PHILADELPHIA'S WET WEATHER MANAGEMENT PROGRAMS

COMBINED SEWER MANAGEMENT PROGRAM ANNUAL REPORT

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

STORMWATER MANAGEMENT PROGRAM ANNUAL REPORT

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

Reporting Period July 1st 2016 to June 30th 2017

Submitted to:

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Water Quality Management

And

ENVIRONMENTAL PROTECTION AGENCY – REGION III
Water Protection Division

Combined Sewer Management Program Annual Report

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I. Management and Control of CSOs

This report is submitted pursuant to meeting the requirements of NPDES Permits #'s PA0026662, PA0026671, and PA0026689; PART C, I. Other Requirements, Combined Sewer Overflows (CSOs), III. Implementation of the Long Term CSO Control Plan, C. Watershed-Based Management, IV. Monitoring and Assessment. This section requires that the permittee submit an Annual CSO Status Report. The purpose of this report is to document the status and changes made to programs implemented by the City of Philadelphia, during Fiscal Year 2017 (FY17), which encompasses the period of July 1st, 2016 through June 30th, 2017, to manage and reduce the combined sewer overflows (CSOs) permitted to discharge to waters of the Commonwealth of Pennsylvania.

II. Implementation of the Nine Minimum Controls

PWD submitted an Updated Nine Minimum Control Report to the Department on June 1, 2013 to supplement the 1995 report and describe current activities as a result of new technology or practices. The nine minimum controls (NMCs) are low-cost actions or measures that can reduce CSO discharges and their effect on receiving waters, do not require significant engineering studies or major construction, and can be implemented in a relatively short time frame.

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

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

To ensure PWD's investment in GIS is as accurate and up to date as possible, edits and improvements are made to data on a daily basis. PWD utilizes the GIS coverages as the foundation for many of their operations including maintenance management, capital improvements, and hydraulic modeling. During FY17, GIS layers have continued to be updated and maintained to ensure the accurate tracking and reporting of PWD assets and infrastructure. In addition, the GIS software was updated to a newer version to take advantage of new functionality.

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

PWD continues to implement a comprehensive SAP to provide inspection of the collection system using closed circuit television (CCTV) and Sonar. The SAP is used to guide the capital improvement program to ensure that the existing sewer systems are adequately maintained, rehabilitated, and reconstructed. SAP inspections are conducted by PWD's Flow Control group. During the second half of FY17, a contract was awarded for additional CCTV and sonar inspections. The contracted work will benefit the department by increasing the number of inspections and mileage of inspected pipe. For the period of July 2016 – June 2017, the PWD inspected 43.71 miles in length of sewer via CCTV and Sonar, averaging about 3.64 miles a month as shown in **Table II.A.2-1 Monthly TV Inspections.**

Table II.A.2-1 Monthly TV Inspections

Date	Collector Systems (Miles Inspected)
Jul-16	3.35
Aug-16	4.12
Sep-16	3.66
Oct-16	5.33
Nov-16	3.57
Dec-16	2.73
Jan-17	3.03
Feb-17	3.60
Mar-17	3.82
Apr-17	2.85
May-17	4.19
Jun-17	3.46
Average	3.64
Total	**43.71**

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

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

Monitoring

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

Modeling

The hydrologic and hydraulic models will be updated as needed to support Nine Minimum Controls implementation and reporting.

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

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

Permanent Flow Monitoring Program

PWD uses a network of permanent flow monitors that are connected to a newer data acquisition system (TELOG) which uses cellular-based telemetry and improved enterprise data management software. As of FY17, the Collector System Monitoring Network is connected to over 320 sites at various locations including CSO Regulators, Rain Gauges, Pump Stations, Interceptors, Chemical Feed Tanks and Hydraulic Control Points which collect over 720 individual measurements with over a ninety percent operational status. All monitoring devices deployed throughout the PWD Collector System continually store data and periodically communicate monitoring information back to the Collector Systems Headquarters for review and use by staff. The listing of permanent flow monitors can be found in **Appendix B – Flow Monitoring.**

Temporary Flow Monitoring Program

PWD maintains its temporary flow-monitoring program, initiated in July 1999, which consists of deploying portable flow meters throughout targeted Philadelphia sewershed areas to quantify sanitary and combined flow from the sewer system and characterize the tributary sewersheds. During FY17, PWD monitored 76 sites for the purposes of model calibration, I/I identification and design support. The listing of all temporary flow monitors, their location, and the deployment projects can be found in **Appendix B – Flow Monitoring: Table 6 - Listing of all Temporary Flow Monitors deployed by projects**.

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

Long Term Control Plan Update

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

The evaluations of the system-wide models were completed in FY 2008 to support the LTCPU. Since 2008 EPA SWMM models have been converted to be executed using SWMM 5. PWD continues to update the hydrologic and hydraulic models as needed to support planning and regulatory reporting needs.

PC-30 Extreme Wet Weather Overflow

PWD continues to monitor PC-30. For additional information on other efforts conducted for this site, please refer to **Section III.B.2.: Table III.B.2-1** on page 35.

Storm Flood Relief

Throughout its history, PWD has sustained a storm flood relief program to analyze and reduce property damage from flooding and basement backups. Aspects of this program include sewer system inspection and maintenance, property data collection, implementing individual property solutions when appropriate, and sewer system hydraulic and hydrologic (H&H) analysis to understand flood prone areas.

Flood Relief Project Summary

More recently, the focus of storm flood relief effort includes: South Philadelphia, Northern Liberties, Germantown, and Eastwick. The goal of these efforts has been to improve the conveyance of stormwater by targeting peak flow and volume reduction and reducing the potential for flooding. Hydrologic and hydraulic modeling indicates that sewer system improvements or source reduction can sometimes reduce the frequency and/or severity of flooding events. However, the potential benefits of structural improvements to the City's drainage infrastructure must always be counterbalanced by the financial, economic, and social impacts of implementation. Through the Storm Flood Relief program, PWD continues to refine and optimize mitigation solutions to minimize negative impacts to the communities.

South Philadelphia

In FY17, PWD completed a feasibility evaluation for the Pennsport neighborhood of South Philadelphia and will continue the evaluation of structural and non-structural alternatives in the coming year.

Northern Liberties

SFR sewer projects continue to move forward for Northern Liberties which also impact combined sewer neighborhoods in Fishtown, Port Richmond and Lower Kensington. **Table II.B.3-1** demonstrates the status of the Northern Liberties SFR program at the end of FY17:

Table II.B.3-1 Northern Liberties SFR Sewer Improvement Projects

Project Name	Location	Project Status
Northern Liberties Phase 1	Delaware Avenue and Laurel Street	Construction Complete (2011)
Northern Liberties Phase 2	Canal Street Chamber	Construction Complete (2016)
Northern Liberties Phase 3	Delaware Ave to River (Undertaken by Sugar House)	Construction Complete (2016)
Northern Liberties Phase 4	Canal & Laurel Sts. to Germantown Ave. &Wildey St.	Construction Complete (2016)
Northern Liberties Phase 5	Germantown Ave. from Wildey St. to Girard Ave.	Under Construction
Northern Liberties Phase 6	Germantown Ave. & Thompson St. to Master & Randolph Sts.	In Design

Germantown

The East Germantown section of Philadelphia was impacted by flooding from intense rainstorms, such as Hurricane Irene (8/27/11) and Tropical Storm Lee (9/7/11). PWD's SWMM model was expanded for greater accuracy and many preliminary solution options are currently under review and planning. To effectively identify flood mitigation alternatives, both qualitative and quantitative criteria will be evaluated in greater detail. In FY17, PWD and its consultant completed the necessary feasibility evaluation and H&H modeling to inform future capital planning decisions.

Eastwick

Despite a formal support letter for the Eastwick Flood Evaluation from Congressman Brady in 2015, no work was completed in FY17 because federal funds were not appropriated through the 205 program. The City of Philadelphia plans to continue its efforts to solicit 205 funding in FY18.

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

Real Time Control Evaluation

Several projects were previously evaluated for Real Time Control; for additional information on these projects, please refer to Section 2.1 Evaluate Real Time Control in LTCP on page 10 of the 1996 Annual CSO Status Report and Section II.B.3.4 Real Time Control Evaluation on page 26 of the CSO-Stormwater FY 2010 Annual Report. For details regarding the current operational statuses of the City's Tacony Creek Park computer controlled CSO regulator (T-14) and Rock Run Relief CSO regulator (R-15) see **Section II.B.5** below.

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

Main Relief

The Main Relief project is operating as designed with a 7.5-foot static dam. The current configuration achieves an overflow reduction of approximately 30 MG annually.

Construction and Implementation of Tacony Creek Park (T-14)

The T-14 storage sewer provides combined sewer overflow capture in the Northeast Drainage District (NEDD). The T-14 storage sewer system is operating under automated controls and reducing overflow volume during wet weather events. T-14 is operating at the full design level. In FY17, PWD upgraded the radio equipment at this location to improve system resiliency.

Construction and Implementation of Rock Run Relief (R-15)

The Rock Run Relief Sewer provides flood relief to combined sewer areas upstream of regulator T-8 in the Northeast Drainage District (NEDD). An inflatable dam was constructed in the Rock Run Relief Sewer to allow for utilization of in-system storage to retain combined flows during wet weather events. The Rock Run storage facility is operating under automated real time controls at the full design capacity.

Computer-Controlled CSO Regulators

PWD has eight computer-controlled CSO regulators that are configured to maximize storage during wet weather. All the computer controlled regulators are in the northeast drainage district (NEDD). Five of the eight computer controlled regulator sites had control upgrades installed in FY17. The remaining 3 computer controlled regulators are scheduled for upgrades in FY18.

II.C NMC 3 - Review and Modification of Pretreatment Requirements to Assure CSO Impacts Are Minimized

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

The City of Philadelphia's Pretreatment Program regulates all significant industrial users (SIUs) that discharge into PWD's service area, which includes SIUs in both separate and combined sewer systems. The City continually reevaluates the Pretreatment Program to determine if improvements can be made. Through annual monitoring and inspection activities, PWD's Industrial Waste Unit (IWU) currently regulates 126 SIUs that discharge to the sanitary system. IWU conducts SIU program and inspections on a calendar year cycle, having inspected all 126 permitted facilities during the 2016 calendar year.

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

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

A revised version of the Philadelphia Stormwater Management Guidance Manual was released on July 1, 2015 as a web-based resource. The manual assists developers in meeting the requirements of the Stormwater Regulations, and can be updated when necessary to incorporate new information. The current version of the manual is available at http://www.pwdplanreview.org/manual-info/guidance-manual.

Please refer to the MS4 Annual Report **Section F.5.g - Stormwater BMP Handbook and Construction Site BMP Sediment & Erosion Control Checklist** on page 31 for additional information on the updated manual.

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

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

The SYTF is in its eighth year of operation since it was reorganized in September of 2008. Inspections and meetings normally take place once a month, inspecting about four (4) scrap facilities each month, in an effort to bring more scrap yards into compliance. The SYTF will occasionally inspect facilities that do not fit the strict definitions of either junkyard or metal recycler but present the potential for negative impact on the environment and surrounding area. Some of these sites are: tire accumulations, other recycling facilities, and shipping operations. The SYTF also responds to community complaints having to do with facilities or properties that are considered a nuisance or problematic in a given neighborhood.

The core agencies involved in the SYTF are PWD, PADEP's Solid Waste division, Department of License and Inspections (L&I), Philadelphia Police Auto Squad and the Philadelphia Fire Dept. Hazmat

Administration Unit. Each attending agency performs specific tasks as dictated by their primary regulatory mission. For example, PWD also inspects sites for water and sewer violations, as well as violations that may be referred to the PADEP Clean Water division. PWD is the coordinating entity that designates the facilities to be visited.

During FY17, the SYTF held 8 meetings resulting in 29 facilities being inspected. Inspection results are shown in **Table II.C.3-2: SYTF FY17 Inspections** on page 8, while locations are displayed in **Figure II.C.3: SYTF Sites Inspected in FY17** on page 10. The vast majority of the sites inspected in FY17 resulted in minor infractions such as improper labeling and storage, blocked fire lanes and missing business/special work licenses which typically can be addresses shortly after identified. Very few of the inspections during FY17 resulted in water quality concerns, as most facilities are graded in such a way that there is no runoff from the property. Water flows toward the center of the parcel rather than towards surrounding storm drains and local waterways. In addition, fewer than 25% of facilities inspected have water or sewer service.

All instances where during an inspection the SYTF observes potential water quality concerns, the sites are referred to PWD’s IWU. The large majority of sites inspected in FY17 were found to be in compliance, while the sites listed below required further action:

- One site was discovered to be no longer active scrapyard, the SYTF team will continue to monitor these sites as these areas often reestablish as new scrapyards as they change hands.
- Two sites were further investigated by PWD’s Industrial Waste Unit for potential discharges into the department infrastructure.
- Two sites were turned over to the PADEP’s Clean Water Division for potential direct discharges to adjacent waterway.
- One site was turned over to Philadelphia Health Department for concerns about breeding ground for mosquitos from standing water in tires, especially given the concerns with the Zika virus.

Table II.C.3-3: FY17 SYTF Inspections

Address	Facility Name	Date Inspected	Notes & General Findings
6544 Essington Ave	Atlantic Used Auto Parts	7/14/2016	Issue with discharges to indoor drain forwarded to IWU, Minor issues with improper labeling
6330 Passyunk Ave	Cartel Auto Parts	7/14/2016	Minor issues with improper labeling
6308 Passyunk Ave	C&C Auto Parts	7/14/2016	Issue with heavy ground contamination forwarded to PA DEP, Minor issues with improper labeling
6800 Essington Ave	MyAutoStore	7/14/2016	Minor issue with improper storage of batteries
3517-55 S. 61st Street	Jack's Auto Parts & Glass	8/4/2016	Minor issues with excess weeds, improper storage & labeling, block fire lanes, numerous tire improperly store causing mosquito concerns
3511 61st Street	Big Head	8/4/2016	PWD Follow up for potential runoff concerns to local waterway
3507 S. 61st Street	J.T.S Auto Parts	8/4/2016	No Water related concerns, Minor L&I issues including electrical issues, missing license, improper labeling and no identified fire lanes
3501 S. 61st Street	Philly Auto	8/4/2016	PWD & USDEP will follow up for heavy ground contamination, minor issues with improper storage and missing licenses
6110 Passyunk Ave	Cartel Double Discount	11/3/2016	Minor concerns with improper storage and expired licenses
6740 Essington Ave	Essington Avenue Auto Parts	11/3/2016	No issues
2600 Penrose Ferry Rd	European Metal Recycling	11/3/2016	No longer acting as scrap yard
2501 South 28th Street	Matthew's Auto Parts	11/3/2016	Minor issues with improper storage, block fire lanes, excess weeds
7250 Paschall Ave.	PASCO Inc.	12/8/2016	Minor ground contamination
5345 Whitby Ave	Harold's Used Auto Parts Inc.	12/8/2016	Minor issues with labeling & storage & blocking of fire lanes
1580 N 52nd St	IMP Auto	12/8/2016	Not inspected due to no access, owner not present
5000 Warrington Ave	Unknown	12/8/2016	Not inspected due to no access
4087 Richmond St	K-Squad/ReCoyle Towing	3/2/2017	No new issues identified, ongoing land ownership issues with City
2200 Adams Ave	Allegheny Iron & Metal	3/2/2017	Debris getting close to a nearby creek, manager agreed to remove debris and add barrier to prevent
3950 N Delaware Ave	Final Destination Inc	3/2/2017	Minor ground contamination
2200 E Somerset	Philadelphia Metal Resource and Recovery	4/6/2017	Minor ground contamination
2160 E Somerset	K&A Auto Salvage	4/6/2017	Minor issues missing licenses at time of inspection

Address	Facility Name	Date Inspected	Notes & General Findings
2069 E Silver St	Philadelphia Scrap Metal Exchange	4/6/2017	Minor issues improper storage
2157 E Lehigh	Bruce Paul Auto Parts	5/7/2017	Not Inspected, unable to locate facility
2180 Church St	Steffa Metals	5/7/2017	Moderate ground contamination, minor electrical issues, expired licenses, excess weeds, IWU will follow up on floor drain concerns & malfunctioning
2159 Kinsey Street	Steffa Metals-Primary Overflow	5/7/2017	Minor issues with expired licenses & minor debris (municipal trash)
4034 Orchard Street	Steffa Metals- Secondary Overflow	5/7/2017	No issues found
3065 East Ontario St.	Temple Enterprises	6/8/2017	Missing licenses, open fire put out during inspection
2942-2950 East Tioga St	EMR Richmond	6/8/2017	Ground contamination concerns forwarded to PADEP, improper storage
3361 Edgemont St	Sullivan’s Scrap Metal yard	6/8/2017	Missing hazardous materials license, L&I will follow up
2710 E. Westmoreland St	Sullivan’s Scrap Metal yard	6/8/2017	Missing hazardous materials license, L&I will follow up

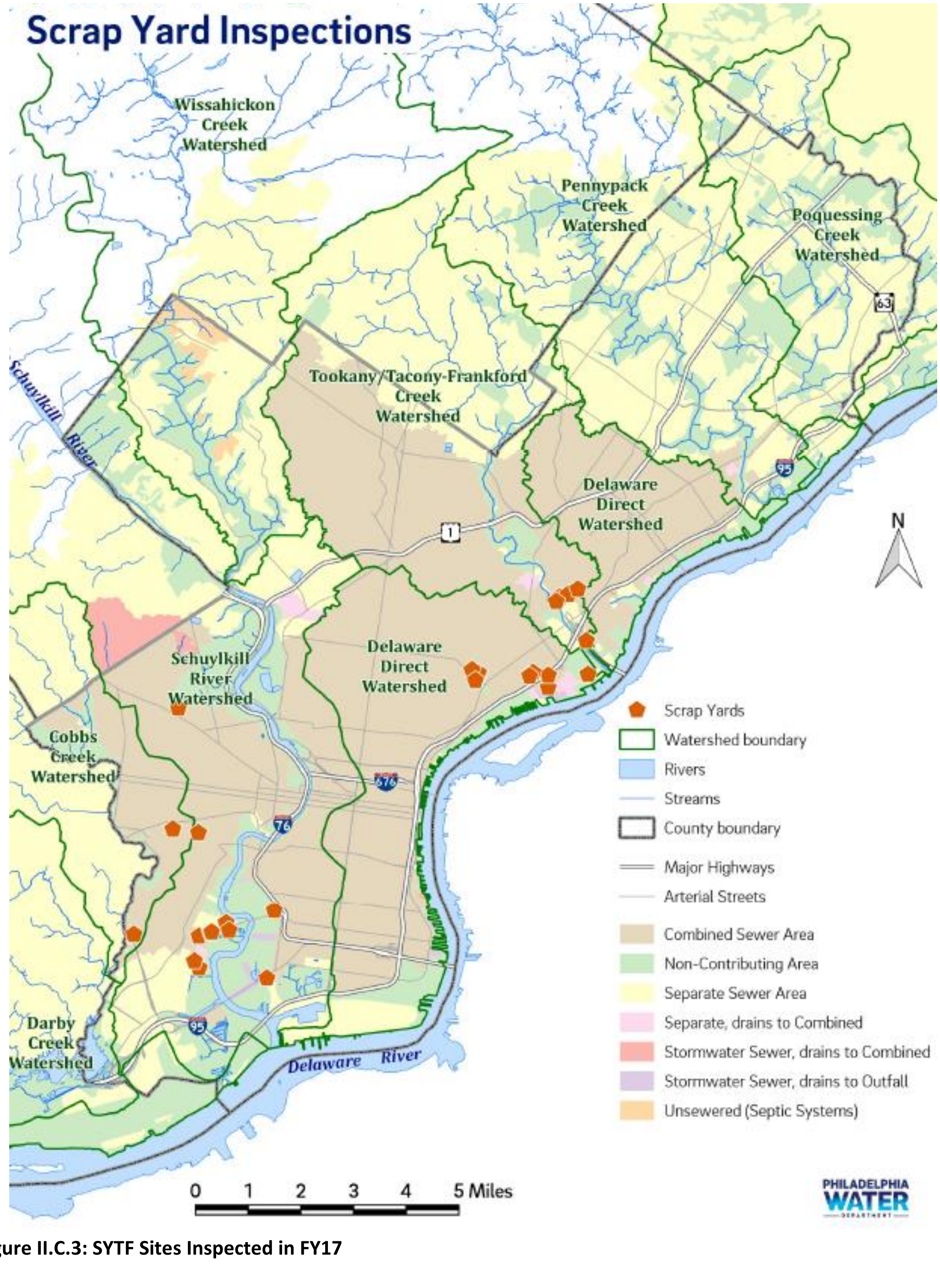


Figure II.C.3: SYTF Sites Inspected in FY17

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

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

Modified Regulator Plan

The Modified Regulator Plan (MRP) was designed to deliver more flow to the WPCPs more frequently and enable greater pollutant removals. The projected flow increase associated with the MRP was completely implemented by the submission of the 1997 Annual Combined Sewer Overflow Status Report. Additional plan implementation efforts were included in the Updated Nine Minimum Controls Report which can be found online by accessing the following link:
http://phillywatersheds.org/doc/Updated%20NMC%20Report.pdf

Maximization of Wet Weather Treatment in the LTCPU

PWD completed and submitted a comprehensive Wet Weather Facility Plan on June 1, 2016, which provides details including schedule, cost and anticipated performance for each project presented in and supersedes the FCPs. More details on these plans can be accessed at the following link:
http://phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan

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

PWD provides wastewater service to some of its neighboring communities. Communities that exceed their contractual limits must develop flow reduction plans, under PWD review. In FY17, there were no significant updates to the Wholesale Wastewater Customer contracts. The list of outlying community contracts can be found below in **Table II.D.2-1: Listing of Wholesale Wastewater Customer Contracts and Capacities.**

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

Customers	Average Annual Daily Flow Maximum (MGD)	Maximum Daily Flow (MGD)	Instantaneous Maximum Rate (Cubic ft./sec)	Maximum Annual BOD Loadings (000's lbs.)	Maximum Annual SS Loadings (000's lbs.)
Northeast Plant					
Abington	2.97	4.45	9.54	2,102	2,481
Bensalem	6.13		11.74	5,340	3,734
Bucks	24	33.00	74.26	13,400	13,400
Cheltenham			26		
Lower Moreland	1.90	2.85	5.88	729	966
Lower Southampton	7.14	9.28	15.79	5,500	6,000
Southwest Plant					
DELCORA	50.00	75.00	155.00	21,771	19,487
Lower Merion	14.50		31.57	6,871	7,250
Springfield (Erdenheim)	3.20		6.65	3100	3300
Upper Darby	17.00		35.00	6,831	7,348
Southeast Plant					
Springfield (Wyndmoor)	1.00		1.93	300	400

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

The U.S. EPA's SWMM was used to develop the watershed-scale model for the combined and separate sewer systems. Suburban communities are modeled as separate sanitary sewersheds that load to the PWD sewer network. The rainfall response from these sheds is calibrated to flow monitoring data collected at each respective connection to PWD sewer network (if the sewershed is not monitored then a reference shed is used to obtain the rainfall response). Presently, permanent flow monitors are installed at 110 connections and 1 connection is unmonitored at this time. **Appendix B – Flow Monitoring: Table 2** contains the list of all known connections, their location and whether the connection is permanently monitored.

Since the FY16 annual report submission, no major changes (hydrology or hydraulics) have been made to the model used to generate Table 2 in Appendix D for the FY17 annual report. The model is simulated using EPA Stormwater Management Model Version 5 (SWMM5).

Since the FY16 annual report submission, some minor changes have been made to the SWMM5 model to include operational and structural changes to the collection system. Modifications include the following:

- H16 (R21): Flow diversions were made for operational purposes on 1/14/2017, 1/19/2017, 2/1/2017, 4/10/2017, 4/27/2017 and have been reflected in the models in the respective quarters.
- D38: Two 6 inch stop logs were installed and removed on the D38 dam for flow diversion on 4/10/2017 and 4/27/2017 respectively. These changes are reflected in the model results.
- R07: Stop logs were installed to divert flow to support collection system operations on 1/13/2017 and included in the models.

Appendix D – FY17 NPDES Annual CSO Status Report: Table 3 shows the CSO overflow volume, duration and frequency. The typical year rainfall and the SWMM model used to support the 5-year Evaluation and Adaptation Plan (EAP) submitted in October 2016 is used to generate this.

II.E NMC 5 - Prohibition of CSOs during Dry Weather

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

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

CSO Regulator Inspection & Maintenance Program

PWD maintains 175 CSO regulator chambers with regulator devices that control the diversion of wastewater flow to the interceptor system and 26 storm relief diversion chambers that allow excess flow during storm events to be diverted to storm relief sewers. These chambers discharge through 164 NPDES permitted point sources which make up the CSO outfalls. The maintenance of the chambers is critical to the performance of the system in that they control the frequency, duration and quantity of CSO discharges. Annual summaries of the comprehensive and preventative maintenance activities completed in the combined sewer system over the past year are detailed in **Appendix D - FY17 NPDES Annual CSO Status Report** and any changes are discussed below.

PWD continues to implement its policy of conducting next day follow-up inspections at sites that experience a dry weather discharge. Ongoing assessment of all inspection scheduling continues to ensure that CSO regulators are inspected at the frequency required to ensure timely response to operational issues and minimize the likelihood of dry weather discharges. During FY17, Flow Control crews completed 5,379 inspections on 201 CSO regulator sites and storm relief diversion chambers. The crews cleared 196 CSO regulator blockages to prevent possible discharges from developing. There were 17 dry weather discharges during this fiscal year. Details of the inspections during the past fiscal year can be found beginning on page 3 of **Appendix C – FY17 CSO Maintenance Program Annual Report.**

Tide Gate Inspection and Maintenance Program

Eighty-nine (89) tide gates are located at approximately half of the CSO regulator chambers in the City's system and prevent tidal inflow into the combined sewer system from the estuary receiving water body.

Maintenance of the gates is critical to system performance because inflow from the receiving water body can adversely affect the combined sewer system and treatment facilities by reducing system capacities, potentially causing dry weather discharges. In FY17, CSO tide gate preventative maintenance was completed at 19 of the tidally-affected CSO regulator sites. Summaries of the tide gate inspection and maintenance completed during the past fiscal year are on page 24 of **Appendix C – FY17 CSO Maintenance Program Annual Report**, which documents the locations of tide gate preventative maintenance performed in FY17.

Somerset Grit Chamber Cleaning

During FY14, the Somerset grit chamber was removed from service because the upstream regulator was being relocated. This relocation project was completed during FY16. During FY17 grit level surveys and sonar inspection of the downstream intercepting sewer were conducted as part of a grit evaluation plan.

Central Schuylkill Pumping Station Grit Pocket Cleaning

During FY17, the two grit pockets at the CSPS siphon were cleaned two times, and a total of 40 cubic yards of grit with an approximate weight of 68 tons were removed to ensure proper functionality of the site. Additional information on the CSPS cleaning activities conducted in FY17 is available on page 24 of **Appendix C – FY17 CSO Maintenance Program Annual Report**.

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

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

PWD is responsible for inspecting and cleaning approximately 72,000 active stormwater inlets within the City. There are thirty-three inlet cleaning crews whose primary duties include cleaning, removing and properly disposing of debris (solids and floatables) from inside City inlets as well as street level cleaning in the vicinity of inlets to prevent debris from entering the collection system. Other duties include inspection of inlet conditions and referral of structural defects to the Sewer Maintenance Unit for repair to ensure proper function. Furthermore, dedicated crews are responsible for cleaning high volume traffic areas, retrieving and installing inlet covers, replacing missing inlet covers, installing locking covers, and unclogging choked inlet traps and outlet pipes so inlets can take water. A high level of focus is placed on responding to customer complaints of flooding, blockages, and foul odors.

During FY17, PWD performed 134,256 inlet inspections and cleaned 107,638 inlets. The average amount of debris removed from each cleaned inlet was 138 pounds. Inlet inspection and cleaning frequencies have significantly increased since the implementation of the Cityworks Work Order Management system. Also, the process of dewatering debris at a central location has increased cleaning efficiency and decreased disposal weight. Additional statistics and information pertaining to Inlet Cleaning from FY17 can be found in **Table II.F.1-1.**

Table II.F.1-1: Inlet Cleaning FY17 Statistics

	FY17
Total Inlet Inspections	134,256
Total Inlets Cleaned	107,638
Total Covers Replaced	103*
Total Covers Retrieved	28*
Total Covers Chained	3,106
Debris Removed (tons)	7,405
Avg. Lbs./ Inlet	138

* The number of inlet covers replaced and retrieved has reduced significantly following PWD's increased focus on chaining and locking inlet covers.

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

PWD's Waterways Restoration Team (WRT) is a multi-crew force dedicated to performing stream examinations and cleanup work throughout the city including large trash and debris removal and restoration of eroded streambanks and streambeds. WRT's stream examinations consist of assessing a variety of field conditions including waterway, infrastructure, site access and sewage discharge assessments. WRT waterway maintenance work involves debris removal, stream restoration work, and assisting with sewer maintenance work to help provide a safe work environment while protecting stream ecosystems. WRT works in partnership with Philadelphia Parks and Recreation (PPR) staff and various Friends of the Parks groups to maximize resources and build positive relationships with our communities.

In FY17, WRT conducted 374 stream examinations and removed a total of 817 tons of debris from the City's waterways (**Table II.F.2-1**). Of the total debris removed, a majority of the weight can be attributed to large organic material (e.g. trees) that have fallen into the waterways and restricted flow, thus increasing the potential for bank erosion and/or damage to infrastructure.

Table II.F2-1 Waterways Restoration Team – Annual Activity Summary FY17

Activity	FY17
Total Tons Removed	817
Cars Removed	2
Tires Removed	1153
Shopping Carts Removed	87
# of Stream Site Cleanups	872
# of Stream Site Exams	374

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

The skimming vessel is used as a control measure, capable of managing debris at various locations in open water after the debris and floatables have bypassed static control methods (e.g., debris screens). Also, these traditionally large vessels provide increased public awareness and education of floatables impacts to Philadelphia receiving waterways. The PWD currently has three (3) skimming vessels; a large marine vessel, the R.E. Roy, a smaller pontoon vessel, and a small general workboat.

Large Floatables Skimming Vessel – R.E. Roy

The 39-foot skimmer vessel is operated for approximately five days per week, for about 7 months out of the year, or more as appropriate conditions allows (i.e. weather). The vessel's main purpose is to perform general debris collection and removal on both these rivers, while also serving as a mechanism for public relations events. During the 134 days of on-water operation in FY17, a total of 5.68 tons (155 cubic yards) of debris and floatables material were removed from the Delaware and Schuylkill Rivers (**Table II.F.3-1**). Also during the FY17 season, the R.E. Roy continued sorting and separating recyclable material, which equated to 4,976 lbs. This recycling procedure on the R.E. Roy was significantly optimized during FY16 resulting in a nearly 4-fold improvement in amount collected in comparison to the previous year. In addition, the R.E. Roy initiated a partnership with Bridgestone through their Tires4Ward Program to recycle the tires. Please see section **Bridgestone Tires4Ward Partnership on page 20** of this report for more details on this program.

Table II.F.3-1 FY17 R.E. Roy Skimming Vessel Metrics

Date	Total Tons Removed*	Cubic Yards Collected	Recyclables Collected (lbs.)	Days in Operation	Days on Schuylkill	Days on Delaware
July 2016	0.00	20	576	19	11	8
August 2016	0.00	25	640	21	14	7
September 2016	1.53	20	608	18	10	8
October 2016	0.00	20	736	20	14	6
November 2016	0.00	20	544	18	13	5
December 2016	2.11	5	128	2	2	0
January 2017	RE Roy Out of Service (Dry-docked & Winterized) for Winter Season					
February 2017						
March 2017						
April 2017	Non-routine maintenance was conducted to prepare skimmer vessel for the season.					
May 2017	0.00	15	672	14	9	5
June 2017	2.04	30	1072	22	13	9
FY17 Total	**5.68**	**155 yd^3**	**4976 lbs.**	**134 days**	**86 days**	**48 days**

* *Total Tons Removed* is not a monthly metric and is only calculated when floatables/debris are removed from the shipyard and transported to the weigh station at the trash collection facility.

Small Skimming Vessels

Philadelphia Water also operates and maintains a small pontoon skimming vessel and recently added a small general workboat that are used along the Schuylkill and Delaware River within Philadelphia to retrieve floating trash and debris from the waterways. The smaller skimming vessels are effective because they can be utilized in tight spaces found in marinas, among piers, and in near shore (shallow) areas. During the boating season, the pontoon skimming vessel is docked at a municipal dock in the non-tidal portion of the Schuylkill where it is primarily used. With the addition of the general workboat in May 2016, Philadelphia Water has begun to deploy skimming operations and other activities in the tidal portions of the Delaware and Schuylkill rivers, specifically in areas not desirable or accessible by the department's other skimming vessels. In both vessels, the marine flotsam and floatables are hand netted from the water surface by employees standing on the vessel deck. The nets are emptied into ten 44-gallon debris containers on the deck and the containers are then offloaded.

In FY17, the small skimming vessels were operational from July – October 2016 and April- June 2017, equating to 49 deployments which is a 40% increase over the number of deployments as the previous year (**Figure II.F.3-2**). During this period, the small skimming vessels removed a total of 44 cubic yards of material, comprised of 26.2 cubic yards of recyclable material including bottles, plastic, paper; 15.7cubic yards of mixed trash and 18 tires (**Table II.F.3-2**). The small skimming vessels were in active operation for a total of 235 hours in FY17.

The pontoon vessel has been discussed in detail in previous reports; please refer to Section II.F.3 Floatables Pontoon Vessel on page 38 of the CSO-Stormwater FY 2012 Annual Report for additional information on the vessel.

Figure II.F.3-1 Small Skimming Vessel Annual Performance (2009-2017)

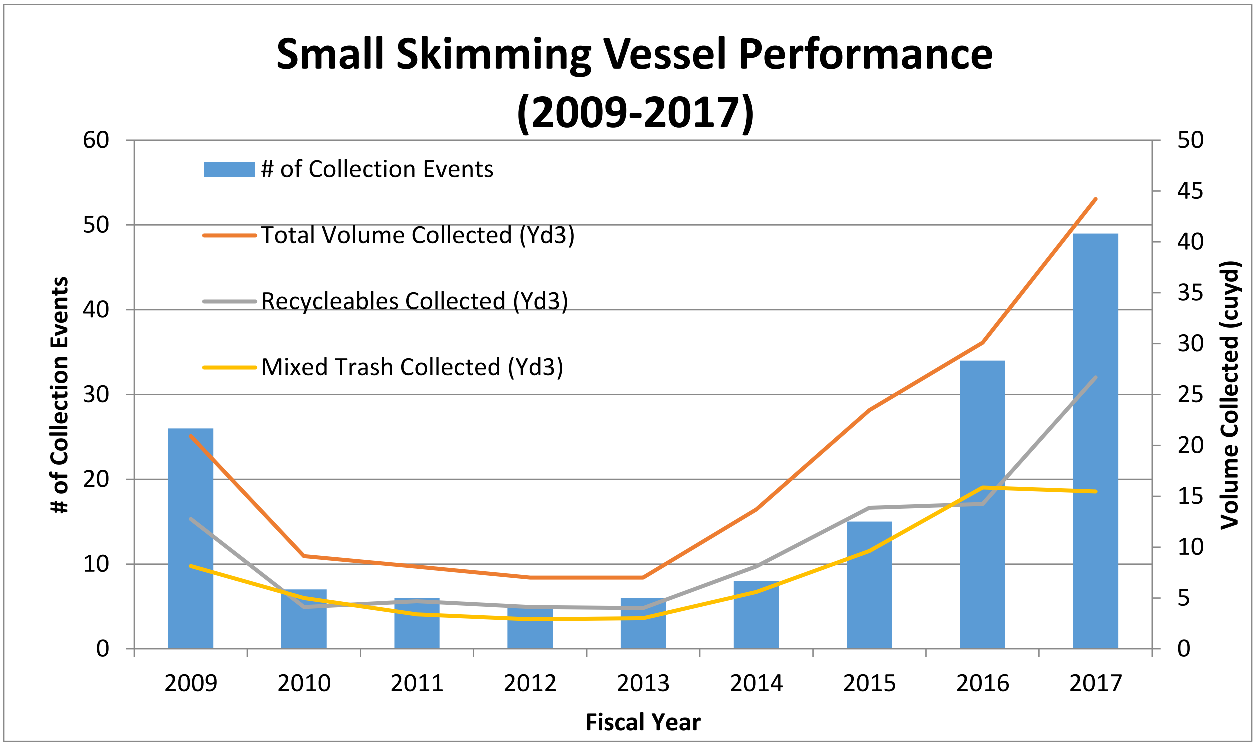


Table II.F.3-2 FY17 Small Skimming Vessel Collection Metrics

Date	# of Collections Events	Total Volume Collected (gal)	Total Weight Collected (lbs)	Total Volume of Recyclables (gal)	Total Volume of Mixed Trash (gal)	Tires Collected
July 2016	5	932	807.3*	528	330	3
August 2016	14	3275	2571.7*	2069	935	11
September 2016	10	1472	908.3	880	567	1
October 2016	5	862	1045.9	573	240	2
November 2016	Skimming Vessel Dry-Docked for Winterization Period					
December 2016						
January 2016						
February 2016						
March 2016						
April 2016*	1	396	202	176	220	0
May 2016	7	950	672.5	407	543	0
June 2016	7	995	335.2	660	335	1
Total	**49**	**8,882 Gal**	**6,560 lbs**	**5,293 Gal**	**3,170 Gal**	**18 Tires**
Total Yd^3/Tons	**49 Events**	**44.0 Yds^3**	**3.3 tons**	**26.2 Yds^3**	**15.7 Yds^3**	**~378 lbs**

* Delayed start due to boat operator availabilities

II.F.4 Other Floatables Control Activities

There is a tremendous amount of other activities that happen within the City that are not conducted with the intention of managing floatables but these initiatives provide integral components by ensuring additional floatable and solids do not make their way into the City's waterways and surrounding areas. In FY17, these activities have resulted to over 1,836 events; 29,422 volunteers; 2,926 tires collected and 436 tons of trash and debris being removed. Some of these activities are described below:

Volunteer Water Adjacent Cleanups

The City has embraced the value of supporting and conducting volunteer water adjacent land-based cleanups with local partners and communities in areas in Philadelphia and surrounding region. These volunteer cleanup events provide an opportunity to make significant difference in a given area within a few hours with the help of people willing to volunteer their time. The cleanup events also serve as opportunities to provide important information and public outreach about PWD's and the City's programs and how the volunteers' efforts are beneficial not only on an environmental/ecological standpoint but also helps promote social behavior changes.

United By Blue Cleanups

In 2016, PWD began to partner with United By Blue (UBB), a Philadelphia-based sustainable outdoor apparel company who conducts annual stream cleanups programs. Part of the company's business model includes the amiable mission, "*For every product sold, United By Blue removes one pound of trash from oceans and waterways through company organized and hosted cleanups*". PWD partners with UBB by recommending litter-prone locations that are adjacent to Philadelphia waterways, promoting and supporting volunteer based cleanup events hosted by UBB, and helping coordinate pick up of event collections by PWD's Waterways Restoration Team (WRT) or the Philadelphia Street Department staff. Much of the work conducted by UBB are often in locations under the purview of PWD's floatables control and pollution prevention programs. In FY17, UBB conducted 16 clean up events in Philadelphia with over 1,267 volunteers collecting 66,532 lbs of trash.

Schuylkill Scrub

The Schuylkill Scrub is a program that encourages and supports cleanup events taking place during the spring (from March 1st through May 31st) throughout the entire Schuylkill watershed- from the headwaters in Schuylkill County down to its confluence with the Delaware River in Philadelphia. The Schuylkill Action Network coordinates the initiative, along with multiple partners, with a shared goal to cleaning as many miles of road, stream, and parkland in the Schuylkill watershed. Their efforts help prevent trash from making its way into our drinking water sources and keep our land and waters clean, litter-free, and beautiful. In calendar year 2017, 1,752 cleanups were registered as part of the Schuylkill Scrub resulting in 28,040 volunteers, 510 miles of streams cleaned, 784,035 pounds of trash removed and 2,587 tires collected.

TTF Trash Task Force

In recent years, more targeted efforts to focus on litter have been initiated in the corridors surrounding the Tacony Creek watershed. PWD gathered members of different City agencies including Streets and Philadelphia Parks and Recreation (PPR), as well as representatives from the TTF Watershed Partnership, SEPTA, United by Blue, and Keep Philadelphia Beautiful (KPB), to initiate discussions and coordinate efforts to alleviate the litter problem and its impact on Tacony Creek. The Task Force decided to invest into the T-04 outfall drainage area, due to its small area drainage and diverse land use. Starting in December 2013, the Task Force contracted Temple University to conduct surveys of trash accumulation in inlets, in the street, the park, and the stream corridors surrounding the T-04 area. Temple's investigations showed that cigarettes butts and plastic material including plastic bags, bottles, etc. were the largest contributors of litter found the in these areas. These litter types generally accumulated in busy areas that often did not have an accessible functioning trash receptacle such as bus stops, food service businesses, gas stations, shopping centers and employee parking areas.

The goal of the study is to establish trash resources and transport methods and then experiment with trash management practices which can then be applied to other drainage areas. The Task Force is continuing to research and explore methods for reducing the trash problem in the Tacony Watershed. The Task Force also added trail counters on three (3) trails in the park to calculate how many people go on each trail. In addition, the team determined that the outfalls in this study area produced a significant amount of trash and debris following a significant rain event, therefore a workforce was contracted to clean four sewer outfalls: T-02, T-03, T-05, and T-08 located around the Tacony Creek Park. In November 2016, the task force installed three (3) surveillance cameras to capture illegal dumping in the park provided through Keep Pennsylvania Beautiful' s Surveillance Camera Loan Program. The task force is also in the process of evaluating locations to install cigarette and litter receptacles in business corridors through KPB's Cigarette Litter Prevention Grant. During FY17, a total of 14,535 lbs. of trash was removed from the area around the outfalls, including twelve (12) clean up events held in the park.

Circular Free Program

Philadelphia residents or businesses that do not wish to receive hand delivered advertising circulars or handbills or local newspapers at their property can fill out a form for a "Circular Non-Delivery" decal to notify advertisement distributors to refrain from delivering advertisements to their property. Per Chapter 10-700 of the Philadelphia Code, the Department of Licenses and Inspections maintains a commercial handbill "Non-Delivery" list identifying all properties whose owners request non-delivery. If the property continues to receive circulars or advertisements from businesses, they can contact Department of Licenses and Inspections to fine violators. This helps prevent litter across the City by limiting the number of unwanted circulars from ending up in the street. During FY17, 426 households registered to receive a "Circular Non-Delivery" decal. Since the inception of the program, over 11,531 households have signed up for the Circular Free Program.

Bridgestone Tires 4ward Partnership

In the summer of 2016, PWD established a partnership with Bridgestone, a tire manufacturer, to recycle tires collected from PWD-sponsored cleanup events including efforts conducted by the Waterways Restoration Team(WRT), Floatables Skimming Vessels and other cleanup activities. Bridgestone or one of their associated partners collects these tires at one of PWD's maintenance facilities as part of their Tires4ward program. This program was initiated to support Bridgestone's goals of ensuring that one spent tire or any tire been taken out of use goes on to another valuable purpose such as for "use as material in rubberized asphalt, construction materials, landscaping mulch and as tire-derived fuel for energy" for every tire sold. During FY17, a total of 379 tires were collected in Philadelphia for the Bridgestone Tires4ward program.

Terracycle Partnership

In Summer of 2017, PWD also established a partnership with Terracycle, a mission-based company focused on eliminating trash, to recycle rigid plastics collected from PWD's Skimming vessel and cleanup events. Recyclables are collected in "super sacks" which stand 55" tall and 35 inches wide, when completely filled they can weight approximately 150-200 lbs and are picked up by Terracycle or their partners. During FY17, PWD filled one "super-sack" of plastics.

Repair, Rehabilitation, and Expansion of Outfall Debris Grills

Debris grills are maintained regularly at sites where the tide introduces large floating debris into the outfall conduit. This debris can become lodged in a tide gate, causing inflow from the receiving water. Additionally, debris grills provide entry restriction and some degree of floatables control.

Standard operating procedures require the inspection of debris during all regulator inspections unless the outfall is submerged at the time of inspection. During FY17, two debris grill maintenance events were completed. The list of the debris grill preventative maintenance activities is available on page 24 of **Appendix C – FY17 CSO Maintenance Program Annual Report**.

II.G NMC 7 - Pollution Prevention

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

The Public Outreach and Participation conducted in FY17 for the *Green City, Clean Waters* program has been provided in **Section 6.0 - Public Outreach and Participation** starting on page 22 of **Appendix A – Green City, Clean Waters FY17 Annual Report** and **Section II.G.3 Continue to Provide Annual Information to City Residents about Programs via Traditional PWD Publications** on page 25 of this report.

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

Phillywatersheds.org

Phillywatersheds.org is an important website which acts as a hub for much of PWD's watershed-based programs and partnership information. The website provides information to the public on issues that are currently problematic for the City's watersheds, what PWD is doing to address these issues, and what residents of Philadelphia can do to help improve watershed health. It also includes educational tools, public meeting materials, maps and reports generated by PWD or partners. Daily activity on the site has decreased slightly compared to the previous year, according to Google Analytics, from 185,874 visitors in FY16 to 166,969 in FY17. However, there was an 4.46% increase of new visitors over the previous fiscal year.

The website features interactive mapping for green stormwater infrastructure projects, traditional infrastructure projects, waterways restoration projects, and community partnership projects. There are also maps for each of the seven major watersheds within Philadelphia. One of the main uses of the mapping system is the Combined Sewer Overflow Public Notification System, known as CSOcast. CSOcast shows CSO outfall overflow information retrieved from PWD's sewer monitoring network. More information on CSOcast is described in further detail in **Section II.H.2** of this report on page 30.

The website also hosts information for various PWD initiatives and programs related to Green Stormwater Infrastructure (GSI). The pages for the Soak It Up GSI Adoption Program, for example, allow Registered Community Organizations (RCO) to check if their organization is eligible to participate, complete the program applications, and schedule training. Additionally, once groups are active in the program they can report issues and log their adoption activities.

Watersheds Blog

The website continues to host a blog that is updated regularly with posts on a wide variety of topics including current programs and events, relevant partner initiatives, and programs that support GSI, the City's waterways, parks and the urban landscape. During FY17, there were 73 posts. This is a reduction in number of posts from FY16, but readership increased netting over 10,000 views. This number does not fully represent the blog's reach as it does not account for the number of views and shares across platforms such as Facebook and Twitter.

RiverCast

Philly RiverCast (www.phillyrivercast.org) is the first operable web-based recreational warning system in the United States. Using near real-time flow, precipitation, and turbidity data, the RiverCast algorithm translates predicted bacteria levels in the Schuylkill River into one of three ratings, each of which corresponds to suggested guidelines for safe recreation. RiverCast guidelines offer tools for the public to make informed decisions about recreation, and thus helps protect the public against illnesses caused by bacteria. Ultimately, RiverCast will help ensure continued safe recreational use of the Schuylkill River, while promoting public awareness of water quality concerns and indirectly engaging support for source water protection measures. More than 1,000,000 users have visited the Philly RiverCast website since it launched in June 2005.

Schuylkill Action Network

The Schuylkill Action Network (SAN) was established as a permanent watershed-wide organization charged with identifying problems, prioritizing projects, and securing funding sources to bring about real water quality improvement in the Schuylkill River watershed. The SAN is organized into a number of focused workgroups. One of the workgroups, the SAN Stormwater workgroup was formed to identify a cost-effective approach to stormwater management through project prioritization and planning. The workgroup is a partnership of representatives from PWD, PADEP, EPA, DRBC, conservation districts, watershed organizations, municipalities, and others groups throughout the watershed. The SAN website supports the SAN's Stormwater Workgroup by providing project and event information, SAN publications, and public messaging about restoring and protecting the Schuylkill River. The SAN Stormwater Workgroup's ultimate goal is to prevent or maximize reduction of stormwater runoff pollution. During its 14 years of existence, the workgroup has served as an advisory committee for state and local governments, an ordinance review board for municipalities, and a support group for large and small projects throughout the Schuylkill River watershed. During the last year, SAN projects have addressed important pollution sources including agriculture, abandoned mine drainage and stormwater. Efforts from the last calendar year are documented in the following table (**Table II.G.2-1**):

Table II.G.2-1: 2017 Schuylkill Action Network Project Progress

Agriculture	Abandoned Mine Drainage (AMD)	Stormwater
• Implemented 29 Comprehensive Nutrient Management Plans • Constructed 13 manure storage facilities • Completed 12 barnyard repairs • Installed 11 stream crossings	• Installed a stream restoration project at one existing AMD treatment system • Added high-calcium sand to reduce stream acidity in Schuylkill River tributary, resulting in an average 6,407 gallons per minute of treated water entering Schuylkill River headwaters • Continued to improve water quality at four treatment system sites	• Hosted an outreach workshop for engineers, planners, and others on green infrastructure benefits • Implemented projects at 2 schools in the watershed to manage stormwater on their campuses by installing rain gardens and planting meadows, riparian buffers, and trees • Completed land transaction assistant projects, preserving 1,731 acres of high priority watershed protection land in the last three years

In order to communicate to SAN stakeholders, the accomplishments of the SAN Stormwater workgroup, as well as other workgroups in the partnership, the SAN routinely updates their website with input from PWD, the SAN Planning Committee and Education and Outreach workgroup. The website, www.schuylkillwaters.org, includes an internal component that allows for improved communication among SAN workgroup members and facilitates on-the-ground work. The SAN website, together with Phillywatersheds.org, provides data and reports from the source water assessments for the Schuylkill River.

Delaware Valley Early Warning System

The Delaware Valley Early Warning System (EWS) is an integrated monitoring, notification, and communication system designed to provide advanced warning of surface water contamination events to subscribing water suppliers, industrial surface water users and partner government agencies in the Schuylkill and Lower Delaware River Watersheds. The Delaware Valley EWS covers the entire length of the Schuylkill River as well as the Delaware River from the Delaware Water Gap to just below Wilmington, Delaware.

The EWS monitoring network is comprised of nearly 90 online water quality data stations throughout the watershed. Access to this real-time data allows EWS users to identify changes in water quality associated with both natural and accidental contamination events. The user can also access historical data from these stations with the data query wizard. Real-time and historic flow data are applied to a time of travel model that generates a range of estimated arrival times for each intake in the system. This time of travel model is also incorporated into a spill simulation tool that can be used for planning and training purposes.

When a responding agency reports a water quality event via the EWS website or telephone hotline, the entire user base is notified almost instantaneously via email. In the case of a high-risk event, supplemental phone notifications are placed using CodeRed technology, allowing all users to receive an automated telephone notification in less than 3 minutes. EWS users can log in to the secure website to view additional event details, spill routing, and predicted arrival times to their intakes. Additionally, a sophisticated tidal modeling component has been developed to better predict and communicate the arrival times of spills on the tidal Delaware River with a user-friendly spill trajectory animation. The EWS received the Governor's Award for Environmental Excellence and is nationally recognized for its use of stakeholder partnerships to meet regional source water protection objectives. In 2016, the EWS was featured as a case study in EPA's publication *Online Source Water Quality Monitoring: For Water Quality Surveillance and Response Systems*.

During FY17, a total of 18 unique water quality events were reported to the EWS. Additional outreach events throughout FY17 expanded the EWS user base, which is currently comprised of more than 300 individual users from 50 organizations.

Other PWD Related Websites and Social Media

PWD Main Web Site

www.phila.gov/water

The official website for PWD continued to be improved to provide more user friendly and comprehensive resources relating to the CSO LTCPU to help our average customer understand the importance of stormwater management. The pages at www.phila.gov/water/wu/stormwater clocked nearly 25,000 (24,831) active visitors during FY17 spending an average of 1:58 on the pages. Among these is our Stormwater Grants page with information for non-residential property owners interested in receiving grants to construct stormwater retrofit projects.

The stormwater parcel viewer (www.phila.gov/water/swmap) continues to be one of the most visited stormwater resources. There were over 22,000 unique users of the application over 115,000 sessions in FY17. This map based application shows the stormwater charges for every property in Philadelphia and links to helpful documents and forms regarding the stormwater fees. Customers are encouraged to explore and get more information about their stormwater charges and about PWD's Appeals, Credits or

Credit Assistance Program (CAP). This information can help property owners reduce the amount of storm water entering the sewer system and lower their stormwater bill.

Development Review Program Website

In July 2015, PWD released a redeveloped website (www.PWDPlanReview.org) to promote user-friendly resources, a streamlined project initiation form and to provide access to critical implementation tools, most notably a revised Philadelphia Stormwater Management Guidance Manual. The updated website was designed to be responsive across multiple devices, allowing for full functionality and optimized display. Since its deployment in FY16, this site has been regularly visited by the development community, clocking over 12,000 views in FY17.

In addition to the manual, a significant focus of the redesign was the implementation of a “smart” project initiation form, which leverages regulatory logic to streamline data inputs for applicants. As a result, users can clearly identify required fields and plan submissions based on the regulatory characteristics of their project. In order to facilitate the tracking of application submissions and review statuses for applications, user log-in functionality was incorporated into the design. This new feature allows users to work on several new applications while also checking the review statuses of project submissions. For more information on the activities conducted by the Development Review Program please refer to the MS4 Annual Report **Section F.5 – Monitor and Control Storm Water from Construction Activities** on page 23.

PWD Department on Social Media

Social Media has become an essential tool for disseminating departmental messaging about stormwater management, pollution prevention and programs, which improves the City’s water resources. Additionally, social media has expanded the reach of partner programming and strengthened PWD’s connections with other institutions around the City. The sections below describe the City’s social media:

Facebook

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

Fairmount Water Works (FWW) also maintains a Facebook page that extends the reach of departmental messaging. The page can be accessed at https://www.facebook.com/28309557520. Between these three Facebook pages, the department reaches over 4,000 followers.

Twitter

Twitter is a valuable communications channel for resolving customer complaints, providing customer information, and delivering news concerning the Department, education and water in general. Both PWD and the FWW have Twitter accounts and their feeds can be found at: https://twitter.com/PhillyH2O and http://www.twitter.com/FairmountWW and one can follow the accounts at @PhillyH2O and @FairmountWW. The @PhillyH2O account activity has again increased, averaging 96 tweets per month, up from 75 tweets per month in FY15. In addition, @PhillyH2O now has 6095 followers, up from 5741 in FY16. Including the @FairmountWW followers, PWD has over 9000 followers.

PWD Department Videos

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

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

Between the two platforms, the videos have been viewed over 13,000 times between July 1, 2016 and June 30, 2017. This is up from 7000 views in FY16. The increase can be attributed to a more robust distribution strategy with partners and across social media platforms.

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

The Philadelphia Water Department develops numerous publications for the public that are distributed throughout the City at advisory committee meetings, public meetings and other public events, in addition to being distributed through the water\sewer\stormwater bill to PWD customers. The following publications, meetings and events have been shared with and/or involved the public during FY17:

Billstuffers

- Your Bill Will Reflect New Rates – July 2016
  Distributed to explain to customers about the first of a two-phase change to rates spread over a two-year period.
- Updated Bill: Less Mail – September 2016
  Distributed to alert customers that the water/sewer/stormwater bill was redesigned with new features to make it easier to understand and make paying easier and faster.
- 2016 – 17 Philadelphia Water Department's Lead Programs & Initiatives – October 2016
  Distributed to alert customers of new Lead Programs and Initiatives that the Philadelphia Water Department has implemented to mitigate customers' exposure to lead in drinking water.
- Act Now to Prevent Frozen Pipes – January 2017
  Distributed to provide tips for customers to prevent frozen pipes and steps to take in case their pipes were already frozen.
- Keep your water service flowing! – March 2017
  Distributed to alert customers that the moratorium (or suspension) for water shutoffs ends on April 1, 2016; the different methods of payment, locations of approved WRB payment centers and customer's rights and responsibilities as water customers.
- What you need to know when there's a water emergency – March 2017
  Distributed that provided customers with information about their responsibilities with regard to their home's plumbing system as well as how PWD responds to water emergencies.
- Fairmount Water Works – The Mussel Hatchery – May 2017
  Distributed to highlight featured artists and their relationships with the Schuylkill River, one of the sources of Philadelphia's drinking water.

- Help Make the Philadelphia Water Department Better! – May 2017
  Distributed to solicit feedback from Philadelphia residents on PWD and the services it provides.

Publications

- Improvements are Coming to American Street: Public Open Houses – July 2016
  A flyer was created in English and Spanish to alert residents of American Street that the City of Philadelphia received federal funding to make improvements along American Street between Girard and Indiana Avenues.
- Improvements are Coming to American Street: Public Open Houses – October 2016
  A flyer was created in English and Spanish to alert residents of American Street that the City of Philadelphia received federal funding to make improvements along American Street between Girard and Indiana Avenues.
- 2016 Water Quality Report (published Spring 2017) – June 2017
  Annual consumer confidence report mandated by the federal Safe Drinking Water Act to be published each year to PWD wholesale and retail account customers, and other consumers of the city's water. PWD now makes this report available electronically at http://www.phila.gov/water/wu/drinkingwater/quality/Pages/default.aspx
- Op-Ed: Making Philly Water Affordable – June, 26, 2017
  The Philadelphia Inquirer published an Op-Ed about the Philadelphia Water Department's new Tiered Assistance Program.

Fact Sheets

- March 2017 – *Green City, Clean Waters* – 5 Years
- March 2017 – New ways to get help with your water bill – Having a hard time paying your water bill? Philadelphia is helping more people get lower bills.
- June 2017 – Tiered Assistance Program Frequently Asked Questions

Posters

- May 2017 – Struggling with your water bill? Philadelphia is preparing to help more people get lower water bills

Media Advisories

- October 3, 2016 – Heston Rain Garden Ribbon Cutting and Mural Dedication; Organizations Worked Together to Transform a Vacant Lot into a Community Gem
- October 21, 2016 – Cayuga Triangle Rain Garden Ribbon Cutting, Organizations Working Together to Transform Concrete, Traffic Triangle into Community Gem!
- February 21, 2017 – Construction Begins on Green Schoolyard at Alexander Adaire School
- June 20, 2017 – Mayor Kenney, Councilwoman Sanchez and City Officials Launch NEW Program; Income-Based, Tiered Assistance Program (TAP) Will Help Philadelphia Residents Reduce Water Bills

Press releases

- September 27, 2016 – Philadelphia Water Partnership Transforms Vacant Lot into Green Stormwater Tool
- November 21, 2016 – Save Money and Skip the Wait: Plan Now for Outdoor Home Projects
- January 24. 2017 – Drexel University to Receive Founders Award from 10,000 Friends of Pennsylvania, Annual Commonwealth Awards program celebrates smart growth, public transit, urban infrastructure
- February 21, 2017 – Construction Begins on Green Schoolyard at Alexander Adaire School Groundbreaking Celebration Marks Latest Schoolyard Renovation Underway through City-wide Partnership with School District, Philadelphia Water Department, and the Trust for Public Land
- April 11, 2017 – Philadelphia Water Department's Kelly Drive Stations Set to Return
- April 21, 2017 – Councilman Mark Squilla and the Philadelphia Water Department Host Town Hall Connecting with Philadelphia Residents to Improve Customer Service
- May 9, 2017 – Philadelphia Water Department Customers Can Win $100 and Improve Services with 2017 Customer Feedback Survey
- June 20, 2017 – Struggling to Pay Your Water Bill? Philadelphia Launches NEW, Income-Based, Tiered Assistance Program Residents Can "TAP" into Help and Reduce Their Water Bill
- June 26, 2017 – The Philadelphia Water Department's Water Pollution Control Plants Receive Top Honors, Facilities Recognized for Environmental Excellence in Wastewater Treatment

Events/Campaigns

- Heston Rain Garden Ribbon Cutting and Mural Dedication

  October 3, 2016 – As part of the city's *Green City, Clean Waters* Program, the Philadelphia Water Department teamed up with Councilman Jones' office, Philadelphia Parks & Recreation, the Department of Public Property, the Philadelphia City Mural Arts Program and the Pennsylvania Horticultural Society to transform its first vacant land site and ribbon cutting ceremony to mark the occasion.
- Cayuga Triangle Rain Garden Ribbon Cutting

  October 25, 2016 – The Philadelphia Water Department (PWD) teamed up with Councilwoman Maria Quiñones-Sanchez' office, the Tookany/Tacony Watershed Partnership, and the Juniata Action

  Committee to transform the concrete Cayuga traffic triangle into a beautiful rain garden as part of the city's *Green City, Clean Waters* Program.
- Fairmount Park Conservancy Groundbreaking Ceremony for Centennial Commons

  April 20, 2017 – The Philadelphia Water Department partnered with the Fairmount Park Conservancy, Parks & Recreation, and the Streets Department in a groundbreaking ceremony for Centennial Commons where PWD will contribute seven naturalistic rain gardens along the edge of Parkside Avenue.
- Wissinoming Park Groundbreaking

  May 19, 2017 – The Philadelphia Water Department partnered with Councilwoman Maria Quiñones-Sanchez, Councilman Bobby Henon, the Fairmount Park Conservancy, and the

Philadelphia Horticultural Society in the Wissinoming Park Groundbreaking, contributing two rain gardens as part of the *Green City, Clean Waters* Program.

- TAP Program

  June 20, 2017 – Mayor Jim Kenney, Councilwoman Maria Quiñones-Sanchez, the Revenue Department, and the Philadelphia Water Department held a press conference to introduce the Tiered Assistance Program (TAP), a new affordability program for low-income and customers with special hardships, to help reduce their monthly water bills.

Advertisements

- A paid advertisement was placed in GRID Magazine advertising the Philly Fun Fishing Fest – August, 2016
- Paid advertisements were placed in the following newspapers to alert customers of the Philadelphia Water Rate Board's Rate Increase Public Hearing on Proposed Rate Change in Stormwater Rates for Community Gardens:
  1. Philadelphia Inquirer and Daily News – October 21, 2016
  2. Al Dia – October 21, 2016
  3. Philadelphia Tribune – October 21, 2016
  4. Philadelphia Metro – October 21, 2016
- A paid advertisement was placed in the Water Resources Association's Awards Program highlighting the Philadelphia Water Department's Rain Check Program – March 31, 2017:
- Paid advertisements were placed in the following newspapers to alert the public that the 2016 Water Quality Report (published Spring 2017) was available electronically at http://www.phila.gov/water/wu/drinkingwater/quality/Pages/default.aspx:
  1. The Philadelphia Inquirer – June 8, 2017
  2. The Philadelphia Daily News – June 8, 2017
  3. The Philadelphia Metro – June 8, 2017
  4. The Philadelphia Tribune – June 9, 2017
  5. Al Dia – June 9, 2017

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

As detailed in **Table II.G.4-1**, during FY17, more than 26,000 visitors attended the Fairmount Water Works which consisted of general visitors, school groups, community groups, and attendees for special exhibits, visiting authors and lecturers. An additional 2,190 adults and children were reached as part of the center's outreach efforts.

Table II.G.4-1 Fairmount Water Works –FY17 Education Center Attendance

Types of Attendance	Number Attended
General FWW Visitors	13,768
School Groups, Camps and Recreational Center	7,043
Tours	2,063
Special Events	1,423
Outreach Efforts	2,190
FY17 Total Visitors	**26,487**

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

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

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

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

CSO Outfall Signage

In summer 2007, PWD initiated a pilot project to install 13 signs at CSO outfalls throughout the City. During a follow-up survey in October 2007 it was found that 5 of the 13 signs had been either removed or vandalized. During FY17, PWD formed a working group to analyze the feasibility of installing updated informational signage at the City's CSO outfalls. Currently each CSO outfall location, except for 8 inaccessible locations, has an identification sign installed which helps the public to accurately identify an outfall when reporting a problem.

Other Notification Measures

PWD continues to develop informational materials and maintain websites to educate the public about its CSO discharges and the potential effect on receiving waters. PWD has found that one of the best ways for public notification of CSOs is through the traditional public outreach programs described in NMC7: Pollution Prevention Program, please refer **Section II.G – Pollution Prevention** on page 21.

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

In order to expand the web-based water quality forecasting system for the Schuylkill River, RiverCast, PWD developed another internet-based notification system called CSOcast in 2008, which reports on the overflow status of outfalls in every CSO shed.

The website is built using the Google Maps API which allows for the dynamic loading of geographically referenced data that can be viewed with a familiar and user-friendly interface. The map is available 24 hours a day and displays the most up-to-date data available. PWD is constantly updating and improving the notification system as well as the flow monitoring network in order to deliver the best information possible to the public. During FY17, CSOcast reported on the 164 CSO outfalls twice a day, with 2,917 unique page views. The CSOcast notification system can be accessed through: http://www.phillywatersheds.org/what_were_doing/documents_and_data/live_data/csocast.

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

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

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

III Implementation of the LTCP

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

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

III.A CSO LTCP Update

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

Please refer to **Appendix A – Green City, Clean Waters FY17 Annual Report** for an update on implementation progress.

III.B Capital Improvement Projects

III.B.1 On-going Capital Improvement Projects

Table III.B.1-1 – Status updates for On-going Capital Improvement Projects

Project	Status	Update / Reference
Completion and Operation of the Real-time Control Center and Rehabilitate and Maintain the Monitoring Network	Completed in 2003	For details on FY16 maintenance of monitoring network please refer to page XX of this report.
WPCP Wet Weather Treatment Maximization (NE)	Evaluated and implemented options from the Jan. 2000 Stress Testing Report	Refer to Section III.B.1.2 WPCP Wet Weather Treatment Maximization (NE) on page 66 of the CSO-Stormwater FY 2012 Annual Report
Evaluate Stress Test Report Options in the LTCPU	Completed March 2009 (all three WPCPs)	Refer to Section III.B.1.2.1 Evaluate Stress Test Report Options in the LTCPU on page 69 of the CSO-Stormwater FY 2012 Annual Report
Implement Options 1, 2, and 4 from the Stress Test Report (NE)	Completed January 2006	Refer to Section III.B.1.3.2 Implement Options 1, 2, and 4 from the Stress Test Report on page 91 in the CSO-Stormwater FY 2010 Annual Report.
Plan, Design, and Construct Options 5 & 7 of the Stress Test Report to Increase the Secondary Plant Capacity to 435 MGD	Completed February and August 2012	Refer to Section III.B.1.2.3 Plan, Design, and Construct Options 2 & 6 from the Stress Test Report on page 70 in the CSO-Stormwater FY 2012 Annual Report.
Explore increasing the preliminary treatment, primary treatment, and final effluent disinfection treatment capacities in excess of the existing secondary treatment capacity at the NE WPCP	A Wet Weather Facility Plan was submitted to PA DEP on June 1, 2016 which supersedes the FCP.	These plans are available on-line through the following website: http://phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan. FY17 progress on the projects specified in the Wet Weather Facility Plan can be found in Appendix A: *Green City, Clean Waters* FY17 Annual Report.
Initiate the Facility Planning and Design for the By-pass Conduit	PADEP approved on April 1, 2009, the bypass of secondary treatment for 100 MGD of additional wet weather flow at NE WPCP	As described in the LTCPU, PWD committed to the expansion of the NE WPCP to include a 215 million gallon/day secondary treatment bypass. PWD proceeded with a design and the bypass of the plant secondary processes for total plant flows that exceed 435 MGD is currently under construction.
Report to the DEP the Status of these Projects in the Annual Status Reports when Major Work Elements Are Completed	N/A	The Annual Report continues to include information in the WPCP wet weather treatment maximization at the NE WPCP

Project	Status	Update / Reference
85% Capture (NE) - 85% Flow Capture Technical Report	August 2008	Refer to Section III.B.1.3 85% Capture (NE) on page 71 of the CSO-Stormwater FY 2012 Annual Report.
In-Line System Storage Projects (NE)	N/A	Reported on in Section II.B.5 Operate and Maintain In-line Collection Storage System Projects Contained Within the LTCP of this report, starting on page 5.
Implementation of the Southwest Plant Stress Test Report Option 1	Option 1, to inspect and repair leaking weirs and concrete surfaces in the final sedimentation tanks at the Southwest Plant, was completed in April of 2002	Option 1 and other improvements were also discussed in further detail within the Facility Concept Plan for the Southwest Water Pollution Control Plant that was submitted to the PADEP on June 1, 2013. This plan is available on-line through the following website: http://phillywatersheds.org/doc/SW%20Facility%20Concept%20Plan%20-%20Final_FINAL.pdf.
Real Time Control (RTC) and Flow Optimization for the Southwest Drainage (SW) - Implementation of Projects for Real Time Control (RTC) and Flow Optimization for the Southwest Drainage District	Completed April 2010	Refer to Section III.B.1.8 Real Time Control and Flow Optimization for the Southwest Drainage on page 74 of the CSO-Stormwater FY 2012 Annual Report.
RTC/Main Relief Sewer Storage (SW) - Construction and Implementation of Main Relief Sewer Storage and Real-time Control		Refer to Section II.B.5 Main Relief on page 5 of this report
Eliminate CSO/Dobsons Run Project (SW) - Construction and Implementation of the Dobson's Run Project	Phases I completed in 1998; Phases II and III were completed by 2011.	Refer to Section III.B.1.10 Eliminate CSO/Dobsons Run Project on page 95 of the CSO-Stormwater FY 2011 Annual Report
Eliminate CSO/Main and Shurs Off-Line Storage (SW) - Construction and Implementation of the Main and Shurs Off-line Storage Project	Please see subsection below, page 34 for status.	

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

The Upper Schuylkill East Side Interceptor Sewer (USES) is located along the Schuylkill River adjacent to the Manayunk Canal in the northwest section of Philadelphia. It conveys sewage from collection systems which serve the northwest section of the City. During extreme wet weather events, the USES exceeded its capacity and overflows occurred at relief point R-20 into a storm sewer upstream of storm water outfall S-052-5. To abate the hydraulic overload conditions in the USES, PWD finished construction of a four-million-gallon offline storage tank in May of 2013, which captures and stores excess flows. The tank would serve to eliminate surcharges and prevent overflow conditions at the R-20 relief location.

The Venice Island Storage Facility is currently in service and operating as designed. In FY17, the facility took on water for 12 major storms storing a total of approximately 3.9 MG of sanitary wastewater. There were four overflow events at R-20 during FY17: 7/25/2016, 7/31/2016, 6/17/2017 & 6/24/2017. All overflows occurred during storms in which the tank had capacity for additional storage.

The 6/17/2017 and 6/24/2017 overflows were caused by an operator error during a routine maintenance visit on 6/14/2017. Standard operating procedures have been amended and alarms have been activated to prevent this error from being repeated.

To ensure full utilization of the tank and to minimize the risk of future overflows, the relief window at R-20 was modified on 8/9/2017. The overflow elevation was raised 16” inches and is now 65” above the chamber invert. The modification should ensure that the capacity of the tank is fully utilized prior to overflowing at R20.

Grit accumulation is a known USES issue that reduces interceptor capacity and the effectiveness of the Venice Island storage tank. PWD performs periodic grit surveys of the USES to better understand grit type and accumulation frequency. The lower portion of the USES was cleaned during the first half of FY17. In the coming year, SONAR inspection of this sewer will be conducted and this information will be analyzed to further understand grit accumulation trends and inform scheduled maintenance. By taking a proactive approach, PWD can schedule flushing and sewer cleaning to maximize the USES capacity and the Venice Island storage tank’s effectiveness.

In FY17, PWD has begun CCTV inspections of storm and sanitary sewer sheds with high levels of observed infiltration and inflow. Inspections and repairs are ongoing. Three major repairs have been completed as of August 2017.

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

Table III.B.2-1 – Status updates for New Capital Improvement Projects to be included in LTCPU

Project	Status	Update / Reference
Asset and Capacity Management Program		
Geographic Information System	Ongoing	Refer to Section II.A.1 Implement a Comprehensive Geographic Information System (GIS) of the City sewer system on page 1
Sewer Assessment Program	Ongoing	Refer to Section II.A.2 Implement a Comprehensive Sewer Assessment Program (SAP) on page 1
Monitoring and Modeling Program	Ongoing	Refer to II.B.1 Continue to Institutionalize a Comprehensive Monitoring and Modeling Program on page 2
Inflow/Infiltration (I/I) Controls		
Tide Inflow	Completed in 1999	PWD continues to inspect and maintain all tide gates to ensure their correct performance. Refer to Section 2.1.2 Corrective Actions – Tide Inflow on page 28 of the 2001 CSO Annual Status Report
Sewer Assessment Program		Refer to Section II.A.2 Implement a Comprehensive Sewer Assessment Program (SAP) on page 1 of this report
Infrastructure Assessments	Completed in 2008; PWD continues to monitor and inspect for problem areas	Refer to Section III.B.2.2 Infrastructure Assessments on page 82 of the CSO-Stormwater FY 2008 Annual Report
Interceptor Relining	Planning and design is underway	Additional details on the progress of interceptor relining occurring in the Cobbs Creek and Tookany/Tacony-Frankford Watersheds are discussed in the Appendix A – Green City, Clean Waters FY17 Annual Report on page 6
PC-30 Parallel Relief Sewer	COA stipulations completed on 12/27/11. Operating as designed as of July 2013.	During fiscal year 2017, there were no overflow events at manhole PC-30.
Sewer Separation		
	Sewer separation was studied and modeled as one of the options in the LTCPU and deemed cost prohibitive. No sewer separation projects have been identified or implemented during the reporting period.	
New Storage Facilities		
	PWD is continuing to investigate opportunities to construct off-line CSO storage facilities to maximize existing sewer treatment capacity and increase the volume of CSO captured and treated. No new storage facility projects have been identified or implemented during the reporting period.	

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

Watershed Alliance of Southeastern Pennsylvania

In 2013, PWD and its designated watershed partnership facilitator, the Pennsylvania Environmental Council (PEC), initiated the Watershed Alliance of Southeastern PA to unite the watershed partnerships in the Philadelphia area. In FY17, PEC continued its support of the implementation of the Upstream Philadelphia Cluster. These efforts resulted in the award of $100,000 in National Fish and Wildlife Foundation funding (with another $271,485 in associated matching funds) for stormwater management at the Curtis Arboretum in Cheltenham Township, PA (Tookany/Tacony-Frankford Watershed).

Tookany/Tacony-Frankford Watershed Partnership

In FY17, the TTF Watershed Partnership held 63 outreach events in Philadelphia County with approximately 2,921 participants in attendance.

Darby – Cobbs Watershed Partnership

During the past fiscal year, the Partnership focused on outreach and education, to implement previously identified project opportunities through the William Penn Foundation's Delaware Watershed Protection Initiative. Also during FY17, the partnership continued work on implantation of projects funded through the Delaware River Watershed Initiative. Additionally, PWD utilized the partnership to aid in public outreach and municipal approval for ecological restoration projects along the Cobbs Creek including a partial removal of the Woodland Ave Dam.

Pennypack Creek Watershed Partnership

The Partnership continues to organize activities to involve the community in improving the watershed. In FY17 the partnership continued education and outreach towards implementing the projects identified under the William Penn Foundation's Delaware Watershed Protection Initiative. The partnership also conducted workshops on rain gardens, citizen stream monitoring, Mowing to Meadows and municipal MS4 compliance.

Poquessing Creek Watershed Partnership

The Poquessing Creek Watershed Partnership holds a range of public education and outreach activities and events every year for residents. The Poquessing Partnership also participates in the Upstream Philadelphia Cluster of the William Penn Watershed Initiative developing programs for citizen monitoring and identification of stormwater projects in the watershed.

Delaware Direct Watershed Partnership

Throughout FY17, the Partnership continued its work acquiring grant funding to support restoration projects throughout the watershed. The Kensington & Tacony Trail, an abandoned riverfront rail line, continued to move forward in FY17 with the expansion of new trail segments. Additionally, PWD continued expanding its floatable debris programming. In conjunction with the Department of Conservation and Natural Resources and the Partnership for the Delaware Estuary. PWD also continued a successful partnership with sustainable retailer United by Blue (UBB). 16 cleanups were held at various locations throughout the City including 4 events within the Delaware Direct Watershed during FY17 removing 23,514 lbs. (11.8 tons). of trash with 341 volunteers participating.

Wissahickon Creek Watershed Partnership

PWD continued its participation in the Wissahickon Partnership throughout FY17. A key component of these efforts was the creation and ratification of a multi-municipal agreement to establish an alternative TMDL program for phosphorous in the watershed. The City of Philadelphia was one of 16 municipalities cooperating in this program with assistance from the Pennsylvania Department of Environmental Protection, the Wissahickon Valley Watershed Association and the Pennsylvania Environmental Council (PEC). The Wissahickon Partnership is also actively participating in components of the Delaware River Watershed Initiative, including citizen monitoring as well as project identification and implementation.

Schuylkill River Watershed Partnership (Philadelphia-Based Partnership)

PWD continued to support the efforts of the Schuylkill Action Network (SAN), a regional watershed partnership dedicated to improving the water resources of the Schuylkill River Watershed through strategic implementation of protection measures. More information on the SAN can be found in **Section II.G.2** on page 21 of this Annual Report. Also in FY17, PWD continued to build on the successful partnership with the Schuylkill Navy of Philadelphia. This partnership led to the Head of the Schuylkill Regatta, becoming the first national rowing event to ban the use of plastic water bottles. To support these efforts PWD again donated 12,000 reusable water bottles to the event.

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

The culmination of the watershed management planning process often results in an Integrated Watershed Management Plan (IWMP), or a watershed-specific planning document. The process for developing watershed planning documents has evolved and depends on the interests of the partnerships. **Table III.C.1-2** contains the status of the various plans in each of Philadelphia's watersheds. Information on the each of the watersheds and the completed plans can be found at www.phillywatersheds.org/your_watershed. Many of the recommended management options in the TTF and Cobbs Creek IWMPs have been institutionalized a city-wide basis and continue to be implemented.

The watersheds in the MS4 section of the City have undergone a slightly different process. In these watersheds (Pennypack, Poquessing, and Wissahickon), the stakeholder goals and objectives were established through the development of Rivers Conservation Plans and Act 167 Plans. PWD has decided to work with the watershed partners through these existing watershed-based planning efforts. Details on the Act 167 Plans can be found in **Section III.C.3.7 Basin-Specific Stormwater Management Plans (ACT 167)** on page 47**.** The Act 167 process has met PWD's goal to have watershed-wide commitment to the watershed planning process, and allows the process to be partner-driven and focus on implementation.

Table III.C.1-2 – Planning by Watershed

Watershed	Preliminary Reconnaissance	Watershed Monitoring Program	River Conservation Plan	Watershed Management Plan	Implementation Commitment Status
Delaware River (tidal, non-tidal)	Monitoring Only		Completed in 2011	PWD continues to work with watershed partners on implementing specific projects.	Philadelphia commitment documented in the LTCPU and its supplements.
Cobbs-Darby Creeks	2003	2003	Darby RCP completed in 2005 by Darby Creek Valley Association	Completed 2004	Philadelphia commitment documented in the LTCPU and its supplements.
Tacony-Frankford Creek	2000/2001	2004	Completed in 2004	Completed 2005	Philadelphia commitment documented in the LTCPU and its supplements.
Pennypack Creek	2002	2007-2008	Completed in 2005	Act 167 Stormwater Management Plan approved in July 2013	PWD updated Stormwater Regulations to implement the Act 167 Plan.
Schuylkill River (tidal, non-tidal)	Monitoring Only		Completed in 2001 by the Academy of Natural Sciences, Natural Lands Trust, and the Conservation Fund	PWD continues to work with watershed partners on implementing specific projects.	Documented in the LTCPU and its supplements.
Poquessing Creek	2001	2008-2009	Completed in 2007	Act 167 Stormwater Management Plan approved August 28, 2013.	PWD is planning Stormwater Regulation changes to implement the Act 167 Plan.
Wissahickon Creek	2001	2005-2006	Completed in 2000 by FPC	Act 167 Stormwater Management Plan approved on July 10, 2015	PWD is planning Stormwater Regulation changes to implement the Act 167 Plan. A Wissahickon TMDL Implementation Plan was submitted in 2012. Implementation plan depends on watershed partnership support for a watershed-wide initiative.

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

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

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

The wet-weather source controls have been formalized in the LTCPU and its supplements, including the Consent Order and Agreement signed on June 1, 2011, which formally approved the *Green City, Clean Waters* program. Detailed information on the Land-based wet-weather source controls can be found in **Appendix A – Green City, Clean Waters FY17 Annual Report.**

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

PWD's Stormwater Management Regulations became effective in Philadelphia on January 1, 2006, which provided PWD with an opportunity to ensure development/redevelopment that protects our water resources, reduces neighborhood flooding, and improves the quality of life in our communities. The Stormwater Management Regulations are triggered when a project disturbs 15,000 or more square feet of earth. Effective July 1, 2015, the Stormwater Regulations were updated to improve and strengthen PWD's stormwater programs. For more information on PWD's Regulations, please see the MS4 Annual Report **Section F.5.b – Post-Construction Stormwater Management in New Development and Redevelopment** on page 28.

III.C.1.2 Conduct workshops on LID

PWD staff in charge of Stormwater Regulation implementation holds weekly walk-in hours, encouraging the development community to attend to discuss general and technical details regarding their projects. Guidance is provided by PWD staff as it relates to regulatory applicability as well as stormwater management implementation and approach without the need to schedule an appointment.

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

PWD continues to implement stormwater BMPs and LID, now referred to as Green Stormwater Infrastructure (GSI) through the Green City, Clean Waters program. Please refer to **Appendix A – Green**

City, Clean Waters FY17 Annual Report for a detailed description on the City's implementation of GSI during FY17.

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

PWD continues to maintain all City-owned inlets and catch basins to ensure they are clear and operating correctly. For a full description of the activities conducted by inlet cleaning programs during FY17, please refer to **Section II.F.1 Control the Discharge of Solids and Floatables by Cleaning Inlets and Catch Basins** on page 14.

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

PWD is working to separate stormwater runoff from large impervious tracts of land using incentives and regulatory-based approaches. Projects that apply for PWD's grant programs, Stormwater Management Incentives Program (SMIP) and Greened Acre Retrofit Program (GARP), are evaluated for disconnection potential and encouraged to construct connections to available separate storm sewer or private stormwater outfalls where feasible. To date, PWD has awarded a number of projects where this potential exists, and in the last year 3 projects successfully disconnected from the combined sewer system.

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

Green Stormwater Infrastructure Projects

Community greening and tree planting is a key component of green stormwater infrastructure and the *Green City, Clean Waters* plan. PWD has been planting trees as part of the GSI projects. Please refer to **Appendix A – Green City, Clean Waters FY17 Annual Report** for information on trees planted as part of GSI projects implemented in the City.

Street Tree Planting

As part of supporting the City's GreenWorks goals, PWD has partnered with PPR to conduct street tree plantings. PPR contracted trees to be planted in the right-of-way in front of properties and on public lands. During FY17, 757 trees were planted through this contract.

TreePhilly Yard Tree Program

TreePhilly is an urban forestry community engagement initiative led by PPR, in partnership with the Fairmount Park Conservancy. TreePhilly directly engages all Philadelphians in improving their communities by planting and maintaining trees. Through TreePhilly's Yard Tree Giveaway program, Philadelphia residents can sign up for free yard trees for their private property (front, back, and side yards). In the FY17 the Yard Tree Giveaway program distributed approximately 3,000 trees, and TreePhilly also engaged corporate and community volunteers to plant 50 large trees at Pennypack on the Delaware Park.

Tree Vitalize and Pennsylvania Horticultural Society's Tree Plantings

PWD is an active partner and supporter of *Tree Vitalize* and PHS's other tree planting programs. Tree Vitalize was developed by the Pennsylvania Department of Conservation and Natural Resources to increase the tree canopy in the five-county Philadelphia area. Tree Vitalize partners with numerous community groups throughout this area in order to plant trees in neighborhoods lacking sufficient tree canopy. During FY17, PHS tree planting events resulted in 2,678 trees planted in Philadelphia.

Table III.C.1.6 -1 Pennsylvania Horticultural Society's FY17 Tree Plantings Events/ Activities

# of Trees Planted	Pennsylvania Horticultural Society's Tree Plantings Event
1614	TreeVitalize Watersheds riparian plantings, including Schuylkill River planting on MLK, Schuylkill Center for Env. Education, and Woodmere Art Museum
826	Philadelphia Tree Tenders street and yard trees
45	Cooke-Wissahickon School
15	Philadelphia Gardens/City Harvest
73	Philadelphia Public Landscapes
99	Philadelphia LandCare vacant lands trees
6	Philadelphia School for the Deaf
2,678	**TOTAL TREES (FY17)**

III.C.2 Water Ecosystem Restoration and Aesthetics

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

During FY17, the Waterways Restoration Team has continued their program which includes removal of cars, shopping carts, and other debris from receiving waters. Please refer to **Section II.F.2 Continue to Fund and Operate the Waterways Restoration Team** on page 15 for information pertaining to the Waterways Restoration Team's activities during FY17.

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

During FY17, the Waterways Restoration Team continued their program, which includes conducting minor stream bank and bed repairs around outfalls and removing debris around them. Please refer to **Section II.F.2 Continue to Fund and Operate the Waterways Restoration Team** on page 15 for information pertaining to the Waterways Restoration Team's activities during FY17.

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

PWD is currently employing natural stream channel design (NSCD) and associated stormwater management BMPs as a means to improve the health of aquatic communities in receiving waters with degraded flow and habitat alterations due to stormwater runoff.

Cobbs Creek Stream Restoration

During FY17, Upper Darby Township passed a resolution in support of the project. This resolution provides PWD with the permission to carry out the project and engage landowners that will be impacted by the stream restoration work. PWD is currently working to acquire property rights to access the stream and floodplain for construction and to ensure protection of the restored environment in perpetuity.

Tacony Creek Stream Restoration

During FY17, PWD has reviewed the design plan for the restoration of about a mile of Tacony Creek. The design was adjusted to address issues in the stream channel that have evolved during the design process. The new design will provide a more stable stream channel, protect trees along the stream bank, create sustainable aquatic and riparian habitat, and provide more wetland area for stormwater management and baseflow recharge.

Indian Creek Stream Daylighting & CSO Storage Project

During FY17, PWD continued to monitor the site and has been developing a report to document the findings of the study. Biological studies of macro-invertebrates and fish species in the Indian Creek daylighted stream channel have been conducted and PWD's Collectors Unit has provided the flow data for the Combined Sewer Overflow storage facility.

Wissahickon TMDL Stream Restoration Projects

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

- Carpenter's Woods (Construction Completed in 2009)
- Cathedral Run (Construction Completed in 2006)
- Cresheim Creek at St. Martins (Construction Completed in 2011)
- Hartwell Lane (Construction Completed in 2009)
- Rex Avenue (Construction Completed in 2010)
- Bells Mill Run (Construction Completed in 2012)
- Wises Mill Run (Construction Completed in 2012)
- Gorgas Run (Design Completed in 2012, Construction Completion October 2017)

During FY17, PWD conducted studies and developed data to display the sustainability of these projects and sediment load reduction to the Wissahickon Creek. Because these projects were completed as part of the Wissahickon Sediment TMDL Implementation Plan, a more detailed description of PWD's efforts have been provided in the **Section D - Wissahickon Sediment TMDL Monitoring plan implementation** on page 1**.**

III.C.2.4 Wetland Enhancement and Construction

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

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

In total, these three facilities receive and treat stormwater from more than 300 acres of the MS4 service area. Because these projects were completed as part of PWD's Wissahickon Sediment TMDL Implementation Plan, a more detailed description of the Department's efforts has been provided in **Section D - Wissahickon Sediment TMDL Monitoring plan implementation** on page 2. PWD is working to maintain these project sites, and new stormwater and floodplain wetland creation projects are being planned in the coming years that will help satisfy PWD's regulatory requirements and improve the health and habitat of PWD watersheds.

Watershed Mitigation Registry

PWD is investigating projects and partnerships that could potentially be suited for the state's mitigation banking program.

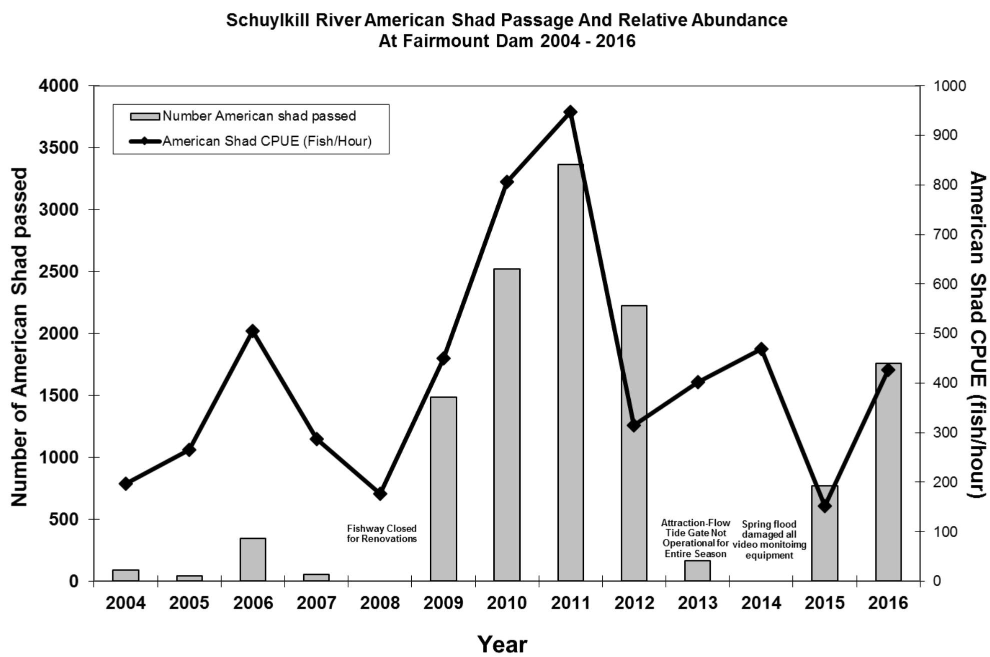
III.C.2.5 Fish Passage Projects

Fairmount Fish Ladder

The Fairmount Dam Fishway located on the western side of the Fairmount Dam, was completed in 1979. In 2009, through a joint cooperative agreement with the United States Army Corps of Engineers (USACE), the City of Philadelphia upgraded many features of the fishway to improve hydraulics and overall fish passage efficiency.

As outlined in **Figure III.C.2.5 -1 Catch-Per-Unit-Effort (CPUE) and Fish Passage of American shad**, relative abundance (number of Shad per hour of electrofishing) in the Schuylkill River in 2016 increased nearly three-fold compared to the previous year, based on standardized daytime boat electrofishing. The 2016 CPUE at Fairmount Dam (426.6 Shad/hour) was significantly above the 2015 CPUE (152.5 Shad/hour) and represents the 6th highest American Shad relative abundance in the 15-year data-set (2002 to 2016). The CPUE in 2016 was greater than the 15-year average for this location. Correspondingly, 2016 American Shad passage at Fairmount Fishway (1758 Shad) increased to more than double from the previous year (771 Shad in 2015). The 2016 Shad passage at Fairmount was the 4th highest ever recorded in the 13-year time-series (2004 to 20016). These findings support our observations that an increase in American Shad relative abundance below the dam manifests into increased Shad passage at Fairmount Fishway. It should be noted that fish passage data from Fairmount Fishway were reported from direct analysis of recorded digital video, in which each-and-every fish between April 1st to June 30th was identified and counted. These were not estimated or extrapolated fish passage numbers. Of particular interest is the hatchery contribution for the returning Schuylkill River adult American Shad was 65.5% in 2016, which was the lowest observed in the 10-year time-series. The decrease in hatchery contribution suggests an increased level of wild reproduction of American Shad in the Schuylkill River.

Figure III.C.2.5 -1 Catch-Per-Unit-Effort and Fish Passage of American shad



PWD Sanitary Line Natural Rock Ramp Fishway

A rock ramp fishway was constructed in Pennypack Creek in 2007 to raise the water surface elevation and provide fish passage at this site. PWD electrofishing surveys of the tidal Pennypack Creek have documented a spawning population of anadromous alewife and blueback herring. Both adult and juvenile striped bass have been collected in the tidal portion, but not above the rock ramp. The future of shad restoration in Pennypack Creek remains uncertain. No hickory shad fry were stocked in 2016 or 2017.

Dam Removal Projects

Juniata Golf Course Dam Removal

PWD completed the pre-dam removal monitoring of the site in December 2016. A field meeting was held in February 2017 to discuss the staging/storage areas, the limits of disturbance, and stream channel access. The construction access route and staging/storage areas will be revised for the 100% submission.

Philadelphia Parks & Recreation (PP&R) conducted a structural inspection of the superstructure of the bridge and had concerns in a few areas. PP&R and PWD will be meeting to discuss the project path for the repairs either through interfund or a separate project before the dam removal. The Joint Permit application was submitted in October 2016.

Woodland Dam Removal

PWD received a revised 90% plan set in February 2016. A May 2017 submission included a revised LOD that did not impact the property in Yeadon Borough. PWD is currently working with the solicitor for Darby Borough in approving an ordinance that would allow Darby Borough to sign on behalf of the defunct Darby Redevelopment Authority for the two remaining property easements. The Floodplain Consistency Letter was approved without comments by the Philadelphia City Planning Commission in July 2017. The 100% plan set should be submitted in September 2017.

Boulevard Dam Removal

PWD has developed a design to lower the dam upstream of the Roosevelt Boulevard (Route 1) Stream Crossing to address recurrent flooding of a sewer access trail. This design includes a rock ramp fishway to improve upstream and downstream habitat connectivity. At this time, PWD and project partner Philadelphia Parks and Recreation are searching for a funding source to complete the design and implement the removal of the dam and the rock ramp.

III.C.2.6 Riparian Buffer Creation and Enhancement

Environment, Stewardship & Education Division

PWD continues to support Philadelphia Parks and Recreation, which undertakes a broad range of environmental restoration activities throughout the park system. Restoration activities have been ongoing since 2008. These efforts have been discussed in previous years; for more details and a full list of these activities, please refer to Section III.C.2.6 Environment, Stewardship & Education Division on page 121 of the CSO-Stormwater FY 2012 Annual Report.

