wednesday, March 9
Current RiverCast: GREEN
[click for details](#)

Welcome to Philly RiverCast

What is RiverCast?
 The Philly RiverCast is a forecast of water quality that estimates potential levels of pathogens in the Schuylkill River between Flat Rock Dam and Fairmount Dam (i.e., between Manayunk and Boathouse Row).
 The Schuylkill River, like all urban rivers, is not a pristine body of water and is subject to contamination from many sources and activities that either discharge directly, or enter the river during rain events. Because rivers are vulnerable to such contamination, recreation in or upon any body of water has with it an inherent risk of illness and infection for the individual involved.

RiverCast Water Quality Designations:
GREEN: Water quality is suitable for all recreational activities. Click for more details.
YELLOW: Water quality may not be suitable for activities involving direct contact with the river. Click for more details.
RED: Water quality not suitable for activities involving direct contact with the river. Click for more details.

Recreation in Philadelphia Waters
 Philadelphia's rivers and streams are not designated swimming areas, and swimming and bathing are not permitted outside of organized events (e.g., races, triathlons, etc.), due to risks of drowning, injury from submerged objects, strong currents, and other hazards. Individuals should consult a physician before engaging in recreational activities that would place them in contact with river water. Persons with compromised immune systems should consult their health care provider before participating in recreational activities that place them

Limitations of Philly Rivercast
 Inherent uncertainty and potential for error is associated with any forecast of water quality. Therefore, the RiverCast should be considered a guideline and general estimate of water quality at a given period of time and not a direct measurement of water quality. Other information, policies, regulations, public health statements, data, or observations should be considered in addition to any River-

Number of visitors
00031475

Site brought to you by
Philadelphia Water Department
 with funding from the
Environmental Protection Agency

Figure 16: Philly RiverCast homepage

16. Capital Projects

Maintaining and improving natural and manmade stormwater systems are fundamental to overall stormwater management. Philadelphia develops and submits capital projects based on inspections of conveyance, treatment, and storage structures. The City actively pursues grants and other funding mechanisms to fund beneficial capital projects like streambank restoration. Funding sources like EPA Section 319 grants and DEP Growing Greener grants, among other sources, are available for non-permit related projects – essentially demonstration projects beyond permit compliance.

a. Streambank Restoration

Historically areas along streambanks were cleared to allow full visibility and universal access to the stream. Increased turbidity during precipitation events has resulted in the need to convert some areas along streambanks back to natural conditions. There is a practical need to balance historical recreational uses with streambank protection. The restoration projects have an added benefit, a reduction in operation and maintenance

resources required to clear streambanks. In addition, signage along the banks provides additional education opportunities.

i. Marshall Road – Cobbs Creek Project

In the fall of 2000, PWD was awarded a PADEP Growing Greener Grant for \$150,000 for the restoration of a reach of Cobbs Creek. 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.

PWD put the restoration design bid package and specifications out for advertisement in March, 2004 and a bid due date in April, 2004. Buckley & Company Inc, a Philadelphia based construction firm, was awarded the contract at a winning bid of \$768,737.80. Throughout June and July, 2004 the contract between PWD and Buckley & Company was finalized – bonding, insurance, and legal document review.

Construction commenced in August and the project was completed by mid-December. The major components of the project included: creation of the rock construction entrance, removal of the existing bridge abutment, invasive species management, rehabilitation of the existing sewer, erosion and sediment control, significant clearing and grubbing, installation of a tock vane, a “J” vane, and 250 yd³ of constructed riffles, and boulder bank stabilization. The total length of the reach restored was approximately 1000 feet.

ii. Redd Rambler Run

Over the years, PWD has received complaints and petitions from residents in the vicinity of Redd Rambler Run, a tributary of the Pennypack Creek (Pauls Run Watershed) located in Northeast Philadelphia, about property erosion, periodic flooding and safety concerns. PWD has since had the opportunity to evaluate and participate in natural restoration technologies – engineering and stream studies that focus on the natural characteristics of a stream and incorporate techniques such as reconnecting the stream to its floodplain, fortifying the stream’s banks and floodplains with deep rooted vegetation, and installing boulders and rocks to decrease the stream’s energy under storm conditions. Natural restorations enhance the existing beauty of streams while giving them back their ability to better handle higher flows. In addition, natural restoration techniques provide habitat for fish and insects, creating a “healthy” stream.

In March of 2004, PWD contracted the services of KCI Technologies, an environmental engineering design firm, to prepare final design and construction plans for the restoration of approximately 2,500 feet of Redd Rambler Run bounded by Verree Road to the north and Walley Avenue to the south.

D.S. Winokur & Associates, a local surveying firm, was contracted to perform the survey work and base mapping for the initial phase of the design. The completion of the base mapping was completed in December, 2004.

KCI then commenced conceptual design plans that holistically considered the engineering requirements for a stable stream with the current physical characteristics of the stream and its neighboring properties. Together, this information details the proposed stream alignment and channel treatments that will meet the residents' goals (a stable, aesthetically pleasing stream) and PWDs overall restoration design goals (a clean stream with the potential to nurture habitat). The concept design involves minor channel realignment at localized reaches, bank re-grading and stabilization using stone and planted materials, and channel bed stabilization through a combination of shallow riffles (a shallow area of a stream in which water flows rapidly over a rocky or gravelly stream bed). Riffles will typically be situated along straight stretches of the stream while pools will typically be situated along the bends in the stream.

A series of public meetings in April and May, 2005 were held at the Pennypack Environmental Center for the purpose of presenting conceptual design plans with the local residents affected by the restoration efforts and to provide a forum for review and comment.

KCI has continued design work and should have 30% Design Plans completed by September, 2005.

A hydrologic and hydraulic model of Redd Rambler Run and its tributary storm sewer systems was created to support. In order to characterize the watershed, a long-term model simulation was performed. Once the model was completed and tested for stability and connectivity, the hydrologic and hydraulic models of the Redd Rambler were used for 50-year simulation with hourly rainfall depths recorded at the NWS rain gage located at the Philadelphia International Airport as the primary input. A frequency analysis was performed on the 50 year model output. Cumulative distribution frequency (CDF) graphs were produced for flow and velocity at each natural cross section on the open channel portion. Also some discharge-frequency-duration curves were produced for the natural cross sections on the stream. The results of the analysis are being used in the design of the restoration project for the entire length of the stream.

iii. Fox Chase Farms Streambank Fencing and Buffer Installation

The purpose of the Fox Chase Farm project is to utilize agricultural BMPs to reduce the amount of harmful pathogens and nutrients entering the Pennypack Creek from the farm's tributary. Prior to project implementation, cows were allowed free access to the stream and the pasture land surrounding the stream was mowed to the stream's edge. Without the proper fencing to keep cows out of the stream, cows lingered in the tributary for long periods of time, especially in the warmer summer months. The access of the cows to the tributary, coupled with the lack of proper vegetation surrounding the tributary, allowed tremendous amounts of fecal coliform, E. Coli, and nutrients to enter directly into the stream and then into the Pennypack Creek from the farm. To address this situation, PWD and Fairmount Park Commission (FPC), along with volunteers, planted a 1.85 acre riparian buffer along the approximately 430 yard length of the tributary in May of 2002. Approximately 400 trees and 700 shrubs were planted to create approximately 45 ft of

buffer on each side of the stream for the cost of \$13,000. Streambank fencing and a cattle crossing were also installed to limit the impact of cows on the stream.

PWD conducted regular water quality monitoring in 2003 and 2004 to evaluate project performance and observed a 90% reduction in fecal coliform, a 94% reduction in *E. Coli*, 37% reduction in nitrate, and a 36% reduction in turbidity at the origin of the tributary as a result of project implementation. These same parameters, along with ammonia, nitrite, and orthophosphate also decreased significantly at the mouth of the tributary before entering the Pennypack Creek. PWD continues to support this project by coordinating annual invasive species removal in the riparian buffer and in FY 2006 will provide assistance in establishing an alternative drinking source for the cows to further reduce the impact of cow activity on the water quality of the farm's tributary.

iv. 7th and Cheltenham / Mill Run Stream Restoration

The Mill Run project was a small-scale outfall/creek restoration project that took place at the mouth of a PWD stormwater outfall located near the intersection of 7th Street and Cheltenham Avenue. The purpose was to mitigate the effects of storm flow on the stream by decreasing the erosive effects of the stormwater and decreasing the quantity of water that ponds just downstream of the concrete outfall pad. The goals of the project were to clear the pad of all debris and the scour area just downstream of the outfall, to regrade 90 linear feet of the natural channel bottom to provide for a low flow channel, and to stabilize the stream banks to withstand high storm flow conditions.

The project consisted of stream bank stabilization measures which featured soil bioengineering and natural channel design measures, the creation of a healthy, vegetated riparian zone to add biological diversity to the stream system and to enhance in-stream aquatic habitat.

The project was designed by Biohabitats, Inc., an ecological restoration firm located in Baltimore, MD. The project was advertised and bid in April of 2004 in the same bid package as the Cobbs Creek Marshall Road stream restoration project. The bid was awarded to Buckley & Company Inc. Due to the combined bid costs it is hard to determine the exact cost of the project, but estimates put it around \$100,000.00. Even though the bid was awarded in June of 2004, construction did not commence until February of 2005 – after the completion of the restoration project at Cobbs Creek. Construction was brief based on the small scale of the project. The project was completed in early March of 2005.

v. Saylor Grove Stormwater Treatment Wetland

PWD proposed to design and construct a stormwater treatment wetland at Saylor Grove, a 3-acre parcel of Fairmount Park. The 1-acre wetland will be designed to treat an estimated 70 million gallons of urban stormwater per year before it's 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 would be a highly visible Urban Stormwater BMP Retrofit in the historic Wissahickon Watershed.

In March of 2002, TRC-OMNI, from Princeton, New Jersey, was chosen to prepare design plans and provide construction oversight services for the wetland project.

In January of 2005, the final plans and specifications were sent to PWDs Projects Control Unit for review. The project was advertised in March, 2005 and March 8, 2005 with bids due in early April. The bids ranged from the low bid winner, Anchor Environmental, \$494,010 to the high bid of \$927,524.

Anchor Environmental was awarded the job and a construction Notice to Proceed (NTP) in early May. However, Anchor Environmental declared bankruptcy and the PWD was forced to re-bid the project and ask for a project deadline extension from June 30, 2005 to September 30, 2005.