Riparian Buffer component of Stream Restorations

Riparian buffer enhancement will be evaluated in all stream restorations that are completed. Typically, riparian buffer enhancement activity includes invasive species management, live-stake planting, tree and shrub planting, and native seed mix application. Invasive species management usually begins one to two years prior to construction. Once the construction of the stream restoration project is complete, a landscaping plan is implemented which includes all of the applications mentioned above. Please refer to **Section III.C.2.3 Stream Habitat Restoration** on page 42 and **Section III.C.2.4 Wetland Enhancement and Construction** on page 42 in this report for more information on these topics.

Natural Lands Team

The Natural Lands Team, initiated in 2011, is a group comprised of members from PWD's Ecological Restoration Unit, Waterways Restoration Team, Public Affairs, PWD Design Branch and staff from Philadelphia's Department of Parks and Recreation. Bi-monthly meetings are held to coordinate a wide range of projects that affect the City's stream corridors and natural areas. Through centralizing the myriad of ongoing and upcoming projects, this group works to improve efficiency and communication. Projects include but are not limited to stream restoration, wetland creation, stormwater management, infrastructure protection and invasive species management. During FY17, the Natural Lands Team convened five times to discuss upcoming projects and potential issues that could be addressed by the team members.

III.C.3 Other Watershed Projects

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

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

Table III.C.3-1: River Conservation Plan References

River Conservation Plans	Complete Date	Previous Reference
Darby Creek	2005	Page 121 of the CSO-Stormwater FY 2008 Annual Report.
Tacony-Frankford	2004	Page 74 of the FY 2005 Stormwater Annual Report.
Pennypack	2005	Page 122 of the CSO-Stormwater FY 2008 Annual Report.
Poquessing	2007	Page 155 of the CSO-Stormwater FY 2010 Report.
Delaware Direct	2011	Page 151 of the CSO-Stormwater FY 2011 Annual Report

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

The City maintains several websites that provide information on our watersheds and activities within them, please refer to **Section II.G.2 Continue to Maintain Watershed Management and Source Water Protection Partnership Websites** on page 21 and **Section II.H.2 Expand the Internet-Based Notification System (River cast) to the Tidal Section of the Lower Schuylkill River** on page 30 for additional information on the websites.

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

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

Please refer to **Section II.G.2 Continue to Maintain Watershed Management and Source Water Protection Partnership Websites** on page 21 for details about these communication and water quality monitoring systems.

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

Please refer to **Section II.H.2 Expand the Internet-based Notification System (Rivercast) to the Tidal Section of the Lower Schuylkill River** on page 30 for information pertaining to this topic.

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

Green Stormwater Infrastructure and Restoration Locations Signage

Information on the *Green City, Clean Waters* Signage Program can be found within **Appendix A- Green City, Clean Waters FY17 Annual Report** on page 24.

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

PWD supports several existing educational centers including FWW and many public outreach efforts conducted by partners. Please refer to **Section II.G.3 Continue to Provide Annual Information to City Residents about Programs via Traditional PWD Publications** on page 25 and **Section II.G.4 Continue to Support the Fairmount Water Works** on page 29 for more information on activities done in FY17 by the FWW and partner sponsored events.

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

As of July 10, 2015, all Act 167 plans have been approved. Please refer to **Table III.C.1-2 Planning by Watershed** on page 39 for more information.

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

During FY17, PWD reviewed 922 “Sewage Facilities Planning Module Application Mailers” for projects requiring building permits within Philadelphia County. During the same period, PWD issued 79 sanitary sewer capacity certifications for projects in tributary municipalities.

III.C.4 Monitoring and Assessment

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

PWD is committed to submitting the Quarterly Special Discharge Monitoring Report (DMR) documenting the Department's CSO discharges during the specified time periods. This report is due 45 days after the end of each quarter, and is submitted by February 15, May 15, August 15, and November 15 of each year. During FY17, four DMRs were submitted within the 45-day timeframe, these reports are also referred to as Quarterly Combined Sewer Overflow Status Reports.

III.C.4.2 NPDES - Annual CSO Status Report

Monitoring and characterization of CSO impacts from a combined wastewater collection and treatment system are necessary to document existing conditions and to identify water quality benefits achievable by CSO mitigation measures. The tables included in **Appendix D** and other information provided within this annual report represent the average annual CSO overflow statistics for period July 1 2016 – June 30 2017 as required in the NPDES Permit. Please refer to **Table 1 in Appendix D – NPDES – FY17 CSO Status Report** on page 2 for a listing of all CSO permitted outfalls. The tables have been reorganized to present overflows by the specific receiving water into which the CSOs from a given interceptor system discharge. In order to be consistent, the column headings are presented in the same format found in the System Hydraulic Characterization (SHC) and NMC Documentation.

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

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

Please refer MS4 Annual Report **Section F.2.Step 1.b – Preliminary physical, chemical and biological quality assessment** on page 8 for information about Comprehensive Watershed Monitoring Program.

Stormwater Management Program Annual Report

National Pollutant Discharge Elimination System (NPDES) Permit
No. PA 0054712
Reporting Period July 1, 2016 to June 30, 2017

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Section F

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Part I Permit Conditions

Section A Applicability and Limitation on Coverage

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

Section B Legal Authority

The City maintains adequate legal authority to enforce the Stormwater Management Program, in accordance with the National Pollutant Discharge Elimination System (NPDES) regulations 40 CFR122.26(D)(2)(i). Legal authority to enforce the Stormwater Management Program is granted by various ordinances and regulations. Philadelphia Code section 13-603 was enacted in 1993 to ensure that the City has the authority necessary to implement the federal stormwater program. This ordinance and other city ordinances are available at http://www.amlegal.com/library/pa/philadelphia.shtml. Additionally, Philadelphia Water Department Regulation (PWD) 500.0 prohibits cross connected sewer laterals, and PWD Regulations 600.14 and 600.15 prohibit certain non-stormwater discharges and connections to the storm sewer system. PWD's Regulations are available here: http://www.phila.gov/water/wu/ratesregulationsresp/Pages/Regulations.aspx.

Additionally, Philadelphia Code section 14-704(3) authorizes the Water Department to regulate stormwater management on a City-wide basis for new and redevelopment. Chapter 6 of PWD's Regulations implements that authority.

This Annual Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) and the US EPA, in accordance with requirements of the City of Philadelphia's NPDES Stormwater Management Permit No. PA 0054712. The report documents the Fiscal Year 2017 (FY17) progress completed in order to comply with the requirements during the reporting period from July 1, 2016 to June 30, 2017.

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

Wissahickon Sediment TMDL Monitoring Plan Implementation

PWD's commitment to meeting the Wissahickon Sediment TMDL was initiated in 2005 through detailed monitoring and assessment of the Wissahickon Creek Watershed. The goal of PWD's implementation is to reduce the amount of sediment reaching the Wissahickon Creek using a multi-faceted approach. In addition to continuing street sweeping and implementing and strengthening stormwater management regulations, the PWD has implemented three stormwater wetland facilities and seven stream restoration and stabilization projects. During FY14, PWD completed the Sediment TMDL Baseline Monitoring Report in November 2013 based on the previously submitted TMDL Monitoring Plan. This report was submitted with the FY 2014 CSO-MS4 Annual Report. The baseline monitoring report documents the data collected following the implementation of the stormwater wetland facilities and stream restoration projects. This information will be used to measure sediment reductions as a result of the implemented projects. The initial phase of this effort included baseline monitoring to measure the effectiveness of the stream restoration and stormwater treatment wetland facilities projects in meeting the targeted sediment reductions and H&H modeling and topographic survey monitoring to confirm sediment reduction estimates presented in PWD's Implementation Plan.

During FY17, PWD began analyzing the data collected over a four-year period (2012-2016) for the seven stream restoration sites and three constructed stormwater wetlands. PWD will submit to DEP a Wissahickon Sediment TMDL Monitoring Status Report by the end of the 2017 calendar year. The report will include surveyed cross-section overlays, photomonitoring, in-stream structure evaluation, and wetland hydraulic and hydrologic modeling.

Section E Pollutant Minimization Plan for Polychlorinated Biphenyls in the City's MS4

During the tenth year of the PCB PMP, the following tasks were accomplished:

- One hundred eleven (111) of the three hundred thirty-seven (337) remaining sites listed by EPA or other agencies as housing PCB containing devices were inspected.
- Wet-weather PCB sampling and analysis of the 3 WPCPs' effluent was performed as required by the WPCP NPDES permits.
- PWD began the process of monitoring outlying township connections using EPA Method 680.
- PWD Continued monitoring of groundwater discharged from new construction and remediation sites to ensure compliance with PWD's published PCB limit of "non-detection by EPA Method 608". PWD issued 21 groundwater discharge permits in calendar year 2016. Every permit was compliant with PWD's published PCB limit of "non-detection by EPA Method 608."
- PWD wet and dry weather WPCP effluent data have been entered into the DRBC PCB database.
- Significant reductions in WPCP effluent PCB loadings were seen over the course of the PMP

Additionally, the following initiatives were undertaken:

- The contract for development of a PCB database was awarded. Work on the database is under way, and completion is expected in the 2017 calendar year.
- Generation of interactive GIS maps which could assist in identifying areas of concern and planning any additional efforts to identify potential sources.

Section F Stormwater Management

F.1. Source Identification

A description of PWD's MS4 Infrastructure, including; stormwater outfalls, lengths of sanitary sewer, and lengths of stormwater sewer within Philadelphia are shown in **Table 1-1**. The 205 "Non-PWD Owned" outfalls listed in the table are owned by other City agencies, private entities, or individuals. The PWD-owned stormwater outfall locations and MS4 areas are shown in **Figure F.1-1**.

Table F.1-1: Description of MS4 Infrastructure

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

GIS Data Layers have been submitted within a geodatabase, **PWD_Annual_Report_GIS_Data_2017.mdb** which can be found on the **Supplemental CD.** The GIS Data Feature class filenames within the geodatabase are provided in **Table F.1-2.**

Table F.1-2: GIS Data Feature Classes within Geodatabase named - PWD_Annual_Report_GIS_Data_2017.mdb

• All_PWD_Monitoring_FY17 • FY17_GSI_Monitored_Locations • FY17_GSI_Projects_Completed • FY17_GSI_Projects_Planned • FY17_IWU_Pollution_Migration_Events • FY17_PD_ActiveConstructionInspectionSites • FY17_PD_Citywide_Regulation • FY17_PD_Citywide_Retrofit • FY17_PD_NewProjectSubmissions • FY17_PD_TechnicalApprovals • FY17_SanitaryInfiltrationEvents • Hydro_Line • Hydro_Poly • Land_Use_PCPC_2017 • PCB_Locations_Known_Historical	• Permitted_Dischargers_FY17 • Philadelphia_Detention_Basins • Philadelphia_Impervious • Philadelphia_Major_Watersheds • Philadelphia_only_Major_Watersheds • Philadelphia_Sewersheds_2017 • PhiladelphiaCensus_Blocks_2010 • Stormwatersheds_Pennypack • Stormwatersheds_Poquessing • Stormwatersheds_Wissahickon • Stormwater_Outfalls • Stormwater_Outfalls_with_DrainageArea_summary • Wissahickon_Point_Source

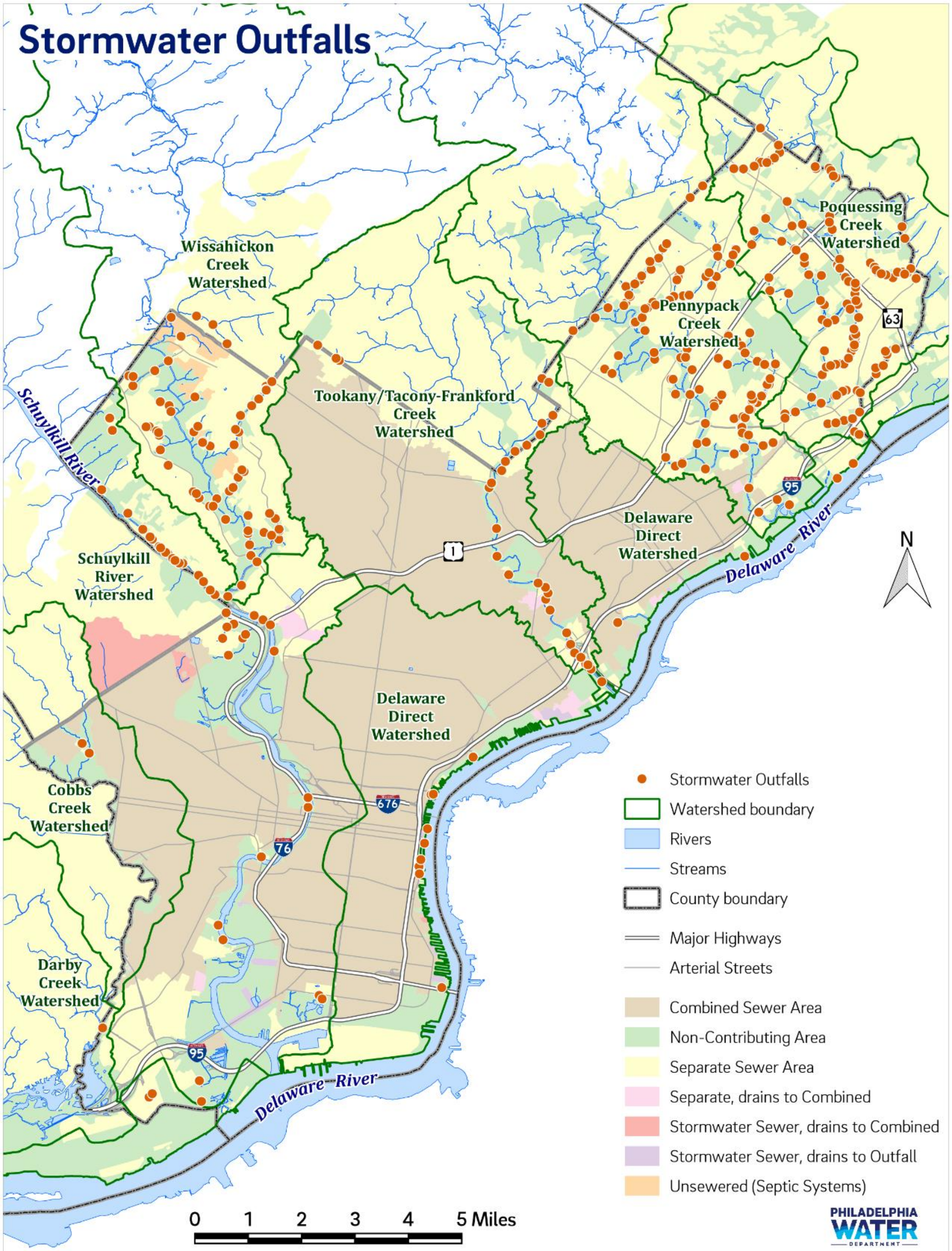


Figure F.1-1 City of Philadelphia Stormwater Outfalls

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

All_PWD_Monitoring_2017

This layer presents the locations of PWD's chemical, fish, macroinvertebrate, and algae sampling sites. The contents of this feature class are discussed in **Section F.2.Step.1.b** on page 8.

FY17_GSI_Monitored_Locations

This layer presents the locations of existing green stormwater infrastructure projects actively monitored by PWD in Philadelphia County.

FY17_GSI_Projects_Completed

This layer presents the locations of completed publicly implemented green stormwater infrastructure projects sorted by their current status within Philadelphia County.

FY17_GSI_Projects_Planned

This layer presents the locations of planned publicly implemented green stormwater infrastructure projects sorted by their status within Philadelphia County.

FY17_IWU_Pollution_Migration_Events

This layer presents the locations of spills documented by PWD Industrial Waste Unit within Philadelphia in FY17. The contents of this layer are discussed in **Section F.7.a – Pollutant Migration/Infiltration** on page 32.

FY17_ PD_ActiveConstructionInspectionSites

This layer presents the locations of active construction private development projects within Philadelphia in FY17. The contents of this layer are discussed in **Section F.5 –Stormwater From Construction Activities** on page 23.

FY17_ PD_CSO_Regulation

This layer presents the locations of constructed and verified private development projects subjected to stormwater regulations within Philadelphia in FY17. The contents of this layer are discussed in **Section F.5 –Stormwater From Construction Activities** on page 23.

FY17_ PD_CSO_Retrofit

This layer presents the locations of constructed and verified private retrofit development projects subjected to stormwater regulations within Philadelphia in FY17. The contents of this layer are discussed in **Section F.5 –Stormwater From Construction Activities** on page 23.

FY17_PD_NewProjectSubmissions

This layer presents the locations of new project submissions for conceptual stormwater plan review in FY17. The contents of this layer are discussed in **Section F.5.b - Post Construction Stormwater Management** on page 28.

FY17_PD_TechnicalApprovals

This layer presents the locations of projects issued technical approvals by PWD in FY17. The contents of this layer are discussed in **Section F.5.b - Post Construction Stormwater Management** on page 28.

FY17_SanitaryInfiltrationEvents
This layer presents the locations of Sewage Pollution Incidents documented by PWD within Philadelphia in FY17.The contents of this layer are discussed in **Section F.8.g. – Investigate, Remediate, and Report Sanitary Infiltration** on page 37.

Hydro_Line
This layer presents the surrounding watershed hydrology in a polyline based feature class.

Hydro_Poly
This layer presents the surrounding watershed hydrology in a polygon based feature class.

Land_Use_PCPC_2017
This layer presents Philadelphia land use as ascribed to individual parcel boundaries or units of land. Land use is the type of activity occurring on the land such as residential, commercial or industrial. Each unit of land is assigned to one of nine major classifications of land use (2-digit codes) and where possible more narrowly defined into one of 70 sub-classifications (3-digit codes).

PCB_Locations_Known_Historical
This layer presents the location of all known and historical PCB locations within Philadelphia. The contents of this layer are discussed in **Section E – Pollutant Minimization Plan for PCBs** on page 2.

Permitted_Dischargers_FY2017
This layer presents the location within Philadelphia of all NPDES Industrial Stormwater permitted Discharger. The contents of this layer are discussed in **Section F.2.Step 1.c** on page 15 and a list of permitted facilities can be found in **Appendix K – NPDES Permitted Sites – Philadelphia County 2017**

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

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

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

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

Philadelphia_Sewersheds_2017
This layer presents the boundaries of the MS4, combined sewer, un-sewered, non-contributing, and stormwater only areas within Philadelphia County and the neighboring contributing areas.

PhiladelphiaCensus_Blocks_2010
This layer presents the results of the 2010 Census in Philadelphia County on a block level.

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

Stormwater_Outfalls_with_DrainageArea_summary
This layer presents locations of all permitted stormwater outfalls within Philadelphia County and the neighboring contributing areas. Drainage area analysis values are appended in the attribute table to display outfall metrics including total drainage area, total impervious drainage area, percent impervious, and runoff coefficient.

Stormwatersheds_Pennypack
This layer presents the stormwater drainage areas to receiving waterways and stormwater outfalls within the Pennypack Watershed.

Stormwatersheds_Poquessing
This layer presents the stormwater drainage areas to receiving waterways and stormwater outfalls within the Poquessing Watershed.

Stormwatersheds_Wissahickon
This layer presents the stormwater drainage areas to receiving waterways and stormwater outfalls within the Wissahickon Watershed.

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

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

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

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

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

Step 1. Preliminary Reconnaissance: Permit Issuance through end of Year 2

a. Land use and resource mapping

PWD has conducted extensive mapping of information relevant to stormwater management planning. Previously discussed in **Section F.1 – Source Identification** of this document on page 3, the GIS files include MS4 outfalls and contributing drainage areas, land use, population, monitoring locations, and other relevant layers. The maps and supporting GIS layers are included in the **Supplemental CD.**

b. Preliminary physical, chemical, and biological quality assessment

Comprehensive Watershed Monitoring Program

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

PWD has carried out extensive sampling and monitoring programs to characterize conditions in seven local watersheds**,** both within the county boundaries and outside counties/municipalities. From 1999 to 2017, PWD has implemented a comprehensive watershed assessment strategy, integrating biological, chemical and physical assessments to provide both quantitative and qualitative information regarding the aquatic integrity of the Philadelphia regional watersheds. This information is published in Comprehensive Characterization Reports (CCRs) and used to plan improvements to watersheds in the Southeast Region of Pennsylvania.

Monitoring Timeline Strategy

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

PWD conducted benthic macroinvertebrate and physical habitat monitoring activities in the Pennypack Creek Watershed tributaries in spring and summer 2016. This data will be processed and analyzed with results presented in an Integrated Watershed Management Plan indicator status update. Assessments targeting mainstem sites in the Pennypack Creek Watershed were completed in spring of 2017 **(Table F.2.Step 1.b-1).**

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

Table F.2.-1 Overview of PWD Proposed Watershed Monitoring Activities 2010-2018

Watershed/Geographic Area	Activity	Period
PWD/USGS Gages	Continuous Water Quality Monitoring	2010-2017
PWD/USGS Gages	Quarterly Water Quality Grab Samples	2010-2017
Philadelphia Area Watersheds	Stormwater BMP Monitoring	2010-2017
Philadelphia Area Watersheds	Stream Restoration Project Monitoring	2010-2017
Cobbs Creek Watershed	Watershed-wide Comprehensive Assessment	2012-2013
Tookany-Tacony/Frankford Watershed	Watershed-wide Comprehensive Assessment	2013-2014
Wissahickon Creek Watershed	Tributary Assessment	2014-2015
Wissahickon Creek Watershed	Watershed-wide Comprehensive Assessment	2015-2016
Pennypack Creek Watershed	Tributary Assessment	2016-2017
Poquessing Creek Watershed	Watershed-wide Comprehensive Assessment	2018

Monitoring Timeline 2010-2017

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

The proposed strategy for watershed assessments 2010-2018 includes resuming watershed-scale bioassessment activities at several stations within targeted watersheds. (**Table F.2.Step 1.b-2 Proposed Watershed Monitoring Timeline 2008-2018)**. These watershed scale reassessments should complement the "adaptive management" approach favored by the IWMP implementation process, and allow for the locations and methods of assessment to be changed, depending upon the number of projects implemented and their spatial distribution within the watershed. It is hoped that these data will be useful as a long-term record of water quality changes in the region, more appropriate for assessing the goals of a City-wide distributed green infrastructure program than an approach that focuses on individual watersheds.

Table F.2.-2 Proposed Watershed Monitoring Timeline 2010-2018

Watershed	BMP Monitoring	Quarterly WQ Grab sampling	Continuous WQ Monitoring	Annual WQ Summary	Bioassessment	Bioassessment Data Analysis
Cobbs	2010-2018	2010-2018	2010-2018	2010-2018	2012	2012-2013
Tacony-Frankford	2010-2018	2010-2018	2010-2018	2010-2018	2013	2013-2014
Wissahickon	2010-2018	2010-2018	2010-2018	2010-2018	2014-2016	2014-2016
Pennypack	2010-2018	2010-2018	2010-2018	2010-2018	2016-2018	2016-2018
Poquessing	2010-2018	2010-2018	2010-2018	2010-2018	2018	2018-2019

Water Quality Sampling and Monitoring

Guiding Principles of Urban Water Chemistry Assessment

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

In order to comply with the State-regulated stormwater permit obligations, PWD worked with USGS to record continuous water quality data at 10 gage stations in the Philadelphia region from July 2016 through November 2016 and March 2017 through June 2017. The sampling and monitoring sites are presented in **Appendix F - Monitoring Locations.** Four types of sampling were performed as discussed below. Parameters were chosen based on state water quality criteria, or because they are known or suspected to be important in urban watersheds.

Discrete Water Chemistry Assessment

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

Grab samples were also collected from seven locations in the Delaware Estuary by boat in July, August, September and October 2016; and in January, February, March, May and June 2017. Samples are collected at low tide to ensure that water samples adequately represent spatial variability in water quality that may be present. PWD has collected 46 samples from the Delaware River by boat since 2011. Results from quarterly dry weather grab sampling thus far are generally similar to data collected during the CCR data collection periods. For this reason, PWD will re-evaluate whether additional water quality sampling is needed to characterize water quality in targeted watersheds on a case-by-case basis.

Continuous Water Quality Assessment

In order to characterize conditions throughout the Philadelphia region and build a long-term record of water quality, PWD initiated a continuous water quality monitoring program at 10 USGS gage stations. Each USGS/PWD cooperative monitoring gage site records water quality data for dissolved oxygen, temperature, flow, pH, and specific conductance. Selected locations are also instrumented for turbidity, precipitation and photosynthetically active radiation (PAR). These data are made available to the public in near real-time on the internet at http://pa.water.usgs.gov/pwd/. The monitoring results from FY 2017 are presented in **Appendix H - PWD-USGS Cooperative Water Quality Monitoring Program Annual Summary.**

In addition to continuously monitoring water quality at USGS gaging stations, PWD continued deployments of *in situ* self-contained data logging continuous water quality monitoring sondes (YSI Inc. Model EXO2) in the tidal Schuylkill River and Frankford Creek from June-November of 2016. Tidal sondes were deployed again in June 2017, with the intention of collecting data through November 2017.

Long-term continuous monitoring for TMDL compliance and building a long-term water quality data record for the aforementioned watersheds will be accomplished in 2010-2018 through a partnership with the USGS. Results from City-wide continuous monitoring thus far are generally similar to data collected during the CCR data collection periods. For this reason, PWD will re-evaluate whether additional water quality sampling is needed to characterize water quality in targeted watersheds on a case-by-case basis. Continuous water quality instruments will also be utilized in evaluating the performance of certain stormwater BMPs and assessing conditions in tidal portions of the Schuylkill and Delaware Rivers as well as Frankford Creek.

Groundwater Monitoring

A City-wide groundwater level monitoring network will provide long-term monthly data documenting current water levels and trends in groundwater elevations throughout the City, helping to track the impacts of widespread implementation of stormwater management practices (SMPs) and global climate change. Data from the groundwater monitoring network will also be used to calibrate a Philadelphia groundwater model and update the USGS groundwater contour map of Philadelphia (Paulachok 1984).

PWD and USGS identified existing wells that would be suitable for the network and obtained permission for site access. Once wells were identified and accessible, well condition and suitability for inclusion in the monitoring network were investigated by continuous water level monitoring and remote video camera inspection when accessible. Wells that met acceptance criteria were added to the monitoring network. After examining readily available information about existing wells, PWD elected to drill additional wells in order to provide better spatial distribution of wells in the monitoring network. Current status of the groundwater monitoring network and a summary of data collected through June 30, 2017 are presented in **Appendix I – PWD/USGS Groundwater Monitoring Program**.

Biological Monitoring

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

- Rapid Bioassessment Protocol III (Benthic Macroinvertebrate Sampling)

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

Macroinvertebrate Assessments

As described in the PWD *Comprehensive Watershed Monitoring Program: Proposed Monitoring Strategy 2010-2015*, PWD's approach is intended to be a compromise, recognizing not only the benefits of collecting data from randomly selected sites but also the importance of maintaining a monitoring effort at consistent locations over time. This plan is based on a similar monitoring program that USGS has implemented in Chester County (Reif 2002, Reif 2004). The plan reflects the manpower constraints of collecting and processing samples with the PADEP ICE protocol. It is hoped that this approach will achieve some of the benefits of a randomized approach, while providing periodic re-evaluation of our watersheds required to inform the watershed planning process and comply with environmental mandates. Targeted watershed assessments resumed in the Wissahickon Creek Watershed mainstem in spring 2015. (**Table F.2.-3 Proposed Benthic Invertebrate Monitoring Timeline 2010-2017)**.

Table F.2.-3: Proposed Benthic Invertebrate Monitoring Timeline 2010-2017

Period	Monitoring Activity (number of samples*)
2010	Stream Restoration Monitoring (3)
2011	USGS gage samples (9); Randomly selected sites (16)
2012	Cobbs Creek (6**); USGS gage samples (9); Random (10)
2013	Tookany/Tacony Creek (10**) USGS gage samples (9); Random (6)
2014	Wissahickon Creek Tributaries*** (15); USGS gage samples (9); Random (1)
2015	Wissahickon Creek (10**); USGS gage samples (8); Random (4)
2016	Pennypack Creek Tributaries (11**); USGS gage samples (9); Random (5)
2017	Pennypack Creek (12**); USGS gage samples (9); Random (4)

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

** Number of monitoring sites excludes 2 USGS gage sites in target watershed

*** See section 7 for more information on Wissahickon Creek tributary samples

During March and April 2016, PWD conducted Rapid Bioassessment Protocols (RBP III) at 25 (n=25) locations within Philadelphia area watersheds. Sampling was conducted at 9 USGS gages in the PWD/USGS Cooperative Monitoring program, 11 tributary sites in the Pennypack Creek Watershed, and 5 randomly selected sites. These data are presented in **Appendix J – PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments.** Results of the Wissahickon Creek assessments will be presented in a Wissahickon Creek Watershed Integrated Watershed Management Plan Indicator Status Update. In spring 2017, PWD sampled 9 USGS gages, 12 mainstem sites in the Pennypack Creek Watershed, and 4 randomly chosen sites.

Fish Assessments

Because 2016 monitoring efforts focused on Pennypack tributaries, fish assessments were not performed that year. Fish were not assessed in 2017 due to a shortage of resources and staffing (**Table F.2.-4 Proposed Fish Monitoring Timeline 2010-2017)**. All surveys were conducted using electrofishing gear as described in EPA RBP V (Barbour, et al. 1999). Results of these fish assessments will be presented in Integrated Watershed Management Plan Indicator Status Updates.

Table F.2.-4: Proposed Fish Monitoring Timeline 2010-2017

Period	Monitoring Activity (number of samples*)
2012	Cobbs Creek Watershed Assessment (4)
2013	Tookany/Tacony Creek Watershed Assessment (8)
2015	Wissahickon Creek Watershed Assessment (10)
2016	Fish not assessed; tributaries targeted in 2016.
2017	Fish not assessed

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

Algae Assessments

Algal biomass and nutrient ratio data may be used to provide information for the parameterization of water quality models. From 2011-2014 and resuming in 2016, PWD collected monthly (when feasible) phytoplankton samples from three monitoring locations on the Delaware River. Grab samples are taken at sites DR8190 (Commodore Barry Bridge), DR10016 (Ben Franklin Bridge), and DR11011 (Baxter Water Treatment Plant Intake). From 2012-2014, PWD collected phytoplankton samples from monitoring location SC470 (Navy Yard) on the Schuylkill River. Samples were delivered to the Patrick Center of the Academy of Natural Sciences of Philadelphia, phycology section, for taxonomic identification of diatoms and soft algae, as well as the determination of intracellular nutrient (C, N, P) concentrations. In spring 2016, PWD began a pilot effort to collect continuous chlorophyll-a data at three USGS stations along the Delaware River: 01467200 (Ben Franklin Bridge), 014670261 (Delaware River near Pennypack Woods), and 01463500 (Trenton).

Physical Monitoring

Physical Habitat Assessments

Habitat assessments are conducted along with benthic macroinvertebrate monitoring and thus the habitat assessment strategy is described under the heading **Biological Monitoring - Macroinvertebrate Assessments***,* above*.* PWD assesses stream physical habitat condition using PADEP Instream Comprehensive Evaluation (ICE) protocols. During 2016, PWD conducted physical habitat assessments at 25 locations within Philadelphia area watersheds. Sampling was conducted at 9 USGS gages in the PWD/USGS Cooperative Monitoring program, 11 tributary sites in the targeted Pennypack Creek Watershed, and 5 randomly selected sites. These data are presented in **Appendix J – PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments.** Results of the Wissahickon Creek assessments will additionally be presented in a Wissahickon Creek Watershed Integrated Watershed Management Plan Indicator Status Update. In spring 2017, PWD sampled 9 USGS gages, 12 mainstem sites in the Pennypack Creek Watershed, and 4 randomly chosen sites.

Habitat Suitability Index (HSI)

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

Fluvial Geomorphologic (FGM) / Infrastructure Analysis

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

During FY17, PWD implemented two infrastructure protection and streambank restoration projects along Paul's Run (Pennypack Creek Watershed) and the Wissahickon Creek. Construction of the Gorgas Run Stream Restoration project continued through FY17 and will be complete in early FY18. PWD staff continued to monitor the effectiveness of select projects to calculate the reduction of sedimentation to the Wissahickon Creek.

Summary of Monitoring Locations

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

Quality Assurance/Quality Control (QA/QC) and Data Evaluation

PWD has planned and carried out an extensive sampling and monitoring program to characterize conditions in Philadelphia's watersheds. Sampling and monitoring follow the Standard Operating Protocols (SOPs) and Quality Manual as maintained by PWD's BLS. These documents cover the elements of quality assurance, including field and laboratory procedures, chain of custody, holding times, collection of blanks and duplicates, and health and safety.

They are intended to help the program achieve a level of quality assurance and control that is acceptable to regulatory agencies. More information regarding Standard Operating Procedures (SOPs) for chemical and biological assessments is available from BLS.

c. Inventory of Point and Non-Point sources

As of April 2017, there are 165 NPDES permitted dischargers in Philadelphia County, as shown in **Appendix K – NPDES Industrial Stormwater Permitted Sites**. This listing was downloaded from the PADEP Environment Facility Compliance Tracking System (eFACTS). The eFACTS website can be accessed through the following link: http://www.ahs.dep.pa.gov/eFACTSWeb/default.aspx.

PWD is also actively involved in developing estimates of non-point source pollutants. The results of this analysis are described in the hydrologic models in **Section G Assessment of Controls** on page 40.

d. Preliminary problem assessment

CCRs were completed for the Wissahickon (2007), Pennypack (2009) and the Poquessing (2010) Creek Watersheds. These reports include analysis of data collected over the monitoring period and present a characterization of problems within the watershed. The reports for each watershed are available to the public through the internet at the following address:
http://www.phillywatersheds.org/what_were_doing/documents_and_data/watershed_plans_reports

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

For information on the status of the Act 167 plans, please refer to the CSO Annual Report **Table III.C.1-2 - Planning by Watershed** on page 39 for more information.

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

a. Dry Weather Water Quality and Aesthetics

Operate the Defective Lateral Program

Over the last fiscal year, PWD has continued to successfully operate its Defective Lateral Program. A detailed discussion of this program is provided within this report in **Section F.3 - Detection, Investigation, and Abatement of Illicit Connections and Improper Disposal** on page 20.

Debris removal from waterways impacted by storm water discharges

PWD continues to employ the WRT to remove debris and conduct small scale stream restoration projects within the City's waterways. Please refer the CSO Annual Report **Section II.F – Control of solid and Floatable Materials** on page 14 for information about debris removal from waterways impacted by storm water discharges.

Lincoln Drive sewer relining

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

Stormwater outfall dry weather flow inspections

The City maintains a stormwater outfall inspection program in compliance with the MS4 permit. All 434 of the City's permitted stormwater outfalls are scheduled to be inspected by the Industrial Waste unit at least once each permit cycle. Those with dry weather flow are sampled for fecal coliform and fluoride analysis. The results of these samples are reported on a quarterly basis and summarized in this annual report. Those outfalls identified as priority outfalls under the MS4 permit are inspected quarterly.

During FY17, 44 outfall inspections were conducted and 37 samples were taken due to observed dry weather flow as part of the Priority Outfall inspection program. During FY17, 171 outfall inspections were conducted and 91 samples were taken due to observed dry weather flow as part of the Permit inspection program. The sample results are used on the Stormwater Outfall Priority Score list.

The full details of program accomplishments for FY17 can be found in **Appendix M – FY2017 Defective Lateral Connection Quarterly Status Reports.**

Table F.2-5: Stormwater Outfall Inspection Program – FY17 Summary

	Permit Inspection Program		Priority Outfall Program	
Fiscal Year	Inspections	Samples	Inspections	Samples
2017	171	91	44	37

Defective Lateral Program - Priority Outfalls

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

As of June 30, 2017, DCG program activities have performed 2,831 complete tests in this sewershed, identifying 132 cross-connections, all of which have been abated.

The locations of dry weather diversion devices, and the number of inspections, blockages, and discharges found by the Flow Control unit during FY17 are listed below.

Table F.2-6: 7th & Cheltenham Ave – Diversion Devices - FY17 Summary

Location	ID #	Inspections	Blockages	Discharges
Plymouth St. west of Pittsville St.	CFD-01	35	5	0
Pittsville St. south of Plymouth St.	CFD-02	33	4	0
Elston St. east of Bouvier St.	CFD-03	34	1	0
Ashley St. west of Bouvier St.	CFD-04	35	6	0
Cheltenham Ave. east of 19th St.	CFD-05	28	2	0
Verbena St. south of Cheltenham Ave.	CFD-06	33	0	0
Cheltenham Ave. east of 7th St.	CFD-07	77	15	0
7th St. south of Cheltenham Ave.	CFD-08	68	8	0

Inspections and fecal coliform sampling at this outfall continues quarterly. Results for the outfall samples during FY17 are listed below.

Table F.2-7: 7th & Cheltenham Ave - Fecal Coliform Results – FY17 Summary

Date	Fecal Count (MPN per 100 ml)
8/10/2016	24196
10/5/2016	>2419.6
2/3/2017	12997
4/13/2017	10462

W-060-01 (Monastery Avenue)

As of June 30, 2017, DCG program activities have performed 611 complete tests in this sewershed, identifying 16 cross-connections, all of which have been abated.

The locations of dry weather diversion devices and the number of inspections, blockages, and discharges found by the Flow Control unit during FY17 are listed below.

Table F.2.-8: Monastery Ave - Diversion Devices - FY17 Summary

Location	ID#	Inspections	Blockages	Discharges
Jannette St. west of Monastery Ave.	MFD-01	25	2	0
Green La. North of Lawnton St.	MFD-02	25	0	0

Inspections and fecal coliform sampling at this outfall continues quarterly. Results for the outfall samples during FY16 are listed below.

Table F.2.-9: Monastery Ave - Fecal Coliform Results – FY17 Summary

Date	Fecal Count (MPN per 100 ml)
9/7/2016	1203.3
11/7/2016	261.3
2/6/2017	461.1
5/3/2017	1153.1

W-068-05 (Monoshone Creek Outfall)

Additional areas of focus: W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04

As of June 30, 2017, DCG program activities have performed 2,764 complete tests in these sewershed areas, identifying 94 cross-connections, all of which have been abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

Inspections and fecal coliform sampling at the W-068-05 outfall continues quarterly. Results for the outfall samples during FY17 are listed below.

Table F.2.-10: Monoshone Creek (W-068-05 Outfall) - Fecal Coliform Results – FY17 Summary

Date	Fecal Count (MPN per 100 ml)
9/6/2016	>2419.6
12/16/2016	2419.6
2/6/2017	27550
4/11/2017	>2419.6

Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

As of June 30, 2017, DLC program activities have performed 2,478 complete tests in these sewershed areas, identifying 61 cross-connections, all of which have been abated. Most the efforts have been in the S-059-04 sewershed area.

Inspections and fecal coliform sampling at the following outfalls continues quarterly. Results for the outfall samples during FY17 are listed below.

Table F.2.-11: Manayunk Canal - Fecal Coliform Results – FY17 Summary

	Fecal Count (MPN per 100 mL)			
Outfall	8/4/2016	10/21/2016	2/15/2017	4/12/2017
S-058-01	2980	1553.1	>24196	17329
S-059-01	10170	>2419.6	11199	7701
S-059-02	198630	>2419.6	11199	>24196
S-059-03	3990	1046.2	521	842
S-059-04	517.2	648.8	19863	1918
S-059-05	686.7	816.4	<1	>24196
S-059-09	235.9	NF*	NF*	NF*

Note: * NF indicates that no flow was observed

Defective Lateral Program - Other Important Outfalls

P-090-02 (Sandyford Run)

As of June 30, 2017, DCG program activities have performed 5,831 complete tests in this sewershed, identifying 87 cross-connections, all of which have been abated.

The location of the dry weather diversion device and the number of inspections, blockages, and discharges found by the Flow Control unit during FY17 are listed below.

Table F.2.-12: Sandyford Run - Diversion Device - FY17 Summary

Location	ID#	Inspections	Blockages	Discharges
Brous and Lexington Aves.	PFD-01	78	4	0

T-089-04 (Franklin and Hasbrook Outfall)

As of June 30, 2017, DCG program activities have performed 1,017 complete tests in this sewershed, identifying 46 cross-connections, all of which have been abated.

The location of the dry weather diversion device and the number of inspections, blockages, and discharges found by the Flow Control unit during FY17 are listed below.

Table F.2.-13: Franklin and Hasbrook - Diversion Device - FY17 Summary

Location	ID#	Inspections	Blockages	Discharges
Franklin and Hasbrook	CFD-01	86	16	5

Please refer to **Section F.3 - Detection, Investigation, and Abatement of Illicit Connections and Improper Disposal** on page 20 for additional information on activities conducted for the Defective Lateral Program.

Priority Outfall Closure Testing

Investigation will continue within each particular outfall area (sewershed) until the Priority outfall status may be closed. During FY17, none of the Priority outfalls were authorized to be removed from the list by DEP. The four (4) Priority outfalls have continued to be inspected and sampled quarterly by PWD. Please reference **Section F.3 - Detection, Investigation, and Abatement of Illicit Connections and Improper Disposal** on page 20 for a more detailed discussion of this subject.

Healthy Living Resources

Develop integrated storm water management plans

PWD develops integrated stormwater management plans for all of the City's watersheds. Please refer to the CSO Annual Report in **Section III.C.3.7 - Basin-Specific Stormwater Management Plans (ACT 167)** on page 48 for a detailed explanation of the City's watersheds stormwater management plans.

Assess the benefits of implementing a Natural Stream Channel Design (NSCD) and effectiveness of the NSCD restoration approach

PWD has conducted several projects that have been designed with Natural Stream Channel Design concepts in mind. As each of PWD's NSCD projects are constructed, PWD realizes the importance of the extensive monitoring and O&M that accompanies such projects. Each project provides the opportunity to learn about what techniques do and do not work in their respective hydrologic and hydraulic regimes. In order to assess the effectiveness of these NSCD projects, PWD conducts post implementation monitoring at each site that includes the measurement of relevant biological, habitat, and physical parameters to be used in comparison to pre-construction conditions.

Wet Weather Water Quality and Quantity

Implement several BMP projects

PWD and its partners have implemented many BMP projects throughout the City including GSI, stream restoration, and wetland creation projects. For a complete listing of both completed and current GSI projects, please refer to the **Appendix A - Green City, Clean Waters FY17 Annual report.** For a description of activities conducted for PWD's stream restoration, and wetland creation projects, please refer to the CSO Annual Report **Sections III.C.2.3 Stream Habitat** on page 43 and **III.C.2.4 Wetland Enhancement and Construction** starting on page 44.

Monitor three demonstration BMPs

PWD is currently monitoring multiple stormwater BMP project types such as stormwater tree trenches, stormwater planters, and porous pavement in order to develop monitoring protocols and assess the performance of individual BMPs. Monitoring activities for PWD's green stormwater infrastructure projects during FY17 are documented within **Appendix A: Green City, Clean Waters FY17 Annual report Section-Appendix 4: GSI Monitoring Status Report.**

PWD is committed to ensuring stormwater BMPs owned and operated by the City are maintained. This commitment is often evaluated through monitoring of these sites. PWD has detailed activities conducted during FY17 for PWD's stream restoration, and wetland creation; please refer to the CSO Annual Report **Sections III.C.2.3 Stream Habitat Restoration** on page43 and **III.C.2.4 Wetland Enhancement and Construction** starting on page 44.

F.3. Detection, Investigation, and Abatement of Illicit Connection and Improper Disposal

a. Prevention of Illicit Discharges

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. Philadelphia Water reviewed 1525 new sewer and storm connections during FY17. This numbers includes all connections (storm, sanitary and /or combined sewers). A single project or permit may also have one connection or multiple connections.

b. Investigation of Illicit Discharge Sources

Rank the MS4 outfalls according to their priority for corrective actions

PWD maintains a stormwater outfall monitoring system in compliance with the MS4 permit issued by the PADEP. Samples are collected for outfalls that have dry weather flow and analyzed for fecal coliform and fluoride. Priority outfalls have been established through the 1998 Stormwater Consent Order and Agreement and internally, additional areas of focus have been added to maintain progress in the screening, testing and abating program and for efficient crew deployment. Priority Outfalls are sampled on a quarterly basis. Refer to page 16 of this report for FY17 priority outfall summaries.

Investigate dry weather flow to identify sewer lateral defects

During FY17, the DCG performed 2,093 complete dye tests with 44 defective connections found and 36 abatements completed. Details of FY17 activities are listed below.

Table F.3-1: Defective Connections Program - FY17 Summary

Quarter	CY2016-3	CY2016-4	CY2017-1	CY2017-2	Total
Date Coverage	Jul16-Sep16	Oct16-Dec16	Jan16-Mar17	Apr17-Jun17	**FY2017**
Completed Tests	629	556	470	438	**2093**
No Cross Connections	615	550	460	424	**2049**
Cross Connection Identified	14	6	10	14	**44**
Abatements *	8	8	8	12	**36**

Note: *Some cross connections abated may have been identified in prior fiscal years

Reports of potential dry weather discharge from the stormwater system are also investigated, primarily through the Industrial Waste and/or Sewer Maintenance units. During FY17, 25 incidents were investigated. For details, refer to **Appendix N – FY17 Sanitary Infiltration Events.**

The DCG Field Investigation SOP was updated in March 2017. A copy is available upon request.

d. Abatements

Written notice about sewer lateral defects

The Plumbing Repair Programs unit handles customer communications (through letters, telephone or site visits) and is responsible for the abatement of the defects identified.

Abatements of Cross Connections

36 abatements were completed during FY17. Details of abatement types and costs are listed below.

Table F.3-2 Defective Connection Abatement – FY17 Summary

Fiscal Year	# Cross Connections Abated				Total Cost of Abatements
	Residential	Cost	Commercial	Cost	
2017	31	$ 294,807.00	5	$ 23,44.00	$ 317,851.00

Defective Connections Abatement Schedule

All defective connections are required to be abated within 120 days of discovery, in compliance with the MS4 permit.

Defective Connections Abatement Confirmation Tests

All abatements completed during FY17 were tested to confirm that the abatement was completed properly.

e. Defective Connection Program Reporting

Illicit connection program quarterly report

Defective Lateral Quarterly Reports are submitted four times a year to Andrew Sinclair at PADEP as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers three-month periods staring in January, April, July, and October which are submitted no later than 45 days from the end of the reporting period. The Quarterly reports were submitted as required during FY17. All these reports can be found in **Appendix P – FY17 Defective Lateral Quarterly reports**.

Illicit connection program quarterly report contents

The report content within the illicit connection program quarterly reports has not changed in FY17.

F.4 Monitor and Control Pollutants from Industrial Sources

a. Applications/Permits

The City obtains NPDES permits/discharge information from industries if they contribute significant amounts of stormwater into the City's sewer system. Industries that contribute stormwater directly into a waterway or discharge non-industrial waste into the system usually coordinate directly with the PADEP. A list of NPDES permits that involve stormwater associated with industrial activities in the City were obtained from the Department's website and are listed in **Appendix K – NPDES Permitted Dischargers FY17**.

b. Inspections

Industrial inspections

The Philadelphia Local Emergency Planning Committee (PLEPC) is the entity tasked with meeting the responsibilities of SARA Title III. Under PLEPC, the Philadelphia Fire Department (PFD) Hazmat Administrative Unit (HMAU) representative is the individual that carries out the inspections. HMAU personnel inspect SARA facilities to ensure that information submitted in their Tier II report is accurate. The inspection includes a visual on-site inspection, verifying the facility has a Preparedness, Prevention, and Contingency (PPC) plan and reviewing any other information contained within the Tier II report. During calendar 2016, HMAU inspected 41 facilities of the 446 SARA reporting facilities that submit Tier II status reports. As of August 2017, 50 inspections have been performed in calendar year 2017. This effort varies each year depending on staffing and the number of SARA Tier II reports that are submitted.

Industrial waste inspection forms

The Industrial Waste Inspection Form was updated in 2006 to include a stormwater inspection section. A copy of the form can be found in previous reports; please refer to Appendix O of the CSO-Stormwater FY09 Annual Report.

c. Monitoring/Enforcement

Industrial DMR submission

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

NPDES permits enforcement

Should PWD personnel observe a violation of NPDES permit terms and conditions, PWD will report the violation immediately and notify the interested and downstream parties, including PADEP, on a case by case basis.

F.5 Monitor and Control Stormwater from Construction Activities

Stormwater runoff is a concern both during construction and post-construction. Integrated in the City's development review process, PWD is provided the authority to review and regulate the runoff from earth disturbance activities to improve water quality. Additionally, post-construction stormwater management plan review extends beyond peak rate control and encompasses water quality and water quantity technical requirements for more frequent storm events. Efforts continue to be focused on improving plan review for both Erosion & Sedimentation (E&S) as well as post-construction stormwater management. The following discussion documents the progress made so far in terms of stormwater runoff from construction activities including the collaboration between the Philadelphia development community, multiple City Departments, and State agencies.

During FY17, PWD performed numerous tasks in direct compliance with the NPDES Permit as well as tasks supporting continuance and improvement of a growing stormwater management program and watershed program. Some of the FY17 activities include the following:

- Continued coordination efforts with Philadelphia Licenses and Inspections (L&I) regarding permit review and issuance for private development projects applicable to the Stormwater Regulations. At a minimum, the L&I issuance of a Zoning, Demolition, Foundation, and Building permit was coordinated appropriately between the two agencies. In addition, L&I supported PWD in enforcement measures through the issuance of Stop Work Orders and withholding Certificate of Occupancy permits for sites that are non-compliant.
- Continued coordination with the PA DEP Southeast Regional Office Waterways and Wetlands program through regular project communication and quarterly meetings with PA DEP and southeast region conservation district staff. The purpose of the quarterly meetings is to discuss regional and district updates, permitting services and projects, and other various topics. PWD also participated in applicant project meetings with DEP staff to discuss upcoming projects and active projects.
- Scheduled and held coordination meetings with local universities and other large landowners to discuss upcoming or current development projects as well as identify ways to strengthen communication and streamline the review process.
- Completed updates to the PWD E&S compliance as an element of all active construction inspections in order to ensure appropriate controls are implemented during construction. Potential E&S issues or violations are documented as part of an inspection report provided to the on-site representative. The reports identify the required corrective actions, and active construction inspectors will return to the site to verify compliance. E&S violations may trigger

active construction enforcement actions such as a Stop Work Order, requiring continued coordination through L&I.

- Developed an E&S FAQ for contractors which discusses the importance of E&S controls during construction and highlights typical E&S measures that apply to all construction activities. The FAQ also provides the contractor with information about E&S plan submittals and permitting requirements, and contact information. This FAQ can be found on PWD's website, but has also been provided to partner agencies including Licenses and Inspections (L&I) for distribution to permit applicants and contractors.
- Continued to update plan review website content, in an effort to provide clear and accessible resources to the applicant to support quality submittals and efficient reviews.
- Continued to review projects applying for Philadelphia's Green Roof Density Bonus, which was incorporated into the Zoning Code in 2015. This bonus offers exceptions to certain residential density rules for development projects that include a green roof. The green roof must meet PWD's requirements and be approved by PWD before the bonus can be awarded. In FY17, PWD approved 28 projects as eligible to apply for this bonus.
- Continued to attend bi-monthly Business Industry Association (BIA) meetings for the Government Affairs/Fix It Philly subcommittee. In these meetings, representatives from the development community including developers, architects, and engineers come together with City agency representatives from Water, L&I, Planning, and Streets to discuss policy and legislation impacting development in Philadelphia to ensure a transparent and efficient development process.
- Continued to hold Development Services Committee (DSC) meetings with representatives from the development community including developers, designers, large land owners, and attorneys to discuss ideas for improving the PWD Stormwater Plan Review program to better streamline development in the City. In FY17, the DSC focused on creative stormwater management solutions for PWD to partner with the private development community to increase the amount of stormwater being managed on each site. The committee continues to be a valuable resource for the Department to gather feedback on existing procedures as well as new policies and programs.

PWD continued to conduct reviews of stormwater management plans, hold weekly walk-in hours for applicants and maintain the website to allow online submittal of plans.

A summary of all plan review activities City-wide in FY17 is presented in **Table F.5-1 on page 26**.

a. Construction Site Runoff Control

PWD reviews and approves E&S Plans, along with Post-Construction Stormwater Management Plans, for all development sites disturbing more than 15,000 square feet of earth citywide. For E&S plans, PWD follows policies and practices as provided within the PA DEP E&S Control Manual. PWD conducts coordinated reviews with the PA DEP for projects disturbing more than one acre of earth.

Site inspections of E&S controls are conducted on a reoccurring basis and in response to any received complaints during active construction. The purpose of reoccurring inspections is to monitor E&S controls on projects where construction and earth moving activities are active, and to require site operators to maintain E&S controls as needed. PWD inspects controls such as, but not limited to, rock construction entrances, silt fences, inlet protection, and concrete washouts. During an inspection, the inspector communicates with the construction manager or site representative and requests to see a copy of the on-site E&S Plan. Photographs are taken documenting site conditions. An inspection report detailing any out-of-compliance items is generated and distributed to the site manager, and then maintained as part of PWD's electronic project file. Failure to adhere to the requirements in the inspection reports can result in a Notice of Violation or a Stop Work Order. For more information regarding enforcement actions, see **Section F.5.e on page 30**.

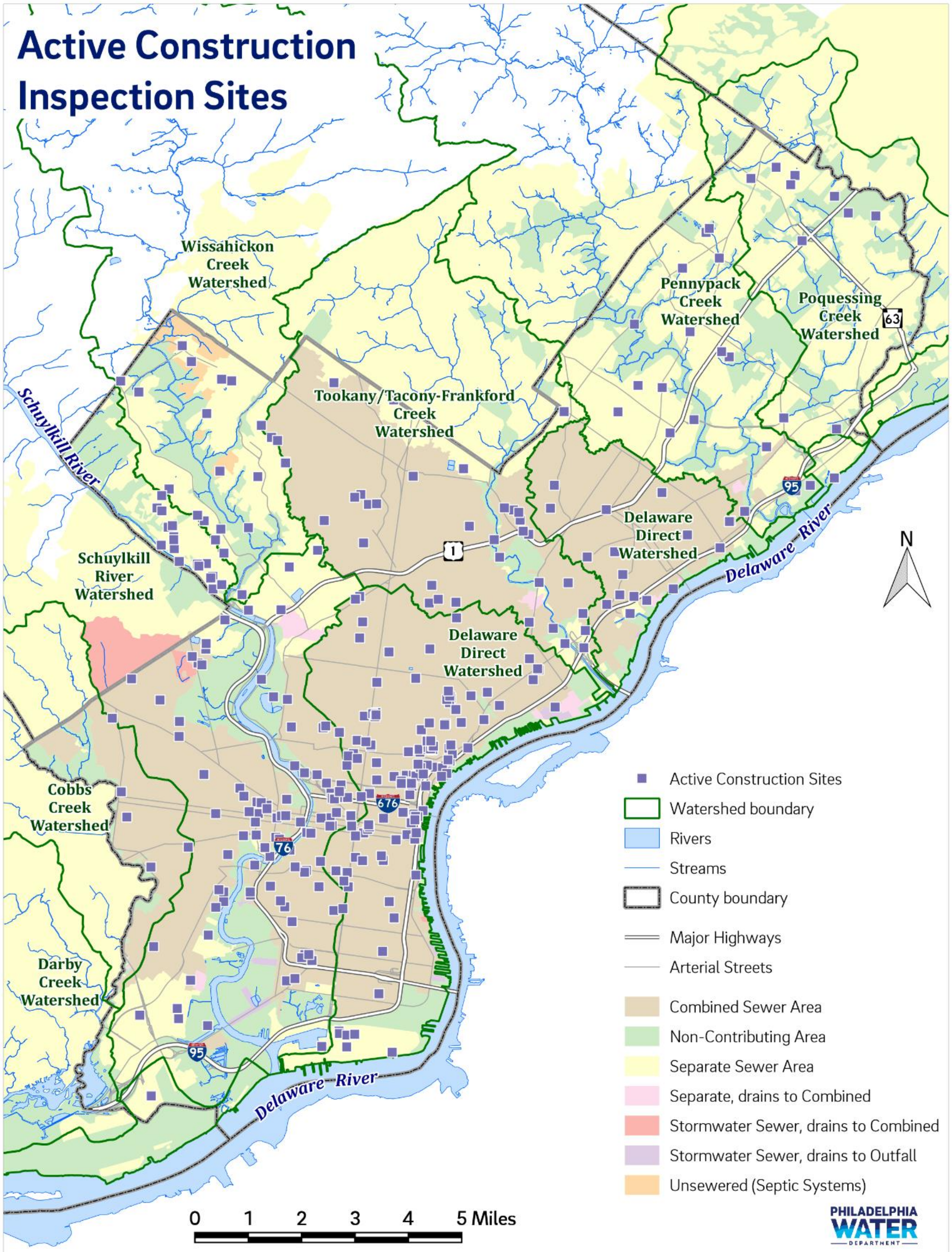
The sites visited cover all of Philadelphia including both separate storm sewer areas and combined sewer areas as depicted in **Figure F.5.-1 on page 27**.

Table F.5-1: FY17 Summary of Plan Review Activities

	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	FY 17 Total
Conceptual Review Stage													
Approvals	6	7	4	10	7	6	5	6	8	3	10	7	79
Rejections	43	40	45	46	43	45	47	55	38	53	52	55	562
Reviews	56	54	53	56	53	60	63	69	55	68	66	66	719
New Project Submittals	26	32	25	28	27	30	29	28	25	34	35	41	360
Average Review Time (days)	2.8	3.0	3.3	5.5	5.4	3.3	6.1	6.2	3.9	4.6	3.8	4.7	4.5
Post Construction Stormwater Management Plan Review Stage													
Administrative Screenings	15	10	15	10	6	15	14	11	22	14	19	16	167
Technical Approvals Issued	6	7	4	10	7	6	5	6	8	3	10	7	79
Rejections	23	16	24	22	17	23	16	22	31	28	39	29	290
Full Technical Reviews	43	41	44	51	46	40	33	42	51	48	69	58	566
New Project Submittals Received	30	14	21	13	8	10	11	13	14	16	20	6	176
Average Number of Reviews per Approval	4.2	4.3	4.0	4.2	3.9	4.3	4.2	4.7	4.4	4.7	4.7	4.1	4.3
Average Approval Time (days)	82	161	130	157	121	125	125	259	117	103	150	179	145
Acres of Earth Disturbance Approved	6.2	12.3	20.3	2.8	10.2	15.6	8.7	19.4	10.1	41.7	13.1	10.2	170.4
Acres of Green Roofs Approved	0.0	0.3	0.0	0.1	0.6	0.1	0.0	0.6	1.4	0.1	0.1	0.4	3.5
Acres of Porous Pavement Approved	0.1	0.1	0.0	1.5	0.0	2.5	0.0	0.1	0.2	0.0	0.5	1.3	6.4
DEP Reviews													
New Coordinated Reviews	2	1	4	6	7	9	5	2	9	6	7	12	70
Erosion and Sedimentation Plan Review													
Defer to DEP	0	0	2	0	1	1	0	0	0	2	1	0	7
Approved	10	9	2	7	9	4	6	2	5	2	8	9	73
Rejected	9	6	8	12	5	9	7	11	12	12	15	11	117
Not Applicable	8	16	7	13	8	8	18	11	14	9	12	18	142
Total Inspections													
New Sites Inspected	35	29	28	141	32	25	57	29	10	15	36	33	470
Total Inspections	344	403	358	382	283	395	473	446	441	324	391	444	4684
Active Construction Inspections at Project Sites with MS4 Sewers	70	90	63	101	72	96	125	90	70	52	62	68	959
Post Construction Inspections at Project Sites with MS4 Sewers	5	5	5	3	3	1	1	0	0	6	7	2	38
Total Inspections at Project Sites with MS4 Sewers	75	95	68	104	75	97	126	90	70	58	69	70	997
Active Construction Inspections at Project Sites with Combined Sewers	243	263	247	247	194	278	324	330	349	241	282	343	3341
Post Construction Inspections at Project Sites with Combined Sewers	4	20	20	8	7	3	0	0	0	0	9	5	76
Total Inspections at Project Sites with Combined Sewers	247	283	267	255	201	281	324	330	349	241	291	348	3417

Please note: In FY2009, PWD changed the Technical Screening to more of an administrative check to better mirror DEP's administrative check. PWD Screenings are no longer included in the Technical Review count. Total Inspections includes projects in "Non-Contributing" sewered areas

Figure F.5.1: FY17 Active Construction Sites



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

Adopted in January 2006, the Philadelphia Stormwater Regulations enabled PWD to review plans for both new and redevelopment sites throughout the City to ensure water quality and quantity were part of the proposed management plan. Since 2006, PWD has collected and synthesized feedback from the development community regarding improvements to the stormwater plan review program. With the signing of a Consent Order and Agreement with the PA DEP in June 2011, the Department saw an opportunity to increase stormwater management from land development projects while simultaneously implementing business-friendly improvements to the program. Effective July 1, 2015, the Stormwater Regulations were updated to improve and strengthen PWD's stormwater programs. The Philadelphia Stormwater Management Regulations are available online at http://www.phila.gov/water/PDF/PWDregCH6.pdf.

c. Applications/Permits

Across the entire city during FY17, 360 unique projects were submitted to PWD for conceptual review through the program's website. PWD approved full technical plans for 79 projects during FY17 citywide. It should be noted that this number does not include plans re-submitted for review, some of them multiple times. The distribution of development projects that submitted post-construction stormwater management plans for review is presented in **Figure F.5.c-1, Table F.5.2 & 3**.

Table F.5.-2: Approved Stormwater Plan Location Summary by Contributing Area

Drainage Type	Number of Locations
Combined Sewer Area	57
Non-Contributing Area	5
Separate Sewer Area	17
Total	**79**

Table F.5.-3: Approved Stormwater Plan Location Summary by Watershed

Drainage Watershed	Number of Locations
Delaware River	26
Poquessing Creek	3
Pennypack Creek	2
Schuylkill River	36
Tacony/Frankford Creek	5
Wissahickon Creek	4
Darby-Cobbs Creek	3
Total	**79**

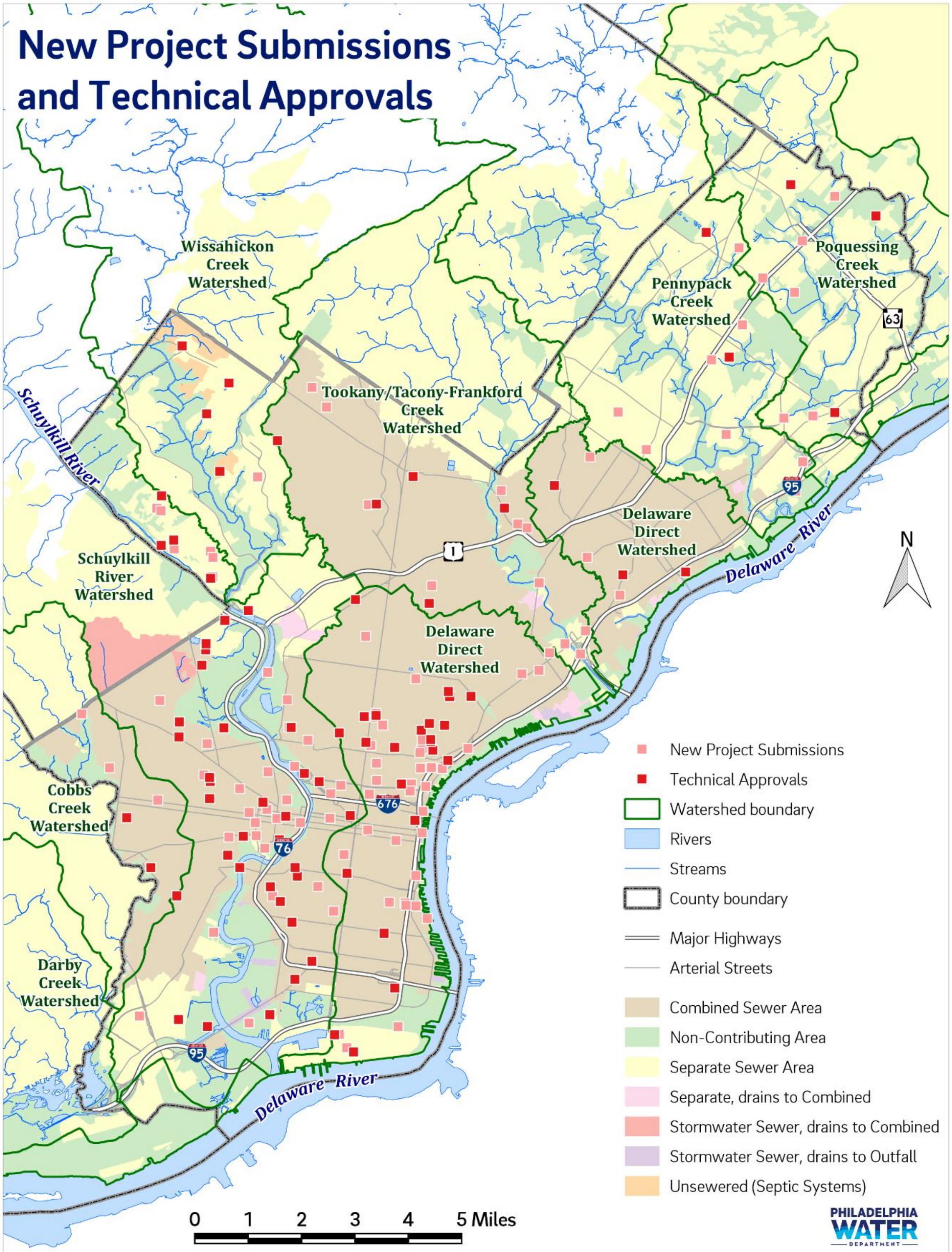


Figure F.5.2: Locations of New Project Submissions and Technical Approvals

d. Inspections

PWD requires a pre-construction meeting prior to commencement of earth moving activities for projects applicable to post-construction stormwater management requirements. In FY17, PWD conducted 98 pre-construction meetings citywide for development projects. During the pre-construction meeting, both the approved Erosion and Sedimentation Pollution (E&S) Control Plan and the approved Post-Construction Stormwater Management Plan (PCSMP) are discussed with the construction manager and property owner representative. Post-Construction Stormwater Management inspections are discussed in **Section F.8. on page 34**

The inspection program continued in FY17 by conducting inspections of stormwater structural controls on land development sites. PWD stormwater plan review inspectors conducted site visits for 343 active sites citywide during FY17. Technical plan review staff was also on-site to verify construction of the stormwater management practices (SMPs) was completed in accordance with the approved plan. In the case that concerns are identified regarding SMP installation during construction, the technical plan reviewer will discuss the necessary corrective actions for the project with the PWD inspector and the construction manager.

During FY17, PWD inspectors had the task of inspecting the installation of SMPs and erosion and sedimentation controls during active construction for private development sites. Thus, PWD was able to maintain its presence in the field by conducting 959 active construction inspections on 73 sites in the separate sewered areas of the city. Many sites were visited multiple times to ensure compliance with appropriate requirements (**Table F.5-4**).

Table F.5-4: Active Construction Inspection Site Location Summary

Drainage Type	Number of Locations
Combined Sewer Area	242
Non-Contributing Area	28
Separate Sewer Area	73
Total	**343**

e. Monitoring/Enforcement

PWD issues a Notice of Violation to sites when significant or persistent issues with E&S controls or the installation of required SMPs are not addressed in a timely manner. In FY17, PWD issued a total of 16 Notice of Violations to projects under construction citywide. The major compliance issues for active construction projects include improper use of silt fences, inadequate or lack of rock construction entrances, contractor not following the onsite E&S Plan, a complete absence of E&S controls, and incorrect SMP installation. In severe cases, PWD may request support from PA DEP to perform a co-inspection of a site and aid in enforcement action. Through an established referral process, PA DEP can also provide enforcement support to PWD through notice of violation, compliance meetings, and by issuing fines. In FY17, PWD relied on existing enforcement coordination protocols with PA DEP on an as-needed basis.

Notice of Violations include a deadline for compliance and re-inspection. If a project remains out of compliance, PWD will coordinate with the Department of Licenses & Inspections to issue a Stop Work

Order. One site was issued a Stop Work Order citywide in FY17. PWD also coordinates with the Department of Licenses & Inspections to hold the building Certificate of Occupancy for any projects where major issues are identified during the construction process.

f. NPDES Permit Requests

PWD continues to serve as the Conservation District for the City of Philadelphia for NPDES Construction Permitting Requirements and Chapter 102 Regulations relating to Erosion and Sedimentation Pollution Control. PWD continues to receive notifications and coordinate reviews for permitting. For more information and full details on this process described in previous reports; please refer to Section F.5.f NPDES Permit Requests on page 204 of the CSO-Stormwater FY 2013 Annual Report.

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

The Stormwater Management Guidance Manual Version 3.0 represents a comprehensive revision released in conjunction with the updated Stormwater Regulations on July 1, 2015. Primarily a web-based resource, this version of the manual is organized to reflect the life cycle of a development project from initial submission through operation and maintenance. In addition to providing context on the regulatory framework for stormwater management in the city, the manual builds upon nearly a decade of program growth and technological advancements to streamline the technical design requirements and clearly document the plan review process for applicants. The Department leveraged feedback from design engineers to clarify existing content, provide new resources and develop a fully searchable and accessible online manual. The manual is located on the web at http://www.pwdplanreview.org/.

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

PWD, through the Planning and Environmental Services Division (PESD), strives to reduce the amount of point and non-point discharges entering regional waterways and improve the environmental health of the region so that all waters are fishable and swimmable. The main programs within PESD, in addition to the Stormwater Management Program, that work together to improve regional ecological health, water quality, and sustainability are: EWS, SAN, CSO Management Program, Watershed Planning, Source Water Protection Program, and Wetlands Mitigation Registry. The Watershed Planning Program is presently explained in detail throughout **Section III.C.** on page 36 of the CSO Annual Report.

Source Water Protection Program

PWD's Source Water Protection Program embodies PWD's multi-barrier approach to ensuring the safety and quality of Philadelphia's drinking water, whose sources consist of the Schuylkill and Delaware Rivers. The Source Water Protection Program staff work closely with PWD water treatment plant managers and operators to anticipate and respond to emergencies and challenges to conventional treatment techniques. PWD continues to support the Source Water Protection Program, and has discussed it in full detail in the past. For more information on this program, please refer to the following sections:

- Schuylkill Action Network
  Please refer the CSO Annual Report **Section II.G.2 – Schuylkill Action Network** on page 21 for information about this topic.
- Delaware Valley Early Warning System
  Please refer the CSO Annual Report **Section II.G.2 – Early Warning System** on page 21for information about this topic.
- RiverCast
  Please refer the CSO Annual Report **Section II.G.2 – RiverCast** on page 21 information about RiverCast.

Combined Sewer Overflow Management Program

The Combined Sewer Overflow management program works to implement technically viable, cost-effective improvements and operational changes that mitigate the impacts of combined sewer overflows. Please refer to **Section I Management and Control of CSOs** on page 1 in the CSO Annual Report for additional information.

Watershed Mitigation Registry

Please refer to the CSO Annual Report **Section III.C.2.4 – Wetland Enhancement and Construction** on page 44 for information about the Watershed Mitigation Registry.

F.7. Miscellaneous Programs and Activities

a. Pollutant Migration/Infiltration to the MS4 System

PWD responds to all citizen complaints of liquid, solid, or gaseous pollutants within Philadelphia. A list of all pollutant migration events in the MS4 section of the City that occurred in FY17 is presented in **Appendix O – FY17 Pollutant Migration/Infiltration**.

b. Public Education and Awareness

Public Education Literature

The City takes an active role in providing information and education to the public and our community. Several events and programs are conducted each year in which the City provides numerous amounts of literature to the public. Please refer to the CSO Annual Report **Section II.G – Pollution Prevention** on page 21 for information about this topic.

c. Pesticides, Herbicides, and Fertilizer Controls

Integrated Pest Management protocol

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

The Philadelphia Health Department uses larvicides, Bacillus Sphaericus (brand name Vectolex), Methoprene (Altosid), and Spinosad (Natular), to prevent mosquito breeding. These larvicides are approved for use in the stormwater catch basins and are applied as such. The IPM protocol is followed when using the larvicides by inspecting the catch basins before treatments, using the least toxic or non-toxic product, and submitting a request for repairs when necessary. PWD and the Department of Public Health work closely together. This collaboration has resulted in the Health Department receiving maps with locations of the City's storm water inlets and surface basins. This allows PWD improved access to refer concerns of pests in the water collections systems for treatment by Health Department staff.

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

Education materials to private pesticide users

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

d. Snow Management Plan

The City faces winter storms that bring potentially dangerous accumulations of ice, sleet, freezing rain, and snow. To mitigate the impact of these storms, the Streets Department has prepared a Snow and Ice Operations Plan which provides a detailed outline of the City's response to adverse winter weather conditions. The plan includes the salt storage locations at the six (6) Highway Districts. Page 37 of the Plan describes the Streets Dept. salting policy. The updated Snow and Ice Removal Operations Plan for winter 2016-2017 is provided in **Appendix M - City of Philadelphia Snow and Ice Operations Plan Winter 2016-2017.**

e. Municipal/Hazardous Waste, Storage, Treatment, and Processing Facilities

The City's one waste transfer station, Northwest Transfer Station, is located at Domino Lane and Umbria Street. In May 2017, PWD, along with multiple City agencies conducted a stormwater inspection at this facility as part of a new effort to educate City employees on stormwater pollution prevention. During FY17, Streets Dept. prepared an application for the PAG-03 General NPDES Industrial Stormwater permit.

F.8. Best Management Practices (BMPs)

a. Submit storm sewer discharge ordinance

The authority for PWD to adopt stormwater regulations is found within Title 14 Zoning and Planning Code under §14-704(3) Stormwater Management. PWD maintains Stormwater Regulations as Chapter 6 of PWD's regulations. These regulations were originally adopted in 2006 and have been most recently updated in July of 2015. These regulations require stormwater management on development projects that exceed an earth disturbance threshold of 15,000 square feet. For more information regarding PWD's regulation updates within the last year, see **Section F.5.b. – Post-Construction Stormwater Management in New Development and Redevelopment on page 28.**

PWD has added documentation to a website (http://www.pwdplanreview.org) in order to provide the development community a means of accessing the most recent stormwater management information.

b. Commercial and Residential Source Controls

b.i. Mingo Creek Surge Basin

The Basin was last dewatered in August of 2012 to inspect the sediment levels. The basin sediment appeared to have not changed since its last inspection in 2009; therefore, no further accumulation had occurred. A bathymetric study of the Basin is being planned for FY18, the results of this survey will be evaluated to determine if additional action is required for sedimentation control. For more information on this project, please refer to Section F.8.b.i on page 214 of the CSO-Stormwater FY12 Annual Report.

b.ii. Existing privately owned structural controls

To ensure ongoing SMP maintenance of private facilities, the PWD continues to utilize three means: executing Operation & Maintenance Agreements, conducting post-construction maintenance inspections, and utilizing enforcement tools.

An Operation & Maintenance Agreement is executed by PWD and the property owner, notarized, and recorded to the property land deed prior to the issuance of a Post-Construction Stormwater Management Plan Approval by the PWD. These agreements outline the SMP(s) on the private site and stipulate maintenance requirements. The agreements also include language granting the PWD the right to inspect on-site SMPs and even perform maintenance on behalf of the property owner if necessary. The PWD also maintains a comprehensive operations and maintenance manual for SMPs geared toward private development users: http://www.phila.gov/water/PDF/Retrofit-O.M.Manual.pdf.

Post-construction maintenance inspections of private facilities were conducted through the reporting period. The PWD utilizes both specialized inspection techniques as well as visual inspections to assess the performance of private SMPs. The inspections conducted to date have identified the most effective methods and technologies, including closed-circuit television, ground penetrating radar, surveys of critical system elevation points, confined space, pole-mounted camera photography, and visual and wet weather inspections. In FY17, the PWD performed 141 post-construction inspections citywide. The PWD will continue to evaluate and refine post-construction inspection protocols.

Utilizing **enforcement tools**, PWD will issue notification to the property owner if an SMP is found to be insufficiently maintained. This notification will include a description of any issues identified and a timeline for achieving compliance. The City is authorized to compel maintenance of SMPs on private property under the Philadelphia Code and PWD Regulations. Development sites that are subject to PWD's stormwater regulations are required to maintain the SMP(s) to function as designed. If this initial notification is unsuccessful at bringing action from the property owner, PWD can compel compliance through a number of enforcement tools, including issuance of notice of violations, fines, court action, and/or a nuisance abatement and lien by the City. For non-compliant projects, PWD will also suspend any applicable stormwater billing credits if the required maintenance is not performed.

In FY17, 16 projects were brought back into compliance citywide using the above-referenced protocols. PWD will continue to work with property owners to ensure that SMPs are inspected and maintained in accordance with Regulations and recorded O&M agreements.

c. Development plans review

PWD and the City Planning Commission provide review of drainage plans for new and redevelopment. The drainage plans address both flood control and potential stormwater pollutants under the authority of the Philadelphia Code. Please refer to **Section F.5 – Monitor Stormwater from Construction Activities on page 23** for additional information.

d. Street Cleaning Program

During FY17, the Streets Department continued its street cleaning programs that target street debris and litter. With its fleet of mechanical sweepers, the Streets Department provides daily street cleaning in Center City and on major arteries and commercial corridors throughout the city. Since FY14 the Streets Department has initiated monthly street sweeping operations on routes along the Tookany / Tacony Frankford, Wissahickon, Cobbs Creek and Pennypack watersheds within the city. In FY17, a total of 802 miles were cleaned and 103.16 tons of debris was removed.

In addition, the Center City District (CCD) and University City District (UCD) conduct sidewalk cleaning. Heavily-trafficked commercial streets and areas receive daily sweeping with pans and brooms and mechanical cleaning. Other areas with a high density are cleaned at least twice weekly with machines (some areas are cleaned daily). Sidewalks also get a monthly power washing, except in winter, to remove accumulated stains, gum and grime. Through a variety of fee-for-service arrangements, CCD crews clean several adjacent commercial and residential areas and provide a 24-hour deployment to clean the three and a half mile long underground subway concourse and Center City's two regional rail stations.

Public awareness of litter

The City promotes, develops, and implements litter reduction programs in an effort to increase public awareness of litter as a source of stormwater pollution. There are about 500 solar-powered, compaction litter receptacles in Center City, and another 460 in other commercial districts throughout the city. Over 600 standard wire baskets are also in place through the Philadelphia More Beautiful Committee (PMBC) Adopt-A-Basket program, that provides block captains with wire waste baskets to distribute and manage across city neighborhoods. PMBC also organizes neighborhood cleaning events citywide. In FY17, 5,315 blocks were cleaned by 26,402 volunteers; 4,605 tons of trash were collected and removed.

These efforts are bolstered by Philadelphia's SWEEP program. SWEEP officers, employees of the Streets Department, work with residential communities to address locations with problematic amounts of litter and short dumping. In cases of non-compliance, SWEEP officers will issue warnings and citations to the appropriate individuals. In FY17, approximately 59,712 tickets were issued.

During FY17, the City of Philadelphia Mayor Kenney signed an Executive Order to create the Zero Waste and Litter Cabinet (Cabinet) to move the City towards a zero waste and litter-free future. To accomplish the goals of reducing waste and litter the Cabinet was created as an interdepartmental effort to combat litter, enhance cleanliness of streets and public spaces, and increase the waste diversion rate toward a long-term goal of Zero Waste entering landfills or conventional incinerators. A Zero Waste and Litter Cabinet Action Plan was released in Summer 2017, and is available here: http://cleanphl.org/

e. Animal Waste and Code Enforcement

Educational material regarding control of animal waste

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

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

Dog Waste Control Program

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

f. Flood Management and Flood Control Devices

Structures built within the floodplain

All structures including buildings and infrastructure such as piping and roads built within or close to the 100 Year Flood Plain area that require a Zoning Permit or a Building Permit or both should be reviewed to determine if Floodplain Regulations apply. The City's Licenses and Inspection (L&I) department will send all applicants with properties located in or close to the 100 Year Flood Plain to the Philadelphia City Planning Commission (PCPC) for review. If the property is determined to be within the Floodway or Floodway Fringe, structures built on the allowable property will be built at least one-foot above the Base

Flood Elevation (BFE) or flood proofed such that plan complies to 14-1606 and any special Building Code requirements. PCPC signed off on 56 plans in FY17.

Evaluate new and existing structural drainage controls

Our evaluation of structural drainage controls was discussed in further detail in **Section F.8.b.ii - Existing Privately Owned Structural Controls** on page 36 of this report.

Work is being done on sections of the city that have chronic flooding to eliminate or reduce these occurrences; please refer to CSO Annual Report **Section II.B.3.3 – Storm Flood Relief** on page 3 for more information about the SFR projects and details on evaluating structural drainage controls.

Streambank Restoration and Wetland Enhancement

Please refer to the CSO Annual Report **Section III.C.2.3 – Stream Habitat Restoration** on page 43 for information pertaining to streambank restoration.

Please refer to the CSO Annual Report **Section III.C.2.4 – Wetland Enhancement and Construction** on page 44 for information pertaining to wetland enhancement.

g. Sanitary Infiltration Controls

Limit sanitary infiltration

As part of the Cross Connection Repair Program, PWD has conducted 1,420 abatements to correct cross connection in sewer laterals since 1994; 36 abatements were completed in FY17 alone. PWD also has in place twelve (12) dry weather diversion devices which divert sanitary flow back into the sanitary sewer but still allow stormwater to pass through during wet weather events. PWD estimates that these abatements and dry weather diversion devices have prevented over 199.5 million gallons of contaminated flow from entering our waterways since the inception of the program and about 5.1 million gallons during FY17. Please refer to **Section F.3 – Detection, investigation and abatement of Illicit Discharges** on page 20 for more information on the Cross Connection Repair Program.

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

As a part of PWD's commitment to improvement of water quality and aesthetics in dry weather, large sewer lining projects began on the entire length of intercepting sewers along the Tookany/Tacony-Frankford and Cobbs Creeks. Please refer to **Appendix A - *Green City, Clean Waters* FY17 Annual Report Section 3.3 Interceptor Rehabilitation Program** on page 6 for more information on the interceptor relining project.

Construction of a storage tank upstream of relief sewer manhole R-20, located at Main Street and Shurs Lane, to capture and store excess flows was completed during November of 2013. The consent order requirement for sewer linings to be done around regulator R-20 in an effort to reduce inflow and infiltration has been completed. Please refer to CSO Annual Report **Section III.B.1– Construction and Implementation of the Main and Shurs Off-line Storage Project** on page 34 for more information on the Main and Shurs Off-line Storage Project and efforts to reduce inflow and infiltration at R-20.

PWD constructed a parallel relief sewer in December of 2011 to eliminate overflows at manhole PC-30 as per a consent order issued by the DEP. The overflows at PC-30 were caused by a combination of various factors which influence the hydraulic carrying capacity of the Poquessing Creek Interceptor during wet weather events. In FY17, PWD continued to monitor the effectiveness of this relief sewer. There were also several sewer lining projects done under the consent order for PC- 30 area in conjunction with the relief sewer being constructed. Please refer to CSO Annual Report **Section III.B.2. – PC-30 Relief Sewer** on page 35 for more information on the PC-30 Relief Sewer.

Investigate, remediate, and report sanitary infiltration

PWD responds to all citizen complaints of liquid, solid, or gaseous pollutants within Philadelphia. A database called the Sewage Pollution Incident & Location Log (SPILL), which stores information about unintentional sanitary discharges including the date reported, problem location, spill type, description, and abatement date, is maintained. Detailed information on the events found on the SPILL database of reported sewage pollution incidents in FY17 are found within in **Appendix N – FY17 Sanitary Infiltration Events**.

During FY17, six (6) complaints of malfunctioning On-Lot Sewage Disposal Systems were investigated. Of those complaints, one (1) has been mitigated, two (2) are currently on-going and require enforcement hearings to resolve noncompliance, and one (1) is awaiting PWD review for public sewer to be installed. Also during FY2017, six (6) applications were received and issued for the installation of on-lot sewage disposal systems. Of those applications, five (5) permits were approved. In addition, 487 portable toilet permits were issued. PWD continues to support the inspection and remediation of these systems.

h. Spill Prevention and Response

The City's response plan to respond to and contain harmful spills that may discharge to the municipal separate storm sewer system is managed by the Office of Emergency Management. The City of Philadelphia Emergency Operations Plan – Annex F Hazardous Materials and PWD – Waterways Contamination Response Protocol, can be found in the Additional Documents folder on the **Supplemental CD**.

In order to protect PWD's structures and treatment processes, PWD staff respond to oil and chemical spills and other incidents that have the potential to threaten the water supply or impact the sewer system, twenty-four hours per day, seven days per week. PWD responds to all incidents that can impact the sewer system or endanger PWD employees. This includes both the sanitary sewer system and the storm sewer system. PWD supervises cleanup activities and assesses environmental impact. PWD inspectors also investigate various other types of complaints. A list of all pollutant migration events in the MS4 section of the City that occurred in FY17 is presented in **Appendix O – FY17 Pollutant Migration**.

i. Public Reporting of Illicit Discharges, Improper Disposal

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

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

PWD received 150,799 phone calls which lead to 20,948 service requests being conducted during FY17. Currently PWD does not track phone calls specifically related to illicit discharges and improper disposals in the MS4 area, but instead tracks much broader topics including sewage backup, flooding, street cave-ins and water service disruptions.

Philly 311

Philly311 was created to help eliminate the need to sort through the numerous phone numbers and hotlines available to contact the City government. A customer service specialist will connect the user to the information and services they may need either by calling 3-1-1, asking a question on the website or through Twitter @philly311. A Philly 311 mobile app is available for iPhone, Android, or Blackberry devices to report issues such as graffiti, potholes, litter and more. For more information on uses of Philly311, please visit: http://www.phila.gov/311/. During FY17, Philly 311 transferred 1,320 non-emergency inlet and hydrant requests to Customer Service Call Center.

j. Used Oil and Toxic Material Disposal

The City continues to facilitate the proper disposal of used oil and other toxic materials. This program includes collections events, distribution of educational materials, the operation of a website, and a hotline accessible to the public. For more information on the hazardous waste program please visit: http://www.philadelphiastreets.com/hazardous-waste.

k. Storm Water Inlet Labeling/Stenciling

In September 2015, Philadelphia Water released a refreshed storm drain marking program. This new iteration features watershed specific storm drain markers. Each of the seven new markers prominently features a unique color scheme and an animal native to that respective watershed. Educational materials provided with each kit better inform the public about how their actions on the street can reduce stormwater runoff pollution. In 2017, PWD launched a beta version of a new web-based storm drain marking app. This new app will allow participants to more accurately mark inlets on their blocks and public spaces. Inlets are color coded by watershed allowing participants to view the often hidden natural watershed boundaries of our city. The direct capture of information via the app will also allow the Department to more accurately track the placement of markers throughout the city. The app can be accessed here: https://markingapp.philadelphiawater.org/

During FY17 Philadelphia Water distributed 138 storm drain marking kits, totaling 2,070 individual stormwater inlet labels. PWD continues to encourage community organizations and citizens to get involved in storm drain marking projects. More information on this program has been provided in previous years; please refer to Section F.8.k on page 312 of the CSO-Stormwater FY 2010 Annual Report.

Section G Assessment of Controls

Annually estimate pollutant loadings & reductions from stormwater management plan

The Philadelphia Water Department selected a set of effective post-construction stormwater management controls to address problems identified in the waterways, and documented these controls in the Stormwater Management Guidance Manual. Philadelphia's stormwater management regulation legally require all development and redevelopment projects subject to these regulations to implement the identified controls. The requirements of the stormwater regulations were developed through the Act 167 planning process in coordination with neighboring counties. The requirements are explained in detail in Section 1.2.1 of the Stormwater Management Guidance Manual, and summarized below.

Water Quality

The Water Quality requirement focuses on the removal of both runoff volume and pollutants and is similar to requirements in surrounding states and other major cities across the country. Because flow rates and velocities were identified as significant causes of aquatic ecosystem impairment, infiltration is emphasized as the preferred water quality management practice unless evidence is provided that it is infeasible on a particular site. Additional water quality benefits are provided, in part, by slowing water down and allowing suspended solids and associated pollutants to settle.

The Water Quality requirement stipulates infiltration of the first 1.5 inches of runoff from all directly connected impervious area (DCIA) within the limits of earth disturbance. The initial 2006 regulations required 1.0 inch of runoff to be managed, based on water budget analyses and precedents for control of the 90th percentile event set by Maryland and other nearby states with similar climates. This requirement has been increased in 2015 to 1.5 inches based on evidence provided by simulations showing that this level of control will further reduce the volume and flow rate of runoff to waterways.

Channel Protection

Erosion of stream beds and banks caused by high volumes and velocities of urban runoff was identified as a significant contributing factor to aquatic ecosystem impairment in Philadelphia's stream systems. For this reason, a channel protection requirement was incorporated in the stormwater regulations. This requirement is based on the concept of effective channel forming discharge, and is similar to precedents set by Maryland and other nearby states with similar climates and geology.

The Channel Protection requirement stipulates the detention and release of runoff from the one-year, 24-hour Natural Resources Conservation Service Type II design storm event for all DCIA within the limits of earth disturbance at a maximum rate of 0.24 cfs per acre of directly connected impervious drainage area in no more than 72 hours.

Flood Control

Act 167 Plans identified peak rates of runoff as a contributing factor to out-of-bank flooding events in Philadelphia and surrounding counties. To address peak rate control, geographically specific requirements were incorporated in Philadelphia's stormwater regulations and manual.

The Flood Control requirement stipulates that a development project meet or reduce peak rates of runoff, as determined by its Flood Management District, from predevelopment to post-development conditions during certain storm events.

There are approximately 20.7 square miles of impervious area in the portion of the City that falls under the MS4 permit. As of September 2017, approximately 0.87 square miles (559 acres) of directly connected impervious area are tributary to completed or approved green stormwater infrastructure. This is approximately 4.2% of the impervious area.

Section H Fiscal Resources

Maintain adequate program funding

During FY17, the City provided fiscal resources needed to support operation and maintenance of the Stormwater Management Program. The budget for the upcoming FY18 budget is available upon request.

Annually submit fiscal analysis

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

APPENDIX A

Green City, Clean Waters

FY 2017 Annual Report

Sixth Annual Report for the City of Philadelphia's Consent Order and Agreement on *Green City, Clean Waters*

Reporting period July 1, 2016 – June 30, 2017

Submitted to

The Commonwealth of Pennsylvania

Department of Environmental Protection

And

The United States Environmental Protection Agency

By the City of Philadelphia Water Department

September 30, 2017

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6.0 Data Collection and Analysis

7.0 Public Outreach and Participation

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Glossary of Acronyms

ADCP	Acoustic Doppler Current Profiler
ADA	Americans with Disabilities Act
AOCC	Administrative Order for Compliance on Consent
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CCLL	Cobbs Creek Low Level
City	City of Philadelphia
CMP	Comprehensive Monitoring Plan
COA	Consent Order and Agreement
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
DO	Dissolved Oxygen
DPP	Department of Public Property
ECA	Energy Coordinating Agency
GA	Greened Acre
GARP	Greened Acre Retrofit Program
GIS	Geographic Information Systems
GSI	Green Stormwater Infrastructure
IAMP	Implementation and Adaptive Management Plan
L+I	Department of Licenses and Inspection
LTCP	Long Term Control Plan and its supplemental documents
LTCPU	Long Term Control Plan Update
MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
NMCs	Nine Minimum Controls
NOAA	National Oceanic and Atmospheric Association
NPDES	National Pollutant Discharge Elimination System
oTIS	Office of Transportation & Infrastructure Systems
PADEP	Pennsylvania Department of Environmental Protection
PCPC	Philadelphia City Planning Commission
PDE	Partnership for the Delaware Estuary
PEC	Pennsylvania Environmental Council
PennDOT	Pennsylvania Department of Transportation
PHA	Philadelphia Housing Authority
PIDC	Philadelphia Industrial Development Corporation
PPR	Philadelphia Parks and Recreation
PRA	Philadelphia Redevelopment Authority
PWD	Philadelphia Water Department (PWD)
RFI	Request for Information
RFP	Request for Proposal
RTC	Real Time Control
RTP	Rebuilding Together Philadelphia
SDP	School District of Philadelphia
SEPTA	Southeastern Pennsylvania Transportation Authority
SMED	Stormwater Management Enhancement District

SMIP	Stormwater Management Incentive Program
SMP	Stormwater Management Practice
SOD	Sediment Oxygen Demand
SRT	Simulated Runoff Testing
SSES	Sanitary Sewer Evaluation Survey
SWMM	Stormwater Management Model
TIGER	Transportation Investment Generating Economic Recovery
TPL	Trust for Public Land
TTF	Tookany/Tacony-Frankford Watershed
USEPA	United States Environmental Protection Agency
WASP	Water Quality Analysis Simulation Program
WPCP	Water Pollution Control Plant
WQBEL	Water Quality-Based Effluent Limit

1.0 Introduction

The Consent Order and Agreement (COA) between the City of Philadelphia (City) and the Pennsylvania Department of Environmental Protection (PADEP), and the Administrative Order for Compliance on Consent (AOCC) between the City and the United States Environmental Protection Agency (USEPA), formalized the regulatory approval of the *Green City, Clean Waters* program and amended the 2009 CSO Long Term Control Plan Update (LTCPU). This is the sixth Annual Report submitted under the requirements of the COA. Fiscal Year 2017 (FY17) covers the City's *Green City, Clean Waters* implementation progress activities that occurred between July 1, 2016 and June 30, 2017. **Table 1-1: Cumulative Greened Acres** displays the program progress towards meeting the total Greened Acres at the end of Year 6.

Table 1-1: Cumulative Greened Acres

Project Type	Cumulative Number of projects (FY11-FY17)	Cumulative Greened Acres (FY11-FY17)
Public Retrofits	152	198
Private Development	296	456
SMIP/GARP	55	301
Total	**503**	**955**

1.1 Water Quality Based Effluent Limit (WQBEL) Performance Standards

The Water Quality-Based Effluent Limits (WQBEL) performance standards are broken into incremental targets that must be achieved by the City of Philadelphia every 5 years of the 25-year program. The Philadelphia Water Department submitted the Year 5 Evaluation and Adaptation Plan (EAP) October 30, 2016 to PADEP. The EAP focused on the culmination of the first five years of program progress including an assessment of compliance with the WQBEL Performance Standards. The Year 5 EAP is available online here: http://phillywatersheds.org/doc/Year5_EAPBody_website.pdf

Table 1-2: Water Quality-Based Effluent Limits

Metric	Units	Base Line Value	Year 5 WQBEL Target	Cumulative Amount as of Year 5 (2016)	Year 10 WQBEL Target
NE WPCP Improvements	Percent Complete	0	See Section 3.1.1		See *Green City, Clean Waters* Wet Weather Facility Plan
SE WPCP Improvements	Percent Complete	0	See Section 3.1.2		
SW WPCP Improvements	Percent Complete	0	See Section 3.1.3		
Miles of Interceptor Lined	Miles	0	2	7.5	6
Overflow Reduction Volume	Million Gallons Per Year	0	600	1,710	2,044
Total Greened Acres	Greened Acres	0	744	837.7	2,148
Equivalent Mass Capture (TSS)	Percent	62%	Report value	70.5%	Report value
Equivalent Mass Capture (BOD)	Percent	62%	Report value	88.9%	Report value
Equivalent Mass Capture (*Fecal Coliform*)	Percent	62%	Report value	72.0%	Report value

2.0 Implementation Tracking and Reporting

2.1 *Green City, Clean Waters* Program Tracking

Currently the existing databases and systems track program implementation and support data requests for internal and external reporting. The development of the *Green City, Clean Waters* program tracking system will integrate this data from the existing Water Department systems to streamline the process.

During FY17, several milestones were achieved in the development of the *Green City, Clean Waters* program tracking system. This year timing milestones between programs as well as Targets and Benchmarks were aligned, to help create unified reporting. Additionally, dashboards, data visualizations and calculations of metrics were finalized with the vendor, finishing up the final steps of the system design.

Table 2-1: FY17 Status Updates for Existing Databases and Systems

Existing Databases and Systems	Status
PlanIT	Philadelphia Water Department's (PWD) tracking system that stores information from site evaluations conducted on locations throughout Philadelphia. All sites must undergo an initial evaluation to determine the feasibility of green infrastructure before they can be transferred to GreenIT to begin design phase.
GreenIT	PWD's metrics tracking system for all public green stormwater infrastructure projects. GreenIT tracks estimated, designed, built, and maintained compliance metrics. During FY17, development work started on adding new fields in support of the H&H compliance model and rebuilding the Data Entry Application to an online tool, rather than a locally installed application. The Data Entry Application is used to create metrics reports by consultants and staff that are directly uploaded to the GreenIT database.
Plan Review Database	PWD's tracking system that stores metrics, including detailed SMP data, related to private development project compliance with the Philadelphia Stormwater Regulations as well as voluntary Stormwater management retrofit projects. The database is designed to track workflows related to reviews and inspections, including the status of conceptual and technical reviews, record drawing reviews, and active and post-construction inspections.
CAPIT	PWD's Capital Project Tracking System is in the process of being replaced to meet PWD's growing needs. In FY17, PWD worked to configure the new system, CIPIT, that will replace CAPIT. CIPIT is anticipated to go-live in early FY18 and will include integration with PlanIT and GreenIT.
Geographic Information System (GIS) Asset Tracking	GIS is used to track the location all PWD assets including green infrastructure.
Maintenance Management Systems	Green stormwater infrastructure maintenance activities have been fully incorporated into PWD's Cityworks work order management system, which is linked to the City's GIS and provides tools to track and manage work performed on PWD's assets such as fire hydrants, inlets, water mains, sewers, and green stormwater infrastructure.

2.2 Reporting Metrics

Green Stormwater Infrastructure through Public Implementation

The information in GreenIT is used to produce compliance reporting outputs for the completed and planned public project tables in **Appendices 1** and **2** of this report. The reporting format and metric definitions are described in Table 1 and Table 2, respectively, in **Appendix 1**.

Green Stormwater Infrastructure through Private Development

Information from the Stormwater Plan Review Database is used to produce reporting outputs for completed private redevelopment and incentives project tables in **Appendix 3**. The reporting format and metric definitions are described in Table 1 and Table 2, respectively, in **Appendix 3**.

Stormwater Management Types

SMP types used for public implementation are described in Table 3 of **Appendix 1** and private implementation are defined in Table 3 of **Appendix 3**.

3.0 Water Pollution Control Plant and Collection System Project Progress

3.1 Water Pollution Control Plant and Collection System Project Progress

Upgrades to increase peak flow capacity at each of the City's Water Pollution Control Plants (WPCPs) were described in the Wet Weather Facility Plan, submitted on June 1, 2016. During FY17, PWD has continued working towards completing the projects committed to in the Wet Weather Facility Plan. Within the following sections, progress in FY17 on these projects is discussed. The *Green City, Clean Waters* Wet Weather Facility Plan can be referenced here: http://phillywatersheds.org/doc/Wet_Weather_Facility_Plan_website.pdf

3.1.1 Northeast Water Pollution Control Plant

Within **Table 3-1**, the eight Northeast WPCP improvements committed to in the Wet Weather Facility Plan are listed with their required operation years, as approved by the PADEP. Within the first five years of the program, two improvements were completed, and the remaining six improvements are on track for completion by the required completion date.

Table 3-1: Status of Northeast WPCP Improvements

Northeast WPCP Improvements	Required Operation	Project Status (FY 17)
Facility Improvements		
Remove Double Deck Effluent Channel in Final Sedimentation Tanks Set 2	6/1/2016	Complete
New (4 x 48") conduits from Preliminary Treatment Building to Primary Sedimentation Tanks Set 1	6/1/2016	Complete
Secondary Treatment Bypass	6/1/2021	In Construction
Gravity Sludge Thickeners	6/1/2021	In Construction
Preliminary Treatment Building #2	6/1/2031	In Design
New Influent Baffles in Primary Sedimentation Tanks Set 2	6/1/2031	In Design
Operational Improvements		
Operate with minimal sludge blanket when Gravity Sludge Thickeners in service	6/1/2021	On Track

3.1.2 Southeast Water Pollution Control Plant

All Southeast WPCP improvement commitments in the Wet Weather Facility Plan were completed in FY16, meeting the required operation date of June 1, 2016. For more detailed information, please see the *Green City, Clean Waters* Wet Weather Facility Plan or the Year 5 EAP.

3.1.3 Southwest Water Pollution Control Plant

Within **Table 3-2**, the Southwest WPCP improvement committed to in the Wet Weather Facility Plan is listed with its associated required operation year.

Table 3-2: Status of Southwest WPCP Improvements

Southwest WPCP Improvements	Required Operation	Project Status
Facility Improvements		
Additional Effluent Pump	6/1/2026	In Construction

3.2 Philadelphia Collection System Improvements

Within **Table 3-3**, the three Collection System improvements committed to in the Wet Weather Facility Plan are listed with their required operation dates. Two of the improvements were completed, meeting the required deadlines. The other improvement identified is a study to evaluate CSO regulator capacities and identify improvements, if necessary. This study is ongoing and is anticipated to continue throughout the implementation of the LTCPU, as PWD is committed to maintaining and improving the efficiency of the collection system.

Table 3-3: Status of Collection System Improvements

Collection System Improvements	Required Operation	Project Status
Improvements		
NE Second 66" Frankford Grit Chamber Bypass In Service	6/1/2016	Complete
NE Frankford High Level Second Barrel Rehabilitation	6/1/2016	Complete
All Districts: Balancing CSO Regulator Wet Weather Capacities	Study - Ongoing	On Track

3.3 Interceptor Relining

FY17 Progress on Miles of Interceptor Lined

The WQBEL Performance Standards requires 6 miles of interceptor lining completed by the end of year 10 (2021). During FY17 the number of completed miles remained the same as FY16 but, the City is well ahead of the year 10 target with 7.5 miles completed. Additionally, there are 4.3 miles in construction or in contract management, and 3.3 miles in design. (**Table 3-4**).

Table 3-4: Interceptor Relining FY17 Status

Project Name	Street Extents	Length (Miles)
Construction Complete		**7.5**
60th and Cobbs Creek Parkway to 75th and Wheeler Sewer Lining	60th and Cobbs Creek Parkway to 75th and Wheeler	2.2
Cobbs Creek Park to 63rd and Market Sewer Lining	Cobbs Creek Park to 63rd and Market	0.5
Cobbs Creek Interceptor Phase 1 CIPP Lining	63rd and Market to 62nd and Baltimore	1.6
Tacony Creek Intercepting Sewer Lining Phase 1	Chew & Rising Sun to I & Ramona	1.9
Tacony Creek Intercepting Sewer Lining Phase 2	2nd St & 64th Ave to Chew & Rising Sun; DRW Mascher to Tacony Interceptor; Cheltenham Ave to Crescentville & Godfrey	1.3
In Contract Management		**4.3**
Cobbs Creek Intercepting Sewer Lining Phase 2	61st and Baltimore to 60th and Warrington	1
Cobbs Creek Interceptor Lining Phase 3	City Avenue to D R/W in former 67th Street	1.7
Cobbs Creek Intercepting Sewer Lining Phase 4 (Indian Creek Branch)	City Avenue to D R/W in former 67th Street	1.6
In Design		**3.3**
Tacony Creek Intercepting Sewer Lining Phase 3	I & Ramona to O & Erie	1
Upper Frankford LL Collector/Tacony Intercepting Sewer Lining Phase 4	Castor & Wyoming to Frankford/Hunting Park	1.1
Upper Frankford Creek LL Collector/Tacony Intercepting Sewer Lining Phase 5	Frankford/Hunting Park to Luzerne & Richmond	1.2
Total Anticipated Miles of Interceptor Lined		**15.1**

4.0 Green Stormwater Infrastructure through Public Implementation

The programmatic strategies for achieving public Greened Acres are benchmarked in three phases: planning, design, and construction. The following three sub sections describe the progress made during FY17 for each of these phases. **Table 4-1** summarizes Public GSI projects and Greened Acres for FY17. **Figure 4.2** displays the Planned and Completed Public Green Stormwater Infrastructure projects.

Table 4-1: FY17 Summary of Public Green Stormwater Infrastructure

	End of FY17			Cumulative
Project Phase	In Design	In Contract Development	In Construction	Completed
Number of Projects	200	39	51	**152**
Potential Number of Greened Acres	TBD*	107	100	**198**

*Potential number of Greened Acres is subject to change as projects go through the design process

4.1 Planning Approaches for Green Stormwater Infrastructure Implementation

PWD has developed a planning and engineering process that is applied to evaluate management potential of large study areas and specific locations. **Figure 4-1** displays the FY17 status of study areas where the planning and engineering process has been applied. The team is continuing to evaluate a diverse selection of project types ranging from smaller street interventions to large disconnection systems on park sites. The planning studies conducted to date have successfully produced a queue of recommended locations that the team packages and moves to the design phase.

Study Area-Based Opportunities

PWD works closely with a variety of partners to implement the *Green City, Clean Waters* program. Partnership projects take place in two primary ways: 1) identifying green stormwater infrastructure opportunities on public properties and working with partners to acquire access to land and their departmental support and 2) working with partner agencies to identify opportunities to maximize stormwater management in their capital investments. PWD has solidified many of these partnership project identification processes with primary agency partners such as the Streets Department, Philadelphia Parks and Recreation and the Department of Public Property.

PWD is also working to integrate green stormwater infrastructure into investments made by other large landholders in the City who own public facilities such as universities, public housing and public transit.

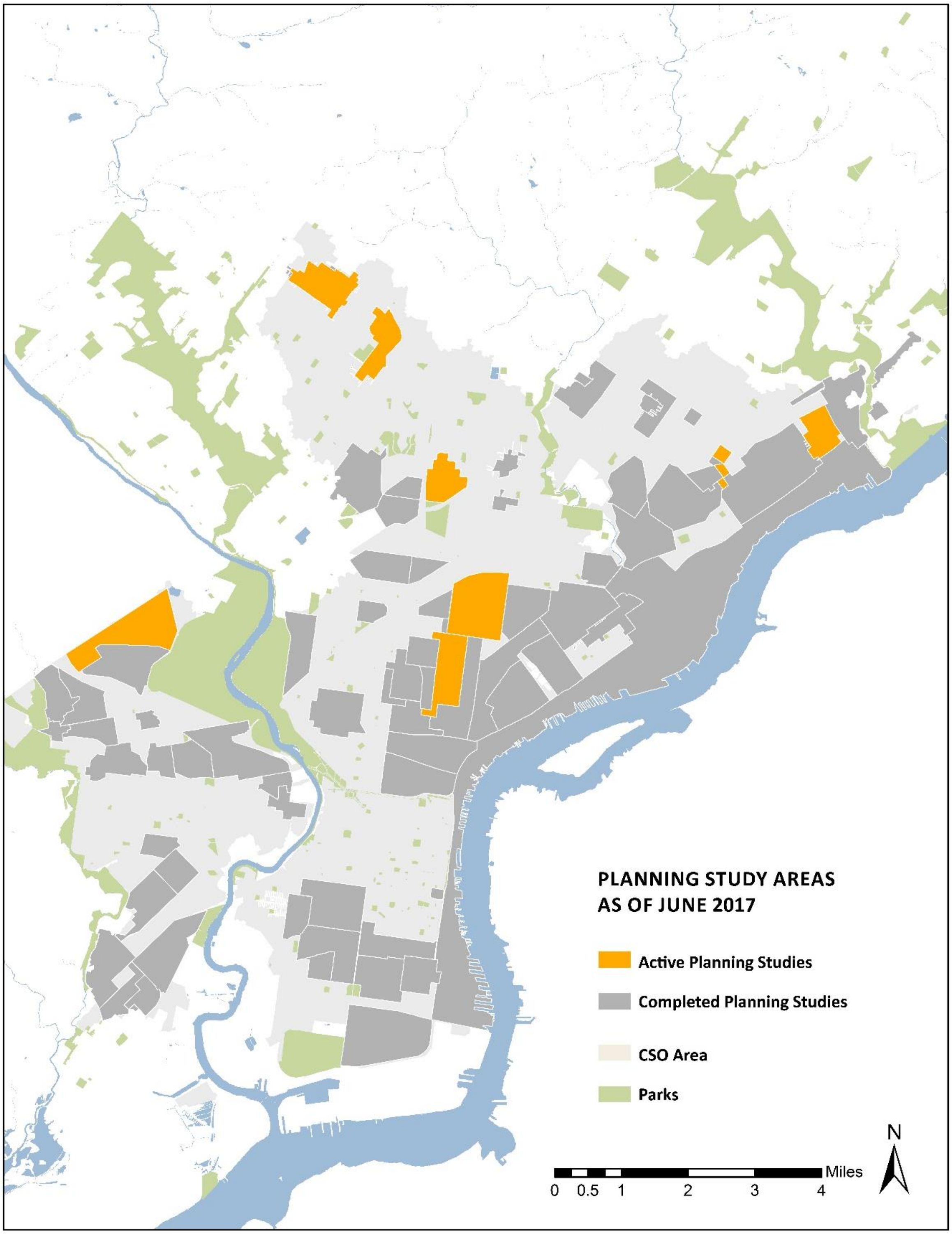

Figure 4-1: Areas Evaluated through Planning and Engineering Process as of June 2017

4.2 Design Approaches

Over the last year, PWD strove to increase design efficiencies and improve design timelines by analyzing current bottlenecks and identifying opportunities for further improvement. PWD continued to advance the design of Large Area Disconnection (LAD) projects that take advantage of well situated large open spaces to provide centralized stormwater management for multiple acres of impervious runoff. During FY17 ten LAD projects were in design and phase one of a multi-phased site, Lanier Playground, completed constructed.

Development of GSI Resources

In October 2016, PWD published the new GSI Planning & Design Resources webpage which included a significant overhaul and reorganization of all resources including the GSI Planning & Design Manual, the GSI Survey & Drawing Standards, the GSI Landscape Guidebook, the GSI Rendering Standards, and the PWD Project Summaries Guidance Manual. The website provides a comprehensive and easy to navigate portal for planning and design consultants to access necessary resources and references for working with PWD.

4.3 Construction

PWD released significant updates to the master green specifications in 2016 and a cross-divisional committee has been meeting regularly to discuss additional updates and refinements based on field experiences and new knowledge. In FY17, PWD implemented the first year of a separate GSI Landscape contract to provide consistent landscaping at multiple sites and address issues encountered when a construction contract must be held open until the next appropriate planting season. PWD began writing the GSI section of a field inspectors guidebook to provide written direction to inspectors working on green stormwater projects. Ongoing trainings for inspectors and contractors has continued periodically throughout the year covering a variety of topics from as-builts to soils and tree protection.

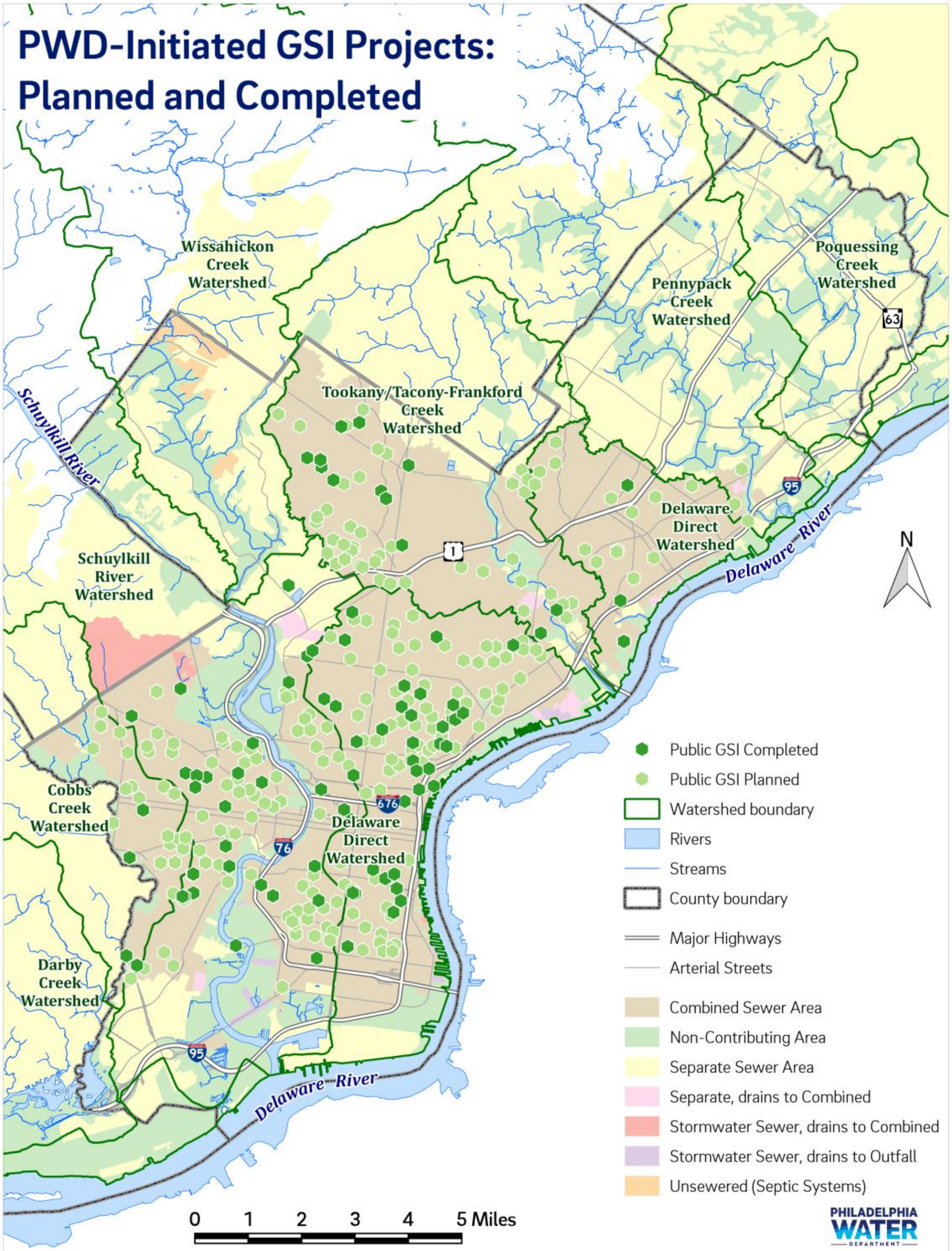

Figure 4-2: Public Green Stormwater Infrastructure Projects

4.4 Public Green Stormwater Infrastructure Maintenance Program

To ensure the function and sustainability of stormwater management infrastructure investments, PWD continues to maintain each system as well as update its Operation & Maintenance protocols. **Table 4-2** provides a list of SMP types and the total number currently maintained by the PWD.

Table 4-2: PWD SMP Types Maintained in FY17

SMP Types	Total Number of SMPs
Green Roof	2
Infiltration/Storage Trench	93
Pervious Paving	15
Rain Garden/Basin	98
Planter	49
Bumpout	19
Stormwater Tree	96
Tree Trench	225
Swale	11
Total Number of SMP's	**608**

In FY17, PWD drafted the "Green Stormwater Operations Tree Identification Guide". This reference guide is intended for use by PWD crews and contractors and provides photographs, growth habits and other key characteristics useful in tree identification. This document is intended to serve as a supplemental reference to the 2014 "PWD Plant Inspection Guidebook" and contains all existing and proposed species to be planted within PWD SMPs.

4.4.1 Inspections

Inspection of Surface Elements

The objective of the surface inspection program is to inform timely preventative and corrective maintenance activities. During FY16, Inspection Staff accumulated a total of 16 hours of training in the following professional training programs: National Stormwater Center's Certified Municipal Stormwater Inspector.

Inspections are denoted as wet weather inspections or dry weather inspections. A total of 998 inspections were conducted during FY17. There were 907 dry weather and 91 wet weather inspections. Procedure dictates that any issue identified during a routine inspection will be referred for follow-up maintenance.

Inspection of Subsurface Elements

The objective of the subsurface inspection program is to observe and assess all structural components of GSI systems that exist below street level. Inspections are performed in dry weather conditions as capturing discernable video during wet weather conditions is difficult. Inspection staff is certified through the National Association of Sewer Service Companies' (NASSCO) Pipeline, Manhole, and Lateral Assessment Certification Program.

297 SMPs and a total of 12 miles of pipe were inspected during FY17. Any issue identified during a routine inspection is referred for follow-up maintenance.

4.4.2 Maintenance

PWD's GSI maintenance program operates through three types of maintenance activities in order to adequately address the maintenance needs of PWD's GSI. Maintenance events associated with surface maintenance, aesthetic maintenance and subsurface maintenance are summarized in **Table 4-3**.

Table 4-3: FY17 Summary of Maintenance Events by Type

Maintenance Work Order Type	Number of FY17 Events
Surface	
Routine	4,323
Mulching	244
Pruning	295
Watering	1,906
Tree Maintenance	167
Inlet Protection Maintenance	550
Work Zone Protection	81
Aesthetic	835
Reactive - Vegetation Repair	855
Reactive - Structural Repair	119
Reactive - Green Infrastructure Request	19
Reactive - Drainage Modification	19
Subsurface	
Maintenance	457
Inlet Cleaning	40
Porous	
Routine	8
Restorative	3
Total Maintenance Events	**9,921**

In FY17, PWD drafted the "Green Stormwater Operations Tree Identification Guide". This reference guide is intended for use by PWD crews and contractors and provides photographs, growth habits and other key characteristics useful in tree identification. This document is intended to serve as a supplemental reference to the 2014 "PWD Plant Inspection Guidebook" and contains all existing and proposed species to be planted within PWD SMPs.

PowerCorps PHL

Over the past decade, the City and PWD have implemented new strategies to promote the economic and social growth of the City and meet environmental, ecological and business missions. In support of these initiatives, and to augment PWD's GSI aesthetic maintenance responsibilities, PWD entered into a partnership with PowerCorpsPHL. PowerCorps is a City of Philadelphia AmeriCorps initiative designed to engage youth, ages 18-26, which transforms lives through service and workforce development. **Table 4-4** summarizes the type and amount (in pounds) of material collected by PowerCorps in FY17.

Table 4-4: PowerCorps PHL Trash Removal in FY17

Type of Material Collected	Amount Collected (lbs.)
Litter	8,413
Leaves and Organic Debris	33,985
Construction/Commercial Debris	325
Other (e.g. tires, appliances, short-dumping)	50
Total	**42,773**

5.0 Green Stormwater Infrastructure through Private Development

5.1 Philadelphia Stormwater Management Regulations

The Philadelphia Stormwater Management Regulations (PSWMR) were revised in January of 2006 and July of 2015, providing the foundation of the private sector's role in stormwater management. PWD requires stormwater management for land development projects in the City of Philadelphia with 15,000 or more square feet of earth disturbance. Plans for proposed projects must be submitted for conceptual review to pursue a Zoning Permit, while the submission of detailed stormwater management plans must receive a technical review and approval prior to pursuing obtaining a Building Permit. For the projects that proceed to construction, the installations of SMPs are inspected during construction. During FY17, PWD conducted 3,341 inspections during active construction in the combined sewer area. **Figure 5.2** displays the completed Green Infrastructure installed through Private Development and Incentivized Retrofits. A full list of complete Private Development projects can be found in **Appendix 3**. A summary of constructed Greened Acres through Private Development projects by watershed are listed below in **Table 5-1**.

Table 5-1: Cumulative Greened Acres by Watershed through Private Development

Watershed	Darby-Cobbs	Delaware	Pennypack	Tookany-Tacony/ Frankford	Schuylkill	Total
Stormwater Regulations Greened Acres	9.95	207.64	3.69	55.39	179.11	**456**

Expedited Review

PWD offers a service level goal of no more than a 15-day review for all projects submitting for post-construction stormwater management plan review. However, projects that use preferred green stormwater management approaches are eligible for an expedited, 5-day review. PWD offers two types of expedited review: 1) Disconnection Green Review and 2) Surface Green Review. The Disconnection Green Review ensures redevelopment projects that disconnect 95% or more of the post-construction impervious area (DCIA) using features such as green roofs, porous pavement and new tree canopy will receive a review response within 5 days. The Surface Green Review expands the number of eligible projects by including both new development and redevelopment projects that manage 100% of the post-construction DCIA through bioinfiltration and bioretention basins as well as the practices that qualify for the Disconnection Green Review. In FY17 a total of 21 projects qualified for an expedited review in the combined sewer, with 13 projects selecting the Disconnection Green Review and 8 projects selecting the new Surface Green Review.

Construction Verification Initiative

PWD continued to refine a construction verification process with the goal of assessing individual projects prior to counting Greened Acres toward compliance totals. This process emphasizes communication efforts from the start of the development project so property owners can adequately plan for record drawing creation. Throughout construction and at the time of construction completion, PWD conducted inspections of the site to observe and document installation of the approved SMPs. PWD also continued to perform outreach at the close of construction to solicit record drawings from project engineers and owners. These record drawings allow PWD to verify SMP installation and function. In addition to this process, PWD continued to pursue a verification initiative to gather documentation of approvals that have not otherwise been verified and create record drawings to document the constructed conditions. To date, 115 projects totaling 157.4 Greened Acres have been inspected and verified through this supplemental approach.

I-95 Reconstruction Project

Sector A of the I-95 Reconstruction Project is divided into five major design sections, moving from north to south: CPR, BSR, BRI, AFC, and GIR. Each of these sections is further subdivided into a total of 25 construction subsections. At present, Sector B has two design sections delineated, Section CAP from Chestnut to Walnut, and Section CSP from Vine Street to Girard Point Bridge (stadium side). A graphic illustrating the I-95 Reconstruction Project sections is featured below in **Figure 5-1**.

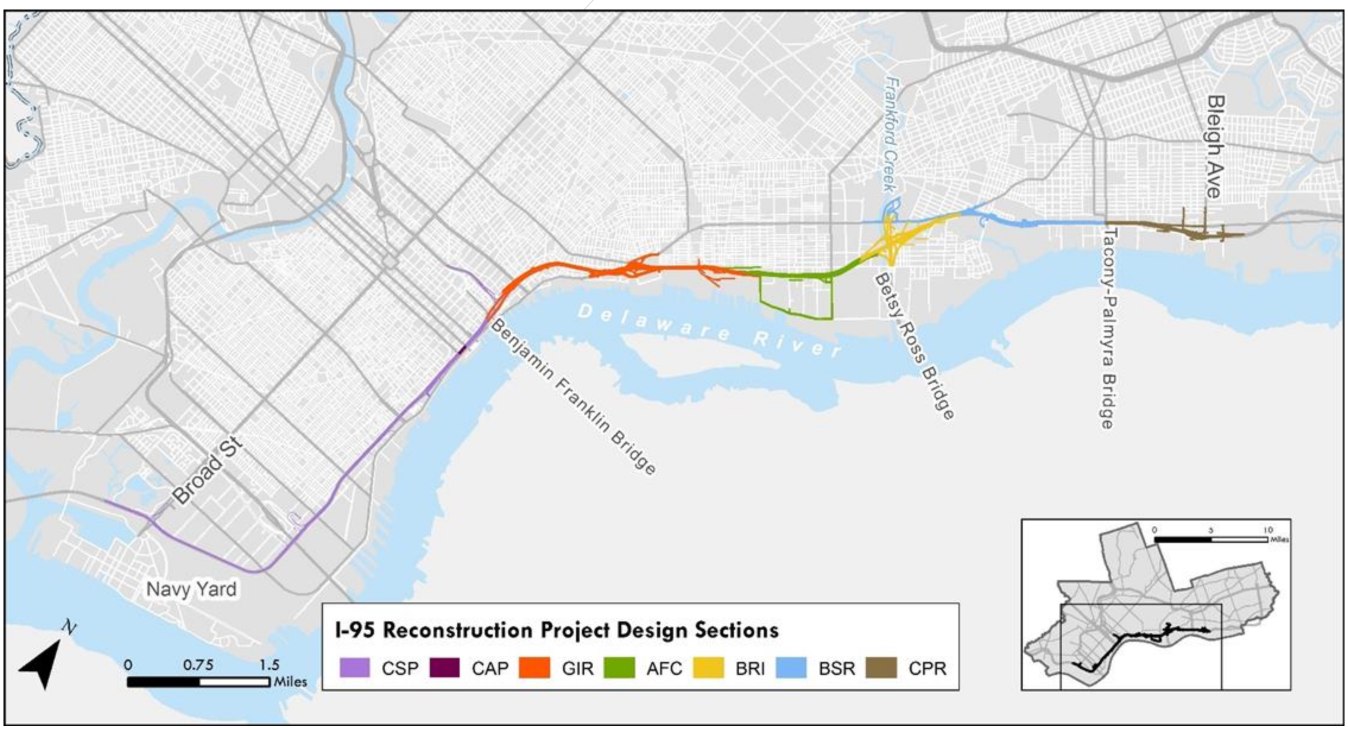

Figure 5-1: I-95 Reconstruction Project Sections

Subsections with significant design or construction progress in FY17 are summarized in **Table 5-2**.

Table 5.2: I-95 Construction Section Limits and Anticipated Let Dates

Section	Project Description	Anticipated Let date or Estimated Completion (if in construction)
Section CPR (Cottman-Princeton Ramp Area)		
CP1	This section was exempt from meeting the Philadelphia Stormwater Regulations because it was designed before the regulations went into effect. Approximately 60 street trees were planted along Princeton Avenue between Torresdale Avenue and State Road as part of this phase.	2013, completed
CP2	Six new separate stormwater outfalls are under construction or completed. Pipes have been completed in Cottman, Princeton, Magee, Disston, and Unruh Streets, and work is ongoing in Bleigh Avenue. The stormwater pipes are designed to accept the drainage from the highway as well as the area in between the highway and the Delaware River as development occurs.	2017, est. completion
Section BSR (Bridge Street Ramp Area)		
BS1	This project is in preliminary design. Work will include the construction of stormwater management practice devices, routing stormwater away from combined flow conveyances, and construction of connections to City stormwater conveyances.	2018
BS4	New PWD storm sewers, inlets, and new outfalls will be installed to convey runoff from the new Adams Avenue. Three basins with amended soils and impervious liners are being constructed to treat stormwater from the new interchange ramps.	2020
Section BRI (Betsy Ross Interchange Area)		
BR0	Construction is underway. PWD sanitary and storm sewer culverts will be relocated. Stormwater runoff from the reconstructed portions of the highway and ramps is being treated through the use of under-drained bioretention and water quality units then directly discharged to Frankford Creek, removing the drainage area from the CSO system.	2017 (est. completion)
BR2	Basins built in BR0 will be reused in BR2 and some new basins will be installed. The new basins will be sized for future phases as well. All basins will have forebays, be non-infiltrating, and have amended soils and underdrains with a rock layer and liner. The PennDOT-owned outfall locations in BR2 will be reconstructed in the same locations as existing outfalls.	2018

Section AFC (Ann Street to Frankford Creek Area)		
AF1	Improvements to Melvale Street will be managed by two infiltration trenches that will be owned and maintained by PWD.	2018 (est. completion)
Section GIR (Girard Avenue Interchange Area)		
GR0	Storm sewer systems and swales were constructed in conjunction with the temporary improvements that constituted this section; however, portions will be removed or adjusted during later phases of construction. A net increase in impervious coverage (and runoff volume) was avoided by re-grading, seeding, and stabilizing areas where pavement was removed along northbound Aramingo Avenue.	
GR3/GR4	One separate sewer outfall was constructed in Cumberland Street. In Dyott Street, a pipe was constructed and will tie in below the regulating chamber. A sewer was found in the old Leigh Avenue right of way and rehabilitated to separate a portion of the highway drainage. Stormwater will be managed in GR3 using bioretention basins, infiltration basins, and detention basins.	2019 (est. completion)
Sector B – Race Street to Girard Point Bridge (Airport Side)		**Planning Study Underway**

5.2 Incentives for Private Property Owners to Implement Green Stormwater Infrastructure

Stormwater Management Incentives Program & Greened Acre Retrofit Program

PWD offers incentives to private property owners to implement stormwater management practices on existing properties that reduce stormwater pollution to the City's sewers and surrounding waterways and enhance water quality in the region's watersheds. PWD, in partnership with the Philadelphia Industrial Development Corporation, created the Stormwater Management Incentives Program (SMIP) in FY12and the Greened Acre Retrofit Program (GARP) in FY15 to reduce the cost for qualified non-residential PWD customers and contractors to design and install stormwater best management practices. Completed SMIP and GARP projects are listed in Table 2 of **Appendix 3**. **Figure 5-2** displays the completed Green Infrastructure installed through Incentivized Retrofits. A summary of constructed Greened Acres from SMIP and GARP projects by watershed are listed below in **Table 5-3.**

Table 5-3: Cumulative Green Acres by Watershed through SMIP and GARP

Watershed	Darby-Cobbs	Delaware	Tookany-Tacony/ Frankford	Schuylkill	Total
SMIP/GARP Greened Acres	0.17	96.4	93.52	111.19	**301**

Stormwater Pioneers

In 2014, PWD started Stormwater Pioneers, a recognition program for excellence in design and construction of stormwater management practices on private property. In 2017, PWD began the planning process to honor a third Stormwater Pioneer, the Children's Hospital of Philadelphia Buerger Center. The Buerger Center project was required to meet the Regulations, but the hospital chose to creatively integrate stormwater management into the site through two green roof areas which direct access to outdoor space for staff and patients. In conjunction with the green roof are three subsurface tanks which store stormwater for slow release back into the sewer.

The Stormwater Pioneers program brings elected officials, community members, private landowners and department officials together to recognize the importance of stormwater management on private property. In addition to coordinating a press event to celebrate each Stormwater Pioneer, PWD also creates a short video and written case study about each project to help other developers and business owners learn from these successful case studies. Visit www.phillywatersheds.org/stormwaterpioneers for more information.

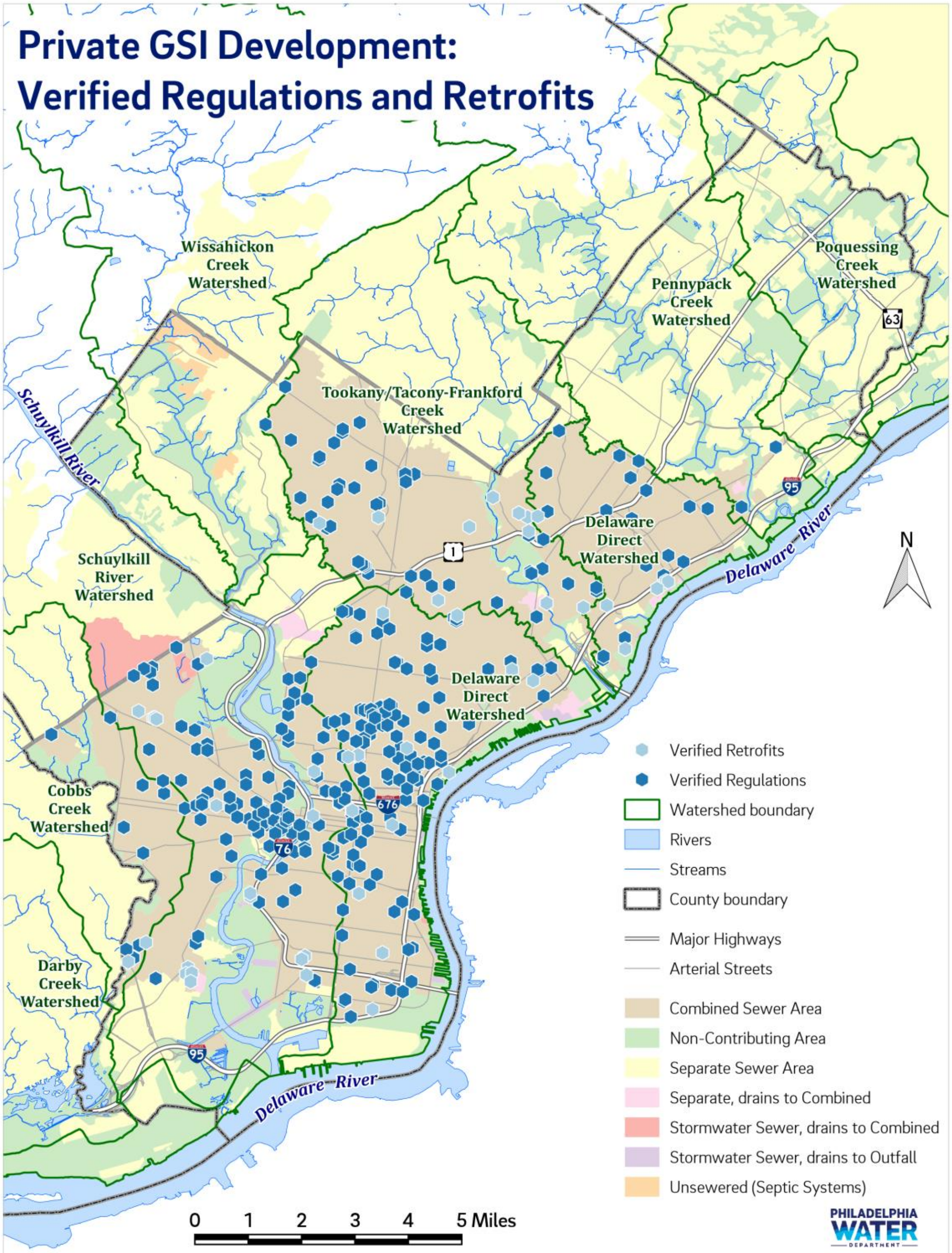

Figure 5-2: Regulations and Retrofit GSI projects

5.3 Maintenance of Private Facilities

To ensure ongoing SMP maintenance of private facilities constructed through the Stormwater Management Regulations or SMIP and GARP, PWD continues to utilize the following: executing Operation & Maintenance Agreements, conducting post-construction maintenance inspections, utilizing enforcement tools, and stormwater credits.

In FY17, 11 projects were brought back into compliance in the combined sewer areas of the city using the protocols described below. PWD will continue to work with property owners to ensure that SMPs are inspected and maintained in accordance with Regulations and recorded O&M agreements.

An Operation & Maintenance Agreement between the property owner and PWD is recorded against the property prior to the issuance of a Post Construction Stormwater Management Plan Approval by PWD. These agreements outline the SMP(s) on the private site and stipulate maintenance requirements. The agreements also include language granting PWD the authority to inspect on-site SMPs and even perform maintenance on behalf of the property owner if necessary. PWD also maintains a comprehensive operations and maintenance manual for SMPs geared toward private development users, available at: http://www.phila.gov/water/PDF/Retrofit-O.M.Manual.pdf.

Post-construction maintenance inspections of private facilities were conducted through the reporting period. PWD relies on specialized inspection techniques as well as visual inspections to assess the performance of private SMPs. The inspections conducted to date have identified the most effective methods and technologies, including closed-circuit television, ground penetrating radar, surveys of critical system elevation points, confined space, pole-mounted camera photography, and visual and wet weather inspections. In FY17, PWD performed 76 post-construction inspections in the combined sewer areas of the city. PWD will continue to evaluate and refine post-construction inspection protocols.

Utilizing **enforcement tools**, PWD will issue notification to the property owner if an SMP is found to be insufficiently maintained. This notification will include a description of any issues identified and a timeline for achieving compliance. The City is authorized to compel maintenance of SMPs on private property under the Philadelphia Code and PWD Regulations. Development sites that are subject to PWD's stormwater regulations, as well as properties that have SMPs funded by SMIP and GARP, are required to maintain the SMP(s) to function as designed. If this initial notification is unsuccessful at bringing action from the property owner, PWD can compel compliance through a number of enforcement tools, including notice of violation, fines, court action, and/or a nuisance abatement and lien by the City. For non-compliant projects, PWD will also suspend any applicable stormwater billing credits, if the required maintenance is not performed.

Stormwater Credits

Non-residential property owners are eligible for stormwater credits, a direct reduction to the monthly stormwater charge, if they own and maintain stormwater management practices that reduce stormwater flows and volume to the City's sewer systems and surrounding waterways. Retrofit and development projects are eligible for credits against their stormwater charge upon completion of construction, and owners must renew their credits every 4 years. With the credits renewal application, owners provide maintenance logs and demonstrate that the SMPs continue to be functional. PWD approved or renewed 225 stormwater billing credit applications during the reporting period.

6.0 Data Collection and Analysis

6.1 Green Stormwater Infrastructure Post-Construction Monitoring

Proposed methodologies for the *Green City, Clean Waters* monitoring program were outlined in a revised CMP that was submitted on January 10, 2014 and approved on May 28, 2014 by PADEP.

Monitoring and testing green stormwater infrastructure is essential to evaluate its effectiveness in managing stormwater and reducing combined sewer overflows. PWD uses post-construction monitoring and post-construction testing at the SMP and system levels to ensure functionality, evaluate the performance of stormwater management practices and to provide information for improvements to design and maintenance. FY17 monitoring activities are described in detail in **Appendix 4 GSI Monitoring Status Report.** FY17 updates on non-green infrastructure components of the CMP can be referenced in **Section F.2 Step 1.b. of the Stormwater Management Program Annual Report.**

PWD has completed its five-year green stormwater infrastructure pilot program and results were reported in the Year 5 Evaluation and Adaptation Plan. Information on the selected sites, associated variables and results are available here:
http://phillywatersheds.org/doc/Year5_EAPCombinedAppendices_website.pdf

7.0 Public Outreach and Participation

The Philadelphia Water Department continues to enhance tools for engaging a broad range of stakeholders. In FY17, PWD engaged approximately 76,158 citizens through a variety of public education, outreach and participation initiatives. The following includes updates on current programs and projects.

7.1 Green Stormwater Infrastructure (GSI) Notification & Outreach Process for Green Programs

In FY17, public education and outreach for green stormwater infrastructure in Philadelphia's neighborhoods grew with the number of projects going into the ground. During FY17, approximately 3,646 representatives participated in 125 community meetings co-hosted with civic partners and events (such as tours, walks and festivals) to learn about green infrastructure projects and hold one-on-one conversations in neighborhoods across the city. Also, 888 residents attended Rain Check workshops and 961 green stormwater infrastructure tools were installed on private properties through Rain Check while 14 organizations participated in Soak It Up Adoption, where they helped maintain the public green stormwater infrastructure at 112 sites and remove 52,984.7 lbs. of residential waste from these locations.

Furthermore, approximately 69,980 people participated in the following education and outreach events that featured *Green City, Clean Waters* and/or urban waters themed content.

- Environmental education programming offered by PWD educators and Fairmount Water Works educators
- Environmental education programming offered by PP&R educators
- Environmental education and outreach programming offered in Philadelphia by the Tookany/Tacony-Frankford Watershed Partnership and Partnership for Delaware Estuary
- Environmental education and outreach by Wild West Philadelphia

It should be noted that the number of participants associated with Rain Check (which now includes Rain Barrels) and Soak It Up Adoption are reported on in more detail in Section 7.2 of this report.

7.2 Public Education and Outreach Programs

Philadelphia Water Department Master List

The Philadelphia Water Department Master List is the previously referenced *Green City, Clean Waters* Partners Master List, which is a distribution list of email addresses that gets updated after collecting contact information at public events and meetings hosted by PWD. Today, there are 15,242 active live entries on the list. This number reflects the number of individuals confirmed through the email management system as participants with accurate contact information and those specifically interested in receiving email updates and e-newsletters, regarding the Philadelphia Water Department special initiatives and events. Any contacts found to be redundant or nonresponsive were removed from the Master List in June 2015 and are not represented in this number.

Green City, Clean Waters Signage

PWD continued to develop the interpretive Green City, Clean Waters permanent signage, which included new designs, more fabrication and additional installation of the signage. This process also included site visits, coordination with property owners/partners, and promotion of the signage. To date, PWD has installed a total of 79 *Green City, Clean Waters* interpretive signs at 54 sites. For images of the installed signage, please visit:
https://www.flickr.com/photos/philadelphiawater/sets/72157654299547526

Stormwater Art

PWD uses design and art as one of many public engagement tools. Projects such as yarn bombing (temporary knitted yarn art) of stormwater tree trenches; rain barrel wrap original designs created by local students; and temporary public street art projects are examples of opportunities to engage residents through visual learning. In FY17, PWD and Mural Arts partnered with muralist, Paul Santoleri, on a mural for the Roxborough Pocket Park which demonstrates the power of de-paving in a community space. PWD and Mural Arts also worked with *Uncover the Green, 2016,* artists to develop their designs for fabrication-ready purposes. The goal is to place them on sidewalks either adjacent to green stormwater infrastructure; or use them as educational tool at meetings and events.

Figure 7-1: Early Design, Uncover the Green 2016, Paul Santoleri

Homeowner's Stormwater Handbook – Smart Stormwater Management: A How-to for Homeowners

In FY17, PWD and the Partnership for the Delaware Estuary distributed an updated version of the original Homeowners Guide to Stormwater Management to residents. This document includes tips and information that can guide homeowners on the latest tools and resources.

Soak It Up Adoption

In FY17, four new organizations were accepted into the Soak It Up Adoption program (Asociacion Puertorriquenos en Marcha, Empowered CDC, Greensgrow-West, and Tookany/Tacony Frankford-Friends of Vernon Park), creating a program comprised of 14 organizations with 49 individuals acting as Adoption representatives. Throughout the fiscal year, adoptees completed a number of community events highlighting their adopted infrastructure. These events included: guided tours, tabling sessions at local public events and presentations at civic association meetings. We are proud to note that this year represents a programmatic record for the amount of trash collected. Photos from Soak It Up events are available at the following links:

http://phillywatersheds.org/history-nature-and-green-stormwater-tools-tour-roxborough-gem-local-experts

http://phillywatersheds.org/adopters-welcome-new-green-roxborough

https://www.flickr.com/photos/philadelphiawater/sets/72157649212677496

https://www.flickr.com/photos/philadelphiawater/sets/72157648859945369

Table 7-1 Provides metrics used by PWD to track the Soak It Up Adoption program throughout FY17. These figures reflect the variety of adopted SMPs and the amount of trash collected.

Table 7-1: Soak It Up Adoption Pilot Program Metrics for the 2017 Reporting Year

Adoption Partner	Number of SMPs Adopted	*Amount of Residential Waste Collected in FY17 (LBS)
Asociacion Puertorriquenos en Marcha	15	357
East Falls Development Corporation	6	1,283
Empowered CDC	1	606
Frankford CDC	2	16,131
Greensgrow-West	13	182
NorthEast Treatment Center	6	4,973
Newbold CDC	9	12,089
Northern Liberties Neighbors Association	11	521
New Kensington CDC	9	553
Passyunk Square Civic Association	12	4,634
Southwest CDC	14	3,761
TTF-Friends of Vernon Park	1	107
Upper Roxborough Conservancy	2	856
Urban Tree Connection	11	6,934
TOTALS:	**112 SMPs**	**52,987 lbs**

*All Adoption partners collect trash in 55 gallon bags and the total pounds are converted from this base unit

Urban Waters Curriculum

This year, the Fairmount Water Works (FWW) completed the development of their “Understanding the Urban Watershed" Curriculum for middle school, comprised of 6 thematic Units, developed by

Philadelphia teachers and piloted in their classrooms. The Curriculum is the culmination of a three-year project to develop integrated and hands-on learning experiences for students in Philadelphia schools to connect them to their local watershed. 19 teachers participated in piloting and nearly 60 hours of full-day professional development sessions starting in October that concluded with a Student Summit for hundreds of 6th, 7th and 8th graders in early June. During the full day (6-hour) professional development sessions, teachers were provided with background content knowledge, collaborative lesson planning time, and group demonstrations of ideas and activities to be piloted in the classroom.

GreenSTEM Network

The GreenSTEM Network continues to connect students to the environment through hands-on science and technology projects involving environmental monitoring and data collection. In FY17, PWD staff worked with 8 different student groups from a variety of schools and grade levels. The projects ranged from one-day workshops to weekly, year-round instruction centered on coding, sensor technology and robotics.

7.3 Green Homes Initiatives

Green Homes Technical Evaluation and Improvement

PWD is piloting, monitoring and evaluating residential green tools and tracking technology improvements for these tools. In FY17, several residential tools were evaluated including new designs for rain barrels and cisterns, and vertical planted systems that manage stormwater.

Downspout Planter Technology Improvements

PWD finalized the design for a metal downspout planter made from commercially available stock tanks. This planter can manage more stormwater at a lower cost. PWD tested the planter throughout the year and will plan to distribute the planter through the Rain Check program.

The Department has also continued to evaluate other residential stormwater tools including modified rain barrels, cisterns and planters for future use through the Rain Check program.

Figure 7-2: New Metal Downspout Planter

Rain Check Program

In FY17, the number of participants in the Rain Check program increased considerably and PWD made significant improvements in program management and data tracking. In addition, PWD recruited and provided free training for a number of new landscape and hardscape companies to install Rain Check stormwater tools. More information on the program is available at: http://www.phillywatersheds.org/raincheck

Table 7-2: Rain Check Program Metrics

Rain Check Metrics	FY 17
Workshops Hosted	72
Workshop Attendees*	888
Contractor Training Participants	91
Rain Barrel Installations**	750
Downspout Planter Installations**	121
Rain Garden Installations**	17
Permeable Paving Installations**	63
Depaving Projects	10

***Workshop Attendees**: This represents the total number of people who attended a Rain Check workshop. These hour-long educational workshops are mandatory for participation in Rain Check. Some FY17 attendees had their tools installed in FY17 but others will have their tools installed in FY18.
****Installations Completed**: PWD installed 750 rain barrels and 211 other stormwater tools by the end of FY17. For some participants who signed up this year, the installation of their tools is still in progress.

Appendix 1

Completed Public Green Stormwater Infrastructure Projects

Public Green Infrastructure Reporting Metrics

Table 1: Public Project Tracking Metrics and Reporting Format

Public Project Tracking Metrics											
Project Name	**Status**	**Storage Volume (cf)**	**New Trees**	**Drainage Area (sq. ft)**	**Greened Acres (acre-inch)**	**SMP Type(s)**	**Program**	**Green Construction Cost****	**Partner(s)**	**Watershed**	**Last Maintained Date**

Table 2: Public Reporting Metric Definitions

Metric	Definition
Project Name	For PWD initiated and/or public property project, the project name typically is the name of the associated school, park, playground, or streets. For Privately Initiated projects, the project name is derived from the property owner and date of submission.
Status	Current project status. Statuses include: In Design, In Projects Control (Under Contract Management), In Construction, and Construction Complete. The category for private and incentivized projects is verified as only completed projects are reported.
Storage Volume	The volume of runoff managed by the system. For all systems, the entire depth of the system is counted, except for detention/slow-release systems that are completely lined with an impermeable liner. For those systems, only the depth above the orifice is counted.
New Trees	Total number of new trees planted in association with a system. This number also includes non-SMP trees, which are trees planted as part of a project but are not part of a stormwater management system.
Drainage Area	Area, in square footage, of impervious and/or pervious surface(s) flowing into a system(s) and SMP(s).
Greened Acres (GAs)	Greened Acres is a metric that accounts for the conversion of a highly impervious urban landscape through the implementation of projects that reduce storm water runoff. A Greened Acre is described as an acre of impervious cover connected (tributary) to a combined sewer that subsequently is reconfigured to utilize green stormwater infrastructure to manage at least one inch of stormwater runoff. If storage is provided, systems can credit up to two inches of the storm water runoff from that acre. The best available Greened Acre value will be pulled from the database for regulatory reporting.
Program	Current public programs which a greened acre can be assigned to include: • Alleys/Driveways • Campuses • Facilities • Industry and Business • Open Space • Parking • Schools • Stormwater Planning Districts • Streets • Vacant Land

Metric	Definition
Construction Cost	Projects with a status of Construction Complete will have a finalized cost of construction provided.
Partner(s)	External entities involved in a project.
Watershed	The City of Philadelphia watershed where the project is located. Four of the City's seven watersheds fall at least partially within the combined sewer area. These watersheds are: • Cobbs Creek Watershed • Delaware Direct Watershed • Tookany/Tacony-Frankford Creek Watershed • Schuylkill River Watersheds
Stormwater Management Practice (SMP) Type	A Stormwater Management Practice is a technique that controls the rate and volume of stormwater runoff and/or improves runoff water quality. Multiple SMP types can be grouped together in a larger GSI system. The SMP types were originally defined in Table 2-1 of the IAMP.

Table 3: Public SMP Definitions

Public SMP Type Definitions	
Field/Metric	**Definition/Purpose**
Basin*	A stormwater basin is a basin or depression that is vegetated with mowed grass. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Blue Roof	A blue roof is a storage system designed into a roof surface such that the roof retains stormwater. Blue roofs are designed to reduce the rate of stormwater runoff.
Bump-out*	A stormwater bump-out is a vegetated curb extension that intercepts gutter flow. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Cistern/Rain Barrel	A cistern/rain barrel is a tank or storage receptacle that captures and stores runoff and can thereby reduce runoff volume. The stored water may be used to serve a variety of non-potable water needs (e.g., irrigation).
Depaving	Depaving projects remove existing impervious pavement and restore the surface with grass, other types of vegetation, or loose materials (stone, mulch, etc.) such that the area can thereafter be considered pervious area. Depaving projects remove contributing impervious area from the sewer system.
Drainage Well	A stormwater drainage well is manhole structure designed to manage stormwater runoff by receiving stormwater from upstream collection and pretreatment systems and then discharging the stormwater into the surrounding soils through perforations in the manhole. It is designed to infiltrate stormwater.
Green Gutter	A green gutter is a narrow and shallow landscaped strip along a street's curb line. It is designed to manage stormwater runoff by placing the top of the planting media in the green gutter lower that the street's gutter elevation allowing stormwater runoff from both the street and sidewalk to flow directly into the green gutter. It is designed to slow and infiltrate stormwater.

Public SMP Type Definitions	
Green Roof	A green roof is a vegetated surface installed over a roof surface.
Infiltration Column	An infiltration column is a stone column that extends below the bottom of the surrounding GSI system in order to promote infiltration in more permeable sub-grades that exist at greater depths.
Infiltration/Storage Trench	An infiltration/storage trench is a subsurface structure designed to detain and release stormwater runoff and/or infiltrate where feasible.
Non-SMP Tree	A non-SMP tree is a planted tree that does not have stormwater directed to it.
Pervious Paving	Pervious paving is a hard permeable surface commonly composed of concrete, asphalt or pavers. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Planter*	A stormwater planter is a structure filled with soil media and planted with vegetation or trees. It is designed to detain and release stormwater runoff and/or infiltrate where feasible. Planters often contain curb edging or fencing as barrier protection around the planter.
Rain Garden	A rain garden is a shallow vegetated area designed to detain and release stormwater runoff and/or infiltrate where feasible. Rain gardens may also be referred to as bio-infiltration basins and bio-retention basins. They are typically integrated into landscape features (e.g. median strips) and are non-mowed areas.
Stormwater Tree	A stormwater tree is planted in a specialized tree pit that has stormwater runoff directed to its pit. It is designed to manage stormwater by placing the top of the planting media in a tree pit lower than the street's gutter elevation and connecting the tree pit to an inlet which directs runoff from the street into the tree pit. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Swale	A swale is a channel designed to convey stormwater. It can be designed to attenuate and/or infiltrate where feasible.
Tree Trench*	A stormwater tree trench is a subsurface infiltration/storage trench that is planted with trees. They are typically linear features that are constructed between the curb and the sidewalk. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Wetland*	A stormwater wetland is a vegetated basin designed principally for pollutant removal. It typically holds runoff for periods longer than 72 hours and may include a permanent pool. Wetlands can also detain and release stormwater runoff.

*The word 'stormwater' was previously included in these types but was removed because it was redundant.

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acre (acre-inches)	SMP Types	Program	Green Construction Cost**	Partner(s)	Watershed
Ogden St and Ramsey St (West Mill Creek Recreation Center)	1/1/2006	830	4	17345	0.229	Stormwater Tree Trench, Pervious Pavement	Streets	Partner-project, no capital investment by PWD	Pennsylvania Department of Environmental Protection, Pennsylvania Horticulture Society, Philadelphia Department of Recreation	Schuylkill
West Mill Creek Farm Swales	5/1/2006	360	4	13942	0.099	Rain Garden, Swale	Streets	$57,850	Pennsylvania Department of Environmental Protection, Philadelphia Water Department, Pennsylvania Horticulture Society	Schuylkill
Mill Creek Playground Basketball Court	6/2/2006	1870	0	9350	0.429	Pervious Pavement	Open Space	$33,001	Councilwoman Blackwell, Pennsylvania Department of Environmental Protection, Philadelphia Department of Parks & Recreation	Schuylkill
47th & Grays Ferry	4/1/2007	1260	7	19200	0.347	Rain Garden	Vacant Land	$16,000	Pennsylvania Department of Environmental Protection, Pennsylvania Horticulture Society, University City Green	Schuylkill
Cliveden Park	10/1/2007	4563	0	52355	1.257	Rain Garden	Open Space	$175,000	Pennsylvania Department of Environmental Protection, Pennsylvania Horticulture Society, Philadelphia Department of Parks & Recreation	TTF
Clark Park Basketball Court	11/1/2007	3080	0	32517	0.848	Infiltration Storage Trench	Open Space	Cost not available	Pennsylvania Department of Environmental Protection, Pennsylvania Department of Conservation & Natural Resources, Philadelphia Department of Parks & Recreation	Schuylkill
Jefferson Square Raingarden	6/1/2008	347	3	3565	0.096	Rain Garden	Streets	Cost not available		Delaware
McMahon St (Waterview Recreation Center)	7/1/2008	1835.84	8	13368	0.506	Stormwater Tree Trench, Stormwater Planter, Pervious Pavement	Streets	$50,000	Pennsylvania Horticulture Society, Philadelphia Department of Recreation	TTF

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acre (acre-inches)	SMP Types	Program	Green Construction Cost**	Partner(s)	Watershed
Liberty Lands	6/1/2009	849	24	8000	0.234	Rain Garden	Open Space	$22,236	Northern Liberties Neighborhood Association, Pennsylvania Department of Environmental Protection, Pennsylvania Horticulture Society, Philadelphia Department of Parks & Recreation	Delaware
Sepviva St from Susquehanna Ave to Dauphin St*	1/27/2010	1601.2	17	27425	0.441	Infiltration Storage Trench, Storm Water Tree	Streets	$209,000		Delaware
Columbus Square	5/26/2010	922	0	7908	0.25	Stormwater Planter, Infiltration Storage Trench	Streets	$65,506	Department of Public Property, Department of Recreation, Friends of Columbus Square	Delaware
Shissler Playground	10/10/2010	3032.6	6	17600	0.808	Stormwater Tree Trench	Open Space	$50,000	New Kensington Community Development Corporation, Pennsylvania Horticulture Society, Philadelphia Department of Parks & Recreation	Delaware
Lancaster Ave from N 58th St to N 63rd St	11/1/2010	6091.1	17	41671.24	1.646	Stormwater Tree Trench, Stormwater Bump-out, Rain Garden, Swale	Streets	Partner-project, no capital investment by PWD	Environmental Protection Agency, Philadelphia Department of Commerce, Philadelphia Industrial Development Corporation	Schuylkill
7th St, 8th St, and Cumberland St (Hartranft School)*	11/10/2010	3556	6	44524	0.979	Stormwater Tree Trench	Streets	$402,396.00	Pennsylvania Horticulture Society	Delaware
Palmer St from Frankford Ave to Blair St (Shissler Playground)*	11/10/2010	1272.8	5	9250	0.343	Stormwater Tree Trench	Streets		New Kensington Community Development Corporation, Pennsylvania Horticulture Society	Delaware
16th St between Passyunk Ave and Jackson St*	11/10/2010	609.4	8	14735	0.168	Stormwater Tree Trench	Streets			Schuylkill
Rockland St*	4/8/2011	6976.2	29	178850	1.921	Infiltration Storage Trench, Storm Water Tree	Streets	$924,000		TTF

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Bureau of Laboratory Services*	5/14/2011	4423.2	13	52339	0.374	Stormwater Tree Trench, Stormwater Planter, Infiltration Storage Trench	Streets	$112,477		TTF
Benjamin Franklin Parkway from 21st St to 23rd St	6/1/2011	3561	0	29605	0.981	Infiltration Storage Trench	Streets	$215,600	Fairmount Park Commission	Schuylkill
Percy St from Catharine St to Christian St	7/18/2011	657	0	4740	0.181	Pervious Pavement	Streets	$48,283		Delaware
Belfield Ave from Chew Ave to Walnut Ln*	9/23/2011	5846	24	68465	1.61	Stormwater Tree Trench	Streets	$313,385	Tookany/Tacony-Frankford Watershed Partnership	TTF
Montgomery Ave, Shissler Playground*	11/4/2011	3385.86	3	49120	0.932	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench	Streets	$173,494	Department of Recreation, New Kensington Community Development Corporation, Pennsylvania Horticulture Society	Delaware
Reese St	11/5/2011	646	4	4829	0.178	Stormwater Tree Trench	Streets	Partner-project, no capital investment by PWD	Pennsylvania Horticulture Society	Delaware
Earl St (Hetzell Playground)	11/5/2011	768	4	6930	0.212	Stormwater Tree Trench	Streets	Partner-project, no capital investment by PWD	Pennsylvania Horticulture Society	Delaware
8th St	11/5/2011	1088	4	9361	0.3	Stormwater Tree Trench	Streets	Partner-project, no capital investment by PWD	Pennsylvania Horticulture Society	Delaware
Front St	11/5/2011	1047	6	17972	0.288	Stormwater Tree Trench	Streets	Partner-project, no capital investment by PWD	Pennsylvania Horticulture Society	Delaware

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9th St	11/5/2011	1029	4	9100	0.283	Stormwater Tree Trench	Streets	Partner-project, no capital investment by PWD	Pennsylvania Horticulture Society	Delaware
Diamond St	11/5/2011	1292	4	12538	0.356	Stormwater Tree Trench	Streets	Partner-project, no capital investment by PWD	Pennsylvania Horticulture Society	Delaware
Madison Memorial Park	12/16/2011	402	13	7015	0.111	Infiltration Storage Trench	Open Space	Partner-project, no capital investment by PWD	City Play, Digsau, Northern Liberties Neighborhood Association, Philadelphia Department of Parks & Recreation	Delaware
Eadom Parking Lot	5/2/2012	11243	20	85827	2.871	Rain Garden	Parking	All done in house by PWD crews; No bid costs.	Department of Public Property	Delaware
Womrath Park*	9/27/2012	3539	7	46080	0.975	Rain Garden, Infiltration Storage Trench, Swale	Open Space	$540,071	Tookany/Tacony-Frankford Watershed Partnership, Philadelphia Department of Parks & Recreation, Frankford Civic Association	TTF
Herron Playground	10/2/2012	2689	12	14480	0.517	Rain Garden, Infiltration Storage Trench, Pervious Pavement	Open Space	$190,959	Philadelphia Capital Program Office, Philadelphia Department of Parks & Recreation	Delaware
Baltimore Ave Island from S 60th St to Wharton St*	11/23/2012	3251.22	5	22684	0.895	Stormwater Tree Trench	Streets	$951,600	Pennsylvania Environmental Council	Cobbs-Darby
52nd St, 53rd St, Pine St, and Osage St (Samuel B. Huey Elementary School)*	11/23/2012	4221.82	15	34558	1.163	Stormwater Tree Trench	Streets		Pennsylvania Environmental Council	Cobbs-Darby

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Christian St, Webster St, 56th St (Christy Recreation Center)*	11/23/2012	5456.14	19	43007	1.503	Stormwater Tree Trench	Streets		Department of Recreation, Pennsylvania Environmental Council	Cobbs-Darby
William Harrity School*	11/23/2012	2804.32	11	19364	0.771	Stormwater Tree Trench	Streets			Cobbs-Darby
60th St, 61st St, Cedar Ave, and Hazel Ave (Bryant Elementary School)*	11/23/2012	6420.64	16	45432	1.768	Stormwater Tree Trench	Streets		Pennsylvania Environmental Council	Cobbs-Darby
Harper's Hollow Park*	12/4/2012	2996	0	24542	0.825	Stormwater Basin	Open Space	$474,000	Philadelphia Department of Parks & Recreation	TTF
Wakefield Park*	12/4/2012	4567	0	38710	1.258	Rain Garden	Open Space		Philadelphia Department of Parks & Recreation	TTF
21st St from Venango to Pacific	12/6/2012	1497.05	6	15237	0.412	Stormwater Tree Trench	Streets	$146,030		Delaware
58th St, 59th St, and Walnut St (Sayre High School)*	12/13/2012	7551.22	42	64720	2.08	Stormwater Tree Trench, Infiltration Storage Trench	Streets	$1,658,770.22	Pennsylvania Environmental Council	Cobbs-Darby
Haverford Ave, 57th St and Vine St (Shepard Recreation Center)*	12/13/2012	10254.63	27	64162	2.605	Stormwater Tree Trench, Stormwater Planter, Stormwater Bump-out	Streets		Pennsylvania Environmental Council	Schuylkill
Pine St, Frazier St, and 57th St (Andrew Hamilton School)*	12/13/2012	3913.02	14	44332	1.078	Stormwater Tree Trench, Stormwater Planter	Streets		Pennsylvania Environmental Council	Cobbs-Darby

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56th St, 57th St, Race St, and Vine St (Daroff School)*	12/13/2012	9727.5	39	79396	2.679	Stormwater Tree Trench, Stormwater Planter, Stormwater Bump-out	Streets		Pennsylvania Environmental Council	Cobbs-Darby
Belgrade St and Marlborough St	12/20/2012	1263	1	14700	0.348	Infiltration Storage Trench	Streets	$26,835.00		Delaware
Norris St, Van Pelt St, and Berks St (Frederick Douglass Elementary School)*	12/24/2012	4044.6	20	32100	1.114	Stormwater Tree Trench	Streets	$604,124.21		Delaware
Philadelphia Military Academy*	12/24/2012	1348	14	20275	0.371	Stormwater Tree Trench	Streets			Delaware
22nd St, Cecil B Moore Ave (Martin Luther King Recreation Center)*	12/24/2012	6106.1	10	42040	1.634	Stormwater Tree Trench	Streets			Delaware
Berks, Mascher (Towey Recreation Center)*	12/24/2012	3242.1	5	20800	0.878	Stormwater Tree Trench	Streets		Fairmount Park Commission, Pennsylvania Horticulture Society	Delaware
Sepviva	12/27/2012	1005.6	35	0	0.277	Storm Water Tree	Streets	$155,966		Delaware
58th St Connector (Bartram's Garden, Francis Myers Rec, Cobbs Creek Park)	1/15/2013	4825	12	46000	1.329	Stormwater Tree Trench, Rain Garden	Streets	$354,206		Cobbs-Darby, Schuylkill

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4th St and Cambridge St (Bodine High School)*	2/8/2013	2592.67	11	33496	0.714	Stormwater Tree Trench, Stormwater Planter, Infiltration Storage Trench	Streets	$454,930	City Play, Mural Arts Program, Northern Liberties Neighborhood Association	Delaware
3rd St and Fairmount Ave Intersection*	2/8/2013	1463	7	15630	0.403	Stormwater Tree Trench, Stormwater Bump-out	Streets		Northern Liberties Neighborhood Association	Delaware
Passyunk Ave	3/5/2013	10468	0	56500	1.019	Stormwater Bump-out	Streets	Partner-project, no capital investment by PWD	Philadelphia Streets Department	Schuylkill
Welsh School*	4/23/2013	1816.8	7	23419	0.5	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench	Streets	$691,409	Pennsylvania Horticulture Society	Delaware
Wakisha Charter School*	4/23/2013	3076.8	19	31812	0.847	Stormwater Tree Trench	Streets		Department of Recreation	Delaware
Diamond St from 25th St to Stillman St*	4/23/2013	973.6	7	9178	0.268	Stormwater Tree Trench	Streets		Pennsylvania Horticulture Society	Delaware
Poplar St from 8th St to Franklin St*	4/23/2013	1034	4	8242	0.285	Stormwater Tree Trench	Streets		Pennsylvania Horticulture Society	Delaware
10th St and Jefferson St (Dendy Recreation Center)*	4/23/2013	2312.6	7	24057	0.637	Stormwater Tree Trench	Streets		Department of Recreation	Delaware
Woolston Ave, Walnut Ln, Rodney St (Simons Recreation Center)*	5/10/2013	567.6	32	21254	0.156	Stormwater Tree Trench	Streets	$1,130,670	Department of Recreation	TTF

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acre (acre-inches)	SMP Types	Program	Green Construction Cost**	Partner(s)	Watershed
Morris Leeds Middle School*	5/10/2013	35279.82	80	229748	8.873	Stormwater Tree Trench	Streets			TTF
22nd, Carpenter, Montrose (Julian Abele Park)*	5/16/2013	3565.9	7	22487	0.982	Stormwater Tree Trench	Streets	$1,335,859	Department of Public Property	Schuylkill
Oakford, 30th (Donald Finnegan Playground)*	5/16/2013	3728	23	29513	1.027	Stormwater Tree Trench	Streets			Schuylkill
24th St and Wolf St (Smith Playground)*	5/16/2013	8932.64	18	55510	2.46	Stormwater Tree Trench	Streets			Schuylkill
23rd St, 24th St, and Jackson (E.H. Vare Middle School)*	5/16/2013	4471.26	20	32228	1.231	Stormwater Tree Trench	Streets			Schuylkill
Stephen Girard School*	5/16/2013	1604	6	9315	0.428	Stormwater Tree Trench	Streets			Schuylkill
Southwark School*	5/16/2013	2029	4	16658	0.559	Stormwater Tree Trench	Streets			Delaware
Philadelphia Zoo	5/29/2013	6510.16	5	52446	1.793	Stormwater Planter, Rain Garden, Infiltration Storage Trench	Streets	$357,687	Philadelphia Department of Parks & Recreation, Philadelphia Zoo	Schuylkill
Penn Street Trail	6/13/2013	2265	25	38203	0.47	Rain Garden	Streets	Partner-project, no capital investment by PWD	DRWC	Delaware
33rd & Dauphin SEPTA Bus Stop Loop	7/31/2013	481.17	0	3750	0.133	Stormwater Tree Trench, Infiltration Storage Trench	Streets	Partner-project, no capital investment by PWD	Southeastern Transportation Authority	Schuylkill
George W. Nebinger School	9/8/2013	7364	10	46815	0.87	Rain Garden, Infiltration Storage Trench, Pervious Pavement, Swale	Schools	$361,073	Environmental Protection Agency	Delaware

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Preston St, 41st St, Brown St, and Aspen St (Belmont School)*	9/9/2013	6497	29	47758	1.789	Stormwater Tree Trench	Streets	$1,547,000		Schuylkill
49th St, Parrish St, and Ogden St (James Rhoads School)*	9/9/2013	3614	13	24384	0.995	Stormwater Tree Trench	Streets			Schuylkill
Sister Clara Muhammad School*	9/9/2013	2933	15	26407	0.808	Stormwater Tree Trench	Streets			Schuylkill
47th St, 48th St, Wyalusing Ave (Muhammed Square)*	9/9/2013	5675	39	57043	1.563	Stormwater Tree Trench	Streets			Schuylkill
53rd St and Peach St (Mastery Charter School)*	9/9/2013	2712	4	23751	0.747	Stormwater Tree Trench	Streets			Schuylkill
Kenmore Rd, Haddington St, and Atwood Rd (Cassidy Elementary School)*	9/9/2013	5776	9	42141	1.591	Stormwater Tree Trench	Streets			Cobbs-Darby
62nd St and Lebanon (Overbrook Elementary)*	9/9/2013	3189	3	26530	0.878	Stormwater Tree Trench	Streets			Schuylkill
Old Cathedral Cemetary*	9/9/2013	2921	12	25301	0.804	Stormwater Tree Trench	Streets			Schuylkill
12th St and Reed St (Columbus Square)*	9/17/2013	1976.82	0	19690	0.544	Rain Garden, Infiltration Storage Trench	Streets	$873,261	Department of Recreation, Passyunk Square Civic Association	Delaware

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12th St from Dickinson St to Tasker St*	9/17/2013	2930.17	5	24020	0.807	Stormwater Tree Trench, Stormwater Planter	Streets		Passyunk Square Civic Association	Delaware
10th St from Wilder St to Reed St*	9/17/2013	1111.8	5	9400	0.306	Stormwater Tree Trench	Streets		Department of Recreation, Passyunk Square Civic Association, South Philadelphia Older Adult Center	Delaware
18th St, 19th St, Ellsworth St, and Washington Ave (Chew Playground)*	9/17/2013	5196.94	13	41940	1.419	Stormwater Tree Trench, Stormwater Bump-out	Streets		Department of Recreation	Delaware,Schuylkill
Passyunk Ave from Dickinson St To Reed St*	9/17/2013	1353.56	0	11620	0.373	Stormwater Planter, Infiltration Storage Trench	Streets		Department of Recreation,Passyunk Square Civic Association, South Philadelphia Older Adult Center	Delaware
Thompson St and Columbia Ave*	9/20/2013	3921.08	4	34905	1.08	Stormwater Tree Trench, Stormwater Bump-out, Infiltration Storage Trench	Streets	$580,829	New Kensington Community Development Corporation, Pennsylvania Horticulture Society	Delaware
Trenton Ave and Norris St*	9/20/2013	3866.11	1	30943	1.065	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench	Streets		New Kensington Community Development Corporation, Pennsylvania Horticulture Society	Delaware
Bridesburg Recreation Center/Bridesburg School*	9/30/2013	7436.23	3	51638	1.96	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench	Streets	$1,607,932.00	Philadelphia Department of Parks & Recreation, Tacony Civic Association	Delaware
White Hall Commons/ Carmella Playground/ Gambrell Recreation Center/Warren G Harding School*	9/30/2013	12713.61	13	88542	3.39	Stormwater Tree Trench	Streets		Tacony Civic Association	Delaware

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Hegerman St, Magee Ave, and Hellerman St (Dorsey Playground)*	9/30/2013	5752	35	35604	1.56	Stormwater Tree Trench	Streets		Tacony Civic Association	Delaware
Hellerman St, Cottage St, and Levick St (Roosevelt Playground)*	9/30/2013	6757	42	55471	2.21	Stormwater Tree Trench, Stormwater Planter, Infiltration Storage Trench	Streets		Roosevelt Playground Park Advisory Council, Tacony Civic Association	Delaware
Magnolia Cemetery*	9/30/2013	1968.4	2	11861	0.542	Stormwater Tree Trench	Streets		Tacony Civic Association	Delaware
18th St, 19th St, and Bigler St (Barry Playground)*	10/14/2013	16143.5	36	108972	4.165	Stormwater Tree Trench	Streets	$975,008	Department of Recreation	Schuylkill
13th St, Porter St, and Moyamensing Ave (A.S. Jenks School)*	10/22/2013	2572.75	18	22520	0.709	Stormwater Tree Trench, Infiltration Storage Trench	Streets		Lower Moyamensing Civic Association	Delaware
4th St, 5th St, Federal St, and Washington Ave (Sacks Playground)*	10/22/2013	6569.25	12	47775	1.809	Stormwater Tree Trench	Streets	$1,107,760		Delaware
Smith Elementary School*	10/22/2013	2905.3	20	23700	0.8	Stormwater Tree Trench	Streets			Schuylkill
St Thomas Aquinas School*	10/22/2013	4723	19	42170	1.301	Stormwater Tree Trench, Infiltration Storage Trench	Streets			Schuylkill
Franklin St from Diamond St to Norris St	10/24/2013	7215	35	62625	1.987	Stormwater Tree Trench	Streets	$184,925		Delaware

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Blue Bell Inn Triangle Park*	10/31/2013	2189	6	25911	0.603	Rain Garden	Open Space	$278,349	Fairmount Park Commission, Pennsylvania Horticulture Society, Philadelphia Department of Parks & Recreation	Cobbs-Darby
Little Sisters of the Poor*	1/13/2014	9885	33	75556	2.722	Stormwater Tree Trench	Streets	$1,232,000	Snyderville Community Development Corporation	Schuylkill
57th St and Pentridge St (Longstreth School)*	1/13/2014	4488	13	35058	1.236	Stormwater Tree Trench, Stormwater Planter	Streets		Snyderville Community Development Corporation	Cobbs-Darby
McCreesh Playground / Catharine Elementary School*	1/13/2014	8287	12	62951	2.269	Stormwater Tree Trench, Infiltration Storage Trench	Streets		Snyderville Community Development Corporation	Cobbs-Darby
Springfield Ave and Cobbs Creek Island*	1/13/2014	3312	6	33640	0.912	Rain Garden, Infiltration Storage Trench	Streets		Snyderville Community Development Corporation	Cobbs-Darby
Chalmers (29th and Chalmers Playground)*	4/25/2014	3353	5	27710	0.923	Stormwater Tree Trench, Stormwater Bump-out	Streets	$612,155	Philadelphia Department of Parks & Recreation	Delaware
27th St from Indiana to Toronto*	4/25/2014	1189.35	2	9000	0.328	Stormwater Tree Trench	Streets		Philadelphia Department of Parks & Recreation	Delaware
William Cramp School*	4/25/2014	4880.35	11	36565	1.344	Stormwater Tree Trench	Streets			Delaware
Rosehill St (Barton School)*	4/25/2014	4884.55	5	38500	1.345	Stormwater Tree Trench	Streets			TTF
William Dick Elementary	6/13/2014	8738.01	0	65171	2.406	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench	Schools	$207,000	Philadelphia School District, Philadelphia Department of Parks & Recreation, Trust for Public Land	Delaware

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Stenton Avenue and Washington Lane, NE Intersection	7/8/2014	2326	0	12340	0.566	Rain Garden, Infiltration Storage Trench	Streets	$34,123	Philadelphia Streets Department, Ogontz Avenue Revitalization Corporation, Mayors Office of Transportation & Utilities	TTF
William Gray Youth Center*	8/1/2014	4224.8	9	38946	1.164	Stormwater Tree Trench, Infiltration Storage Trench	Streets	$887,378		Delaware
Parking Lot - 12th St, Marvine St, and Diamond St*	8/1/2014	7687.2	21	48344	2.024	Stormwater Tree Trench	Streets			Delaware
24th St and Diamond St (Dick Elementary School)*	8/1/2014	6641	11	26669	1.224	Stormwater Tree Trench	Streets			Delaware
Alder St from Norris St to Diamond St*	8/1/2014	1985	1	14662	0.547	Stormwater Tree Trench	Streets		Philadelphia Housing Authority	Delaware
Moyamensing Ave and Morris St (Dickinson Square)*	11/25/2014	3650	5	27875	1.005	Stormwater Tree Trench, Stormwater Bump-out, Infiltration Storage Trench	Streets	$881,827	Department of Recreation, Friends of Dickinson Park, Southeastern Transportation Authority	Delaware
Jackson St, Tree St, 13th St (Epiphany of Our Lord School)*	11/25/2014	619.48	1	4200	0.171	Infiltration Storage Trench	Streets		Lower Moyamensing Civic Association	Delaware
8th St, Wolf St, and Mildred St (Francis Scott Key School)*	11/25/2014	2980	2	24300	0.821	Stormwater Tree Trench, Infiltration Storage Trench	Streets		Lower Moyamensing Civic Association	Delaware
Duval St, Crittenden St, and Johnson St (Anna B. Day School)*	11/25/2014	9882	15	72900	2.714	Stormwater Tree Trench	Streets		Tookany/Tacony-Frankford Watershed Partnership	TTF

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Kemble Park	1/21/2015	37176	69	227049	10.236	Rain Garden, Stormwater Basin, Infiltration Storage Trench, Swale	Open Space	$2,330,406	Philadelphia Department of Parks & Recreation	TTF
Wister Woods Park	1/21/2015	41165	7	207638	9.531	Rain Garden, Stormwater Basin	Open Space		Philadelphia Department of Parks & Recreation	TTF
73rd and Grays	2/3/2015	9534	8	73799	2.626	Stormwater Tree Trench	Streets	$2,533,627		Cobbs-Darby
72nd, Buist, 71st, Dicks (Elmwood Park)	2/3/2015	14315	9	134010	3.942	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench	Streets		Philadelphia Department of Parks & Recreation	Schuylkill
Buist Ave, 70th, Elmwood, Holbrook (Patterson School)	2/3/2015	5490	6	40863	1.512	Stormwater Tree Trench, Infiltration Storage Trench	Streets			Schuylkill
Elmwood, 64th, Grays, 65th (Connell Park)	2/3/2015	6420.2	16	70873	1.768	Stormwater Tree Trench	Streets			Schuylkill
Buist, 63rd, Chelwynde, 64th (Mother Mary of Peace School)	2/3/2015	5677.5	8	49418	1.564	Stormwater Tree Trench	Streets			Schuylkill
St. James Episcopal Church of Kingesessing	2/3/2015	12399	18	112757	3.147	Stormwater Tree Trench	Streets			Cobbs-Darby, Schuylkill
Panati Playground	5/14/2015	2726	7	37113	0.751	Rain Garden, Infiltration Storage Trench	Open Space	$227,394	Department of Public Property, Philadelphia Department of Parks & Recreation	Delaware
Dauphin from Frankford to Tulip	8/26/2015	4630	10	30422	1.274	Stormwater Tree Trench, Infiltration Storage Trench, Pervious Pavement	Streets	$122,998		Delaware

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acre (acre-inches)	SMP Types	Program	Green Construction Cost**	Partner(s)	Watershed
Ralph Brooks Park	10/8/2015	1503	8	14510	0.414	Rain Garden, Infiltration Storage Trench	Open Space	$152,300	Philadelphia Department of Parks & Recreation, Councilman Johnson, Urban Roots	Schuylkill
Benson Park	11/13/2015	3551	18	15354	0.628	Stormwater Tree Trench, Infiltration Storage Trench, Pervious Pavement	Open Space	$162,843	Department of Public Property, Philadelphia Department of Parks & Recreation	Delaware
Woodland Ave (Tiger III)	12/14/2015	6676	15	61563	1.839	Stormwater Tree Trench	Streets	$357,918	Philadelphia Streets Department	Cobbs-Darby, Schuylkill
Callowhill Stormwater Trees	2/5/2016	272	10	0	0.075	Other, Storm Water Tree	Streets	$0.00	Philadelphia Streets Department	Delaware
Bustleton Ave (Tiger III)	2/8/2016	2650	0	20261	0.73	Stormwater TreeTrench, Infiltration Storage Trench	Streets	$173,173	Philadelphia Streets Department	Delaware
56th from Greenway to Paschall	5/6/2016	2409.69	5	21675	0.664	Stormwater Tree Trench, Infiltration Storage Trench	Streets	$156,362		Schuylkill
Medary Ave from 13th to Broad	5/31/2016	2472.52	0	21758	0.681	Infiltration Storage Trench	Streets	$169,706		TTF
Stinger Square	7/6/2016	3033	15	27118	0.835	Rain Garden, Infiltration Storage Trench	Open Space	$231,585	Philadelphia Department of Parks & Recreation	Schuylkill
Germantown Ave SFR - Phase 4 - Laurel to Wildey	7/15/2016	2511	16	47527	0.619	Stormwater Tree Trench, Infiltration Storage Trench, Other	Streets	$378,003		Delaware
Frankford Ave	8/22/2016	7911	0	67221	2.179	Infiltration Storage Trench, Other	Streets	$462,716		Delaware, TTF
Harrowgate Park	9/1/2016	12731	0	78317	3.506	Rain Garden	Open Space	$772,155	Southeastern Transportation Authority, Philadelphia Department of Parks & Recreation	Delaware
43rd St & 45th St	9/7/2016	571	3	6412	0.157	Stormwater Tree Trench	Streets	$59,187		Schuylkill

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acre (acre-inches)	SMP Types	Program	Green Construction Cost**	Partner(s)	Watershed
Heston Lot	9/16/2016	3638	4	28741	1.002	Rain Garden, Infiltration Storage Trench	Vacant Land	$572,148	Department of Public Property, Philadelphia Department of Parks & Recreation	Schuylkill
Haverford Triangle	9/16/2016	5574.15	10	50079	1.535	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench, Swale	Vacant Land			Schuylkill
Baker Playground	9/16/2016	1417	0	11269	0.39	Rain Garden, Infiltration Storage Trench	Open Space		Philadelphia Department of Parks & Recreation	Schuylkill
Clearview and Washington	10/7/2016	3531	0	31812	0.972	Rain Garden, Infiltration Storage Trench	Vacant Land	$569,129	Tookany/Tacony-Frankford Watershed Partnership	TTF
Morris Estates	10/7/2016	6342	13	61297	1.747	Stormwater Tree Trench, Rain Garden, Infiltration Storage Trench	Open Space		Philadelphia Department of Parks & Recreation	TTF
29th & Cambria PWD Facility Employee Parking Lot	10/31/2016	8510.23	27	71033.12	2.344	Stormwater Tree Trench, Swale	Streets	$553,785		Delaware
Ingersoll Commons Park	11/8/2016	5738	15	42755	1.58	Rain Garden, Infiltration Storage Trench, Swale, Other	Open Space	$488,924	Community Ventures, Department of Public Property, Philadelphia Department of Parks & Recreation	Delaware
Weccacoe Playground	12/9/2016	1181	9	13466	0.432	Rain Garden, Infiltration Storage Trench, Depaving	Open Space	$118,707	Philadelphia Department of Parks & Recreation	Delaware
37th & Mt Vernon Playground	12/16/2016	2006	5	11592	0.532	Rain Garden, Infiltration Storage Trench	Open Space	$72,439	Philadelphia Department of Parks & Recreation	Schuylkill
Hagert Playground	2/10/2017	4296	0	31454	1.183	Rain Garden, Infiltration Storage Trench	Open Space	$259,585	Philadelphia Department of Parks & Recreation	Delaware

Project Name	Construction Complete Date	Storage Volume (cf)	New Trees	Drainage Area (sq. ft)	Greened Acre (acre-inches)	SMP Types	Program	Green Construction Cost**	Partner(s)	Watershed
Benjamin Franklin Pkwy from 16th St to 19th St	3/16/2017	11739	0	91092	3.233	Stormwater Tree Trench, Infiltration Storage Trench	Streets	$300,000	Department of Public Property, Philadelphia Department of Parks & Recreation	Schuylkill
Ontario St from A St to 6th St	3/24/2017	5444.7	9	41168	1.499	Stormwater Tree Trench	Streets	$107,773		Delaware
Wynnefield, Monument	5/25/2017	19487.23	18	151475.2	5.249	Stormwater Tree Trench, Infiltration Storage Trench	Streets	$651,725		Schuylkill
Brandywine St, Melon St, Sydenham St	6/7/2017	970	0	14684	0.267	Stormwater TreeTrench, Infiltration Storage Trench	Streets	$10,301		Delaware, Schuylkill
Total Greened Acres					**198**					

* Pennvest project

** Reported construction costs may vary from past fiscal years. Green Construction Costs are reported for FY17, as PWD now has the capability to track the costs associated specifically with Green Stormwater Infrastructure line items.