The project was re-bid on June 28, 2005.

vi. Courtesy Stables Runoff Treatment Project

PWD is partnering with the Fairmount Park Commission (FPC) to address stormwater and agricultural runoff at this FPC property in the Wissahickon Watershed. The Courtesy Stables Runoff Treatment Project is aimed at correcting a suite of problems contributing to nutrient-laden stormwater that flows from the barnyard through an adjacent wetland and into a tributary of the Wissahickon Creek. The project diverts stormwater from the barnyard and surrounding area into a grassed waterway/filter strip where nutrients and sediment is removed and a portion of the water infiltrated before reaching the wetland. Flow from a springhouse has been routed directly to the wetland, serving as a continuous source of clean water, rather than through the riding ring, where it adsorbs nutrients and creates muddy conditions. Invasive plant species onsite has been removed and replaced with Philadelphia-native trees and shrubs and educational signage will be erected to link the nutrient runoff reduction to the improvement of the Schuylkill River watershed. FPC received a grant from NFWF to conduct this project and construction was completed in the fall of 2004. PWD is committed to providing matching funds (\$13,000) and in-kind services in the form of pre and post construction water quality monitoring. Pre-construction monitoring has been completed and PWD will continue to support this project through the completion of post-construction monitoring and a thorough evaluation of project performance.

vii. W.B. Saul High School Project

In FY04, PWD utilized a PADEP Growing Greener Technical Assistance Grant to complete a conceptual design to implement stormwater BMPs at this Agricultural High School in the Wissahickon Watershed. PWD is conducting wet weather monitoring at the

project site prior to project initiation. This will allow for a quantitative assessment of the effectiveness of the BMPs upon completion of the project. The W.B. Saul High School project combines urban stormwater and agricultural BMPs to reduce the harmful impact of the school's runoff on the water quality of the Wissahickon Creek. Prior to discharging into the sewer, which then flows to the Wissahickon, agricultural runoff from the livestock and farming practices, as well as stormwater runoff from the school's roofs and parking lots, will be captured and treated through a series of long pools connected by wetland swales. This project will add a significant educational component to the curriculum of Saul High School, already one of the nation's premier agricultural high schools, by demonstrating proper management of agricultural runoff.

viii. Monastery Stables Stormwater Diversion & Detention Project

PWD is partnering with the FPC to address stormwater and agricultural runoff at this FPC property in along the Wissahickon Creek. Lack of proper stormwater management controls, a sloping topography toward the bordering creek, and the intensity of horse activity on the site make Monastery Stables a potentially significant source of contamination to Wissahickon Watershed. Presently, rainfall collects in the paddocks and discharges toward the Wissahickon through several eroded gullies, carrying sediment, nutrients, and harmful pathogens. This project will introduce stormwater management controls to increase stormwater infiltration, and direct and treat stormwater runoff, reducing sediment, nutrient, and harmful pathogen loadings on the Wissahickon Creek. PWD supported FPC in their 2004 Growing Greener Application for funding for this project and will offer in-kind match in the form of pre and post implementation monitoring. PWD in-kind match is estimated at \$7000.

ix. Tacony Creek Watershed Infrastructure Investigation

An infrastructure investigation of Tacony Creek and its 10 tributaries was performed by PWD during the period of August 2004 to November 2004 for the purpose of providing data to support two major studies underway in the Watershed – The Tacony Creek Integrated Watershed Management Plan and the Development of an Act 167 Plan for the Tacony Creek.

The Main Stem of Tacony Creek is approximately 15 miles in length with about 16 miles of tributary creeks and streams. About 7 miles of Tacony Creek are located in Philadelphia County. The rest of the Creek is within Montgomery County, more specifically within Abington, Rockledge, and Jenkintown Townships, but mostly located in Cheltenham Township.

Field crews consisting of biologists and engineers, both from PWD and D.S. Winokur and Associates, were mobilized to collect spatial location data for all points that either hydraulically alter the flow of the creek, or, infrastructure points effected by the stream migration, whether natural or caused by it's presence within the creek.

Over 1000 points of data were collected documenting the spatial locations of all bridges, channelized portions, confluences, culverted portions, dams, manholes, outfalls, and pipes within the Watershed. In addition to spatial locations, and depending on the type of infrastructure point, the following information was also collected: Size, Material, Length and Height of Exposed Portion, Condition, Presence and Quality of Dry Weather Flow, Bank Location, Level of Submergence, Dimensions – Height, Width, Length (Channels and Culverts only), Digital Photos and Descriptions, and Additional Field Notes.

The field studies performed utilized digital aerial photo based maps containing the following Geographical Information System (GIS) layers: street centerlines, township boundaries, and hydrology layers. A Global Positioning System (GPS) unit was used to collect the spatial locations (x-y coordinates) for each point. Attribute data was documented on paper field forms for the categories listed previously for each point and were converted to digital format back in the office. Eight different GIS layers were then created combining the spatial location data with the digital attribute data. A photography database was also compiled based on the photos taken of each point of infrastructure.

x. Wise's mill

In response to flooding occurring on August 1, 2004, a hydrologic model of the Wise's Mill Tributary to the Wissahickon Creek was created to quantify runoff amounts in this system from this event relative to long-term amounts from previous hydrologic events. The model was run using rainfall data from 1902-2000, a statistical analysis was performed on the results to quantify return frequencies for various discharge durations. The August 1, 2004 event was run separately to compare with the long-term statistics; this event exceeded the 100-year flow frequency for all durations less than 24 hours. The results of the statistical analysis were also used in the design of the restoration project in this tributary.

b. Low Impact Development Demonstration Program

Low-impact development (LID) is an ecologically friendly approach to site development and stormwater management that aims to mitigate development impacts to land, water, and air by conserving or replicating natural systems. For stormwater management, LID designs mimic the natural water cycle by using small-scale, decentralized practices that detain, infiltrate, evaporate, and transpire water. Through these practices three major goals of stormwater management are met: reduction of peak flow, reduction of total volume, and reduction of pollutants.

When implementing LID, stormwater controls such as bioretention gardens, green roofs, permeable paving, and infiltration areas are integrated into built and landscaped areas close to the source of the stormwater. In addition to better management of stormwater, LID techniques provide ancillary benefits, such as the reduction of the urban heat island effect, energy and water conservation, and improved aesthetics.

The Philadelphia Water Department has initiated a LID Demonstration Program to illustrate the benefits of this approach and familiarize designers, builders, developers, and community groups with the LID approach. The demonstration projects, developed directly by PWD or in concert with nonprofit or for-profit partners, can be grouped into four broad categories: 1) Vacant lot stabilizations; 2) School yards; 3) City facilities and public rights-of-way; and 4) Redevelopment and new construction projects.

With funding from PA-DEP, PWD has administered the Technical Assistance Grant (TAG) program, which has supported the development of LID demonstration site plans for schools, community groups, and other nonprofit organizations. During FY 2005, PWD assisted with the creation of three site plans (including full construction drawings for two sites) for the School District of Philadelphia. In addition, a final site plan and construction drawings were completed for a parking lot bioretention project for the East Falls Development Corporation in concert with the City's Commerce Department. PWD also continues to provide technical assistance to applicants and recipients of PA-DEP's Growing Greener program. For instance, PWD is partnering with three local nonprofit organizations and one school to implement stormwater management demonstrations utilizing Round V Growing Greener funding awards and provided design technical assistance to three nonprofit organizations for their Growing Greener Round VI applications.

Finally, PWD is managing the implementation of two large-scale LID demonstration programs. The first is the Mill Creek Watershed Redevelopment Project, supported by PA-DEP Growing Greener funding. This program demonstrates LID and specific stormwater best management practices as a tool to vacant land reclamation and improvement to recreation facilities, while also creating a legacy of environmental education for school children and opportunities for experiential learning for people of all ages within highly urbanized, inner-city neighborhoods.

The second is a program entitled "Restoring Urban Watersheds in Philadelphia Using Decentralized Water Resources Management," funded by a STAG grant from the U.S. EPA. This is a long-term, comprehensive approach to addressing watershed degradation due to urban development. Integral to this approach is the development of land-based strategies to control the impacts of development and redevelopment on area rivers and streams, while at the same time enhancing community aesthetics and minimizing infrastructure maintenance and replacement costs. This project will pilot a range of decentralized stormwater practices throughout urban areas of Philadelphia. The goal is to construct Low Impact Development (LID) demonstration projects appropriate to the urban environment and evaluate their environmental effectiveness, stakeholder acceptance, and the watershed-based life cycle cost benefit. The program will implement a comprehensive suite of land-based technologies, applicable to both redevelopment and retrofit of existing development, that provide for on-site management and re-use of stormwater runoff, improvement of deteriorated drainage systems with modern conservation devices, educational programs, and assessment of public perceptions of LID in the urban context.

17. Philadelphia Water Department Office of Watersheds Wetland Program

PWD's wetland program supports comprehensive, environmentally sound management of urban stormwater runoff, combined sewer overflows, and protection of drinking water sources through the management of wetland resources. In previous years, PWD has undertaken extensive assessment and evaluation of wetlands and riparian areas within the City boundaries to facilitate the protection and enhancement of existing wetlands and identify opportunities for construction of treatment wetlands. Recently PWD has expanded the wetland assessment program to include portions of four watersheds that lie outside of the city limits, because it is essential that wetland management and protection occurs at a watershed level. PWD entered into a grant agreement with EPA that will fund \$175,000 of a projected \$250,000 program to complete wetland assessments outside of the city, supplement available wetlands data within Philadelphia, and integrate the in and out of city wetlands into a series of comprehensive wetlands management reports.

The inventory and assessment phase of the project includes the identification of existing wetlands as well as the identification of areas that are potential sites for wetland creation, expansion, or mitigation. The field evaluations and assessments are guided by desktop evaluation of orthophotography, stormwater outfall data, land use and open space coverages, hydric soils, NWI wetlands mapping, hydrology, 100-year floodplains, and topography. Field investigations are undertaken to verify the presence of wetlands, conduct functional assessments of wetlands, identify potential for improvement of existing wetlands, and identify sites for potential wetlands creation.