Appendix 2

Planned Public Green Stormwater Infrastructure Projects

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
28th, Poplar, Pennsylvania	Combined	Schuylkill	Streets	In Design			0	2020	TBD
Germantown Ave SFR - Phase 6 - 3rd St, Germantown Ave, and Master St	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter		1.65	2020	TBD
Ashville/Ditman/ Rhawn et al.	Combined	Delaware, Pennypack	Streets	In Design	Tree Trench		2.68	2020	TBD
Marston St, Eyre St, and Taney St	Combined	Schuylkill	Streets	In Design	Pervious Pavement		0.913	2020	TBD
Ridgewood - 55th to 54th	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Infiltration Storage Trench		0.253	2020	TBD
Cloud St from Church St to Walnut St	Combined	TTF	Streets	In Design	Pervious Pavement		0.22	2020	TBD
Kinsey from Tackawanna St to Torresdale St	Combined	TTF	Streets	In Design	Other		0.135	2020	TBD
Warrington - 54th to 55th	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Stormwater Bump-out		1.343	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Gerritt/Earp/Fernon /22nd/Cleveland	Combined	Schuylkill	Streets	In Design	Pervious Pavement		2.27	2020	TBD
Gillespie, Cottage, Ditman, Devereaux	Combined	Delaware	Streets	In Design	Tree Trench		1.77	2020	TBD
Tacony Creek Reaches 4/5	Combined, Separate, Non-Contributing	TTF	Open Space	In Design	Rain Garden	Tookany/Tacony-Frankford Watershed Partnership, Philadelphia Department of Parks & Recreation	13.25	2020	TBD
Cobbs Creek Park Reaches 6-8	Combined, Separate, Non-Contributing	Cobbs-Darby	Open Space	In Design	Tree Trench, Stormwater Bump-out, Rain Garden, Infiltration Storage Trench, Swale	Philadelphia Department of Parks & Recreation	14.08	2020	TBD
Hunting Park	Combined	Delaware	Open Space	In Design	Rain Garden, Infiltration Storage Trench, Swale, Infiltration Columns	Philadelphia Department of Parks & Recreation	12.48	2020	TBD
Berks / Montgomery / 6th	Combined	Delaware	Streets	In Design	Tree Trench		5.4	2020	TBD
Parrish, Union, 41st	Combined	Schuylkill	Streets	In Design	Tree Trench		2.14	2020	TBD
Ross Park	Combined	Delaware	Open Space	In Design	Rain Garden, Infiltration Storage Trench, Swale	Department of Public Property, Philadelphia Department of Parks & Recreation, Councilwoman Sanchez	0.62	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Master / Wanamaker / Hobart	Combined	Schuylkill	Streets	In Design	Tree Trench		0.74	2020	TBD
Rowland Ave - Ryan to Vista	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench		5.27	2020	TBD
Crispin St - Ryan to Lansing	Combined, Separate	Delaware, Pennypack	Streets	In Design	Stormwater Bump-out, Infiltration Storage Trench		12.8	2020	TBD
Crispin St - Hartel to Rhawn	Combined, Separate	Pennypack	Streets	In Design	Stormwater Bump-out, Infiltration Storage Trench		2.7	2020	TBD
Luzerne, Dungan, L, Lycoming (Francis Hopkinson Little School House)	Combined	TTF	Streets	In Design	Tree Trench, Stormwater Planter, Infiltration Storage Trench		1.76	2020	TBD
Erie Shopping Center	Combined	TTF	Streets	In Design	Tree Trench, Stormwater Planter, Infiltration Storage Trench		3.21	2020	TBD
Philadelphia Protestant House	Combined	Delaware	Streets	In Design	Stormwater Planter, Stormwater Bump-out		3.02	2020	TBD
Har Nebo Cemetery - Algon and Oxford Intersection	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		2.93	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Mariana Bracetti Academy Charter School	Combined	TTF	Streets	In Design	Tree Trench, Stormwater Planter, Infiltration Storage Trench		2.71	2020	TBD
46th, Westminster to Lancaster	Combined	Schuylkill	Streets	In Design	Stormwater Bump-out		0.9	2020	TBD
Price and Wayne Green Streets	Combined, Separate	Schuylkill, TTF, Wissahickon	Streets	In Design	Stormwater TreeTrench		2.32	2020	TBD
Nicholas, 28th, Myrtlewood	Combined	Schuylkill	Streets	In Design	Stormwater Bump-out		0.64	2020	TBD
15th & Carlisle	Combined	Delaware	Streets	In Design	Tree Trench		1.288	2020	TBD
Watkins / Fernon / McClellan	Combined	Delaware	Streets	In Design	Tree Trench		0.25	2020	$73,214
Media	Combined	Schuylkill	Streets	In Design	Tree Trench		2	2020	TBD
Race, Vodges, 55th	Combined	Cobbs-Darby	Streets	In Design	Tree Trench		1.81	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Bailey, Oxford, Turner, 26th & 30th	Combined	Schuylkill	Streets	In Design	Tree Trench		0.5	2020	TBD
Bristol & Staub Streets	Combined	TTF	Streets	In Design	Tree Trench		0.43	2020	TBD
Benner/Lawndale/Levick/Palmetto	Combined	Delaware	Streets	In Design	Tree Trench		5.66	2020	TBD
35th St, Earp St	Combined	Schuylkill	Streets	In Design	Tree Trench		1.19	2020	TBD
Auburn/Hagert/Rush/William	Combined	Delaware	Streets	In Design	Infiltration Storage Trench, Pervious Pavement		3.95	2020	TBD
Hestonville Neighborhood Disconnection SMP	Combined	Schuylkill	Open Space	In Design	Stormwater Basin, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	23	2020	TBD
Kingsessing Recreation Center	Combined	Schuylkill	Open Space	In Design	Rain Garden, Swale	Philadelphia Department of Parks & Recreation	9.22	2020	TBD
Kingsessing Recreation Streets Locations	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench, Infiltration Storage Trench		1.72	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Somerset/7th/Huntingdon	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter		4.32	2020	TBD
Viola & Stiles Street	Combined	Schuylkill	Streets	In Design	Tree Trench		3.24	2020	TBD
Stenton Park	Combined	TTF	Open Space	In Design	Tree Trench, Rain Garden, Infiltration Storage Trench, Swale	Philadelphia Department of Parks & Recreation	6.389	2020	$2,190,247
Stenton Streets Locations	Combined	TTF	Streets	In Design	Tree Trench, Infiltration Storage Trench		5.358	2020	
Springfield/Ruby/Upland	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench		0.99	2020	TBD
McClellan, Morris at 18th	Combined	Schuylkill	Streets	In Design	Tree Trench		0.44	2020	TBD
Argyle, Potter, Shelbourne, Russell	Combined	Delaware	Streets	In Design	Tree Trench		4.77	2020	TBD
48th St. Osage to Ludlow	Combined	Schuylkill	Streets	In Design	Tree Trench		4.14	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Revere St Greening	Combined	Delaware	Streets	In Design	Tree Trench		0.72	2020	$243,082
Brancroft/Chadwick /Courtland/19th	Combined	TTF	Streets	In Design	Tree Trench, Pervious Pavement		1.22	2020	TBD
Francis Myers Recreation Center	Combined	Cobbs-Darby	Open Space	In Design	Stormwater Planter, Rain Garden, Infiltration Storage Trench, Pervious Pavement	Philadelphia Department of Parks & Recreation	0.84	2020	TBD
Francis Myers Streets Locations	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out, Green Gutter, Infiltration Columns		16.65	2020	TBD
Cantrell, Jackson at 5th	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter		0.38	2020	TBD
Carroll Park Streets	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench		14.27	2020	TBD
50th, Beaumont, Pentridge, Windsor, Hadfield	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out		6.13	2020	TBD
Morris Park	Combined	Cobbs-Darby	Open Space	In Design	Tree Trench, Rain Garden	Philadelphia Department of Parks & Recreation	6.15	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Osage Ave. from 42nd St to 43rd St	Combined	Schuylkill	Streets	In Design	Stormwater Planter, Pervious Pavement		0.76	2020	TBD
Fotterall Square Streets	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench		4.4	2020	TBD
Vandergrift Park - Danny Boyle Park	Combined	Delaware	Open Space	In Design	Rain Garden, Infiltration Storage Trench	Philadelphia School District	0.48	2020	TBD
Lanier Playground	Combined	Schuylkill	Open Space	In Design	Rain Garden	Philadelphia Department of Parks & Recreation	0.9	2020	TBD
East Poplar Playground	Combined	Delaware	Open Space	In Design	Tree Trench, Rain Garden, Infiltration Storage Trench, Swale		4.1	2020	TBD
East Poplar Field	Combined	Delaware	Open Space	In Design	Infiltration Storage Trench, Swale		0.79	2020	TBD
Darien St from Poplar St to Girard Ave	Combined	Delaware	Streets	In Design	Tree Trench		0.54	2020	TBD
Street Crossings Pilot - Aramingo, Cedar, Cambria, Almond	Combined	Delaware	Streets	In Design	Tree Trench, Rain Garden		4.3	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Cement Park Streets Locations	Combined	Delaware	Streets	In Design	Tree Trench, Rain Garden, Infiltration Storage Trench		3.1	2020	TBD
Cement Park (Northern Liberties Recreation Center)	Combined	Delaware	Open Space	In Design	Rain Garden, Infiltration Storage Trench, Pervious Pavement		0.42	2020	TBD
McPherson Square	Combined	Delaware	Open Space	In Design	Tree Trench, Stormwater Planter, Rain Garden, Infiltration Storage Trench		3.24	2020	TBD
McPherson Square Streets Locations	Combined	Delaware	Streets	In Design	Tree Trench		7.24	2020	TBD
Cohocksink Playground	Combined	Delaware	Open Space	In Design	Rain Garden, Stormwater Basin, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	20.6	2020	TBD
McIlvain Playground	Combined	Delaware	Open Space	In Design	Infiltration Storage Trench		2.04	2020	TBD
Mount Sinai Streets Locations	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench, Swale	Philadelphia Department of Parks & Recreation	12.15	2020	TBD
Paschall, 46th-49th	Combined	Schuylkill	Streets	In Design	Tree Trench		1.59	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Osage Ave	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter		0.67	2020	$131,500
Cornwall, Westmoreland, Thayer	Combined	Delaware	Streets	In Design	Tree Trench, Pervious Pavement		2.91	2020	TBD
Mascher/Mutter/Palmer/Wilt	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Infiltration Storage Trench		4.41	2020	TBD
Trenton & Auburn Playground	Combined	Delaware	Open Space	In Design	Infiltration Storage Trench		16.68	2020	TBD
Bambrey, Stillman, Toronto	Combined	Delaware	Streets	In Design	Pervious Pavement		3.31	2020	TBD
Porous Streets - Atlantic, Joyce, Schiller	Combined	Delaware	Streets	In Design	Tree Trench, Pervious Pavement		0.18	2020	TBD
Lawncrest Streets Southeast	Combined	Delaware, TTF	Streets	In Design	Stormwater Bump-out		12	2020	TBD
Pennypacker - Safe Routes to Schools	Combined	TTF	Streets	In Design	Stormwater Bump-out		1.56	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Duckrey - Safe Routes to Schools	Combined	Delaware	Streets	In Design	Stormwater Bump-out, Infiltration Storage Trench		1.69	2020	TBD
Spruance School	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Bump-out		0	2020	TBD
Weinberg Street Locations	Combined	Delaware	Streets	In Design	Tree Trench, Infiltration Storage Trench		6.96	2020	TBD
Weinberg Park	Combined	Delaware	Open Space	In Design	Tree Trench, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	1.09	2020	TBD
Weinberg Street 2	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter		1.01	2020	TBD
Warriner Post Park	Combined	Schuylkill	Streets	In Design	Tree Trench, Rain Garden	Philadelphia Department of Parks & Recreation	1.64	2020	TBD
Stephen Girard Park - Porter St, 21st St, Shunk St, 22nd St	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out	Philadelphia Department of Parks & Recreation	3.93	2020	TBD
Girard Park and Warriner Post Park Streets	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		3.97	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Wilder/Cross/Mountain/Greenwich	Combined	Delaware	Streets	In Design	Pervious Pavement		1.9	2020	TBD
Max Myers - Park	Combined	Delaware	Open Space	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Rain Garden, Infiltration Storage Trench, Swale		9.77	2020	TBD
Max Myers - Streets	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		4.82	2020	TBD
Lawncrest Streets Southwest	Combined, Separate	TTF	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench		21.74	2020	TBD
Additional Lawncrest Streets	Combined	TTF	Streets	In Design	Tree Trench		2.91	2020	TBD
11th/Marvine/Tioga/Ontario	Combined	Delaware	Streets	In Design	Tree Trench		1.64	2020	TBD
Wharton Square Greening Improvement	Combined	Schuylkill	Open Space	In Design	Stormwater Planter, Rain Garden, Infiltration Storage Trench		5.53	2020	TBD
PHA/Blumberg Green Streets	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out	Philadelphia Housing Authority	3.17	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Lawncrest Rec Center	Combined, Separate	TTF	Open Space	In Design	Tree Trench, Stormwater Planter, Rain Garden, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	6.16	2020	TBD
Mayfair I/ Tyson/ Brighton/ Princeton/ Et al	Combined	Delaware	Streets	In Design	Tree Trench		0	2020	TBD
Buist Avenue Green Streets and Park Improvements	Combined	Schuylkill	Streets	In Design	Stormwater Bump-out, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	9.08	2020	TBD
Buist Park Improvements	Combined	Schuylkill	Open Space	In Design	Stormwater Bump-out, Rain Garden		2.4	2020	TBD
Waterloo/Hewson/ Mutter/Palethorp	Combined	Delaware	Streets	In Design	Pervious Pavement		2.04	2020	TBD
Passyunk Avenue Medians Improvements	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Rain Garden		7.37	2020	TBD
Glenwood Streets Improvements	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		6.53	2020	TBD
Loudoun Park Green Streets Improvements	Combined	TTF	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		5.19	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Loudoun Park	Combined	TTF	Open Space	In Design	Tree Trench, Rain Garden		2.25	2020	TBD
Mantua Greenway	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out, Rain Garden, Swale	Philadelphia Planning Commission	5.17	2020	TBD
Nelson Playground and Green Improvements	Combined	Delaware	Open Space	In Design	Tree Trench, Rain Garden		3.84	2020	TBD
1900-02 Point Breeze Ave. Vacant Lot	Combined	Schuylkill	Vacant Land	In Design	Rain Garden		0.58	2020	TBD
1701-03 Ringgold St. Vacant Lot	Combined	Schuylkill	Vacant Land	In Design	Rain Garden		0.45	2020	TBD
Point Breeze Vacant Lots Streets	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out, Rain Garden, Infiltration Storage Trench		6.13	2020	TBD
Callowhill Green Streets	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		3.28	2020	TBD
41st / Pine / Chester	Combined	Schuylkill	Streets	In Design	Tree Trench, Infiltration Storage Trench		1.45	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Elmwood Medians Package	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Stormwater Planter, Rain Garden, Swale		6.52	2020	TBD
Erie and Rising Sun Street Improvements	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Bump-out		7.99	2020	TBD
1038 W TIOGA ST	Combined	Delaware	Vacant Land	In Design			0	2020	TBD
Athletic Square	Combined	Schuylkill	Open Space	In Design	Tree Trench		0.49	2020	TBD
Athletic Square	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Infiltration Storage Trench		2.32	2020	TBD
Loudoun Green Streets Improvements - Phase II	Combined	TTF	Streets	In Design	Tree Trench, Stormwater Planter, Infiltration Storage Trench		8.43	2020	TBD
Kensington Streets Package	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		4.19	2020	TBD
53rd and Baltimore	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Stormwater Bump-out, Rain Garden, Infiltration Storage Trench	Philadelphia Streets Department	3.72	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Maplewood Mall	Combined	TTF	Streets	In Design	Pervious Pavement		0.85	2020	TBD
Kensington Neighborhood Greening Phase 2	Combined	Delaware	Streets	In Design	Tree Trench		7.73	2020	TBD
Broad/Carlisle/Thompson/Master	Combined	Delaware	Streets	In Design	Infiltration Storage Trench		1.37	2020	TBD
18th/ Jackson/ Lambert/ Woodstock	Combined		Streets	In Design	Tree Trench		0.48	2020	TBD
Moore/ McClellan/ 22nd	Combined	Schuylkill	Streets	In Design			0	2020	TBD
Jackson St from S Colorado St to S 17th St	Combined	Schuylkill	Streets	In Design	Tree Trench		0.48	2020	TBD
Cedar Park Neighborhood Streets Package 1	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		8.75	2020	TBD
Germantown Station	Combined	TTF	Facilities	In Design	Rain Garden		0.44	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Temple Station Green Streets	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench		5.51	2020	TBD
Dakota Street	Combined	Delaware	Streets	In Design			0	2020	TBD
Jefferson, Thompson, 5th	Combined	Delaware	Streets	In Design	Tree Trench		2.07	2020	TBD
Wissinoming Park	Combined	Delaware	Open Space	In Design	Infiltration Storage Trench, Stormwater Wetland		35.7	2020	TBD
Cedar Park Neighborhood Streets 2	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Storm Water Tree		6.36	2020	TBD
W Oxford St from N 33rd St to N Natrona St	Combined	Schuylkill	Streets	In Design	Stormwater Bump-out		1.22	2020	TBD
East Park Greenways Parcel	Combined	Schuylkill	Open Space	In Design	Stormwater Bump-out, Rain Garden	Philadelphia Department of Parks & Recreation, Fairmount Park Conservancy	6	2020	TBD
South Street Headhouse Square	Combined	Delaware	Streets	In Design	Infiltration Storage Trench	Department of Public Property, Philadelphia Streets Department	2.25	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Elmwood Culs-de-Sac	Combined	Schuylkill	Streets	In Design	Stormwater Planter, Stormwater Bump-out, Rain Garden, Storm Water Tree, Green Gutter, Infiltration Columns		7.04	2020	TBD
Cohocksink Green Streets Improvements	Combined	Delaware	Streets	In Design	Storm Water Tree, Drainage Well		3.78	2020	TBD
Tioga Green Streets I	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter		8.48	2020	TBD
20536	Combined	TTF	Streets	In Design	Infiltration Storage Trench, Storm Water Tree		3.38	2020	TBD
Berks, Norris, 31st	Combined	Schuylkill	Streets	In Design	Tree Trench, Infiltration Storage Trench		1.77	2020	TBD
Girard Estates Green Streets Improvements	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		8.35	2020	TBD
Wayne & Manheim Streets	Combined, Separate	Schuylkill, TTF	Streets	In Design	Tree Trench		5	2020	TBD
Saunders Park Streets Package	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		5.67	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Berks & Sedgley Greening	Combined	Schuylkill	Streets	In Design	Tree Trench		7.95	2020	TBD
Fitzgerald/ American/ Daly	Combined	Delaware	Streets	In Design	Pervious Pavement		1.96	2020	TBD
Kimball	Combined	Delaware	Streets	In Design	Pervious Pavement		0.37	2020	TBD
16th Police District Headquarters	Combined	Schuylkill	Streets	In Design	Tree Trench, Rain Garden		2.54	2020	TBD
16th Police District Parcels	Combined	Schuylkill	Facilities	In Design	Stormwater Planter, Rain Garden		2.5	2020	TBD
Hollywood, 30th	Combined	Schuylkill	Streets	In Design	Pervious Pavement		0.96	2020	TBD
Conestoga, Sickels, Ruby, Lindenwood, Arch	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench, Pervious Pavement		3.94	2020	TBD
Feltonville Plaza package	Combined	TTF	Streets	In Design	Tree Trench, Stormwater Bump-out, Storm Water Tree		5.37	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Broomall/Malcolm/ 56th	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Pervious Pavement		6.51	2020	TBD
Seymour Streets Corridor	Combined	TTF	Streets	In Design	Tree Trench, Stormwater Bump-out		4.13	2020	TBD
Port Richmond Green Streets Improvements	Combined, Separate	Delaware, TTF	Streets	In Design	Storm Water Tree		6.35	2020	TBD
Jefferson Street	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out		6.2	2020	TBD
Craig/Solly	Combined	Pennypack	Streets	In Design	Tree Trench, Infiltration Storage Trench		2.11	2020	TBD
Ludlow, S. Salford S, S. Redfield	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Pervious Pavement		1.53	2020	TBD
Palmer Park	Combined	Delaware	Open Space	In Design	Stormwater Basin	Philadelphia Department of Parks & Recreation	0.71	2020	$4,007
Palmer Park Streets	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench		3.05	2020	

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Fishtown Recreation Center	Combined	Delaware	Open Space	In Design	Rain Garden, Infiltration Storage Trench	Trust for Public Land	1.08	2020	TBD
Newbold Green Streets Improvements	Combined	Schuylkill	Streets	In Design	Storm Water Tree		3.9	2020	TBD
Clayborn & Lewis Streets	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter		5.7	2020	TBD
Clayborn & Lewis Playground	Combined	Schuylkill	Open Space	In Design	Stormwater Planter, Rain Garden		0.8	2020	TBD
Ardleigh/Jane/Godfrey/Woodlawn	Combined	TTF	Streets	In Design	Tree Trench		0.93	2020	TBD
Thompson/ Belgrade	Combined	Delaware	Streets	In Design	Tree Trench, Pervious Pavement		2.4	2020	TBD
Heitzman Playground	Combined	Delaware	Open Space	In Design	Infiltration Columns	Philadelphia Department of Parks & Recreation	14	2020	TBD
Heitzman Playground Streets	Combined	Delaware, TTF	Streets	In Design	Tree Trench, Infiltration Storage Trench		4.52	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Kensington Ludlow	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Bump-out, Rain Garden		6.99	2020	TBD
East Parkside Streets Improvements Package	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out		6.78	2020	TBD
Germantown Ave South	Combined	TTF	Streets	In Design	Tree Trench		2.54	2020	TBD
Happy Hollow Streets	Combined, Separate	Schuylkill, TTF	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench		8.44	2020	TBD
Happy Hollow Package Parks	Combined, Separate	Schuylkill, TTF	Open Space	In Design	Tree Trench, Stormwater Planter, Rain Garden, Infiltration Storage Trench, Swale	Philadelphia Department of Parks & Recreation	5.43	2020	TBD
6th & Susquehanna	Combined	Delaware	Streets	In Design	Tree Trench, Rain Garden		2.1	2020	TBD
41st and Lancaster 1	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter		10.9	2020	TBD
41st and Lancaster 2	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		11.04	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
41st and Lancaster 3	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		7.2	2020	TBD
Sprague/ Vernon	Combined	TTF	Streets	In Design			0	2020	TBD
229 E LOGAN ST	Combined	TTF	Vacant Land	In Design	Rain Garden, Infiltration Storage Trench, Swale		3.52	2020	TBD
Wister Playground Package Parks	Combined	TTF	Open Space	In Design	Infiltration Storage Trench		1.83	2020	TBD
Wister Playground Package	Combined	TTF	Streets	In Design	Tree Trench, Infiltration Storage Trench		2.97	2020	TBD
Penrose Avenue Sidepath	Combined, Non-Contributing	Schuylkill	Streets	In Design	Tree Trench, Rain Garden, Infiltration Storage Trench, Swale		12	2020	TBD
Sansom Street	Combined	Schuylkill	Streets	In Design	Tree Trench, Infiltration Storage Trench		0.54	2020	TBD
Yorktown Courtyards	Combined	Delaware	Open Space	In Design	Tree Trench, Stormwater Planter, Rain Garden		5.25	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Mantua Greenway Neighborhood Connections 1	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out, Rain Garden, Infiltration Storage Trench		11.76	2020	TBD
Drexel University Green Streets	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out	Drexel University	7.85	2020	TBD
Snyder Avenue Greening Improvements	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		9.18	2020	TBD
Duckrey, Tanner	Combined	Delaware	Schools	In Design	Tree Trench, Stormwater Bump-out	School District of Philadelphia	9.54	2020	TBD
24th Street Greening Improvements	Combined	Schuylkill	Streets	In Design	Rain Garden		10.3	2020	TBD
Mifflin Square	Combined	Delaware	Open Space	In Design	Stormwater Planter		1.45	2020	TBD
Mifflin Square	Combined	Delaware	Streets	In Design	Tree Trench, Infiltration Storage Trench		3.48	2020	TBD
Fairmount Avenue Greening Improvements	Combined	Delaware, Schuylkill	Streets	In Design	Tree Trench		5.82	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
5 loaves 2 Fish Street Package	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Planter, Stormwater Bump-out		4.11	2020	TBD
State Rhawn Sidepath (Pennypack Trail Head)	Combined, Non-Contributing	Pennypack	Streets	In Design	Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	0.75	2020	TBD
Fairmount Neighborhood Bumpouts	Combined	Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out		4.97	2020	TBD
Arch St West Corridor	Combined	Cobbs-Darby	Streets	In Design	Tree Trench, Stormwater Bump-out		11.06	2020	TBD
Lawncrest Streets North Package	Combined	Delaware, TTF	Streets	In Design	Tree Trench, Stormwater Bump-out, Storm Water Tree		12.27	2020	TBD
Shunk Street Greening Improvements	Combined	Delaware	Streets	In Design	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		8.9	2020	TBD
64th St Corridor Package	Combined	Cobbs-Darby, Schuylkill	Streets	In Design	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		11.34	2020	TBD
Tabor Ave Greening	Combined	Delaware, TTF	Streets	In Design	Stormwater Bump-out, Infiltration Storage Trench, Swale		19.37	2020	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Marshall St from Hunting Park Ave to Cayuga St	Combined	TTF	Streets	In Contract Management	Infiltration Storage Trench, Pervious Pavement		1.224	2019	$289,435
Adams Ave from Ruan to Factory	Combined	TTF	Streets	In Contract Management	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench, Storm Water Tree		0.522	2019	$197,056
Federal St, Wharton St, Columbus Square	Combined	Delaware	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	0.784	2019	$216,750
Atlantic, Tioga (Kenderton Field Park)	Combined	Delaware	Streets	In Contract Management	Tree Trench	Fairmount Park Commission, Pennsylvania Horticulture Society	1.28	2019	$1,384,635
Sedgley Ave, 22nd St (Cecil B Moore Recreation Center, Reyburn Park)	Combined	Delaware	Streets	In Contract Management	Tree Trench, Stormwater Bump-out	Fairmount Park Commission, Pennsylvania Horticulture Society	2.36	2019	
16th St, Sydenham St, and Cumberland St (HM Stanton School)	Combined	Delaware	Streets	In Contract Management	Tree Trench		0.62	2019	
Yorktown Green and Complete Streets	Combined	Delaware	Streets	In Contract Management	Stormwater Planter, Infiltration Storage Trench		2.358	2019	$1,129,973
Thompson, Conestoga	Combined	Schuylkill	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench		0.542	2019	$226,704

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Hirst, Ludlow, Robinson	Combined	Cobbs-Darby	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench, Pervious Pavement		1.371	2019	$552,767
Cleveland, Gratz, Greene, Roberts	Combined	TTF	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench		1.254	2019	$293,888
59th, Vodges	Combined	Cobbs-Darby, Schuylkill	Streets	In Contract Management	Tree Trench, Pervious Pavement		1.162	2019	$488,725
Gaul, Weikel, Witte	Combined	Delaware	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench, Storm Water Tree		2.568	2019	$638,040
Camac St, Iseminger St, Juniper St, McClellan St, Pierce St, Watkins St	Combined	Delaware	Streets	In Contract Management	Pervious Pavement		1.544	2019	$418,210
52nd, 53rd, Gainor, and Diamond	Combined	Schuylkill	Streets	In Contract Management	Tree Trench		1.36	2019	$279,651
Leithgow / Cambridge	Combined	Delaware	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench		0.521	2019	$161,910
Fairmount, Corinthian, 20th, Ridge	Combined	Delaware, Schuylkill	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench		2.537	2019	$750,420

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
50th, Walton, Rodman	Combined	Cobbs-Darby, Schuylkill	Streets	In Contract Management	Tree Trench		1.3	2019	$354,488
Guerin Recreation Center	Combined	Schuylkill	Open Space	In Contract Management	Stormwater Basin, Infiltration Storage Trench, Depaving	Philadelphia Department of Parks & Recreation	4.239	2019	$775,074
Bridge/Creston/ Darrah/Penn	Combined	Delaware	Streets	In Contract Management	Tree Trench		1.39	2019	$1,198,900
Moss Playground	Combined	Delaware	Open Space	In Contract Management	Tree Trench, Rain Garden, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	4.813	2019	$1,458,243
Carmella Playground	Combined	Delaware	Open Space	In Contract Management	Rain Garden, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	5.253	2019	
Point Breeze, 25th to 26th	Combined	Schuylkill	Streets	In Contract Management			0	2019	TBD
Hackett School	Combined	Delaware	Schools	In Contract Management	Tree Trench, Rain Garden, Infiltration Storage Trench	Community Design Collaborative, Pennsylvania Horticulture Society, School District of Philadelphia	5.099	2019	$1,255,852
Berks, 17th, Arlington & Bouvier	Combined	Delaware	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench		1.412	2019	$336,100

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<tr><th>Project Name</th><th>Sewer Type</th><th>Watershed</th><th>Program</th><th>Status</th><th>Estimated SMP Type(s)</th><th>Potential Partner(s)</th><th>Greened Acre (acre-inches)</th><th>Completion Date Estimate</th><th>Estimated Construction Cost</th></tr>
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<tr><td>Crowson/Stokes/Woodlawn</td><td>Combined</td><td>TTF</td><td>Streets</td><td>In Contract Management</td><td>Tree Trench, Infiltration Storage Trench</td><td></td><td>1.517</td><td>2019</td><td>$526,525</td></tr>
<tr><td>8th & Poplar</td><td>Combined</td><td>Delaware</td><td>Streets</td><td>In Contract Management</td><td>Tree Trench, Infiltration Storage Trench</td><td></td><td>1.005</td><td>2019</td><td>$219,595</td></tr>
<tr><td>Conestoga Community Playground</td><td>Combined</td><td>Schuylkill</td><td>Open Space</td><td>In Contract Management</td><td>Depaving</td><td>Philadelphia Department of Parks & Recreation</td><td>0.12</td><td>2019</td><td>TBD</td></tr>
<tr><td>Longshore/Bingham/Glenview/Martin Mills</td><td>Combined</td><td>Delaware</td><td>Streets</td><td>In Contract Management</td><td>Infiltration Storage Trench</td><td></td><td>0.62</td><td>2019</td><td>$174,995</td></tr>
<tr><td>Malvern Ave from Atwood Rd to 65th St</td><td>Combined</td><td>Cobbs-Darby</td><td>Streets</td><td>In Contract Management</td><td>Tree Trench, Drainage Well</td><td></td><td>0.155</td><td>2019</td><td rowspan="3">$333,680</td></tr>
<tr><td>Algon Ave from Glenview St to Longshore Ave</td><td>Combined</td><td>Delaware</td><td>Streets</td><td>In Contract Management</td><td>Tree Trench, Drainage Well</td><td></td><td>0.071</td><td>2019</td></tr>
<tr><td>Unruh Ave between Summerdale and Frontenac</td><td>Combined</td><td>Delaware</td><td>Streets</td><td>In Contract Management</td><td>Drainage Well</td><td></td><td>0.126</td><td>2019</td></tr>
<tr><td>Church, Orchard, Ruan, Salem</td><td>Combined</td><td>TTF</td><td>Streets</td><td>In Contract Management</td><td>Stormwater Planter, Infiltration Storage Trench</td><td></td><td>0.239</td><td>2019</td><td>$88,460</td></tr>
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Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Cedar Ave, Yewdall St	Combined	Cobbs-Darby	Streets	In Contract Management	Infiltration Storage Trench		1.17	2019	$342,226
Helen/Jasper/Clementine/Hilton	Combined	Delaware	Streets	In Contract Management	Tree Trench, Infiltration Storage Trench		1.6	2019	$287,908
Crease / Frankford / Mascher / Thompson	Combined	Delaware	Streets	In Contract Management	Infiltration Storage Trench		0.32	2019	$159,666
Rising Sun/Germantown/ Ontario Intersection	Combined	Delaware	Streets	In Contract Management	Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench, Depaving	Philadelphia Streets Department, Mayors Office of Transportation & Utilities	0.761	2019	$111,108
Hazzard	Combined	Delaware	Streets	In Contract Management	Infiltration Storage Trench		0.3	2019	$83,170
American Street Corridor Improvements	Combined	Delaware	Streets	In Contract Management	Tree Trench, Stormwater Planter, Stormwater Bump-out, Rain Garden, Infiltration Storage Trench, Swale		51.72	2019	$18,929
Windrim Ave from Wayne Ave to Germantown Ave	Combined	TTF	Streets	In Contract Management	Stormwater Bump-out, Infiltration Storage Trench	Philadelphia Planning Commission, Southeastern Transportation Authority, Nicetown Community Development Corporation	2.068	2019	$649,209
Mole St from Fitzwater to Catharine St and	Combined	Delaware	Streets	In Construction	Pervious Pavement		0.297	2018	$145,625

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Webster St from 16th to 17th									
Germantown Ave SFR - Phase 5	Combined	Delaware	Streets	In Construction	Tree Trench, Infiltration Storage Trench		0.391	2018	$97,950
Galloway, Howard, & Hancock	Combined	Delaware	Streets	In Construction	Tree Trench		0.361	2018	$107,500
20th, Limekiln, Ridley, and 65th (Kinsey School)	Combined	TTF	Streets	In Construction	Tree Trench		1.671	2018	$1,101,200
National Cemetery	Combined	TTF	Streets	In Construction	Rain Garden, Infiltration Storage Trench, Swale		0.523	2018	
19th, Haines (Rowen William School)	Combined	TTF	Streets	In Construction	Tree Trench		0.898	2018	
Wagner Louis Middle School	Combined	TTF	Streets	In Construction	Tree Trench		1.479	2018	
Wolf St (Sharswood School and Our Lady of Carmel School)	Combined	Delaware	Streets	In Construction	Tree Trench, Infiltration Storage Trench		1.672	2018	$1,191,880
Taggert School	Combined	Delaware	Streets	In Construction	Tree Trench, Infiltration Storage Trench	Community Design Collaborative	1.619	2018	

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
St. Monica Manor	Combined	Delaware	Streets	In Construction	Tree Trench, Infiltration Storage Trench		1.042	2018	
Sedgwick Station	Combined	TTF	Streets	In Construction	Stormwater Bump-out, Infiltration Storage Trench	Southeastern Transportation Authority	1.675	2018	$2,300,055
Chelten Hills Cemetery	Combined	TTF	Streets	In Construction	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench, Swale		7.955	2018	
Thouron Ave, Mohican St, Rugby St, W Washington Ln (Pennypacker School)	Combined	TTF	Streets	In Construction	Tree Trench, Infiltration Storage Trench		1.81	2018	
Drexel College of Media Arts & Design	Combined	Schuylkill	Streets	In Construction	Tree Trench	Drexel University	1.446	2018	$1,936,198
Pine, Larchwood, 51st (Malcolm X Park)	Combined	Cobbs-Darby, Schuylkill	Streets	In Construction	Tree Trench	Philadelphia Planning Commission, Philadelphia Department of Parks & Recreation	3.036	2018	
Upland Way	Combined	Schuylkill	Streets	In Construction	Stormwater Bump-out, Rain Garden, Infiltration Storage Trench, Swale	American Cities Foundation	3.037	2018	
Woodcrest, Graham, Malvern, 59th (Beeber Middle School)	Combined	Schuylkill	Streets	In Construction	Tree Trench		0.624	2018	

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
40th and Baltimore	Combined	Schuylkill	Streets	In Construction	Tree Trench	Southeastern Transportation Authority, University City District	1.504	2018	
Ruscomb, 17th, Ogontz (Logan School)	Combined	TTF	Streets	In Construction	Tree Trench		2.066	2018	$1,834,625
Wayne Ave and Abbottsford Ave	Combined	TTF	Streets	In Construction	Infiltration Storage Trench		0.334	2018	
Mercer, Indiana, Ann, Almond (Powers Park)	Combined	Delaware	Streets	In Construction	Tree Trench		1.148	2018	
Thompson, Elkhart, Edgemont, Indiana (Stokley Playground)	Combined	Delaware	Streets	In Construction	Tree Trench		0.852	2018	
Westmoreland and Tulip	Combined	Delaware	Streets	In Construction	Tree Trench		1.487	2018	
Hope St from Master to Jefferson	Combined	Delaware	Streets	NTP	Pervious Pavement		0.376	2018	$228,735
Hope St from Berks to Norris	Combined	Delaware	Streets	NTP	Pervious Pavement		0.351	2018	

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Old York Rd (Skevchenko Park)	Combined	TTF	Streets	In Construction	Stormwater Bump-out, Infiltration Storage Trench	Department of Public Property	0.677	2018	$1,834,625
Park Ave	Combined	Delaware	Streets	In Construction	Tree Trench		0.757	2018	
Rosehill St and C Street	Combined	Delaware	Streets	In Construction	Tree Trench		1.85	2018	$272,190
9th St, Hoffman St, Mifflin St, Percy St, Pierce St	Combined	Delaware	Streets	In Construction	Tree Trench, Pervious Pavement		1.443	2018	$782,150
Mole, Bancroft	Combined	Schuylkill	Streets	In Construction	Pervious Pavement		1.478	2018	$556,550
Ellsworth, 22nd, 20th, 18th	Combined	Delaware, Schuylkill	Streets	In Construction	Tree Trench, Infiltration Storage Trench		2.043	2018	$565,810
Collazo Park	Combined	Delaware	Open Space	In Construction	Tree Trench, Rain Garden, Infiltration Storage Trench, Pervious Pavement	Philadelphia School District, Philadelphia Department of Parks & Recreation, Trust for Public Land	2.535	2018	$352,915
Ferko Playground	Combined, Separate, Non-Contributing	TTF	Open Space	In Construction	Stormwater Bump-out, Rain Garden, Infiltration Storage Trench, Swale	Philadelphia Department of Parks & Recreation	14.607	2018	$2,658,620

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Mansfield Ave	Combined	TTF	Streets	In Construction	Tree Trench, Infiltration Storage Trench		1.749	2018	$541,420
Black Coyle and McBride Playground	Combined	Delaware	Open Space	In Construction	Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	0.747	2018	$1,194,310
Almond St - York to Boston	Combined	Delaware	Streets	In Construction	Tree Trench		0.463	2018	
Amber St, Lehigh Ave, Collins St	Combined	Delaware	Streets	In Construction	Tree Trench, Infiltration Storage Trench		0.289	2018	
Lehigh Ave - Martha to Trenton	Combined	Delaware	Streets	In Construction	Tree Trench		0.337	2018	
St. Anne Rectory	Combined	Delaware	Streets	In Construction	Tree Trench		1.29	2018	
Penn Treaty School - Moyer St	Combined	Delaware	Streets	In Construction	Tree Trench		0.405	2018	
Wissinoming Park	Combined	Delaware	Open Space	In Construction	Rain Garden, Infiltration Storage Trench	Philadelphia Department of Parks & Recreation	1.856	2018	$500,000

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
JFK, 20th to 23rd Street	Combined, Non-Contributing	Schuylkill	Streets	In Construction	Tree Trench, Infiltration Storage Trench		2.865	2018	TBD
65th, 18th, Chelten, Ogontz (Mt. Airy School of God in Christ)	Combined	TTF	Streets	In Construction	Tree Trench, Stormwater Bump-out, Infiltration Storage Trench		3.817	2018	$941,372
Botanic Ave from 49th St to 51 St	Combined	Schuylkill	Streets	In Construction	Rain Garden, Infiltration Storage Trench, Swale	Philadelphia Department of Parks & Recreation	2.712	2018	$500,000
Loudon, Carlisle	Combined	TTF	Streets	In Construction	Infiltration Storage Trench		0.596	2018	$131,760
Allegheny Ave Safety Corridor Improvement Project Street Locations	Combined	Delaware	Streets	In Construction	Tree Trench, Stormwater Planter, Stormwater Bump-out, Infiltration Storage Trench	PennDOT	3.209	2018	TBD
1-95 Green Streets	Combined, Non-Contributing	TTF	Streets	In Construction	Tree Trench		4.179	2018	TBD
Drew (Walnut Center) (UCHS Redevelopment)	Combined	Schuylkill	Schools	In Construction	Tree Trench		3.84	2018	TBD
Parkside Edge	Combined	Schuylkill	Streets	In Construction	Rain Garden, Infiltration Storage Trench	Fairmount Park Conservancy	5.17	2018	TBD

Project Name	Sewer Type	Watershed	Program	Status	Estimated SMP Type(s)	Potential Partner(s)	Greened Acre (acre-inches)	Completion Date Estimate	Estimated Construction Cost
Reading Viaduct	Combined	Delaware	Streets	In Construction	Stormwater Bump-out, Infiltration Storage Trench	Center City District	0.285	2018	TBD
Smith Playground	Combined	Schuylkill	Open Space	In Construction	Tree Trench, Rain Garden, Infiltration Storage Trench	Department of Public Property, Philadelphia Department of Parks & Recreation, Councilman Johnson, Urban Roots	2.953	2018	$670,000

Appendix 3

Complete Redevelopment and Incentivized Green Stormwater Infrastructure Projects

Table 1: Private Project Tracking Metrics and Reporting Format

Private Project Tracking Metrics						
Tracking Number	**Sewer Type**	**Category**	**Watershed**	**Zip Code**	**SMP Type (s)**	**Greened Acres (acre-inch)**

Table 2: Private/Incentives SMP Type Definitions

Private / Incentives SMP Type Definitions	
Basin	A surface basin or depression that is vegetated with mowed grass. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Bioinfiltration / Bioretention	A bioinfiltration/bioretention basin is a vegetated basin or depression designed to either infiltrate or release stormwater runoff.
Blue Roof	A blue roof is a storage system designed into a roof surface such that the roof retains stormwater. Blue roofs are designed to reduce the rate of stormwater runoff.
Cistern	Cisterns are storage tanks, located either above or below ground, that captures and stores runoff and can thereby reduce runoff volume. Stored water may drain by gravity or be pumped to its ultimate end use for a variety of non-potable water needs.
Depaving	Depaving projects remove existing impervious pavement and restore the surface with grass, other types of vegetation, or loose materials (stone, mulch, etc.) such that the area can thereafter be considered pervious area. Depaving projects remove contributing impervious area from the sewer system. Categorized as a Disconnection and logged in square feet.
Green Roof	A green roof is a vegetated surface installed over a roof surface. Green roofs are effective in reducing the volume and rates of stormwater runoff.
Planters	At or above grade planter area and number of planters tracked as "Disconnection" practice. Do not contribute to water quality.
Porous Pavement	Porous pavement is a hard permeable surface commonly composed of concrete, asphalt or pavers. It is designed to detain and release stormwater runoff and/or infiltrate where feasible.
Total Rooftop Area Disconnected	Tracked as the square footage of roof runoff directed to a pervious area.
Total Pavement Disconnections	Tracked as the square footage of runoff from impervious surfaces directed to a pervious area.
Tree Credit	Tracked as either "existing" or "new" tree credits, where each tree is credited with 100 square feet of management per tree.

Table 1: Complete Private Development Green Stormwater Infrastructure

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2005-0052-01	Combined	Verified	Lower Schuylkill River	19139	Subsurface Infiltration	2.49
2005-0099-01	Combined	Verified	Lower Schuylkill River	19131	Surface Detention	37.4
2006-0017-01	Combined	Verified	Lower Schuylkill River	19142	Subsurface Infiltration, Porous Pavement	1.21
2006-0057-01	Combined	Verified	Delaware Direct	19123	Subsurface Detention	0.02
2006-0063-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration	1.9
2006-0074-01	Combined	Verified	Lower Schuylkill River	19145	Subsurface Infiltration	0.65
2006-0084-01	Combined	Verified	Delaware Direct	19121	Subsurface Infiltration	2.51
2006-0110-01	Combined	Verified	Delaware Direct	19140	Subsurface Infiltration, Subsurface Detention	0.69
2006-129-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof	0.48
2006-132-01	Combined	Verified	Delaware Direct	19133	Subsurface Detention	0.15
2006-30TH-236-01	Combined	Verified	Lower Schuylkill River	19104	Surface Infiltration	0.63
2006-777L-326-01	Combined	Verified	Delaware Direct	19147	Subsurface Infiltration, Porous Pavement	2.04
2006-9349-349-01	Combined	Verified	Delaware Direct	19123	Subsurface Detention	0.1
2006-94-01	Combined	Verified	Delaware Direct	19148	Subsurface Detention	2.25
2006-96-01	Combined	Verified	Lower Schuylkill River	19140	Subsurface Detention	0.06
2006-ANGE-268-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration	0.82
2006-ANNE-209-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention	0.17
2006-BCRC-246-01	Combined	Verified	Delaware Direct	19134	Subsurface Infiltration	0.21
2006-BEAZ-250-01	Combined	Verified	Delaware Direct	19134	Subsurface Detention	1.55
2006-BOOT-310-01	Combined	Verified	Cobbs Creek	19139	Subsurface Infiltration, Subsurface Detention	0.7
2006-BRID-200-01	Combined	Verified	Delaware Direct	19137	Subsurface Infiltration	0.7

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2006-CCPO-276-01	Combined	Verified	Delaware Direct	19122	Surface Infiltration, Surface Detention	4.54
2006-CINT-431-01	Combined	Verified	Lower Schuylkill River	19131	Surface Detention	9.47
2006-COMM-328-01	Combined	Verified	Cobbs Creek	19139	Subsurface Detention, Cistern, Porous Pavement	0.93
2006-EDWI-215-01	Combined	Verified	Delaware Direct	19136	Subsurface Detention, Disconnected Impervious Area	0.76
2006-FAIR-175-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration	1.24
2006-FEDE-409-01	Combined	Verified	Delaware Direct	19106	Subsurface Detention, Green Roof	0.27
2006-FRON-290-01	Combined	Verified	Delaware Direct	19140	Subsurface Infiltration	0.45
2006-GENE-192-01	Combined	Verified	Delaware Direct	19123	Subsurface Detention	0.3
2006-HESS-267-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Detention	0.63
2006-HOPE-447-01	Combined	Verified	Delaware Direct	19122	Porous Pavement	0.5
2006-HUNT-445-01	Combined	Verified	Delaware Direct	19133	Subsurface Infiltration, Porous Pavement	1.36
2006-LAWT-291-01	Combined	Verified	Delaware Direct	19135	Subsurface Detention	1.17
2006-LE22-460-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration, Porous Pavement	0.68
2006-MICH-419-01	Combined	Verified	Delaware Direct	19125	Subsurface Infiltration, Porous Pavement	0.37
2006-NATI-441-01	Combined	Verified	Delaware Direct	19106	Subsurface Detention	0.52
2006-NEWF-343-01	Combined	Verified	Pennypack Creek	19136	Subsurface Infiltration	2.51
2006-OVER-462-01	Combined	Verified	Lower Schuylkill River	19151	Subsurface Infiltration	1.77
2006-PASQ-416-01	Combined	Verified	Tacony-Frankford Creek	19124	Subsurface Detention	0.32
2006-PENN-421-01	Combined	Verified	Lower Schuylkill River	19107	Subsurface Detention	2.3
2006-PHIL-205-01	Combined	Verified	Delaware Direct	19123	Subsurface Detention, Porous Pavement	0.14
2006-PILG-444-01	Combined	Verified	Delaware Direct	19111	Subsurface Infiltration	1.09
2006-PIZZ-242-01	Combined	Verified	Tacony-Frankford Creek	19138	Subsurface Infiltration	0.15

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2006-PREF-176-01	Combined	Verified	Delaware Direct	19148	Subsurface Detention	1.6
2006-PROG-400-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration	3.65
2006-PROP-233-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Infiltration	1.04
2006-REBA-275-01	Combined	Verified	Lower Schuylkill River	19143	Subsurface Infiltration	2.14
2006-SAFE-234-01	Combined	Verified	Delaware Direct	19134	Subsurface Detention, Bioretention	0.56
2006-SOLI-300-01	Combined	Verified	Delaware Direct	19149	Subsurface Infiltration, Bioretention	1.99
2006-STHE-171-01	Combined	Verified	Lower Schuylkill River	19130	Subsurface Infiltration	0.41
2006-STJO-273-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Infiltration, Porous Pavement	1.1
2006-TACO-337-01	Combined	Verified	Delaware Direct	19149	Subsurface Infiltration	0.18
2006-TEMP-197-01	Combined	Verified	Tacony-Frankford Creek	19138	Subsurface Detention, Porous Pavement	0.22
2006-TEMP-210-01	Combined	Verified	Delaware Direct	19122	Subsurface Detention, Porous Pavement	0.6
2006-TEMP-245-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration	1.06
2006-UNIO-235-01	Combined	Verified	Lower Schuylkill River	19104	Surface Infiltration, Subsurface Detention, Porous Pavement, Disconnected Impervious Area	1.05
2006-VAUX-338-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Detention	1.33
2006-WALN-251-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof, Porous Pavement	0.67
2007-1615-544-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration, Porous Pavement	0.55
2007-4839-625-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Detention	0.95
2007-AROU-626-01	Combined	Verified	Tacony-Frankford Creek	19144	Subsurface Infiltration	0.46
2007-CECI-556-01	Combined	Verified	Delaware Direct	19121	Subsurface Detention	1.08
2007-CECI-561-01	Combined	Verified	Delaware Direct	19121	Subsurface Infiltration, Subsurface Detention	0.78
2007-DREX-669-01	Combined	Verified	Lower Schuylkill River	19104	Cistern, Porous Pavement, Disconnected Impervious Area	0.81
2007-EYEI-616-01	Combined	Verified	Tacony-Frankford Creek	19141	Subsurface Detention	0.37

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2007-GAMB-624-01	Combined	Verified	Tacony-Frankford Creek	19124	Porous Pavement	0.07
2007-GAMB-701-01	Combined	Verified	Tacony-Frankford Creek	19124	Bioinfiltration, Porous Pavement	1.54
2007-GERM-647-01	Combined	Verified	Tacony-Frankford Creek	19144	Subsurface Detention, Bioinfiltration, Bioretention, Cistern, Green Roof	0.81
2007-GUIO-721-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Detention, Porous Pavement	1.35
2007-HACE-731-01	Combined	Verified	Delaware Direct	19140	Subsurface Infiltration, Disconnected Impervious Area	0.52
2007-HERR-690-01	Combined	Verified	Delaware Direct	19147	Porous Pavement, Disconnected Impervious Area	0.56
2007-HOWI-498-01	Combined	Verified	Delaware Direct	19123	Subsurface Detention	0.34
2007-LASA-593-01	Combined	Verified	Tacony-Frankford Creek	19144	Subsurface Infiltration, Porous Pavement	10.63
2007-MCDO-558-01	Combined	Verified	Delaware Direct	19133	Subsurface Detention	0.54
2007-MCDO-560-01	Combined	Verified	Delaware Direct	19135	Subsurface Detention	0.06
2007-MTTA-480-01	Combined	Verified	Delaware Direct	19123	Green Roof, Porous Pavement	0.33
2007-PASH-524-01	Combined	Verified	Cobbs Creek	19142	Subsurface Infiltration	0.83
2007-POWE-679-01	Combined	Verified	Lower Schuylkill River	19104	Disconnected Impervious Area	0.37
2007-PRAD-489-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration	1.45
2007-SAIN-553-01	Combined	Verified	Lower Schuylkill River	19131	Porous Pavement	3.58
2007-SIMO-496-01	Combined	Verified	Tacony-Frankford Creek	19138	Bioinfiltration, Porous Pavement	0.52
2007-SOUT-557-01	Combined	Verified	Delaware Direct	19148	Subsurface Detention	0.12
2007-THEC-538-01	Combined	Verified	Cobbs Creek	19143	Green Roof, Porous Pavement	0.55
2007-THEL-606-01	Combined	Verified	Tacony-Frankford Creek	19119	Subsurface Detention	0.49
2007-THEM-495-01	Combined	Verified	Lower Schuylkill River	19131	Surface Detention, Subsurface Detention	6.38
2007-UNIV-633-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration, Bioinfiltration, Disconnected Impervious Area	0.36

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2007-WARN-646-01	Combined	Verified	Delaware Direct	19133	Subsurface Infiltration	2.07
2007-WARN-651-01	Combined	Verified	Delaware Direct	19133	Subsurface Infiltration	2.66
2007-WASH-642-01	Combined	Verified	Delaware Direct	19146	Subsurface Infiltration	0.99
2007-WEST-684-01	Combined	Verified	Cobbs Creek	19139	Subsurface Detention	0.01
2007-WILL-699-01	Combined	Verified	Delaware Direct	19134	Subsurface Detention, Bioretention	5.03
2008-1600-898-01	Combined	Verified	Delaware Direct	19122	Bioretention	0.5
2008-20UN-767-01	Combined	Verified	Lower Schuylkill River	19104	Green Roof, Porous Pavement	0.4
2008-2116-992-01	Combined	Verified	Lower Schuylkill River	19103	Surface Detention, Bioretention, Green Roof	0.45
2008-4014-979-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration, Disconnected Impervious Area	0.47
2008-CAST-875-01	Combined	Verified	Delaware Direct	19149	Subsurface Detention	0.02
2008-CLAS-765-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration, Porous Pavement, Disconnected Impervious Area	0.34
2008-COMM-763-01	Combined	Verified	Lower Schuylkill River	19130	Subsurface Infiltration, Green Roof, Porous Pavement	2.34
2008-DREX-788-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration, Bioinfiltration, Porous Pavement	1.47
2008-DREX-950-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof	0.23
2008-FRAN-921-01	Combined	Verified	Lower Schuylkill River	19104	Porous Pavement	0.25
2008-FRAN-994-01	Combined	Verified	Delaware Direct	19130	Subsurface Infiltration, Porous Pavement	0.66
2008-MART-980-01	Combined	Verified	Delaware Direct	19147	Subsurface Infiltration	0.6
2008-NAVA-893-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Infiltration	5.67
2008-NEWK-958-01	Combined	Verified	Delaware Direct	19122	Subsurface Detention, Bioinfiltration, Green Roof, Porous Pavement	5.15
2008-NEWL-778-01	Combined	Verified	Delaware Direct	19140	Subsurface Infiltration	0.45
2008-NEWL-839-01	Combined	Verified	Delaware Direct	19140	Subsurface Infiltration	0.48

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2008-NORT-1012-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration, Disconnected Impervious Area	0.4
2008-PROP-824-01	Combined	Verified	Lower Schuylkill River	19139	Subsurface Infiltration, Porous Pavement	5.4
2008-ROLA-813-01	Combined	Verified	Tacony-Frankford Creek	19141	Subsurface Infiltration, Green Roof	0.24
2008-ROTE-960-01	Combined	Verified	Delaware Direct	19148	Subsurface Detention, Bioretention, Porous Pavement	1.58
2008-SCHM-902-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration, Green Roof, Porous Pavement, Disconnected Impervious Area	4.37
2008-SHER-926-01	Combined	Verified	Delaware Direct	19122	Green Roof, Porous Pavement	0.24
2008-STRA-799-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration, Porous Pavement	0.42
2008-STRA-802-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration, Porous Pavement	0.34
2008-THEC-806-01	Combined	Verified	Delaware Direct	19103	Subsurface Detention, Green Roof	0.21
2008-WALG-838-01	Combined	Verified	Delaware Direct	19146	Subsurface Detention, Bioretention	0.5
2008-WOOD-864-01	Combined	Verified	Lower Schuylkill River	19104	Porous Pavement	0.45
2009-GLOB-1016-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Detention, Bioretention	1.75
2009-PENN-1019-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Bioretention	3.94
2009-IATS-1023-01	Combined	Verified	Delaware Direct	19148	Subsurface Detention, Green Roof	0.79
2009-PRES-1037-01	Combined	Verified	Tacony-Frankford Creek	19150	Subsurface Infiltration, Bioretention, Porous Pavement	1.92
2009-DORA-1041-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Infiltration, Porous Pavement	0.4
2009-STRA-1050-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration	0.22
2009-STRA-1055-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration	0.25
2009-MANT-1033-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration	3.64
2009-LAWR-1044-01	Combined	Verified	Delaware Direct	19140	Subsurface Infiltration, Porous Pavement	2.95
2009-SIST-1062-01	Combined	Verified	Lower Schuylkill River	19103	Disconnected Impervious Area	0.15
2009-NEWH-1079-01	Combined	Verified	Lower Schuylkill River	19139	Subsurface Infiltration	0.34

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2009-TEMP-1077-01	Combined	Verified	Delaware Direct	19122	Subsurface Detention, Bioretention, Porous Pavement	0.91
2009-TDBA-1072-01	Combined	Verified	Delaware Direct	19149	Subsurface Infiltration, Bioinfiltration, Disconnected Impervious Area	1.1
2009-2007-1090-01	Combined	Verified	Delaware Direct	19148	Subsurface Detention	17.72
2009-PHIL-1101-01	Combined	Verified	Lower Schuylkill River	19102	Subsurface Detention, Bioretention	0.26
2009-TEMP-1096-01	Combined	Verified	Delaware Direct	19122	Porous Pavement	1.48
2009-FRAN-1130-01	Combined	Verified	Delaware Direct	19137	Subsurface Infiltration	4.08
2009-PECO-1133-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Infiltration	2.75
2009-SIST-1131-01	Combined	Verified	Lower Schuylkill River	19103	Subsurface Infiltration, Green Roof, Disconnected Impervious Area	0.37
2009-HELP-1138-01	Combined	Verified	Lower Schuylkill River	19153	Subsurface Infiltration	3.73
2009-NICE-1136-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Detention, Bioretention	0.41
2009-JANN-1141-01	Combined	Verified	Lower Schuylkill River	19104	Green Roof, Porous Pavement, Disconnected Impervious Area	0.27
2009-PRIN-1147-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration, Green Roof	0.51
2009-CANC-1145-01	Combined	Verified	Tacony-Frankford Creek	19124	Surface Detention, Bioretention	6.14
2009-HAWT-1102-01	Combined	Verified	Delaware Direct	19147	Porous Pavement, Disconnected Impervious Area	0.3
2009-SCHU-1140-01	Combined	Verified	Lower Schuylkill River	19103	Disconnected Impervious Area	0.69
2009-THEM-1167-01	Combined	Verified	Delaware Direct	19121	Green Roof, Porous Pavement	0.39
2009-WALM-1045-01	MS4	Verified	Delaware Direct	19148	Direct Discharge	7.99
2009-WOLC-1169-01	Combined	Verified	Tacony-Frankford Creek	19138	Subsurface Detention, Bioinfiltration	1.72
2009-PENN-1144-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof, Porous Pavement, Disconnected Impervious Area	0.44
2009-RODI-1176-01	Combined	Verified	Lower Schuylkill River	19130	Subsurface Infiltration	0.18
2009-THEC-1174-01	Combined	Verified	Delaware Direct	19135	Bioretention, Green Roof	0.55

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2009-THEP-1173-01	Combined	Verified	Lower Schuylkill River	19140	Green Roof	0.09
2009-7149-1186-01	Combined	Verified	Delaware Direct	19135	Subsurface Infiltration, Disconnected Impervious Area	0.35
2009-PARK-1197-01	Combined	Verified	Lower Schuylkill River	19104	Bioinfiltration, Disconnected Impervious Area	0.11
2009-PHIL-1205-01	Combined	Verified	Delaware Direct	19148	Porous Pavement	14.6
2009-CONG-1210-01	Combined	Verified	Delaware Direct	19133	Subsurface Infiltration, Porous Pavement	2.8
2009-PASC-1226-01	Combined	Verified	Cobbs Creek	19142	Subsurface Infiltration, Porous Pavement	3.25
2010-BRID-1233-01	Combined	Verified	Delaware Direct	19137	Subsurface Infiltration, Porous Pavement	1.08
2010-PSDC-1234-01	Combined	Verified	Delaware Direct	19147	Subsurface Infiltration	1.08
2010-PASC-1238-01	Combined	Verified	Cobbs Creek	19142	Subsurface Infiltration, Porous Pavement	2.17
2010-STJO-1239-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Infiltration, Bioinfiltration, Green Roof	1
2010-ESPE-1288-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Infiltration	1.05
2010-1800-1260-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Infiltration	0.84
2010-4109-1277-01	Combined	Verified	Lower Schuylkill River	19104	Green Roof, Porous Pavement	0.21
2010-411W-1300-01	Combined	Verified	Delaware Direct	19122	Subsurface Detention, Bioretention	0.15
2010-UNIV-1312-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof	0.72
2010-TEMP-1302-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration, Cistern, Disconnected Impervious Area	2.92
2010-8828-1321-01	Combined	Verified	Pennypack Creek	19136	Subsurface Infiltration	1.18
2010-3737-1331-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof	0.29
2010-WATE-1343-01	Combined	Verified	Delaware Direct	19123	Disconnected Impervious Area	0.05
2010-BROA-1347-01	Combined	Verified	Tacony-Frankford Creek	19141	Subsurface Infiltration	0.86
2010-PSPH-1353-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Infiltration, Green Roof	8.42
2010-PNKW-1360-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Infiltration, Porous Pavement	2.26

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2010-HUNT-1351-01	Combined	Verified	Tacony-Frankford Creek	19140	Disconnected Impervious Area	0.06
2010-PHIL-1362-01	Combined	Verified	Delaware Direct	19148	Surface Detention, Bioretention	2.17
2010-CHOP-1367-01	Combined	Verified	Lower Schuylkill River	19104	Surface Detention, Green Roof, Disconnected Impervious Area	2.61
2010-GEST-1346-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Detention	1.09
2010-PROP-1376-01	Combined	Verified	Delaware Direct	19141	Subsurface Infiltration, Bioinfiltration	2.36
2010-ARCH-1393-01	Combined	Verified	Delaware Direct	19122	Green Roof	0.2
2010-DREX-1399-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof	1.49
2010-DICK-1410-01	Combined	Verified	Delaware Direct	19148	Porous Pavement, Disconnected Impervious Area	0.65
2010-1940-1435-01	Combined	Verified	Delaware Direct	19140	Subsurface Infiltration, Porous Pavement	0.55
2010-5526-1348-01	Combined	Verified	Darby Creek	19139	Subsurface Infiltration, Porous Pavement	0.45
2010-CREA-1427-01	Combined	Verified	Delaware Direct	19125	Green Roof, Porous Pavement	0.3
2010-NORT-1449-01	Combined	Verified	Tacony-Frankford Creek	19124	Subsurface Infiltration	0.92
2010-EARL-1460-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Infiltration	0.45
2010-PLEA-1444-01	Combined	Verified	Tacony-Frankford Creek	19119	Subsurface Detention, Green Roof, Disconnected Impervious Area	0.16
2010-DILW-1442-01	Combined	Verified	Lower Schuylkill River	19107	Subsurface Detention	0.72
2010-PHIL-1469-01	Combined	Verified	Delaware Direct	19148	Subsurface Detention, Bioretention, Disconnected Impervious Area	3.39
2010-NORR-1475-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration, Disconnected Impervious Area	2.1
2010-4FRA-1464-01	Combined	Verified	Lower Schuylkill River	19103	Subsurface Detention, Green Roof	0.89
2010-AGIL-1461-01	Combined	Verified	Delaware Direct	19121	Subsurface Infiltration, Disconnected Impervious Area	1.36
2010-UNIV-1385-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Bioretention, Disconnected Impervious Area	1.41
2011-PROP-1483-01	Combined	Verified	Tacony-Frankford Creek	19144	Surface Infiltration, Porous Pavement	1.55

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2011-CANC-1485-01	Combined	Verified	Tacony-Frankford Creek	19124	Green Roof	0.17
2011-LOCU-1503-01	Combined	Verified	Lower Schuylkill River	19104	Disconnected Impervious Area	0.2
2011-CONV-1491-01	Combined	Verified	Lower Schuylkill River	19107	Subsurface Detention, Green Roof	0.25
2011-STMA-1508-01	Combined	Verified	Delaware Direct	19147	Subsurface Infiltration, Subsurface Detention, Green Roof,Porous Pavement	0.52
2011-KARA-1505-01	Combined	Verified	Lower Schuylkill River	19139	Subsurface Infiltration, Porous Pavement, Disconnected Impervious Area	3.96
2011-HAMI-1518-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration, Cistern, Green Roof, Disconnected Impervious Area	1.91
2011-FAIR-1488-01	Combined	Verified	Delaware Direct	19130	Subsurface Detention, Green Roof	0.39
2011-MONT-1516-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration	2.83
2011-CHRI-1545-01	Combined	Verified	Delaware Direct	19147	Subsurface Infiltration, Green Roof, Porous Pavement	0.95
2010-GRAN-1432-01	Combined	Verified	Lower Schuylkill River	19130	Subsurface Detention, Green Roof	0.58
2011-4240-1543-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Infiltration	0.74
2011-CCTD-1535-01	Combined	Verified	Lower Schuylkill River	19139	Subsurface Infiltration	1.04
2011-HAGE-1562-01	Combined	Verified	Delaware Direct	19125	Subsurface Infiltration, Porous Pavement	1.51
2011-SAMU-1569-01	Combined	Verified	Delaware Direct	19111	Porous Pavement	0.4
2011-HOME-1571-01	Combined	Verified	Delaware Direct	19107	Subsurface Detention, Bioretention, Green Roof	0.15
2011-TOLL-1586-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Infiltration, Green Roof	2.36
2011-DIAM-1617-01	Combined	Verified	Delaware Direct	19140	Subsurface Detention, Green Roof	0.44
2011-NEWN-1620-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration, Green Roof, Porous Pavement	0.88
2011-DOLL-1636-01	Combined	Verified	Tacony-Frankford Creek	19144	Subsurface Infiltration	0.32
2011-TEMP-1622-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration, Green Roof, Blue Roof, Porous Pavement	1.93
2011-DREX-1638-01	Combined	Verified	Lower Schuylkill River	19104	Bioretention, Green Roof	0.78

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2011-3343-1653-01	Combined	Verified	Tacony-Frankford Creek	19144	Subsurface Infiltration, Porous Pavement	0.68
2011-8318-1655-01	Combined	Verified	Lower Schuylkill River	19121	Green Roof, Porous Pavement	0.23
2011-BOTT-1646-01	Combined	Verified	Tacony-Frankford Creek	19124	Subsurface Detention, Bioretention	2.71
2011-PHIL-1596-01	Combined	Verified	Lower Schuylkill River	19104	Surface Infiltration, Bioretention, Porous Pavement, Disconnected Impervious Area	3.15
2011-PROP-1662-01	Combined	Verified	Lower Schuylkill River	19130	Surface Infiltration, Subsurface Infiltration	3.68
2011-WEST-1675-01	Combined	Verified	Lower Schuylkill River	19139	Depaving	0
2011-JWSD-1674-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration	1.82
2011-33RD-1697-01	Combined	Verified	Lower Schuylkill River	19132	Bioretention, Green Roof	0.09
2011-GREE-1706-01	Combined	Verified	Tacony-Frankford Creek	19138	Surface Infiltration, Subsurface Detention, Porous Pavement	1.9
2011-PENN-1664-01	Combined	Verified	Lower Schuylkill River	19104	Porous Pavement	0.19
2011-TEMP-1739-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration, Subsurface Detention, Bioretention, Cistern, Porous Pavement	2.14
2011-NICE-1728-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Infiltration, Porous Pavement	0.3
2011-NICE-1729-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Detention, Porous Pavement	0.51
2011-NICE-1730-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Infiltration, Porous Pavement	1.11
2012-1900-1754-01	Combined	Verified	Lower Schuylkill River	19145	Green Roof, Porous Pavement	0.59
2012-SOUT-1782-01	Combined	Verified	Delaware Direct	19102	Subsurface Detention, Green Roof	0.76
2012-CENT-1791-01	Combined	Verified	Delaware Direct	19122	Porous Pavement	1.34
2012-BUIL-1807-01	Combined	Verified	Tacony-Frankford Creek	19111	Disconnected Impervious Area	0.08
2012-CANC-1770-01	Combined	Verified	Tacony-Frankford Creek	19124	Bioinfiltration, Green Roof	0.56
2012-SPRU-1813-01	Combined	Verified	Delaware Direct	19107	Subsurface Detention, Green Roof	0.1
2012-1426-1805-01	Combined	Verified	Lower Schuylkill River	19102	Green Roof, Blue Roof	0.32

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2012-RODE-1835-01	Combined	Verified	Delaware Direct	19130	Subsurface Infiltration	0.7
2012-INGE-1798-01	Combined	Verified	Delaware Direct	19121	Subsurface Infiltration	0.89
2012-412N-1844-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration, Green Roof, Porous Pavement	1.15
2012-HUNT-1764-01	Combined	Verified	Tacony-Frankford Creek	19140	Porous Pavement, Disconnected Impervious Area	1.77
2012-915N-1854-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration, Porous Pavement	0.82
2012-UNIV-1848-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Bioinfiltration, Green Roof, Porous Pavement, Disconnected Impervious Area	1.57
2012-PROP-1883-01	Combined	Verified	Tacony-Frankford Creek	19138	Subsurface Infiltration	0.97
2012-WISS-1891-01	Combined	Verified	Tacony-Frankford Creek	19138	Bioretention	1.3
2012-EPIS-1888-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof	0.21
2012-1220-1913-01	Combined	Verified	Delaware Direct	19123	Green Roof, Porous Pavement	0.42
2012-SENI-1900-01	Combined	Verified	Lower Schuylkill River	19145	Subsurface Detention, Bioretention	0.42
2012-PENN-1774-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Bioinfiltration	0.86
2012-SYSC-1931-01	Combined	Verified	Delaware Direct	19148	Bioretention	3.94
2012-CIRA-1937-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention, Green Roof	2.14
2012-ESPE-1947-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Detention, Porous Pavement	3.66
2012-701W-2002-01	Combined	Verified	Delaware Direct	19133	Subsurface Infiltration, Subsurface Detention, Disconnected Impervious Area	4.67
2012-LINC-2012-01	Combined	Verified	Delaware Direct	19148	Bioinfiltration, Porous Pavement	1.81
2012-TDBA-2047-01	Combined	Verified	Delaware Direct	19149	Subsurface Infiltration, Bioinfiltration	0.82
2012-RIVE-2027-01	Combined	Verified	Lower Schuylkill River	19104	Porous Pavement	3.33
2013-9THS-2075-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration	4.6
2013-DREX-2081-01	Combined	Verified	Lower Schuylkill River	19104	Surface Detention, Subsurface Detention	1.33

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2013-SETT-2085-01	Combined	Verified	Tacony-Frankford Creek	19144	Subsurface Detention, Bioinfiltration, Porous Pavement	2.11
2013-COBB-2080-01	Combined	Verified	Cobbs Creek	19143	Subsurface Detention, Bioretention, Disconnected Impervious Area	0.76
2013-STCH-2103-01	Combined	Verified	Delaware Direct	19134	Bioinfiltration, Bioretention, Disconnected Impervious Area	4.59
2013-1901-2109-01	Combined	Verified	Lower Schuylkill River	19146	Subsurface Infiltration, Green Roof, Porous Pavement	0.56
2013-8268-2116-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration	0.4
2013-HALP-2134-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration	1.61
2013-STCH-2149-01	Combined	Verified	Delaware Direct	19134	Bioretention	3.76
2013-CECI-2157-01	Combined	Verified	Lower Schuylkill River	19121	Subsurface Infiltration, Green Roof	0.85
2013-THES-2177-01	Combined	Verified	Delaware Direct	19123	Subsurface Infiltration	1.17
2013-PROP-2163-01	Combined	Verified	Tacony-Frankford Creek	19141	Subsurface Infiltration	0.87
2013-TEMP-2178-01	Combined	Verified	Delaware Direct	19140	Subsurface Detention, Bioretention	1.13
2013-TACO-2197-01	Combined	Verified	Delaware Direct	19135	Subsurface Detention, Bioinfiltration	2.05
2013-HELP-2241-01	Combined	Verified	Lower Schuylkill River	19153	Surface Infiltration	1.78
2013-1118-2248-01	Combined	Verified	Delaware Direct	19107	Surface Detention, Green Roof, Porous Pavement	0.79
2013-23RD-2272-01	Combined	Verified	Lower Schuylkill River	19140	Subsurface Infiltration	0.42
2013-1601-2261-01	Combined	Verified	Delaware Direct	19148	Subsurface Infiltration	0.85
2013-CHOP-2288-01	Combined	Verified	Delaware Direct	19145	Subsurface Detention, Bioretention, Porous Pavement	1.22
2013-EDBE-2293-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration	4.21
2013-MAST-2259-01	Combined	Verified	Lower Schuylkill River	19121	Disconnected Impervious Area	0.58
2013-ALDI-2287-01	Combined	Verified	Darby Creek	19151	Bioretention	0.3
2013-3541-2376-01	Combined	Verified	Delaware Direct	19147	Subsurface Infiltration	0.55
2014-STJO-2424-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration, Disconnected Impervious Area	5.56

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2014-GSTR-2443-01	Combined	Verified	Tacony-Frankford Creek	19124	Subsurface Infiltration	1.07
2014-PHAO-2459-01	Combined	Verified	Lower Schuylkill River	19132	Subsurface Detention, Bioretention, Porous Pavement	0.43
2014-DREX-2457-01	Combined	Verified	Lower Schuylkill River	19104	Porous Pavement	2.55
2014-1325-2469-01	Combined	Verified	Delaware Direct	19121	Subsurface Detention, Bioretention	0.8
2014-PERE-2472-01	Combined	Verified	Lower Schuylkill River	19104	Subsurface Detention	0.57
2014-PHAG-2547-01	Combined	Verified	Lower Schuylkill River	19132	Subsurface Detention, Bioretention	0.31
2014-ENVI-2646-01	Combined	Verified	Delaware Direct	19148	Surface Infiltration, Subsurface Detention, Bioretention	1.97
2014-VERN-2690-01	Combined	Verified	Tacony-Frankford Creek	19144	Porous Pavement, Disconnected Impervious Area	0.55
2014-2322-2715-01	Combined	Verified	Lower Schuylkill River	19130	Subsurface Infiltration, Porous Pavement	0.43
2014-TEMP-2699-01	Combined	Verified	Delaware Direct	19121	Disconnected Impervious Area	0.4
2014-UNIV-2747-01	Combined	Verified	Lower Schuylkill River	19104	Porous Pavement	0.53
2014-CHIC-2755-01	Combined	Verified	Tacony-Frankford Creek	19124	Subsurface Infiltration	0.54
2015-WAYN-2771-01	Combined	Verified	Tacony-Frankford Creek	19144	Subsurface Infiltration, Porous Pavement	1.16
2014-PAND-2762-01	Combined	Verified	Delaware Direct	19134	Subsurface Infiltration	0.33
2015-TEMP-2829-01	Combined	Verified	Delaware Direct	19122	Subsurface Infiltration, Porous Pavement	0.22
FY16-FRAN-4076-01	Combined	Verified	Tacony-Frankford Creek	19124	Disconnected Impervious Area	0.02
FY16-TEMP-4277-01	Combined	Verified	Delaware Direct	19122	Porous Pavement	0.38
FY16-LASA-4354-01	Combined	Verified	Tacony-Frankford Creek	19141	Porous Pavement	0.16
Total Greened Acres:						**455.78**

Table 2: Complete SMIP and GARP Green Stormwater Infrastructure Projects

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2010-COMM-1370-01	Combined	Verified	Delaware Direct	19140	Green Roof	0.08
2011-1518-1561-01	Combined	Verified	Delaware Direct	19130	Subsurface Infiltration	0.17

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2011-2150-1616-01	Combined	Verified	Delaware Direct	19134	Subsurface Infiltration	1.43
2011-RETR-001-01	Combined	Verified	Lower Schuylkill River	19142	Disconnected Impervious Area	0.26
2012-5818-1784-01	Combined	Verified	Tacony-Frankford Creek	19144	Bioinfiltration	0.11
2012-6225-1857-01	Combined	Verified	Delaware Direct	19135	Bioinfiltration	0.34
2012-GSFS-2028-01	Combined	Verified	Tacony-Frankford Creek	19144	Bioretention, Disconnected Impervious Area	1.04
2012-NEWM-1776-01	Combined	Verified	Delaware Direct	19135	Cistern	1.01
2012-ROOF-1869-01	Combined	Verified	Delaware Direct	19125	Direct Discharge	0.87
2012-THEE-1746-01	Combined	Verified	Lower Schuylkill River	19139	Green Roof	0.06
2012-WOLF-1792-01	Combined	Verified	Delaware Direct	19137	Direct Discharge	11.74
2013-1148-2105-01	Combined	Verified	Delaware Direct	19127	Surface Infiltration, Subsurface Infiltration, Green Roof	0.67
2013-6225-2400-01	Combined	Verified	Delaware Direct	19135	Subsurface Infiltration	2.96
2013-CARD-2076-01	Combined	Verified	Delaware Direct	19124	Surface Detention, Subsurface Detention	52.99
2013-CARD-2220-01	Combined	Verified	Tacony-Frankford Creek	19124	Surface Detention	15.37
2013-METH-2117-01	Combined	Verified	Lower Schuylkill River	19131	Bioinfiltration	1.72
2013-SITE-2387-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Infiltration	5.27
2013-SITE-2401-01	Combined	Verified	Lower Schuylkill River	19131	Subsurface Infiltration	3.41
2014-GLOB-2467-01	Combined	Verified	Tacony-Frankford Creek	19124	Surface Detention	0.58
2014-SITE-2501-01	Combined	Verified	Lower Schuylkill River	19131	Bioinfiltration	35.53
2014-SITE-2549-01	Combined	Verified	Lower Schuylkill River	19145	Subsurface Infiltration	3.28
2014-SITE-2550-01	Combined	Verified	Delaware Direct	19135	Subsurface Infiltration	1.67
2014-SITE-2592-01	Combined	Verified	Lower Schuylkill River	19153	Subsurface Infiltration	9.08
2014-SITE-2665-01	Combined	Verified	Lower Schuylkill River	19145	Subsurface Infiltration, Subsurface Detention	8.92
2014-SITE-2666-01	Combined	Verified	Lower Schuylkill River	19153	Subsurface Infiltration	2.7
2014-SITE-2682-01	Combined	Verified	Lower Schuylkill River	19131	Surface Infiltration, Subsurface Detention	7.43
2014-WARR-2757-01	Combined	Verified	Tacony-Frankford Creek	19124	Bioretention	3.11
2015-FRAN-2954-01	Combined	Verified	Delaware Direct	19130	Surface Detention	0.59
2015-LASA-2865-01	Combined	Verified	Tacony-Frankford Creek	19141	Surface Detention	7.36

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
2015-LEAE-2888-01	Combined	Verified	Lower Schuylkill River	19036	Subsurface Infiltration, Bioinfiltration, Porous Pavement	1.96
2015-LIGH-2907-01	Combined	Verified	Delaware Direct	19140	Surface Detention	0.7
2015-MART-2832-01	Combined	Verified	Tacony-Frankford Creek	19138	Subsurface Infiltration, Bioinfiltration	3.81
2015-MAYF-2796-01	Combined	Verified	Delaware Direct	19149	Biorentention	4.78
2015-MINK-2844-01	Combined	Verified	Lower Schuylkill River	19145	Surface Infiltration	0.73
2015-NORT-2977-01	Combined	Verified	Tacony-Frankford Creek	19124	Subsurface Infiltration, Subsurface Detention	17.56
2015-SITE-2809-01	Combined	Verified	Tacony-Frankford Creek	19120	Subsurface Infiltration, Subsurface Detention	21.92
2015-SITE-2810-01	Combined	Verified	Lower Schuylkill River	19153	Subsurface Detention	9.87
2015-STJA-2895-01	Combined	Verified	Tacony-Frankford Creek	19120	Surface Infiltration, Surface Detention, Subsurface Detention	0.48
2015-TAGG-2931-01	Combined	Verified	Delaware Direct	19148	Subsurface Infiltration, Bioinfiltration, Disconnected Impervious Area	0.93
FY16-ADAM-4101-01	Combined	Verified	Tacony-Frankford Creek	19124	Surface Detention, Disconnected Impervious Area	1.8
FY16-CHES-4233-01	Combined	Verified	Lower Schuylkill River	19146	Surface Infiltration, Subsurface Infiltration, Porous Pavement, Depaving	1.02
FY16-ESSI-4357-01	Combined	Verified	Lower Schuylkill River	19153	Subsurface Detention	8
FY16-FRIE-4238-01	Combined	Verified	Lower Schuylkill River	19102	Green Roof	0.17
FY16-GAUL-4273-01	Combined	Verified	Delaware Direct	19134	Subsurface Infiltration	1.21
FY16-NAME-4323-01	Combined	Verified	Tacony-Frankford Creek	19140	Subsurface Detention	7.48
FY16-PECO-4145-01	Combined	Verified	Lower Schuylkill River	19103	Green Roof	0.75
FY16-PHIL-4130-01	Combined	Verified	Darby Creek	19142	Depaving	0.17
FY16-PHIL-4134-01	Combined	Verified	Lower Schuylkill River	19130	Green Roof	0.14
FY16-SITE-4016-01	Combined	Verified	Lower Schuylkill River	19145	Subsurface Detention	6.38
FY16-SITE-4039-01	Combined	Verified	Delaware Direct	19148	Surface Detention, Subsurface Detention	5.7
FY16-SITE-4189-01	Combined	Verified	Tacony-Frankford Creek	19120	Surface Detention, Subsurface Detention	12.9
FY16-STHS-4226-01	Combined	Verified	Lower Schuylkill River	19145	Subsurface Detention, Bioretention	4.51
FY16-USGS-4133-01	Combined	Verified	Delaware Direct	19106	Green Roof	0.35
FY16-WAKE-4282-01	Combined	Verified	Delaware Direct	19137	Subsurface Detention	8.07
FY17-FSFA-4510-01	Combined	Verified	Delaware Direct	19122	Green Roof	0.14

Tracking Number	Sewer Type	Category	Watershed Type	Zip	SMP Types	Greened Acres
FY16-PHIL-4130-01	Combined	Verified	Darby Creek	19142	Depave	0.17
Total Greened Acres:						**301.28**

Appendix 4

Green Stormwater Infrastructure Monitoring Status Report

1.0 Introduction

During the reporting period of July 1, 2016 to June 30, 2017, the Water Department's *Green City, Clean Waters* program addressed stormwater runoff reductions in urbanized areas using a combination of traditional infrastructure and green stormwater infrastructure (GSI). GSI systems vary in size, complexity, and interconnectedness to the existing drainage system, but the objective is to evapotranspire, infiltrate, reuse, or detain stormwater rather than to convey it directly to the sewer system. Monitoring and testing GSI systems is therefore essential to determine the effectiveness of various SMP types in managing stormwater and reducing combined sewer overflows.

The focus of the *Green City, Clean Waters* monitoring program is post-construction performance monitoring and testing using various methods (*e.g.*, continuous water level monitoring, simulated runoff tests, etc.). The primary goal of GSI monitoring and testing is to measure the performance of GSI systems for reducing stormwater runoff volume. Secondary goals include providing information for improvements to GSI design and maintenance and developing appropriate monitoring methods for the variety of GSI projects installed city-wide.

Project characteristics such as contributing drainage area, storage volume, inlet capture efficiency, and (when present) slow release discharge parameters can be observed, allowing for a more complete view of a system's functionality. The comprehensive understanding of GSI through monitoring and testing allows the Water Department to make informed decisions for current and future projects regarding the GSI design standards, type and frequency of maintenance activities, and program optimization.

From July 1, 2016 to June 30, 2017, the Water Department performed monitoring and testing of GSI stormwater management practices (SMPs) using methods described in the Comprehensive Monitoring Plan (CMP) submitted January 10, 2014 and approved by PADEP May 28, 2014. An updated CMP with revised methodology will be submitted in the coming year. In selecting monitoring locations, the Water Department has attempted to allocate monitoring effort roughly according to the types of SMPs that are being constructed for the *Green City, Clean Waters* program as a whole (Table 1-1).

Table 1-1: Monitored SMPs by Type

SMP Type	Monitored SMPs	Total Constructed SMPs	Percent Monitored
Stormwater Tree Trench	167	217	77%
Stormwater Planter	7	49	14%
Stormwater Bump-out	1	18	5.5%
Rain Garden	30	74	40.5%
Stormwater Basin	0	3	0%
Infiltration/Storage Trench	34	80	42.5%
Pervious Paving	8	11	72%
Swale	1	9	11%
Subsurface Basin*	4	79	5%
Bioinfiltration/Bioretention*	14	31	45%
Total	**248**	**575**	**43.1%**

*The number of Total Constructed SMPs are SMIP/GARP projects only

2.0 Data Tracking

The data tracking mechanism for *Green City, Clean Waters* GSI monitoring data has evolved significantly since the inception of the program. Raw data are stored on an SMP-by-SMP basis in a filesystem directory tree that is backed up periodically. Derived data from quality assurance calculations are stored in spreadsheets and relational databases, to be used by various data analysis groups. System metrics and design characteristics are stored in other relational databases managed by PWD.

3.0 Comprehensive Monitoring Plan Implementation Status

Proposed methods for performance monitoring were outlined in both the draft Comprehensive Monitoring Plan submitted December 1, 2012 and in a comment response sent to PADEP and the EPA on July 31, 2013. A revised CMP was submitted on January 10th, 2014 and approved by PADEP on May 28, 2014. The following sections summarize the status of monitoring activities described in the CMP for July 1, 2016 through June 30, 2017. Updated monitoring procedures from the 2014 revision to the CMP will be described in the forthcoming CMP update.

3.1 Green Stormwater Infrastructure Performance Monitoring

Continuous water level and storage volume monitoring of GSI systems is the primary way that the Water Department is evaluating performance of constructed SMPs. In 2016/2017 307 HOBO U20-001-04 water level loggers (Onset Computer Corp, Bourne MA) have been deployed in 260 GSI systems (Tables 3-1 and 3-2, Figure 3-1). It should be noted that the number of water level sensors is greater than the number of systems because some systems have multiple SMPs and some SMPs have multiple observation wells. Additionally, 34 barometric pressure sensors were also deployed throughout the City to provide compensation for changes in barometric pressure. Each barometric sensor can provide data for multiple water level loggers. A one kilometer radius is the maximum distance used between a barometric sensor and water level loggers deployed in GSI system observation wells.

Table 3-1: Number of sensors and Average Deployment Duration for Continuous Water Level Monitoring Sensors

Sensor Type	Number Deployed FY17	Average Number of Days Deployed
Barometric Pressure Sensor	34	682
Water Level Sensor	307	276

Table 3-2: SMP Attributes for Continuous Water Level Monitoring SMPs

SMP ID	SMP Type	Project Name
1-1-1	Tree Trench	7th St, 8th St, and Cumberland St (Hartranft School)
1-2-1	Tree Trench	7th St, 8th St, and Cumberland St (Hartranft School)
1-3-1	Tree Trench	7th St, 8th St, and Cumberland St (Hartranft School)
3-1-1	Tree Trench	Belfield Ave from Chew Ave to Walnut Ln
3-2-1	Tree Trench	Belfield Ave from Chew Ave to Walnut Ln
3-3-1	Tree Trench	Belfield Ave from Chew Ave to Walnut Ln
3-4-1	Tree Trench	Belfield Ave from Chew Ave to Walnut Ln
3-5-1	Tree Trench	Belfield Ave from Chew Ave to Walnut Ln
3-6-1	Tree Trench	Belfield Ave from Chew Ave to Walnut Ln
8-1-1	Tree Trench	Montgomery Ave, Shissler Playground
8-2-1	Rain Garden	Shissler, south basin
9-1-1	Tree Trench	Palmer St from Frankford Ave to Blair St (Shissler Playground)
9-2-1	Tree Trench	Palmer St from Frankford Ave to Blair St (Shissler Playground)
10-1-1	Tree Trench	Thompson St and Columbia Ave
12-1-3	Infiltration/Storage Trench	4th St and Cambridge St (Bodine High School)
12-3-1	Tree Trench	Bodine HS, system 3
12-4-1	Tree Trench	Bodine HS, system 4
12-5-1	Tree Trench	4th St and Cambridge St (Bodine High School)
13-1-1	Infiltration/Storage Trench	Madison Memorial Park
14-1-2	Infiltration/Storage Trench	12th St and Reed St (Columbus Square)
15-1-1	Tree Trench	12th St from Dickinson to Tasker

SMP ID	SMP Type	Project Name
15-2-1	Tree Trench	12th St from Dickinson to Tasker
16-1-1	Tree Trench	10th St from Wilder to Reed
18-1-1	Tree Trench	16th St between Passyunk Ave and Jackson St
19-5-1	Tree Trench	Barry Playground
20-1-1	Planter	Bureau of Laboratory Services
20-2-1	Planter	Bureau of Laboratory Services
20-3-1	Planter	Bureau of Laboratory Services
20-4-1	Planter	Bureau of Laboratory Services
20-5-1	Planter	Bureau of Laboratory Services
20-6-1	Planter	Bureau of Laboratory Services
20-7-1	Planter	Bureau of Laboratory Services
20-8-1	Infiltration/Storage Trench	Bureau of Laboratory Services
20-9-1	Tree Trench	Bureau of Laboratory Services
20-10-1	Tree Trench	Bureau of Laboratory Services
21-1-1	Rain Garden	Blue Bell Inn Triangle Park
46-3-1	Bioinfiltration	Lancaster Ave from N 58th St to N 63rd St
46-4-1	Bioinfiltration	Lancaster Ave from N 58th St to N 63rd St
59-1-1	Tree Trench	Baltimore Ave Island
88-1-1	Infiltration/Storage Trench	Trenton Ave and Norris St
88-1-2	Rain Garden	Trenton Ave and Norris St
91-1-1	Tree Trench	3rd St and Fairmount Ave Intersection
123-1-1	Rain Garden	Elmwood and Lindberg
123-2-1	Tree Trench	59th and Chester
123-3-1	Tree Trench	59th and Florence
157-1-1	Tree Trench	Wakisha Charter School
157-2-1	Tree Trench	Wakisha Charter School
157-3-1	Tree Trench	Wakisha Charter School
162-3-1	Tree Trench	Chew Playground
162-4-1	Tree Trench	Chew Playground
167-1-1	Tree Trench	Little Sisters of the Poor-53rd and Chester
167-2-1	Tree Trench	Little Sisters of the Poor
167-3-1	Tree Trench	Little Sisters of the Poor-53rd and Kingsessing
170-1-1	Tree Trench	Shissler Playground
170-2-1	Tree Trench	Shissler Playground
175-1-1	Tree Trench	Frederick Douglas Elem.
176-1-1	Tree Trench	Philadelphia Military Academy
177-2-1	Tree Trench	MLK Rec Center
178-1-1	Tree Trench	Towey Rec., Berks
178-2-1	Tree Trench	Towey Rec., Masher St

SMP ID	SMP Type	Project Name
179-1-1	Tree Trench	Morris Leeds
179-2-1	Tree Trench	Morris Leeds
179-3-1	Tree Trench	Morris Leeds
179-4-1	Tree Trench	Morris Leeds
179-5-1	Tree Trench	Morris Leeds Middle School
179-6-1	Tree Trench	Morris Leeds
179-7-1	Tree Trench	Morris Leeds
179-8-1	Tree Trench	Morris Leeds
179-9-1	Tree Trench	Morris Leeds
179-10-1	Tree Trench	Morris Leeds
179-11-1	Tree Trench	Morris Leeds
179-12-1	Tree Trench	Morris Leeds
179-13-1	Tree Trench	Morris Leeds
179-14-1	Tree Trench	Morris Leeds
180-1-1	Tree Trench	Reese St
181-1-1	Rain Garden	47th & Grays Ferry
185-1-1	Infiltration/Storage Trench	Clark Park Basketball Court
186-1-1	Rain Garden	Cliveden Park
186-2-1	Rain Garden	Cliveden Park
187-3-3	Infiltration/Storage Trench	Columbus Square
192-1-1	Storage Trench	Herron Playground
194-1-1	Rain Garden	Liberty Lands
207-1-1	Tree Trench	Waterview
210-1-1	Infiltration/Storage Trench	Sayre High School
210-2-1	Infiltration/Storage Trench	Sayre High School
210-3-1	Tree Trench	Sayre High School
211-1-1	Bumpout	Haverford Ave, 57th St and Vine St (Shepard Recreation Center)
211-2-1	Tree Trench	Haverford Ave, 57th St and Vine St (Shepard Recreation Center)
211-3-1	Tree Trench	Haverford Ave, 57th St and Vine St (Shepard Recreation Center)
212-1-1	Tree Trench	Samuel B. Huey Elementary School
212-2-1	Tree Trench	Samuel B. Huey Elementary School
212-3-1	Tree Trench	Samuel B. Huey Elementary School
213-1-1	Tree Trench	Christy Rec Center
213-2-1	Tree Trench	Christy Rec Center
213-3-1	Tree Trench	Christy Rec Center
214-1-1	Tree Trench	William Harrity School
214-2-1	Tree Trench	William Harrity School
215-1-1	Tree Trench	Bryant Elementary School
215-2-1	Tree Trench	Bryant Elementary School

SMP ID	SMP Type	Project Name
216-1-1	Tree Trench	Andrew Hamilton School
223-1-1	Tree Trench	A.S. Jenks School
223-2-1	Tree Trench	A.S. Jenks School
224-1-1	Tree Trench	Sacks Playgound
224-2-1	Tree Trench	Sacks Playgound
224-3-1	Tree Trench	Sacks Playgound
226-1-1	Tree Trench	Smith Elementary
227-1-1	Tree Trench	St Thomas Aquinas School
227-2-1	Tree Trench	St Thomas Aquinas School
227-3-1	Tree Trench	St Thomas Aquinas School
231-1-1	Tree Trench	56th St, 57th St, Race St, and Vine St (Daroff School)
231-2-1	Tree Trench	56th St, 57th St, Race St, and Vine St (Daroff School)
233-1-1	Tree Trench	Belgrade and Marlborough
233-2-1	Tree Trench	Belgrade and Marlborough
234-1-1	Tree Trench	Franklin St. from Diamond to Norris
234-2-1	Tree Trench	Franklin St. from Diamond to Norris
234-3-1	Tree Trench	Franklin St. from Diamond to Norris
234-4-1	Tree Trench	Franklin St. from Diamond to Norris
234-5-1	Tree Trench	Franklin St. from Diamond to Norris
240-1-1	Pervious Paving	Percy St from Catharine St to Christian St
245-1-1	Tree Trench	25th and Diamond
250-1-1	Infiltration/Storage Trench	Belmont School
250-2-1	Infiltration/Storage Trench	Belmont School
250-3-1	Infiltration/Storage Trench	Belmont School
251-1-1	Tree Trench	49th St, Parrish St, and Ogden St (James Rhoads School)
252-1-1	Tree Trench	Sister Clara Muhammad School
252-2-1	Tree Trench	Sister Clara Muhammad School
253-1-1	Tree Trench	47th St, 48th St, Wyalusing Ave (Muhammed Square)
253-2-1	Tree Trench	47th St, 48th St, Wyalusing Ave (Muhammed Square)
253-3-1	Tree Trench	47th St, 48th St, Wyalusing Ave (Muhammed Square)
254-1-1	Tree Trench	Mastery Charter School
254-2-1	Tree Trench	Mastery Charter School
255-1-1	Tree Trench	Kenmore Rd, Haddington St, and Atwood Rd (Cassidy Elementary School)
255-2-1	Tree Trench	Kenmore Rd, Haddington St, and Atwood Rd (Cassidy Elementary School)
256-1-1	Tree Trench	62nd St and Lebanon (Overbrook Elementary)
257-1-1	Tree Trench	Old Cathedral Cemetary
258-1-1	Tree Trench	Donald Finnegan Playground
260-1-1	Tree Trench	E.H. Vare Middle School

SMP ID	SMP Type	Project Name
260-2-1	Tree Trench	E.H. Vare Middle School
261-1-1	Tree Trench	Stephen Girard School
262-1-1	Tree Trench	Southwark School
264-1-1	Tree Trench	57th St and Pentridge St (Longstreth School)
265-1-1	Tree Trench	66th and Regent St.
265-2-1	Infiltration/Storage Trench	Regent and 66th St.
265-3-1	Infiltration/Storage Trench	Regent and 67th St.
265-4-1	Infiltration/Storage Trench	66th and Regent
265-5-1	Tree Trench	Regent and 67th St.
266-1-1	Rain Garden	Springfield and Cobbs Creek
266-1-2	Infiltration/Storage Trench	Springfield and Cobbs Creek
266-1-3	Rain Garden	Springfield and Cobbs Creek
269-1-1	Tree Trench	Parking Lot- 12th, Marvine, and Diamond
269-2-1	Tree Trench	Parking Lot- 12th, Marvine, and Diamond
269-3-1	Tree Trench	Parking Lot- 12th, Marvine, and Diamond
269-4-1	Tree Trench	Parking Lot- 12th, Marvine, and Diamond
269-5-1	Tree Trench	Parking Lot- 12th, Marvine, and Diamond
270-1-1	Tree Trench	Dick Elementary, Diamond
270-2-1	Tree Trench	Dick Elementary, 24th
271-1-1	Infiltration/Storage Trench	Bridesburg Recreation Center/Bridesburg School
271-2-1	Tree Trench	Bridesburg Rec Center
271-3-1	Tree Trench	Bridesburg Rec Center
272-1-1	Tree Trench	White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School
272-2-1	Tree Trench	White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School
272-3-1	Tree Trench	White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School
272-4-1	Tree Trench	White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School
272-5-1	Tree Trench	White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School
272-6-1	Tree Trench	White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School
272-7-1	Tree Trench	White Hall Commons/Carmella Playground/Gambrell Recreation Center/Warren G Harding School
273-1-1	Tree Trench	Dorsey Playground
273-2-1	Tree Trench	Dorsey Playground
273-3-1	Tree Trench	Dorsey Playground
274-1-1	Tree Trench	Roosevelt Playground
274-2-1	Tree Trench	Roosevelt Playground
274-3-1	Tree Trench	Roosevelt Playground

SMP ID	SMP Type	Project Name
274-4-1	Infiltration/Storage Trench	Hellerman St, Cottage St, and Levick St (Roosevelt Playground)
275-1-1	Tree Trench	Magnolia Cemetary
277-1-1	Tree Trench	William Cramp
277-2-1	Tree Trench	William Cramp
279-1-1	Rain Garden	Harpers Hollow
280-1-1	Rain Garden	Kemble Park
280-2-1	Infiltration/Storage Trench	Kemble Park
280-3-1	Subsurface Basin	Kemble Park
280-4-1	Subsurface Basin	Kemble Park
281-1-1	Rain Garden	Wakefield
281-2-1	Rain Garden	Wakefield
282-1-1	Rain Garden	Wister Woods
282-2-1	Rain Garden	Wister Woods
282-3-1	Rain Garden	Wister Woods
282-4-1	Rain Garden	Wister Woods
285-1-1	Tree Trench	21st St from Venango to Pacific
296-1-1	Tree Trench	Poplar St. from 8th to Franklin
301-2-1	Tree Trench	Dauphin, Frankford to Tulip
312-1-1	Tree Trench	Dendy Rec Center
312-2-1	Tree Trench	Dendy Rec Center
313-1-1	Storage Trench	Passyunk Ave from Dickinson to Reed
324-1-1	Tree Trench	Earl St (Hetzell Playground)
325-1-1	Tree Trench	8th St
326-1-1	Tree Trench	Front St
327-1-1	Tree Trench	9th St
342-1-1	Tree Trench	Diamond St., 24th to 25th
366-2-1	Rain Garden	Philadelphia Zoo
366-2-2	Infiltration/Storage Trench	Philadelphia Zoo
366-3-1	Rain Garden	Philadelphia Zoo
366-4-1	Rain Garden	Philadelphia Zoo
366-5-1	Rain Garden	Philadelphia Zoo
366-6-1	Rain Garden	Philadelphia Zoo
366-9-1	Infiltration/Storage Trench	Philadelphia Zoo
366-10-3	Infiltration/Storage Trench	Philadelphia Zoo
392-1-1	Tree Trench	73rd & Grays Ave.
392-2-1	Tree Trench	73rd & Grays Ave.
393-1-1	Rain Garden	Dicks and 71st St.
393-2-1	Tree Trench	71st and Buist Ave.
393-3-1	Tree Trench	Buist Ave. and 71st St

SMP ID	SMP Type	Project Name
393-4-1	Infiltration/Storage Trench	Buist Ave. and 72st St.
393-5-1	Tree Trench	72nd St and Dicks Ave.
394-1-1	Tree Trench	Holbrook and Buist
394-2-1	Tree Trench	70th and Buist
394-3-1	Infiltration/Storage Trench	Buist and Holbrook
396-1-1	Tree Trench	65th St. and Elmwood
396-2-1	Tree Trench	Elmwood and 65th St.
396-3-1	Tree Trench	64th and Elmwood
397-1-1	Tree Trench	Chelwynde Ave. and 64th St
397-2-1	Tree Trench	63rd and Chelwynde Ave.
398-1-1	Tree Trench	St. James Episcopal
398-2-1	Tree Trench	St. James Episcopal
403-1-3	Infiltration/Storage Trench	George W. Nebinger School
403-1-4	Rain Garden	George W. Nebinger School
403-2-1	Infiltration/Storage Trench	George W. Nebinger School
417-1-1	Rain Garden	Stenton and Washington
445-1-1	Pervious Paving	Southwest Treatment Plant Parking Lot
470-1-1	Tree Trench	50th and Woodland
470-2-1	Tree Trench	61st and Woodland
470-3-1	Tree Trench	68th and Woodland
470-4-1	Tree Trench	70th and Woodland
479-1-1	Rain Garden	William Dick
517-1-1	Tree Trench	56th from Greenway to Paschall
517-2-1	Tree Trench	56th from Greenway to Paschall
524-2-1	Infiltration/Storage Trench	Benson Park
530-1-1	Bioretention	Baker Playground
558-1-1	Bioretention	Heston Lot
574-1-1	Infiltration/Storage Trench	Ralph Brooks
589-1-1	Infiltration/Storage Trench	Stinger Square
589-2-1	Infiltration/Storage Trench	Stinger Square
597-1-1	Tree Trench	33rd and Dauphin
2796-1	Bioinfiltration/Bioretention	Mayfair Elementary
2796-2	Bioinfiltration/Bioretention	Mayfair Elementary
2796-3	Bioinfiltration/Bioretention	Mayfair Elementary
2832-1	Bioinfiltration/Bioretention	MLK High School
2832-2	Bioinfiltration/Bioretention	MLK High School
2832-3	Bioinfiltration/Bioretention	MLK High School
2832-4	Bioinfiltration/Bioretention	MLK High School
2832-5	Bioinfiltration/Bioretention	MLK High School

SMP ID	SMP Type	Project Name
2757-1	Bioinfiltration/Bioretention	Warren G Harding
2757-2	Bioinfiltration/Bioretention	Warren G Harding
2757-3	Bioinfiltration/Bioretention	Warren G Harding
2757-4	Bioinfiltration/Bioretention	Warren G Harding
61609	Basin	Quaker City Flea Market
62624	Basin	Baptist Worship Center
62262	Basin	Novick Brothers
62089	Bioinfiltration/Bioretention	La Salle University
59550	Bioinfiltration/Bioretention	Germantown Friends School
59552	Bioinfiltration/Bioretention	Germantown Friends School

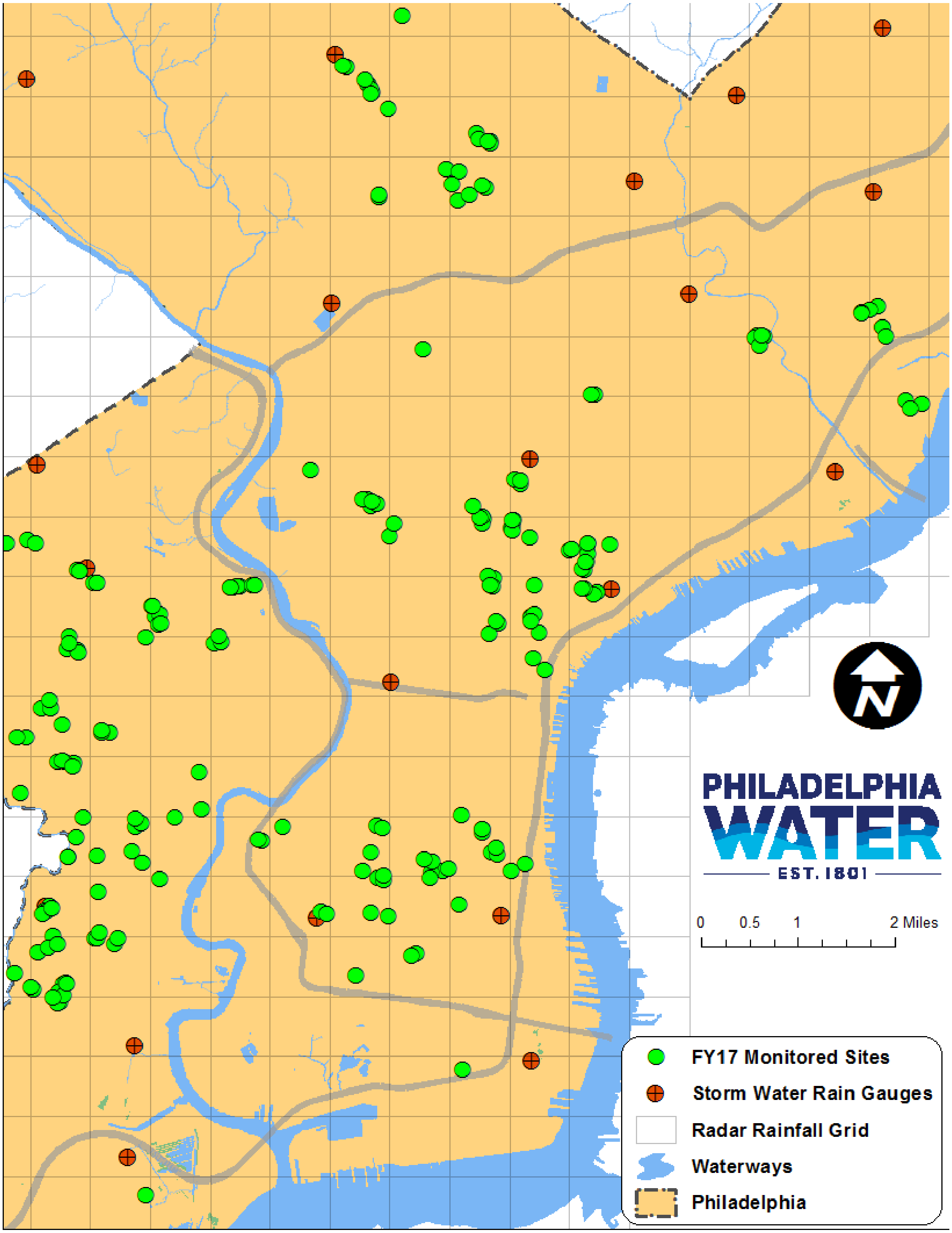


Figure 3-1: Continuous Water Level Monitoring Project Locations, PWD Rain Gauge Network and Radar Rainfall Grid.

3.2 Green Stormwater Infrastructure Performance Testing

The Water Department uses a W-1250 Sensus Water Meter Tester for measuring flow applied to an SMP during Simulated Runoff Tests (SRT). This water meter is capable of estimating flows from 0.04 CFM to 167 CFM. Simulated Runoff Tests have been performed for 11 GSI systems for July 1, 2016 to June 30, 2017. Monitoring locations are shown in **Table 3-3** and **Figure 3-2**.

Table 3-3: SMP Attributes for SMPs tested with Simulated Runoff Test (SRT)

SMP ID	SMP Type	Project Name	Test Date
19-5-1	Tree Trench	Barry Playground	8/12/2016
403-2-1	Infiltration/Storage Trench	Nebinger School	8/22/2016
366-2-1	Rain Garden	Philadelphia Zoo	11/18/2016
179-6-1	Tree Trench	Morris Leeds	12/9/2016
61609	Infiltration/Storage Trench	Quaker City Flea Market	3/30/2017
62262	Subsurface Basin	Novick Brothers	4/12/2017
62089	Rain Garden	La Salle University	6/1/2017
62624	Subsurface Basin	Baptist Worship Center	6/8/2017
59550	Rain Garden	Germantown Friends School	6/13/2017
59552	Rain Garden	Germantown Friends School	6/13/2017
10-1-1	Bumpout/Tree Trench	Thompson and Columbia	6/28/2017

3.3 Permeable Pavement Surface Infiltration Rate Testing

The Water Department uses ASTM Standards (ASTM Committee D18, ASTM C1701/C1701M-09 Standard Test method for Infiltration Rate of In Place Pervious Concrete, 2009) (ASTM Committee C15, 2013), with minor modifications for pervious paving infiltration testing. Development of these procedures was completed in FY13 and refinement of the methods is ongoing. Two 12" diameter sections of Schedule 60 PVC pipe are used as infiltration rings to allow for performing multiple tests simultaneously. Modifications were made to the test calculations to compensate for the different infiltration ring diameter compared to the ring diameter specified in the method. Eight SMPs have been selected for surface infiltration rate testing in FY17. Monitoring locations are shown in **Table 3-4** and **Figure 3-2**. 110 different surface infiltration rate tests of porous surfaces have been performed on these sites.

Table 3-4: Permeable Pavement SMPs Selected for Surface Infiltration Rate Testing

SMP ID	Project Name	Surface Type	Number of Test Locations	Number of Tests Performed
197-1-1	Mill Creek Playground Basketball Court	Porous asphalt	6	2
192-2-1	Herron Playground Basketball Court	Porous Asphalt	9	2
207-1-3	McMahon St (Waterview Recreation Center)	Pervious Concrete	3	2
240-1-1	Percy St from Catharine St to Christian St	Porous asphalt	6	2
301-1-1	Collins Street	Porous asphalt	3	2
301-3-1	Gordon Street	Porous asphalt	3	2
331-1-1	Hope Street	Porous asphalt	3	2
329-1-1	Hope Street	Porous asphalt	3	2
445-1-1	Southwest Treatment Plant Parking Lot	Porous asphalt	4	2
445-1-1	Southwest Treatment Plant Parking Lot	Permeable Interlocking Concrete Paver (Eagle Bay Aqua Bric)	3	2
445-1-1	Southwest Treatment Plant Parking Lot	Permeable Articulating Concrete Block/Mat (Pave Drain)	3	2
445-1-1	Southwest Treatment Plant Parking Lot	Modular Pre-Cast Porous Concrete (Stormcrete)	3	2
445-1-1	Southwest Treatment Plant Parking Lot	Pervious concrete	3	2
445-1-1	Southwest Treatment Plant Parking Lot	Pervious stamped concrete	3	2

Figure 3-2: Lateral Groundwater Mounding Monitoring, Simulated Runoff Testing and Surface Infiltration Testing Locations

3.4 Soil Surface Infiltration Rate Testing

The Water Department does not actively use the soil surface infiltration rate testing methods previously considered. ASTM Standards (ASTM Committee D18, ASTM D3385-09 Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer, 2009) are used when monitoring staff cannot determine soil surface infiltration rate information from other less intensive methods. Forthcoming updates to the CMP will provide updated methods for determination of soil surface infiltration rate.

3.5 Lateral Groundwater Mounding

The Water Department installed 18 groundwater monitoring wells in close proximity to six SMPs and four groundwater monitoring wells away from SMPs to act as control wells. Monitoring locations are shown in **Table 3-5** and **Figure 3-2**.

Table 3-5: SMP Attributes for SMPs Selected for Lateral Groundwater Mounding Monitoring

SMP ID	SMP Type	Project Name	Number of wells
12-5-1	Stormwater Tree Trench	Bodine High School	3
271-2-1	Rain Garden	Bridesburg Recreation Center	4
274-4-2	Stormwater Planter	Roosevelt Playground	4
285-1-1	Stormwater Tree Trench	21st and Venango Streets	2
403-2-1	Infiltration/Storage Trench	George W. Nebinger School	5
403-1-3	Infiltration/Storage Trench	George W. Nebinger School	5

Table 3-6: Number of sensors and Average Deployment Duration for Lateral Groundwater Water Mounding Monitoring Sensors

Sensor Type	Number Currently Deployed	Average Number of Days Deployed
Water Level Sensor	23	1071

3.6 Sewer System Monitoring

The Water Department continues to perform sewer system monitoring per the methods outlined in the CMP. More information is available in **Appendix B** Flow Monitoring.

3.7 Meteorological Monitoring

The Water Department continues to perform meteorological monitoring, including operation and maintenance of a rain gauge network, as described in the CMP. More information is available in **Appendix B** Flow Monitoring**.**

3.8 Groundwater Level Monitoring

The Water Department is monitoring groundwater levels in the Philadelphia region in partnership with the U.S. Geological Survey. As of July 2017, 26 wells have been established from which water level measurements are made monthly. Results of groundwater monitoring are presented in **Appendix I PWD-USGS Cooperative Groundwater Monitoring Program**. Well PH1043, located in the Germantown section of the City, is equipped with continuous water level recording and telemetry equipment making the data available in near-real time. Working with USGS to monitor historic wells discovered in FY15 and FY16 has allowed PWD to establish 6 new groundwater monitoring wells in FY17.

4.0 CMP Implementation Successes and Challenges Encountered

PWD submitted the Year 5 Evaluation and Adaptation Plan (EAP) in October 2016. The Pilot Program final report was delivered as an appendix to the Year 5 EAP. During FY17, updated methods were developed and will be reflected in the revision to the CMP anticipated in the coming year.

The GSI monitoring program has been successful in acquiring the needed equipment, deploying water level sensors to GSI systems, and performing simulated runoff and permeable pavement infiltration tests. During FY17, the number of simulated runoff tests performed was greatly reduced relative to the previous fiscal year. Simulated runoff test methods have been modified using experiences from Year 5 EAP and the revisions will be included in the updated CMP.

The GSI monitoring team has continued providing monitoring assistance to the GSI Implementation program to collect data from systems where problems have been observed to help interpret cause(s) and verify remediation measures. The performance of these systems was evaluated using methods that will be detailed in the update to the CMP.

Another challenge encountered is establishing a network of groundwater wells for monitoring ambient groundwater elevations. Given that a USGS study conducted in the 1980s to revise the groundwater table map of Philadelphia (Paulachok and Wood, 1984) contained several hundred observation points, the Water Department had expected to be able to identify numerous potential existing well locations within the City to investigate for gaining site access and establishing groundwater monitoring wells. In FY15, numerous groundwater wells were identified in Philadelphia through newly discovered construction records. PWD has worked with USGS to identify wells that are functional and begin monitoring these wells. Six wells have been identified and are being monitored as groundwater monitoring sites.

Appendix B – Flow Monitoring

APPENDIX B – FLOW MONITORING

Page

Table 1 - Summary of All Monitors

	# of Permanent Monitors	# of Temporary Monitors	# of Unknown Monitors
Combined/Separate Sewer Monitors	469	76	-
Outlying Community Monitors	128	-	1
Pumping Stations	82	-	-
Rain Gages	35	-	-
Total	714	76	1

Table 2 - Listing of Monitored Outlying Community Connections

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

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

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

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

*STD – temporary flow monitor

**MTR/NO – Permanent monitor

Table 3 - Listing of Combined/Separate Sewer Monitors

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C_01	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_01	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_02	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_02	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_04	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_04	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_05	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_05	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_06	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_06	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_07	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_07	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_09	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_09	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_10	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_10	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_11	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_11	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_12	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_12	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_14	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_14	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_15	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_15	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_17	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_17	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_18	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_18	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_19	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_19	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_20	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_20	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_21	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_21	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_22	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_22	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_23	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_23	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_24	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_24	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_26	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_26	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_28A	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
C_28A	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_29	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_29	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_30	Cobbs Creek Low Level	Cobbs Creek	SWO LEVEL	LEVEL
C_30	Cobbs Creek Low Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_31	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_31	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_32	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_32	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_33	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_33	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_34	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_34	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_35	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_35	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_36	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_36	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
C_37	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
C_37	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
CSPS	Central Schuylkill	Schuylkill River	INTERCEPTOR LEVEL N	LEVEL
CSPS	Central Schuylkill	Schuylkill River	INTERCEPTOR LEVEL S	LEVEL
D_02	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_02	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_02	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_02	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_02	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_03	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_03	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_03	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_03	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_03	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_04	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_04	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_04	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_04	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_04	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_05	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_05	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_05	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_05	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_05	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_06	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_06	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_06	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_07	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D_07	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_07	Upper Delaware Low Level	Delaware River	SWO GATE POSITION 1	POSITION
D_07	Upper Delaware Low Level	Delaware River	SWO GATE POSITION 2	POSITION
D_07	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_07	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_08	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_08	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_09	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_09	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_09	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_09	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_09	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_11	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_11	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_11	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_11	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_11	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_12	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_12	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_13	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_13	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_15	Upper Delaware Low Level	Delaware River	DWO GATE POSITION	POSITION
D_15	Upper Delaware Low Level	Delaware River	DWO LEVEL	LEVEL
D_15	Upper Delaware Low Level	Delaware River	SWO GATE POSITION	POSITION
D_15	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_15	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_17	Somerset	Delaware River	SWO LEVEL	LEVEL
D_17	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_18	Somerset	Delaware River	SWO LEVEL	LEVEL
D_18	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_19	Somerset	Delaware River	SWO LEVEL	LEVEL
D_19	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_20	Somerset	Delaware River	SWO LEVEL	LEVEL
D_20	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_21	Somerset	Delaware River	SWO LEVEL	LEVEL
D_21	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_22	Somerset	Delaware River	SWO LEVEL	LEVEL
D_22	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_23	Somerset	Delaware River	SWO LEVEL	LEVEL
D_23	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_24	Somerset	Delaware River	SWO LEVEL	LEVEL
D_24	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_25	Somerset	Delaware River	SWO LEVEL	LEVEL
D_25	Somerset	Delaware River	TRUNK LEVEL	LEVEL
D_37	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D_37	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_38	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_38	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_39	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_39	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_40	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_40	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_41	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_41	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_42	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_42	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_43	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_43	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_47	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_47	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_48	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_48	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_49	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_49	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_50	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_50	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_51	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_51	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_51A	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_52	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_52	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_53	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_53	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_54	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_54	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_58	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_58	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_61	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_61	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_63	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_63	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_64	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_64	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_65	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_65	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_66	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_66	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_67	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_67	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_68	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
D_68	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_69	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_69	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_70	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_70	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_72	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_72	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
D_73	Lower Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
D_73	Lower Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
F_03	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_03	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_04	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_04	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_05	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_05	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_06	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_06	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_07	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_07	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_08	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_08	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_09	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_09	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_10	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_10	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_11	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_11	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_12	Lower Frankford Low Level	Frankford Creek	SWO LEVEL	LEVEL
F_12	Lower Frankford Low Level	Frankford Creek	TRUNK LEVEL	LEVEL
F_13	Lower Frankford Creek	Frankford Creek	DWO LEVEL	LEVEL
F_13	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_13	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_14	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_14	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_23	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_23	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_24	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_24	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
F_25	Lower Frankford Creek	Frankford Creek	DWO GATE POSITION	POSITION
F_25	Lower Frankford Creek	Frankford Creek	SWO GATE POSITION 1	POSITION
F_25	Lower Frankford Creek	Frankford Creek	SWO GATE POSITION 2	POSITION
F_25	Lower Frankford Creek	Frankford Creek	SWO LEVEL	LEVEL
F_25	Lower Frankford Creek	Frankford Creek	TRUNK LEVEL	LEVEL
H_29		Schuylkill River	DWO LEVEL	LEVEL
H_29		Schuylkill River	SWO LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
H_29		Schuylkill River	TRUNK LEVEL	LEVEL
H_35		Schuylkill River	BLOWER 1 RUN	EVENT
H_35		Schuylkill River	BLOWER 2 RUN	EVENT
H_35		Schuylkill River	DAM AIR PRESSURE	PSI
H_35		Schuylkill River	DWO GATE POSITION	POSITION
H_35		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
H_35		Schuylkill River	SWO GATE POSITION	POSITION
H_35		Schuylkill River	SWO LEVEL	LEVEL
H_35		Schuylkill River	TRUNK LEVEL	LEVEL
I_BYH09		Byberry Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC07	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC12	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC13	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC14	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC17	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC18	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLC34	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCHLH18	Cobbs Creek High Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC19	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC20	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC22	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC24	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLC26	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_CCLLH01	Cobbs Creek Low Level	Cobbs Creek	INTERCEPTOR LEVEL	LEVEL
I_COHOH16		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESH11	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESH15	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS09	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS14	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS17	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSESS26	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CSSSH15	Central Schuylkill	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_CVBH08		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_FHLH03	Frankford High Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_FHLTT08	Frankford High Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_FHLTT15	Frankford High Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_FLLH03	Frankford Low Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LDLLD43	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD45	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD47	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD53	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD62	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD69	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LDLLD70	Lower Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_LFCH07	Lower Frankford Creek	Frankford Creek	INTERCEPTOR LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
I_LFCH19	Lower Frankford Creek	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LFLLF08	Lower Frankford Low Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LFLLF10	Lower Frankford Low Level	Frankford Creek	INTERCEPTOR LEVEL	LEVEL
I_LSESH15	Lower Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSESS36	Lower Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSH01	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSS33	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSS38	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_LSWSS45	Lower Schuylkill West Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_MRH21	Main Relief Sewer	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_OH12		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PASYH13		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PDRLH01		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PDRLH02		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PENRH02		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PH04	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PH05	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PH06	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PH10	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PMPFH03		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_PP02	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PP04	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PP05	Pennypack	Pennypack Creek	INTERCEPTOR LEVEL	LEVEL
I_PQH09	Poquessing	Poquessing Creek	INTERCEPTOR LEVEL	LEVEL
I_PRH10		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SD19	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SD21	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SD25	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SH03	Somerset	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_SRH05		Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGCHLH01	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGEHLH01	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGH17	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGH20	Southwest Main Gravity	Schuylkill River	C GATE POSITION	POSITION
I_SWMGH20	Southwest Main Gravity	Schuylkill River	E GATE POSITION	POSITION
I_SWMGH20	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGH20	Southwest Main Gravity	Schuylkill River	W GATE POSITION	POSITION
I_SWMGS28	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS34	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS43	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS47	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_SWMGS50	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
I_SWMGWHL H01	Southwest Main Gravity	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
I_UDLLD04	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLD08	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH03	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH04	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH07	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_UDLLH14	Upper Delaware Low Level	Delaware River	INTERCEPTOR LEVEL	LEVEL
I_WBH06		Wissahickon Creek	INTERCEPTOR LEVEL	LEVEL
I_WHLH08	Wissahickon High Level	Wissahickon Creek	INTERCEPTOR LEVEL	LEVEL
I_WLLH11	Wissahickon Low Level	Wissahickon Creek	INTERCEPTOR LEVEL	LEVEL
P_01	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_01	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_02	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_02	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_03	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_03	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_04	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_04	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
P_05	Pennypack	Pennypack Creek	SWO LEVEL	LEVEL
P_05	Pennypack	Pennypack Creek	TRUNK LEVEL	LEVEL
R_06	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_06	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
R_07	Main Relief Sewer	Schuylkill River	SWO LEVEL	LEVEL
R_07	Main Relief Sewer	Schuylkill River	TRUNK LEVEL	LEVEL
R_12	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
R_12	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
R_13	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R_13	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R_14	Upper Delaware Low Level	Delaware River	SWO LEVEL	LEVEL
R_14	Upper Delaware Low Level	Delaware River	TRUNK LEVEL	LEVEL
R_15	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
R_15	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
R_18	Frankford High Level	Tacony Creek	INTERCEPTOR LEVEL	LEVEL
R_18	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
R_20	Central Schuylkill East Side	Schuylkill River	INTERCEPTOR LEVEL	LEVEL
R_20	Central Schuylkill East Side	Schuylkill River	STORMWATER LEVEL	LEVEL
R_24	Cobbs Creek High Level	Cobbs Creek	SWO LEVEL	LEVEL
R_24	Cobbs Creek High Level	Cobbs Creek	TRUNK LEVEL	LEVEL
S_01	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_01	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_03	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_03	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_04	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_04	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S_05	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_05	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_06	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_06	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_07	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_07	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_08	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_08	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_09	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_09	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_10	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_10	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_11	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_11	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_12	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_12	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_12A	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_12A	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_13	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_13	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_15	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_15	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_17	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_17	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_18	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_18	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_19	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_19	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_22	Central Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_22	Central Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_23	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_23	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_25	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_25	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_26	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_26	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_27	Central Schuylkill East Side	Schuylkill River	DWO LEVEL	LEVEL
S_27	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_27	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_28	Central Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_28	Central Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_30	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S_30	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
S_31	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_31	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
S_32	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_32	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_33	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_33	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_34	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_34	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_35	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_35	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_36	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_36	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_36A	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_36A	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_37	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_37	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_38	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_38	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_39	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_39	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_40	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_40	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_42	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_42	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_42A	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_42A	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_43	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_43	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_44	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_44	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_45	Lower Schuylkill West Side	Schuylkill River	DWO LEVEL	LEVEL
S_45	Lower Schuylkill West Side	Schuylkill River	SWO LEVEL	LEVEL
S_45	Lower Schuylkill West Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_46	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_46	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_47	Lower Schuylkill East Side	Schuylkill River	SWO LEVEL	LEVEL
S_47	Lower Schuylkill East Side	Schuylkill River	TRUNK LEVEL	LEVEL
S_50	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S_50	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
S_51	Southwest Main Gravity	Schuylkill River	SWO LEVEL	LEVEL
S_51	Southwest Main Gravity	Schuylkill River	TRUNK LEVEL	LEVEL
T_01	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_01	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_03	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_03	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_04	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_04	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL

Site Name	Interceptor	Waterbody	Measurement Name	Measurement Type
T_05	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_05	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_06	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_06	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_07	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_07	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_08	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_08	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_09	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_09	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_10	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_10	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_11	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_11	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_12	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_12	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_13	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_13	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_14	Frankford High Level	Tacony Creek	DWO GATE 1	POSITION
T_14	Frankford High Level	Tacony Creek	DWO GATE 2	POSITION
T_14	Frankford High Level	Tacony Creek	SWO CREST GATE	POSITION
T_14	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_14	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL
T_15	Frankford High Level	Tacony Creek	SWO LEVEL	LEVEL
T_15	Frankford High Level	Tacony Creek	TRUNK LEVEL	LEVEL

Table 4 - Listing of all Rain Gages (7/1/2016 - 6/30/2017)

Rain Gage	Location	Percent Working
RG_1	70th and Essington Ave	97.83%
RG_2	66th and Regent St	98.19%
RG_3	Fox Chase Rd. and Castor Ave	98.13%
RG_4	State Rd and Pennypack St	98.34%
RG_5	3rd and Mifflin St	73.09%
RG_6	Cardinal Ave and City Line Ave	98.33%
RG_7	G St. and E Annsbury St	97.67%
RG_8	N Water St. and E Clarkson Ave	98.31%
RG_9	54th and Lancaster Ave	89.84%
RG_10	Pine Rd and Susquehanna Rd	95.39%
RG_11	Rising Sun Ave and Lardner St	89.13%
RG_12	Pattison Ave and Columbus Blvd	97.82%
RG_13	Glendale Ave and Algon Ave	97.79%
RG_14	Delaware Ave and Lewis St	94.00%

RG_15	E Montgomery Ave and Thompson St	97.62%
RG_16	19th and Wood St	98.33%
RG_17	Saul St. and Benner St	98.34%
RG_18	Fox St. and Roosevelt Blvd	97.76%
RG_19	Chew Ave and Sharpnack St	98.14%
RG_20	Woodhaven Rd and Knights Rd	98.32%
RG_21	Shawmont Ave and Eva St	98.34%
RG_22	N 67th and Callowhill St	81.58%
RG_23	Penrose Ave and Mingo Ave	98.32%
RG_24	Lockart Rd and Lockart Ln	98.34%
RG_25	24th and Wolf St	90.74%
RG_26	621 Lehigh Ave	89.37%
RG_27	Grant Ave and Ashford Rd	98.32%
RG_28	1350 Southampton Rd	94.20%
RG_29	Springfield Way and PaperMill Rd	97.84%
RG_30	7609 Montgomery Ave	95.96%
RG_31	Valley Rd and Old Valley Rd	97.45%
RG_32	Rozel Ave and Crushmore Rd	94.75%
RG_33	Jackson St and E Broadway Ave	97.61%
RG_34	Lawrence Rd and Chester Ave	83.26%
RG_35	Hagysford Rd and Tower Lane	95.77%

Table 5 - Listing of All Pumping Station Monitors

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_26VA	Storm Water	PUMP 1 RUN	EVENT	26th and Vare Ave
PS_26VA	Storm Water	PUMP 2 RUN	EVENT	27th and Vare Ave
PS_26VA	Storm Water	WET WELL LEVEL	LEVEL	28th and Vare Ave
PS_42ST	Waste Water	PUMP 1 RUN	EVENT	761 S 43rd St
PS_42ST	Waste Water	PUMP 2 RUN	EVENT	762 S 43rd St
PS_42ST	Waste Water	PUMP 3 RUN	EVENT	763 S 43rd St
PS_42ST	Waste Water	WET WELL LEVEL	LEVEL	764 S 43rd St
PS_BANK	Waste Water	PUMP 1 RUN	EVENT	15 S Bank St (Bank & Elbow Ln)
PS_BANK	Waste Water	PUMP 2 RUN	EVENT	16 S Bank St (Bank & Elbow Ln)
PS_BANK	Waste Water	WET WELL LEVEL	LEVEL	17 S Bank St (Bank & Elbow Ln)
PS_BELD	Waste Water	PUMP 1 RUN	EVENT	751 S Manatawna St (Belfry & Steeple)
PS_BELD	Waste Water	PUMP 2 RUN	EVENT	752 S Manatawna St (Belfry & Steeple)
PS_BELD	Waste Water	WET WELL LEVEL	LEVEL	753 S Manatawna St (Belfry & Steeple)
PS_BLVD	Storm Water	PUMP 1 RUN	EVENT	4251 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	PUMP 2 RUN	EVENT	4252 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	PUMP 3 RUN	EVENT	4253 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	PUMP 4 RUN	EVENT	4254 N Broad St (Broad & Roosevelt Blvd)
PS_BLVD	Storm Water	WET WELL LEVEL	LEVEL	4255 N Broad St (Broad & Roosevelt Blvd)
PS_CSPS	Waste Water	N GATE POSITION	POSITION	600 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	N SIPHON LEVEL	LEVEL	601 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	N SIPHON LEVEL	LEVEL	602 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	N WET WELL LEVEL	LEVEL	603 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 1 RUN	EVENT	604 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 2 RUN	EVENT	605 University Ave (34th St Bridge & University)

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_CSPS	Waste Water	PUMP 3 RUN	EVENT	606 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 4 RUN	EVENT	607 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 5 RUN	EVENT	608 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	PUMP 6 RUN	EVENT	609 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	S GATE POSITION	POSITION	610 University Ave (34th St Bridge & University)
PS_CSPS	Waste Water	S WET WELL LEVEL	LEVEL	611 University Ave (34th St Bridge & University)
PS_FORD	Waste Water	PUMP 1 RUN	EVENT	3800 Ford Rd (Across from West Park Hospital)
PS_FORD	Waste Water	PUMP 2 RUN	EVENT	3801 Ford Rd (Across from West Park Hospital)
PS_FORD	Waste Water	WET WELL LEVEL	LEVEL	3802 Ford Rd (Across from West Park Hospital)
PS_HOGI	Waste Water	PUMP 1 RUN	EVENT	3 Hog Island Rd (east of Airport control tower)
PS_HOGI	Waste Water	PUMP 2 RUN	EVENT	4 Hog Island Rd (east of Airport control tower)
PS_HOGI	Waste Water	WET WELL LEVEL	LEVEL	5 Hog Island Rd (east of Airport control tower)
PS_LIND	Waste Water	PUMP 1 RUN	EVENT	5200 Linden Ave (Linden & Milnor)
PS_LIND	Waste Water	PUMP 2 RUN	EVENT	5201 Linden Ave (Linden & Milnor)
PS_LIND	Waste Water	WET WELL LEVEL	LEVEL	5202 Linden Ave (Linden & Milnor)
PS_LOCK	Waste Water	PUMP 1 RUN	EVENT	10778 Lockart Rd (Lockart St & Locart Ln)
PS_LOCK	Waste Water	PUMP 2 RUN	EVENT	10779 Lockart Rd (Lockart St & Locart Ln)
PS_LOCK	Waste Water	WET WELL LEVEL	LEVEL	10780 Lockart Rd (Lockart St & Locart Ln)
PS_MILN	Waste Water	PUMP 1 RUN	EVENT	9647 Milnor St (between Grant Ave & Eden St)
PS_MILN	Waste Water	PUMP 2 RUN	EVENT	9648 Milnor St (between Grant Ave & Eden St)
PS_MILN	Waste Water	PUMP 3 RUN	EVENT	9649 Milnor St (between Grant Ave & Eden St)
PS_MILN	Waste Water	WET WELL LEVEL	LEVEL	9650 Milnor St (between Grant Ave & Eden St)
PS_MING	Storm Water	BASIN LEVEL	LEVEL	7000 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 1 RUN	EVENT	7001 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 2 RUN	EVENT	7002 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 3 RUN	EVENT	7003 Penrose Ave (Schuylkill River under Platt Bridge)

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_MING	Storm Water	PUMP 4 RUN	EVENT	7004 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 5 RUN	EVENT	7005 Penrose Ave (Schuylkill River under Platt Bridge)
PS_MING	Storm Water	PUMP 6 RUN	EVENT	7006 Penrose Ave (Schuylkill River under Platt Bridge)
PS_NEIL	Waste Water	PUMP 1 RUN	EVENT	4000 Neill Dr (Neill Dr & Falls Rd)
PS_NEIL	Waste Water	PUMP 1 RUN	EVENT	4001 Neill Dr (Neill Dr & Falls Rd)
PS_NEIL	Waste Water	PUMP 3 RUN	EVENT	4002 Neill Dr (Neill Dr & Falls Rd)
PS_NEIL	Waste Water	WET WELL LEVEL	LEVEL	4003 Neill Dr (Neill Dr & Falls Rd)
PS_P120	Waste Water	PUMP 1 RUN	EVENT	
PS_P120	Waste Water	PUMP 2 RUN	EVENT	
PS_P120	Waste Water	WET WELL LEVEL	LEVEL	
PS_P542	Waste Water	PUMP 1 RUN	EVENT	
PS_P542	Waste Water	PUMP 2 RUN	EVENT	
PS_P542	Waste Water	WET WELL LEVEL	LEVEL	
PS_P603	Waste Water	PUMP 1 RUN	EVENT	2000 Langley Ave (PNBC)
PS_P603	Waste Water	PUMP 2 RUN	EVENT	2001 Langley Ave (PNBC)
PS_P603	Waste Water	WET WELL LEVEL	LEVEL	2002 Langley Ave (PNBC)
PS_P648	Waste Water	PUMP 1 RUN	EVENT	PNBC
PS_P648	Waste Water	PUMP 2 RUN	EVENT	PNBC
PS_P648	Waste Water	WET WELL LEVEL	LEVEL	PNBC
PS_P796	Waste Water	PUMP 1 RUN	EVENT	4801 S 13th St (PNBC)
PS_P796	Waste Water	PUMP 2 RUN	EVENT	4802 S 13th St (PNBC)
PS_P796	Waste Water	PUMP 3 RUN	EVENT	4803 S 13th St (PNBC)
PS_P796	Waste Water	WET WELL LEVEL	LEVEL	4804 S 13th St (PNBC)
PS_POLI	Waste Water	PUMP 1 RUN	EVENT	
PS_POLI	Waste Water	PUMP 2 RUN	EVENT	
PS_POLI	Waste Water	WET WELL LEVEL	LEVEL	

Monitor ID	Type of Pumping Station	Measurement Name	Measurement Type	Address
PS_RENN	Waste Water	PUMP 1 RUN	EVENT	11064 Rennard St (Philmont Shopping Center)
PS_RENN	Waste Water	PUMP 2 RUN	EVENT	11065 Rennard St (Philmont Shopping Center)
PS_RENN	Waste Water	WET WELL LEVEL	LEVEL	11066 Rennard St (Philmont Shopping Center)
PS_SPLA	Waste Water	PUMP 1 RUN	EVENT	9021 Buttonwood Pl (Spring Lane Meadows)
PS_SPLA	Waste Water	PUMP 2 RUN	EVENT	9022 Buttonwood Pl (Spring Lane Meadows)
PS_SPLA	Waste Water	WET WELL LEVEL	LEVEL	9023 Buttonwood Pl (Spring Lane Meadows)

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

Site Name	Start	End	Project
S06-000025	7/9/2015	7/18/2016	CSO model calibration
D53-000025	7/9/2015	7/19/2016	CSO model calibration
D51-S000010	7/22/2015	8/1/2016	CSO model calibration
D53-000155	8/5/2015	8/1/2016	CSO model calibration
S25-000015	11/17/2016	1/26/2017	CSO model calibration
S05-000012	3/30/2011	Present	CSO model calibration
P083-03-S0050	10/11/2011	Present	I/I
S45-001110	10/13/2011	Present	I/I
D63-000035	10/14/2011	Present	CSO model calibration
BC-0055	11/30/2011	Present	I/I
C17-003360	12/13/2011	Present	CSO model calibration
IALL-B0355	12/13/2011	Present	I/I
T14-013875	1/30/2012	Present	CSO model calibration
M005-07-0070	9/27/2012	Present	Eastwick Level Monitoring
M005-09-0140	9/27/2012	Present	Eastwick Level Monitoring
BC-B0755	12/10/2012	Present	I/I
P090-02-S0590	12/10/2012	Present	I/I
D47-000065	12/12/2012	Present	CSO model calibration
F21-000145	12/12/2012	Present	CSO model calibration
WLL-0565	3/7/2013	Present	I/I
USE-0020	8/12/2013	Present	I/I
PC-0040	1/21/2014	Present	I/I
T08-000015	1/27/2014	Present	CSO model calibration
D45-000015	5/8/2014	Present	CSO model calibration
LDLL-0115	5/15/2014	Present	CSO model calibration
LFLL-0015	5/28/2014	Present	CSO model calibration
LSE-0015	5/29/2014	Present	CSO model calibration
UDLL-0045	5/29/2014	Present	CSO model calibration
UFLL-0010	5/29/2014	Present	CSO model calibration
USE-0365	5/29/2014	Present	I/I
USE-0400	5/29/2014	Present	I/I
SOM-0040	5/30/2014	Present	CSO model calibration
D25-001285	6/20/2014	Present	CSO model calibration
SWMG-B0265	6/24/2014	Present	CSO model calibration

Site Name	Start	End	Project
UDLL-0085	6/25/2014	Present	CSO model calibration
SOM-0220	6/26/2014	Present	CSO model calibration
CSE-0030	7/18/2014	Present	CSO model calibration
SWMG-0065	7/21/2014	Present	CSO model calibration
UDLL-0275	9/19/2014	Present	CSO model calibration
IALL-0230	3/2/2015	Present	I/I
PP-0065	3/2/2015	Present	I/I
IALL-0210	3/3/2015	Present	CSO model calibration
WLL-0650	3/10/2015	Present	I/I
IALL-0195	3/12/2015	Present	CSO model calibration
OA-0020	3/12/2015	Present	CSO model calibration
LSW-0077	3/13/2015	Present	CSO model calibration
WLL-0675	3/13/2015	Present	I/I
FCHL-0175	3/16/2015	Present	CSO model calibration
THL-0085	4/14/2015	Present	CSO model calibration
Yeadon	4/27/2015	Present	I/I
IALL-0008	6/25/2015	Present	CSO model calibration
UDLL-0120	7/29/2015	Present	I/I
S059-02-S0010	4/22/2016	Present	I/I
S052-05-S0030	4/26/2016	Present	I/I
S051-08-S0015	4/28/2016	Present	I/I
S051-08-S0180	4/29/2016	Present	I/I
S059-04-S0027	5/4/2016	Present	I/I
S051-05-S0015	5/5/2016	Present	I/I
D73-000575	6/22/2016	Present	CSO model calibration
C12-000015	6/23/2016	Present	I/I
CV-0145	6/24/2016	Present	I/I
T01-000010	8/16/2016	Present	CSO model calibration
CCHL-0065	11/16/2016	Present	CSO model calibration
F21-006997	11/16/2016	Present	CSO model calibration
F23-000010	11/16/2016	Present	CSO model calibration
D40-000017	11/17/2016	Present	CSO model calibration
S13-000010	11/17/2016	Present	CSO model calibration
D02-000020	11/23/2016	Present	CSO model calibration
D66-000010	11/23/2016	Present	CSO model calibration

Site Name	Start	End	Project
WLL-0028	11/29/2016	Present	I/I
LDLL-0030	12/8/2016	Present	CSO model calibration
LDLL-0097	12/8/2016	Present	CSO model calibration
USE-0235	12/14/2016	Present	I/I
D72-000015	12/15/2016	Present	CSO model calibration
LDLL-0047	12/15/2016	Present	CSO model calibration
S051-08-0650	6/7/2017	Present	I/I

Table 7 - Listing of Outlying Community Contract Limits

Metered	Contract Limits					
Standardized	Instantaneous		Daily Max	Township Total		
Site ID	CFS	MGD	MGD	Inst. CFS	Inst. MGD	Daily Max MGD
MA1						
MA2						
MA3						
MA4						
MAx1						
Abington Total				9.542	6.168	4.453
MB1				74.26	47.996	33
Bucks Total						
MBE1						
MBE2						
MBE3						
MBE4						
MBE5						
MBE6						
MBE7						
MBE8						
MBE9						
MBE10						
MBE11						
MBE12						
MBE13						
MBE14						
MBE15						
MBE16						
Bensalem Total				11.74	7.588	6.133
MC1	2.75	1.777				
MC2	18	11.634				
MC3	0.480	0.31				
MCx1	8	5.171	Combined total for all the MCx#			
MCx2						
MCx3						
MCx4						
MCx5						
MCx6						
MCx7						

Metered	Contract Limits					
Standardized	Instantaneous		Daily Max	Township Total		
Site ID	CFS	MGD	MGD	Inst. CFS	Inst. MGD	Daily Max MGD
Cheltenham Total				20.75	13.411	13.380
MD1	155	100.179	50	155	100	50
DELCORA Total				155	100	50
ML1			5.474			
ML2			1.48			
ML3						
ML4			10.264			
ML5			1.848			
ML6			0.252			
ML7			0.84			
Lower Merion Total				31.57	20.404	14.5
MLM1						
MLM2	3.71	2.4	1.8			
MLM3						
MLM4						
MLM5						
MLM6						
MLM7						
Lower Moreland Total				5.88	3.80	2.85
MS1						
MS2						
MS3						
MS4						
MS5						
MS6						
MS7						
MS8						
Springfield Total				8.58	5.55	4.2
MSH1						
MSH2						
MSHX_1						
MSHX_2						
Southampton Total				15.79	10.205	7.14
MUD-N						
MUD-S						
MUD-O						

Metered	Contract Limits					
Standardized	Instantaneous		Daily Max	Township Total		
Site ID	CFS	MGD	MGD	Inst. CFS	Inst. MGD	Daily Max MGD
MUD-1						
Upper Darby Total				35	22.621	17

Appendix C – FY17 CSO Program Maintenance Annual Report

PWD COLLECTOR SYSTEMS - FLOW CONTROL UNIT

2017 CSO Program Maintenance

PHILADELPHIA WATER DEPARTMENT

FLOW CONTROL

FLOW CONTROL UNIT

The Collector System Flow Control Unit's primary responsibilities are divided into four groups; Combined Sewer Overflow (CSO) Regulator Maintenance, Pumping Station Operation & Maintenance, Collector System Instrumentation and CCTV Technical Inspections. The Wastewater Pumping Group main office is located at 5202 Pennypack Street in the Torresdale Raw Water Pumping Station. The WWP Group assembles at this facility, which also has a maintenance machine shop, storage garage, and workshop to handle maintenance assignments. The other three groups have maintenance shops and assemble at the Fox Street Headquarters Facility. A brief description of each of the group's responsibilities and their 2017 fiscal year highlights follows.

CSO REGULATOR MAINTENANCE GROUP

Inspecting and servicing the combined sewer overflow regulating and diversion chambers are completed by 19 Interceptor maintenance personnel. This group is responsible for the operations, maintenance, inspections and cleaning of 175 combined sewer-regulating chambers, 89 tide gate chambers, 26 storm relief chambers, 12 sanitary flow diversions, several siphons and other related wastewater control devices throughout the collection system.

Currently the Philadelphia Water Department Flow Control Unit maintains ten types of CSO regulators and storage systems:

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

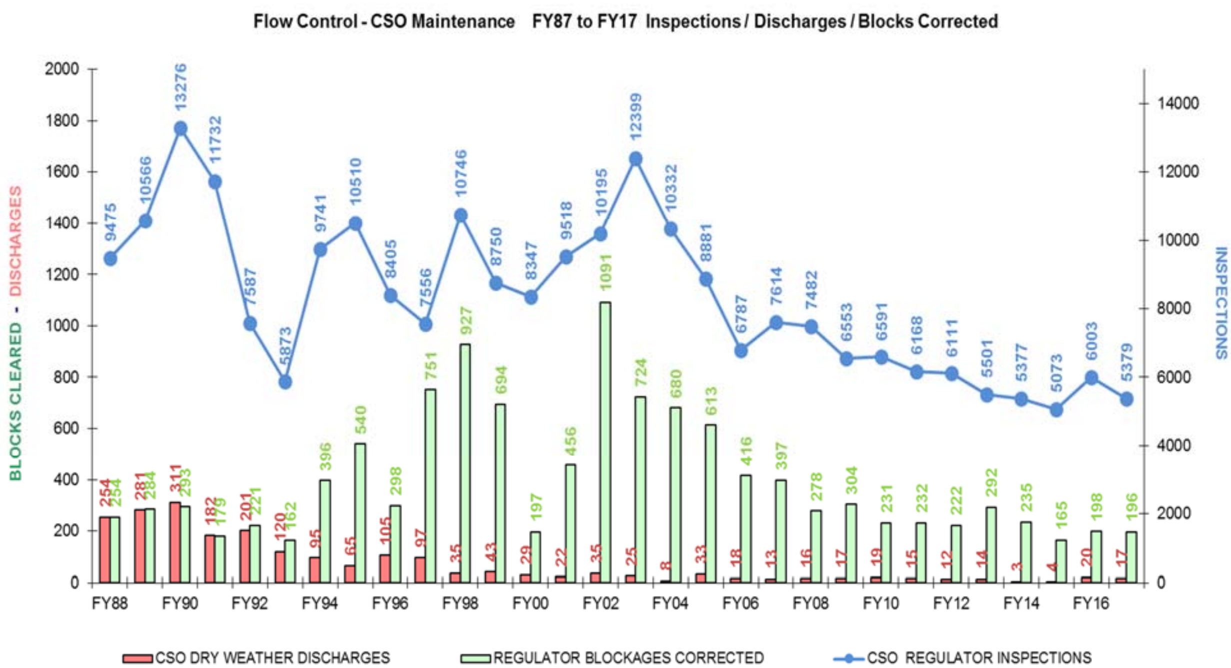
Mechanical or operational malfunctions of the regulators and tide gates can cause dry weather discharges and stream and river inflow. These types of events can have a major impact on the Wastewater and Fresh Water Treatment Plant's performance, stream water quality and affect the recreational use of our local waterways. Thus, the combined sewer regulator systems are closely monitored for potential blockages and when identified the problems are corrected quickly. CSO chamber Inspections and clearing of any regulator blockages prior to causing a dry weather discharge are the primary responsibilities of this group and are key areas in assessing the group's overall performance.

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

The PWD Flow Control Unit continues to aggressively control and minimize these dry weather overflows by utilizing the latest technology-based controls including our Collector System Remote Monitoring Network that currently includes over 320 sites with over 720 individual level and/or flow measurements. Training the CSO maintenance personnel in the use of the system's computer programs for analyzing the trend data has developed a comprehensive understanding of individual CSO sites and their distinctive flow patterns. This familiarity helps them to recognize abnormal conditions quickly at a location so that they can respond before the condition develops into a dry weather CSO blockage or discharge.

The CSO Maintenance Group performed 5379 inspections of the regulating chambers in FY2017. The work includes frequent visual inspections of the equipment and flow patterns to make sure everything is operating properly. The more comprehensive work such as cleaning and lubricating of the mechanical equipment is scheduled during lower flow periods between rain events.

In FY2017, the crews cleared 196 regulator blockages before they developed into a CSO dry weather discharge. There were seventeen CSO dry weather discharges for this fiscal year.



Many discharges are a result of debris such as rags, sticks, stones and other debris that become lodged in the CSO regulator diversion or the dry weather outlet pipe during dry weather periods. These types of blockages are virtually unpredictable so frequent inspections and closely observing the monitoring trend data is essential to our prevention program. Following moderate to heavy rain events the CSO regulators can have grit, sticks, rags and other debris caught at various places in and around the regulator that could eventually result in a discharge. The CSO maintenance crews perform quick topside inspections of the CSO sites throughout the City for several days following these events to remove or clear away any of this storm debris. The work schedule will then revert to the more comprehensive maintenance such as cleaning, lubricating, adjusting equipment and performing minor repairs to the mechanical regulators.

WASTEWATER PUMPING STATION MAINTENANCE GROUP

The Wastewater Pumping Station Maintenance Group consisting of 24 maintenance personnel are located at the 5202 Pennypack St. Maintenance Shop. They are responsible for the operations and maintenance of 16 wastewater-pumping stations, 3 stormwater pumping stations, 2 sodium hypochlorite dosing stations, 11 computer controlled CSO storage regulators and several in-line and offline wastewater-storage facilities among other duties.

Many of the pumping stations provide for only one running pump and one reserve pump. This arrangement means that pump breakdowns are responded to immediately and that overhauls need to be completed in a minimum amount of time. The main pump availability statistic is a good indicator of the Maintenance Group's performance in this area. The main pumping units were in service 100% of the time in FY2017. The WWP Group completed twelve main wastewater pump overhauls at the stations. These overhauls consist of repair and replacement of the worn pump and motor components to bring the equipment's performance up to new operating condition.

The Wastewater Pumping Station Maintenance Group had no main pumps out of service during fiscal year 2017. The reason for this is that during pump maintenance and overhauls the in-service pump was rotated out of activity and replaced by the spare pump for the station. This accomplishes two things, one the station always has its full complement of pumps available and the spare pump for the station gets used. At no time during fiscal year 2017 was a pump station without its full pumping capabilities due to pumps being out of service.

In addition to the pumping station maintenance, the group maintains a variety of other equipment throughout the Collector System. They are responsible for the operations and maintenance of the two sodium hypochlorite dosing stations. The stations are located next to the Queen Lane Raw Water pumping station, which injects hypo into the Upper Schuylkill East Interceptor, and at the Totem Rd. pumping station, which injects hypo into the Bucks

County force main. The group is responsible for maintaining adequate supply of the chemical, over 1,129,043 gallons in FY2017, for monitoring the downstream hydrogen sulfide levels and adjusting the dosage levels in addition to maintenance and repair of the equipment.

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

COLLECTOR SYSTEM INSTRUMENTATION MAINTENANCE GROUP

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

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

CCTV TECHNICAL INSPECTIONS GROUP

The Technical Inspections group consists of one Supervisor, one group leader, and fourteen Technicians who operate and maintain the seven closed circuit TV camera trucks. The seven CCTV trucks logged 43.71 miles of sewer inspections in FY2017. In January, Flow Control acquired a contract with a CCTV inspection contractor. This contractor has been tasked with special projects including the inspection of interceptors through SONAR to acquire grit and debris levels.

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

SERVICE LEVEL GOALS

The goal of the Flow Control Unit is to maintain and exceed the service level goals. One area that directly affects the service level of the Flow Control Unit is personnel vacancies.

Month	CSO Discharges	% Metering	% CSO Level	CCTV	Wastewater Pumping FY 17 Main Pump
	per 100	Chambers	Meters	Inspections	Monthly Availability
	Inspections	Operational	Operational	-	-
Goal -->	**0**	**80% or Higher**	**80% or Higher**	**12.5 Miles**	**95% or Higher**
July - 2016	0.50	96.00%	96.00%	3.35	100%
August - 2016	0.40	95.00%	92.30%	4.12	100%
September - 2016	0.20	95.00%	95.30%	3.66	100%
October - 2016	0.40	92.00%	96.30%	5.33	100%
November - 2016	0.00	94.00%	94.70%	3.57	100%
December - 2016	0.20	93.00%	94.90%	2.73	100%
January - 2017	0.40	95.00%	95.80%	3.03	100%
February - 2017	0.00	88.00%	95.30%	3.60	100%
March - 2017	0.20	92.00%	94.40%	3.82	100%
April - 2017	0.20	93.00%	94.30%	2.85	100%
May - 2017	0.20	95.00%	96.10%	4.19	100%
June - 2017	0.80	96.00%	96.60%	3.46	100%
Year Avg or Total	**0.29**	**93.67%**	**95.17%**	**43.71**	**100.0%**

FLOW CONTROL PERSONNEL SUMMARY

The Flow Control Unit makes every effort to fill all 90 approved positions in order to maintain the service level goals.

90 Flow Control Positions [90 Listed]	Active	Vacant	Total
Clerk III	1	0	1
Clerk Typist II	1	1	2
Data Services Support Clerk	1	0	1
Electrician 1	1	2	3
Electronic Equipment Supervisor	2	0	2
Electronic Technician 1	0	1	1
Electronic Technician 2	17	0	17
Electronic Technician Grp. Ldr.	2	1	3
Ind. Process Mach. Mech. Grp. Ldr.	2	0	2
Industrial Electrician 1	3	0	3
Industrial Electrician Group Leader	1	0	1
Industrial Process Mach. Mech.	7	0	7
Instrumentation Technician I	9	1	10
Interceptor Service Worker I	9	0	9
Interceptor Service Worker II	6	0	6
Interceptor Services Supervisor	2	0	2
Mach. & Equipment Mech.	8	0	8
Semiskilled Laborer	1	0	1
Sewer Maintenance Inspector	1	0	1
Utility Maintenance Trainee	1	0	1
Vocational Student Intern	4	0	4
Water Conveyance Sys. Asst. Supt. (P)	2	0	2
Water Conveyance Sys. Supt.	1	0	1
Water Operations Repair Helper	2	0	2
Totals	84	6	90

APPENDICES

- Appendix A - FY 2017 Annual CSO Report Spreadsheets
- Appendix B - FY 2017 Annual CSO Miscellaneous Site & Maintenance Report
- Appendix C - FY 2017 Main Pump Availability Chart
- Appendix D - Historical CSO Charts

Appendix A

FY 2017 Annual CSO Report Spreadsheets

PART 1	PHILADELPHIA WATER DEPARTMENT	Section 1
DRY WEATHER STATUS	WASTE AND STORM WATER COLLECTION	
REPORT	FLOW CONTROL UNIT	FY2017 Annual CSO Report

COLLECTOR	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Totals
UPPER PENNYPACK - 5 UNITS													
INSPECTIONS	6	12	15	15	11	16	12	10	10	11	11	10	139
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	2	1	0	0	0	0	1	0	0	0	0	4
UPPER DELAWARE LOW LEVEL - 12 UNITS													
INSPECTIONS	24	27	33	36	25	34	31	30	24	33	27	25	349
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	5	1	6	0	1	1	1	2	2	4	3	2	28
LOWER FRANKFORD CREEK - 6 UNITS													
INSPECTIONS	11	23	25	22	12	18	24	12	13	16	16	15	207
DISCHARGES	0	0	0	0	0	0	0	0	0	0	1	0	1
BLOCKS CLEARED	3	4	2	2	0	0	3	0	2	1	8	2	27
LOWER FRANKFORD LOW LEVEL - 10 UNITS													
INSPECTIONS	16	31	26	37	24	30	26	21	18	29	29	29	316
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	2	0	0	3	1	0	3	0	2	0	1	0	12
FRANKFORD HIGH LEVEL - 14 UNITS													
INSPECTIONS	41	32	39	42	38	46	47	42	21	50	37	24	459
DISCHARGES	2	0	0	0	0	0	0	0	0	0	0	0	2
BLOCKS CLEARED	2	3	1	6	0	1	1	1	0	2	0	1	18
SOMERSET - 9 UNITS													
INSPECTIONS	21	31	27	18	18	34	19	18	27	22	18	23	276
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	4	3	2	1	1	3	2	1	5	3	0	1	26
LOWER DELAWARE LOW LEVEL - 33 UNITS													
INSPECTIONS	48	69	87	85	77	97	77	78	77	56	66	66	883
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	3	8	5	1	3	1	4	5	1	3	2	1	37
CENTRAL SCHUYLKILL EAST - 18 UNITS													
INSPECTIONS	33	36	33	43	33	36	36	31	35	45	37	33	431
DISCHARGES	0	1	1	1	0	0	0	0	0	1	0	0	4
BLOCKS CLEARED	0	0	2	1	2	0	1	0	1	1	0	3	11
LOWER SCHUYLKILL EAST - 9 UNITS													
INSPECTIONS	17	13	10	14	9	24	21	11	13	11	22	19	184
DISCHARGES	0	0	0	0	0	0	2	0	0	0	0	0	2
BLOCKS CLEARED	0	0	0	0	0	1	2	0	0	0	1	1	5
CENTRAL SCHUYLKILL WEST - 9 UNITS													
INSPECTIONS	20	17	15	22	20	24	18	19	22	16	28	26	247
DISCHARGES	0	0	0	1	0	1	0	0	0	0	0	3	5
BLOCKS CLEARED	1	0	0	0	0	0	0	0	1	0	2	1	5
SOUTHWEST MAIN GRAVITY - 10 UNITS													
INSPECTIONS	17	23	14	21	20	22	17	19	23	23	32	19	250
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	2	1	0	1	1	0	0	0	0	0	1	6
LOWER SCHUYLKILL WEST - 4 UNITS													
INSPECTIONS	7	7	2	9	3	7	5	8	6	4	8	5	71
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	1	0	0	1	0	0	0	1	0	1	0	4
COBBS CREEK HIGH LEVEL - 23 UNITS													
INSPECTIONS	66	69	45	56	50	60	63	58	43	62	54	53	679
DISCHARGES	1	1	0	0	0	0	0	0	1	0	0	0	3
BLOCKS CLEARED	1	1	2	0	1	1	0	1	0	1	0	3	11
COBBS CREEK LOW LEVEL - 13 UNITS													
INSPECTIONS	23	27	13	25	26	31	30	25	26	25	22	18	291
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	0	1	0	0	0	0	0	0	0	0	1
RELIEF SEWERS - 26 UNITS													
INSPECTIONS	46	51	47	53	43	60	54	52	51	57	54	29	597
DISCHARGES	0	0	0	0	0	0	0	0	0	0	0	0	0
BLOCKS CLEARED	0	0	0	0	0	0	0	0	0	0	1	0	1
TOTALS / MONTH for 201 REGULATOR UNITS													Totals
TOTAL INSPECTIONS	396	468	431	498	409	539	480	434	409	460	461	394	5379
TOTAL DISCHARGES	3	2	1	2	0	1	2	0	1	1	1	3	17
TOTAL BLOCKS CLEARED	21	25	22	15	11	9	17	11	15	15	19	16	196
AVER. # of INSP. / BC	19	19	20	33	37	60	28	39	27	31	24	25	30
DISC / 100 INSPECTIONS	0.8	0.4	0.2	0.4	0.0	0.2	0.4	0.0	0.2	0.2	0.2	0.8	0.3

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
UPPER PENNYPACK 5 NEWPC UNITS															
P01	1	2	3	3	3	3	3	2	2	2	2	2	28	2.3	13.0
P02	1	2	3	3	2	3	2	2	2	2	3	2	27	2.3	13.5
P03	1	3	3	3	2	4	2	2	2	2	3	2	29	2.4	12.6
P04	2	3	3	3	2	4	3	2	2	3	2	2	31	2.6	11.8
P05	1	2	3	3	2	2	2	2	2	2	1	2	24	2.0	15.2
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS															
D02	2	4	3	4	2	3	4	2	2	2	2	2	32	2.7	11.4
D03	4	2	5	4	2	3	4	2	2	6	4	6	44	3.7	8.3
D04	3	3	5	4	3	2	5	2	2	4	2	4	39	3.3	9.4
D05	2	2	2	3	2	3	2	2	2	3	3	2	28	2.3	13.0
D06	2	2	2	3	2	3	2	4	2	3	2	1	28	2.3	13.0
D07	2	2	2	4	2	3	2	3	2	2	2	3	29	2.4	12.6
D08	2	2	3	3	2	3	2	3	2	2	2	1	27	2.3	13.5
D09	1	2	2	2	2	3	2	3	2	2	2	1	24	2.0	15.2
D11	2	2	2	2	2	3	2	3	2	2	2	1	25	2.1	14.6
D12	1	2	2	2	2	3	2	2	2	3	2	1	24	2.0	15.2
D13	1	2	2	2	2	3	2	2	2	2	2	1	23	1.9	15.9
D15	2	2	3	3	2	2	2	2	2	2	2	2	26	2.2	14.0
LOWER FRANKFORD CREEK 6 NEWPC UNITS															
F13	2	3	6	3	2	3	3	2	2	3	2	3	34	2.8	10.7
F14	2	5	6	4	2	3	5	2	2	3	2	4	40	3.3	9.1
F21	1	2	2	2	2	3	3	2	2	3	2	2	26	2.2	14.0
F23	2	6	3	4	2	3	5	2	3	3	2	2	37	3.1	9.9
F24	2	4	3	5	2	3	5	2	2	2	2	2	34	2.8	10.7
F25	2	3	5	4	2	3	3	2	2	2	6	2	36	3.0	10.1
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS															
F03	2	3	3	4	2	3	3	3	2	3	3	3	34	2.8	10.7
F04	2	4	2	4	2	3	3	2	2	3	3	3	33	2.8	11.1
F05	2	3	3	4	2	3	3	2	2	3	3	4	34	2.8	10.7
F06	1	4	3	4	3	3	3	2	2	4	4	3	36	3.0	10.1
F07	1	3	2	3	2	3	3	2	2	3	2	2	28	2.3	13.0
F08	1	4	2	3	2	3	3	2	2	2	2	2	28	2.3	13.0
F09	2	3	4	3	3	3	2	2	1	3	3	4	33	2.8	11.1
F10	1	2	2	3	2	3	2	2	2	2	3	2	26	2.2	14.0
F11	1	2	2	6	3	3	2	2	2	4	3	4	34	2.8	10.7
F12	3	3	3	3	3	3	2	2	1	2	3	2	30	2.5	12.2
FRANKFORD HIGH LEVEL 14 NEWPC UNITS															
T01	2	2	2	3	2	3	2	3	2	3	2	1	27	2.3	13.5
T03	3	3	4	3	3	4	6	4	2	7	5	4	48	4.0	7.6
T04	3	3	4	3	3	4	5	4	2	6	3	1	41	3.4	8.9
T05	2	3	2	4	2	4	4	4	2	3	3	1	34	2.8	10.7
T06	2	3	2	3	2	3	3	3	2	3	3	1	30	2.5	12.2
T07	4	2	2	3	2	3	3	3	2	3	3	1	31	2.6	11.8
T08	4	2	3	3	3	3	3	3	1	3	3	2	33	2.8	11.1
T09	4	2	4	3	3	3	4	4	1	3	2	1	34	2.8	10.7
T10	2	2	3	3	3	3	3	3	1	4	3	2	32	2.7	11.4
T11	3	2	3	3	4	4	3	3	1	4	3	1	34	2.8	10.7
T12	3	2	3	4	3	4	3	2	1	3	2	4	34	2.8	10.7
T13	5	2	3	3	4	4	4	2	1	3	2	2	35	2.9	10.4
T14	2	2	2	2	2	2	2	2	1	2	1	1	21	1.8	17.4
T15	2	2	2	2	2	2	2	2	2	3	2	2	25	2.1	14.6

3 TOTAL DISCHARGES FOR NE & SE DISTRICTS DTR = DAYS TO RETURN TO SITE

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

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

3.6 AVER. INSPECTIONS PER DAY PER CREW

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
SOMERSET LOW LEVEL 9 NEWPC UNITS															
D17	3	2	3	2	2	5	2	2	3	3	2	2	31	2.6	11.8
D18	2	2	3	2	2	4	2	2	4	3	2	2	30	2.5	12.2
D19	3	2	3	2	2	4	2	2	3	2	2	2	29	2.4	12.6
D20	2	3	3	2	2	3	2	2	3	2	2	2	28	2.3	13.0
D21	2	2	3	2	2	3	2	2	3	2	2	1	26	2.2	14.0
D22	2	2	3	2	2	3	2	2	3	2	2	2	27	2.3	13.5
D23	2	2	3	2	2	3	2	2	3	2	2	2	27	2.3	13.5
D24	2	2	3	2	2	3	2	2	3	2	2	1	26	2.2	14.0
D25	3	14	3	2	2	6	3	2	2	4	2	9	52	4.3	7.0
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS															
D37	1	3	3	3	3	3	5	3	4	3	2	6	39	3.3	9.4
D38	1	2	3	2	2	3	5	3	5	3	2	6	37	3.1	9.9
D39	2	3	5	2	2	3	3	2	3	2	2	2	31	2.6	11.8
D40	2	2	2	2	2	3	2	3	3	2	2	2	27	2.3	13.5
D41	1	2	2	2	2	3	3	3	3	2	2	2	27	2.3	13.5
D42	2	2	2	2	2	2	2	3	3	2	2	2	26	2.2	14.0
D43	1	2	2	2	2	2	2	3	2	2	2	3	25	2.1	14.6
D44	3	3	4	2	2	2	2	2	2	2	2	4	30	2.5	12.2
D45	2	4	7	6	2	4	2	2	2	2	2	3	38	3.2	9.6
D46	2	2	3	4	2	4	2	3	2	2	2	1	29	2.4	12.6
D47	1	2	3	2	2	4	2	3	2	2	2	1	26	2.2	14.0
D48	2	2	3	2	2	5	2	3	2	2	2	1	28	2.3	13.0
D49	2	2	3	2	2	4	2	3	2	2	2	1	27	2.3	13.5
D50	2	2	3	2	2	4	2	3	2	2	2	1	27	2.3	13.5
D51	2	2	3	2	2	4	2	3	2	2	2	1	27	2.3	13.5
D52	1	2	3	2	2	2	2	2	2	2	2	1	23	1.9	15.9
D53	1	2	3	3	2	2	2	2	2	2	2	2	25	2.1	14.6
D54	1	2	2	3	2	2	2	2	3	2	2	2	25	2.1	14.6
D58	2	2	2	4	3	2	2	2	2	2	3	1	27	2.3	13.5
D61	1	2	2	3	2	7	2	2	2	1	2	2	28	2.3	13.0
D62	1	2	2	2	2	7	2	2	2	1	2	2	27	2.3	13.5
D63	1	2	2	2	2	2	2	2	2	1	2	1	21	1.8	17.4
D64	1	2	2	2	2	2	2	2	2	1	2	1	21	1.8	17.4
D65	1	2	2	3	3	3	3	2	2	1	2	2	26	2.2	14.0
D66	1	2	2	4	2	2	2	2	2	1	2	2	24	2.0	15.2
D67	3	3	2	2	4	2	3	2	2	2	2	4	31	2.6	11.8
D68	1	2	2	3	4	2	2	2	2	2	2	2	26	2.2	14.0
D69	3	2	2	4	4	2	2	2	2	1	2	2	28	2.3	13.0
D70	1	2	2	3	4	2	3	2	2	1	2	2	26	2.2	14.0
D71	1	2	2	2	3	2	2	2	3	1	2	1	23	1.9	15.9
D72	1	1	2	2	2	2	2	2	2	1	2	1	20	1.7	18.2
D73		1	2	2	1	2	2	2	2	1	2	1	18	1.6	20.3
	1	1	3	2	2	2	2	2	2	1	1	1			
TOTAL	167	225	252	255	205	275	236	211	190	217	204	192	2629		
I/D/C	2.7	3.7	4.1	4.2	3.4	4.5	3.9	3.5	3.1	3.6	3.4	3.2			
UP	6	12	15	15	11	16	12	10	10	11	11	10	139	2.3	13.2
UDLL	24	27	33	36	25	34	31	30	24	33	27	25	349	2.4	13.0
LFC	11	23	25	22	12	18	24	12	13	16	16	15	207	2.9	10.8
LFLL	16	31	26	37	24	30	26	21	18	29	29	29	316	2.6	11.7
FHL	41	32	39	42	38	46	47	42	21	50	37	24	459	2.7	11.5
SLL	21	31	27	18	18	34	19	18	27	22	18	23	276	2.6	12.4
LDLL	48	69	87	85	77	97	77	78	77	56	66	66	863	2.3	13.9

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

													TOTAL
UP	0	0	0	0	0	0	0	0	0	0	0	0	0
UDLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LFC	0	0	0	0	0	0	0	0	0	0	1	0	1
LFLL	0	0	0	0	0	0	0	0	0	0	0	0	0
FHL	2	0	0	0	0	0	0	0	0	0	0	0	2
SLL	0	0	0	0	0	0	0	0	0	0	0	0	0
LDLL	0	0	0	0	0	0	0	0	0	0	0	0	0

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

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

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
UPPER PENNYPACK 5 NEWPC UNITS													
P01								1					1
P02													0
P03		1	1										2
P04													0
P05		1											1
UPPER DELAWARE LOW LEVEL 12 NEWPC UNITS													
D02	1												1
D03	1	1	2		1					4	2	2	13
D04			1					1	1				3
D05													0
D06			1					1					2
D07											1		1
D08	1					1	1						3
D09													0
D11	1												1
D12			1						1				2
D13													0
D15	1		1										2
LOWER FRANKFORD CREEK 6 NEWPC UNITS													
F13											1		1
F14	1						2		1		1	1	6
F21													0
F23	1	4							1	1			7
F24				1			1				1		3
F25	1		2	1							5	1	10
LOWER FRANKFORD LOW LEVEL 10 NEWPC UNITS													
F03													0
F04													0
F05							1						1
F06													0
F07				1									1
F08													0
F09				1									1
F10	1				1		1		1		1		5
F11				1			1		1				3
F12	1												1
FRANKFORD HIGH LEVEL 14 NEWPC UNITS													
T01													0
T03		1											1
T04	1	1		1									3
T05				1									1
T06				1				1		1			3
T07													0
T08													0
T09												1	1
T10						1							1
T11													0
T12													0
T13	1	1	1	3			1			1			8
T14													0
T15													0

12.67 AVERAGE BLOCKAGES PER MONTH

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
SOMERSET LOW LEVEL 9 NEWPC UNITS													
D17									1				1
D18		1							1				2
D19	2	1	1				1		1				6
D20	1	1			1	1	1	1		1			7
D21													0
D22													0
D23	1		1	1		2			2	1		1	9
D24													0
D25										1			1
LOWER DELAWARE LOW LEVEL 33 SEWPC UNITS													
D37													0
D38			1										1
D39			1										1
D40	1		1				1	1		2			6
D41												1	1
D42						1	1	1	1				4
D43	1												1
D44		1											1
D45				1									1
D46								2					2
D47		1	1				1						3
D48													0
D49													0
D50	1	1											2
D51					1								1
D52													0
D53													0
D54													0
D58		1											1
D61			1				1						2
D62		1											1
D63													0
D64													0
D65		2								1			3
D66													0
D67		1						1					2
D68					1								1
D69											1		1
D70											1		1
D71					1								1
D72													0
D73													0
D75													0
													TOTAL
	19	21	17	13	6	6	14	10	12	13	14	7	152
UP	0	2	1	0	0	0	0	1	0	0	0	0	4
UDLL	5	1	6	0	1	1	1	2	2	4	3	2	28
LFC	3	4	2	2	0	0	3	0	2	1	8	2	27
LFLL	2	0	0	3	1	0	3	0	2	0	1	0	12
FHL	2	3	1	6	0	1	1	1	0	2	0	1	18
SLL	4	3	2	1	1	3	2	1	5	3	0	1	26
LDLL	3	8	5	1	3	1	4	5	1	3	2	1	37

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
CENTRAL SCHUYLKILL EAST SIDE 18 SWWPC UNITS															
S05	3	2	2	2	2	2	2	2	2	2	2	1	24	2.0	15.2
S06	2	2	2	2	2	2	3	2	2	2	2	1	24	2.0	15.2
S07	2	2	2	2	2	2	2	2	2	2	2	1	23	1.9	15.9
S08	2	2	2	2	2	2	3	2	2	2	2	1	24	2.0	15.2
S09	2	2	2	2	2	2	2	2	2	2	2	1	23	1.9	15.9
S10	2	2	2	2	2	2	2	2	2	5	2	3	28	2.3	13.0
S12	2	2	2	3	2	2	2	3	2	3	2	3	28	2.3	13.0
S12A	2	2	2	3	2	2	2	2	2	3	2	3	27	2.3	13.5
S13	2	2	5	5	2	2	2	2	2	5	2	2	33	2.8	11.1
S15	2	3	2	3	2	2	2	2	2	2	2	2	26	2.2	14.0
S16	2	2	1	2	1	2	2	2	2	2	2	2	22	1.8	16.6
S17	2	2	1	2	1	2	2	1	2	2	2		19	1.7	19.2
S18	2	2	1	2	2	2	2	1	2	2	3	2	23	1.9	15.9
S19	1	2	1	2	2	2	2	2	2	2	2	2	22	1.8	16.6
S21	2	2	1	2	2	2	1	1	2	2	2	3	22	1.8	16.6
S23	1	2	3	3	2	2	1	1	2	3	2	3	25	2.1	14.6
S25	1	2	1	2	1	2	2	1	2	2	2	2	20	1.7	18.2
S26	1	1	1	2	2	2	2	1	1	2	2	1	18	1.5	20.3
LOWER SCHUYLKILL EAST SIDE 9 SWWPC UNITS															
S31	2	2	1	1	1	2	1		1	1	2	1	15	1.4	24.3
S35	1	1	1	1	1	2	1		1	1	2	1	13	1.2	28.1
S36	1	2	1	1	1	2	2	1	1		1	1	14	1.3	26.1
S36A	2	1		1	1	2	2	1	1	1	2	1	15	1.4	24.3
S37	1	1	1	1	1	2	4	1	1		1	1	15	1.4	24.3
S42	6	4	2	6	1	6	3	4	3	3	5	8	51	4.3	7.2
S42A	3		2	1	1	3	4	1	2	3	4	3	27	2.5	13.5
S44	1	1	1	1	1	2	2	1	1		1	1	13	1.2	28.1
S46		1	1	1	1	3	2	2	2	2	4	2	21	1.9	17.4
CENTRAL SCHUYLKILL WEST 9 SWWPC UNITS															
S01	3	2	1	2	4	3	2	2	2	2	6	7	36	3.0	10.1
S02	2	2	1	2	2	2	2	2	2	2	5	4	28	2.3	13.0
S03	2	2	1	3	2	2	2	2	2	2	4	5	29	2.4	12.6
S04	2	2	1	2	2	2	2	2	2	2	2		21	1.9	17.4
S11	2	2	2	3	2	2	2	3	2	1	2	2	25	2.1	14.6
S14	2	1	1	2	1	2	2	2	2	1	2	1	19	1.6	19.2
S20	3	2	2	2	2	2	2	2	2	2	2	2	25	2.1	14.6
S22	2	2	4	3	3	6	2	2	6	2	2	3	37	3.1	9.9
S24	2	2	2	3	2	3	2	2	2	2	3	2	27	2.3	13.5
SOUTHWEST MAIN GRAVITY 10 SWWPC UNITS															
S27	2	2	2	2	2	2	2	2	2	3	3	2	26	2.2	14.0
S28	2	2	2	2	2	2	1	2	2	2	3	1	23	1.9	15.9
S30	2	2	2	2	2	2	1	2	2	2	4	1	24	2.0	15.2
S34	2	2	2	2	2	2	1	2	2	2	3	1	23	1.9	15.9
S39	1	2	2	2	1	2	1	2	2	2	2	1	20	1.7	18.2
S40	1	1		2	1	2	1	2	2	1	2	1	16	1.5	22.8
S43	1	1	1	2	2	2	1	1	1	1	2	1	16	1.3	22.8
S47	1	2	1	2	2	2	1	2	1	2	3	1	20	1.7	18.2
S50	3	7	1	3	4	3	5	3	6	4	6	6	51	4.3	7.2
S51	2	2	1	2	2	3	3	1	3	4	4	4	31	2.6	11.8
LOWER SCHUYLKILL WEST SIDE 4 SWWPC UNITS															
S32	2	2	1	2	1	2	1	2	1	1	2	1	18	1.5	20.3
S33	2	2	1	2	1	2	1	2	1	1	2	2	19	1.6	19.2
S38	2	2		3	1	2	2	2	2	1	2	1	20	1.8	18.2
S45	1	1		2		1	1	2	2	1	2	1	14	1.4	26.1

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

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

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

2.0 AVER. INSPECTIONS PER DAY PER CREW

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	AVER	DTR
COBBS CREEK HIGH LEVEL 24 SWWPC UNITS															
C01	2	2	3	3	2	2	3	2	2	3	2	4	30	2.5	12.2
C02	2	2	2	3	2	2	3	2	2	3	2	2	27	2.3	13.5
C04	2	2	2	3	2	3	3	2	2	3	3	2	29	2.4	12.6
C04A	2	2	2	3	2	3	2	2	2	3	3	2	28	2.3	13.0
C05	2	2	2	4	2	3	3	2	2	3	2	2	29	2.4	12.6
C06	4	3	2	2	2	3	3	3	2	3	3	2	32	2.7	11.4
C07	4	3	2	2	2	3	3	3	3	3	3	3	34	2.8	10.7
C09	2	3	1	2	2	3	3	3	2	3	2	3	29	2.4	12.6
C10	2	2	1	2	3	3	3	3	2	3	2	2	28	2.3	13.0
C11	13	8	3	3	3	4	4	2	2	3	2	4	51	4.3	7.2
C12	2	2	2	2	2	3	2	2	2	3	2	1	25	2.1	14.6
C13	2	2	1	2	2	3	3	3	2	3	2	1	26	2.2	14.0
C14	3	2	2	2	2	2	3	2	3	2	3	2	28	2.3	13.0
C15	3	2	2	2	2	2	3	2	2	3	2	2	27	2.3	13.5
C16	2	2	2	2	2	2	2	2	2	2	2	2	24	2.0	15.2
C17	3	2	2	2	2	2	2	2	2	2	2	3	26	2.2	14.0
C18	2	2	2	3	2	3	2	2	2	2	3	5	30	2.5	12.2
C31	2	4	2	2	2	2	3	4	1	2	2	2	28	2.3	13.0
C32	2	4	1	2	2	2	2	2	1	3	2	1	24	2.0	15.2
C33	2	4	2	2	2	2	3	4	1	2	2	2	28	2.3	13.0
C34	2	4	2	2	2	2	2	2	1	2	2	2	25	2.1	14.6
C35	2	4	2	2	2	2	2	2	1	2	2	2	25	2.1	14.6
C36	2	4	2	2	2	2	2	2	1	2	2	1	24	2.0	15.2
C37	2	2	1	2	2	2	2	3	1	2	2	1	22	1.8	16.6
COBBS CREEK LOW LEVEL 12 SWWPC UNITS															
C19	2	2	2	3	4	3	2	2	4	2	2	3	31	2.6	11.8
C20	3	2	2	2	2	3	2	2	2	2	2	2	26	2.2	14.0
C21	2	2	1	2	2	3	3	2	2	2	2	2	25	2.1	14.6
C22	2	2	1	2	2	3	3	2	2	2	2	1	24	2.0	15.2
C23	2	4	1	2	2	3	3	2	2	2	2	1	26	2.2	14.0
C24	2	2	1	2	2	3	3	2	2	2	2	1	24	2.0	15.2
C25	2	2	1	2	2	3	3	3	2	3	2	1	26	2.2	14.0
C26	2	3	1	2	2	2	3	2	2	2	2	1	24	2.0	15.2
C27	2	2	1	2	2	2	2	2	2	2	2	1	22	1.8	16.6
C28A	2	2	1	2	2	2	2	2	2	2	1	2	22	1.8	16.6
C29	1	2	1	2	2	2	2	2	2	2	2	2	22	1.8	16.6
C30	1	2		2	2	2	2	2	2	2	1	1	19	1.7	19.2
TOTAL	183	192	132	190	161	204	190	171	168	186	203	173	2153		
I/D/C	2.0	2.1	1.4	2.1	1.8	2.2	2.1	1.9	1.8	2.0	2.2	1.9			
CSES	33	36	33	43	33	36	36	31	35	45	37	33	431	2.0	15.5
LSES	17	13	10	14	9	24	21	11	13	11	22	19	184	1.8	21.5
CSW	20	17	15	22	20	24	18	19	22	16	28	26	247	2.3	13.9
SWMG	17	23	14	21	20	22	17	19	23	23	32	19	250	2.1	16.2
LSW	7	7	2	9	3	7	5	8	6	4	8	5	71	1.6	20.9
CCHL	66	69	45	56	50	60	63	58	43	62	54	53	679	2.4	13.2
CCLL	23	27	13	25	26	31	30	25	26	25	22	18	291	2.0	15.2

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

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
COBBS CREEK HIGH LEVEL 24 SWWPC UNITS													
C01													0
C02													0
C04													0
C04A													0
C05													0
C06													0
C07													0
C09													0
C10													0
C11	1	1											2
C12													0
C13													0
C14									1				1
C15													0
C16													0
C17													0
C18													0
C31													0
C32													0
C33													0
C34													0
C35													0
C36													0
C37													0
COBBS CREEK LOW LEVEL 12 SWWPC UNITS													
C19													0
C20													0
C21													0
C22													0
C23													0
C24													0
C25													0
C26													0
C27													0
C28A													0
C29													0
C30													0
													TOTAL DISC
	1	2	1	2	0	1	2	0	1	1	0	3	14

	NO OF UNITS IN DISTRICT BLOCKED												TOTAL
CSE	0	1	1	1	0	0	0	0	0	1	0	0	4
LSE	0	0	0	0	0	0	1	0	0	0	0	0	1
CSW	0	0	0	1	0	1	0	0	0	0	0	3	5
SWG	0	0	0	0	0	0	0	0	0	0	0	0	0
LSW	0	0	0	0	0	0	0	0	0	0	0	0	0
CCHL	1	1	0	0	0	0	0	0	1	0	0	0	3
CCLL	0	0	0	0	0	0	0	0	0	0	0	0	0

	NO OF DISCHARGES IN DISTRICT												TOTAL
CSE	0	1	1	1	0	0	0	0	0	1	0	0	4
LSE	0	0	0	0	0	0	2	0	0	0	0	0	2
CSW	0	0	0	1	0	1	0	0	0	0	0	3	5
SWG	0	0	0	0	0	0	0	0	0	0	0	0	0
LSW	0	0	0	0	0	0	0	0	0	0	0	0	0
CCHL	1	1	0	0	0	0	0	0	1	0	0	0	3
CCLL	0	0	0	0	0	0	0	0	0	0	0	0	0

CSO REGULATING CHAMBER MONTHLY BLOCKS CLEARED

SWWPC PLANT REGULATORS

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

3.583 AVERAGE BLOCKAGES PER MONTH

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
COBBS CREEK HIGH LEVEL 24 SWWPC UNITS													
C01												1	1
C02													0
C04		1	1										2
C04A													0
C05													0
C06													0
C07													0
C09													0
C10													0
C11													0
C12			1										1
C13								1					1
C14					1	1						1	3
C15												1	1
C16													0
C17	1												1
C18													0
C31													0
C32													0
C33													0
C34													0
C35													0
C36													0
C37										1			1
COBBS CREEK LOW LEVEL 12 SWWPC UNITS													
C19				1									1
C20													0
C21													0
C22													0
C23													0
C24													0
C25													0
C26													0
C27													0
C28A													0
C29													0
C30													0
													TOTAL
	2	4	5	2	5	3	3	1	3	2	4	9	43
CSE	0	0	2	1	2	0	1	0	1	1	0	3	11
LSE	0	0	0	0	0	1	2	0	0	0	1	1	5
CSW	1	0	0	0	0	0	0	0	1	0	2	1	5
SWG	0	2	1	0	1	1	0	0	0	0	0	1	6
LSW	0	1	0	0	1	0	0	0	1	0	1	0	4
CCHL	1	1	2	0	1	1	0	1	0	1	0	3	11
CCLL	0	0	0	1	0	0	0	0	0	0	0	0	1

RELIEF SEWER MONTHLY INSPECTION

SITE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
THOMAS RUN RELIEF SEWER													
R01	2	2	2	3	2	3	2	2	2	3	2	1	26
R02	2	2	2	3	2	3	2	2	2	3	2	1	26
R03	2	2	2	3	2	3	2	2	2	3	2	1	26
R04	2	2	2	3	2	3	2	2	2	2	2	1	25
R05	2	2	2	2	2	3	2	2	2	3	3	1	26
R06	3	3	2	2	1	3	2	2	2	2	2	1	25
MAIN RELIEF SEWER													
R07	2	2	2	2	2	3	3	2	2	2	2	1	25
R08	1	2	2	2	2	3	3	2	2	2	2	2	25
R09	1	2	2	2	2	3	2	2	2	2	2	1	23
R10	2	2	2	2	2	3	2	2	2	2	2	2	25
R11	1	2	2	2	2	2	2	2	2	2	2	1	22
R11A	2	2	2	2	2	2	2	2	2	2	2	1	23
R12	2	2	2	2	2	2	2	2	2	2	2	1	23
WAKLING RELIEF SEWER													
R13	2	2	2	2	2	2	2	3	2	2	2	2	25
R14	2	2	2	2	2	2	2	3	2	2	2	1	24
ROCK RUN STORM FLOOD RELIEF SEWER													
R15	2	2	2	2	2	2	2	2	2	2	2	1	23
OREGON AVE RELIEF SEWER													
R16	1	3	2	2	1	2	3	2	2	2	2	1	23
R17	1	1	2	2	1	2	3	2	2	2	2	2	22
FRANKFORD HIGH LEVEL RELIEF SEWER													
R18	3	2	2	2	2	2	2	2	2	2	2	1	24
32ND ST RELIEF SEWER													
R19		2	1	2	1	2	2	2	2	2	2		18
MAIN STREET RELIEF SEWER													
R20	2	2	1	2	1	2	2	2	2	2	2	1	21
SOMERSET SYSTEM DIVERSION CHAMBER													
R21													0
TEMPORARY REGULATOR CHAMBER													
R22													
R23	2	2	2	2		2	2	2	2	2	1	1	20
ARCH ST RELIEF SEWER													
R24	2	2	2	2	2	2	2	2	3	4	4	1	28
16TH & SNYDER													
R25	3	2	2	2	2	2	2	2	2	3	4	2	28
GRANT & STATE RD. RELIEF													
R26	2	2	1	1	2	2	2	2	2	2	2	1	21
TOTAL	46	51	47	53	43	60	54	52	51	57	54	29	597
AVER	1.7	1.9	1.7	2.0	1.6	2.2	2.0	1.9	1.9	2.1	2.0	1.1	1.8

RELIEF SEWER MONTHLY DISCHARGE

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

RELIEF SEWER MONTHLY BLOCKS CLEARED

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

FY 2017 CSO Dry Weather Discharge Listing

Discharge Observed		Discharge Stopped		Last Inspection						
Date	Time	Date	Time	Date	Time	Site ID	Collector	Type Unit	Location	Comment
05-Jul-16	10:20 AM	05-Jul-16	10:50 AM	28-Jun-16	11:20 AM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	STICKS AND DEBRIS IN SLOT.
05-Jul-16	2:50 PM	05-Jul-16	3:30 PM	05-Jul-16	10:20 AM	T-13	FHL	SLOT	Whitaker Ave. W of Tacony Creek	DEBRIS IN SLOT.
20-Jul-16	11:10 AM	26-Jul-16	5:00 PM	13-Jul-16	1:40 PM	C-11	CCHL	SLOT	63rd St. S of Market St.	ROCKS, CONSTRUCTION DEBRIS AND GRIT IN DWO PIPE
01-Aug-16	8:50 AM	01-Aug-16	9:40 AM	29-Jul-16	9:20 AM	C-11	CCHL	SLOT	63rd St. S of Market St.	WOOD AND ROCKS IN SLOT.
11-Aug-16	10:20 AM	11-Aug-16	10:40 AM	19-Jul-16	1:10 PM	S-23	CSES	B & B	Schuylkill Ave. & Bainbridge St.	DEBRIS IN REGULATOR INLET
27-Sep-16	12:10 PM	27-Sep-16	2:10 PM	17-Sep-16	11:20 AM	S-13	CSES	SLOT	Samson St. W of 24th St.	GRIT AND DEBRIS IN SLOT.
20-Oct-16	9:10 AM	20-Oct-16	10:10 AM	03-Oct-16	1:40 PM	S-13	CSES	SLOT	Samson St. W of 24th St.	GRIT IN DWO PIPE.
24-Oct-16	9:20 AM	24-Oct-16	1:10 PM	12-Oct-16	9:10 AM	S-03	CSW	SLOT	Spring Garden St. W of Schuylkill Exp.	GRIT AND DEBRIS IN SLOT SLOT.
08-Dec-16	12:20 PM	08-Dec-16	12:40 PM	02-Dec-16	9:30 AM	S-22	CSW	B & B	660 ft S of South St E of Penn Field	SHUTTERGATE STUCK IN CLOSED POSITION.
05-Jan-17	12:10 PM	05-Jan-17	1:00 PM	28-Dec-16	10:20 AM	S-37	LSES	B & B	Vare Ave. & Jackson St.	REGULATOR INLET WAS BLOCKED WITH GRIT AND DEBRIS.
11-Jan-17	9:40 AM	11-Jan-17	10:00 AM	05-Jan-17	12:10 PM	S-37	LSES	B & B	Vare Ave. & Jackson St.	GRIT AND DEBRIS IN REGULATOR INLET.
01-Mar-17	9:10 AM	01-Mar-17	9:50 AM	23-Feb-17	11:00 AM	C-14	CCHL	SLOT	Baltimore Ave. & Cobbs Creek	DEBRIS IN SLOT.
13-Apr-17	9:00 AM	13-Apr-17	9:30 AM	08-Apr-17	10:30 AM	S-13	CSES	SLOT	Samson St. W of 24th St.	DEBRIS IN DWO PIPE.
08-May-17	9:10 AM	08-May-17	9:30 AM	19-Apr-17	2:10 PM	F-24	LFC	WH-S	Bridge St. SE of Creek Basin	WOOD AND BOTTLES IN DWO GATE.
12-Jun-17	9:30 AM	12-Jun-17	10:10 AM	31-May-17	8:50 AM	S-20	CSW	B & B	NNW of South St. (Behind Penn Stad.)	CAR WHEEL IN REGULATOR INLET.
26-Jun-17	9:10 AM	26-Jun-17	9:40 AM	08-Jun-17	10:20 AM	S-22	CSW	B & B	660 ft S of South St E of Penn Field	DEBRIS IN SHUTTERGATE.
27-Jun-17	12:50 PM	27-Jun-17	1:30 PM	22-Jun-17	2:30 PM	S-03	CSW	SLOT	Spring Garden St. W of Schuylkill Exp.	BLOCKAGE IN DWO PIPE.