Project accomplishments during FY 2005:

- Completed desktop and field investigations of the entire Poquessing Creek Watershed both and inside and outside the City of Philadelphia
- Prioritized wetlands and potential wetland areas in the Cobbs Creek watershed for restoration and creation in association with stream restoration projects

18. Detection and Abatement of Illicit Connections and Improper Disposal

a. Compliance with Permit Requirements

On March 18, 2004, the Consent Order & Agreement (COA), reached with the Pennsylvania Department of Environmental Protection (PADEP) on June 30, 1998, was officially terminated. However, the City has remained faithful to the terms of that agreement through the entire Fiscal Year. During Fiscal Year 2005, the results of outfall and subsystem sampling were used to evaluate priorities for the Defective Lateral Detection and Abatement Program.

i. Staffing

Although it was terminated on March 18, 2004, the City remains in compliance with the terms of the CO&A. As in prior years, the City maintains 4 crews dedicated to the identification and abatement of defective connections. Additional resources such as CCTV truck and crews are regularly assigned as needed to assist the program.

ii. Funding

In addition to the staff resources dedicated to the identification and abatement of defective connections, the City funds abatement of owner-occupied, residential cross connections through the Cross Connection Repair Program. Funding for cross connection abatement and other customer assistance programs is budgeted at \$2.5 million annually. During the reporting period, of the 53 abatements completed under the program, the City funded abatement of 48 residential cross connections at an average cost of \$3,540.73, for a total cost of \$169,955.00.

b. Outfall Investigations

During Fiscal Year 2005, 87 outfalls, not included in the Priority Outfall sampling program, were inspected and 55 were sampled due to observed dry-weather flow. In addition, 83 samples were taken under the Priority Outfall quarterly sampling program during Fiscal Year 2005. These samples are used to evaluate priorities for the Defective Lateral Detection and Abatement Program. A synopsis of the work in the priority areas is provided below.

i. T-088-01 (7th & Cheltenham Aves.)

In this priority outfall area, as of June 30, 2005, 2,828 properties have had complete tests as defined by the CO&A. Of these properties, 130 (4.6%) have been found to have defective laterals and 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 (5) identified areas and redirect the flow into the sanitary system. These devices are inspected regularly by the City's Collector System Flow Control Unit. The locations of these devices, the number of inspections, and the number of blockages found in Fiscal Year 2005 are listed in Table 6 below:

Table 6: Outfall T-088-01 Dry Weather Diversion Device Inspections

Location	ID#	Inspections	Blockages
Plymouth Street, West of Pittville Avenue	(CFD-01)	49	4
Pittville Avenue, South of Plymouth Street	(CFD-02)	38	11
Elston Street, West of Bouvier Street	(CFD-03)	47	3
Ashley Street, West of Bouvier Street	(CFD-04)	39	5
Cheltenham Ave, East of N. 19 Street	(CFD-05)	46	5
Verbena Street, South of Cheltenham Avenue	(CFD-06)	44	0

There were 3 discharges reported in connection with the blockages found above, one each at CFD-02, CFD-03, and CFD-04.

Fecal coliform sampling at this outfall continues quarterly. Results for the outfall samples and a stream sample taken approximately 50 feet downstream of the outfall in Mill Run are listed in Table 7 below:

Table 7: Outfall T-088-01 Fecal Coliform Sampling

Date	Outfall (Fecal colonies per 100mL)	Stream (Fecal colonies per 100mL)
7/8/04	20,000	17,200
12/12/04	20	690
1/03/05	40	20
4/05/05	270	10

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. This project was bid as a package with a much larger stream bank rehabilitation project on the Cobbs Creek. However, due the extremely high low-bid price for the package, the City had to make changes to the plans and specifications and re-bid the package Fiscal Year 2004. Construction was completed in Fiscal Year 2005.

ii. W-060-01 (Monastery Ave.)

In this priority outfall area, as of June 30, 2005, 610 properties have had complete tests as defined by the CO&A. Of these properties, 16 (2.6%) have been found to have defective laterals. All 16 have been abated.

Additionally, two (2) dry weather diversion devices were installed to intercept contaminated flow within the storm system and redirect the flow into the sanitary system. These devices are inspected regularly by the City’s Collector System Flow Control Unit. The locations of these devices and the number of inspections in Fiscal Year 2005 are listed below:

Table 8: Outfall W-060-01 Dry Weather Diversion Device Inspections

Location	ID#	Inspections
Jannette Street, West of Monastery Avenue	(MFD-01)	33
Green Lane, North of Lawnton Street	(MFD-02)	33

No blockages or discharges were reported with these inspections.

iii. Monoshone Creek Outfalls

Of the seven (7) storm water 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, 2005, 2,355 properties have had complete tests as defined by the CO&A. Of these properties, 82 have been found to have defective laterals and abated.

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. It is believed that the majority of the fecal problem now present at this outfall is the result of this sewer infiltration rather than defective laterals. 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.

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.

iv. 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 device is inspected regularly by the City's Collector System Flow Control Unit and continues to function properly. The number of inspections in Fiscal Year 2005 was 98. There were 16 blockages and 5 discharges reported in conjunction with these inspections.

v. Manayunk Canal Outfalls

Of the 13 storm water outfalls that discharge into the Manayunk Canal, the City is focusing on 8 that have recorded dry weather flow with some amount of fecal contamination. These 8 outfalls are listed below:

- S-051-06
- S-058-01
- S-059-01
- S-059-02
- S-059-03
- S-059-04
- S-059-09

In these 7 outfalls, as of June 30, 2005, 2,444 properties have had complete tests as defined by the CO&A. Of these properties, 59 have been found to have defective laterals and abated.

c. Dye Tests and Abatements

During the reporting period, the Defective Connections Abatement staff conducted 4,152 complete tests. Of the complete tests, 70 (2.0 %) were found defective. A total of 48 residential abatements and 5 commercial abatements were completed. The total cost for these 53 abatements, both residential and commercial, was \$169,955.00.

d. Prevention of Illicit Discharges

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.

ii. Abatement of Residential Cross Connections

The City maintains a Defective Lateral and Abatement Program in compliance with a Consent Order & Agreement with the Pennsylvania Department of Environmental Protection. The City requires abatement of all residential defective connections upon discovery. An annual funding allotment of \$2.5 Million is available through customer assistance programs in the form of City-funded cross connection abatements and HELP loans. Information on the assistance programs accompanies the homeowner's notification of defect. The City also publicizes the assistance programs through bill stuffers to ratepayers, and through public education events. The City also maintains the legal authority to take administrative action to cease the pollution condition. During the reporting period, the City funded abatement of 48 residential cross connections at an average cost of \$3,540.73, for a total cost of \$169,955.00.

iii. Abatement of Commercial and Industrial Cross Connections

The City maintains a Defective Lateral and Abatement Program in compliance with a Consent Order & Agreement with the Pennsylvania Department of Environmental

Protection (see Section 18.a. above and Appendix A for more details). 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. In Fiscal Year 2005, 5 commercial or industrial cross connections were abated.

e. Investigation of Illicit Discharge Sources

The City maintains a storm water outfall monitoring system in compliance with the Consent Order & Agreement with the Pennsylvania Department of Environmental Protection. All 434 of City's permitted storm water 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 Industrial Waste Unit or the Defective Lateral and Abatement Program. In addition, outfalls identified as priority outfalls under the Consent Order & Agreement are sampled quarterly.

The City also investigates all potential reports of an illicit discharge from the storm water system through the Industrial Waste Unit. The City investigates and reports all discovered illicit discharges to receiving waters. During Fiscal Year 2005, the Industrial Waste Unit investigated 40 reports of illicit sewage discharges, of which 10 were to a receiving body and 30 to the municipal storm water system.

In addition to programs above, the City also has initiated a monitoring and modeling effort within the separate sanitary sewer areas to target specific areas where infiltration and/or ex-filtration may be likely. In the summer of 1999, the City initiated a portable flow-monitoring program to augment monitoring data that was collected by an existing network of permanent monitoring sites at fixed locations. Under this program, fifteen (15) American Sigma 920 portable flow monitors were purchased. These monitors have multiple sensors that use a combination of pressure transducer and ultrasonic technologies for measuring depths and Acoustic-Doppler technology for velocity measurement. Additionally, a consultant, Camp Dresser & McKee, was chosen to assist the City in the startup of this program. Data from this program is routinely analyzed and compared to data provided from the City's extensive Storm Water Management Model (SWMM) hydraulic model.

One of the goals of the monitoring program was for the City's in-house instrument technicians to receive training and experience in the proper setup, use, maintenance, and trouble-shooting of flow monitoring equipment. Beginning with the third round of deployments in October 2000, the City's personnel began running this program completely in-house.

Another initiative started by the City is a very large undertaking to evaluate and enhance our existing sewer assessment program. The City awarded a contract for \$5.7 Million over two years to the engineering firm of Hazen & Sawyer Environmental Engineers & Scientists to inspect approximately 200 miles of sewers in 9 pilot areas using CCTV

equipment. Four of these areas (Manayunk, Rhawnhurst, Oak Lane, and Bustleton) are in separate storm and sewer system areas. Additionally, the consultant is providing training the City's in-house sewer inspection personnel based on the standard NASSCO ratings. This program continued throughout Fiscal Year 2004 and again through Fiscal Year 2005. We are currently awaiting a Final Report for this project complete with recommendations on budgeting, staffing, and service level goals for the future.

19. Monitor and Control Pollutants from Municipal Landfills

During the reporting period, the City has not identified any operating municipal landfills in the separate storm water service areas.

20. Monitor and Control Pollutants from Industrial Facilities

a. Inspections

The City conducted 270 site inspections of industrial facilities for compliance with pretreatment permit requirements, including verification that storm water Planning, Preparedness and Contingency (PPC) plans were kept on site.

b. Monitoring/Enforcement

The City also reviewed industrial self-monitoring discharge reports during routine inspections at pretreatment facilities. Observed violations of NPDES permits are referred to the Department for enforcement action.

The City of Philadelphia has received numerous complaints about the operation of scrap metal and auto salvage businesses. Some of these complaints involve existing business, while many involve facilities which are unlicensed, and which operate in violation of existing zoning regulations. The City acknowledges that most licensed businesses operate responsibly; however, some, whether knowingly, or in open disregard of the law, operate in violation of various City, state and federal environmental laws, causing damage to our communities, as well as endangering the health and safety of our citizens.

To address these concerns, the City, in cooperation with the United States Environmental Protection Agency (USEPA) and the Pennsylvania Department of Environmental Protection (PaDEP) has formed a multi-governmental task force, which will educate and assist all those scrap yard operators eager and willing to comply with various laws and regulations, enforce existing regulations against those unwilling to cooperate, and bring to justice those operators of illegal operations, often existing in residential neighborhoods. These illegal operations particularly have caused blight on our neighborhoods, contributing to short dumping, litter, and environmental harm.

The goals of the program are to educate and assist scrap yard operators on various environmental laws and regulations, enforce existing environmental regulations, identify illegal operations, assist with environmental cleanup, and improve aesthetics.

During the reporting period the Task Force investigated around twenty scrap yards, mostly located in the Southwest portion of Philadelphia. A map indicating locations of scrap yards throughout the City is included in Figure 17.

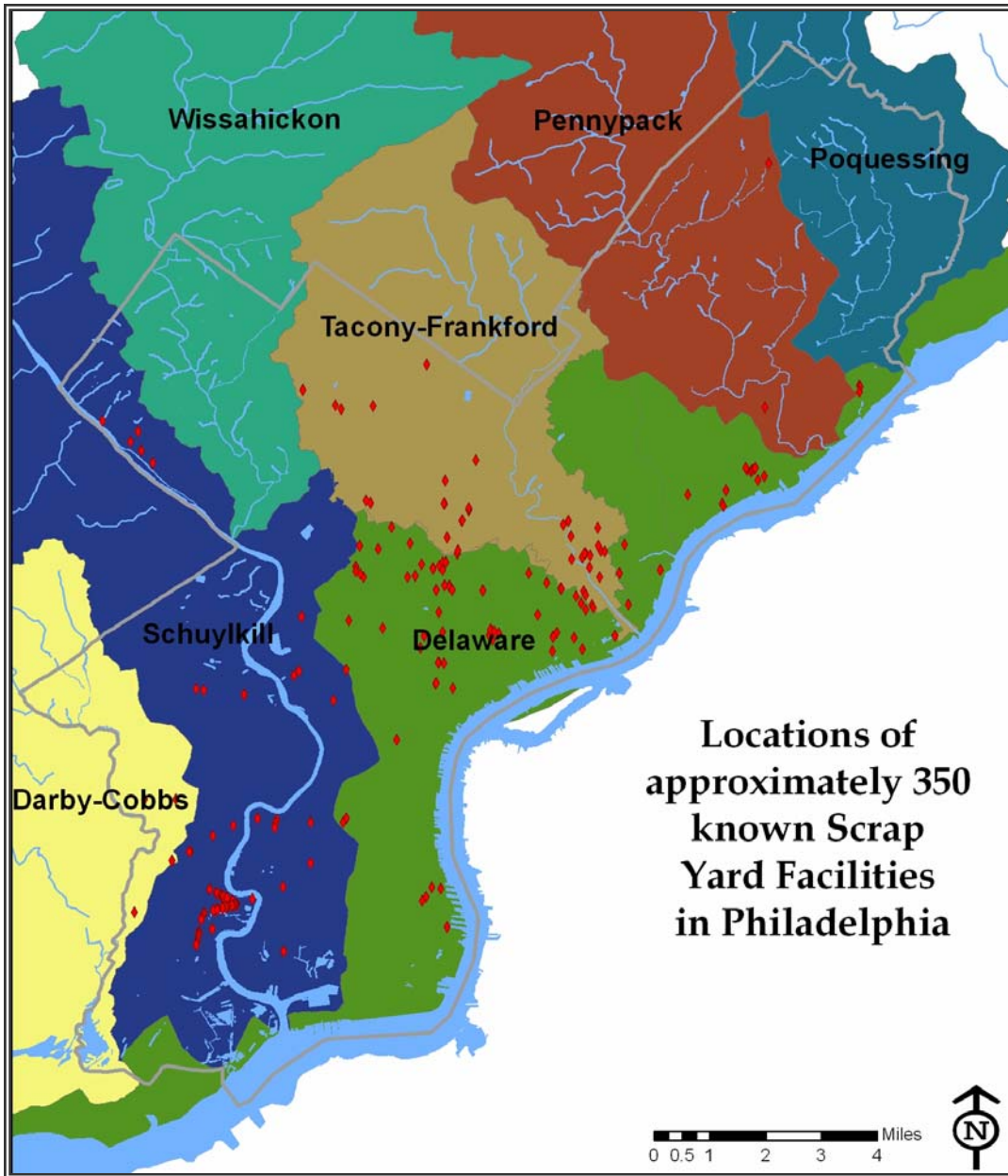


Figure 17: Location of scrap yard facilities in Philadelphia

c. Municipal Industrial Permits

Philadelphia maintains industrial stormwater permits for two of its wastewater treatment plants. Stormwater from the third wastewater plant is transported to the headworks of the plant for treatment. In August 2001, Notices of Intent (NOIs) to continue coverage under DEP general permits were filed for the Philadelphia wastewater treatment plants.

21. Monitor and Control Storm Water from Construction Activities

a. Inspections

The City issues construction permits and conducts inspections per its legal authority as follows.

b. Monitoring/Enforcement

The Department reviews and processes applications for NPDES construction permits. The City is notified through Act 14, Municipal Notification, of permit applications to discharge storm water from construction activities. The Department initiates enforcement of NPDES permit non-compliance.

Water Main and Sewer Reconstruction - The Office of Watersheds has been working on minimum construction site best management practices (BMPs) that may be added to our Standard Contract for water and sewer construction and reconstruction, and to the Construction Branch's Guide to Inspectors. Several meetings have been held with Public Education's Construction CAC project team and the Construction Division to discuss improved customer service on water and sewer jobs and the existing Sediment and Erosion Control Checklist.

The Construction Branch has reviewed the proposed checklist and suggested creation of two checklists, one for water main and sewer construction projects and another for site development construction projects. At the last meeting of the Construction CAC project team, the final checklist for water and sewer reconstruction was approved for a pilot. The project team will also meet with L&I to discuss use of the checklist at plumbing inspections.

c. Public Education

The City is also in the process of developing a Construction Site Best Management Practices (BMPs) handbook to serve as an educational tool for construction site operators, and inspectors in conjunction with city agencies responsible for construction, inspection, and enforcement. This handbook will include an overview on stormwater construction site regulations, exemptions, construction stabilization measures, BMPs better suited for urban environments, contact numbers, and references. The City has contacted and reviewed what other Phase 1 communities (Florida, New York,

Washington) are doing successfully for sediment and erosion control on construction sites and how it could apply in the City of Philadelphia.

D. ASSESSMENT OF CONTROLS

1. Pollution Reduction Estimates

The City continues to improve upon methodologies to assess the effectiveness of the Storm Water Management Program. An analysis of the data collected in Part 1 and Part 2 of the permit application, and the data collected in monitoring program, help form a baseline for the impact of pollution reduction efforts. Understanding the chemical, biological, hydrologic and hydraulic processes that govern water quality requires extensive site-specific data and technical analyses. Emphasis is placed on the level of effort undertaken to reduce pollution, the implementation of BMPs versus end-of-pipe treatment technologies. BMP measures include.

- Number of Inlets Cleaned
- Number of Detention Basin Inspected
- Tons of Debris Removed from Inlets, Basins
- Tons of Leaves Collected
- No. of Industrial and Construction Site Inspections
- Number of Illicit Connections Abated
- Volume of Dry Weather Abated
- Number of Education Materials Delivered
- Number of Training Sessions Conducted
- Number of Surveys on Outreach Material
- Number of Capital Projects Completed
- Adoption of Legal Authority
- Annual BMP Review

For each of the City's 7 watersheds, comprehensive watershed planning and management includes a very wide array of skills and resources: water and land use policy, communications, natural sciences, engineering, administration, management, public education, laboratory and analytical services, computer science, mapping and information systems. The time, effort, and money required to maintain the stormwater program must be coordinated with other improvements on a watershed basis. Regional implementation of BMPs is necessary in order to yield watershed benefits.

2. Best Management Practices

a. Commercial and Residential Source Controls

i. City-owned Structural Controls

The Mingo Creek Basins provide protection to the lower Schuylkill River by limiting flow, trapping sediments and providing retention of pollution due to spills and dumping. The estimated potential volume of solids collected in the Mingo basins is 60,000 cubic yards.

ii. Privately Owned Structural Controls

The City reviews proposed storm water structural controls, as a part of the subdivision review process. During the reporting period, the City did not identify existing privately owned structural controls in violation of the City's Storm Sewer Discharge Ordinance.

One thousand one hundred thirty digital pictures of the basins have been taken of the basins to establish a baseline for reference, and to provide documentation. The pictures have been used favorably on several occasions to review conditions in preparation for discussions with property owners. GPS readings were taken at each site, and locations were added to the GIS mapping for analytical uses. The SWBMP map (Figure 10) presents a City overview of each basin location within each watershed area. An electronic file for each site has been created that records the field documentation collected at each location and basin visited from which the City may recall related information on privately owned structural controls.

The data has been reviewed for the selection of a demonstration project to improve water quality. It was agreed that the project goals varied such that several demonstration projects were feasible. The following selection criteria were agreed upon; the goals and selected demonstration sites are outlined below.

SELECTION CRITERIA:

- User benefits (water quantity and quality)
- Function and maintenance (priority given to public nuisance)
- Land use (priority given to highly replicable and visible)
 - Residential
 - Commercial
 - Industrial
 - institutional
- Public education
- Discharge location (storm sewer or waterbody)

Abatement of Public Nuisance – PWD is continuing to work with Philadelphia University and the Fairmount Park Commission to address erosion issues stemming from stormwater discharges from the University's detention basins to a receiving stream that runs through FPC property and ultimately discharges to the Wissahickon Creek. .

PWD is continuing to work with both PA-DEP and other City Departments on addressing ongoing erosion issues stemming from construction activities associated with the Hunter's Pointe development project in the Roxborough section of the City. .

b. Deicing Practices

The City monitors the quantity of deicing salt used, in an attempt to improve management practices. During FY 2005 the City applied approximately 30,200 tons of deicing salt.

c. Salt Storage

The City's six salt storage sites are covered to prevent precipitation from coming in contact with the storage material and producing storm water runoff pollution.

d. Inlet Cleaning Practices

The City maintains all City-owned storm sewer inlets, including scheduled cleaning of trapped inlet catch basins. The trapped catch basins are designed to capture solids that otherwise would be discharged to the receiving waterbody. During the fiscal 2005 year, the City cleaned 81,588 inlets, collecting 9,030 tons of debris. The frequency of inlet cleaning is location dependent; on average some inlets are cleaned annually and others quarterly.

e. Detection and Abatement of Defective Connections and Improper Disposal

The City runs a Defective Laterals Detection and Abatement Unit in compliance with a Consent Order & Agreement (CO&A) with the Pennsylvania Department of Environmental Protection (PADEP). As part of this program, the City has stipulated performance measures for storm water outfall monitoring, property testing for defective laterals, and abatement of defective laterals found. The City also has requirements for quarterly reporting on these measures.