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

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

Appendix B

FY 2017 Annual CSO Miscellaneous Site & Maintenance Report

Collector System - Flow Control Unit - FY 2017 CSO Annual Report Miscellaneous Maintenance

SOMERSET GRIT CHAMBER CLEANINGS

DATE	TONS
Out of Service for sewer rehabilitation	

T-04 FLOATABLES PILOT PROJECT DEBRIS NET REPLACEMENTS

DATE	TOTAL WEIGHT
Discontinued 12/31/2012	

CSO B&B REGULATOR MAINTENANCE

DATE	SITE
8/3/2016	S-50
1/7/2017	S-5
1/7/2017	S-7
1/19/2017	D-65
1/19/2017	S-42A
1/20/2017	S-33
1/20/2017	D-48
1/25/2017	D-38
1/25/2017	D-37
1/25/2017	F-14
1/25/2017	D-38
1/25/2017	D-4
1/28/2017	S-42
1/28/2017	S-46
1/30/2017	S-36A
1/30/2017	D-39
1/31/2017	S-6
1/31/2017	S-8
1/31/2017	D-41
2/1/2017	D-48
2/1/2017	D-49
2/1/2017	S-9
2/2/2017	D-50
2/2/2017	D-51
2/2/2017	S-15
2/2/2017	S-16
3/18/2017	S-1
3/18/2017	S-2
5/3/2017	S-6
5/4/2017	S-42
5/4/2017	S-43
6/3/2017	D-58
6/3/2017	D-52
6/21/2017	D-67
6/21/2017	D-66
7/6/2017	S-23
7/22/2017	S-47
7/22/2017	S-50

CSO TIDE GATE MAINTENANCE

DATE	SITE
1/7/2017	S-5
1/19/2017	D-65
1/19/2017	S-42A
1/20/2017	S-33
1/30/2017	F-23
1/30/2017	F-24
1/30/2017	D-39
1/31/2017	D-41
1/31/2017	S-6
2/1/2017	D-48
2/1/2017	S-8
2/1/2017	S-9
2/2/2017	D-49
3/18/2017	S-2
4/13/2017	D-4
5/3/2017	S-23
5/11/2017	S-46
6/10/2017	D-61
6/10/2017	D-62

CSO OUTFALL - DEBRIS GRILL MAINTENANCE

DATE	SITE
8/3/2016	C-11
6/7/2017	Linden Outfall

CSPS SIPHON GRIT POCKET CLEANINGS

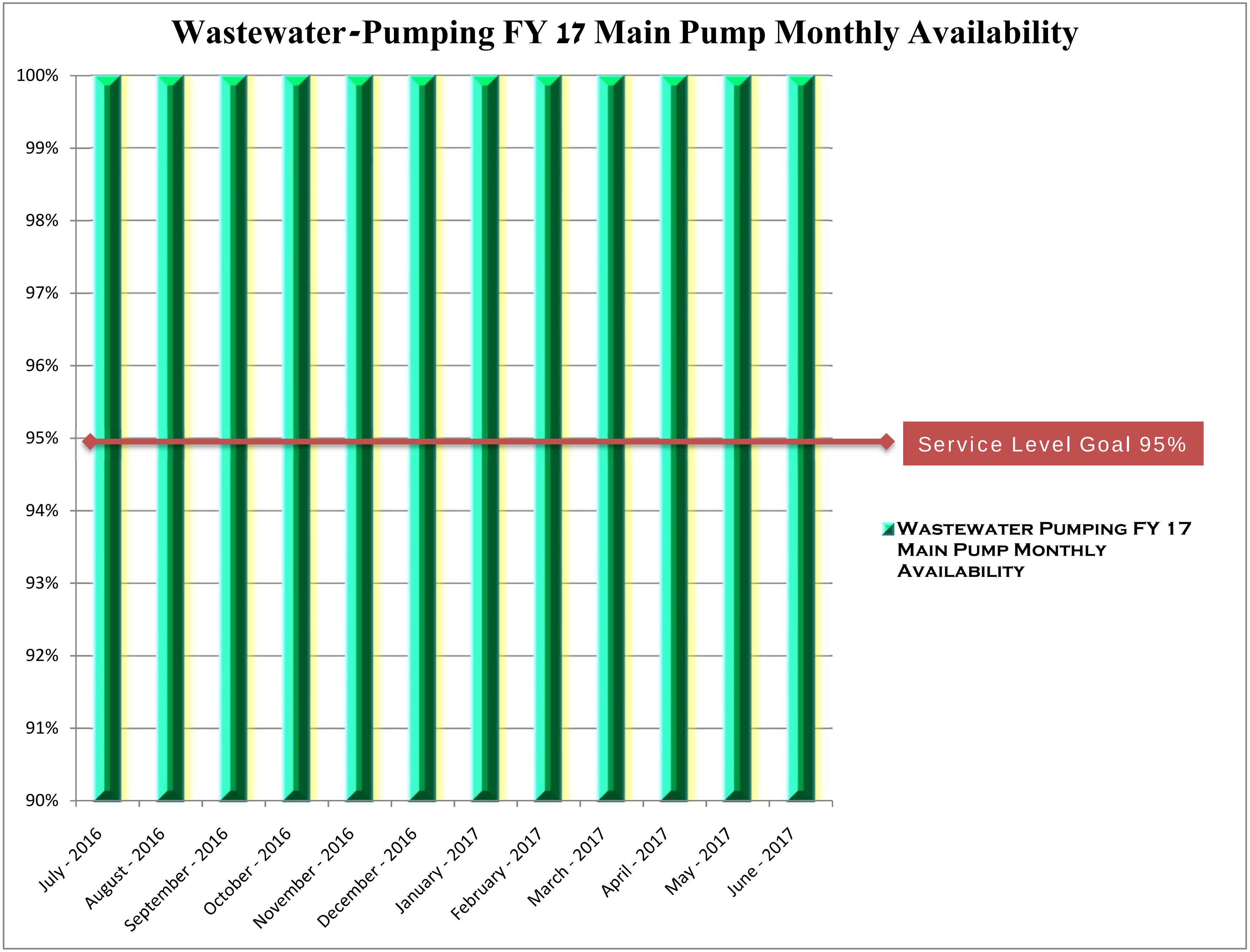
DATE	CU. YARDS
11/18/2016	20 Cu.Yrds.
3/6/2017	20 Cu.Yrds.

COMPUTER CONTROL CHAMBER PREVENTATIVE MAINTENANCE

DATE	SITE	DATE	SITE	DATE	SITE
7/6/2016	D-9	11/7/2016	State Road	3/3/2017	D-7
7/7/2016	D-15	11/9/2016	D-2	3/6/2017	D-5
7/8/2016	D-5	11/9/2016	D-3	3/8/2017	D-11
7/8/2016	D-11	11/10/2016	D-5	3/8/2017	F-25
7/8/2016	Art Museum	11/10/2016	D-7	3/9/2017	D-2
7/8/2016	D-7	11/14/2016	D-9	3/15/2017	D-3
7/11/2016	D-3	11/14/2016	D-11	3/15/2017	D-15
7/11/2016	D-2	11/16/2016	D-15	3/16/2017	State Rd.
7/13/2016	F-25	11/16/2016	F-25	3/22/2017	Art Museum
7/14/2016	Venice	11/17/2016	Art Museum	3/22/2017	T-14
7/15/2016	State Road	11/17/2016	Rock Run	3/23/2017	Rock Run
7/18/2016	Rock Run	11/18/2016	T-14	3/24/2017	Venice
7/18/2016	Fish Ladder	11/21/2016	Venice	3/27/2017	Fish Ladder
7/21/2016	T-14	12/1/2016	Venice	4/5/2017	Fish Ladder
8/1/2016	F-25	12/7/2016	F-25	4/7/2017	D-7
8/1/2016	Venice	12/7/2016	D-7	4/7/2017	D-9
8/5/2016	D-9	12/7/2016	D-11	4/17/2017	D-2
8/8/2016	D-7	12/7/2016	D-15	4/17/2017	D-5
8/8/2016	D-11	12/8/2016	D-2	4/18/2017	F-25
8/10/2016	D-15	12/8/2016	D-3	4/18/2017	D-11
8/11/2016	D-5	12/9/2016	D-5	4/20/2017	Art Museum
8/11/2016	D-2	12/9/2016	D-9	4/20/2017	T-14
8/12/2016	D-3	12/14/2016	Art Museum	4/21/2017	Rock run
8/15/2016	Rock Run	12/15/2016	Rock Run	4/21/2017	D-3
8/15/2016	Art Museum	12/21/2016	T-14	4/21/2017	D-15
8/17/2016	State Road	12/21/2016	State Road	4/24/2017	T-14
8/26/2016	T-14	12/29/2016	Fish Ladder	4/27/2017	State Rd.
8/30/2016	Fish Ladder	1/4/2017	Venice	5/1/2017	D-5
9/2/2016	D-2	1/4/2017	D-7	5/1/2017	D-9
9/2/2016	D-3	1/5/2017	D-15	5/3/2017	D-11
9/6/2016	F-25	1/5/2017	F-25	5/3/2017	F-25
9/8/2016	D-5	1/6/2017	D-9	5/4/2017	D-2
9/8/2016	D-7	1/6/2017	D-11	5/4/2017	D-15
9/9/2016	State Road	1/11/2017	Art Museum	5/5/2017	D-7
9/14/2016	D-9	1/20/2017	State Rd.	5/5/2017	Art Museum
9/14/2016	D-11	1/23/2017	D-3	5/8/2017	Fish Ladder
9/15/2016	D-15	1/25/2017	Rock run	5/10/2017	Venice
9/15/2016	Art Museum	1/25/2017	T-14	5/11/2017	State Road
9/20/2016	Venice	1/26/2017	D-2	5/12/2017	Rock run
9/21/2016	T-14	1/26/2017	D-5	5/19/2017	T-14
9/22/2016	H-35	2/2/2017	D-15	5/22/2017	D-3
9/23/2016	Fish Ladder	2/2/2017	D-9	5/22/2017	D-3
10/3/2016	State Road	2/3/2017	D-2	6/1/2017	D-2
10/5/2016	D-7	2/3/2017	D-3	6/1/2017	D-3
10/5/2016	D-2	2/6/2017	D-11	6/1/2017	D-5
10/6/2016	Art Museum	2/6/2017	D-7	6/1/2017	D-9
10/7/2016	T-14	2/8/2017	D-5	6/7/2017	State Road
10/12/2016	Rock Run	2/8/2017	F-25	6/12/2017	Fish Ladder
10/24/2016	D-3	2/13/2017	Art Museum	6/14/2017	Venice
10/24/2016	D-5	2/13/2017	Rock run	6/14/2017	Art Museum
10/26/2016	D-9	2/13/2017	State Rd.	6/15/2017	D-11

Appendix C

FY 2017 Main Pump Availability Chart

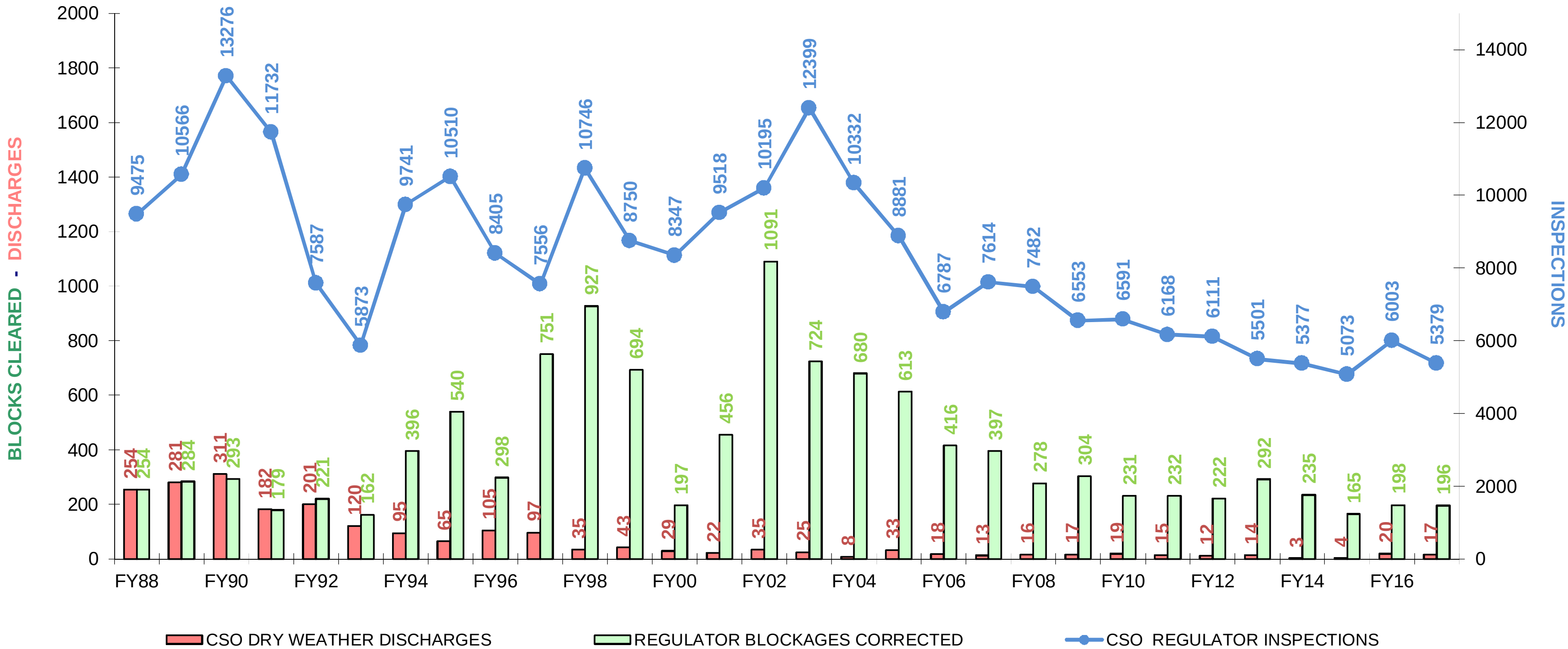


Wastewater-Pumping FY 17 Main Pump Monthly Availability
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
July - 2016
August - 2016
September - 2016
October - 2016
November - 2016
December - 2016
January - 2017
February - 2017
March - 2017
April - 2017
May - 2017
June - 2017
Service Level Goal 95%
Wastewater Pumping FY 17 Main Pump Monthly Availability

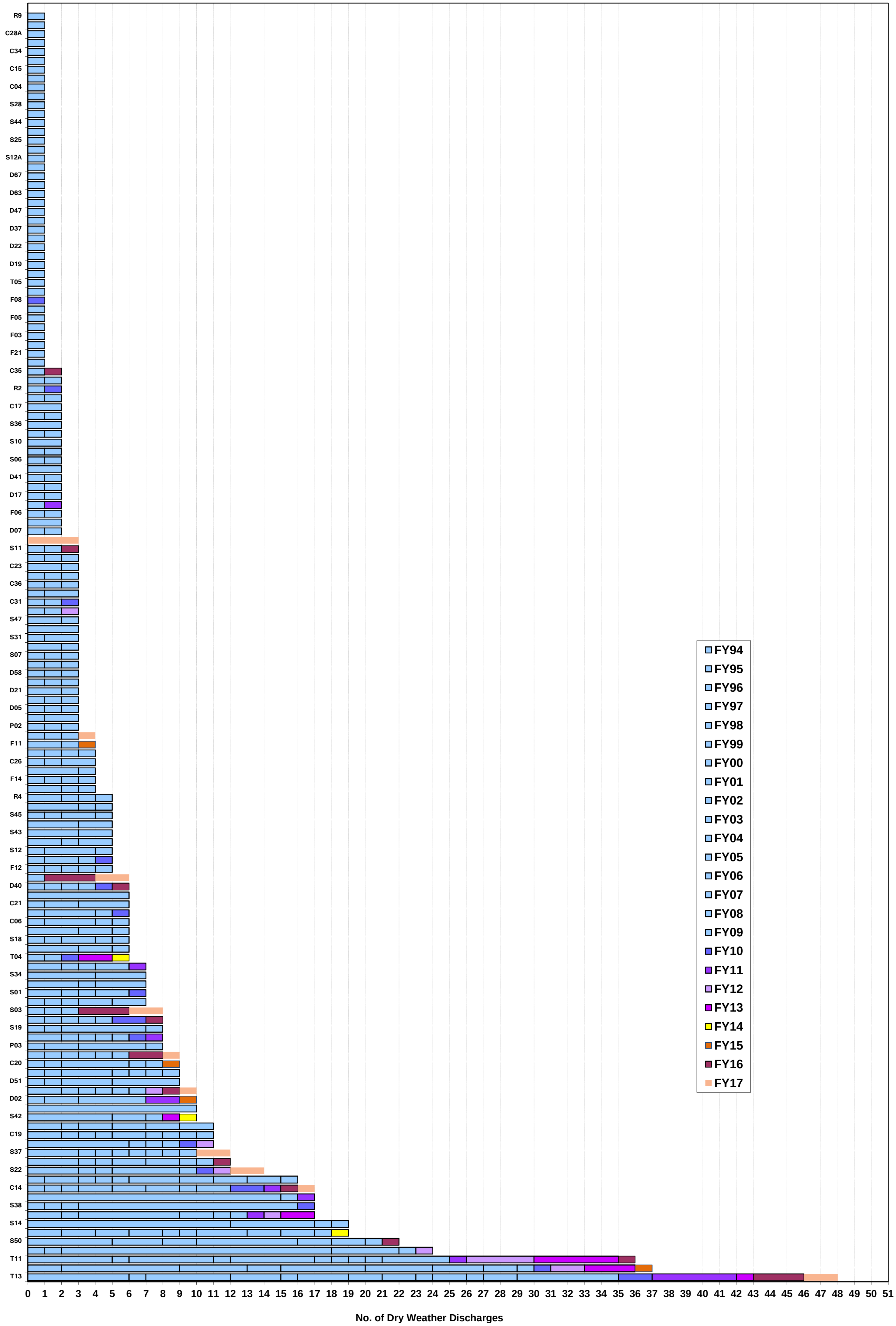
Appendix D

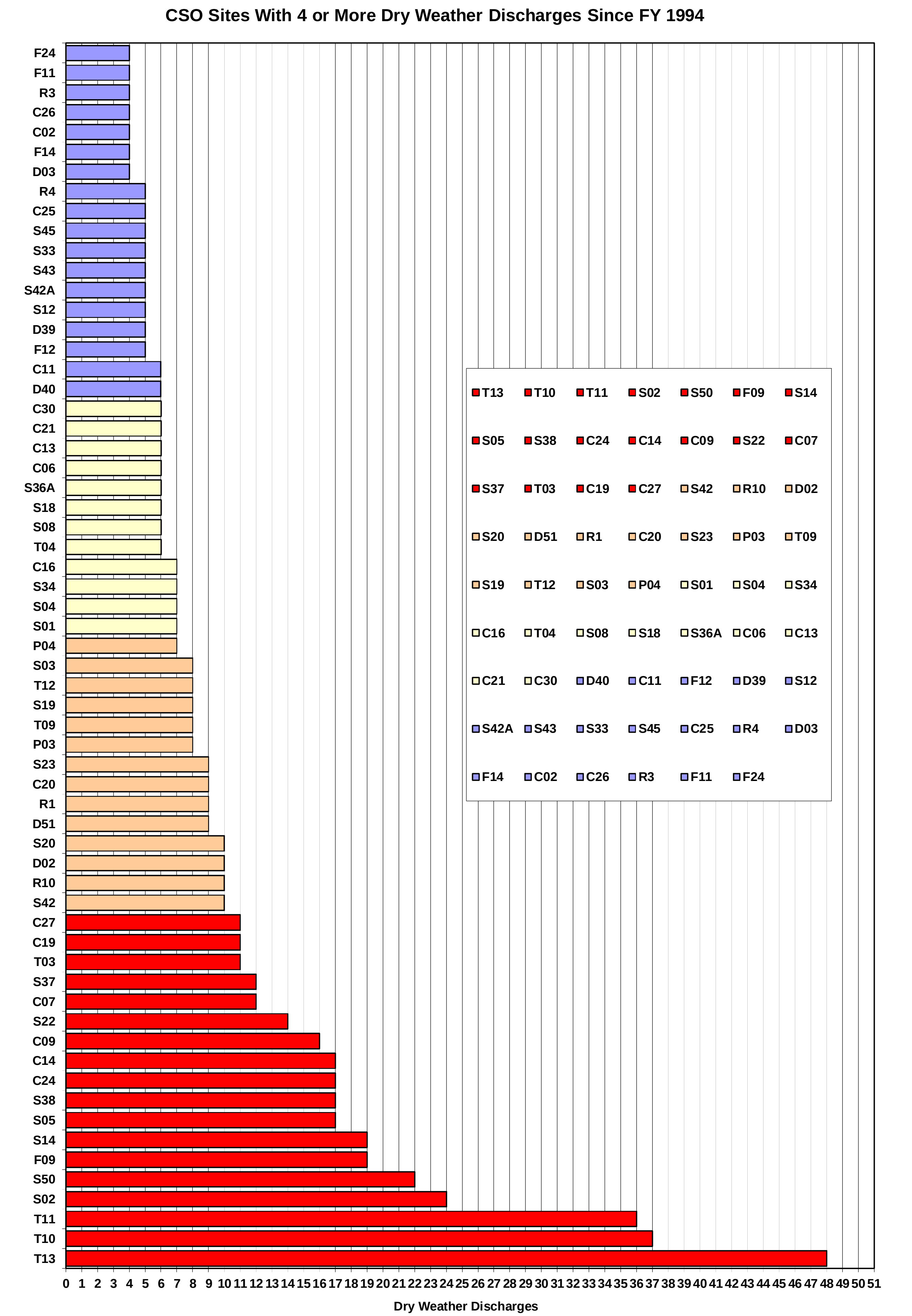
Historical CSO Charts

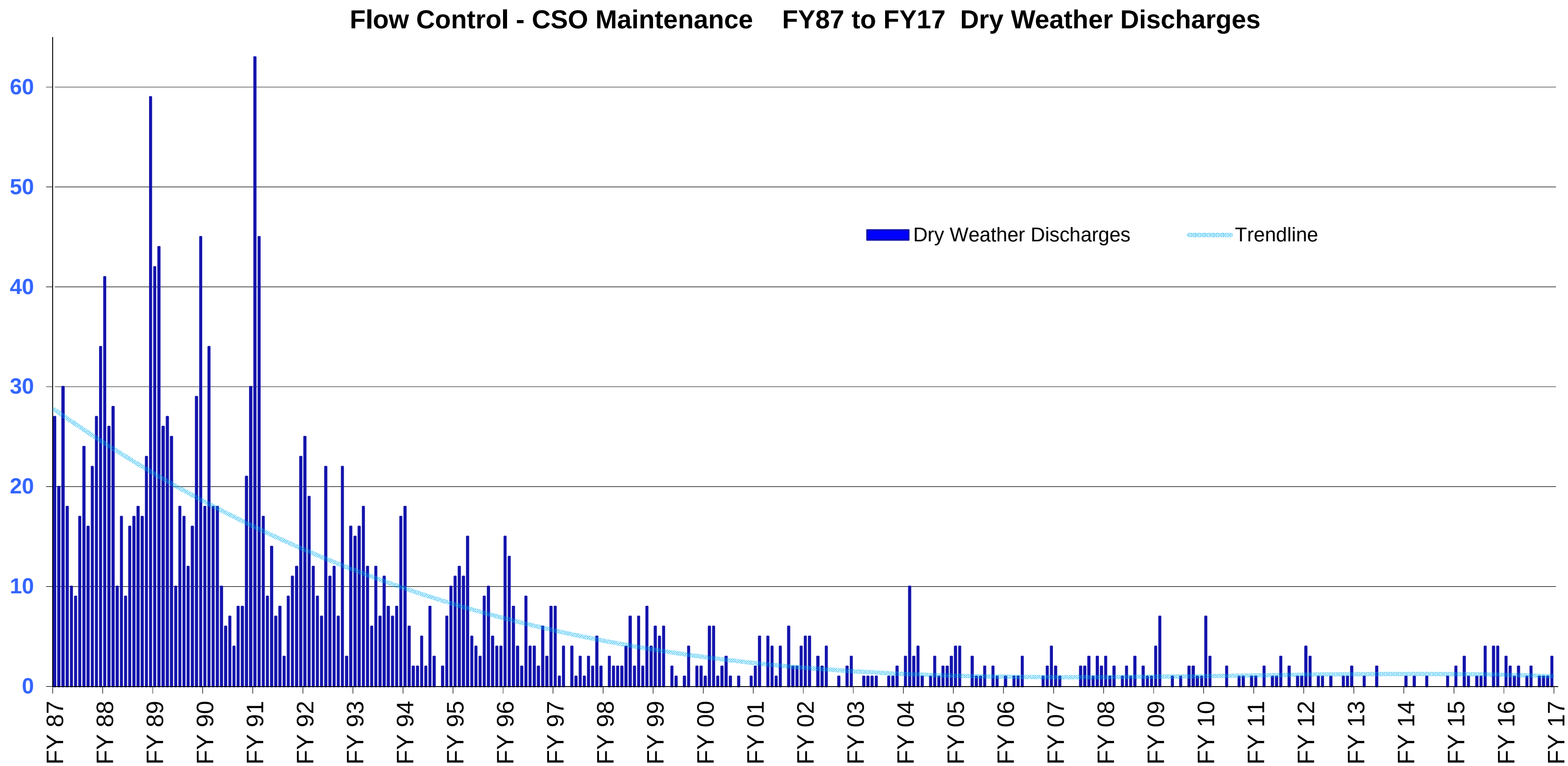
Flow Control - CSO Maintenance   FY87 to FY17 Inspections / Discharges / Blocks Corrected



PWD FLOW CONTROL - CSO DISCHARGE HISTORY - FISCAL YEAR 1994 TO 2017




CSO Sites With 4 or More Dry Weather Discharges Since FY 1994
F24
F11
R3
C26
C02
F14
D03
R4
C25
S45
S33
S43
S42A
S12
D39
F12
C11
D40
C30
C21
C13
C06
S36A
S18
S08
T04
C16
S34
S04
S01
P04
S03
T12
S19
T09
P03
S23
C20
R1
D51
S20
D02
R10
S42
C27
C19
T03
S37
C07
S22
C09
C14
C24
S38
S05
S14
F09
S50
S02
T11
T10
T13
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
Dry Weather Discharges
T13 T10 T11 S02 S50 F09 S14
S05 S38 C24 C14 C09 S22 C07
S37 T03 C19 C27 S42 R10 D02
S20 D51 R1 C20 S23 P03 T09
S19 T12 S03 P04 S01 S04 S34
C16 T04 S08 S18 S36A C06 C13
C21 C30 D40 C11 F12 D39 S12
S42A S43 S33 S45 C25 R4 D03
F14 C02 C26 R3 F11 F24



Flow Control - CSO Maintenance FY87 to FY17 Dry Weather Discharges
0
10
20
30
40
50
60
Dry Weather Discharges
Trendline
FY 87
FY 88
FY 89
FY 90
FY 91
FY 92
FY 93
FY 94
FY 95
FY 96
FY 97
FY 98
FY 99
FY 00
FY 01
FY 02
FY 03
FY 04
FY 05
FY 06
FY 07
FY 08
FY 09
FY 10
FY 11
FY 12
FY 13
FY 14
FY 15
FY 16
FY 17

Appendix D – NPDES Annual CSO Status Report FY17

APPENDIX D –
NPDES ANNUAL CSO STATUS REPORT FY17

Page

Table 1 - Listing of all CSO permitted outfalls

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
NPDES Permit #0026689 - Northeast						
2	39d 58m 50s	75d 4m 58s	Castor Ave. and Balfour St.	Delaware River	Somerset	D_17
3	39d 58m 45s	75d 5m 6s	Venango St. NW of Casper St.	Delaware River	Somerset	D_18
4	39d 58m 41s	75d 5m 15s	Tioga St. NW of Casper St.	Delaware River	Somerset	D_19
5	39d 58m 43s	75d 5m 28s	Ontario St. NW of Casper St.	Delaware River	Somerset	D_20
6	39d 58m 44s	75d 5m 41s	Westmoreland St. NW of Balfour St.	Delaware River	Somerset	D_21
7	39d 58m 42s	75d 5m 53s	Allegheny Ave. SE of Bath St.	Delaware River	Somerset	D_22
8	39d 58m 38s	75d 6m 12s	Indiana Ave. SE of Allen St.	Delaware River	Somerset	D_23
10	39d 58m 38s	75d 6m 28s	Cambria St. E of Melvale St.	Delaware River	Somerset	D_25
11	40d 1m 18s	75d 1m 44s	Cottman St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_02
12	40d 1m 14s	75d 2m 0s	Princeton Ave SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_03
13	40d 1m 8s	75d 2m 13s	Disston St. SE of Wissinoming St.	Delaware River	Upper Delaware Low Level	D_04
14	40d 0m 58s	75d 2m 34s	Magee St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_05
15	40d 0m 53s	75d 2m 46s	Levick St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_06
16	40d 0m 44s	75d 3m 5s	Lardner St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_07
17	40d 0m 38s	75d 3m 13s	Comly St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_08
18	40d 0m 34s	75d 3m 18s	Dark Run La and Milnor St.	Delaware River	Upper Delaware Low Level	D_09
19	40d 0m 21s	75d 3m 28s	Sanger St. SE of Milnor St.	Delaware River	Upper Delaware Low Level	D_11
20	40d 0m 2s	75d 3m 43s	Bridge St. Se of Garden St.	Delaware River	Upper Delaware Low Level	D_12
21	39d 59m 53s	75d 3m 47s	Kirkbride St. and Delaware Ave.	Delaware River	Upper Delaware Low Level	D_13
22	39d 59m 24s	75d 4m 4s	Orthodox St. and Delaware Ave.	Delaware River	Upper Delaware Low Level	D_15
23	40d 2m 36s	75d 1m 15s	Frankford Avenue & Ashburner Street	Pennypack Creek	Pennypack	P_01
24	40d 2m 36s	75d 1m 16s	Frankford Avenue & Holmesburg St.	Pennypack Creek	Pennypack	P_02
25	40d 2m 13s	75d 1m 19s	Torresdale Ave. NW of Pennypack Ck.	Pennypack Creek	Pennypack	P_03
26	40d 2m 23s	75d 1m 21s	Cottage Avenue & Holmesburg Avenue	Pennypack Creek	Pennypack	P_04
27	40d 2m 2s	75d 1m 21s	Holmesburg Ave SE of Hegerman St	Pennypack Creek	Pennypack	P_05
28	40d 4m 34s	75d 9m 44s	Williams Avenue SE of Sedgewick	Tacony Creek	Frankford High Level	T_01
29	40d 2m 28s	75d 6m 56s	Complost Ave West of Tacony Creek	Tacony Creek	Frankford High Level	T_03
30	40d 2m 11s	75d 6m 48s	Rising Sun Ave East of Tacony Creek	Tacony Creek	Frankford High Level	T_04

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
31	40d 2m 9s	75d 6m 48s	Rising Sun Ave West of Tacony Creek	Tacony Creek	Frankford High Level	T_05
32	40d 2m 3s	75d 6m 41s	Bingham Street East of Tacony Creek	Tacony Creek	Frankford High Level	T_06
33	40d 1m 51s	75d 6m 43s	Tabor Road West of Tacony Creek	Tacony Creek	Frankford High Level	T_07
34	40d 1m 42s	75d 6m 47s	Ashdale Street West of Tacony Creek	Tacony Creek	Frankford High Level	T_08
35	40d 1m 37s	75d 6m 48s	Roosevelt Blvd. West of Tacony Creek	Tacony Creek	Frankford High Level	T_09
36	40d 1m 37s	75d 6m 47s	Roosevelt Blvd. East of Tacony Creek	Tacony Creek	Frankford High Level	T_10
37	40d 1m 29s	75d 6m 43s	Ruscomb Street East of Tacony Creek	Tacony Creek	Frankford High Level	T_11
38	40d 1m 23s	75d 6m 41s	Whitaker Avenue East of Tacony Creek	Tacony Creek	Frankford High Level	T_12
39	40d 1m 22s	75d 6m 42s	Whitaker Avenue West of Tacony Ck	Tacony Creek	Frankford High Level	T_13
40	40d 0m 59s	75d 6m 28s	I Street & Ramona Ave.	Tacony Creek	Frankford High Level	T_14
41	40d 0m 57s	75d 6m 20s	J Street & Juniata Park	Tacony Creek	Frankford High Level	T_15
42	40d 0m 57s	75d 5m 51s	Castor Avenue at Unity Street Circle	Frankford Creek	Upper Frankford Low Level	F_03
43	40d 0m 52s	75d 5m 42s	Wingohocking St East of Adams Ave	Frankford Creek	Upper Frankford Low Level	F_04
44	40d 0m 41s	75d 5m 41s	Bristol Street West of Adams Avenue	Frankford Creek	Upper Frankford Low Level	F_05
45	40d 0m 25s	75d 5m 33s	Worrel Street East of Frankford Creek	Frankford Creek	Upper Frankford Low Level	F_06
46	40d 0m 26s	75d 5m 34s	Worrel Street West of Frankford Creek	Frankford Creek	Upper Frankford Low Level	F_07
47	40d 0m 21s	75d 5m 36s	Torresdale Ave & Hunting Park Ave	Frankford Creek	Upper Frankford Low Level	F_08
48	40d 0m 19s	75d 5m 34s	Frankford Ave North of Frankford Ck	Frankford Creek	Upper Frankford Low Level	F_09
49	40d 0m 19s	75d 5m 35s	Frankford Ave South of Frankford Ck	Frankford Creek	Upper Frankford Low Level	F_10
50	40d 0m 15s	75d 5m 26s	Orchard Street South of Vandyke Creek	Frankford Creek	Upper Frankford Low Level	F_11
51	39d 59m 56s	75d 5m 14s	Sepviva Street North of Butler Street	Frankford Creek	Upper Frankford Low Level	F_12
52	39d 59m 49s	75d 5m 3s	Duncan Street Under Delaware Exp.	Frankford Creek	Lower Frankford Low Level	F_13
54	40d 0m 16s	75d 4m 15s	Wakeling Street NW of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_21
55	40d 0m 19s	75d 4m 5s	Bridge Street NW of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_23
56	40d 0m 18s	75d 4m 5s	Bridge Street SE of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_24
57	40d 0m 15s	75d 4m 15s	Ash Street West of Creek Basin	Frankford Creek	Lower Frankford Low Level	F_25
58	40d 0m 30s	75d 3m 20s	Levick St. & Everett Ave.	Delaware River	Wakling Relief Sewer	D_FRW
59	40d 2m 16s	75d 6m 53s	Nedro Ave & 7th St.	Tacony Creek	Rock Run Flood Relief Sewer	T_FRRR
60	40d 0m 36s	75d 5m 44s	Castor Ave. & East Hunting Park Ave.	Frankford Creek	Frankford High Level Relief Sewer	F_FRFG

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
NPDES Permit # 0026662 – Southeast						
2	39d 58m 9s	75d 7m 19s	Dyott Street & Delaware Ave.	Delaware River	Lower Delaware Low Level	D_38
3	39d 58m 7s	75d 7m 23s	Susquehanna Ave. East of Beach Street	Delaware River	Lower Delaware Low Level	D_39
4	39d 58m 5s	75d 7m 26s	Berks Street East of Beach Street	Delaware River	Lower Delaware Low Level	D_40
5	39d 58m 3s	75d 7m 37s	Palmer Street East of Beach Street	Delaware River	Lower Delaware Low Level	D_41
6	39d 57m 54s	75d 7m 42s	Columbia Avenue East of Beach Street	Delaware River	Lower Delaware Low Level	D_42
7	39d 57m 56s	75d 7m 48s	Marlborough Street & Delaware Ave	Delaware River	Lower Delaware Low Level	D_43
8	39d 57m 53s	75d 7m 54s	Shackamaxon St East of Delaware Ave	Delaware River	Lower Delaware Low Level	D_44
9	39d 57m 48s	75d 8m 0s	Laurel Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_45
10	39d 57m 41s	75d 8m 11s	Penn Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_46
11	39d 57m 37s	75d 8m 9s	Fairmont Ave West of Delaware Ave	Delaware River	Lower Delaware Low Level	D_47
12	39d 57m 28s	75d 8m 13s	Willow Street West of Delaware Ave	Delaware River	Lower Delaware Low Level	D_48
13	39d 57m 24s	75d 8m 20s	Callowhill Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_49
14	39d 57m 21s	75d 8m 13s	Delaware Avenue North of Vine Street	Delaware River	Lower Delaware Low Level	D_50
15	39d 57m 11s	75d 8m 17s	Race Street West of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_51
16	39d 57m 7s	75d 8m 25s	Delaware Avenue & Arch Street	Delaware River	Lower Delaware Low Level	D_52
17	39d 56m 57s	75d 8m 23s	Market Street & Front Street	Delaware River	Lower Delaware Low Level	D_53
20	39d 56m 50s	75d 8m 24s	Front Street South of Chestnut Street	Delaware River	Lower Delaware Low Level	D_54
21	39d 56m 26s	75d 8m 32s	South Street & Delaware Avenue	Delaware River	Lower Delaware Low Level	D_58
22	39d 56m 12s	75d 8m 33s	Catharine Street East of Swanson Street	Delaware River	Lower Delaware Low Level	D_61
23	39d 56m 10s	75d 8m 32s	Queen Street East of Swanson Street	Delaware River	Lower Delaware Low Level	D_62
24	39d 56m 5s	75d 8m 33s	Christian St West of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_63
25	39d 55m 59s	75d 8m 35s	Washington Ave East of Delaware Ave	Delaware River	Lower Delaware Low Level	D_64
26	39d 55m 45s	75d 8m 29s	Reed Street East of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_65
27	39d 55m 37s	75d 8m 28s	Tasker Street East of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_66
28	39d 55m 26s	75d 8m 21s	Moore Street East of Delaware Avenue	Delaware River	Lower Delaware Low Level	D_67
33	39d 54m 6s	75d 8m 12s	Pattison Avenue & Swanson Street	Delaware River	Lower Delaware Low Level	D_73
36	39d 58m 21s	75d 6m 58s	Cumberland St East of Richmond St	Delaware River	Lower Delaware Low Level	D_37

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
37	39d 57m 12s	75d 8m 24s	Race Street West of Delaware Avenue, North of D-51	Delaware River	Lower Delaware Low Level	D_51A
29	39d 55m 13s	75d 8m 20s	Snyder Avenue & Delaware Avenue	Delaware River	Oregon	D_68
30	39d 54m 60s	75d 8m 13s	Delaware Ave North of Porter Street	Delaware River	Oregon	D_69
31	39d 54m 44s	75d 8m 15s	Oregon Avenue & Delaware Avenue	Delaware River	Oregon	D_70
32	39d 54m 33s	75d 7m 59s	Bigler Street & Delaware Avenue	Delaware River	Oregon	D_71
34	39d 54m 24s	75d 8m 8s	Packer Avenue East of Delaware Ave	Delaware River	Oregon	D_72
NPDES Permit # 0026671 - Southwest						
2	39d 56m 17s	75d 12m 17s	Reed Street & Schuylkill Avenue	Schuylkill River	Lower Schuylkill East Side	S_31
3	39d 55m 54s	75d 12m 28s	35th St. and Mifflin St.	Schuylkill River	Lower Schuylkill East Side	S_36A
4	39d 55m 41s	75d 12m 38s	Vare Avenue & 29th Street	Schuylkill River	Lower Schuylkill East Side	S_37
5	39d 55m 12s	75d 12m 5s	Passyunk Avenue & 29th Street	Schuylkill River	Lower Schuylkill East Side	S_42
6	39d 55m 12s	75d 12m 5s	Passyunk Avenue & 28th Street	Schuylkill River	Lower Schuylkill East Side	S_42A
7	39d 54m 57s	75d 12m 16s	26th Street 700’ North of Hartranft St	Schuylkill River	Lower Schuylkill East Side	S_44
8	39d 53m 53s	75d 12m 39s	Penrose Avenue & 26th Street	Schuylkill River	Lower Schuylkill East Side	S_46
9	39d 57m 38s	75d 10m 50s	24th Street 155’ South of Parktown Pl	Schuylkill River	Central Schuylkill East Side	S_05
10	39d 57m 39s	75d 10m 49s	24th Street 350’ South of Parktown Pl	Schuylkill River	Central Schuylkill East Side	S_06
11	39d 57m 39s	75d 10m 50s	24th Street East of Schuylkill River	Schuylkill River	Central Schuylkill East Side	S_07
12	39d 57m 29s	75d 10m 43s	Race Street & Bonsall Street	Schuylkill River	Central Schuylkill East Side	S_08
13	39d 57m 30s	75d 10m 45s	Arch Street West of 23rd Street	Schuylkill River	Central Schuylkill East Side	S_09
14	39d 57m 16s	75d 10m 49s	Market Street 25’ East of 24th Street	Schuylkill River	Central Schuylkill East Side	S_10
15	39d 57m 11s	75d 10m 51s	24th St. N of Chestnut St. Bridge	Schuylkill River	Central Schuylkill East Side	S_12A
16	39d 57m 7s	75d 10m 52s	Sansom Street West of 24th Street	Schuylkill River	Central Schuylkill East Side	S_13
17	39d 57m 5s	75d 10m 53s	Walnut Street West of 24th Street	Schuylkill River	Central Schuylkill East Side	S_15
18	39d 57m 1s	75d 10m 56s	Locust Street & 25th Street	Schuylkill River	Central Schuylkill East Side	S_16
19	39d 56m 57s	75d 11m 0s	Spruce Street & 25th Street	Schuylkill River	Central Schuylkill East Side	S_17
20	39d 56m 52s	75d 11m 5s	Pine Street West of Taney Street	Schuylkill River	Central Schuylkill East Side	S_18
21	39d 56m 49s	75d 11m 9s	Lombard Street West of 27th Street	Schuylkill River	Central Schuylkill East Side	S_19
22	39d 56m 47s	75d 11m 12s	South Street East of 27th Street	Schuylkill River	Central Schuylkill East Side	S_21
23	39d 56m 44s	75d 11m 18s	Schuylkill Avenue & Bainbridge Street	Schuylkill River	Central Schuylkill East Side	S_23
24	39d 56m 34s	75d 11m 28s	Schuylkill Avenue & Christian Street	Schuylkill River	Central Schuylkill East Side	S_25

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
25	39d 56m 29s	75d 11m 35s	Ellsworth St West of Schuylkill Avenue	Schuylkill River	Central Schuylkill East Side	S_26
26	39d 58m 1s	75d 11m 17s	Mantua Avenue & West River Drive	Schuylkill River	Central Schuylkill West Side	S_01
27	39d 57m 54s	75d 11m 7s	Haverford Avenue & West River Drive	Schuylkill River	Central Schuylkill West Side	S_02
28	39d 57m 51s	75d 11m 4s	Spring Garden St W of Schuylkill Expy	Schuylkill River	Central Schuylkill West Side	S_03
29	39d 57m 53s	75d 11m 4s	Powelton Ave W of Schuylkill Expy	Schuylkill River	Central Schuylkill West Side	S_04
30	39d 57m 16s	75d 10m 53s	Market St West of Schuylkill Expy	Schuylkill River	Central Schuylkill West Side	S_11
31	39d 57m 5s	75d 10m 58s	Schuylkill Expressway & Walnut Street	Schuylkill River	Central Schuylkill West Side	S_14
32	39d 56m 51s	75d 11m 14s	440’ Northwest of South Street	Schuylkill River	Central Schuylkill West Side	S_20
33	39d 56m 46s	75d 11m 22s	660’ South of South St E of Pennfield	Schuylkill River	Central Schuylkill West Side	S_22
34	39d 56m 43s	75d 11m 26s	1060’ South of South St E of Pennfield	Schuylkill River	Central Schuylkill West Side	S_24
35	39d 56m 32s	75d 12m 27s	46th Street & Paschall Avenue	Schuylkill River	Southwest Main Gravity	S_30
36	39d 56m 36s	75d 12m 18s	43rd St. and Locust St.	Schuylkill River	Southwest Main Gravity	S_50
37	39d 56m 13s	75d 12m 23s	49th Street South of Botanic Street	Schuylkill River	Lower Schuylkill West Side	S_32
38	39d 56m 8s	75d 12m 24s	51st Street South of Botanic Street	Schuylkill River	Lower Schuylkill West Side	S_33
39	39d 55m 43s	75d 12m 45s	56th Street East of P&R Railroad	Schuylkill River	Lower Schuylkill West Side	S_38
40	39d 54m 39s	75d 12m 55s	64th St. and Buist Ave.	Schuylkill River	Lower Schuylkill West Side	S_45
41	39d 56m 10s	75d 14m 6s	60th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek High Level	C_18
51	39d 58m 51s	75d 16m 4s	City Line Avenue & 73rd Street	Cobbs Creek	Cobbs Creek High Level	C_01
52	39d 58m 51s	75d 16m 1s	City Line Ave 100’ South Side of Creek	Cobbs Creek	Cobbs Creek High Level	C_02
54	39d 58m 30s	75d 15m 26s	Lebanon Ave Southwest of 73rd Street	Cobbs Creek	Cobbs Creek High Level	C_05
55	39d 58m 31s	75d 15m 25s	Lebanon Avenue & 68th Street	Cobbs Creek	Cobbs Creek High Level	C_06
56	39d 58m 26s	75d 15m 26s	Lansdowne Avenue & 69th Street	Cobbs Creek	Cobbs Creek High Level	C_07
57	39d 57m 51s	75d 14m 56s	54th Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_09
58	39d 57m 50s	75d 14m 53s	Gross Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_10
59	39d 57m 43s	75d 14m 53s	Cobbs Creek Pky South of Market St	Cobbs Creek	Cobbs Creek High Level	C_11
60	39d 57m 27s	75d 14m 60s	Spruce Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_12
61	39d 56m 45s	75d 14m 58s	62nd Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_13
62	39d 56m 36s	75d 14m 50s	Baltimore Avenue & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_14
63	39d 56m 31s	75d 14m 26s	59th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek High Level	C_15
64	39d 56m 26s	75d 14m 23s	Thomas Avenue & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_16
65	39d 56m 13s	75d 14m 6s	Beaumont Street & Cobbs Creek	Cobbs Creek	Cobbs Creek High Level	C_17

Point Source #	Outfall Latitude	Outfall Longitude	Regulator Location	Discharges to:	Interceptor	Outfall Name
66	39d 58m 29s	75d 16m 48s	Cobbs Creek Pky S of City Line Ave	Cobbs Creek	Cobbs Creek High Level	C_31
67	39d 58m 12s	75d 15m 56s	Brockton Road & Farrington Road	Cobbs Creek	Cobbs Creek High Level	C_33
68	39d 58m 40s	75d 15m 44s	Woodcrest Avenue & Morris Park	Cobbs Creek	Cobbs Creek High Level	C_34
69	39d 58m 47s	75d 15m 54s	Morris Park West of 72nd Street & Sherwood Road	Cobbs Creek	Cobbs Creek High Level	C_35
70	39d 58m 49s	75d 15m 35s	Woodbine Ave South of Brentwood Rd	Cobbs Creek	Cobbs Creek High Level	C_36
71	39d 57m 55s	75d 15m 15s	Cobbs Creek Parkway South of 67th & Callowhill Streets	Cobbs Creek	Cobbs Creek High Level	C_37
72	39d 58m 22s	75d 16m 11s	Cobbs Creek Parkway & 77th Street	Cobbs Creek	Cobbs Creek High Level	C_32
82	39d 58m 38s	75d 15m 28s	Malvern Ave. and 68th St.	Cobbs Creek	Cobbs Creek High Level	C_04A
42	39d 55m 57s	75d 14m 19s	Mount Moriah Cemetary & 62nd Street	Cobbs Creek	Cobbs Creek Low Level	C_19
43	39d 55m 46s	75d 14m 39s	65th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_20
44	39d 55m 37s	75d 14m 40s	68th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_21
45	39d 55m 27s	75d 14m 46s	70th Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_22
46	39d 55m 15s	75d 14m 52s	Upland Street & Cobbs Creek Parkway	Cobbs Creek	Cobbs Creek Low Level	C_23
47	39d 55m 1s	75d 14m 49s	Woodland Avenue East of Island Ave.	Cobbs Creek	Cobbs Creek Low Level	C_25
49	39d 54m 44s	75d 14m 56s	Claymont Street & Grays Avenue	Cobbs Creek	Cobbs Creek Low Level	C_29
50	39d 54m 34s	75d 15m 1s	77th Street West of Elmwood Avenue	Cobbs Creek	Cobbs Creek Low Level	C_30
78	39d 54m 49s	75d 14m 50s	Island Ave. Southeast of Glenmore Ave	Cobbs Creek	Cobbs Creek Low Level	C_28A
75	39d 57m 59s	75d 11m 3s	16th St. & Clearfield St.	Schuylkill River	Main Relief Sewer	S_FRM
83	39d 56m 31s	75d 14m 25s	56th St. & Locust	Cobbs Creek	Thomas Run Relief Sewer	C_FRTR
84	39d 57m 49s	75d 14m 53s	Arch Street & Cobbs Creek	Cobbs Creek	Arch Street Relief Sewer	C_FRA

Table 2 - Overflow Summary for 7/1/2016 – 6/30/2017

District	Permitted Outfall	Frequency	Duration (hours)	Volume (ft^3)
Northeast	D_FRW	50	91	23,542,436
Northeast	D02	52	463	41,686,915
Northeast	D03	49	453.25	11,263,514
Northeast	D04	30	257	732,827
Northeast	D05	59	448.25	79,345,499
Northeast	D06	25	114.5	2,247,329
Northeast	D07	59	447.25	64,649,007
Northeast	D08	49	196.5	1,891,823
Northeast	D09	7	3.75	238,045
Northeast	D11	20	57.75	5,104,356
Northeast	D12	41	61.5	211,208
Northeast	D13	9	5	315,896
Northeast	D15	10	7.25	899,951
Northeast	D17	42	101.75	7,605,315
Northeast	D18	43	101.75	5,563,469
Northeast	D19	48	128.75	4,564,835
Northeast	D20	27	53.5	2,501,921
Northeast	D21	38	77	5,564,649
Northeast	D22	69	353.25	25,656,579
Northeast	D23	44	45	268,970
Northeast	D25	62	276.25	94,622,542
Northeast	F_FRFG	11	19.25	26,044
Northeast	F03	41	45.25	2,859,992
Northeast	F04	64	152.75	8,446,273
Northeast	F05	64	166.5	1,010,615
Northeast	F06	21	21	799,925
Northeast	F07	40	66.25	2,577,915
Northeast	F08	40	54.75	1,421,587
Northeast	F09	56	144.25	871,450
Northeast	F10	62	204	3,043,895
Northeast	F11	70	284.75	14,237,473
Northeast	F12	28	26.5	648,952
Northeast	F13	46	81.25	1,536,058
Northeast	F21	65	262.75	88,395,517
Northeast	F23	44	74.5	1,423,390
Northeast	F24	47	60	645,178
Northeast	F25	7	8	2,302,375

District	Permitted Outfall	Frequency	Duration (hours)	Volume (ft^3)
Northeast	P01	21	11.25	570,533
Northeast	P02	54	99.75	4,687,362
Northeast	P03	42	200.75	3,320,398
Northeast	P04	30	144.25	15,950,185
Northeast	P05	44	299.75	47,505,308
Northeast	T_FRRR	42	166.5	35,501,023
Northeast	T01	59	175.5	6,438,615
Northeast	T03	59	108.5	3,619,687
Northeast	T04	58	108.5	2,498,076
Northeast	T05	46	45.75	1,329,966
Northeast	T06	45	60.5	9,205,814
Northeast	T07	17	6.5	233,902
Northeast	T08	63	151.75	40,625,709
Northeast	T09	43	46	949,792
Northeast	T10	66	155	2,819,100
Northeast	T11	55	79.5	1,287,943
Northeast	T12	10	4.75	72,448
Northeast	T13	63	130.25	4,806,177
Northeast	T14	42	389.75	210,799,610
Northeast	T15	53	111.25	6,221,672
Southeast	D37	52	186.75	19,467,997
Southeast	D38	45	115.75	19,315,530
Southeast	D39	52	159	28,247,502
Southeast	D40	63	220	1,662,531
Southeast	D41	43	102.5	1,895,342
Southeast	D42	16	13	207,337
Southeast	D43	11	13.5	162,458
Southeast	D44	44	105.25	7,011,148
Southeast	D45	36	85.5	40,181,081
Southeast	D46	20	24	613,238
Southeast	D47	68	264.5	8,672,765
Southeast	D48	44	89.75	18,675,988
Southeast	D49	4	1.75	64,618
Southeast	D50	14	8.75	219,119
Southeast	D51	69	530	2,751,326
Southeast	D51A	53	155	1,946,473
Southeast	D52	19	15.5	379,800
Southeast	D53	8	7.5	1,722,652

District	Permitted Outfall	Frequency	Duration (hours)	Volume (ft^3)
Southeast	D54	19	26.25	7,311,404
Southeast	D58	23	23.5	748,565
Southeast	D61	46	59.5	737,641
Southeast	D62	28	21.75	249,607
Southeast	D63	35	61.25	10,368,555
Southeast	D64	34	34.25	156,619
Southeast	D65	35	56	6,173,593
Southeast	D66	41	83.5	6,981,152
Southeast	D67	42	69.5	3,199,521
Southeast	D68	56	178.25	22,659,692
Southeast	D69	27	53.75	4,353,970
Southeast	D70	19	26.75	3,577,682
Southeast	D71	41	87.75	6,475,676
Southeast	D72	27	58	3,902,003
Southeast	D73	41	94.5	11,273,162
Southwest	C_FRA	15	6.25	977,075
Southwest	C_FRTR	79	390.25	19,121,528
Southwest	C01	18	9.75	283,482
Southwest	C02	4	2	35,387
Southwest	C04A	23	18.75	1,442,197
Southwest	C05	17	10.5	372,655
Southwest	C06	62	134.75	4,958,954
Southwest	C07	23	23.75	1,141,132
Southwest	C09	41	43.25	1,470,572
Southwest	C10	14	20.5	128,083
Southwest	C11	50	101.5	11,381,876
Southwest	C12	47	81	1,970,677
Southwest	C13	37	54.75	1,245,533
Southwest	C14	34	71.25	3,075,356
Southwest	C15	23	47	411,102
Southwest	C16	6	3	28,934
Southwest	C17	62	206.5	47,933,915
Southwest	C18	36	71.5	4,095,095
Southwest	C19	18	11.5	520,886
Southwest	C20	17	11.25	268,543
Southwest	C21	17	15.25	354,926
Southwest	C22	41	59.75	1,521,075
Southwest	C23	9	12.5	98,609

District	Permitted Outfall	Frequency	Duration (hours)	Volume (ft^3)
Southwest	C25	22	46.25	1,803,479
Southwest	C28A	43	35.25	249,117
Southwest	C29	51	143	1,757,778
Southwest	C30	31	94.75	865,482
Southwest	C31	45	72.5	1,288,287
Southwest	C32	40	36.25	1,222,087
Southwest	C33	24	13.75	447,414
Southwest	C34	16	7.25	284,380
Southwest	C35	10	6.5	113,344
Southwest	C36	7	4.25	99,705
Southwest	C37	17	9.5	134,661
Southwest	S_FRM	10	12.5	11,823,121
Southwest	S01	50	106.25	13,318,913
Southwest	S01T	37	45.25	3,210,963
Southwest	S02	54	115	1,307,404
Southwest	S03	15	7.25	182,521
Southwest	S04	73	257.75	2,921,252
Southwest	S05	69	229.75	31,689,896
Southwest	S06	71	217.25	15,532,598
Southwest	S07	27	20	1,851,099
Southwest	S08	44	53	255,362
Southwest	S09	44	59.75	6,994,220
Southwest	S10	59	140.5	3,041,235
Southwest	S11	61	117.75	898,129
Southwest	S12A	50	61.25	869,994
Southwest	S13	18	9.25	495,041
Southwest	S14	69	184	2,442,730
Southwest	S15	27	19.25	358,838
Southwest	S16	70	163.25	1,342,325
Southwest	S17	26	20.5	684,579
Southwest	S18	60	138.5	6,689,770
Southwest	S19	34	21.25	306,727
Southwest	S20	73	363	19,127,222
Southwest	S21	22	15	198,159
Southwest	S22	46	68.75	2,494,946
Southwest	S23	59	130	1,466,928
Southwest	S24	46	64.25	774,228
Southwest	S25	52	87.75	1,825,427

District	Permitted Outfall	Frequency	Duration (hours)	Volume (ft^3)
Southwest	S26	69	270	16,097,717
Southwest	S30	10	4	108,532
Southwest	S31	58	117.75	4,103,843
Southwest	S32	17	11	175,941
Southwest	S33	68	245.75	15,695,689
Southwest	S36A	68	223.75	6,776,320
Southwest	S37	63	162	2,712,370
Southwest	S38	36	62.25	5,159,812
Southwest	S42	48	90	7,230,960
Southwest	S42A	71	355.25	19,630,728
Southwest	S44	24	17.75	1,820,153
Southwest	S45	47	96.75	15,154,177
Southwest	S46	23	30	980,998
Southwest	S50	64	273.5	176,798,334

Table 3 - Overflow Summary for Typical Year Precipitation (based on Year-5 EAP submission)

District	Permitted Outfall	Frequency	SWO Duration (hrs)	Overflow Volume (MG)
Northeast	D_FRW	44	117.75	96.0
Northeast	D02	26	0	45.3
Northeast	D03	26	61.75	13.3
Northeast	D04	10	21.75	1.7
Northeast	D05	49	251	360.7
Northeast	D06	9	11	1.3
Northeast	D07	54	204.75	135.9
Northeast	D08	40	92.5	3.3
Northeast	D09	5	3.5	0.5
Northeast	D11	21	56.75	24.6
Northeast	D12	46	114.5	1.6
Northeast	D13	9	12.25	1.3
Northeast	D15	15	30	8.0
Northeast	D17	45	169	64.8
Northeast	D18	52	180.25	53.6
Northeast	D19	53	223.75	48.0
Northeast	D20	36	114.5	28.7
Northeast	D21	45	184.75	65.9
Northeast	D22	71	512	251.7
Northeast	D23	42	72	1.6
Northeast	D25	66	422.75	963.3
Northeast	F_FRFG	5	2.5	0.3
Northeast	F03	33	55.75	18.8
Northeast	F04	63	239.25	63.5
Northeast	F05	69	272	8.1
Northeast	F06	20	36.75	5.5
Northeast	F07	40	94.75	20.4
Northeast	F08	39	76.25	11.0
Northeast	F09	59	231	9.2
Northeast	F10	63	322.25	26.5
Northeast	F11	71	431.75	133.7
Northeast	F12	31	53.25	5.8
Northeast	F13	46	130.25	14.0
Northeast	F21	67	385.5	800.2
Northeast	F23	44	113.75	11.6
Northeast	F24	47	99.75	5.1
Northeast	F25	15	32	28.5
Northeast	P01	15	16.25	3.2
Northeast	P02	49	115.75	14.9
Northeast	P03	20	26.25	2.0
Northeast	P04	9	30.25	11.5

District	Permitted Outfall	Frequency	SWO Duration (hrs)	Overflow Volume (MG)
Northeast	P05	27	56.75	22.3
Northeast	T_FRRR	37	274.5	281.9
Northeast	T01	64	262.5	45.1
Northeast	T03	61	158	22.8
Northeast	T04	59	154.25	15.9
Northeast	T05	42	64.25	7.6
Northeast	T06	39	72	55.3
Northeast	T07	9	8.5	1.0
Northeast	T08	62	234.75	257.0
Northeast	T09	44	68.25	5.7
Northeast	T10	63	258.5	22.3
Northeast	T11	59	165.75	10.1
Northeast	T12	8	7	0.2
Northeast	T13	63	191.75	31.4
Northeast	T14	37	356.5	1546.5
Northeast	T15	54	158	42.1
Southeast	D37	54	282	184.0
Southeast	D38	43	169.75	178.9
Southeast	D39	54	270.75	276.7
Southeast	D40	57	282	14.4
Southeast	D41	42	153.75	17.7
Southeast	D42	18	22	1.5
Southeast	D43	19	31.75	1.3
Southeast	D44	23	55	23.8
Southeast	D45	36	121	357.6
Southeast	D46	19	30.75	3.9
Southeast	D47	56	215	46.3
Southeast	D48	40	94.25	112.3
Southeast	D49	6	4.5	0.4
Southeast	D50	14	12.5	1.5
Southeast	D51	56	372	11.4
Southeast	D51A	49	174	12.5
Southeast	D52	22	31	2.7
Southeast	D53	7	7.5	9.6
Southeast	D54	19	30	48.3
Southeast	D58	18	26.5	5.1
Southeast	D61	46	94.75	6.2
Southeast	D62	20	23.25	1.8
Southeast	D63	31	65.25	73.9
Southeast	D64	27	41.75	1.5
Southeast	D65	29	66.25	52.4
Southeast	D66	37	105.75	58.8

District	Permitted Outfall	Frequency	SWO Duration (hrs)	Overflow Volume (MG)
Southeast	D67	31	80.75	28.0
Southeast	D68	41	183.75	156.0
Southeast	D69	24	70.75	47.2
Southeast	D70	20	45.5	48.3
Southeast	D71	24	63	45.5
Southeast	D72	18	34.75	29.2
Southeast	D73	51	236	159.2
Southwest	C_FRA	11	9.5	5.2
Southwest	C_FRTR	83	500.5	161.8
Southwest	C01	15	15.25	1.7
Southwest	C02	6	4.25	0.2
Southwest	C04A	19	28	12.6
Southwest	C05	2	2.75	0.4
Southwest	C06	61	195.75	40.1
Southwest	C07	19	39.25	10.2
Southwest	C09	33	65	13.6
Southwest	C10	16	36.5	1.6
Southwest	C11	42	122.75	97.1
Southwest	C12	39	100	16.7
Southwest	C13	30	68.25	11.0
Southwest	C14	30	80.5	22.1
Southwest	C15	18	40.75	2.7
Southwest	C16	5	4.75	0.2
Southwest	C17	55	266.5	294.4
Southwest	C18	29	64.75	21.0
Southwest	C19	18	21.75	4.6
Southwest	C20	14	22	2.5
Southwest	C21	15	26.25	3.5
Southwest	C22	37	78.75	14.5
Southwest	C23	12	25	1.7
Southwest	C25	22	61	19.5
Southwest	C28A	36	58.5	2.1
Southwest	C29	48	189.25	16.2
Southwest	C30	30	118.5	8.4
Southwest	C31	40	90.25	10.3
Southwest	C32	31	56.25	9.8
Southwest	C33	20	24.25	3.1
Southwest	C34	13	11.75	1.7
Southwest	C35	10	11.25	0.7
Southwest	C36	10	9.25	0.6
Southwest	C37	15	17.5	0.9
Southwest	S_FRM	8	10.75	41.9

District	Permitted Outfall	Frequency	SWO Duration (hrs)	Overflow Volume (MG)
Southwest	S01	41	122	86.4
Southwest	S02	49	142	7.4
Southwest	S03	11	8	0.6
Southwest	S04	72	385.5	19.8
Southwest	S05	71	338.25	236.5
Southwest	S06	65	281.5	98.6
Southwest	S07	16	22.75	9.1
Southwest	S08	36	64.25	1.3
Southwest	S09	39	78	42.8
Southwest	S10	56	185.25	18.9
Southwest	S11	53	153	4.9
Southwest	S12A	44	80.5	4.9
Southwest	S13	17	12.75	2.0
Southwest	S14	62	263.5	16.4
Southwest	S15	22	27.75	1.7
Southwest	S16	67	238.75	9.1
Southwest	S17	25	32.75	3.8
Southwest	S18	51	188.25	45.1
Southwest	S19	29	33.5	1.8
Southwest	S20	78	517.5	145.6
Southwest	S21	22	22	1.0
Southwest	S22	40	85	15.5
Southwest	S23	59	182.25	10.7
Southwest	S24	41	81.25	5.3
Southwest	S25	45	113.5	12.6
Southwest	S26	69	376.25	133.5
Southwest	S30	7	5.5	0.4
Southwest	S31	57	175	32.4
Southwest	S32	14	14	1.3
Southwest	S33	70	349.75	132.0
Southwest	S36A	66	323	59.8
Southwest	S37	60	239	24.1
Southwest	S38	28	48.75	30.1
Southwest	S42	50	185.25	97.9
Southwest	S42A	74	530.25	177.8
Southwest	S44	43	125	59.4
Southwest	S45	41	104.25	139.0
Southwest	S46	25	48	13.5
Southwest	S50	61	326.75	1067.6

Table 4 - July 2016 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
7/1/2016	0	0.03	0.11	0.48	0.023	0.28	0.2	0.18	0.29	0.02	0.25	0.01	0.22	0.13	0.16	0.07	0.4	0.13
7/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/4/2016	0.29	0.4	0.36	0.28	0.358	0.34	0.29	0.35	0.34	0.36	0.35	0.37	0.34	0.25	0.34	0.4	0.3	0.35
7/5/2016	0.07	0.1	0.13	0.1	0.104	0.08	0.1	0.12	0.09	0.14	0.12	0.11	0.13	0.08	0.12	0.1	0.13	0.1
7/6/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/8/2016	0	0	0.05	0.02	0.018	0	0.05	0.12	0	0.03	0.05	0.03	0	0.02	0	0	0.07	0
7/9/2016	0.02	0.04	0.22	0.23	0.03	0.02	0.02	0.09	0.02	0.27	0.07	0.03	0.09	0.02	0.01	0.01	0.04	0.01
7/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/13/2016	0.16	0.17	0.86	0.38	0.374	0.99	0.63	0.74	0.48	0.84	0.88	0.42	0.79	0.88	0.73	0.33	0.75	0.61
7/14/2016	0	0.04	0.01	0.01	0.004	0.02	0	0.01	0.02	0.01	0.01	0	0.01	0	0.01	0.01	0.01	0.01
7/15/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/16/2016	0.68	0.4	0.04	0	0.137	0	0	0	0	0	0	0.16	0	0.01	0.1	0.28	0	0
7/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/18/2016	0.21	0.4	0.52	0.17	0.372	0.38	0.22	0.31	0.68	0.39	0.48	0.46	0.53	0.38	0.43	0.83	0.17	0.27
7/19/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/20/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/21/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/23/2016	0.03	0.04	0.1	0.05	0.133	0.59	0.24	0.25	0.48	0.05	0.16	0.07	0.26	0.16	0.78	1.05	0.13	0.39
7/24/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/25/2016	1.6	1.82	2.86	2.95	2.055	2.67	2.75	2.79	2.87	2.32	2.79	1.94	2.93	2.77	2.63	2.98	2.65	2.82
7/26/2016	0	0.01	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0
7/27/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/28/2016	0.23	0.24	0.1	0.12	0.696	0.13	0.15	0.18	0.15	0.07	0.15	0.79	0.12	0.12	0.2	0.33	0.18	0.14
7/29/2016	0.44	0.24	0.5	0.77	0.454	0.24	0.45	0.53	0.22	0.39	0.53	0.48	0.54	0.4	0.4	0.3	0.51	0.27
7/30/2016	0.29	0.33	0.37	0.29	0.347	0.27	0.28	0.31	0.28	0.27	0.31	0.35	0.35	0.25	0.3	0.36	0.3	0.27
7/31/2016	0	0.01	0.68	0.22	0.035	0.4	0.54	0.71	0.53	0.82	0.77	0.01	0.65	0.76	0.26	0.03	0.53	0.89

Table 5 - July 2016 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
7/1/2016	0	0.19	0.01	0.268	0.01	0.09	0.02	0.14	0.15	0.1	0.03	0.04	0	0	0.27	0	0.02
7/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/4/2016	0.37	0.42	0.37	0.341	0.31	0.31	0.33	0.28	0.35	0.34	0.25	0.26	0.36	0.31	0.39	0.29	0.36
7/5/2016	0.1	0.15	0.12	0.09	0.1	0.17	0.09	0.07	0.12	0.16	0.08	0.19	0.16	0.19	0.14	0.09	0.09
7/6/2016	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
7/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/8/2016	0	0.92	0	0	0	1	0	0	0.1	1.54	0	0	0.08	2.2	0	0	0
7/9/2016	0.05	0.67	0.03	0.02	0.05	0.64	0.04	0.01	0.25	1.04	0	0.05	0.17	0.34	0.05	0.05	0.06
7/10/2016	0	0.01	0	0	0	0	0	0	0.01	0	0.01	0	0.01	0.23	0	0	0
7/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0
7/13/2016	0.87	0.57	1.15	0.593	0.16	0.89	0.25	0.48	0.73	0.6	0.32	0.86	0.98	0.35	0.38	0.62	0.78
7/14/2016	0.05	0.01	0.1	0.023	0.04	0	0.01	0.01	0.01	0.01	0.08	0.02	0.01	0.12	0.09	0.04	0.05
7/15/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0	0	0
7/16/2016	0	0.08	0	0.025	0.36	0	0.02	0.01	0.07	0	0	0	0	0	0.39	0	0
7/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/18/2016	0.61	0.08	0.25	0.575	0.51	0	0.04	0.13	0.32	0.03	0	0.36	0.01	0	0.34	0.27	0.2
7/19/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/20/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/21/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0
7/23/2016	0.35	0	0.39	0.477	0	0	0	0	0	0	0.07	0.32	0.01	0	0.02	0.13	0.85
7/24/2016	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
7/25/2016	2.29	3.21	2.67	2.36	1.44	2.42	2.043	2.686	3.06	0.62	0.03	2.06	2.34	0.48	1.8	0.14	2.81
7/26/2016	0	0	0	0	0	0	0.001	0	0	0	0	0	0.01	0	0	0.01	0
7/27/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/28/2016	0.08	0.08	0.13	0.17	0.38	0.07	0.352	0.192	0.08	0.03	0.01	0.07	0.09	0	0.21	0.176	0.13
7/29/2016	0.22	0.72	0.3	0.2	0.35	0.37	0.368	0.392	0.45	0.27	0	0.29	0.38	0	0.22	0.235	0.25
7/30/2016	0.27	0.41	0.33	0.26	0.28	0.42	0.318	0.299	0.27	0	0	0.27	0.32	0	0.28	0.277	0.3
7/31/2016	1.71	0.41	2.47	0.2	0.01	1.2	0.054	0.401	0.54	0	0	0.99	1.56	0	0.02	0.415	1.37

Table 6 – August 2016 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
8/1/2016	0	0	0	0	0.016	0	0	0	0	0	0	0.02	0	0	0	0	0	0
8/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/5/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/6/2016	0	0	0.05	0	0	0	0	0	0	0.11	0.01	0	0.01	0	0	0	0	0.01
8/7/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
8/8/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/9/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/11/2016	0.21	0.23	0.02	0.05	0.325	0.42	0.09	0.02	0.37	0.02	0.03	0.36	0.04	0.04	0.08	0.15	0.04	0.09
8/12/2016	0	0	0.1	0.05	0.001	0	0.03	0.17	0	0.12	0.06	0	0.06	0.08	0.03	0	0.24	0.04
8/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/14/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/15/2016	0	0.01	0	0	0.016	0	0	0	0.01	0.01	0	0.02	0	0	0	0	0.01	0.01
8/16/2016	0	0	0	0	0	0	0	0.01	0	0	0.01	0	0	0	0	0	0	0
8/17/2016	0.3	0.4	0.32	0.34	0.491	0.38	0.51	0.35	0.38	0.31	0.29	0.54	0.32	0.09	0.17	0.24	0.31	0.48
8/18/2016	0.31	0.5	0.13	0.1	0.334	0.21	0.1	0.1	0.24	0.2	0.12	0.35	0.14	0.14	0.22	0.27	0.11	0.22
8/19/2016	0.08	0	0.01	0.03	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0
8/20/2016	0	0	0	0.01	0	0	0	0	0	0	0.26	0	0.11	0	0	0	0.58	0
8/21/2016	0.85	0.84	0.77	0.61	1.085	1.42	0.69	0.75	1.05	0.4	0.72	1.16	0.75	0.64	1.06	1.11	0.88	0.78
8/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/24/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/25/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/27/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/28/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/29/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/30/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/31/2016	0	0.02	0	0	0.007	0.02	0.01	0.01	0.04	0.001	0.01	0	0	0.02	0.03	0.04	0.01	0.01

Table 7 - August 2016 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
8/1/2016	0	0	0	0	0	0	0.003	0	0	0	0.001	0	0.01	0	0	0	0
8/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/3/2016	0	0	0	0	0	0.04	0	0	0	0	0	0	0	0	0	0	0
8/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/5/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/6/2016	0.02	0.06	0.05	0	0	0.05	0	0.002	0.02	0.14	0.54	0.04	0.18	0	0	0.01	0.08
8/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/8/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/9/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/11/2016	0	0	0	0.36	0.49	0	0.25	0.087	0.01	0	0.02	0.01	0	0	0.12	0.242	0.01
8/12/2016	0.15	0.01	0.31	0	0	0.09	0.001	0.042	0.05	0.11	0.01	0.23	0.03	0.13	0	0.039	0.27
8/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/14/2016	0	0	0	0	0.02	0.01	0.002	0	0	0.01	0	0	0.01	0.24	0	0	0
8/15/2016	0.02	0	0.01	0.02	0	0.01	0.006	0.001	0	0	0.01	0.01	0.02	0	0.03	0.015	0.01
8/16/2016	0	0	0	0	0	0	0	0.001	0	0	0	0.01	0	0	0	0	0
8/17/2016	0.31	0.29	0.37	0.36	0.49	0.12	0.362	0.254	0.25	0.236	0.03	0.29	0.21	0.23	0.29	0.354	0.4
8/18/2016	0.14	0.31	0.19	0.34	0.36	0.35	0.331	0.198	0.11	0.276	0	0.16	0.37	0.05	0.28	0.275	0.16
8/19/2016	0	0	0	0	0	0	0.024	0	0.02	0.003	0	0.01	0.01	0	0	0.001	0
8/20/2016	0	0	0	0	0	0	0	0.008	0	0.004	0	0.08	0	0	0	0.002	0
8/21/2016	0.51	0.52	0.49	1.07	0.62	0.27	0.963	0.793	0.55	0.454	0.36	0.48	0.27	0.27	0.68	0.939	0.76
8/22/2016	0	0.01	0	0.01	0	0	0	0	0	0.005	0	0.01	0	0.01	0	0.003	0
8/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/24/2016	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
8/25/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/27/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/28/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/29/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/30/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/31/2016	0	0	0.01	0.05	0	0	0.01	0.02	0	0	0	0	0	0	0.04	0.04	0.02

Table 8 – September 2016 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
9/1/2016	0.35	0.32	0.44	0.75	0.712	0.06	0.19	0.43	0.07	0.465	0.57	0.99	0.45	0.17	0.15	0.17	0.37	0.2
9/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/5/2016	0	0	0	0	0.006	0	0	0	0	0	0	0.01	0	0	0	0	0	0
9/6/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/8/2016	0	0	0	0	0	0	0	0	0	0.11	0.01	0	0	0	0	0	0	0
9/9/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10/2016	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0
9/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/12/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/14/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/15/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/18/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/19/2016	1.24	1.22	1.46	1.56	1.533	1.09	1.49	1.32	1.01	1.36	1.28	1.67	1.393	1.38	1.31	1.64	1.31	1.29
9/20/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
9/21/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
9/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/24/2016	0	0	0	0.01	0	0	0	0	0.01	0	0	0	0.02	0.01	0	0	0	0.01
9/25/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/27/2016	0.06	0.09	0.09	0.08	0.079	0.11	0.11	0.1	0.1	0.11	0.09	0.08	0.1	0.05	0.01	0.1	0.11	0.09
9/28/2016	0.06	0.02	0.01	0.02	0.057	0.02	0.02	0	0.02	0.01	0.01	0.06	0.01	0.04	0.06	0.05	0.03	0.01
9/29/2016	0.65	0.69	0.56	0.49	0.449	0.78	0.55	0.62	0.66	0.57	0.58	0.35	0.55	0.5	0.58	0.73	0.53	0.61
9/30/2016	0.81	0.94	0.59	0.71	0.618	0.95	0.68	0.74	0.85	0.65	0.77	0.51	0.66	0.67	0.79	1.01	0.71	0.8

Table 9 - September 2016 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
9/1/2016	0.3	0.54	0.13	0.09	0.37	0.61	0.33	0.06	0.44	0.56	0.27	0.461	0.49	0.27	0.35	0.04	0.28
9/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/5/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/6/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/8/2016	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0
9/9/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0
9/12/2016	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0
9/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/14/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/15/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/18/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/19/2016	2	1.52	1.93	0.88	1.1	1.63	1.25	1.359	1.12	1.31	1.52	1.64	1.436	1.83	0.9	1.099	1.63
9/20/2016	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0.01	0.002	0
9/21/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/24/2016	0	0	0.01	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
9/25/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/27/2016	0.23	0.08	0.05	0.1	0.1	0.1	0.07	0.08	0.08	0.06	0.01	0.11	0	0.05	0	0.09	0.09
9/28/2016	0.02	0.01	0.01	0.03	0.08	0	0.06	0.03	0.01	0	0.01	0.01	0	0	0	0.02	0.02
9/29/2016	0.58	0.41	0.63	0.69	0.53	0.39	0.56	0.597	0.46	0.43	0.55	0.581	0.535	0.48	0.674	0.685	0.69
9/30/2016	0.76	0.45	0.93	0.87	0.67	0.43	0.74	0.783	0.52	0.49	0.78	0.733	0.617	0.55	0.886	0.88	0.92

Table 10 - October 2016 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
10/1/2016	0	0	0.02	0.01	0	0	0	0.01	0.003	0.02	0.02	0	0.02	0.01	0	0	0.02	0.01
10/2/2016	0.01	0.01	0.06	0.03	0.04	0.03	0.03	0.02	0.024	0.02	0.03	0.02	0.08	0.03	0.02	0.02	0.06	0.02
10/3/2016	0	0.01	0	0	0	0.01	0	0	0.006	0.01	0	0	0	0	0.01	0	0	0.02
10/4/2016	0	0	0	0	0	0	0	0	0.003	0	0	0	0	0	0	0	0	0
10/5/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/6/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
10/7/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
10/8/2016	0.19	0.12	0.16	0.22	0.27	0.08	0.14	0.12	0.076	0.11	0.13	0.29	0.15	0.18	0.18	0.18	0.17	0.106
10/9/2016	0.86	0.87	0.86	1.11	0.96	0.87	0.89	0.86	0.837	0.79	0.84	0.81	0.87	0.94	0.97	0.96	0.97	0.795
10/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/12/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/13/2016	0	0	0.01	0	0	0	0	0	0.003	0.02	0.01	0	0.01	0	0	0	0.01	0.01
10/14/2016	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
10/15/2016	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
10/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/18/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/19/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/20/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/21/2016	0	0	0	0	0	0	0	0	0.001	0	0	0	0	0	0	0	0	0
10/22/2016	0.2	0.22	0.37	0.34	0.29	0.27	0.28	0.31	0.26	0.4	0.3	0.25	0.33	0.3	0.25	0.25	0.32	0.17
10/23/2016	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
10/24/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/25/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/27/2016	0.36	0.36	0.45	0.34	0.39	0.34	0.31	0.42	0.323	0.49	0.41	0.39	0.41	0.27	0.3	0.32	0.36	0.4
10/28/2016	0	0	0	0	0	0	0.01	0	0	0	0	0.01	0	0	0	0	0	0
10/29/2016	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0
10/30/2016	0.32	0.4	0.43	0.19	0.37	0.25	0.32	0.15	0.316	0.3	0.14	0.37	0.2	0.25	0.17	0.25	0.2	0.22
10/31/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01

Table 11 - October 2016 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
10/1/2016	0.01	0.01	0.02	0.01	0	0	0	0	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.02
10/2/2016	0.04	0.03	0.05	0.02	0.02	0.02	0.02	0	0.03	0.05	0.04	0.02	0.02	0.02	0.02	0	0.04
10/3/2016	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0.01	0.01	0	0.01
10/4/2016	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0
10/5/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/6/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/8/2016	0.07	0.19	0.07	0.07	0.22	0.1	0.2	0.168	0.16	0.14	0.06	0.122	0.08	0.07	0.1	0.101	0.06
10/9/2016	0.7	0.89	0.61	0.77	0.84	0.71	0.86	0.945	0.82	0.88	0.58	0.832	0.7	0.7	0.9	0.838	0.71
10/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/11/2016	0	0	0	0	0	0	0	0.11	0	0	0	0	0	0	0	0	0
10/12/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/13/2016	0.01	0.01	0.01	0.01	0	0	0	0	0	0	0.01	0.02	0	0.01	0	0.02	0.01
10/14/2016	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0
10/15/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/18/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/19/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/20/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/21/2016	0.01	0	0.09	0	0	0	0	0	0	0	0.06	0	0	0.05	0	0.08	0.09
10/22/2016	0.22	0.38	0.27	0.25	0.24	0.4	0.23	0.25	0.37	0.46	0.23	0.28	0.34	0.4	0.27	0.2	0.35
10/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/24/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06	0
10/25/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0
10/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/27/2016	0.46	0.42	0.53	0.29	0.41	0.43	0.4	0.26	0.39	0.42	0.48	0.46	0.45	0.38	0.35	0.4	0.56
10/28/2016	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0.03	0
10/29/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/30/2016	0.14	0.34	0.16	0.44	0.31	0.4	0.34	0.19	0.47	0.44	0.3	0.196	0.58	0.56	0.37	0.22	0.2
10/31/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 12 - November 2016 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11/1/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/5/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/6/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/8/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/9/2016	0.36	0.43	0.28	0.21	0.45	0.48	0.33	0.36	0.47	0.27	0.33	0.34	0.31	0.26	0.34	0.46	0.3	0.37
11/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/12/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/14/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/15/2016	0	0	0.06	0.1	0	0	0.03	0.03	0	0.04	0.05	0.02	0.06	0.07	0.01	0	0.08	0
11/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/18/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/19/2016	0.06	0.05	0.15	0.15	0.11	0.07	0.12	0.15	0.07	0.15	0.14	0.09	0.1	0.11	0.04	0.08	0.13	0.02
11/20/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
11/21/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/24/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/25/2016	0.01	0.02	0.03	0.02	0	0.01	0.02	0.02	0.02	0.01	0.02	0	0.03	0.02	0.02	0.03	0.02	0.01
11/26/2016	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0
11/27/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/28/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/29/2016	1.14	1.26	1.43	1.16	1.18	1.31	1.28	1.42	1.28	1.4	1.41	1.05	1.4	1.16	1.36	1.45	1.26	1.45
11/30/2016	0.87	0.909	1	0.77	0.89	1.15	1.18	1.23	0.97	1.12	1.29	0.62	1.2	0.79	0.9	1.09	0.99	0.98

Table 13 - November 2016 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
11/1/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/5/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/6/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/7/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/8/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/9/2016	0.44	0.28	0.48	0.49	0.43	0.25	0.44	0.37	0.23	0.29	0.37	0.32	0.29	0.3	0.38	0.11	0.56
11/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0
11/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/12/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/14/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/15/2016	0	0.1	0	0	0	0.07	0	0.01	0.1	0.09	0	0.04	0.03	0.08	0	0	0
11/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/17/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/18/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/19/2016	0.07	0.14	0.08	0.03	0.04	0.12	0.07	0.09	0.15	0.16	0.07	0.15	0.16	0.17	0.07	0.04	0.13
11/20/2016	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0.01	0	0
11/21/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/24/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/25/2016	0.02	0	0.01	0.02	0.01	0	0.01	0.02	0.03	0	0.01	0.03	0.02	0	0.03	0.02	0.02
11/26/2016	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0.01
11/27/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/28/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/29/2016	1.2	1.24	1.3	1.26	1.09	1.23	1.2	1.17	1.34	1.28	1.29	1.22	1.39	1.46	1.38	1.12	1.31
11/30/2016	0.9	0.71	1.1	1.05	0.84	1	0.93	1.08	0.92	1.13	1.15	0.88	0.89	0.9	0.92	0.9	0.97

Table 14 – December 2016 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
12/1/2016	0.02	0.019	0.03	0.02	0.02	0.03	0.01	0.01	0.01	0.02	0.02	0.05	0.01	0.01	0.01	0.01	0.01	0.02
12/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/5/2016	0.14	0.14	0.16	0.14	0.15	0.13	0.15	0.15	0.15	0.18	0.15	0.15	0.16	0.15	0.17	0.15	0.14	0.14
12/6/2016	0.674	0.86	0.86	0.84	0.96	0.95	0.87	0.92	0.9	0.88	0.93	0.59	0.89	0.77	0.88	0.93	0.85	0.87
12/7/2016	0.041	0.04	0.02	0.03	0.03	0.03	0.02	0.02	0.04	0.02	0.03	0.03	0.02	0.03	0.02	0.05	0.02	0.01
12/8/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/9/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/12/2016	0.46	0.5	0.67	0.62	0.54	0.49	0.57	0.62	0.53	0.66	0.63	0.45	0.63	0.53	0.54	0.57	0.6	0.56
12/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/14/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/15/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/17/2016	0.67	0.7	0.66	0.69	0.77	0.68	0.58	0.66	0.68	0.59	0.68	0.71	0.65	0.626	0.68	0.71	0.65	0.57
12/18/2016	0.05	0.07	0.05	0.08	0.03	0.03	0.05	0.03	0.04	0.09	0.03	0.08	0.06	0.049	0.06	0.04	0.05	0.05
12/19/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/20/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/21/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/24/2016	0.39	0.41	0.45	0.4	0.47	0.44	0.44	0.49	0.47	0.47	0.49	0.42	0.45	0.35	0.4	0.44	0.44	0.45
12/25/2016	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
12/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/27/2016	0.02	0.02	0.01	0	0.02	0.01	0	0.01	0.01	0.01	0	0.06	0.01	0.01	0.01	0.01	0.01	0.01
12/28/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/29/2016	0.2	0.22	0.24	0.24	0.22	0.24	0.23	0.25	0.26	0.26	0.25	0.2	0.23	0.21	0.22	0.22	0.23	0.27
12/30/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
12/31/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 15 - December 2016 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
12/1/2016	0.02	0.1	0.03	0.01	0.04	0.03	0.02	0.01	0.07	0.07	0.01	0.02	0.03	0.06	0.01	0.02	0.03
12/2/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/3/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/4/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/5/2016	0.15	0.16	0.17	0.15	0.13	0.18	0.15	0.13	0.16	0.18	0.16	0.16	0.19	0.23	0.16	0.14	0.14
12/6/2016	0.85	0.74	0.94	0.72	0.62	0.78	0.83	0.91	0.83	0.83	0.91	0.88	0.88	0.82	0.92	0.78	0.93
12/7/2016	0.03	0.02	0.04	0.03	0.04	0.01	0.05	0.04	0.02	0.01	0.04	0.03	0.02	0.03	0.05	0.03	0.03
12/8/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/9/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/10/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/11/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/12/2016	0.57	0.66	0.61	0.43	0.46	0.63	0.49	0.5	0.64	0.62	0.58	0.6	0.63	0.61	0.49	0.41	0.58
12/13/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0
12/14/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/15/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/16/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/17/2016	0.61	0.65	0.54	0.68	0.73	0.6	0.63	0.6	0.52	0.56	0.58	0.6	0.53	0.47	0.71	0.52	0.583
12/18/2016	0.03	0.03	0.15	0.04	0.03	0.03	0.05	0.05	0.04	0.04	0.05	0.05	0.08	0.13	0.06	0.08	0.109
12/19/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/20/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/21/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/22/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/23/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/24/2016	0.42	0.44	0.45	0.46	0.41	0.43	0.4	0.37	0.45	0.42	0.43	0.43	0.45	0.4	0.44	0.4	0.31
12/25/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/26/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0
12/27/2016	0	0.01	0.01	0.01	0.04	0	0.02	0	0.01	0	0	0.01	0	0	0.02	0	0.01
12/28/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/29/2016	0.24	0.22	0.25	0.26	0.19	0.25	0.21	0.22	0.22	0.24	0.27	0.25	0.25	0.23	0.27	0.2	0.257
12/30/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0
12/31/2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 16 - January 2017 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1/1/2017	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
1/2/2017	0.34	0.38	0.33	0.35	0.43	0.36	0.32	0.34	0.34	0.32	0.34	0.31	0.34	0.32	0.34	0.37	0.32	0.34
1/3/2017	0.29	0.35	0.34	0.41	0.42	0.41	0.33	0.38	0.36	0.4	0.37	0.25	0.36	0.34	0.33	0.34	0.32	0.37
1/4/2017	0.01	0.01	0	0	0	0.01	0	0.01	0.01	0.01	0	0	0.01	0	0	0	0.01	0
1/5/2017	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0.01	0	0.01
1/6/2017	0.05	0.02	0.04	0.01	0.02	0.08	0.07	0.09	0.04	0.07	0.06	0.03	0.06	0.08	0.02	0.05	0.03	0.09
1/7/2017	0	0	0	0	0	0	0	0	0	0	0.06	0	0	0	0	0.06	0	0
1/8/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/10/2017	0	0	0	0.11	0	0	0.02	0.01	0.01	0.09	0	0.01	0.1	0	0	0	0.01	0.01
1/11/2017	0.4	0.42	0.46	0.38	0.43	0.4	0.41	0.45	0.43	0.54	0.46	0.41	0.47	0.38	0.43	0.45	0.41	0.36
1/12/2017	0.05	0.06	0.02	0.02	0.05	0.02	0.03	0.03	0.03	0.01	0.02	0.07	0.01	0.04	0.06	0.06	0.03	0.02
1/13/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/14/2017	0.02	0.03	0	0.01	0.03	0.02	0.01	0.02	0.02	0	0.01	0.03	0.01	0.02	0.02	0.02	0.02	0.01
1/15/2017	0	0	0	0	0	0	0.01	0	0	0	0	0.02	0.01	0	0	0	0	0.01
1/16/2017	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0	0
1/17/2017	0.26	0.32	0.19	0.17	0.27	0.27	0.18	0.17	0.28	0.27	0.17	0.25	0.18	0.23	0.23	0.29	0.16	0.22
1/18/2017	0.33	0.35	0.17	0.19	0.39	0.3	0.27	0.28	0.3	0.15	0.25	0.36	0.22	0.35	0.35	0.35	0.25	0.29
1/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/20/2017	0.15	0.16	0.14	0.11	0.17	0.17	0.14	0.15	0.17	0.15	0.14	0.17	0.14	0.13	0.13	0.14	0.13	0.18
1/21/2017	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/22/2017	0.09	0.09	0.13	0.16	0.13	0.08	0.09	0.08	0.08	0.13	0.08	0.09	0.11	0.12	0.09	0.08	0.08	0.1
1/23/2017	0.75	0.71	0.94	0.92	0.84	0.77	0.82	0.43	0.72	0.92	0.99	0.31	1.01	0.76	0.81	0.75	1.01	0.57
1/24/2017	0.13	0.13	0.19	0.2	0.19	0.2	0.1	0	0.17	0.22	0.13	0.08	0.16	0.1	0.09	0.14	0.13	0.06
1/25/2017	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0
1/26/2017	0.05	0.04	0.03	0.04	0.05	0.02	0.03	0	0.02	0.02	0.03	0.06	0.03	0.05	0.04	0.04	0.03	0.02
1/27/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/28/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/29/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/30/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/31/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 17 - January 2017 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1/1/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/2/2017	0.28	0.29	0.31	0.36	0.35	0.23	0.36	0.35	0.32	0.28	0.28	0.32	0.28	0.27	0.42	0.343	0.13
1/3/2017	0.36	0.34	0.44	0.39	0.29	0.33	0.32	0.37	0.38	0.37	0.39	0.35	0.39	0.39	0.41	0.367	0.22
1/4/2017	0	0	0.01	0.01	0.01	0	0	0	0	0.01	0.02	0.01	0.01	0.01	0.01	0.008	0
1/5/2017	0.02	0.03	0	0	0.01	0.03	0	0	0	0	0	0	0	0	0	0.01	0
1/6/2017	0.04	0.08	0.02	0.09	0.04	0.07	0.05	0.07	0.11	0.05	0.05	0.09	0.11	0.03	0.08	0	0.05
1/7/2017	0.03	0.08	0	0	0.05	0.08	0	0	0	0	0	0	0	0	0	0	0
1/8/2017	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0.01	0.01	0	0.01
1/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/10/2017	0	0	0.01	0	0	0	0	0	0.05	0	0	0.02	0.03	0.01	0.01	0.01	0
1/11/2017	0.4	0.46	0.49	0.44	0.43	0.43	0.41	0.37	0.47	0.43	0.47	0.43	0.48	0.45	0.42	0.4	0.27
1/12/2017	0.02	0.01	0.02	0.03	0.05	0.01	0.05	0.03	0.02	0.02	0.01	0.02	0.01	0.01	0.04	0	0.02
1/13/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/14/2017	0.01	0	0	0.03	0.02	0	0.03	0.02	0	0	0	0	0	0	0.03	0	0
1/15/2017	0	0	0.01	0	0	0	0	0	0	0	0.01	0.01	0	0	0	0.01	0.01
1/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/17/2017	0.18	0.21	0.24	0.31	0.18	0.16	0.28	0.21	0.18	0.18	0.15	0.18	0.16	0.26	0.34	0.3	0.239
1/18/2017	0.29	0.14	0.32	0.31	0.33	0.22	0.35	0.33	0.15	0.12	0.14	0.21	0.12	0.11	0.36	0.29	0.31
1/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/20/2017	0.16	0.1	0.17	0.17	0.17	0.14	0.15	0.13	0.12	0.12	0.16	0.15	0.16	0.16	0.19	0.16	0.18
1/21/2017	0	0	0.01	0.01	0.01	0	0	0	0	0	0.01	0.01	0	0.01	0.01	0	0.01
1/22/2017	0.09	0.1	0.08	0.08	0.09	0.11	0.1	0.1	0.13	0.14	0.07	0.08	0.1	0.08	0.08	0.07	0.09
1/23/2017	0.75	0.89	0.72	0.68	0.44	0.92	0.75	1.03	0.85	1.2	0.8	0.9	1	1.1	0.73	0.741	0.81
1/24/2017	0.1	0.24	0.15	0.16	0.13	0.17	0.19	0.09	0.18	0.32	0.14	0.15	0.19	0.27	0.13	0.15	0.17
1/25/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/26/2017	0.02	0.03	0.02	0.03	0.04	0.02	0.05	0.02	0.03	0.03	0.01	0.02	0.02	0.02	0.03	0.026	0.02
1/27/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/28/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/29/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/30/2017	0	0	0	0.01	0.03	0	0	0	0	0	0	0	0	0	0	0	0
1/31/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0

Table 18 – February 2017 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
2/1/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/3/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/5/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/6/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/7/2017	0.07	0.08	0.23	0.13	0.09	0.15	0.12	0.02	0.11	0.21	0.19	0.05	0.2	0.09	0.09	0.09	0.13	0.16
2/8/2017	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0
2/9/2017	0.43	0.41	0.38	0.4	0.41	0.38	0.39	0.35	0.41	0.33	0.55	0.3	0.44	0.37	0.43	0.54	0.41	0.28
2/10/2017	0.01	0	0	0	0	0.01	0	0.01	0	0	0	0	0	0	0.01	0	0	0
2/11/2017	0	0	0	0.17	0	0.01	0.11	0	0.05	0.21	0	0.01	0.06	0.01	0	0	0.02	0.04
2/12/2017	0.25	0.29	0.14	0.17	0.32	0.26	0.18	0.17	0.27	0.16	0.15	0.41	0.16	0.21	0.26	0.28	0.16	0.2
2/13/2017	0	0	0	0	0	0.01	0	0	0	0	0	0.06	0	0	0	0	0	0
2/14/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
2/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/17/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/20/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/21/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/22/2017	0	0	0	0.04	0	0.01	0.02	0.04	0	0	0.01	0	0.01	0	0	0	0.04	0
2/23/2017	0	0.01	0	0	0	0	0.01	0	0	0	0.01	0	0	0	0	0	0	0
2/24/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/25/2017	0.48	0.43	0.49	0.5	0.32	0.54	0.55	0.54	0.49	0.47	0.55	0.33	0.5	0.39	0.28	0.54	0.52	0.492
2/26/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/27/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/28/2017	0.2	0.21	0.05	0.04	0.2	0.07	0.06	0.05	0.1	0.05	0.05	0.14	0.05	0.08	0.13	0.14	0.04	0.073