A summary of major performance measures follows:

i. Storm Water Outfall Monitoring & Prioritization

The City is required to inspect all 434 permitted storm water outfalls during the 5 year NPDES permit cycle. If dry weather flow is present, then the City estimates the volume and samples the flow for fecal coliform and fluoride analysis. The City maintains a Priority Outfall list based on the flow volume, fecal coliform concentration, health and environmental impacts, and complaint history. In fiscal year 2005, the City inspected 170 storm water outfalls as part of its annual outfall-sampling program.

Additionally, the City is required to sample outfalls listed as priority outfalls under the (CO&A) quarterly. In fiscal year 2005, the priority outfalls were the Manayunk Canal

outfalls (S-051-06, S-058-01, S-059-01, S-059-02, S-059-03, S-059-03), and the Monastery Ave. outfall (W-060-01), the Monoshone Creek outfalls (W-064-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04, and W-068-05) and the Sandy Run outfall (P-090-02). Additionally, the City has continued to treat the 7th & Cheltenham Avenues outfall (T-088-01) as a priority outfall and sampled it quarterly.

During Fiscal Year 2005, 87 outfalls, not included in the Priority Outfall sampling program, were inspected and 55 were sampled due to observed dry-weather flow. In addition, 83 samples were taken under the Priority Outfall quarterly sampling program during Fiscal Year 2005. These samples are used to evaluate priorities for the Defective Lateral Detection and Abatement Program.

ii. Property Testing for Defective Connections

Since the City began the Defective Laterals and Abatement Program prior to the signing of the CO&A, the total of complete property tests performed by the program is 26,187. In fiscal year 2005, the City performed 4,152 complete tests.

iii. Abatement of Defective Connections

The City is required to abate all defective lateral discovered during property testing within 120 days or take administrative action. Of the 26,187 properties with complete tests under the Defective Laterals and Abatement Program, 689 (2.6%) have been found to have defective laterals. Of the 4,152 properties with complete tests in Fiscal Year 2005, 70 (1.7 %) were found to be defective and Notices of Defects (NOD) were issued in each case. Unfortunately, administrative actions are necessary in some cases to obtain property owner cooperation. As a result of these efforts 53 abatements were successfully completed. Of these abatements, 53 were City funded residential cross connections repairs averaging \$3,206.70, for a total cost of \$169,955.

f. Monitor and Control Industrial Activities

During the reporting period, the City conducted 270 site inspections of industrial facilities that include verification that storm water PPC plans are kept on site, permit requirements, DMR reports, and pretreatment permit compliance. The City has not identified significant non-compliance.

g. Reduce Pollutants from Runoff at Construction Sites

The City reviews plans for storm water structural controls, as a part of the subdivision review process. The City also reviews proposals for land development in accordance with City Code 14-1606. This code section insures that structures, built within the floodplain, are located a minimum of 1 foot above the 100-year flood elevation.

The Office of Watersheds has been working on minimum construction site best management practices (BMPs) that may be added to our Standard Contract for water and

sewer construction and reconstruction, and to the Construction Branch's Guide to Inspectors. Several meetings have been held with Public Education's Construction CAC project team and the Construction Division to discuss improved customer service on water and sewer jobs and the existing Sediment and Erosion Control Checklist.

The Construction Branch has reviewed the proposed checklist and suggested creation of two checklists, one for water main and sewer construction projects and another for site development construction projects. At the last meeting of the Construction CAC project team, the final checklist for water and sewer reconstruction was approved for a pilot. The project team will also meet with L&I to discuss use of the checklist at plumbing inspections.

The City is also in the process of developing a Construction Site Best Management Practices (BMPs) handbook to serve as an educational tool for construction site operators, and inspectors in conjunction with city agencies responsible for construction, inspection, and enforcement. This handbook will include an overview on stormwater construction site regulations, exemptions, construction stabilization measures, BMPs better suited for urban environments, contact numbers, and references.

The City has contacted and reviewed what other Phase 1 communities (Florida, New York, Washington) are doing successfully for sediment and erosion control on construction sites and how it could apply in the City of Philadelphia.

3. Ground Water Impacts

The City researches existing local ground water studies conducted in conjunction with industrial pretreatment permit approvals, and through United States Geological Survey (USGS) studies to identify groundwater impacts.

E. EDUCATION PROGRAMS

Most of the city ordinances related to this minimum control 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. If these pollutant parameters eventually accumulate within the watershed, practices such as street sweeping and regular maintenance of catch basins can help to reduce the amount of pollutants entering the combined system and ultimately, the receiving water. Examples of these programs are ongoing and were presented in the NMC document. The City will continue to provide public information about the litter and stormwater inlets as part of its implementing this minimum control as well as continue to develop the following new programs.

From the moment the City of Philadelphia began providing water to its citizens there has been a need to create partnerships to protect the water supply. In our earliest days it was through the creation of Fairmount Park. Today we comply with state and federal regulations that require citizen participation. More importantly however, the Philadelphia Water Department through its Public Education Unit has for more than 21 years voluntarily reached the public through an aggressive education and community outreach program that serves as a model for utilities across the country. Through these programs, the Water Department raises public awareness and understanding of storm water problems and issues. Educational materials are distributed at these events and included in bill stuffers to over 470,000 households. In addition, the City continues to facilitate watershed stakeholder meetings to unify public participation in the surrounding counties and to address the issues pertaining to stormwater management on a watershed scale.

1. Billstuffers

Billstuffers are regularly produced by the Water Department as an educational tool for disseminating information pertaining to customer service and environmental issues. Specific billstuffers are designed on an annual basis for the CSO, Stormwater and Watershed Management programs to address the associated educational issues. These billstuffers reach over 470,000 water and wastewater customers. The environmental bill stuffers distributed in FY 2005 include:

- Waterwheel (April)
- Streets Department Curbside Recycling Program (May)
- Streets Recycling (August)
- In's & Out's of Sewer Inlets (Nov.)
- Trash & Recycling Schedule (Dec.)
- Waterwheel (Jan.)
- Streets Recycling (March)
- Streets Recycling (May)
- Water and Sewer Rates (June and July)
- Streets Recycling (August)
- Ins and Outs of Sewer Inlets/Proper Disposal of Grease (Oct.)
- Trash & Recycling Schedule (Dec.)

2. Waterwheel Watershed Newsletters

The Water Department's watershed newsletters are usually published on bi-annual basis and target specific information to the residents living within a particular watershed. In this manner, citizens can be kept informed of departmental water pollution control initiatives specific to the watershed they live in. Issues are sometimes published in the form of billstuffers and sometimes as a brochure (when combined with the annual drinking water quality report). Newsletters issued in FY'05 include:

Winter '05 Edition – This issue, in the form of a billstuffer, featured PWD's River Conservation Plans, an Update on the Tacony-Frankford River Conservation Plan, and the Poquessing River Conservation Plan

Spring '05 Edition - – This issue, in the form of a mailed newsletter, featured an update on the Pennypack River Conservation Plan, Watershed Events and Seminars, in addition to the department's source water protection plan and its annual drinking water quality data.

Winter '06 Edition – This issue, in the form of a billstuffer, will feature 2005 Watershed Improvements and Accomplishments including an update on the Pennypack Watershed Partnership, 2005 Goals for Philadelphia's River Conservation Plans, and Stormwater BMP Recognition Program.

3. Comprehensive Education Materials

a. FY 2005 Projects

The following projects were initiated and/or completed in FY 2005:

- Watershed educational partnerships (continued from 1999) with Bodine High School, Edison-Faira High School, Fairmount Park, Phila. Recreation Dept., Academy of Natural Sciences, Lincoln High School, Turner Middle School, Senior Environmental Corps, and the Schuylkill Center for Environmental Education.
- Completion of the Technical Memos for water quality assessments (chemical, biological, physical) for the Tookany/Tacony-Frankford Watershed Partnership, facilitated by the Water Department and its consultant, the Pennsylvania Environmental Council.
- Completion of the Tookany-Tacony/Frankford (TTF) Watershed Management Plan
- The completion of the Tacony-Frankford River Conservation Plan.
- Recruitment of an Interim Board to develop a non-profit TTF Entity to implement the final plan
- Data Collection and analysis for the Pennypack Creek River Conservation Plan
- Recruitment of steering committee members for the Poquessing Creek River Conservation Plan and the completion of Year One studies and public outreach for the Pennypack Creek River Conservation. PWD and its partners have completed visual assessments and the data collection components of the Pennypack Creek and is planning for a number of outreach events in the spring 2005.
- The development of a website (www.phillywater.org/Partnerships) for the Poquessing Creek Watershed Partnership.
- The development and release of a website (www.phillyRiverCast.org) for determining the safety of water recreation activities on the Schuylkill River.

b. Activity Book

One of the Water Department's most successful community publications is the recently released 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. Future editions will include descriptions and activities for various city watersheds. The curriculum has already been used in a number of middle schools to meet state required science-based credits. In FY 2005, the Activity Booklet was updated and made full color. The Fairmount Water Works Interpretive Center was also highlighted in some of the activities to encourage students to visit with their families.

c. General educational projects

A great variety of public information materials concerning the CSO LTCP in relation to the watershed framework were developed as a result of the watershed partnerships and river conservation plans, including: fact sheets, press releases, tabletop exhibits, brochures, watershed surveys, websites, watershed walks, and presentation materials. Materials developed for a specific watershed are discussed in the Watershed Planning sections as appropriate.

Some of these publications/projects include:

- WaterWheel - Issue 2 included with 2004 Water Quality Report (April/May 2004)
- WaterWheel - Issue 2 to be included with 2005 Water Quality Report (April/May 2005)
- 2004 Annual Water Quality Report featuring special supplement on Source Water Assessment and Protection (April/May 2004)
- 2005 Annual Water Quality Report featuring special supplement on Source Water Assessment and Protection (April/May 2005)
- Fairmount Water Works Interpretive Center: Water in Our World (printed several runs 5,000 each time distributed at the Center and other visitor centers and public areas - 2003 & 2004)
- Keeping America's Waterways Beautiful: PWD's Flower Show Exhibit Features Best Management Practices in Landscaping and Gardening – March 2005
- 4th Annual 2005 Southeastern Pennsylvania Coast Day & BYOB Fishing Event (contributed funds for brochure)
- PWD Annual Report Fiscal Years 2004 & 2005
- (annual report features watershed/stormwater projects)
- Clean Water Begins and Ends with You! Calendar Contest: distribution of calendars and SEPTA car cards featuring winning entries
- Guide for Hydrant Use & Street Water Discharges (best management practices for construction contractors) - in development by Industrial Waste.

- Learn About Your Water from the Comfort of Your Own Home (PWD and Partnership for the Delaware Estuary videos running on Philadelphia's Government Access Channel)
- Another Philadelphia First: Online Forecast System Predicts Schuylkill River Water
- Quality: RiverCast Unveiled - June 2005
- Southeast Water Pollution Control Plant Employees Receive Platinum Award, Recognizing
- Environmental Excellence in Wastewater Treatment, National Association of Clean Water Agencies Award - May, 2005
- Pennsylvania Has a Coast? Travelers learn about the Delaware Estuary and the region's premiere ecotourism center (signs on display at the Philadelphia International Airport)
- Know Your Watershed: New Signs Installed in Tookany/Frankford Watershed – July 2005
- You 'Otter' Know: Schuylkill River is Healthier than Ever
- Clean Water Begins and Ends With You! Drawing Calendar Contest - Awards Ceremony at the Fairmount Water Works Interpretive Center; Students' drawings were on display at the Center.
- Fairmount Water Works Interpretive Center – educational brochure for teachers
- First Urban Shad Watch at the Fairmount Water Works Interpretive Center – April 23
 - Catch of the Day – Fish paintings for children
 - Fish don't talk, but what do they tell us? Aquatic biologist' presentation on how many species of fish have returned to the Schuylkill River
 - What's in the River Today? New Exhibit featuring otter caught on tape
 - Name the Shad; Name the Otter Activity
 - Fish Facts – educational activity booklet, filled to the gills with activities about fish
- First Urban Shad Watch at the Fairmount Water Works Interpretive Center – April 24
 - Season of the Shad Celebration Featuring: Native American Foodways Demonstrations -Fishnet Weaving and Shad Catching, Cooking and Drying Methods
- Saturday Morning Family Programs at the Fairmount Water Works Interpretive Center (Spring 2005)
 - The Thirsty Land! Everyone has a Watershed. Where's yours? April 16
 - The Dirty Truth: The Scoop on Poop and Pollution – April 9
 - An Expedition in Time: Explore water pollution now and then during Ready? Set. Navigate! May 14
 - A Delicate Balance: Exploring the Relationship of Land and Water during Choose it. Use it! ...Abuse it? Lose it. – June 11
- Travel Through Time Tours: Experience our past, examine our present, explore our future. May 7 (for Drinking Water Week)

- Drinking Water Week at the Fairmount Water Works Interpretive Center (PWD water treatment engineers and plant managers introduced students to water treatment processes)
- Know Your Watershed: New Signs Installed in Tookany/Frankford Watershed – July 2005
- New Skimmer Vessel Commissioned to Improve Water Quality - The Water Department, in partnership with the Philadelphia Department of Public Health, the Oliver Evans Chapter of the Society for Industrial Archeology and the Atwater Kent Museum of Philadelphia, is celebrated 200 years' worth of efforts to clean the Schuylkill and Delaware Rivers - July 16, 2005
- Clean Water Theater
Clean Water Theater: videos and DVDs available for public distribution
- 4th Annual 2005 Southeastern Pennsylvania Coast Day Event – September '05
- Watershed Exhibits at EPA Information Center – May – July 2004
- Return and Rededication of the Fisherman Statue - esplanade exhibit at Fairmount Water Works Interpretive Center

d. PWD Flower Show

The PWD Public Affairs Division participates in the PA Horticultural Society's annual Flower Show each year to inform citizens of its biosolids products in addition to providing tips on how garden and home water conservation can provide a powerful tool for stormwater management at the residential level. The PWD Public Affairs Division participates in the PA Horticultural Society's annual Flower Show each year to inform citizens of its biosolids products in addition to providing tips on how garden and home water conservation can provide a powerful tool for stormwater management at the residential level.

Water Department Awarded for Flower Show Exhibit: Keeping America's Waterways Beautiful

Sunday, March 13 marked the end of a successful 2005 Philadelphia Flower Show, and with its ending comes the fruits of labor. The Philadelphia Water Department received the Pennsylvania Horticultural Society's Award of Merit for a Nonacademic Educational Exhibit and the Special Achievement Award of the Garden Club Federation of Pennsylvania for Conservation.

This year's theme was "Keeping America's Waterways Beautiful." The Water Department, along with the Partnership for the Delaware Estuary, presented an exhibit on a landscaping project in Fairmount Park.



Nearly seven years ago a gaggle of Canadian geese took up year-round residence in Fairmount Park along a section of West River Drive. People flocked to the geese, bringing an endless and abundant supply of food, giving the geese no reason to leave, resulting in environmental changes.

The geese trounced about, tore up the landscape and caused significant erosion to the stream bank. When it rained the stormwater runoff carried sediment along with pollutants into the river. More than 150 geese, producing nearly 82 tons of droppings annually, posed a risk to drinking water quality since their new home was very close to an intake for one of Philadelphia's water treatment plants.

A humane solution was needed, and one was quickly found. Geese feel insecure in areas where the natural ground cover obstructs their line of vision. Following this logic, volunteers from the Water Department, Fairmount Park Commission and citizens restored the barren stream bank with native trees, shrubs, grasses, and wildflowers that grow higher than the line of vision for the geese.

The project proved to be a success, and the geese moved on to less environmentally sensitive areas in the park. The flourishing native plants are effectively protecting the source water by absorbing and filtering much of the stormwater runoff before it enters the river. The graceful meadow, dotted with colorful wildflowers, now provides a visual retreat for the thousands of Philadelphians who recreate in that area of Fairmount Park. The native plants used to restore the river bank have yielded additional benefits by increasing habitat for small animals, insects, and even for the fish.

Using best management practices, as demonstrated in this modest project, can add up to make a significant improvement in the quality of America's water resources – from the Schuylkill River, to the Delaware Estuary to the shining Atlantic!

4. Fairmount Water Works interpretive Center

The City's Stormwater Management and Source Water Protection programs are inherently linked, as surface water is the source of the city's drinking water supply. Through programs offered at the Interpretive Center, the City provides public education about the urban water cycle and the role of environmental stewardship through tours of the department's drinking and wastewater treatment plants. Students in Philadelphia and surrounding communities learn about stormwater pollution prevention through a series of educational activities, most notably the Summer Water Camp and Urban Ecology programs. Since it's opening in October 2004, the FWWIC has had 53,661 visitors explore its exhibits and/or take part in its exciting programming.

a. The Scoop on Poop and Pollution

Interpretive Center Educator Brian Rudnick created a novel approach for FWWIC visitors gain a better understand of a common urban watershed problem -- pollution from stormwater runoff. As part of his educational program, Brian "introduced" visitors to new students Alice and Sunny, who walked their faithful dog Schnitzel to their new schoolyard. Brian encouraged the visitors to create a short skit, challenging them to give Alice and Sunny, the "scoop on poop" when Schnitzel forgets himself in the schoolyard. Visitors were encouraged to use the exhibits to complete activities in story form.

b. The Thirsty Land

Everybody has a watershed. Where's yours? From Cobbs Creek to the Poquessing, there's a watershed near you. Some watersheds are small, some large. Drew Brown and Jacquelyn Bivins of the Philadelphia Water Department helped some eager Philadelphians explore their local watershed when they presented *The Thirsty Land* on April 16, 2005 at the FWWIC. Participants built a model watershed and learned how to protect their watersheds from stormwater runoff pollution. Jackie and Drew explained where Philadelphia is located in the Delaware River Basin Watershed, and how the Delaware and Schuylkill Rivers provide drinking water to nearly 1.5 million people in Philadelphia.

c. Promoting Clean Water Creatively

The Fairmount Water Works Interpretive Center was proud to host an award ceremony honoring 16 student artists, all winners of a city-wide drawing contest. The contest provides students with a better understanding of how stormwater runoff pollution adversely affects our local waterways. The FWWIC was the ideal place to hold the ceremony and serve as the official "art gallery" for the budding artists' work, as the contest's theme is closely aligned with the environmental education messages taught at the Center.

Philadelphia Mayor John F. Street and other city officials recognized the students and their teachers during the ceremony at the FWWIC in April. The *Clean Water Begins and Ends with You!* Drawing Contest, sponsored by the Philadelphia Water Department and the Partnership for the Delaware Estuary, was open to Philadelphia public, private and parochial students ranging in age from kindergarten through 12th grade.

Drawings of the students receiving first-place prizes were used to promote the stormwater runoff pollution prevention message on public transit buses in celebration of the 35th anniversary of Earth Day, April 22. The 16 winning students' work is also being featured in a special 15-month calendar titled *Clean Water Begins and Ends with You*.

d. Fish don't talk, but what do they tell us?

A lot, actually. Did you know that in the late 1980s, only 11 species of fish were found locally in the Schuylkill River? More recently, aquatic biologists have identified 37 species in the river. What does that tell us? The health of Philadelphia's rivers is better than ever. And that's a good reason to celebrate.

On Saturday, April 23, 2005, the FWWIC sponsored the First Urban Shad Watch. Philadelphia Water Department aquatic biologists Lance Butler and Joe Perillo were on hand to give presentations on the species of fish found in the Schuylkill, and a unique demonstration of the fish ladder at the Fairmount Dam.

As a special treat that day, visitors were able to nominate names for the North American River otter that was caught on tape going through the fish ladder, and for a replica made

from a real shad. The otter can be seen in the What's in the River, Today? Exhibit located in the Water and Wildlife section of the FWWIC.

Kids who came to the shad watch were able to take home their fish paintings and a special, educational booklet, that was filled to the gills with activities including a word search puzzle of Pennsylvania Fish and *All About Fish*, a glossary that helps identify the parts of a fish. The FWWIC partnered with the Pennsylvania Fish and Boat Commission to develop the booklet, and we are grateful to them for their support of what we hope will become an annual Shad Watch at the Center.

e. WOW! The Wonder of Water!