Table 19 - February 2017 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
2/1/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/3/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/5/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/6/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/7/2017	0.19	0.2	0.21	0.11	0.05	0.19	0.08	0.1	0.2	0.18	0.23	0.18	0.2	0.21	0.1	0.16	0.12
2/8/2017	0	0	0	0.01	0.12	0.01	0	0	0	0	0	0.01	0	0	0	0	0.01
2/9/2017	0.48	0.54	0.33	0.71	0.47	0.51	0.4	0.39	0.4	0.34	0.24	0.32	0.28	0.23	0.4	0.33	0.329
2/10/2017	0	0	0	0.01	0	0	0.01	0	0	0	0	0.05	0.01	0	0.01	0	0
2/11/2017	0	0	0.01	0	0	0	0.01	0.02	0.08	0.01	0.02	0.02	0.01	0.05	0.01	0.02	0
2/12/2017	0.14	0.1	0.16	0.3	0.22	0.14	0.26	0.23	0.15	0.15	0.17	0.15	0.16	0.14	0.32	0.28	0.192
2/13/2017	0	0.14	0	0	0	0	0	0	0	0	0	0	0.13	0.01	0.01	0	0.07
2/14/2017	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
2/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/17/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/20/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/21/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/22/2017	0	0.01	0.01	0	0	0	0	0.01	0.01	0	0	0	0	0	0	0.01	0.05
2/23/2017	0.01	0	0.01	0.01	0	0	0	0.01	0.01	0	0	0.01	0	0	0.01	0.01	0.01
2/24/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/25/2017	0.51	0.52	0.56	0.56	0.43	0.47	0.44	0.42	0.52	0.6	0.49	0.53	0.56	0.49	0.58	0.47	0.57
2/26/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/27/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/28/2017	0.05	0.05	0.07	0.13	0.18	0.04	0.21	0.07	0.04	0.03	0.03	0.05	0.04	0.04	0.21	0.11	0.09

Table 20 – March 2017 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
3/1/2017	0.02	0.03	0.01	0	0.02	0.02	0	0.01	0.03	0.04	0.01	0.03	0.01	0.01	0.01	0.03	0.01	0.005
3/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/3/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/5/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/6/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/7/2017	0.02	0.03	0.05	0.04	0.03	0.05	0.04	0.05	0.04	0.05	0.05	0.02	0.05	0.04	0.03	0.04	0.05	0.05
3/8/2017	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0	0.02	0.01
3/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/10/2017	0.28	0.34	0.32	0.37	0.34	0.42	0.37	0.3	0.37	0.27	0.37	0.17	0.4	0.31	0.33	0.34	0.33	0.24
3/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/12/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/13/2017	0	0	0	0	0	0	0	0	0	0.04	0	0	0	0	0	0	0	0
3/14/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/17/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/20/2017	0	0	0	0	0	0	0	0	0	0.04	0	0	0	0	0	0	0	0
3/21/2017	0	0.01	0.01	0	0	0	0.01	0.01	0	0.01	0.01	0	0.01	0	0	0	0.01	0
3/22/2017	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
3/23/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/24/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/25/2017	0.04	0.04	0.02	0.02	0.05	0.03	0.02	0.03	0.01	0.02	0.02	0.02	0.02	0.02	0	0.02	0.03	0.03
3/26/2017	0	0	0	0.01	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0
3/27/2017	0.18	0.19	0.13	0.21	0.2	0.16	0.15	0.13	0.14	0.12	0.13	0.09	0.13	0.19	0.21	0.21	0.13	0.16
3/28/2017	0.83	0.58	0.49	0.53	0.82	0.48	0.74	0.57	0.53	0.77	0.59	0.422	0.55	0.45	0.42	1	0.75	0.62
3/29/2017	0	0.01	0	0	0	0	0	0	0.01	0	0	0.01	0.01	0	0	0	0	0
3/30/2017	0.02	0.02	0.01	0.01	0.01	0.06	0.02	0	0.05	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0	0.03
3/31/2017	1.54	1.59	1.34	1.38	1.85	1.54	1.42	1.49	1.42	1.4	1.47	0.53	1.49	1.36	1.6	1.73	1.32	1.34

Table 21 - March 2017 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
3/1/2017	0.02	0.02	0.04	0.02	0.02	0.06	0.03	0.01	0.01	0.04	0.01	0.04	0.03	0.02	0.04	0.02	0.02
3/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02
3/3/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/5/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/6/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/7/2017	0.05	0.04	0.05	0.05	0.03	0.06	0.03	0.03	0.04	0.04	0.06	0.05	0.06	0.07	0.05	0.06	0.067
3/8/2017	0.02	0.02	0.03	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.03	0.03	0.02	0.02	0.02	0	0.02
3/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/10/2017	0.23	0.31	0.29	0.42	0.3	0.25	0.41	0.38	0.33	0.34	0.29	0.36	0.35	0.31	0.33	0.37	0.33
3/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/12/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/13/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/14/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/17/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/20/2017	0	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/21/2017	0.01	0	0.01	0.01	0.02	0.02	0.01	0	0	0.01	0.02	0.01	0	0.02	0.01	0	0
3/22/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01
3/23/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/24/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/25/2017	0.02	0.02	0.02	0.01	0.03	0	0.05	0.02	0.02	0	0	0.02	0.01	0	0.03	0.02	0.02
3/26/2017	0	0	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0.01
3/27/2017	0.14	0.13	0.12	0.15	0.14	0.11	0.19	0.15	0.12	0.12	0.11	0.12	0.04	0.15	0.18	0.16	0.13
3/28/2017	0.42	0.5	0.65	0.59	0.5	0.79	0.88	0.76	0.49	1.01	0.68	0.482	0.551	0.77	0.74	0.61	0.54
3/29/2017	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0	0.01
3/30/2017	0.03	0.02	0.03	0.04	0.07	0.01	0.01	0.04	0.01	0.11	0.01	0.02	0.01	0.17	0.02	0.08	0.03
3/31/2017	1.39	1.12	1.45	1.56	1.33	1.12	1.71	1.59	1.37	1.28	1.17	1.37	1.41	1.25	1.68	1.36	1.59

Table 22 - April 2017 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4/1/2017	0.06	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0	0.02	0.02	0.01	0.01	0.01	0.02
4/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/3/2017	0.01	0.05	0.02	0.02	0.03	0.04	0.02	0.02	0.04	0.02	0.03	0.03	0.02	0.02	0.03	0.03	0.02	0.04
4/4/2017	0.3	0.35	0.46	0.31	0.3	0.41	0.39	0.42	0.4	0.47	0.42	0.302	0.43	0.3	0.37	0.38	0.38	0.41
4/5/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/6/2017	1.48	1.34	0.96	1.11	1.45	1.35	1.2	1.23	1.32	1.15	1.25	1.456	1.15	0.99	1.12	1.6	1.06	1.46
4/7/2017	0	0	0.01	0	0	0.01	0	0	0.01	0.01	0.01	0.01	0.01	0	0	0.01	0	0
4/8/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/10/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/12/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/13/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/14/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/17/2017	0.04	0.06	0.08	0.1	0.03	0.09	0.087	0.09	0.08	0.07	0.09	0.032	0.09	0.08	0.069	0.06	0.09	0.07
4/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/20/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/21/2017	0.49	0.54	0.19	0.47	0.49	0.6	0.244	0.5	0.36	0.23	0.41	0.38	0.26	0.55	0.215	0.39	0.68	0.75
4/22/2017	0.13	0.17	0.2	0.19	0.11	0.23	0.194	0.2	0.22	0.19	0.21	0.09	0.2	0.17	0.167	0.17	0.18	0.18
4/23/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/24/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/25/2017	0.37	0.43	0.55	0.65	0.3	0.46	0.604	0.6	0.47	0.61	0.68	0.13	0.81	0.56	0.533	0.36	0.68	0.36
4/26/2017	0.21	0.25	0.04	0.15	0.23	0.32	0.378	0.41	0.26	0.13	0.28	0.14	0.16	0.47	0.335	0.36	0.36	0.31
4/27/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/28/2017	0.02	0.04	0.01	0.02	0.02	0.02	0.027	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.019	0.02	0.02	0.03
4/29/2017	0.22	0.12	0.04	0.29	0.22	0.23	0.24	0.22	0.17	0.22	0.18	0.05	0.15	0.15	0.196	0.12	0.3	0.25
4/30/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 23 – April 2017 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
4/1/2017	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.04
4/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/3/2017	0.03	0.02	0.03	0.06	0.06	0.02	0.04	0.02	0.02	0.01	0.01	0.03	0.02	0.01	0.06	0.04	0.04
4/4/2017	0.4	0.41	0.43	0.38	0.22	0.47	0.29	0.36	0.37	0.44	0.45	0.4	0.45	0.51	0.36	0.38	0.43
4/5/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/6/2017	1.33	1.05	1.13	1.16	1.36	0.88	1.59	1.28	1	0.97	1.17	1.219	1.27	1.04	1.15	1.218	1.07
4/7/2017	0.01	0	0.01	0	0	0	0	0	0	0.01	0.01	0.01	0	0.01	0.01	0	0.02
4/8/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/10/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/12/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/13/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/14/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/17/2017	0.08	0.08	0.08	0.09	0.06	0.06	0.04	0.07	0.08	0.06	0.06	0.08	0.06	0.05	0.08	0.083	0.09
4/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/20/2017	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0.01	0	0
4/21/2017	0.27	0.18	0.33	0.35	0.32	0.18	0.49	0.6	0.19	0.18	0.23	0.22	0.22	0.24	0.55	0.406	0.57
4/22/2017	0.16	0.19	0.17	0.21	0.11	0.15	0.14	0.17	0.18	0.17	0.17	0.16	0.19	0.16	0.18	0.19	0.18
4/23/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/24/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/25/2017	0.53	0.43	0.39	0.5	0.31	0.41	0.35	0.58	0.58	0.52	0.46	0.31	0.62	0.54	0.72	0.494	0.38
4/26/2017	0.32	0.14	0.36	0.2	0.15	0.09	0.18	0.33	0.14	0.08	0.28	0.13	0.14	0.14	0.18	0.225	0.16
4/27/2017	0	0	0	0	0	0	0.01	0	0	0	0	0.03	0	0	0	0.01	0
4/28/2017	0.02	0.02	0.04	0.02	0.02	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.05	0.04	0.04
4/29/2017	0.21	0.11	0.27	0.17	0.08	0.32	0.2	0.21	0.11	0.29	0.49	0.01	0.47	0.4	0.17	0.185	0.21
4/30/2017	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0

Table 24 – May 2017 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
5/1/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/2/2017	0.02	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0.06	0	0
5/3/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/5/2017	1.14	1.43	1.01	1.33	1.19	1.54	1.14	1.21	1.5	1.25	1.24	1.14	1.32	1.01	1.12	1.28	1.24	1.4
5/6/2017	0	0	0.02	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0.01	0
5/7/2017	0.03	0.06	0.03	0.04	0.05	0.01	0.05	0.04	0.02	0.05	0.04	0.01	0.03	0.02	0	0.01	0.03	0.06
5/8/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/10/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/12/2017	0	0	0.01	0.01	0	0	0	0	0	0.01	0	0	0.01	0	0	0	0.01	0
5/13/2017	1.68	2.01	1.7	2.03	1.9	2.04	1.8	1.87	2	2.08	1.8	1.25	2.14	1.67	1.85	1.9	1.82	1.79
5/14/2017	0	0	0.01	0	0	0	0.14	0.07	0	0.03	0.02	0	0	0.08	0.1	0	0.03	0.19
5/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/17/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/20/2017	0.03	0.04	0	0.01	0.08	0	0	0.01	0.01	0.02	0	0.01	0	0.01	0.01	0.09	0	0
5/21/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/22/2017	0.43	0.4	0.315	0.44	0.52	0.28	0.3	0.32	0.29	0.33	0.311	0.52	0.31	0.39	0.43	0.44	0.31	0.29
5/23/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/24/2017	0	0.01	0	0	0.01	0.01	0.01	0.01	0	0.02	0.01	0	0.01	0.01	0	0.01	0.01	0.01
5/25/2017	2.37	1.85	2.02	1.08	1.7	1.76	1.43	1.69	1.81	1.83	1.644	1.04	1.75	1.08	1.33	2.56	1.36	2.11
5/26/2017	0.02	0.02	0.03	0.02	0.01	0.02	0	0.01	0.03	0.03	0.01	0.01	0.02	0.01	0	0.01	0.01	0
5/27/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/28/2017	0.04	0.08	0.08	0.1	0.07	0.11	0.11	0.11	0.09	0.11	0.101	0.03	0.08	0.14	0.12	0.09	0.09	0.14
5/29/2017	0.06	0.06	0.11	0.13	0.06	0.07	0.09	0.09	0.05	0.1	0.093	0.06	0.11	0.08	0.07	0.05	0.08	0.06
5/30/2017	0.06	0.06	0.02	0.07	0.09	0.03	0.03	0.04	0.02	0.04	0.034	0.08	0.02	0	0.05	0.06	0.04	0.04
5/31/2017	0	0	0	0	0	0.01	0	0	0.01	0.01	0	0	0.01	0	0	0	0	0.01

Table 25 - May 2017 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
5/1/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/2/2017	0.05	0	0	0	0	0	0.02	0.02	0	0	0	0	0	0	0	0	0.01
5/3/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/5/2017	1.26	1.22	1.44	1.5	1.33	1.14	1.14	1.03	1.27	1.34	1.27	1.237	1.31	1.3	1.45	1.42	1.455
5/6/2017	0	0	0	0	0	0.01	0	0	0	0.01	0	0.02	0.01	0	0	0	0
5/7/2017	0.08	0.03	0.05	0.06	0.1	0.01	0.04	0.02	0.03	0.03	0.01	0	0.03	0.06	0.08	0.02	0.07
5/8/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/10/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/12/2017	0	0.02	0	0	0	0.01	0	0	0.01	0.01	0	0.01	0.01	0	0	0	0
5/13/2017	1.68	1.9	1.97	1.99	1.49	1.53	1.73	1.91	1.82	2.02	1.8	1.92	2.06	2.1	1.91	1.9	2.06
5/14/2017	0.1	0.01	0.1	0	0	0.01	0	0.13	0.01	0.02	0	0.01	0.04	0.01	0	0	0.11
5/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/17/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/18/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/19/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/20/2017	0	0	0	0.01	0	0	0.05	0	0	0	0.03	0.01	0.03	0	0.09	0.03	0.01
5/21/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/22/2017	0.3	0.34	0.29	0.18	0.45	0.3	0.45	0.31	0.33	0.34	0.31	0.29	0.33	0.42	0.32	0.27	0.26
5/23/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/24/2017	0	0	0.01	0	0	0.01	0	0	0	0	0.01	0.01	0.01	0.01	0.01	0.02	0.01
5/25/2017	1.96	1.03	1.54	1.773	2.05	1.36	2.11	1.499	1.32	1.23	1.88	1.79	1.75	1.423	1.17	1.35	1.11
5/26/2017	0.01	0.03	0.01	0.025	0.02	0.02	0.01	0.002	0.03	0.03	0	0	0.02	0.017	0.03	0.03	0.01
5/27/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/28/2017	0.12	0.09	0.09	0.092	0.04	0.08	0.05	0.07	0.08	0.09	0.1	0.11	0.15	0.25	0.06	0.08	0.08
5/29/2017	0.07	0.15	0.07	0.054	0.09	0.14	0.06	0.09	0.11	0.16	0.05	0.1	0.1	0.12	0.07	0.05	0.06
5/30/2017	0.04	0.02	0.06	0.026	0.08	0.03	0.07	0.01	0.03	0.01	0.03	0.04	0.05	0.03	0.03	0.07	0.06
5/31/2017	0.01	0.01	0.01	0.009	0	0	0	0.02	0	0.01	0.01	0.01	0.01	0.01	0	0.01	0.01

Table 26 - June 2017 PWD Rain Gage Records

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6/1/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/3/2017	0.05	0.06	0	0	0.03	0.02	0.01	0.02	0.03	0.01	0.01	0.05	0.01	0.015	0.03	0.02	0.01	0.03
6/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/5/2017	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.014	0.01	0.02	0.02	0.02
6/6/2017	0.5	0.47	0.47	0.59	0.66	0.76	0.49	0.42	0.7	0.36	0.509	0.37	0.53	0.524	0.68	0.6	0.41	0.72
6/7/2017	0	0	0	0	0	0	0	0	0	0.01	0.001	0	0	0	0	0	0	0
6/8/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/10/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/12/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/13/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/14/2017	0.35	0.01	0.15	0.18	0.28	0.14	0.01	0.12	0.08	0.03	0.098	0.28	0.15	0.066	0.07	0.01	0.06	0.17
6/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/17/2017	0.29	0.18	1.02	0.11	0.67	0.71	0.79	0.47	0.21	0.84	0.621	0.24	0.8	0.29	0.5	0.34	0.67	0.35
6/18/2017	0.01	0	0	0	0	0.02	0	0	0.06	0	0.002	0	0.01	0	0	0	0	0.01
6/19/2017	0.59	0.59	0.64	0.92	0.67	0.42	0.81	0.77	0.41	0.73	0.746	0.58	0.7	0.78	0.69	0.68	0.86	0.4
6/20/2017	0.01	0.02	0.03	0.02	0	0.03	0.03	0.03	0.02	0.04	0.033	0.01	0.03	0.01	0.02	0.02	0.03	0.02
6/21/2017	0.23	0.16	0.34	0.2	0.28	0.18	0.36	0.33	0.32	0.44	0.315	0.18	0.28	0.19	0.19	0.23	0.25	0.18
6/22/2017	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/23/2017	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.03	0.019	0.03	0.02	0.01	0.01	0.01	0.02	0.01
6/24/2017	0.91	1.33	1.43	1.07	0.93	1.23	0.92	1.04	0.99	1.5	1.118	0.61	1.25	0.84	0.91	1.02	1.02	1.02
6/25/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/26/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27/2017	0.17	0.31	0.13	0.16	0.15	0.13	0.17	0.21	0.22	0.2	0.188	0.31	0.13	0.15	0.21	0.22	0.19	0.21
6/28/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/29/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 27 - June 2017 PWD Rain Gage Records

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
6/1/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/2/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/3/2017	0.01	0	0.02	0.03	0.03	0	0.04	0.02	0	0	0.01	0	0	0	0.07	0.04	0.03
6/4/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/5/2017	0.02	0.02	0.01	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.06	0.02	0.02	0.02
6/6/2017	0.39	0.38	0.43	0.688	0.37	0.41	0.48	0.55	0.41	0.36	0.5	0.35	0.49	0.5	0.38	0.52	0.32
6/7/2017	0	0	0	0	0	0.01	0	0	0	0.02	0.01	0.01	0.01	0.01	0	0	0.01
6/8/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/9/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/10/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/11/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/12/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/13/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/14/2017	0.06	0.01	0.14	0.091	0.01	0	0.25	0.15	0	0	0	0.05	0	0	0	0	0.13
6/15/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/16/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/17/2017	0.62	0.28	1.64	0.348	0.22	0.87	0.35	0.34	0.42	0.65	1.61	0.62	1.32	0.96	0.48	0.565	0.84
6/18/2017	0.01	0	0	0.045	0.03	0	0	0	0	0	0.06	0	0	0.02	0.05	0	0
6/19/2017	0.74	0.86	0.55	0.419	0.54	0.58	0.61	0.63	0.8	0.51	0.52	0.56	0.89	0.633	0.35	0.376	0.33
6/20/2017	0.02	0.02	0	0.022	0	0.04	0.01	0.02	0.02	0.03	0	0.07	0.03	0.034	0.03	0.021	0.01
6/21/2017	0.34	0.13	0.22	0.273	0.09	0.23	0.37	0.38	0.26	0.27	0.33	0.37	0.27	0.256	0.08	0.183	0.24
6/22/2017	0	0.01	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/23/2017	0.02	0.02	0.04	0.013	0.04	0.03	0.01	0.01	0.02	0.02	0.03	0.02	0.03	0.025	0.01	0.014	0.03
6/24/2017	1.32	1.17	1.87	1.052	0.75	1.4	0.88	0.83	1.12	1.45	1.81	1.3	1.86	1.429	1	0.887	0.49
6/25/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/26/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27/2017	0.15	0.21	0.19	0.2	0.23	0.14	0.18	0.23	0.14	0.25	0.26	0.23	0.16	0.172	0.2	0.164	0.177
6/28/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/29/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30/2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 28 - Rain Gage records by year and month for FY17

Date/RG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Jul16	4.02	4.27	6.91	6.07	5.14	6.41	5.92	6.69	6.45	5.98	6.92	5.23	6.97	6.23	6.47	7.08	6.17	6.26
Aug16	1.75	2	1.4	1.19	2.276	2.45	1.43	1.41	2.09	1.181	1.51	2.45	1.43	1.01	1.59	1.81	2.18	1.64
Sep16	3.17	3.28	3.15	3.62	3.454	3.01	3.04	3.22	2.72	3.295	3.31	3.67	3.183	2.82	2.9	3.7	3.06	3.01
Oct16	1.94	1.99	2.36	2.24	2.32	1.85	1.98	1.89	1.852	2.18	1.88	2.19	2.07	1.98	1.9	1.98	2.11	1.761
Nov16	2.44	2.669	2.95	2.41	2.63	3.02	2.96	3.21	2.81	3.01	3.24	2.12	3.1	2.41	2.67	3.11	2.78	2.83
Dec16	2.665	2.979	3.15	3.06	3.21	3.03	2.92	3.16	3.09	3.18	3.21	2.75	3.11	2.735	2.99	3.13	3	2.96
Jan17	2.92	3.08	2.98	3.08	3.42	3.11	2.83	2.44	2.98	3.3	3.12	2.53	3.22	2.92	2.94	3.15	2.94	2.66
Feb17	1.44	1.43	1.29	1.45	1.34	1.44	1.44	1.19	1.43	1.43	1.51	1.3	1.42	1.15	1.2	1.59	1.32	1.255
Mar17	2.95	2.86	2.39	2.58	3.34	2.77	2.78	2.61	2.62	2.79	2.7	1.352	2.73	2.42	2.64	3.4	2.65	2.485
Apr17	3.33	3.36	2.57	3.34	3.19	3.78	3.394	3.73	3.37	3.15	3.6	2.65	3.33	3.32	3.064	3.51	3.78	3.88
May17	5.88	6.02	5.355	5.26	5.68	5.88	5.1	5.47	5.83	5.92	5.303	4.15	5.81	4.51	5.08	6.56	5.04	6.1
Jun17	3.13	3.18	4.25	3.28	3.69	3.68	3.61	3.45	3.07	4.21	3.68	2.68	3.93	2.889	3.32	3.17	3.54	3.14
Total	**35.635**	**37.118**	**38.755**	**37.58**	**39.69**	**40.43**	**37.404**	**38.47**	**38.312**	**39.626**	**39.983**	**33.072**	**40.303**	**34.394**	**36.764**	**42.19**	**38.57**	**37.981**

Date/RG	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Jul16	6.97	7.93	8.32	5.602	4	7.58	3.936	5.1	6.51	4.75	0.9	5.78	6.49	4.28	4.6	2.753	7.27	
Aug16	1.15	1.2	1.43	2.21	1.98	0.94	1.952	1.406	1.01	1.238	0.981	1.33	1.11	0.93	1.44	1.92	1.71	
Sep16	3.89	3.01	3.7	2.66	2.85	3.17	3.01	2.909	2.63	2.85	3.15	3.545	3.078	3.2	2.82	2.816	3.63	
Oct16	1.66	2.27	1.81	1.87	2.04	2.07	2.05	1.933	2.25	2.41	1.77	1.95	2.19	2.22	2.03	1.969	2.05	
Nov16	2.63	2.47	2.97	2.85	2.41	2.67	2.66	2.74	2.78	2.95	2.89	2.64	2.78	2.91	2.79	2.2	3	
Dec16	2.92	3.03	3.19	2.79	2.69	2.94	2.85	2.83	2.96	2.97	3.03	3.03	3.06	2.99	3.14	2.59	2.979	
Jan17	2.75	3	3.02	3.11	2.67	2.92	3.09	3.12	3	3.27	2.71	2.95	3.06	3.19	3.32	2.885	2.539	
Feb17	1.38	1.56	1.36	1.84	1.47	1.36	1.41	1.25	1.41	1.31	1.18	1.32	1.49	1.17	1.65	1.39	1.441	
Mar17	2.33	2.18	2.73	2.87	2.45	2.43	3.35	2.99	2.4	2.98	2.38	2.502	2.481	2.78	3.1	2.68	2.797	
Apr17	3.37	2.64	3.27	3.15	2.71	2.61	3.37	3.66	2.7	2.76	3.36	2.639	3.47	3.14	3.53	3.291	3.23	
May17	5.68	4.85	5.64	5.719	5.65	4.65	5.73	5.111	5.04	5.3	5.5	5.557	5.91	5.75	5.22	5.25	5.315	
Jun17	3.7	3.11	5.12	3.201	2.34	3.74	3.19	3.17	3.2	3.57	5.15	3.59	5.09	4.099	2.67	2.79	2.627	
Total	**38.43**	**37.25**	**42.56**	**37.872**	**33.26**	**37.08**	**36.598**	**36.219**	**35.89**	**36.358**	**33.001**	**36.833**	**40.209**	**36.659**	**36.31**	**32.534**	**38.588**	

Table 29 - SSO Statistics for Period July 1 2016 – June 30 2017

Main & Shurs					
Event No.	**Start of Overflow Date Time**	**End of Overflow Date Time**	**Event Duration (hours:mins)**	**Flow Volume (ft^3)**	**Flow Volume (Millions of gallons)**
1	**7/31/16 6:12**	**7/31/16 6:42**	**0:30**	**2998**	**0.022425736**
2	**7/25/16 19:17**	**7/25/16 19:52**	**0:35**	**3021**	**0.022599204**
3	**7/25/16 5:12**	**7/25/16 5:17**	**0:05**	**21**	**0.000157371**
4	**6/24/17 6:30**	**6/24/17 7:07**	**0:37**	**9503**	**0.071079814**
5	**6/17/17 17:07**	**6/17/17 17:15**	**0:07**	**277**	**0.002073768**

PC-30					
Event No.	**Start of Overflow Date**	**End of Overflow Date**	**Event Duration (hours:mins)**	**Flow Volume (ft^3)**	**Flow Volume (Millions of gallons)**
0			0	0	0

Appendix E – PCB PMP 10th Annual Report

PHILADELPHIA WATER DEPARTMENT

PCB

Pollutant Minimization Plan

Tenth Annual Report

Table of Contents

1 PMP Achievement Executive Summary

The Philadelphia Water Department (PWD) submitted its PCB Pollutant Minimization Plan (PCB PMP) on September 30, 2005 and was issued a Completeness Determination letter on January 12, 2006. PWD initiated the actions called for in its PCB PMP on March 4, 2006.

PWD's PCB PMP set out the following approaches to achieving PCB minimization:

- Sample three Water Pollution Control Plants' effluent every two years and analyze using Method 1668A.
- Visit and inspect three hundred ninety-nine (399) sites listed by either EPA or other agencies as housing PCB-containing devices and report the number of devices that have been removed from each site, both prior to our inspection and subsequent to it.
- Visit and inspect thirty-one (31) sites listed by the Philadelphia Department of Public Health as having previously undergone some type of PCB remediation activity, and report the number of sites removed from the list as posing no threat of PCB discharge to PWD's sewer system.
- Report any reductions in PCB concentrations in the wastestreams from our three Water Treatment Plants by measuring PCBs in the ferric chloride used in the treatment process as well as reductions of PCBs in the source water (Delaware River or Schuylkill River).
- Continue the sewershed PCB trackdown sampling program for each of our three Water Pollution Control Plants.

Refer to the First through the Ninth Annual Reports for information on PMP efforts during Years 1 - 9. Year 10 efforts are detailed in the attached report.

During the tenth year of our five-year PCB PMP, the following tasks were performed:

- ❖ Wet-weather PCB sampling and analysis of the three Water Pollution Control Plants' (WPCPs') effluent was performed as required by PWD's NPDES permits. See Section 7, "Tabular Summary", for data.
- ❖ There are 337 sites remaining on list of sites identified by EPA or other agencies as housing PCB-containing devices. In 2016, PWD increased its goal of 50 site inspections per year to 70 inspections per year. In 2016, 111 of sites were inspected, far exceeding the goal. A schedule was generated, which plans sites for inspection through calendar year 2020.
- ❖ The contract for development of a PCB database was awarded. Work on the database is under way, and completion is expected in 2017.
- ❖ In 2016, PWD began the process of monitoring outlying township connections using EPA Method 680. Results are presented in Section 8, Township Data.
- ❖ PWD issued 21 groundwater discharge permits in 2016. Every permit was compliant with PWD's published PCB limit of "non-detection by EPA Method 608."
- ❖ PWD wet weather and dry weather WPCP effluent data have been entered into the DRBC PCB database.
- ❖ Significant reductions in WPCP effluent PCB loadings were seen over the course of the PMP (see "Tabular Summary").

Additionally, the following initiatives were reviewed for future consideration:

- ❖ Continue monitoring of outlying township connections to determine if there are PCB loadings entering the City through the surrounding township connections.
- ❖ Monitoring new construction and groundwater remediation sites to ensure compliance with PWD's published PCB limit of "non-detection by EPA Method 608."
- ❖ Utilize the PCB database to develop interactive GIS Maps, which could assist in identifying areas of concern, and planning potential trackdown efforts.

2 Facility and Contact Information

Facility Name and Address:	Philadelphia Water Department 1101 Market Street Philadelphia, PA 19107
Water Pollution Control Plants:	Northeast WPCP 3899 Richmond St. Philadelphia, PA 19137
	Southeast WPCP 25 Pattison Ave. Philadelphia, PA 19148
	Southwest WPCP 8200 Enterprise Ave. Philadelphia, PA 19153
Contact Person:	Nicole Charlton Manager, Industrial Waste 1101 Market St., 4th Floor Philadelphia, PA 19107
	Phone: 215-685-8093 Fax: 215-685-8008 Email: nicole.charlton@phila.gov
Date of Submittal of PMP:	September 30, 2005
Date of Completeness Determination:	January 12, 2006
Date of Initiation of PMP:	March 4, 2006
Reporting Period:	Year 10 (Calendar Year 2016)

3 Revisions to PMP

During Year 10, no revisions were made to the PMP.

4 Material and Process Modifications

During Year 10 of the PMP, there was a revision to the sampling locations at Northeast Water Pollution Control Plant (NEWPCP). For the NEWPCP, there are two NPDES permit effluent sample locations: North and South. Previously, in order to collect a PCB sample at NEWPCP, the plant had to divert all flow through a single channel (North or South) in order to ensure all flow ran through a single monitoring point. This process put undue stress on the treatment plant, and decreased chlorine contact time, resulting in higher coliform counts in the plant effluent during wet weather sample events. PWD explained this situation and requested that, since two wet weather and two dry sample events are performed each year, one wet and one dry sample would be collected from the North channel, and the remaining set of wet and dry samples would be collected from the South channel. PADEP granted PWD permission to alter the sample protocol at NEWPCP as described on April 28th, 2016. Thus, samples of Northeast effluent prior to April 28th were collected under the old sample protocol, diverting all plant flow through one effluent channel. Samples after April 28th, 2016 were collected under the new sample protocol.

During 2016, Southeast Water Pollution Control Plant (SEWPCP) and Southwest Water Pollution Control Plant (SWWPCP) PCB wet and dry sampling remained the same. All SEWPCP and SWWPCP flows goes through one effluent monitoring location at each plant.

5 Measures to Address Known, Probable and Potential Sources

5.1 Known and Probable Sources

Two known sources of PCBs were identified in PWD's PCB PMP. These were the source water for PWD's Water Treatment Plants (Delaware and Schuylkill Rivers) and the ferric chloride supplied to PWD by DuPont and used in the water treatment process. No direct measurement of the PCB concentration in the source water was made during Year 3. With respect to the ferric chloride, during Year 3 of the PMP, PWD switched ferric chloride suppliers and began receiving ferric chloride from Kemira rather than DuPont. During Year 5, PWD obtained a copy of a letter from Vista Analytical Laboratory to Kemira. Lab analysis of Kemira's ferric chloride for coplanar PCBs (which is the same analysis on which the DuPont ferric chloride content was based) gave a result of 28.3 pg/g. Compared to the DuPont concentration of 0.00055 mg/L, this is a ninety-five percent (95%) reduction in PCB content in ferric chloride used by PWD in its water treatment process.

One probable source of PCBs was identified in PWD's PCB PMP. This source is sludge stored in lagoons at both NEWPCP and SWWPCP. Trackdown efforts conducted in the sewersheds of both NEWPCP and SWWPCP included sampling of the lagoons. The data are available in Attachment B of the Year 5 report.

5.2 Potential Sources

Numerous potential sources of PCBs were identified in PWD's PCB PMP. These were identified from databases supplied by EPA, the Philadelphia Fire Department, the Philadelphia Department of Public Health and others. The thirty-one (31) potential sources supplied by the Philadelphia Department of Public Health were identified as sites at which some form of prior PCB remediation had taken place. All thirty-one (31) of these sites were inspected during Year 1 of the PMP.

The remaining potential sources of PCBs, taken from information supplied by EPA and others, were identified as sites on which PCB devices were believed to be present. These sites were separated into three groups by sewershed (NEWPCP, SEWPCP or SWWPCP). Approximately one hundred sixty-seven (167), seventy-three (73) and one hundred fifty-seven (157) sites were listed for NEWPCP, SEWPCP and SWWPCP, respectively. During 2016 (Year 10 of the PMP), PWD's Industrial Waste group inspected fifty (50) of the NEWPCP-related sites, thirty-one (31) of the SEWPCP-related sites and thirty (30) of the SWWPCP-related sites. The results of these inspections are summarized in the Tables, "Inspections of Potential Source Sites" (see Attachment B).

PCB Database

PWD is in the process of creating a PCB database, which will store all PCB data needed to create reports, graphs, GIS Maps and incorporate all future data in one location. LINKO has been selected as the PCB database vendor. The database is in the development stage and the product is anticipated for delivery in 2017.

GIS Maps

GIS Specialists (GISS) have been brought in to provide assistance with creating interactive GIS Maps, which could assist in identifying areas of concern, and planning any potential trackdown efforts. All PCB data locations have been geocoded so that they can be included on GIS Maps. The data locations contain all sampling locations including PCB trackdowns, SIUs' Discharges, Groundwater Permits' Discharges, and Wastewater Treatment Plants. Maps detailing the 2016 PCB inspection sites are included in Attachment B.

Township Connections

PWD has agreements with the surrounding townships to convey and treat township wastewater, which is ultimately discharged at NEWPCP and SWWPCP. Part of the agreement includes sampling the respective township's wastewater at the connection to the City's sewer system (i.e. near Philadelphia border). In 2016, PWD sampled three of these connections using EPA Method 680 to determine if there are PCB loadings entering the City through the surrounding township connections. Results of this sampling are presented in Attachment C. In two of the three locations sampled, PCBs were not detected. The Grant Avenue location showed 1.3 µg/L of total PCBs, 1.2 µg/L monochlorobiphenyls. The composition of the homologs suggests this is not likely new contamination, and that weathering may have taken place. A second sample was collected from this location at a later date. The results of the second sample event were all below the detection limit.

Future efforts will include resampling the Grant Avenue location in 2017, continuing to sample additional township connections using EPA method 680.

New Construction and Groundwater Remediation Sites:

In an effort to minimize the amount of PCBs entering the City's sewer system, PWD has begun to implement PCB monitoring in all Groundwater Discharge Permits. These permits are used to regulate specific pollutants of concern from groundwater discharges to the City sewer. Generally, these permits are for remediation sites with groundwater contaminated with petroleum products, such as former gasoline stations. However, all temporary discharges from construction activities are also permitted under the Groundwater Discharge Permit Program. The Groundwater Discharge Permits require all Contractors and/or Subcontractors to monitor their discharges monthly for PCBs via sampling and to report their activities and results. All Groundwater Discharge Permits include PWD's published PCB limit of "non-detection by EPA Method 608" limitation. All PCB detections require additional monitoring by the contractor or subcontractor to show compliance with the permit limitation. In 2016, 21 groundwater permits were issued. None reported detectable levels of PCBs.

6 Incremental and Cumulative Changes from the Baseline Loading

6.1 Loading Baseline

PWD's PCB PMP provides the following baseline loadings (see Section 7, "Tabular Summary):

WPCP	Baseline Loading (mg/day)
NEWPCP	11,510
SEWPCP	7,559
SWWPCP	10,970

These loadings differ from those found in the TMDL. This is because the data are from different sampling events, the PMP baseline loadings are weighted by wet versus dry weather results, the analyses are for different numbers of congeners and there is a difference in analytical methods.

6.2 Baseline Loading Reduction – Direct Measurement

During Year 10, wet-weather effluent sampling for PCBs was performed at each of PWD's three Water Pollution Control Plants (WPCPs), as required by PWD's NPDES permits. See Section 7 ("Tabular Summary") for data. Results of the 2016 sampling show substantial reductions of 67-87% from the baseline PCB loading levels.

6.3 Baseline Loading Reduction – Other Measures of Progress

See Attachment B ("Potential Sources and Inspection Findings").

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Facility:	Philadelphia Water Department	**Date of Completeness Determination:**	January 12, 2006
Contact Information		**Date of Initiation of PMP:**	March 4, 2006
Name:	Nicole Charlton		
Phone:	215-685-8093		
Email:	nicole.charlton@phila.gov		

NPDES No(s).: PA0026689 (Northeast Water Pollution Control Plant, NEWPCP)
PA0026662 (Southeast Water Pollution Control Plant, SEWPCP)
PA0026671 (Southwest Water Pollution Control Plant, SWWPCP)

Cumulative Percent Reductions

Baseline Loading Calculations Date: 2005
Revisions Date: N/A

Year	Loading (milligrams per day)		Estimated Reductions (from baseline) (milligrams per day)		Cumulative Reductions (% from baseline)	
TMDL Estimated Loading (to be added by DRBC)						
Discharger Computed Baseline						
NEWPCP	11,510					
SEWPCP	7,559					
SWWPCP	10,970					
			N/A		N/A	
2007	December 3, 2007		December 3, 2007		December 3, 2007	
NEWPCP	8,594		2,916		25.3	
SEWPCP	4,595		2,964		39.2	
SWWPCP	6,369		4,601		41.9	
2009	March 27, 2009	October 16, 2009	March 27, 2009	October 16, 2009	March 27, 2009	October 16, 2009
NEWPCP	5,846	6,571	5,664	4,939	49.2	42.9
SEWPCP	3,435	4,287	4,124	3,272	54.6	43.3
SWWPCP	7,334	5,690	3,636	5,280	33.1	48.1
2010	April 21, 2010	December 2, 2010 (Dec. 13 for NEWPCP)	April 21, 2010	December 2, 2010 (Dec. 13 for NEWPCP)	April 21, 2010	December 2, 2010 (Dec. 13 for NEWPCP)
NEWPCP	5,490	4,615	6,020	6,895	52.3	59.9
SEWPCP	2,155	2,736	5,404	4,823	71.5	63.8
SWWPCP	2,948	5,027	8,022	5,943	73.1	54.2
2011	September 6, 2011	November 17, 2011	September 6, 2011	November 17, 2011	September 6, 2011	Novermber 17, 2011
NEWPCP	6,224	3,745	5,286	7,765	45.9	67.5
SEWPCP	4,135	1,368	3,424	6,191	45.3	81.9
SWWPCP	10,270	4,280	700	6,690	6.4	61.0
2012	June 13, 2012	October 16, 2012	June 13, 2012	October 16, 2012	June 13, 2012	October 16, 2012
NEWPCP	11,189	2,542	321	8,968	2.8	77.9
SEWPCP	5,659	1,296	1,900	6,263	25.1	82.9
SWWPCP	5,766	2,663	5,204	8,307	47.4	75.7
2013	April 20, 2013	October 8, 2013	April 20, 2013	October 8, 2013	April 20, 2013	October 8, 2013
NEWPCP	2,849	2,349	8,661	9,161	75.2	79.6
SEWPCP	2,803	2,599	4,756	4,960	62.9	65.6
SWWPCP	3,673	3,040	7,297	7,930	66.5	72.3
2014	April 16, 2014	September 25, 2014	April 16, 2014	September 25, 2014	April 16, 2014	September 25, 2014
NEWPCP	2,315	1,552	9,195	9,958	79.9	86.5
SEWPCP	6,370	1,827	1,189	5,732	15.7	75.8
SWWPCP	2,939	2,882	8,031	8,088	73.2	73.7
2015*	May 28, 2015 (August 12, 2015 for SWWPCP)	October 10, 2015	May 28, 2015 (August 12, 2015 for SWWPCP)	October 10, 2015	May 28, 2015 (August 12, 2015 for SWWPCP)	October 10, 2015
NEWPCP	3,157	2,291	8,353	9,219	72.6	80.1
SEWPCP	2,744	2,795	4,815	4,764	63.7	63.0
SWWPCP	4,265	3,610	6,705	7,360	61.1	67.1
2016	May 14, 2016	October 23, 2016 (October 28, 2016 for SEWPCP)	May 14, 2016	October 23, 2016 (October 28, 2016 for SEWPCP)	May 14, 2016	October 23, 2016 (October 28, 2016 for SEWPCP)
NEWPCP	1,755	1,479	9,755	10,031	84.8	87.1
SEWPCP	1,525	1,058	6,034	6,501	79.8	86.0
SWWPCP	3,662	1,416	7,308	9,554	66.6	87.1

*Updated information is included for 2015. The Effluent Data was reported in the Mass Loadings section and the Mass Loadings were reported in the Effluent Data section in the 2015 Spreadsheet.

Measures

Description	Date Initiated	Date Completed	Comments/Status:
SEWPCP Phase 2 Trackdown Sampling	October 17, 2006	October 20, 2006	Complete
NEWPCP Phase 1 Trackdown Sampling	November 3, 2010	November 4, 2010	
NEWPCP Phase 2 Trackdown Sampling	January 26, 2012	January 27, 2012	
SWWPCP Phase 1 Trackdown Sampling	October 12, 2011	October 13, 2011	
SWWPCP Phase 2 Trackdown Sampling	February 23, 2012	February 24, 2012	
Inspections of "Potential Source" sites	March 4, 2006	April 2011	363 Completed
(Phila. Health Dept. list)	October 30, 2006	March 21, 2007	31 of 31 Completed

7 Tabular Summary

Plant Monitoring Data

Sample Location	Date of Sample Collection	Date Results Received	Total PCBs (pg/l)	Penta-PCBs (pg/l)
SEWPCP Phase 2 Trackdown Sampling	October 17-20, 2006	May 1, 2007		
NEWPCP, SEWPCP & SWWPCP effluent	December 2-3, 2007	March 28, 2008		
NEWPCP			13,709	2340
SEWPCP			13,580	2233
SWWPCP			7,362	1,314
NEWPCP, SEWPCP & SWWPCP effluent	March 27, 2009	May 29, 2009		
NEWPCP			4,047	850
SEWPCP			1,593	373
SWWPCP			8,866	1,474
NEWPCP, SEWPCP & SWWPCP effluent	October 16, 2009	December 23, 2009		
NEWPCP			5,924	1,238
SEWPCP			3,797	711
SWWPCP			4,612	886
NEWPCP, SEWPCP & SWWPCP effluent	April 21, 2010	June 18, 2010		
NEWPCP			6,746	1,629
SEWPCP			5,322	1,114
SWWPCP			3,623	729
NEWPCP, SEWPCP & SWWPCP effluent	December 2, 2010	January 31, 2011		
NEWPCP	(December 13, 2010)		5,671	1,379
SEWPCP			6,755	1,348
SWWPCP			6,177	1,110
NEWPCP, SEWPCP & SWWPCP effluent	September 6, 2011	October 25, 2011		
NEWPCP			7,646	1,624
SEWPCP			10,206	1,723
SWWPCP			12,385	1,911
NEWPCP, SEWPCP & SWWPCP effluent	November 17, 2011	January 13, 2012		
NEWPCP			4,600	1,159
SEWPCP			3,376	635
SWWPCP			5,162	997
NEWPCP, SEWPCP & SWWPCP effluent	June 13, 2012	Juyl 24, 2012		
NEWPCP			13,745	2,057
SEWPCP			13,968	2,954
SWWPCP			6,954	1,331
NEWPCP, SEWPCP & SWWPCP effluent	October 16, 2012	November 30, 2012		
NEWPCP			3,123	791
SEWPCP			3,198	595
SWWPCP			3,211	558
NEWPCP, SEWPCP & SWWPCP effluent	April 20, 2013	May 29, 2013		
NEWPCP			3,500	806
SEWPCP			6,918	1,566
SWWPCP			4,429	932
NEWPCP, SEWPCP & SWWPCP effluent	October 8, 2013	January 20, 2014		
NEWPCP			2,886	669
SEWPCP	(November 27, 2013)		6,414	1,204
SWWPCP			3,666	757
NEWPCP, SEWPCP & SWWPCP effluent	April 16, 2014	May 26, 2014		
NEWPCP			2,844	622
SEWPCP			15,722	3,182
SWWPCP	(April 26, 2014)	(June 2, 2014)	3,544	737
NEWPCP, SEWPCP & SWWPCP effluent	September 25, 2014	October 26, 2014		
NEWPCP	(September 26, 2014)		1,907	458
SEWPCP			4,510	912
SWWPCP			3,476	745

7 Tabular Summary

Sample Location	Date of Sample Collection	Date Results Received	Total PCBs (pg/l)	Penta-PCBs (pg/l)
NEWPCP, SEWPCP & SWWPCP effluent	May 28, 2015	August 4, 2015		
NEWPCP	N/A	N/A	N/A	N/A
SEWPCP	N/A	N/A	N/A	N/A
SWWPCP	5,143		4,265	1,338
NEWPCP, SEWPCP & SWWPCP effluent	August 12, 2015	November 2, 2015		
NEWPCP	3878		3,157	963
SEWPCP	6774		2,744	1,411
SWWPCP	N/A	N/A	N/A	N/A
NEWPCP, SEWPCP & SWWPCP effluent	October 10, 2015	December 21, 2015		
NEWPCP			2,291	584
SEWPCP			2,795	1,516
SWWPCP			3,610	790
NEWPCP, SEWPCP & SWWPCP effluent*	May 14, 2016	June 27, 2016		
NEWPCP			2,156	488
SEWPCP			3,765	847
SWWPCP			4,416	979
NEWPCP, SEWPCP & SWWPCP effluent	October 23, 2016 (October 28, 2016 for SEWPCP)	November 28, 2016		
NEWPCP			1,817	377
SEWPCP			2,612	452
SWWPCP			1,708	307

*Updated information is included for 2015. The Effluent Data was reported in the Mass Loadings section and the Mass Loadings were reported in the Effluent Data section in the 2015 Spreadsheet.

Attachment A

Data Graphs By Plant

Figure A1

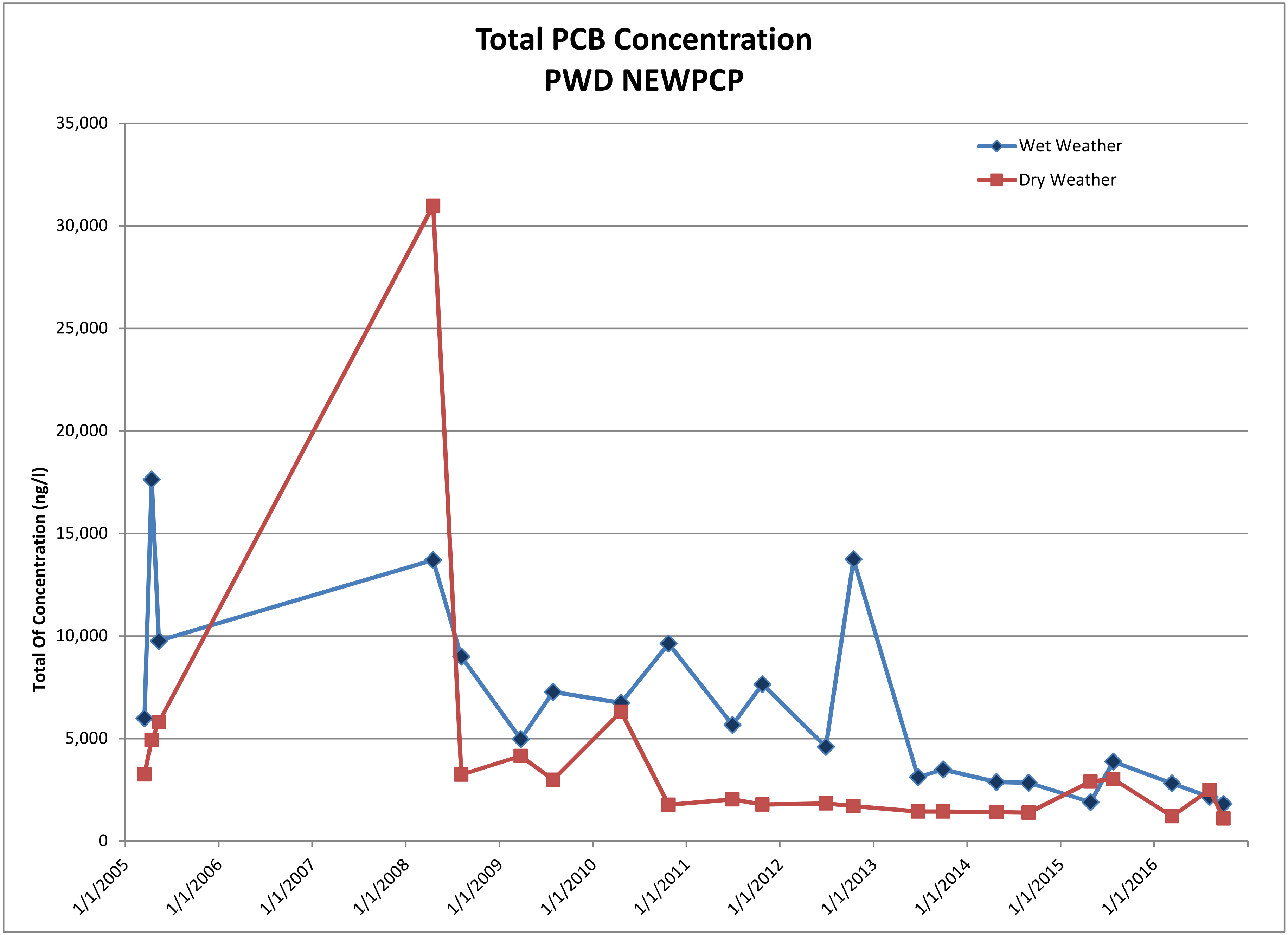

Total PCB Concentration
PWD NEWPCP
Wet Weather
Dry Weather
Total Of Concentration (ng/l)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
1/1/2014
1/1/2015
1/1/2016

Figure A2

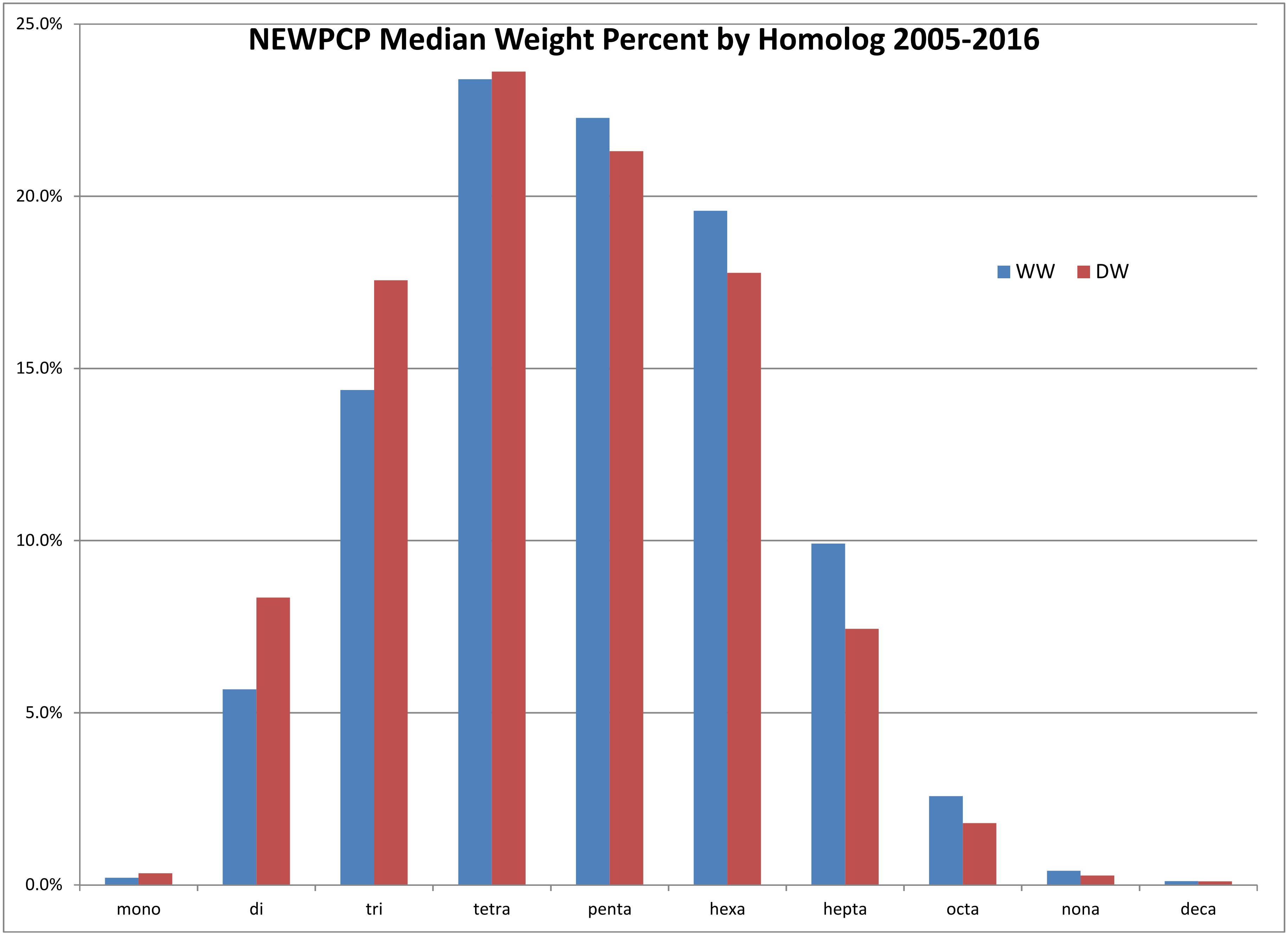

NEWPCP Median Weight Percent by Homolog 2005-2016
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
WW
DW
mono
di
tri
tetra
penta
hexa
hepta
octa
nona
deca

Figure A3

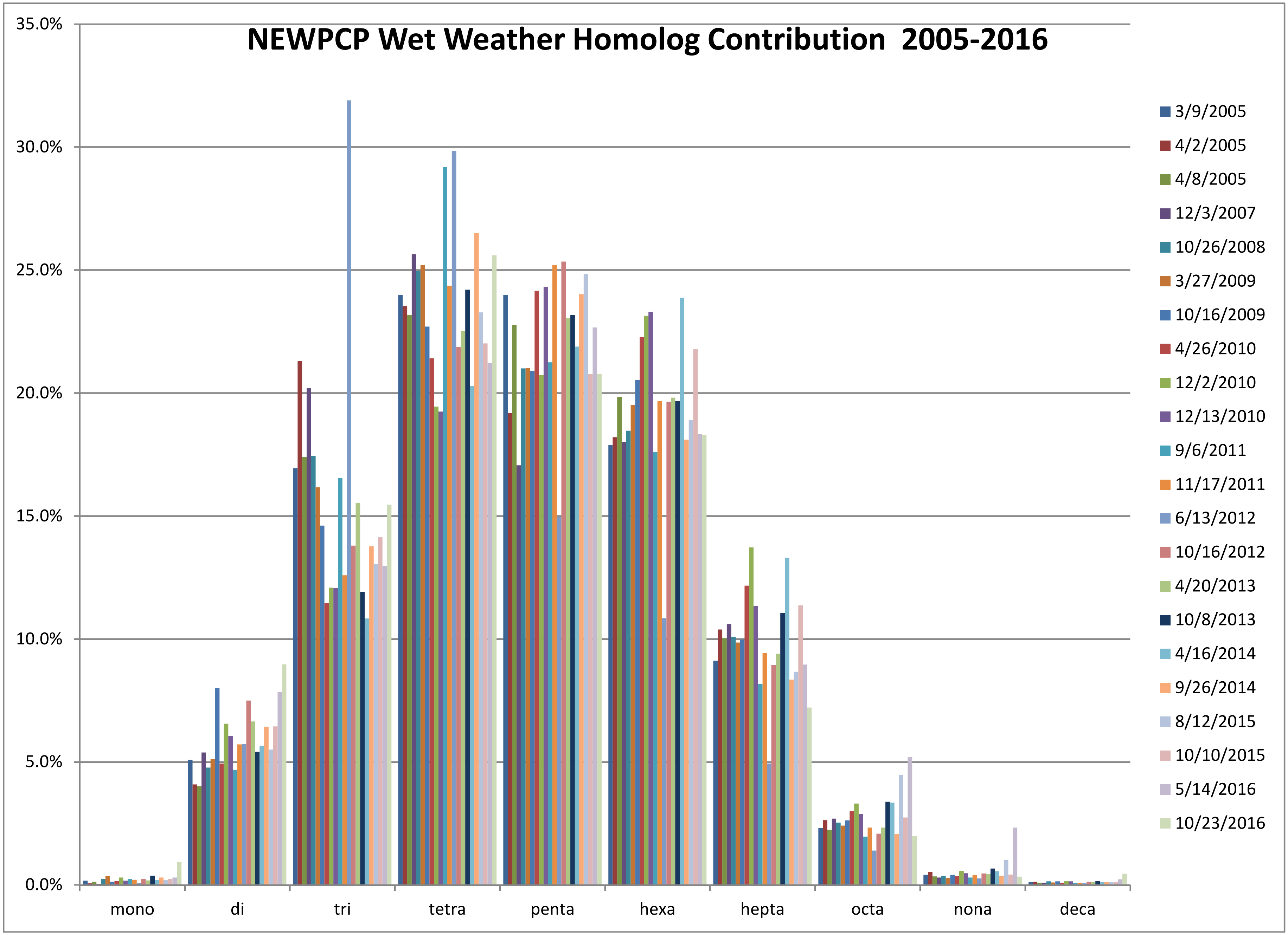

NEWPCP Wet Weather Homolog Contribution 2005-2016
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
mono
di
tri
tetra
penta
hexa
hepta
octa
nona
deca
3/9/2005
4/2/2005
4/8/2005
12/3/2007
10/26/2008
3/27/2009
10/16/2009
4/26/2010
12/2/2010
12/13/2010
9/6/2011
11/17/2011
6/13/2012
10/16/2012
4/20/2013
10/8/2013
4/16/2014
9/26/2014
8/12/2015
10/10/2015
5/14/2016
10/23/2016

Figure A4

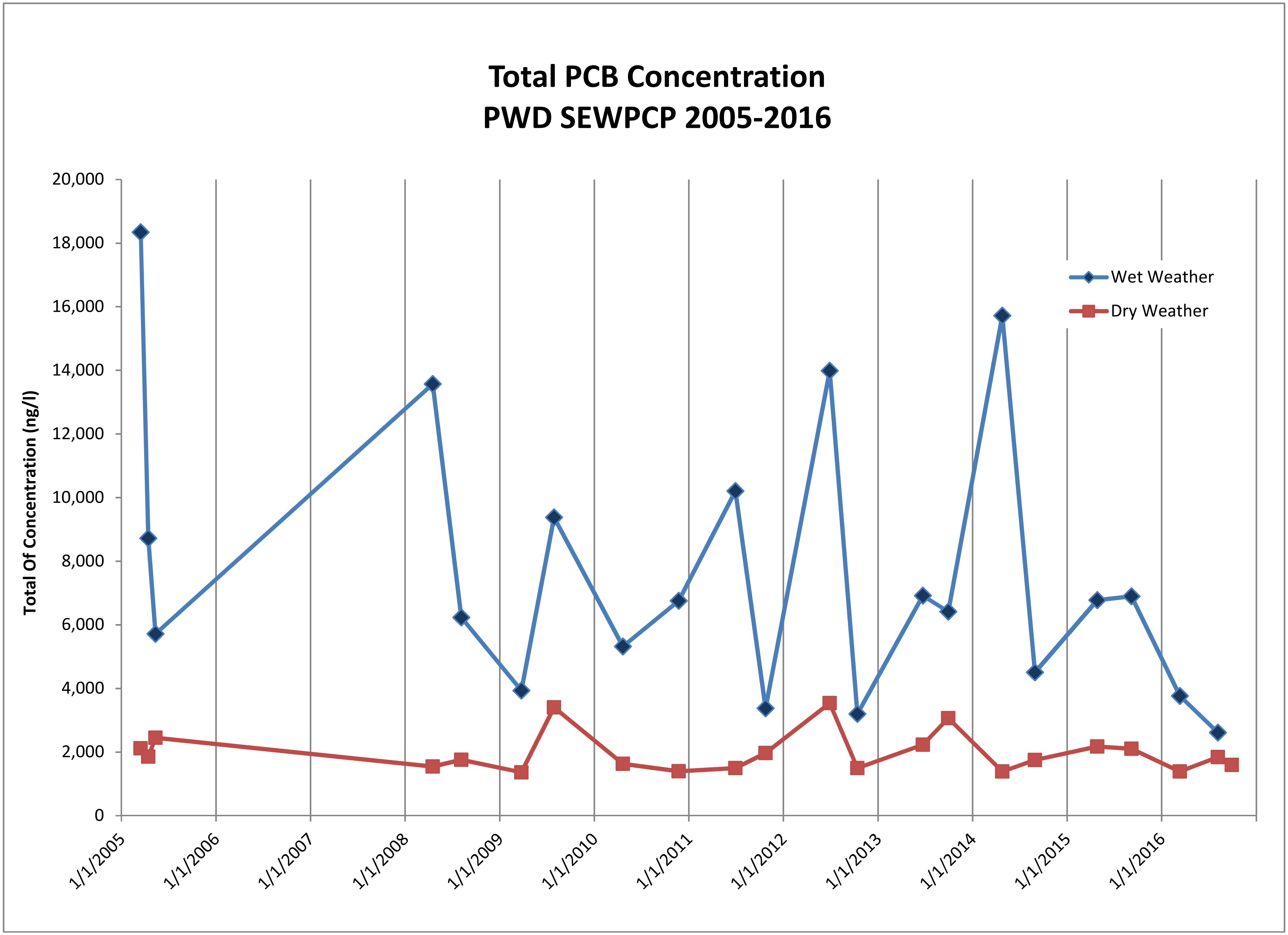
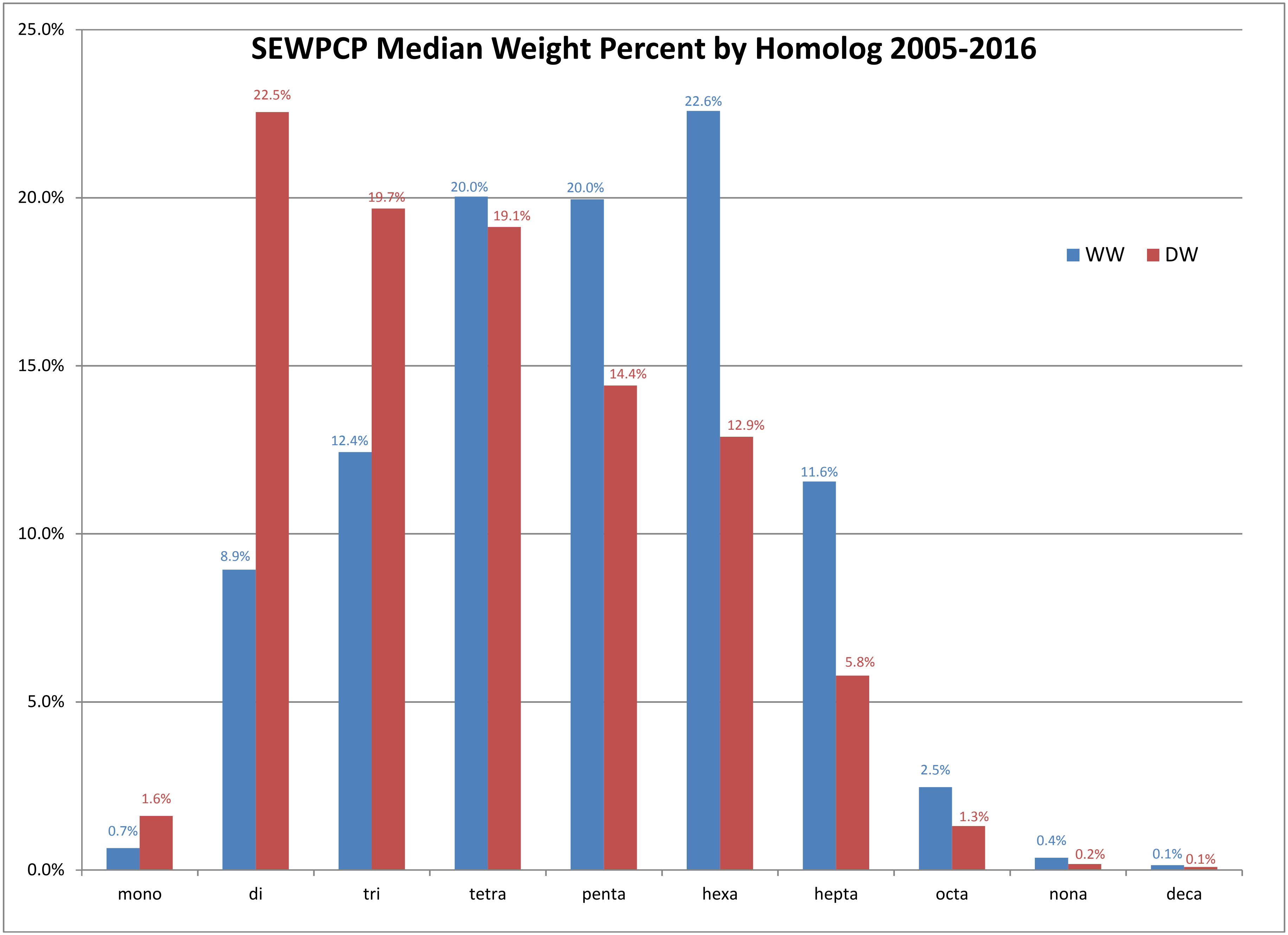

Total PCB Concentration
PWD SEWPCP 2005-2016
Total Of Concentration (ng/l)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
1/1/2011
1/1/2012
1/1/2013
1/1/2014
1/1/2015
1/1/2016
Wet Weather
Dry Weather

Figure A5



SEWPCP Median Weight Percent by Homolog 2005-2016
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
WW
DW
0.7%
1.6%
8.9%
22.5%
12.4%
19.7%
20.0%
19.1%
20.0%
14.4%
22.6%
12.9%
11.6%
5.8%
2.5%
1.3%
0.4%
0.2%
0.1%
0.1%
mono
di
tri
tetra
penta
hexa
hepta
octa
nona
deca

Figure A6

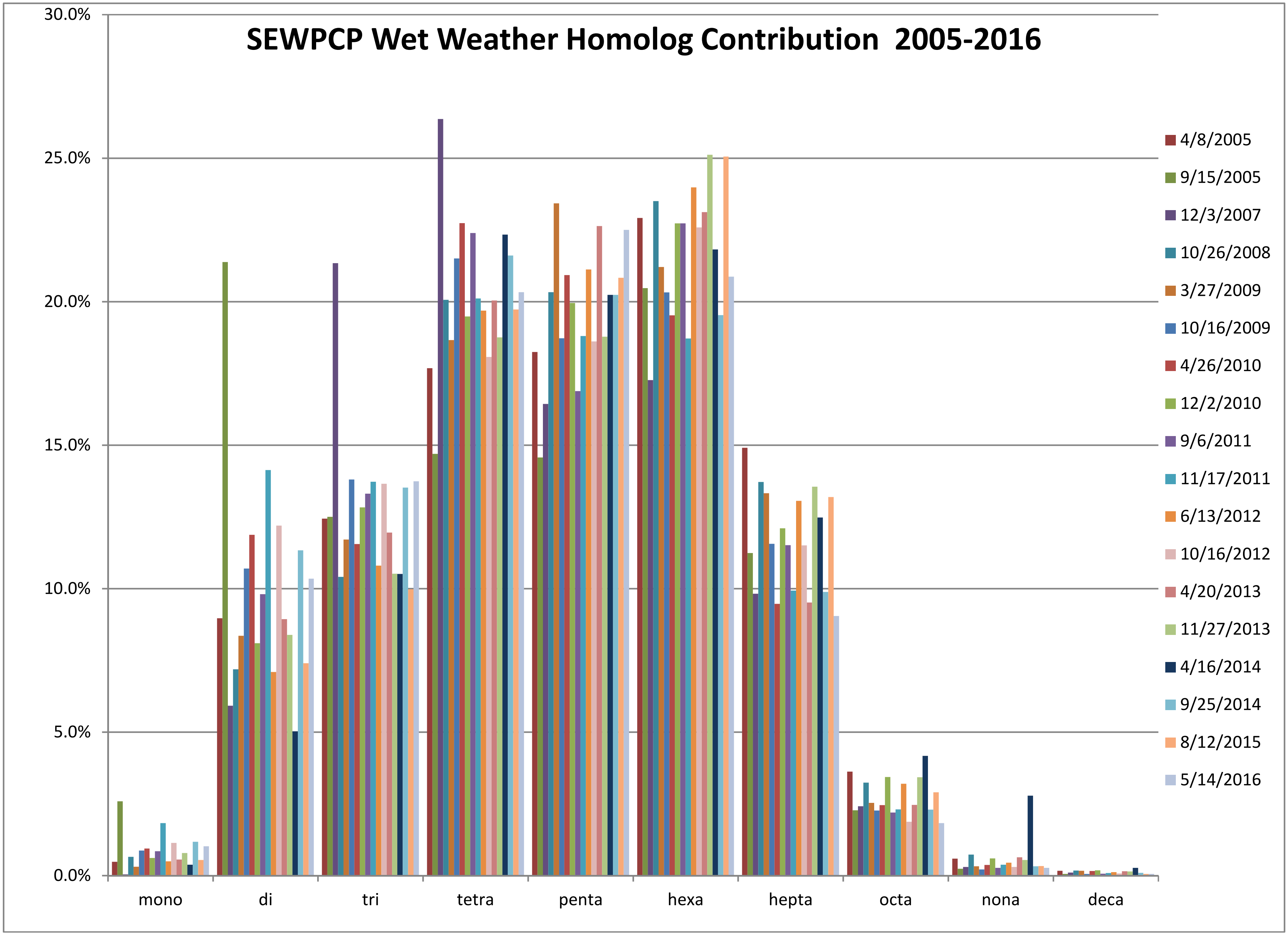
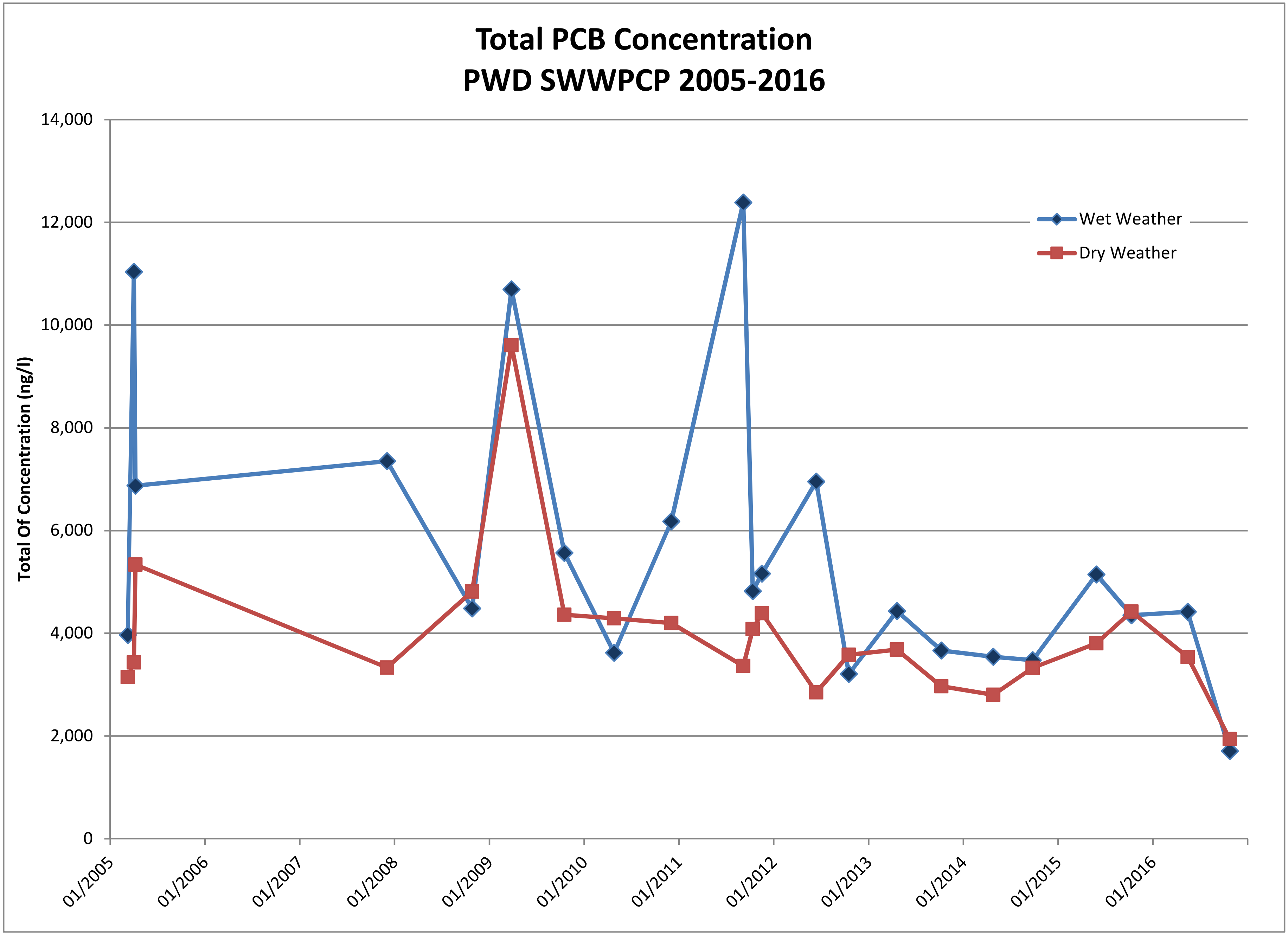
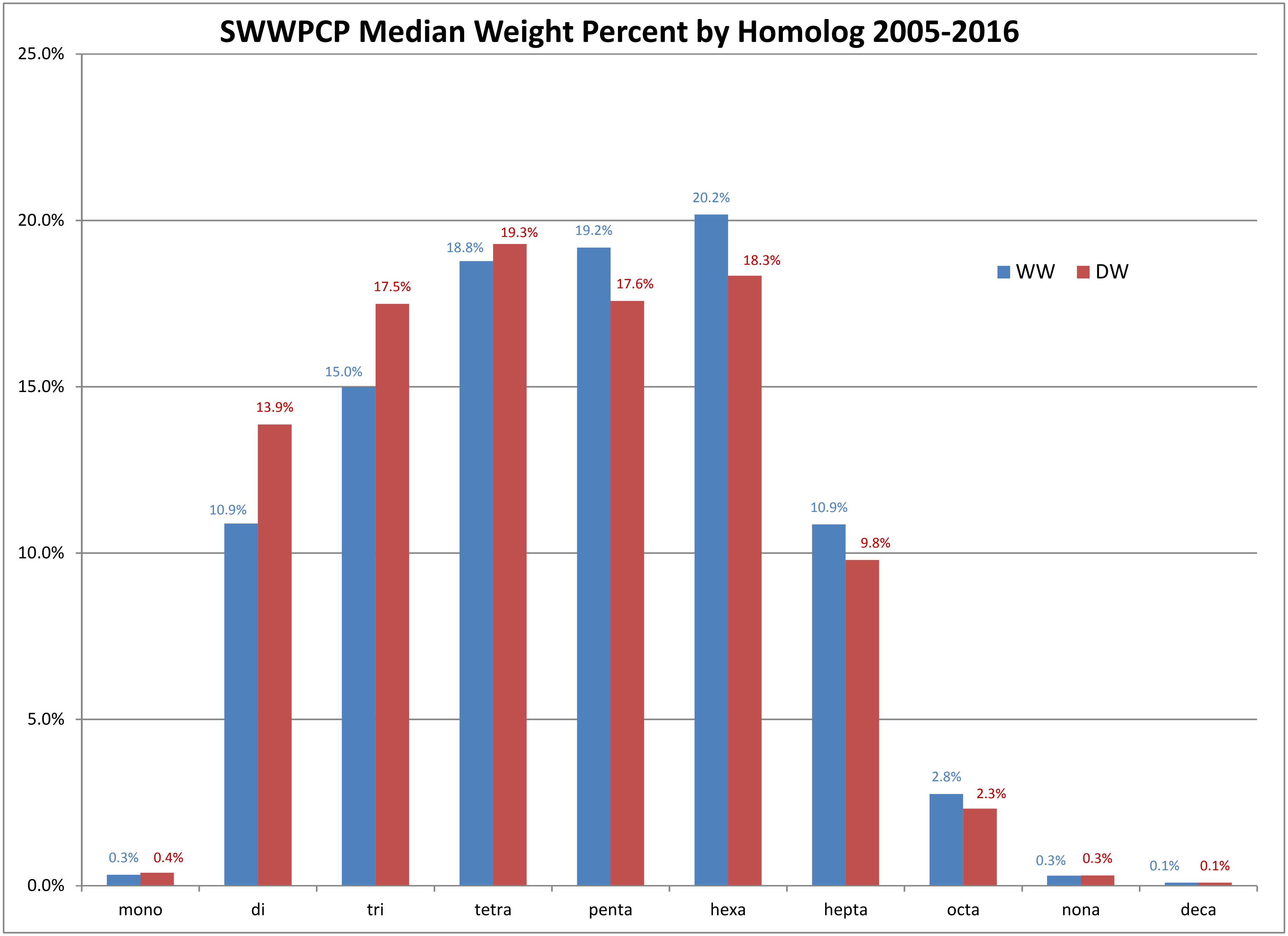

SEWPCP Wet Weather Homolog Contribution 2005-2016
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
mono
di
tri
tetra
penta
hexa
hepta
octa
nona
deca
4/8/2005
9/15/2005
12/3/2007
10/26/2008
3/27/2009
10/16/2009
4/26/2010
12/2/2010
9/6/2011
11/17/2011
6/13/2012
10/16/2012
4/20/2013
11/27/2013
4/16/2014
9/25/2014
8/12/2015
5/14/2016

Figure A7



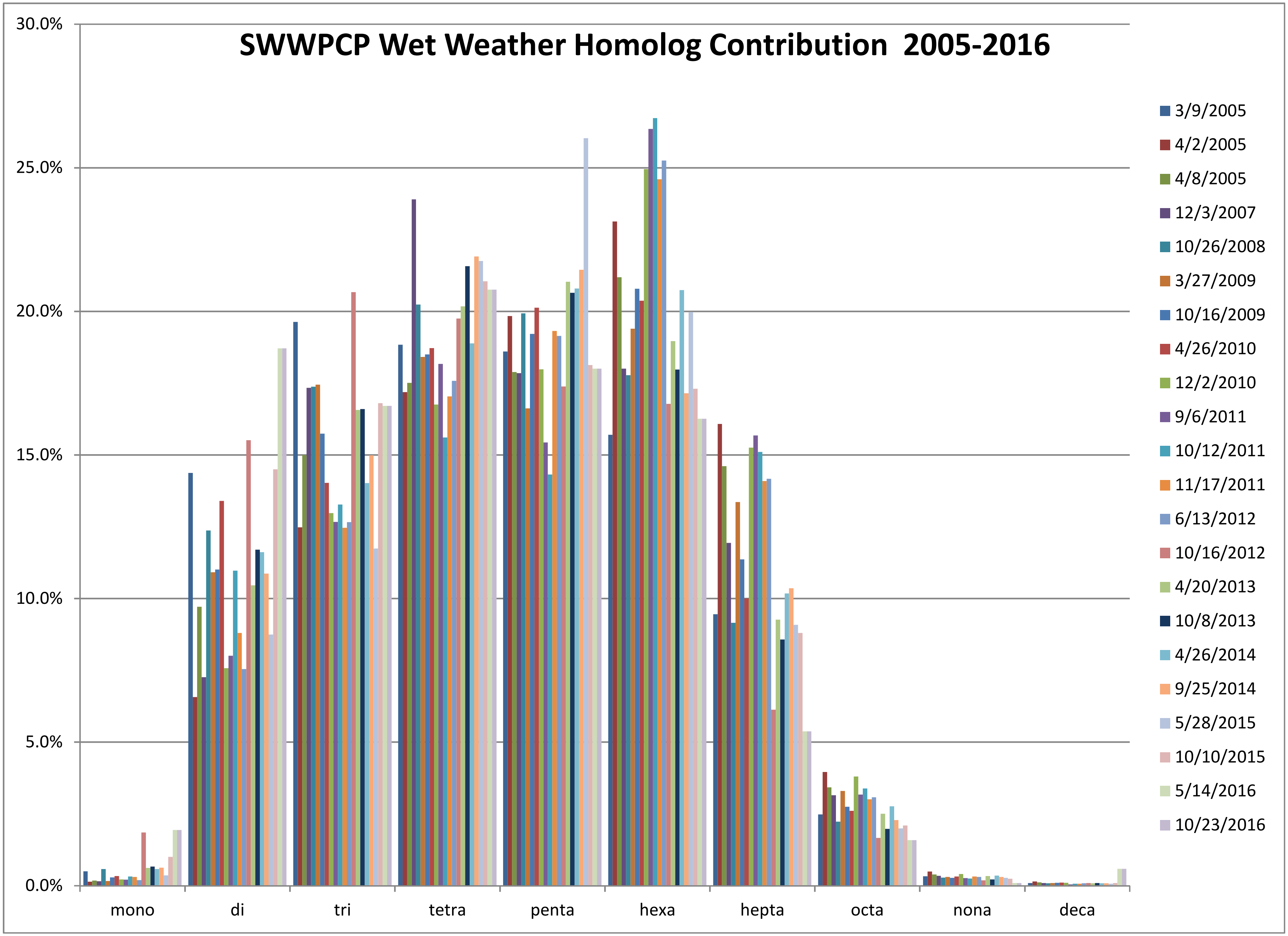
Total PCB Concentration
PWD SWWPCP 2005-2016
Total Of Concentration (ng/l)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
01/2005
01/2006
01/2007
01/2008
01/2009
01/2010
01/2011
01/2012
01/2013
01/2014
01/2015
01/2016
Wet Weather
Dry Weather

Figure A8



SWWPCP Median Weight Percent by Homolog 2005-2016
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
WW
DW
0.3%
0.4%
10.9%
13.9%
15.0%
17.5%
18.8%
19.3%
19.2%
17.6%
20.2%
18.3%
10.9%
9.8%
2.8%
2.3%
0.3%
0.3%
0.1%
0.1%
mono
di
tri
tetra
penta
hexa
hepta
octa
nona
deca

Figure A9



SWWPCP Wet Weather Homolog Contribution 2005-2016
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
mono
di
tri
tetra
penta
hexa
hepta
octa
nona
deca
3/9/2005
4/2/2005
4/8/2005
12/3/2007
10/26/2008
3/27/2009
10/16/2009
4/26/2010
12/2/2010
9/6/2011
10/12/2011
11/17/2011
6/13/2012
10/16/2012
4/20/2013
10/8/2013
4/26/2014
9/25/2014
5/28/2015
10/10/2015
5/14/2016
10/23/2016

Attachment B

Potential Sources and Inspection Findings

Table B1 - Known, Probable and Potential Sources and Measures to Address Sources

Source	Source Type: Known	Source Type: Probable	Source Type: Potential	Measure to Address Source
Water Supply (Delaware and Schuylkill Rivers)	X			PCB PMP and action by others
Ferric Chloride used in Water Treatment	X			Switched ferric chloride suppliers
Sludge Lagoons (NEWPCP and SWWPCP)		X		Trackdown for each WPCP calls for sampling and analysis
PCB Device sites in sewershed of each WPCP (see Attachment B, "Inspections of Potential Source Sites")			X	Site inspections, evaluation and followup
Significant Industrial Users			X	Modify permits as warranted
Electric Company (PECO) customers			X	Undetermined. PECO will not share customer information.
Township Connections			X	Sample points of connections for PCBs
Groundwater Discharges			X	Require PCB monitoring

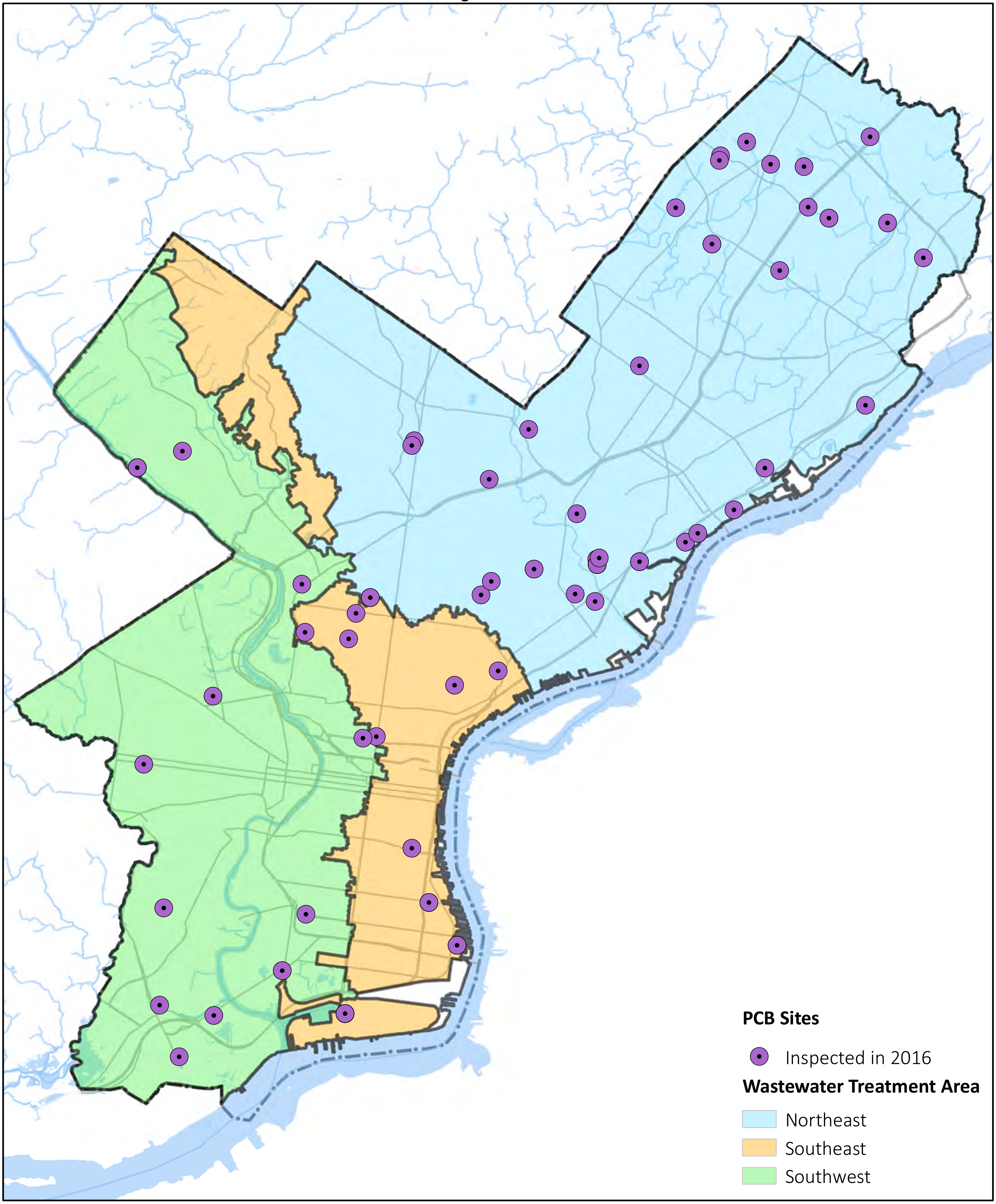
Industry No.	Loc ID	Drainage Area Type	Name	Address	Location	Contact	Equipment	Number	Aroclor	Concentration	Gallons	Inspection Date
IU-02490	NE-10	Combined	AdvanSix LLC formerly Honeywell	Margaret and Bermuda Streets	Cooling Tower 4	Paul Persing	Transformers	3				11/16/2016
PCB-NE-011	NE-11	MS4	Posel Corporation	9381 Krewstown Road	Ana Corrado	Rosa Corrado	Transformer	1		<50 ppm		12/5/2016
PCB-NE111	NE-111	Combined	School Dist. OF Phila.	Broad & Olney (Widner)	Electrical Room by Dock	K. Choper	Switches	3				2/16/2016
PCB-NE112	NE-112	Combined	School Dist. OF Phila.	Front & Duncannon (Olney)	Electrical Room by Loading Dock	K. Choper	Transformers	2			180	2/16/2016
PCB-NE-011	NE-12	MS4	Posel Corporation	9381 Krewstown Road	Ana Corrado	Rosa Corrado	Transformer	1		<50 ppm		12/5/2016
	NE-121	Combined	Allegheny Scrap	Adams Avenue & Tacony Street	Crane Platform	C. Doloway	REMOVED	4		<50 mg/l		12/1/2016
	NE-122	Combined	Allegheny Scrap	Adams Avenue & Tacony Street	Maintenance Building N. Wall	C. Doloway	Capacitors	4		<50 mg/l		12/1/2016
PCB-NE013	NE-13	MS4	School Dist. OF Phila.	10159 Bustleton Avenue	George Washington High School	K. Choper	Transformers	2	Chlorextol		342	2/16/2016
	NE-134	Combined	Allegheny Scrap	Adams Avenue & Tacony Street	Steel Building Exterior	C. Doloway	Capacitors	5		<50 mg/l	217	12/1/2016
	NE-138	Combined	Allegheny Scrap	Adams Avenue & Tacony Street	Office Transformer Vault	C. Doloway	REMOVED	6		<50 mg/l		12/1/2016
	NE-144	Combined	Allegheny Scrap	Adams Avenue & Tacony Street	Bailer Power Room	C. Doloway	Capacitors	8				12/1/2016
IU-02490	NE-20	Combined	AdvanSix LLC formerly Honeywell	Margaret and Bermuda Streets	Cooling Tower 3	Paul Persing	Transformers	3				11/16/2016
IU-01020	NE-203	Combined	Henshell Corp.	2229 N. 19th Street	Outside by Indiana Ave	Kevin Maloney	Transformer	1			240	9/10/2015
IU-02410	NE-204	MS4	SPD	13500 Roosevelt Blvd.	Transformer Room	Dave Urda	Transformer	4	1260/1254	5 to 25 ppm	318x3/345	6/1/2016
IU-01061	NE-208	MS4	HP Hood	10975 Dutton Road	Outside Cage	Bill Horan	Transformers	2				3/8/2016
IU-00530	NE-210	MS4	Cintas	10080 Sandmeyer Lane	Back Parking Lot	Dennis Kelley	Transformers	2			2590 lbs	7/20/2016
IU-00690	NE-211	MS4	Delavau LLC	10101 Roosevelt Blvd	East Side of Building	James Hansen	Transformer	1		<50	258	9/7/2016
IU-01690	NE-213	Combined	Frontida BioPharm	1100 Orthodox Street	Building Rear	Robert Rovinsky	Transformer	4				9/22/2015
IU-00730	NE-215	Combined	Dickler	4201 Torresdale Avenue	Transformer Room	Ken Hamel	Transformer	1		<2ppm		11/22/2016
IU-01220	NE-216	Township	Thermacore	2000 Cabot Blvd. Suite 150	Building Rear	David O'Connor	Transformer	1				7/5/2016
IU-01020	NE-219	Combined	Henshell Corp.	2229 N. 19th Street	Transformer Room Near Boiler	Kevin Maloney	Transformer	1	1260	407	175	12/8/2016
IU-00930	NE-22	Combined	General Electric International, Inc. (GEII)	1040 East Erie Avenue	General Electric International	Ana Adorno	Transformers	4		1.4ppm		5/4/2016
IU-01020	NE-220	Combined	Henshell Corp.	2229 N. 19th Street	Transformer Room Near Office	Kevin Maloney	Transformer	2			41	12/8/2016
IU-00050	NE-221	Combined	Abbey Color Inc	400 E. Tioga St	Inside Transformer Vault	Roger Nielson	Transformer	2			102	11/15/2016
IU-00180	NE-222	MS4	Allied Tube and Conduit	11350 Norcom Rd.	In Electrical Rm	Donn Carroll	Transformer	4	Interteen		Approx 300 each	2/3/2016
IU-00180	NE-222	MS4	Allied Tube and Conduit	11350 Norcom Rd	In Electrical Rm	Donn Carroll	Transformer	4	Interteen		Approx 300 each	2/3/2016
IU-00180	NE-228	MS4	Allied Tube and Conduit	11350 Norcom Rd	Loft	Donn Carroll	Capacitor	1				2/3/2016
IU-00930	NE-23	Combined	General Electric International, Inc. (GEII)	1040 East Erie Avenue	General Electric International	Ana Adorno	Capacitors	2				5/4/2016
IU-01020	NE-230	Combined	Henshell Corp.	2229 N. 19th Street	Outside	Kevin Maloney	Transformer	1				
IU-01610	NE-260	Combined	Michel's Bakery	5698 Rising Sun Avenue	Transformer Room	Tom Evans	Transformers	2		<50	637	7/28/2016
IU-00740	NE-261	Combined	Dietz and Watson	5701 Tacony Street	Boiler Room	Mike Kump	Transformers	2			665/705	7/13/2016
IU-00740	NE-262	Combined	Dietz and Watson	5701 Tacony Street	Electrical Room	Mike Kump	Capacitor					7/13/2016
	NE-263	MS4	AAA Distributors	2501 Grant Avenue	Blue Grass Road Side of Building		Transformers	3				11/16/2016
IU-02240	NE-264	Combined	Regal Leather	3795 Sepviva Street	Transformer Room By Loading Dock	Martha Duolos	Transformer	1				7/28/2016
IU-01590	NE-266	Township	Metlab	1000 E. Mermaid Lane	Building Rear	James Conybear/ Dan Kracovic	Transformers	4				9/29/2016
IU-01540	NE-267	MS4	Medical Products Lab	9990 Global Rd	IFO Building	Elliot Stone	transformer	1				8/30/2016
IU-01541	NE-268	MS4	Medical Products Lab	490 Red Lion Rd	In Garage Area	Elliot Stone	Capacitor	3				8/30/2016
IU-01040	NE-269	Combined	Hillock Anodizing	5101 Comly Rd	By Loading Area	John Hillock	transformer	1				8/24/2016
IU-02490	NE-27	Combined	AdvanSix LLC formerly Honeywell	Margaret and Bermuda Streets	Cooling Tower 5	Paul Persing	Transformers	1				11/16/2016