Water utilities across the United States, Canada and the United Kingdom celebrated the 30th anniversary of Drinking Water Week, May 1-7, 2005. The FWWIC hosted two Drinking Water Week events sponsored by the Philadelphia Water Department. This year's theme was the Wonder of Water! Drinking Water Week was established by the American Water Works Association to promote the importance of safe, clean water – a resource whose precious value is often forgotten or taken for granted. The FWWIC is proud to participate in this international celebration. Here's a snapshot of Philadelphia's events:

i. Ever wonder about water?

On May 3, 2005, 25 middle school students from Cornerstone Christian Academy joined several water treatment engineers from the Philadelphia Water Department to celebrate Drinking Water Week at the FWWIC, where they learned about water cycles, water treatment processes and aquatic biology.

ii. Travel Through Time Tours

As any FWWIC Tour Guide knows, Philadelphia was the first major municipal water supplier in the United States. But what came before the Fairmount Water Works and what is the Philadelphia Water Department doing now to provide safe water to the City? Citizens throughout the watershed, who participated in our Travel Through Time Tours, learned all about Philadelphia's historical, contemporary and future efforts in water treatment and supply. On Saturday, May 6, these guests were treated to free bus tours to several former and current water facilities as the Drinking Water Weeks activities continued.

The Travel Through Time Tours started at City Hall, the former site of the city's first pumping station, Center Square, where Drew Brown, manager of public education, explained the history of water supply in Philadelphia.

From there, guests traveled to the Interpretive Center where FWWIC Tour Guide Ray Finkel explained the vital role the Fairmount Water Works played in the development of

the City. At the Center, guests viewed a video that details the history of water in the 19th century Philadelphia.

Next, our guests continued on to the Belmont Water Treatment Plant by route of West River Drive, giving passengers a scenic view of the Schuylkill River, a source of Philadelphia's drinking water. Here, Ed Grusheski presented a slide presentation on the history of the Belmont plant.

Finally, Nicole Charleton, Pilot Plant Engineer, provided guests with a tour of one of PWD's research plants where they glimpsed future endeavors for water treatment.

iii. Get Out of Bed, Sleepyhead! Learn About Your Watershed.

This past spring, our Interpretive Center Educators conducted a series of family-orientated educational programs. The Saturday Morning Family Programs provided fun and interesting ways to learn about Philadelphia's watersheds and how to protect our water resources. The Saturday Morning Family Programs proved to be such a success that the FWWIC staff has decided to continue the series this fall.

iv. Ready? Set, Navigate!

What did Philadelphia look like before modern skyscrapers dotted the cityscape? On May 14, some curious youngsters found out that most of the Philadelphia area and its environment looked very different before the 20th century, as they went on an expedition through time with Interpretive Center Educator Karen Young. The children played an exciting orienteering game designed to help compare and contrast Philadelphia's 19th century landscapes and landmarks, to those of the 20th and 21st centuries. Participants explored all around the deck of the Interpretive Center to learn the effects of pollution on the Schuylkill River, the source of drinking water for the city. By the end of the game, the children were able to estimate the impact of pollution from past times to modern.

v. Choose it. Use it! ...Abuse it? Lose It!

Every day, people make choices about how they use the land around them – often without considering how land use will affect the water they drink. On June 11, 2005, visitors to the FWWIC ventured on a scavenger hunt through the exhibits to learn the history of land usage in Philadelphia. They used modern land-use maps to guide them through their journey of discovery, and learned how and why attitudes have changed about using land and protecting the water around us. Interpretive Center Educator Ellen Schultz, creator of *Choose It. Uses it!...Abuse it? Lose It!* was on hand to help visitors make the important connections during the scavenger hunt.

5. Citizen Advisory Committee (CAC) and other Partnership Projects

a. Water Quality Citizens Advisory Council

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, DEP'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 CAC meetings. The committee consists of representatives from the following groups: Tookany Creek Watershed, Academy of Natural Sciences, Action AIDS, Bridesburg Civic Association, Bucks County Water & Sewer Authority, Center in the Park Senior Environmental Corps, Clean Water Action, Cobbs Creek Community Environmental Education Center, Delaware River Basin Commission, Delaware Valley Regional Planning Commission, Drexel University, Eastwick PAC, Fairmount Park Commission, Frankford Group Ministry, Friends of Fox Chase Farm, Friends of High School Park, Friends of Manayunk Canal, Friends of Pennypack Park, Friends of Poquessing Creek Park, Friends of Tacony Creek Park, MANNA, Mayor's Commission on Literacy, PA DEP Water Supply Division, Partnership for the Delaware Estuary, PA Environmental Council, PennPIRG, PA Horticultural Society, Pennypack Environmental Center, Pennypack Watershed Association, Phila. Health Department, Phila. Corp. for Aging, School District of Philadelphia, Schuylkill Center for Environmental Education, Schuylkill Navy, Schuylkill River Development Corp, Schuylkill River Heritage Corridor, Southampton Watershed Association, Stroud Water Research Center, US EPA Region III, Wissahickon Charter School.

b. Clean Water Partners

Clean Water Partners is a project designed to reduce non-point source pollution from retail and commercial businesses that will be implemented in several commercial districts in Philadelphia and Chester Counties. In FY'05, the Partnership developed and disseminated a brochure to over 2000 groups/individuals, including municipal officials, watershed associations, environmental advisory councils (EACs). The Partnership had 15 resulting responses from groups expressing interest in the Clean Water Partners program. Direct contact was made with 55 groups through a personalized letter and at least one phone call. In total, 41 groups expressed interest in the participating in the Clean Water Partners program, including EACs, watershed groups, business groups, and municipalities. The program coordinator made 33 presentations describing this program and educating 192 individuals about stormwater runoff pollution prevention during this partner recruitment phase.

Program literature and training materials were developed based on the results of the Partnership's Clean Water Partners pilot. Four basic Clean Water Partners educational pieces were developed to support this program, including:

- Eight-page Good Housekeeping Handbook
- Clean Water Partners Auto Service Sector Fact Sheet
- Clean Water Partners Food Service Sector Fact Sheet
- Clean Water Partners Site Survey Form and Pledge Certificate (Developed to standardize education program, site visit/survey procedures, and facilitate pledges).

Additional training materials were developed to support program partners and assist with program implementation. These included: Sample Kick-off Letter, Flyers, Sample Press Release, Training Packet and Clean Water Partners Powerpoint Presentation.

The current seven active program partners in Pennsylvania include: Abington Township EAC, Chester-Ridley-Crum Watersheds Association, Friends of the Wissahickon, Marcus Hook Boro EAC, Norwood Boro, West Goshen Township, and University City. In New Jersey, Gloucester City is the only active program partner. In Delaware, Delaware City is the only active partner.

i. Annual Earth Day Service Project

Community and watershed volunteers participated in the Water Department- and Stormwater CAC-sponsored annual Earth Day service project by installing storm drain curb markers throughout the City. Volunteers used the new curbmarkers developed by PWD and PA Coastal Zone Management Project to stencil the message “Yo!!! No Dumping! Drains to River!” beside a fish. By developing a more durable and easily applied curb marker, volunteers are able to cover more area. In spring and summer 2005, over 20 organizations participated in the storm drain marking activity. Throughout these months, approximately 3,500 storm drains were marked in April and 1,500 more were decaled during the summer in the City of Philadelphia.

ii. "Stormy Weather" Video

The video focuses on individual responsibility as a critical success factor in improving storm water quality. The deleterious effects of storm water pollution on the physical and biological community in aquatic systems are addressed through various anti-litter messages, such as: litter control, responsible household and pet waste management, and the proper use of inlets. The video is distributed to schools, watershed organizations and interested civics. The video has been distributed to over 300 environmental groups on an annual basis, various citizen groups, and schools, and has become a part of the environmental education curriculum for Delaware schools. The City’s cable channel is showing the video twice a day.

iii. “Clean Water Begins and Ends with You”

The Partnership for the Delaware Estuary and the PWD, sponsored its seventh drawing contest for Philadelphia students grades K-12 in January. Students were required to draw

an illustration that shows how Philadelphians can help prevent stormwater runoff pollution. First prize drawings were used to promote stormwater pollution prevention messages on SEPTA buses and in the creation of a “Clean Water Begins and Ends with You” calendar. In 2005, there were almost 1,500 drawings entered into the contest, with 44 schools participating. This year’s award ceremony was held in April 2005 at the Fairmount Water Works Interpretive Center.

iv. Clean Water Theatre

Working in partnership with the Academy of Natural Sciences, the Partnership for the Delaware Estuary, the PWD CAC offered the Clean Water Theatre’s “All Washed Up” program which uses local artists and musicians to engage public, private and parochial schools throughout the City of Philadelphia in becoming active and informed stewards of our environment. The setting of the 20 minute play is in an urban park that has a river running through it. The story is built around three characters (an old man who is the caretaker of the park and who had been a vaudeville song and dance man in his youth, and two teenagers – a boy and a girl) that explore the importance of environmental stewardship and clean water. While there were not any live performances of Clean Water Theatre in 2005, many video and DVD copies of the performance was distributed to teachers and local educators.

c. Senior Citizen 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. Meetings are held monthly. The Corps is also partnering with PWD on its Saylor Grove Wetland Demonstration Project, assisting with public education and outreach.

d. Safe Boating Program

PWD has also initiated an outreach, education, and notification program for marinas and personal watercraft that may be situated near CSO outfalls on the Delaware River. PWD has held meetings with representatives from DEP’s Coastal Non-Point Pollution program, the Partnership for the Delaware Estuary and administrators of similar programs in New Jersey to develop a host of educational and environmental management measures. Our proposed approach entails conducting a survey of existing marinas and boat launches and their use profiles (personal, charter, open, closed craft, etc.). We would then initiate meetings with the individual marinas to implement site-specific notification mechanisms (brochure, flags, sign, etc.) that list precautions that should be exercised by those engaging in contact recreation within the marina and/or on the open water. In addition, these meetings would discuss how the marina can adopt environmentally responsible

operation and maintenance practices for personal and multi-purpose watercraft that are jointly supportive of safe contact recreation and the DEP Coastal Non-Point Pollution goals. Specifically, these would address the measures identified in the Marinas and Recreational Boating section of the DEP document titled *Deliverables for Results-Based Funding Coastal Non-point Pollution (CNP) Specialist*.

F. WATERSHED PARTNERSHIPS

In the development of watershed partnerships, the scope and importance of each task will vary among watersheds as a result of site-specific factors such as the environmental features of the watershed, regulatory factors such as the need to revise permits or complete TMDLs for the watershed, available funding, extent of previous work, land use and size of the watershed, the nature of businesses and industry, the level of involvement and resources of other stakeholders, and numerous other factors. Philadelphia watersheds have a diverse range of planning needs that range from those of the Delaware, that has a long-standing river basin commission, and has been the focus of major monitoring and modeling studies, to its tributaries for which very little data and analysis are available. The actual scope of each task is developed and described in a work plan or similar document by each stakeholder group at the commencement of watershed planning activities. Most exciting, PWD has completed the watershed management plans for the Cobbs Creek sub-basin (using the Cobbs plan as a model for the entire Darby-Cobbs Watershed) and the Tookany/Tacony-Frankford Creek Watershed, which was developed in hand with the river conservation plan that the department spearheaded for the watershed. These plans will serve as templates for urban watersheds. The following is a list of typical tasks and subtasks included in most watershed planning programs.

1. Darby-Cobbs Watershed

The Darby-Cobbs Watershed Partnership was facilitated by the Philadelphia Water Department to create a framework for all stakeholders in the 75 square mile Darby-Cobbs watershed basin to work together to provide environmentally sound solutions to improve the water quality of Darby and Cobbs Creeks. Permit holders, participating agencies, and community-based organizations are constructing this framework upon regulatory and voluntary activities. The Partnership itself is a public participation mechanism, and acts as a forum for participating members to work together to develop a watershed strategy that meets state and federal regulatory requirements and embraces the environmental/public sensitive approach to improve stream water quality and quality of life in communities.

As one of the first steps in defining its framework, the Partnership developed a mission statement: “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 Partnership formed a Public Participation Committee to ensure that the Partnership identifies and recruits representatives of the diverse array of stakeholders in this basin, including municipalities. Members of the Public Participation Committee include representatives of the following agencies/organizations: the Philadelphia Water Department, the Fairmount Park CAC, Fairmount Park Commission, Dove Communications, US Fish and Wildlife Service, Heinz National Wildlife Refuge Center, Pennsylvania Environmental Council (PEC), Cobbs Creek Community Environmental Education Center (CCCEEC), Delaware Creek Valley Association, DCNR, PA Department of Environmental Protection, Trail Boss Program, Delaware County Planning Department, EPA Region III, Delaware Riverkeeper Network, Academy of Natural Sciences, and the Men of Cobbs Creek.

Under the direction of the Partnership Steering Committee, the Partnership will evolve from one that was based upon a planning mandate to one that will focus on the implementation of the watershed management plan. During the summer of 2005, a variety of self-sufficient models will be explored.

2. Tookany/Tacony-Frankford Watershed

The PWD sponsored Tookany/Tacony-Frankford Watershed kicked off with its first Partnership meeting on October 4, 2001. The Tookany/Tacony-Frankford Watershed drains 29 square miles, or 20,900 acres in Philadelphia and Montgomery counties. It is, for the most part, a highly urbanized watershed with a large diverse population that includes portions of the inner city as well as wealthy suburban communities. This partnership, geographically less diverse than the Darby-Cobbs Watershed, was able to benefit from a number of organizations and groups that are already involved in neighborhood revitalization. Its members are anxious to tackle projects that will see immediate benefits. Members of the Tacony-Frankford Partnership include:

- Philadelphia Water Department
- Fairmount Park Commission and the Natural Lands Restoration Project
- Pennsylvania Environmental Council
- Frankford Group Ministry
- Melrose Park Neighbors Association
- Friends of Tacony Park
- Edison High School
- Rohm and Haas Co.
- Senior Environmental Corps.
- Awbury Arboretum
- Frankford United Neighbors
- Frankford Style Community Arts
- PA Department of Environmental Protection
- US Environmental Protection Agency
- US Army Corps of Engineers

- Philadelphia Green
- Phila. Urban Resources Partnership
- Cheltenham Township

This Partnership has been modeled after the Darby-Cobbs Partnership in working structure and the technical documents generated. However, PWD envisions that more “hands-on” type projects will be encouraged and requested on a regular basis. To supplement the work of the Partnership and to further the development of a watershed management plan, the Water Department, Fairmount Park and the Frankford Group Ministry received a DCNR grant in October 2001 to develop a River Conservation Plan for the Philadelphia county portion of the Tacony-Frankford watershed. The Partnership has worked closely to coordinate this grant with the River Conservation Plan in its final draft on the Tookany Watershed in Montgomery County. Cheltenham Township, a Partnership member, is developing this RCP.

The creation and completion of a River Conservation Plan (RCP) for the Tacony-Frankford Watershed has provided the Partnership with an environmental and cultural planning inventory for a highly urbanized watershed with the ultimate goal to develop a holistic management plan that will facilitate restoration, enhancement and sustainable improvements in the watershed. The watershed management was completed in June 2005.

This Partnership is currently involved in the development of a 501(c)(3) separate entity that will embrace as its mission the implementation of the watershed management plan.

3. Pennypack Creek

The PWD and its partners – the Fairmount Park Commission, the Friends of Pennypack Park, the Friends of Fox Chase Farms, the Pennypack Ecological Trust and the Montgomery County Planning Commission – received notice in Summer 2002 that it was awarded a grant from DCNR to develop a river conservation plan for the Pennypack Creek Watershed – Philadelphia, Montgomery and Bucks Counties. In the Fall 2002, team members toured various sections of the watershed to gain a better understanding of its current physical topography and condition. Also, the team 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. During FY’05, a number of public outreach and education events took place, including:

- Neighborhood and community meetings
- Citizen survey
- Key Person interviews
- April 2004 Sheep Shearing Day at Fox Chase Farms

- July 2004 Wildlife Habitat Walk
- Sept. 2004 Watershed Awareness Festival
- Sept. 2004 Water Quality Workshop
- November 2004 Homeowner's Conservation Workshop
- April 2005 Stream Restoration Workshop
- April 2005 Watershed Friendly Homeowners Workshop

The plan is due for completion in December 2005.

4. Poquessing Creek Watershed

In 2004, the PWD, along with its partners, Fairmount Park Commission and the Friends of Poquessing Creek, were awarded a state river conservation plan grant for the Poquessing Creek Watershed. In FY 2005, the RCP team interviewed a number of potential consultants to assist with the data collection and public outreach for this plan. The first steering committee was held in March 2005 and the second held in June 2005. Efforts are currently focused on data collection and the development of a public outreach program.

5. Waterways Restoration Team – A Partnership between PWD and Fairmount Park Commission

In July 2003, the Philadelphia Water Department and Fairmount Park Commission (FPC) initiated an exciting partnership that will improve the environmental quality of our precious City parks and streams.

FPC has assumed responsibility for over 200 acres of land dedicated to the City for stormwater management purposes land that was, up until now, a mowing and landscaping maintenance burden for the Water Department. FPC will use this land to further its vision of developing “watershed parks,” creating natural connections between neighborhoods and existing park areas.

In exchange, the Water Department is fielding a Waterways Restoration Team (WRT) – a crew 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 will also restore eroded streambanks and streambeds around outfall pipes and remove sanitary debris at these outfalls. The Waterways Restoration Team will work in partnership with FPC staff and the various Friends of the Parks groups to maximize resources and the positive impacts to our communities. This partnership focuses on the core strengths of our two agencies. FPC will continue to improve landscape management of the City's parks and dedicated lands, while the Water Department will focus its efforts on water quality improvements, a mandate it has under its state and federal water quality related permits.

Partners – Manayunk Development Corp (MDC), Fairmount Park Commission (FPC), Managing Director’s Office (MDO), Fish and Boat Commission (F&BC), Friends of Morris Park (FOMP), Friends of Pennypack Park (FOPP), Friends of Poquessing Creek (FOPC).

In addition to the unbelievable amounts of trash that have been eliminated from our park and stream systems, the Waterways Restoration Team completed its second plunge pool restoration project at the Tustin Street outfall in the Pennypack Creek and an interim stabilization of the lower segment of the Wisers Mill Road Tributary to the Wissahickon Creek.

6. Schuylkill Action Network (SAN)

a. Schuylkill Watershed Initiative Grant (SWIG)

Philadelphia is the furthest downstream city in the Schuylkill watershed, which provides a source of drinking water for Philadelphia residents. The primary source of impairment of the Schuylkill watershed is stormwater, which accounts for 273 of its 1,000 total impaired stream miles. The majority of these impaired stream miles are within and just outside Philadelphia. A 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 Stormwater Workgroup, 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, was formed to identify a more cost effective approach. Several projects identified through the Stormwater Workgroup will be funded through the Environmental Protection Agency's Watershed Initiative Grant Program, which awarded approximately 1.15 million dollars to the Schuylkill Action Network for its innovative and collaborative approach to watershed management. Of the total dollar amount, approximately \$300,000 will go toward stormwater-related projects over the next three years. The stormwater workgroup has spent much of the past year performing prioritization and planning activities to set the stage for these projects. For example, a portion of the money will be used for creating conceptual designs for stormwater management plans at two schools in the Wissahickon subwatershed. These schools were identified by the workgroup during the past year based on proximity to headwaters of impaired streams, property size, and other relevant criteria. The workgroup has also spent much of its time budgeting for on-the-ground implementation of projects in high priority areas, determined collaboratively by members of the workgroup according to their educational benefit and ability to leverage existing plans and studies. The workgroup has also set the stage for a collaborative monitoring program to help measure the physical, chemical, and biological project outcomes on the Schuylkill River and its tributaries.

G. FISCAL RESOURCES

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 here.

Table 9: Stormwater Management Program Fiscal Resources

Program	FY 2005 Budget	FY 2006 Budget
Office of Watersheds	5.5 million	5.97 million
Collector Systems Support	1.4 million	1.34 million
Sewer Maintenance and Flow Control	15.1 million	15.9 million
Inlet Cleaning	4.1 million	5.45 million
Abatement of Nuisances	4.4 million	5.45 million
Sewer Reconstruction	22.5 million	22.7 million
Public Affairs and Education	4.0 million	4.09 million
TOTAL	\$ 57.0 million	\$ 60.8 million