Industry No.	Loc ID	Drainage Area Type	Name	Address	Location	Contact	Equipment	Number	Aroclor	Concentration	Gallons	Inspection Date
IU-01041	NE-270	Combined	Hillock Anodizing	7363A Tulip St	Transformer Room	John Hillock	Transformer	3			68	8/24/2016
IU-00920	NE-271	Township	GE Betz	4636 Somerton Rd	Building Rear	Brandy Dowling	Transformers	4				8/9/2016
PCB-NE003	NE-3	MS4	School Dist. OF Phila.	7300 Glendale Avenue	Northeast High School	K. Choper	Transformers	6	Askarel 433		5600	1/27/2016
PCB-NE036	NE-36	MS4	PWD	9001 State Road	Baxter WTP	T. Lapiniski	Transformer	1			155	12/5/2016
PCB-NE053	NE-53	MS4	School Dist. OF Phila.	Knights & Chalfont	School Yard	K. Choper	Transformer	1				2/16/2016
PCB-NE054	NE-54	MS4	School Dist. OF Phila.	Sharon & Alicia	Basement STR Room	K. Choper	Transformers	3				2/16/2016
PCB-NE059	NE-59	MS4	S.D. Richman Inc	2435 Wheatsheaf Lane	Metal Building N.S.	B. Richman	Transformer	1				12/5/2016
PCB-NE065	NE-65	Combined	Specialty Engine Rebuilding	5201 Unruh (5235)	IRO Exterior	Cheryl Smith	Transformer	1				12/5/2016
	NE-77	Combined	Island Import International Inc	4219 Torresdale Avenue	Office Vault	F. Stewart	REMOVED	2				7/7/2016
PCB-NE008	NE-8	Combined	School Dist. OF Phila.	1400 West Olney Avenue	Girls High School	K. Choper	REMOVED	4	Inerteen		493	2/16/2016
PCB-NE084	NE-84	MS4	Wolf Investments	1771 Tomlinson Road	Wall Exterior	John Wolf	Transformer	1				12/2/2016
PCB-SE015	SE-15	Combined	School Dist. OF Phila.	B & Allegeheny (Stetson)	Electrical Room	K. Choper	Transformer	1			208	2/16/2016
IU-00570	SE-201	Combined	Columbia Silk and Dye	1726 N. Howard Street	In Vault	Craig Garton	Transformers	2		35		5/12/2016
IU-02360	SE-203	Combined	Simons Brothers Co.	2438 Sergeant Street	By Front Door	Nelson Kaiser	Capacitor	1				8/12/2015
IU-00300	SE-205	Combined	Ashland	2801 Columbus Blvd.	Main by nitrogen	Eric Weisbrod	Transformer	1		<50	370	6/29/2016
IU-00300	SE-206	Combined	Ashland	2801 Columbus Blvd.	Front Gate	Eric Weisbrod	Transformer	1		<50	300	6/29/2016
IU-00300	SE-207	Combined	Ashland	2801 Columbus Blvd.	Roof of Building. 10	Eric Weisbrod	Transformer	1		<50	238	6/29/2016
IU-01120	SE-208	Combined	Inolex	2101 Swanson Street	Reactor Dock	Dave Olson	Transformers	3		>50		8/16/2016
IU-01120	SE-209	Combined	Inolex	2101 Swanson Street	Waccocoe Street	Dave Olson	Transformer	1		>50		8/16/2016
IU-01120	SE-210	Combined	Inolex	2101 Swanson Street	Railroad/Swanson Street	Dave Olson	Transformer	1				8/16/2016
IU-01120	SE-211	Combined	Inolex	2101 Swanson Street	A Warehouse	Dave Olson	Transformers	3				8/16/2016
	SE-220	MS4	PSNY (NFPC)	4747 S. Broad Street	S. Building 20 (transformer 4, 5, 10, 11)	Christopher Harding	Transformers	4				6/28/2016
	SE-221	MS4	PSNY (NFPC)	4747 S. Broad Street	SW. Building 20 (transformer 6, 7, 8, 9, 12)	Christopher Harding	Transformers	5				6/28/2016
	SE-222	MS4	PNSY (SSES)	4747 S. Broad Street	E. Building 77 (transfromer 16, 17)	Christopher Harding	Transformers	2		<50		6/28/2016
	SE-223	MS4	PNSY (SSES)	4747 S. Broad Street	NW Building 77 (transformer 18)	Christopher Harding	Transformer	1		<2	2110gal	6/28/2016
	SE-224	MS4	PNSY (SSES)	4747 S. Broad Street	NW Building 77 (transformer 19)	Christopher Harding	Transformer	1				6/28/2016
	SE-225	MS4	PNSY (SSES)	4747 S. Broad Street	W. Building 80 (transformer 20,21,22)	Christopher Harding	Transformers	3		<50		6/28/2016
	SE-226	MS4	PNSY (PIDC)	4747 S. Broad Street	N. Building 40 (transformer 13, 55)	Christopher Harding	Transformers	2		<50	166gal	6/28/2016
	SE-227	MS4	PNSY (CNRMA)	4747 S. Broad Street	W. Building 662 (transformer 42, 43)	Christopher Harding	Transformers	2		<50		6/28/2016
	SE-228	MS4	PSNY (SSES)	4747 S. Broad Street	E. Building 87ss (transformer 23, 24)	Christopher Harding	Transformers	2				6/28/2016
	SE-229	MS4	PSNY (CNRMA)	4747 S. Broad Street	N. Building 592 (transformer 28-33)	Christopher Harding	Transformers	6		<50		6/28/2016
	SE-230	MS4	PNSY (NFPC)	4747 S. Broad Street	E. Building 546 (transformer 26, 27)	Christopher Harding	Transformers	2			398 gal	6/28/2016
	SE-231	MS4	PNSY (NFPC)	4747 S. Broad Street	N. Building 1029 (transformer 47)	Christopher Harding	Transformer	1				6/28/2016
	SE-232	MS4	PNSY ((CNRMA)	4747 S. Broad Street	Wharf N. 542 South. (transformer 53)	Christopher Harding	Transformer	1			500 gal	6/28/2016
	SE-233	MS4	PNSY(CNRMA)	4747 S. Broad Street	Wharf N. 120 South (transformer 50)	Christopher Harding	Transformer	1			500 gal	6/28/2016
	SE-234	MS4	PNSY (CNRMA)	4747 S. Broad Street	Wharf N. 603 South (transformer 52)	Christopher Harding	Transformer	1			500 gal	6/28/2016
	SE-235	MS4	PNSY (CNRMA)	4747 S. Broad Street	Pier D (48)	Christopher Harding	Transformer	1			403 gal	6/28/2016
	SE-236	MS4	PNSY (PIDC)	4747 S. Broad Street	N. Building 605ss (transformer 35, 36, 37)	Christopher Harding	Transformers	3				6/28/2016
	SE-237	MS4	PNSY	4747 S. Broad Street	Building 694	Christopher Harding	Transformer	1				6/28/2016
	SE-238	MS4	PNSY	4747 S. Broad Street	Building 763	Christopher Harding	Transformer	1				6/28/2016

Industry No.	Loc ID	Drainage Area Type	Name	Address	Location	Contact	Equipment	Number	Aroclor	Concentration	Gallons	Inspection Date
	SE-239	MS4	PNSY	4747 S. Broad Street	Building 613	Christopher Harding	Transformers	4				6/28/2016
	SE-6	Combined	Southwark Plaza (PHA)	1024 S. 4th. Street	Pole Mounted	Dan Quimby	Transformer	1				12/15/2016
	SW-112	Combined	Shoprite Store	2301 Oregon Avenue	Basement Mechanical Room	Al Hedgepech	Capacitors	4			1.5	12/20/2016
PCB-SW127	SW-127	Combined	School Dist. OF Phila.	17th & Spring Garden (Masterman)	Basement	K. Choper	Transformers	4			88.5	2/17/2016
	SW-128	Combined	School Dist. OF Phila.	22nd & Lehigh (Dobbins)	Basement	K. Choper	Transformers	7				2/17/2016
IU-02460	SW-158	MS4	Sun Chemical	3301 Hunting Park Avenue	Building 1 Boiler Room	Lee Ochal	Capacitors	4	Interteen		1.7gal	11/4/2016
PCB-SW002	SW-2	Combined	School Dist. OF Phila.	1400 Green Street	Benjamin Franklin High School	K. Choper	REMOVED	2				2/17/2016
IU-00531	SW-202	Combined	Cintas	4700 Jefferson Street	By loading dock	Brian Kern	Transformer	1				9/8/2016
IU-01400	SW-203	MS4	Sky Chefs	8401 Escort Avenue	In front of Admin. Building.	Peter Klablunde	Transformer	1				8/10/2016
IU-02440	SW-204	Township	Starlite Industries, Inc.	1111 Lancaster Avenue	1st Floor Tranformer Room	Jay Rosenbluth	Transformer			>50		12/16/2016
IU-01520	SW-207	Township	Johnson & Johnson Consumer Inc. formerly McNeill	7050 Camp Hill Road	Outside CDC	Kristen Egan	Transformer	1		nd	221	10/5/2016
IU-01520	SW-208	Township	Johnson & Johnson Consumer Inc. formerly McNeill	7050 Camp Hill Road	WWTP	Kristen Egan	Transformer	1		nd	135	10/5/2016
	SW-21	Township	Goebelwood Ind. Inc,	100 Sycamore Avenue	Shed on Side of Building	Dominic Pino	Transformers	3				11/30/2016
IU-00305	SW-214	Township	Astra Foods	6430 Market Street	South Building T4	Demitri Poulmentous	Transformer	1				7/27/2016
IU-00305	SW-215	Township	Astra Foods	6430 Market Street	East Building T5	Demitri Poulmentous	Transformer	1				7/27/2016
IU-00305	SW-216	Township	Astra Foods	6430 Market Street	Centrifudge Building West of T4	Demitri Poulmentous	Transformer	1				7/27/2016
U-01210	SW-223	MS4	Paperworks	5000 Flat Rock Road	T2 Pulper Loft	Gary Warren	Transformer	1	Pyranol	14ppm	940	9/7/2016
U-01210	SW-224	MS4	Paperworks	5000 Flat Rock Road	T3 Building 120	Gary Warren	Transformer	1			390	9/7/2016
U-01210	SW-225	MS4	Paperworks	5000 Flat Rock Road	T6 Building 132	Gary Warren	Transformer	1			289	9/7/2016
U-01210	SW-226	MS4	Paperworks	5000 Flat Rock Road	T10 Building 119 Roof	Gary Warren	Transformer	1			635	9/7/2016
U-01210	SW-227	MS4	Paperworks	5000 Flat Rock Road	T11 Building 15	Gary Warren	Transformer	1			359	9/7/2016
U-01210	SW-228	MS4	Paperworks	5000 Flat Rock Road	Building 118 Roof	Gary Warren	Transformers	3				9/7/2016
U-01210	SW-229	MS4	Paperworks	5000 Flat Rock Road	Building 115	Gary Warren	Capacitors	56			56	9/7/2016
PCB-SW023	SW-23	MS4	PWD	7000 Penrose Avenue	Mingo Creek Pumping Station	Tom Whitfield	Capacitors	2	Inerteen		1.35 gal. X 2	12/22/2016
IU-00308	SW-230	MS4	Atlantic City Linens	7831 Bartram Ave.	N. Side of Building.	Michael Grieco	Transformer	1				11/2/2016
PCB-SW049	SW-49	Combined	School Dist. OF Phila.	22nd & Susquehanna	Basement NE Anna Pratt	K. Choper	Transformers	2				2/17/2016
PCB-SW005	SW-5	MS4	School Dist. OF Phila.	6450 Ridge Avenue	Roxborough High School	K. Choper	REMOVED	8				2/17/2016
PCB-SW053	SW-53	Combined	School Dist. OF Phila.	58th & Walnut (Sayre)	SUB Basement SW	K. Choper	Transformers	6	1260	<10ppm	140	2/17/2016
PCB-SW054	SW-54	Combined	School Dist. OF Phila.	67th & Elmwood	Boiler Room	K. Choper	Transformers	2	1260			2/17/2016
PCB-SW064	SW-64	MS4	SPC Corp.	26th & Penrose	Building Exterior	Otto	Transformer	1		<50	1808	11/30/2016
PCB-SW064	SW-65	MS4	SPC Corp.	26th & Penrose	Building SW Room	Otto	Transformer	1			240	11/30/2016
PCB-SW082	SW-82	Combined	School Dist. OF Phila.	32nd & Susquehanna (Strawberry Mansion)	Basement	K. Choper	REMOVED	2	Chlorextol		255	2/17/2016

Sewershed	Number of Inspections
Northeast	50
Southeast	31
Southwest	30
Total	111
Removed devices	7

Figure B1



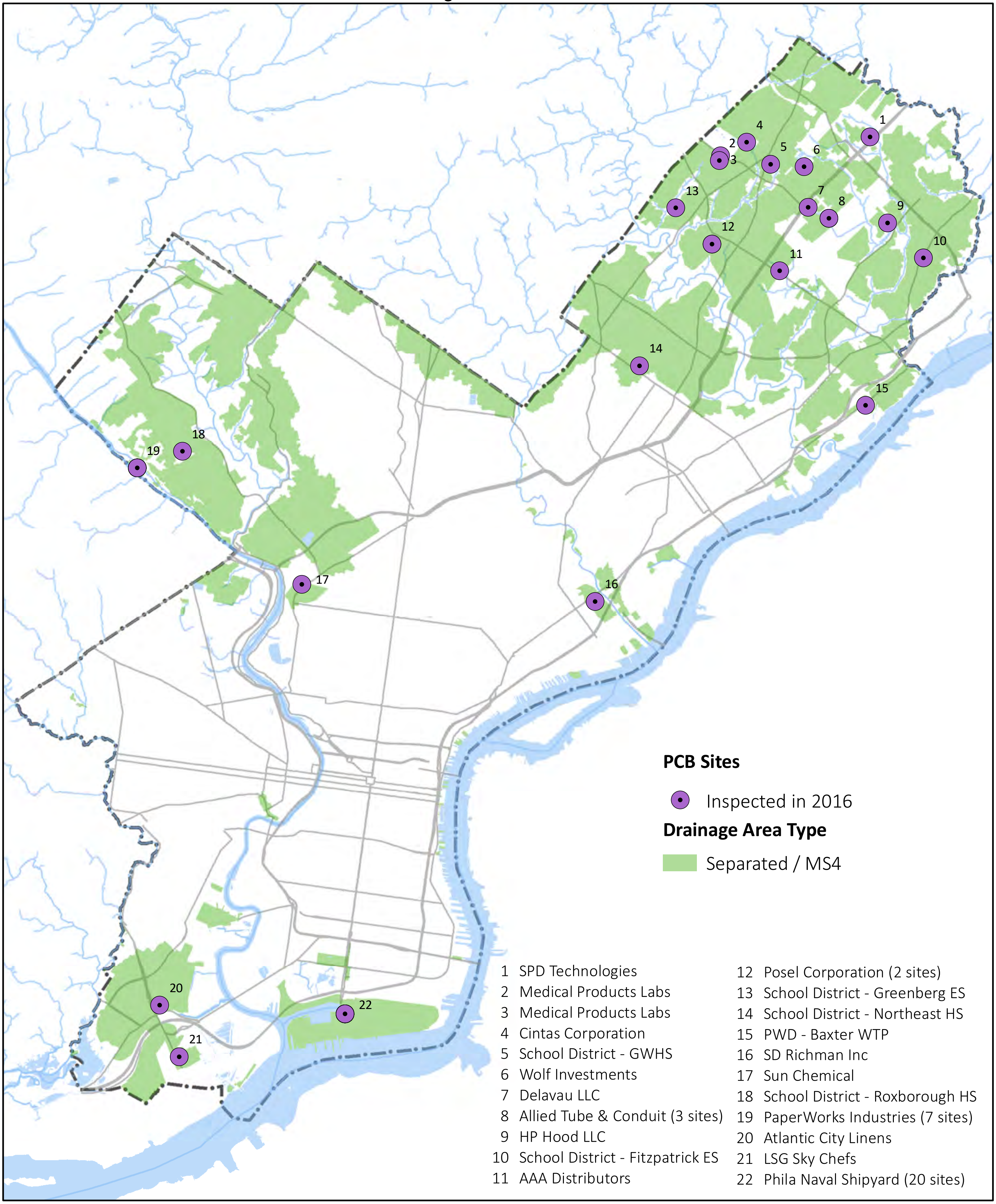
PCB Sites Inspected in 2016

By Wastewater Treatment Area

PHILADELPHIA, PA

Source: Philadelphia Water Department, 2017.
Created By: PWD GIS Unit, Feb 27, 2017.

Figure B2



PCB Sites Inspected in 2016

In MS4 Areas

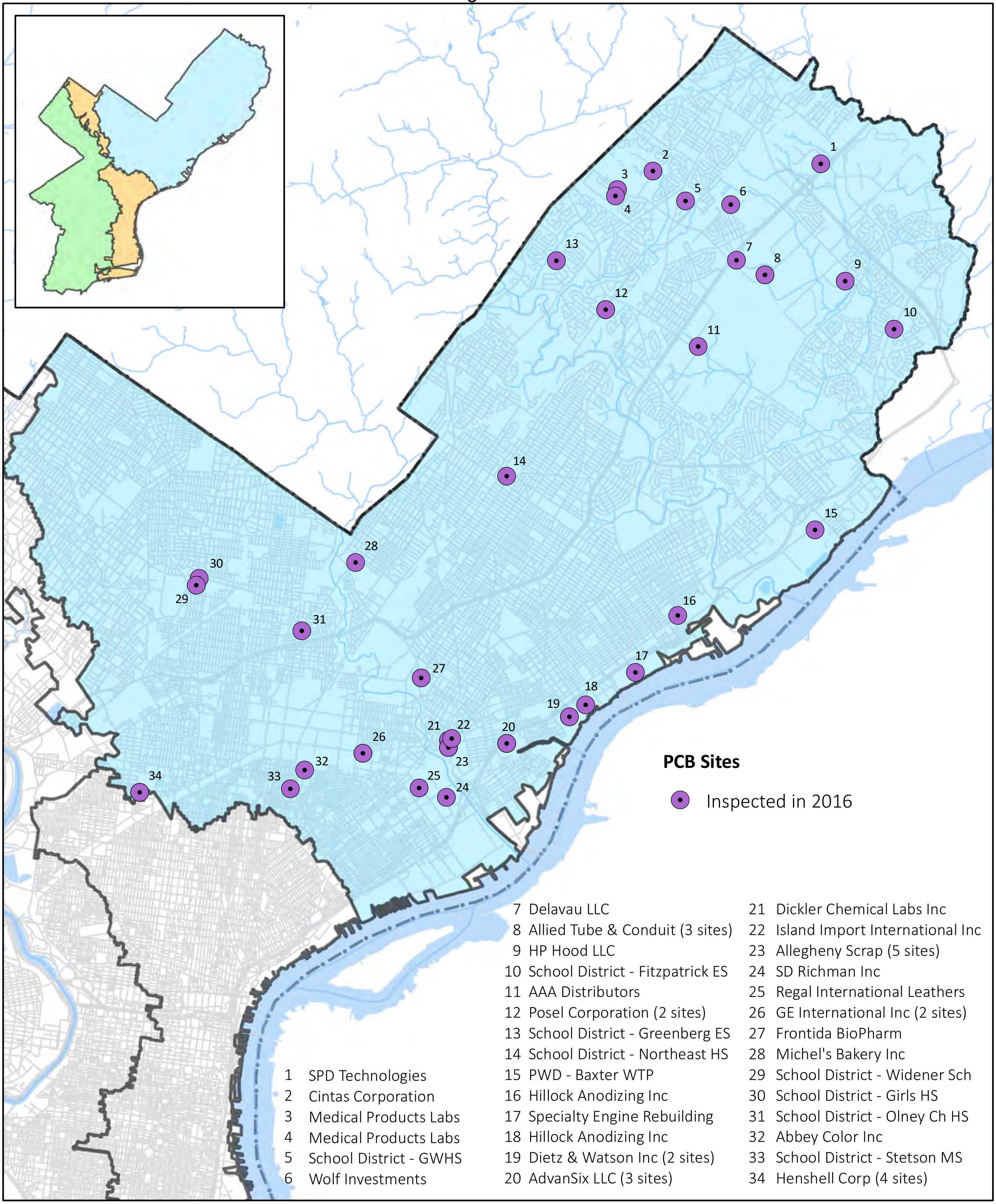
PHILADELPHIA, PA

0 0.75 1.5 3 4.5 6 Miles

N

Source: Philadelphia Water Department, 2017.
Created By: PWD GIS Unit, Feb 27, 2017.

Figure B3



PCB Sites Inspected in 2016

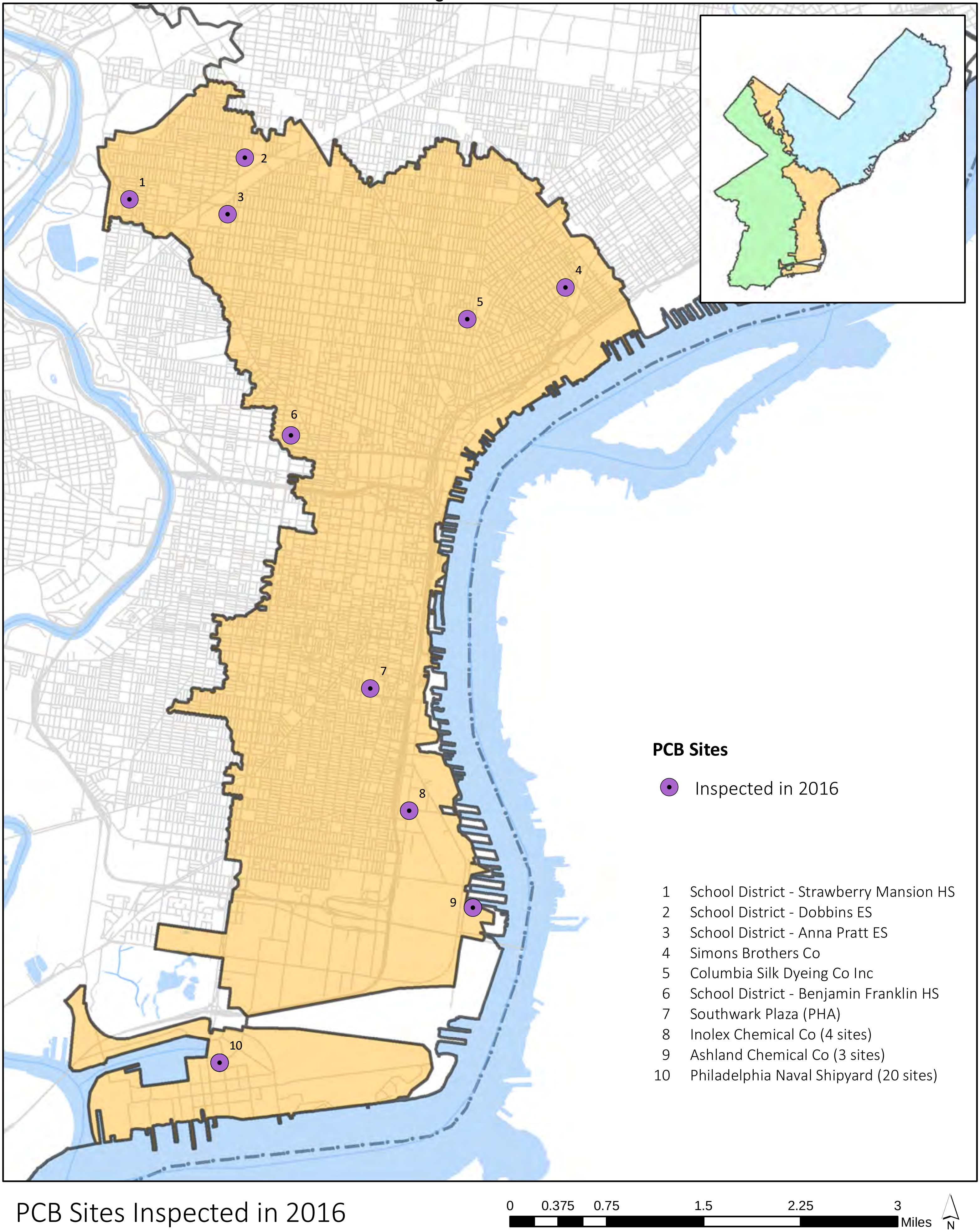
Northeast Treatment Area
PHILADELPHIA, PA

0 0.5 1 2 3 4 Miles

N

Source: Philadelphia Water Department, 2017.
Created By: PWD GIS Unit, Feb 27, 2017.

Figure B4



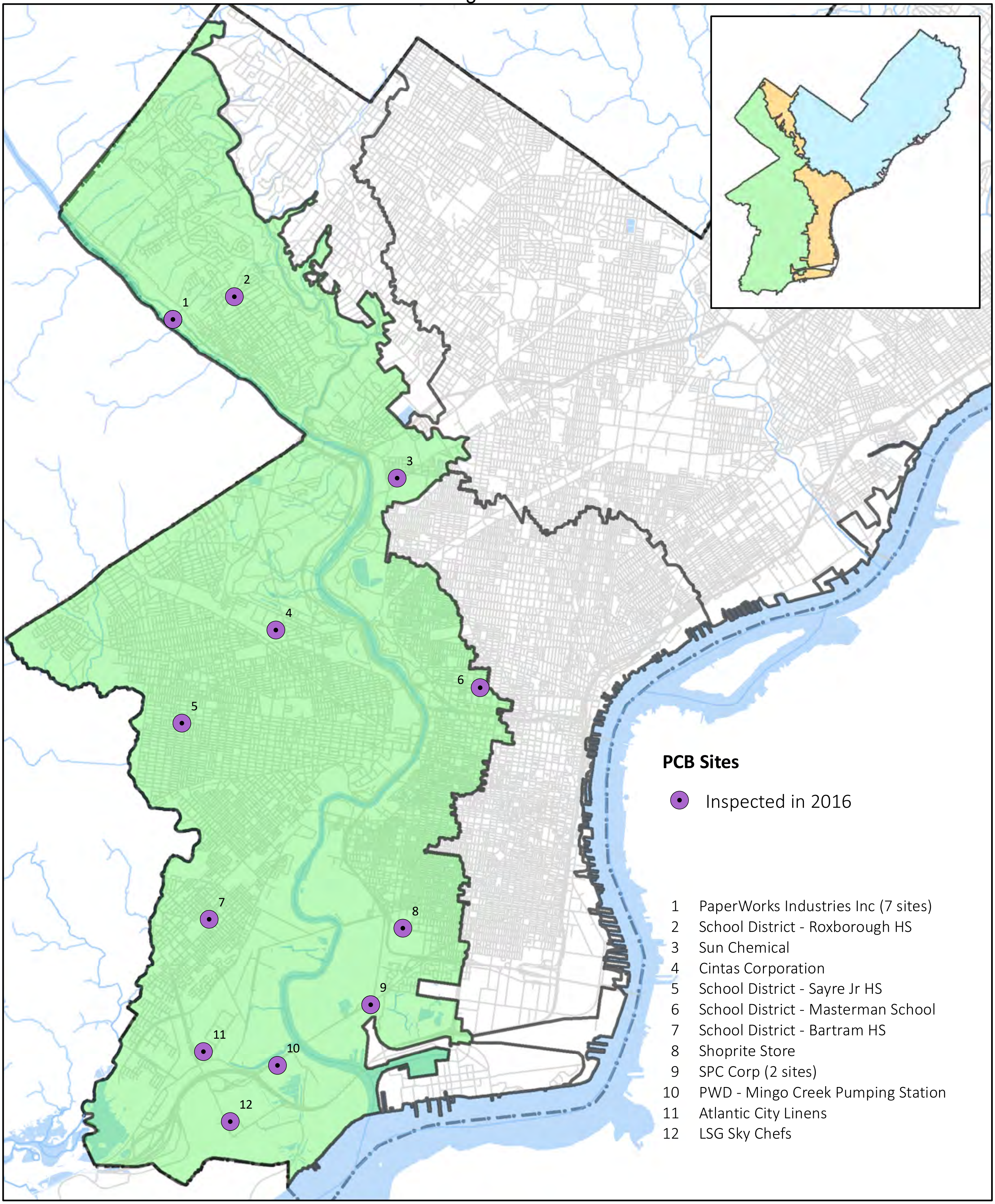
PCB Sites Inspected in 2016

Southeast Treatment Area

PHILADELPHIA, PA

Source: Philadelphia Water Department, 2017.
Created By: PWD GIS Unit, Feb 27, 2017.

Figure B5



PCB Sites Inspected in 2016

Southwest Treatment Area

PHILADELPHIA, PA

0 0.5 1 2 3 4 Miles

N

Source: Philadelphia Water Department, 2017.
Created By: PWD GIS Unit, Feb 27, 2017.

Attachment C

Township Connection PCB Summary

Table C1: 2016 Township Connection PCB Summary

Township Location ID	Sample Date	Parameter	"< >"	Data Value	Units	Sample Type
Grant	7/14/2016	Chlorobiphenyls Total		1.3	µg/L	24 Hr Comp
Grant	7/14/2016	Monochlorobiphenyls		1.2	µg/L	24 Hr Comp
Grant	7/14/2016	Decachlorobiphenyls	<	0.5	µg/L	24 Hr Comp
Grant	7/14/2016	Nonachlorobiphenyls	<	0.5	µg/L	24 Hr Comp
Grant	7/14/2016	Heptachlorobiphenyls	<	0.3	µg/L	24 Hr Comp
Grant	7/14/2016	Octachlorobiphenyls	<	0.3	µg/L	24 Hr Comp
Grant	7/14/2016	Hexachlorobiphenyls	<	0.2	µg/L	24 Hr Comp
Grant	7/14/2016	Pentachlorobiphenyls	<	0.2	µg/L	24 Hr Comp
Grant	7/14/2016	Tetrachlorobiphenyls	<	0.2	µg/L	24 Hr Comp
Grant	7/14/2016	Dichlorobiphenyls	<	0.1	µg/L	24 Hr Comp
Grant	7/14/2016	Trichlorobiphenyls	<	0.1	µg/L	24 Hr Comp
Totem Road	7/15/2016	Decachlorobiphenyls	<	0.5	µg/L	24 Hr Comp
Totem Road	7/15/2016	Nonachlorobiphenyls	<	0.5	µg/L	24 Hr Comp
Totem Road	7/15/2016	Heptachlorobiphenyls	<	0.3	µg/L	24 Hr Comp
Totem Road	7/15/2016	Octachlorobiphenyls	<	0.3	µg/L	24 Hr Comp
Totem Road	7/15/2016	Hexachlorobiphenyls	<	0.2	µg/L	24 Hr Comp
Totem Road	7/15/2016	Pentachlorobiphenyls	<	0.2	µg/L	24 Hr Comp
Totem Road	7/15/2016	Tetrachlorobiphenyls	<	0.2	µg/L	24 Hr Comp
Totem Road	7/15/2016	Chlorobiphenyls Total	<	0.1	µg/L	24 Hr Comp
Totem Road	7/15/2016	Dichlorobiphenyls	<	0.1	µg/L	24 Hr Comp
Totem Road	7/15/2016	Monochlorobiphenyls	<	0.1	µg/L	24 Hr Comp
Totem Road	7/15/2016	Trichlorobiphenyls	<	0.1	µg/L	24 Hr Comp
Trevose	9/21/2016	Decachlorobiphenyls	<	0.47	µg/L	24 Hr Comp
Trevose	9/21/2016	Nonachlorobiphenyls	<	0.47	µg/L	24 Hr Comp
Trevose	9/21/2016	Heptachlorobiphenyls	<	0.28	µg/L	24 Hr Comp
Trevose	9/21/2016	Octachlorobiphenyls	<	0.28	µg/L	24 Hr Comp
Trevose	9/21/2016	Hexachlorobiphenyls	<	0.19	µg/L	24 Hr Comp
Trevose	9/21/2016	Pentachlorobiphenyls	<	0.19	µg/L	24 Hr Comp
Trevose	9/21/2016	Tetrachlorobiphenyls	<	0.19	µg/L	24 Hr Comp
Trevose	9/21/2016	Chlorobiphenyls Total	<	0.094	µg/L	24 Hr Comp
Trevose	9/21/2016	Dichlorobiphenyls	<	0.094	µg/L	24 Hr Comp
Trevose	9/21/2016	Monochlorobiphenyls	<	0.094	µg/L	24 Hr Comp
Trevose	9/21/2016	Trichlorobiphenyls	<	0.094	µg/L	24 Hr Comp
Grant	10/21/2016	Decachlorobiphenyls	<	0.48	µg/L	24 Hr Comp
Grant	10/21/2016	Nonachlorobiphenyls	<	0.48	µg/L	24 Hr Comp
Grant	10/21/2016	Heptachlorobiphenyls	<	0.29	µg/L	24 Hr Comp
Grant	10/21/2016	Octachlorobiphenyls	<	0.29	µg/L	24 Hr Comp
Grant	10/21/2016	Hexachlorobiphenyls	<	0.19	µg/L	24 Hr Comp
Grant	10/21/2016	Pentachlorobiphenyls	<	0.19	µg/L	24 Hr Comp
Grant	10/21/2016	Tetrachlorobiphenyls	<	0.19	µg/L	24 Hr Comp
Grant	10/21/2016	Chlorobiphenyls Total	<	0.096	µg/L	24 Hr Comp
Grant	10/21/2016	Dichlorobiphenyls	<	0.096	µg/L	24 Hr Comp
Grant	10/21/2016	Monochlorobiphenyls	<	0.096	µg/L	24 Hr Comp
Grant	10/21/2016	Trichlorobiphenyls	<	0.096	µg/L	24 Hr Comp

Appendix F – Monitoring Locations

APPENDIX F –
MONITORING LOCATIONS

Page

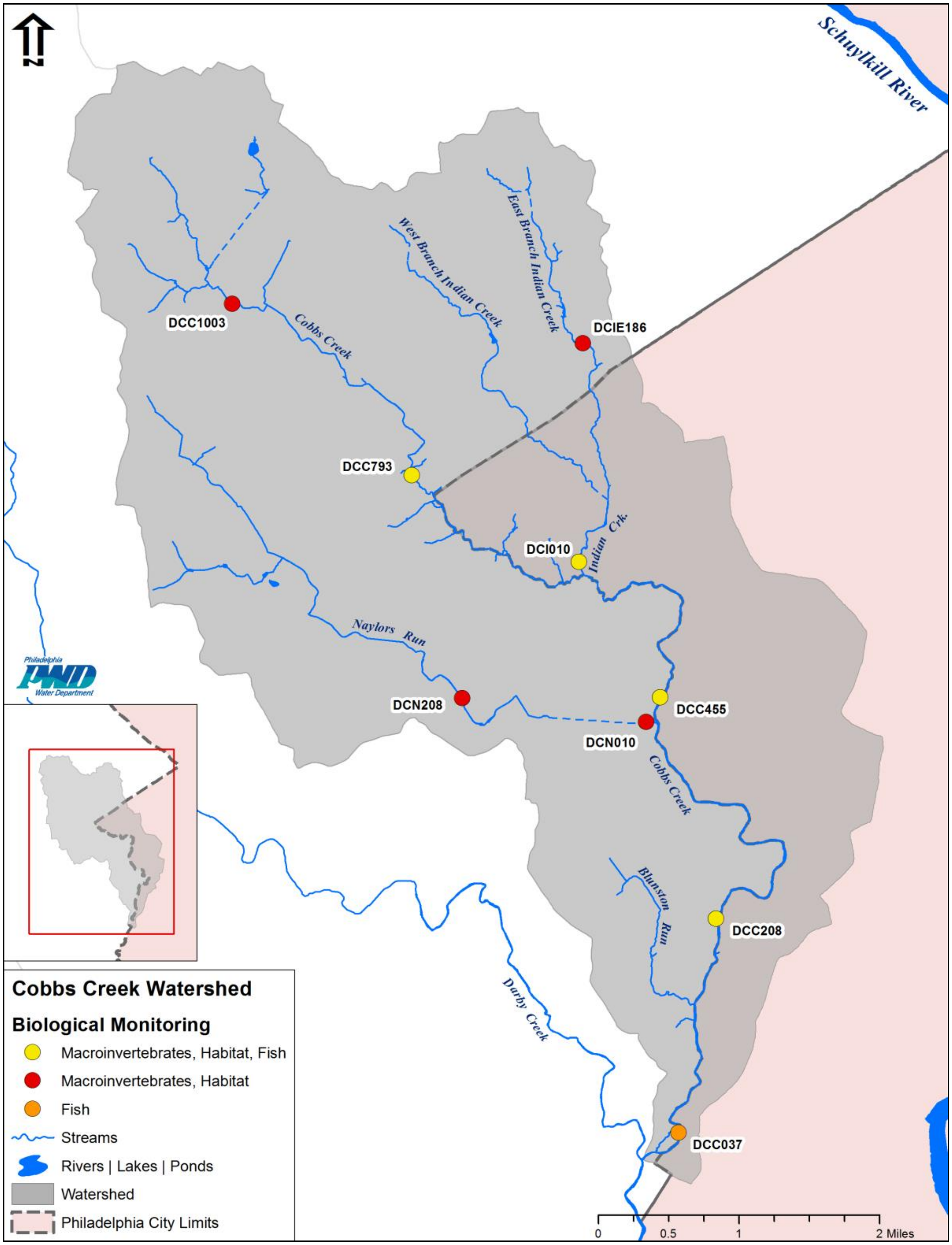


Figure - 1 Biological and Physical assessment locations in Cobbs Creek Watershed

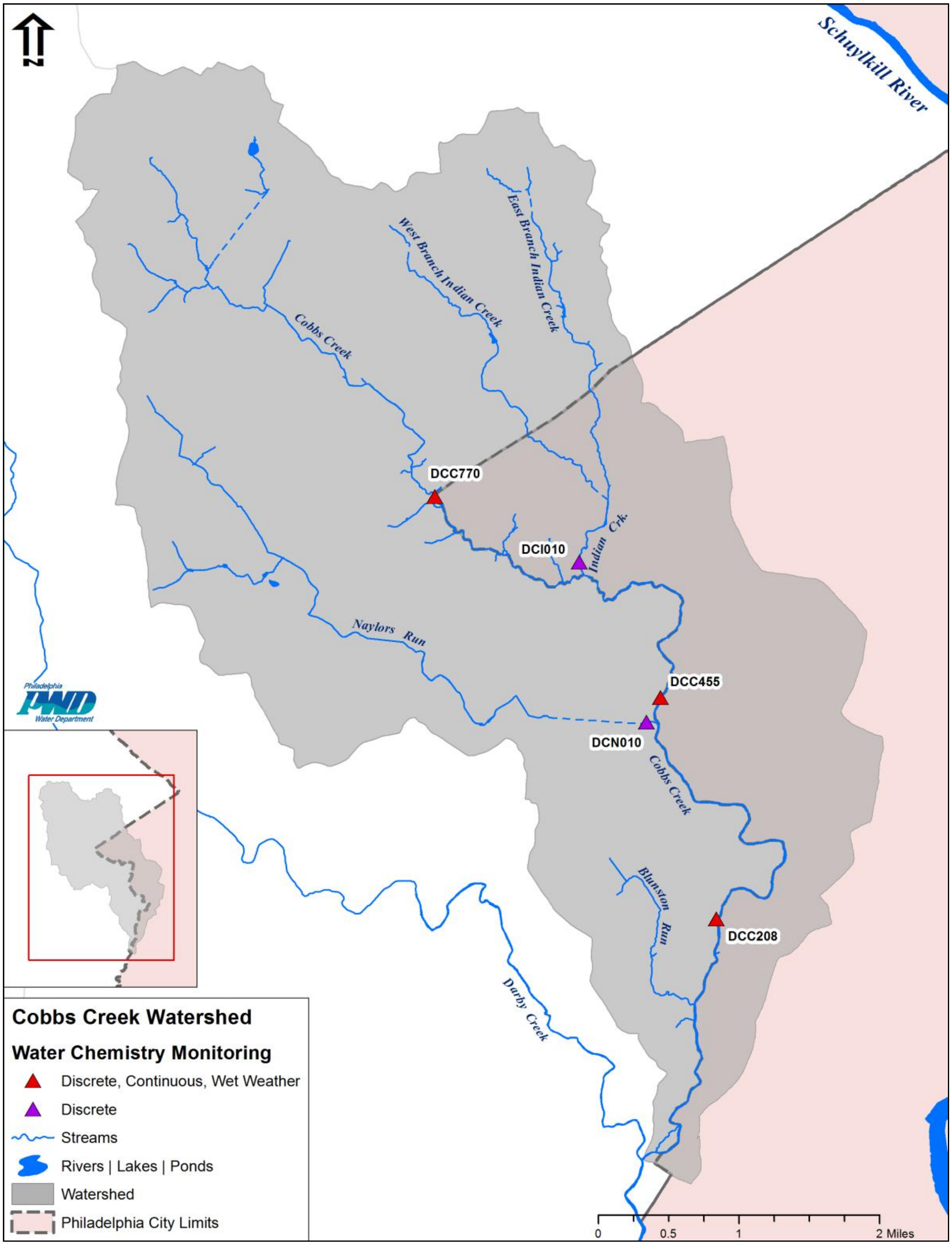


Figure - 2 Chemical monitoring locations in Cobbs Creek Watershed

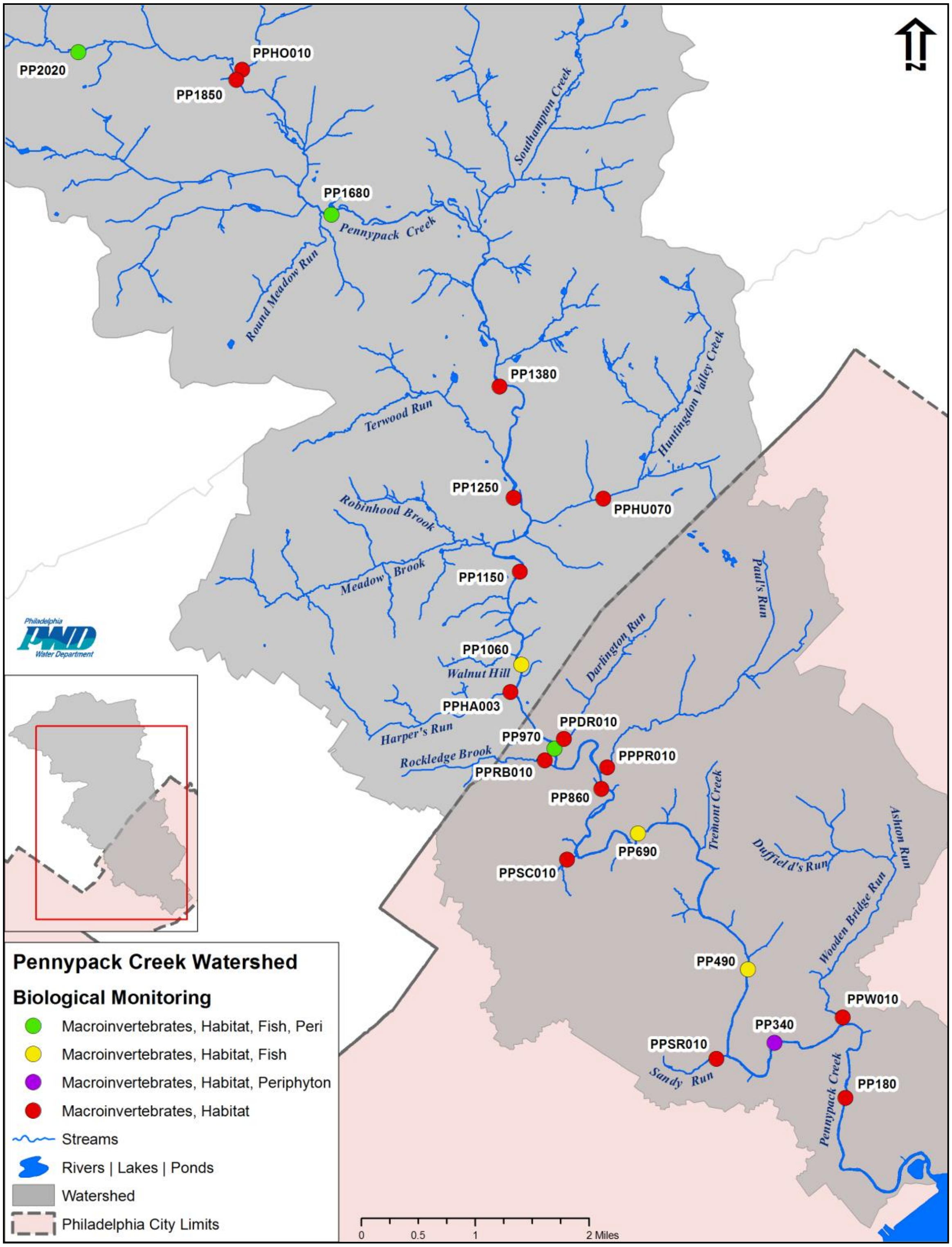


Figure - 3 Biological and Physical assessment locations in Pennypack Watershed

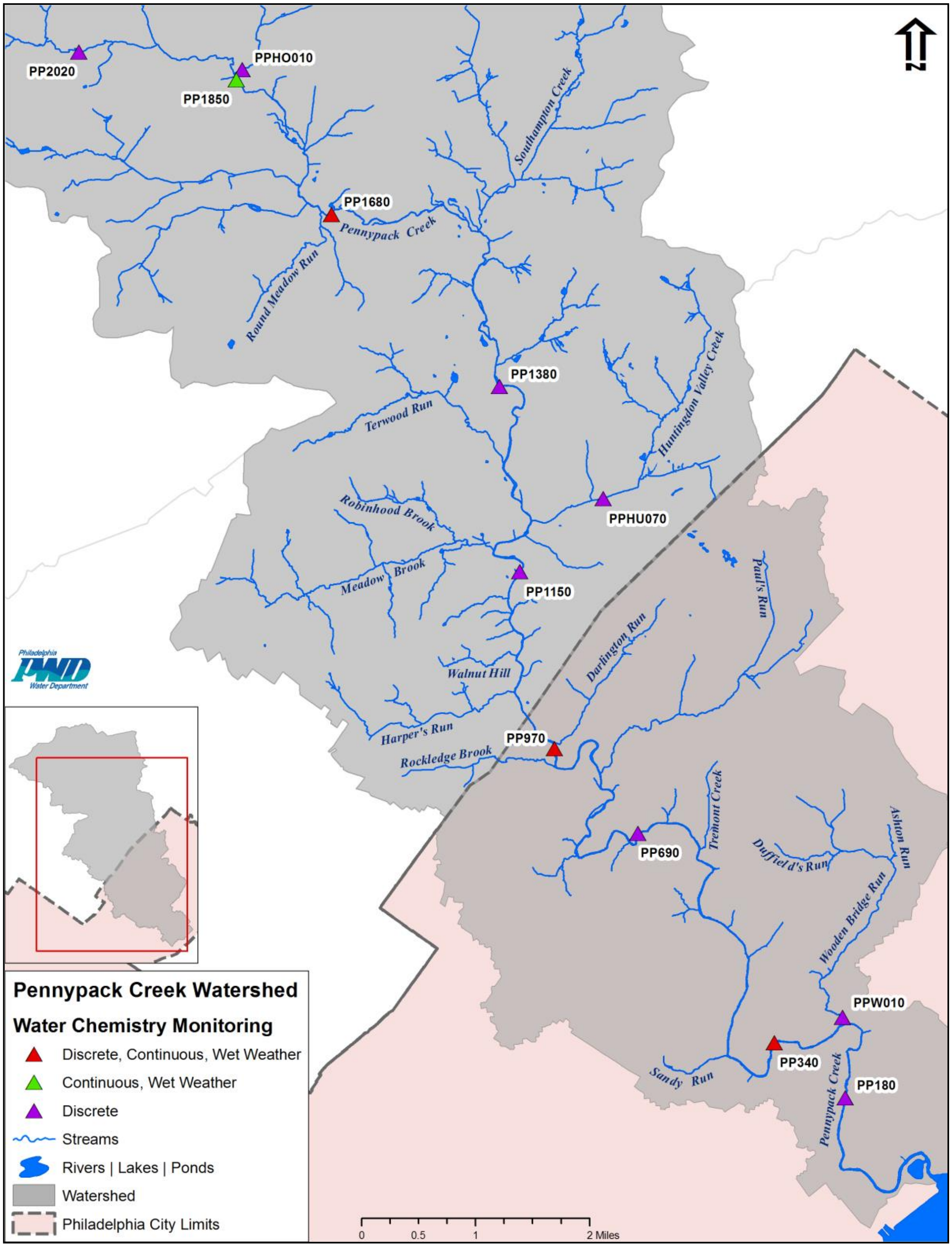


Figure - 4 Chemical monitoring locations in Pennypack Watershed

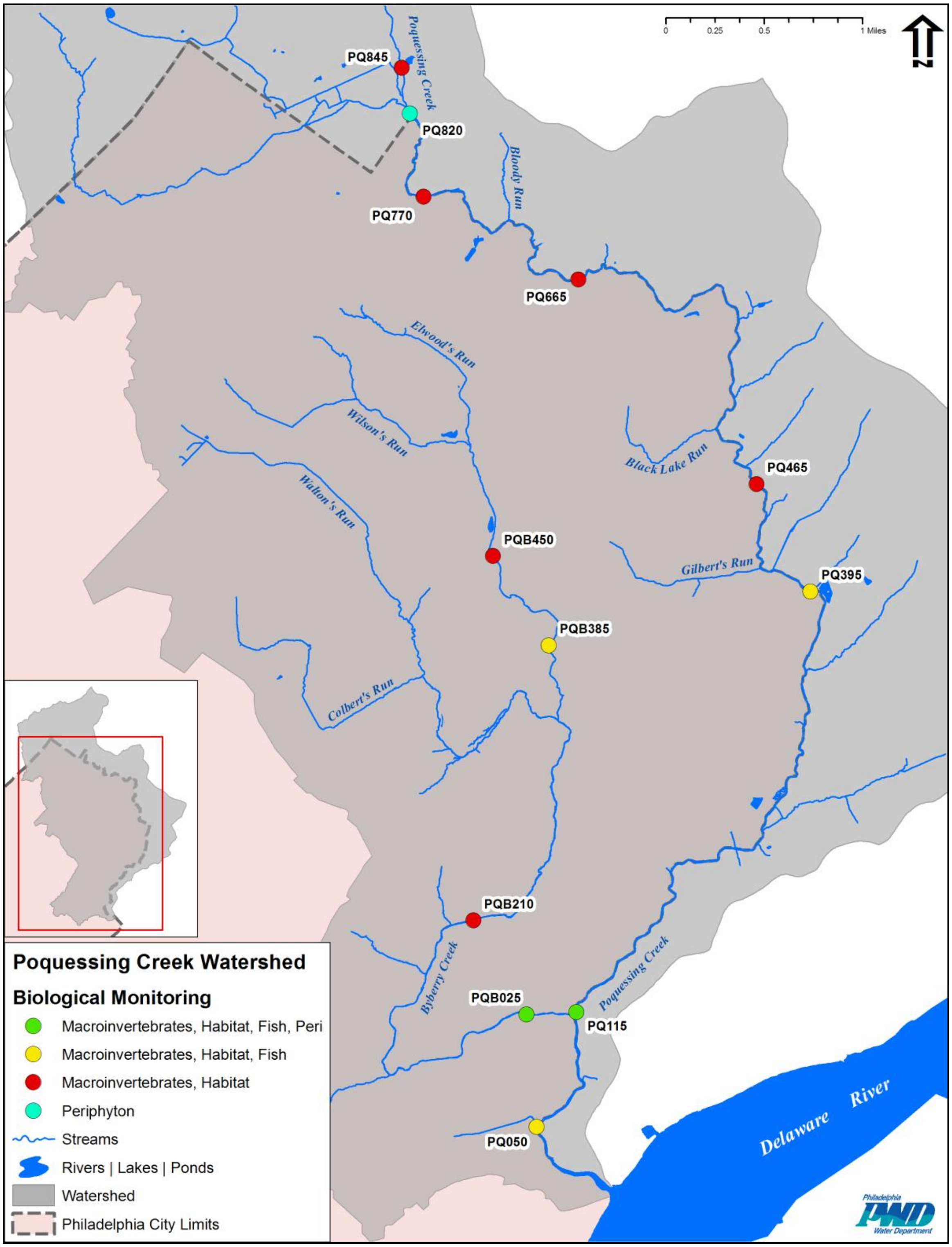


Figure - 5 Biological and Physical assessment locations in Poquessing-Byberry Watershed

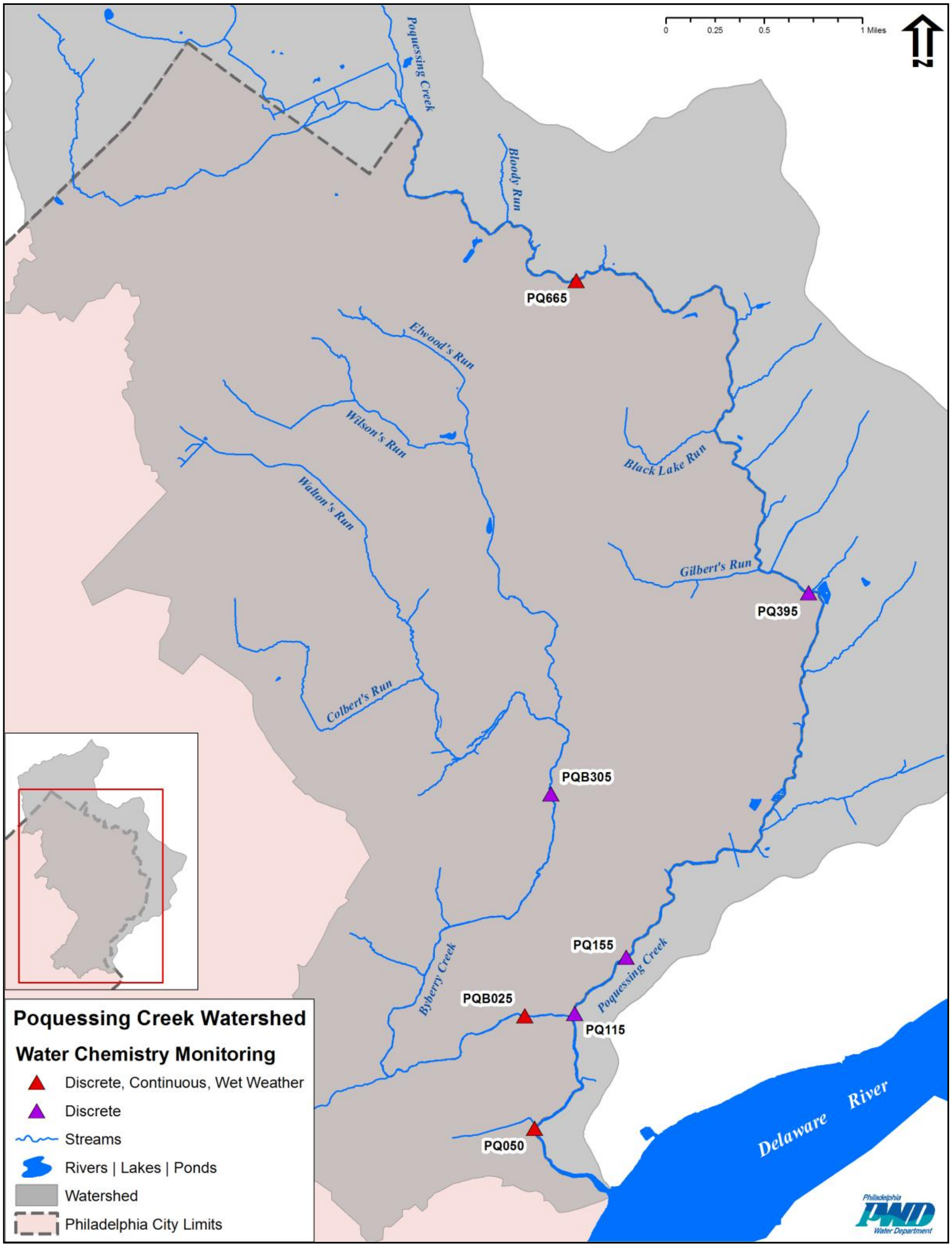


Figure - 6 Chemical monitoring locations in Poquessing-Byberry Watershed

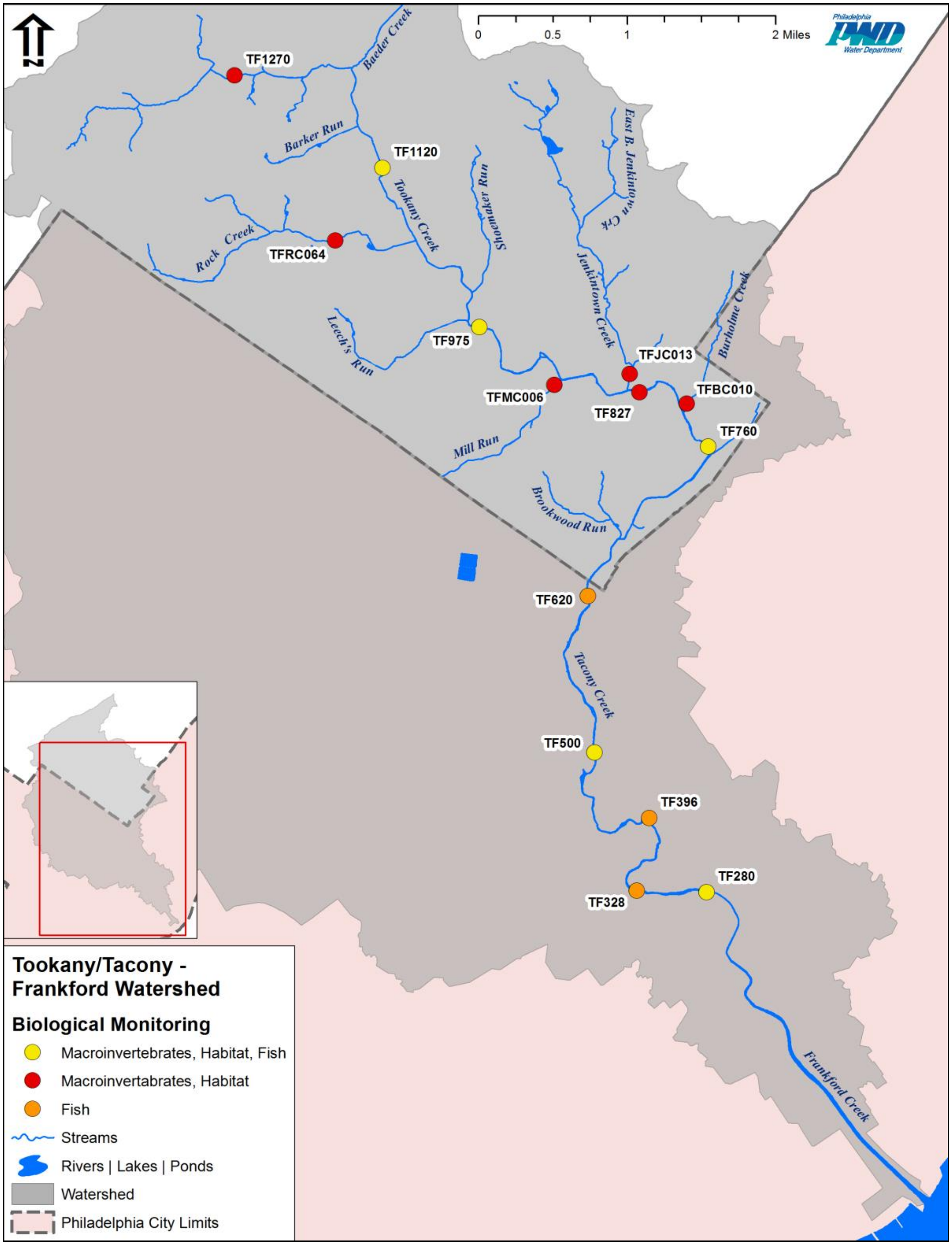


Figure - 7 Biological and Physical assessment locations in Tacony-Frankford Watershed

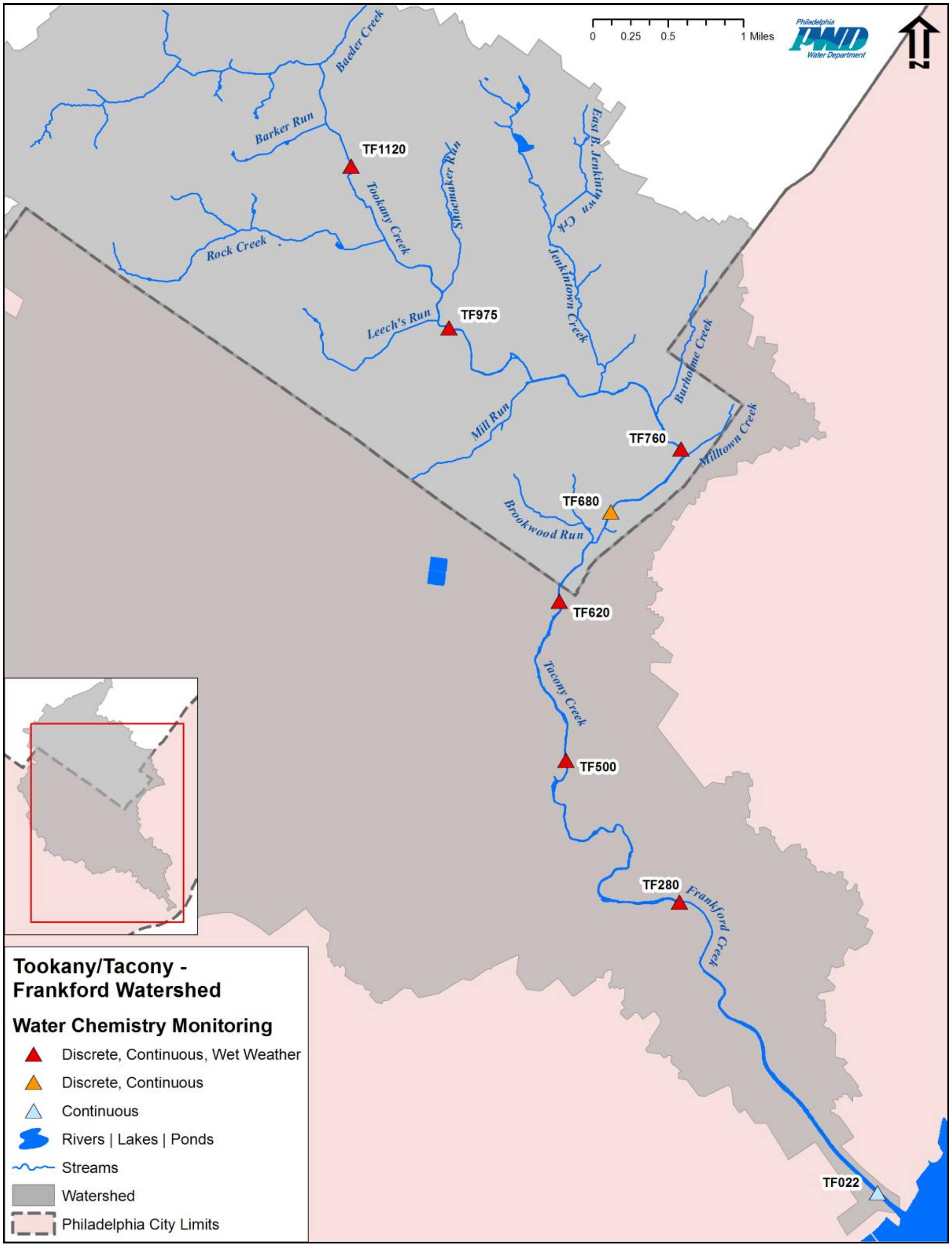


Figure - 8 Chemical monitoring locations in Tacony-Frankford Watershed

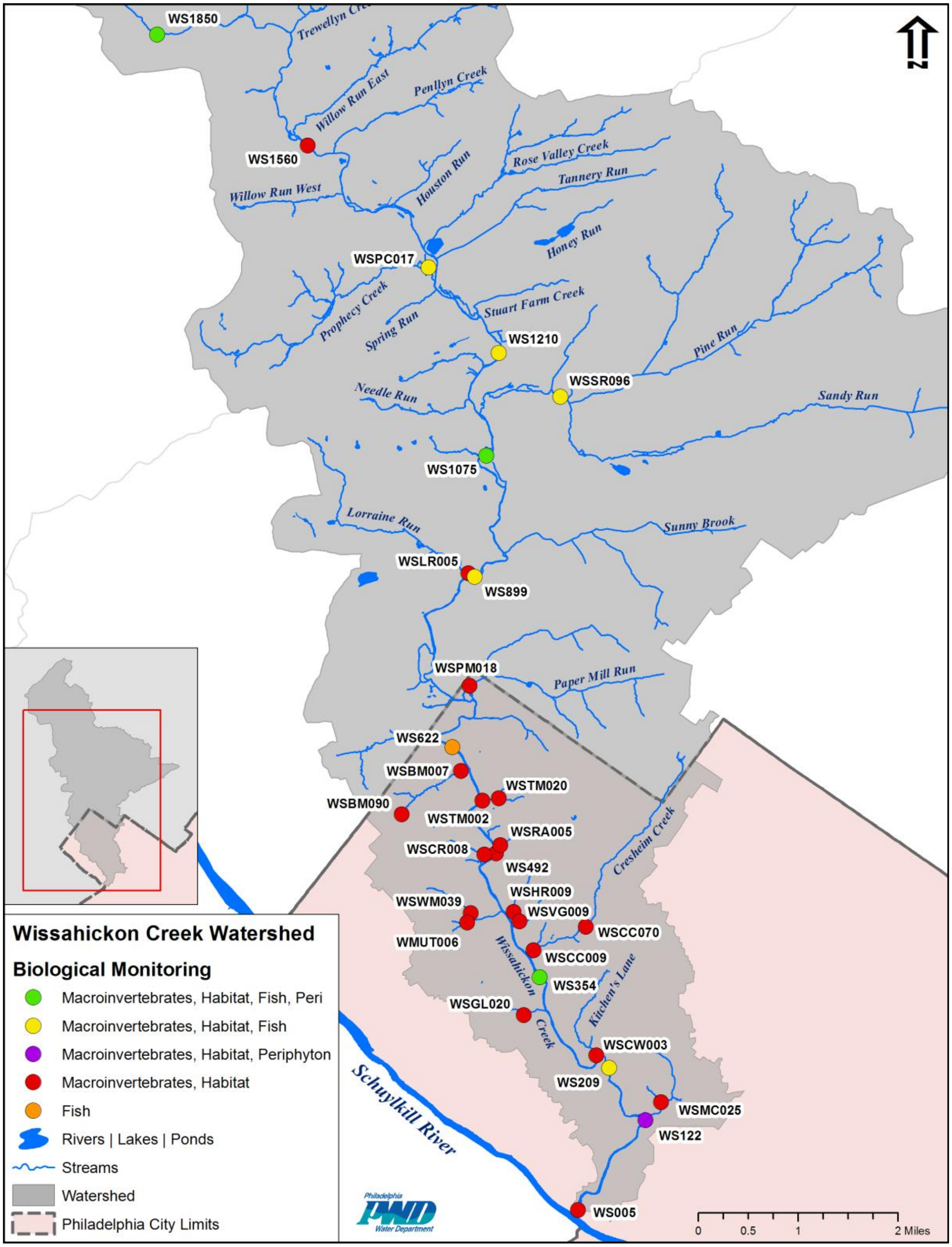


Figure - 9 Biological and Physical assessment locations in Wissahickon Watershed

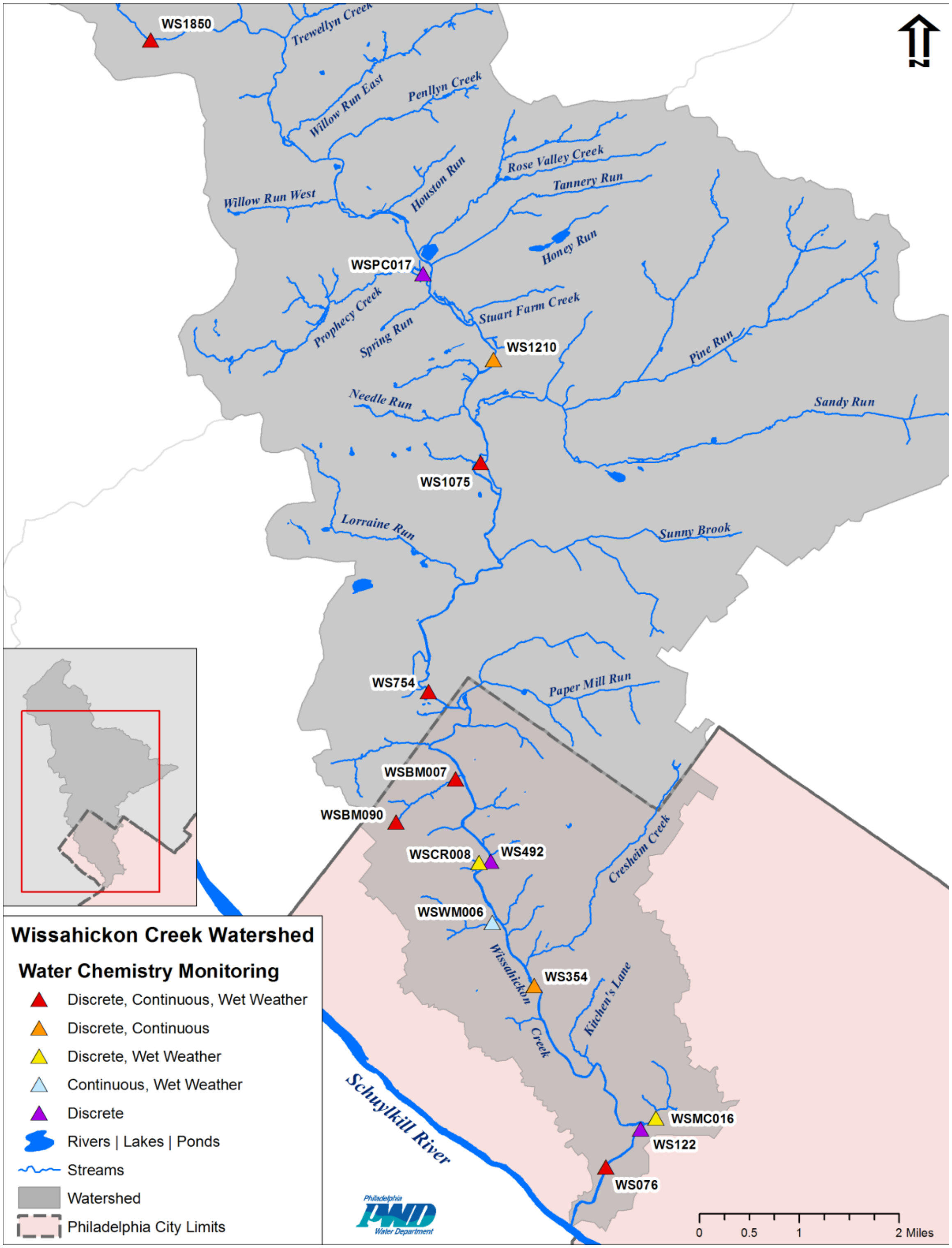


Figure - 10 Chemical monitoring locations in Wissahickon Watershed

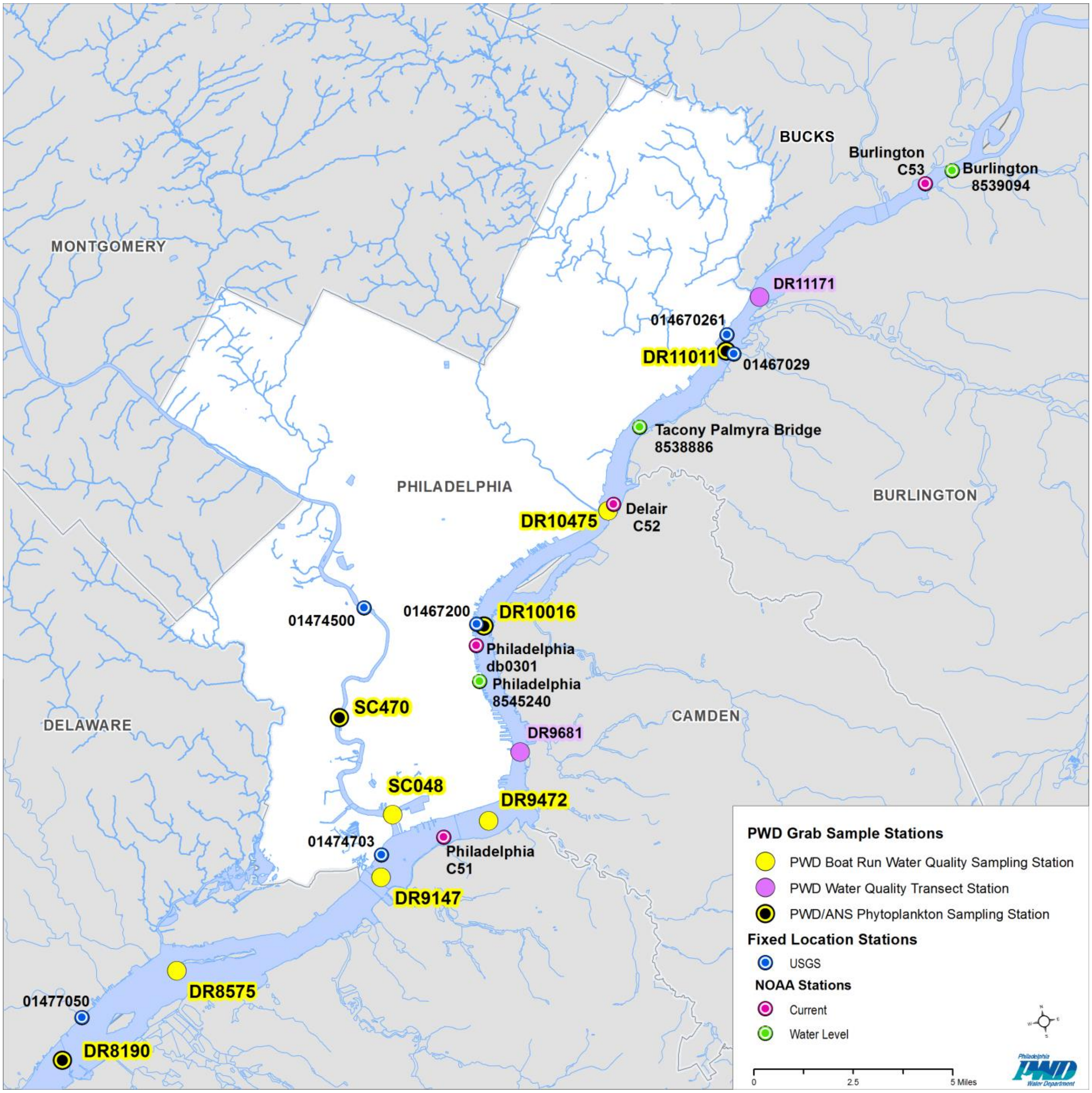


Figure - 11 Chemical monitoring locations in Delaware Estuary and Lower Schuylkill River Watershed

Appendix G – PWD Quarterly Dry Weather Water Quality Monitoring Program

Background

In 2009, the Philadelphia Water Department (PWD) initiated a dry weather water quality sampling program designed to work in tandem with the continuous data collection efforts of the PWD/USGS Cooperative Continuous Water Quality Monitoring Program. Grab samples are collected from 10 sites covering all six of Philadelphia County's watersheds on a quarterly basis by the staff of PWD's Bureau of Laboratory Services (BLS). Data collected through this program are most pertinent to Target A (Dry Weather Water Quality & Aesthetics) of PWD's Integrated Watershed Management Plan (IWMP) Strategy, as outlined in the following section.

The IWMP Target Strategy

IWMPs are designed to meet the goals and objectives of numerous water resources-related regulations and programs. Each IWMP results in a series of implementation recommendations that utilize adaptive management approaches to achieve measurable, watershed-wide benefits. By working with stakeholder groups to prioritize goals and evaluate options, PWD has learned that stakeholder priorities can at times differ from those identified by the data-driven problem identification process. This can present challenges in development and approval of a management alternative for watershed implementation. PWD has developed an approach that addresses what often emerges as a set of high-priority stakeholder concerns while simultaneously addressing the scientifically defined priorities.

By defining three distinct targets to meet the overall plan objectives, priorities identified by stakeholders can be addressed simultaneously with those identified through scientific data. Two of the targets were defined so they could be fully met through implementation of a limited set of options, while the third target would be best addressed through an adaptive management approach. In addition to the three targets, a fourth category has been developed to capture the more programmatic implementation options related to planning, outreach, reporting and continuation of the Watershed Partnership.

Targets are defined here as groups of objectives that each focus on a different problem related to the urban stream system. They can be thought of as different parts of the ultimate goal of fishable and swimmable waters through improved water quality, more natural flow patterns and restored aquatic and riparian habitat. Targets are specifically designed to help focus plan implementation. By defining these targets, and designing alternatives and an implementation plan to address the targets simultaneously, the plan will have a greater likelihood of success. It also achieves some of the objectives within a relatively short time frame, providing incentives to the communities and agencies involved in the restoration, as well as immediate benefits to the people living in the watershed. PWD's IWMP planning targets are defined below:

3 Targets of the IWMP

- Aesthetically appealing, accessible streams during dry weather
- Improved stream habitat for fish and macroinvertebrates
- Wet weather water quality that meets fishable and swimmable criteria

Program Support

A number of implementation options deemed appropriate for a given watershed are "programmatic" in nature. While these options may support achievement of Targets A, B, and/or C, implementation of these options alone would not result in achievement of a particular target. These "Program Support" associated options include items such as monitoring, reporting, feasibility studies, outreach/education, and continuation of the Watershed Partnership.

Target A: Dry Weather Water Quality and Aesthetics

Streams should be aesthetically appealing (look and smell good), accessible to the public, and an amenity to the community. Target A was defined with a focus on eliminating sources of sewage discharge and other pollution during dry weather, along with trash removal and litter prevention. Access and interaction with the stream during dry weather has the highest priority, because dry weather flows occur about 60-65% of the time during the course of a year. These are also the times when the public is most likely to be near or in contact with the stream. In dry weather, stream water quality should be similar to background concentrations in groundwater, particularly with respect to bacteria.

Figure 1. Eroded stream bank at Poquessing Creek

Target B: Healthy Living Resources

Improvements to the number, health, and diversity of benthic macroinvertebrate and fish species need to focus on habitat improvement and the creation of refuges for organisms to avoid high velocities during storms. Fluvial geomorphological studies, wetland and streambank restoration/creation projects, and stream modeling should be combined with continued biological monitoring to ensure that correct procedures are implemented to increase habitat heterogeneity within the aquatic ecosystem.

Improving the ability of an urban stream to support viable habitat and fish populations focuses primarily on the elimination or remediation of the more obvious impacts of urbanization on the stream. These include loss of riparian habitat, eroding and undercut banks, scoured streambed or excessive sediment deposits, channelized and armored stream sections, trash buildup, and invasive species. Thus, the primary tool to accomplish Target B is stream restoration.

Target C: Wet Weather Water Quality and Quantity

The third target is to restore water quality to meet fishable and swimmable criteria during wet weather. Improving water quality and flow conditions during and after storms is the most difficult target to meet in the urban environment. During wet weather, extreme increases in streamflow are common, accompanied by short-term changes in water quality. Where water quality and quantity problems exist, options may be identified that address both. Any stormwater management practice that increases infiltration or detains flow will help decrease the frequency of damaging floods; however, the size of such structures may need to be increased in areas where flooding is a major concern. (Reductions in the frequency of erosive flows and velocities will also help protect the investment in stream restoration made as part of Target B.)

Target C must be approached somewhat differently from Targets A and B. Full achievement of this target means meeting all water quality standards during wet weather, as well as elimination of flood-related issues.

Meeting these goals will be difficult. It will be expensive and requires a long-term effort. A rational approach to achieve this target includes stepped implementation with interim goals for reducing wet weather pollutant loads and stormwater flows, along with monitoring for the efficacy of control measures.

Monitoring Locations

Water quality samples are taken at 10 USGS gage sites in the USGS/PWD Cooperative Monitoring Program (Figure 2). Site identification codes used by PWD's Bureau of Laboratory Services (BLS) and rivermile-based site ID codes are presented alongside USGS gage station numbers in Table 1. USGS stream gaging stations are ideal monitoring points as they allow discrete sample

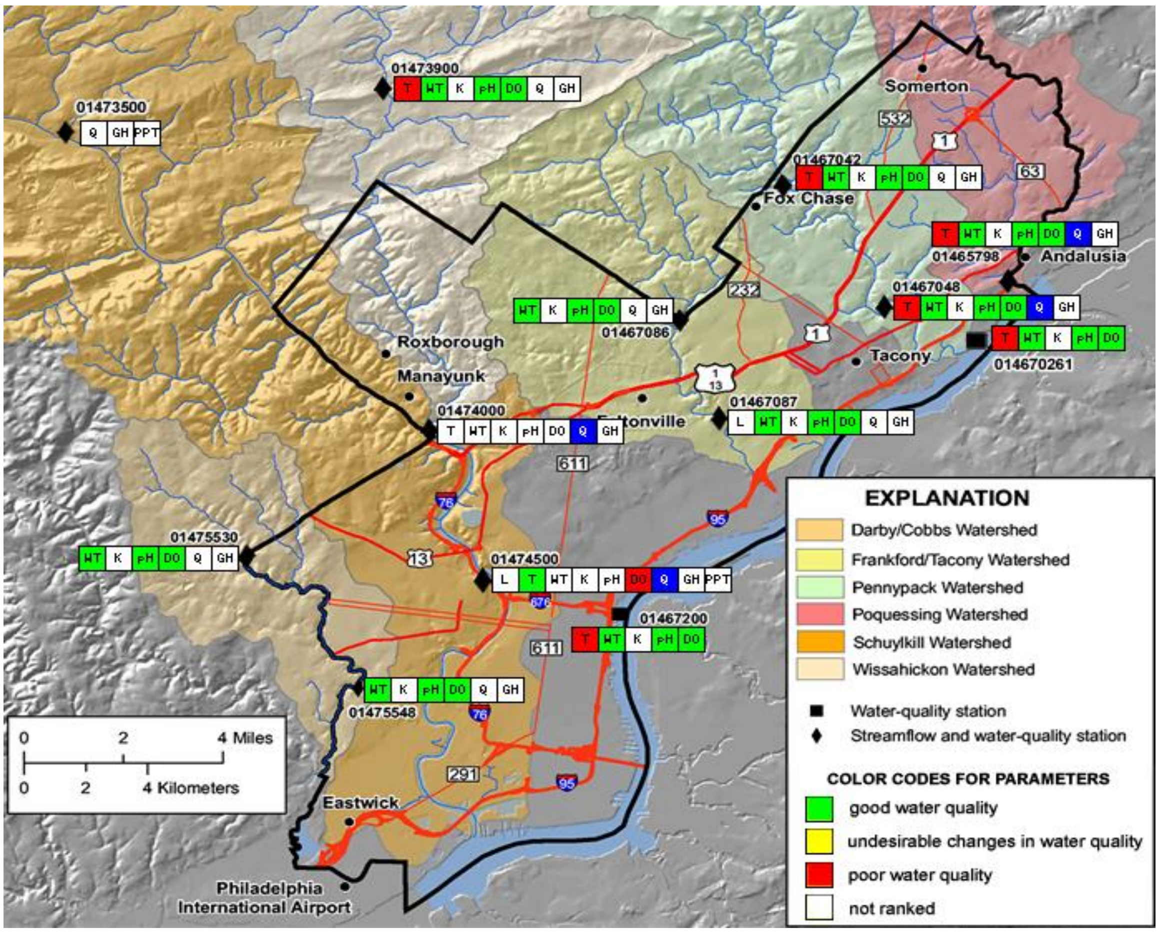


Figure 2. Philadelphia Water Quality Gage Stations as Viewed on Cooperative USGS-PWD Website (http://pa.water.usgs.gov/pwd/)

data to be coupled with continuous discharge data being collected year-round at these sites for loading estimate purposes. Furthermore, grab sample results and field meter readings taken at the time of grab sampling may be invaluable when evaluating continuous water quality data from these USGS gages.

PWD is implementing a City-wide approach to dry weather water quality monitoring, rather than focusing on an individual watershed. Because a number of Green Stormwater Infrastructure (GSI) and other stormwater management projects are in the early stages of implementation, water quality benefits will only be observable over a period of several years.

Gauging the success of such projects on a more immediate scale is best accomplished solely by hydrological analysis. Therefore, the strategic value of the widespread sampling approach is that as more GSI projects are completed over the coming years, the water quality data should gradually begin to reflect their positive environmental impacts.

Table 1. Monitoring Locations in the PWD/USGS Cooperative Program with Location IDs used by PWD Bureau of Laboratory Services and River Mile-Based Site IDs

Description	USGS Gage #	BLS Location ID	Site ID
Cobbs Creek at US Rte. 1 (City Line Ave.)	01475530	COBB700	DCC770
Cobbs Creek at Mt. Moriah Cemetery	01475548	COBB355	DCC251
Schuylkill River at Fairmount Dam	01474500	SCHU154	SC825
Wissahickon Creek at Ft Washington (Rte. 73)	01473900	WISS500	WS1075
Wissahickon Creek at Ridge Ave.	01474000	WISS130	WS076
Tacony Creek at Castor Ave.	01467087	TACO250	TF280
Tacony Creek at Adams Ave.	01467086	TACO435	TF597
Pennypack Creek at Pine Rd.	01467042	PENN407	PP993
Pennypack Creek at Rhawn St.	01467048	PENN175	PP340
Poquessing Creek at Grant Ave.	01465798	POQU150	PQ050

Table 2. PWD/USGS Quarterly Dry Weather Grab Sample Dates

Sample Date	Season	Recreational Use Season
30-Jun-09	summer	Swimming
02-Oct-09	fall	Non-Swimming
17-Dec-09	winter	Non-Swimming
11-Mar-10	spring	Non-Swimming
22-Jun-10	summer	Swimming
15-Sep-10	fall	Swimming
20-Dec-10	winter	Non-Swimming
29-Mar-11	spring	Non-Swimming
27-Jun-11	summer	Swimming
15-Sep-11	fall	Swimming
13-Dec-11	winter	Non-Swimming
20-Mar-12	spring	Non-Swimming
18-Jun-12	summer	Swimming
26-Sep-12	fall	Swimming
02-Jan-13	winter	Non-Swimming
04-Apr-13	spring	Non-Swimming
17-Jul-13	summer	Swimming
26-Sep-13	fall	Swimming
17-Jan-14	winter	Non-Swimming
26-Mar-14	spring	Non-Swimming
17-Jun-14	summer	Swimming
23-Sep-14	fall	Swimming
19-Dec-14	winter	Non-Swimming
18-Mar-15	spring	Non-Swimming
23-Jun-15	summer	Swimming
6-Oct-15	fall	Non-Swimming
6-Jan-16	winter	Non-Swimming
20-Apr-16	spring	Non-Swimming
12-Jul-16	summer	Swimming
22-Sep-16	fall	Swimming
10-Jan-17	winter	Non-Swimming
20-Apr-17	spring	Non-Swimming

Quarterly Dry Weather Monitoring July 2009 – June 2017

Sample Collection Dates

This report summarizes cumulative results from 32 sets of quarterly grab samples that were collected from June 2009 through June 2017. Samples were categorized by season (winter, spring, summer, fall) as well as according to PA DEP seasonal recreational use water quality criteria for interpretation of microbial sample results (Non-Swimming season or Swimming season) (Table 2). Weather conditions prohibited the summer dry-weather sample normally collected during June 2017; the sampling event instead occurred in July and results will be included in next year's report.

Nutrient Analysis

The macronutrients phosphorus and nitrogen are essential to the growth and overall survival of all plants. However, when occurring in surplus they can be extremely detrimental to aquatic ecosystems, and in turn to the human population that utilizes these water bodies for drinking water and recreational activities such as fishing, boating, and swimming. Elevated nutrient concentrations in rivers and streams can most often be attributed to anthropogenic pollution sources. In these situations, the most common sources of both nutrients are runoff from fertilized lawns/farmland and wastewater discharge.

The most immediate result of excessive nutrient concentrations in any natural water body is excessive plant growth, seen in a variety of growth forms from suspended algae to aquatic macrophytes. As the first step in the process of eutrophication, this unnatural acceleration of aquatic plant growth can start a chain reaction leading to highly adverse effects to that ecosystem. For example, in small shallow streams, unnaturally high densities of algal periphyton can cause pronounced fluctuations in dissolved oxygen and pH and also adversely affect aquatic habitat by forming thick mats of filamentous algae or algal scums on stream substrates. Moreover, alteration of the algal community structure can lead to the proliferation of nuisance taxa, taste and odor problems in the drinking water supply, increased water treatment costs and, in rare cases, production of toxins (*e.g.*, from cyanobacteria blooms). As a result of these direct and indirect responses, streams and rivers can suffer severe impacts to both aquatic biodiversity and human recreational use.

It should be noted that several phosphorus-containing compounds, known as polyphosphates, can be found in the region's waterways, but they are naturally occurring and are present due to the geologic composition of the area. Furthermore, these polyphosphates pose little ecological threat as they are not present in a biologically available form. Only over long periods of time can these compounds be broken down into orthophosphates, which plants and algae can absorb and utilize for growth. Therefore, aside from the relatively minor contributions of the region's geology, the most significant source of orthophosphates in rivers and streams is human-generated pollution. It is for this reason that orthophosphates, along with nitrates, are included as components of this water quality monitoring program. These forms of N and P are readily available to stream producers.

Ammonia, present in surface waters as un-ionized ammonia gas (NH_3) or as ammonium ion (NH_4^+), is produced by deamination of organic nitrogen-containing compounds such as proteins, and also by hydrolysis of urea. In the presence of oxygen, ammonia is converted to nitrate (NO_3^-) by a pair of bacteria-mediated reactions, together known as the process of nitrification. Nitrification occurs quickly in oxygenated waters with sufficient densities of nitrifying bacteria, effectively reducing ammonia concentration, although at the expense of increased NO_3^- concentration. Ammonia is a primary form of nitrogen produced from excretory waste products and other organic material in sewage. Thus, presence of ammonia can be an indicator of sewage pollution. As ammonia is converted to nitrate in oxygenated streams, ammonia is a non-conservative pollution indicator that tends to decrease in concentration with increasing distance from the source of pollution. PA DEP water quality criteria for NH_3 reflect the relationship between stream pH, temperature, and ammonia dissociation. Ammonia toxicity is inversely related to hydrogen ion [H^+] concentration (*e.g.*, an increase in pH from 7 to 8 increases NH_3 toxicity by approximately an order of magnitude). At pH 9.5 and above, even background concentrations of NH_3 may be considered potentially toxic.

Ammonia may be introduced to streams through fertilizers, breakdown of natural organic material, stables and livestock operations, stormwater runoff, and in some cases from more serious anthropogenic sources of untreated sewage such as defective laterals, crossed/illicit connections, and sanitary sewer overflows (SSOs). PWD has established intensive field infrastructure trackdown, infrared photography, sewer camera monitoring, and dye testing programs to identify and correct these problems where and when they occur.

Nutrient Results

Nutrient data collected thus far at each of the sites are generally consistent with the data collected for Comprehensive Characterization Reports (CCRs) prepared for each of the respective watersheds. Five of 10 sites are not affected by treated wastewater discharges and usually had orthophosphate concentration less than the reporting limit. The reporting limit for the majority of samples was 0.05 mg/L, but limits of 0.1 mg/L and 0.09 mg/L were also in effect at various times during the quarterly grab sampling program (Table 3). Conversely, Pennypack and Wissahickon creeks had multiple instances of elevated orthophosphate concentration, which is likely attributable to point source discharge of treated wastewater. Dilution effects were seen between upstream and downstream gages, particularly in the cases of Pennypack and Wissahickon creeks.

Though the Schuylkill River sampling station is downstream from several discharges of treated wastewater, nutrient concentrations are generally smaller than those observed from the Pennypack and Wissahickon creeks, perhaps reflecting the Schuylkill station's much larger overall watershed size and dilution capacity.

Summary statistics for the orthophosphate samples, including results from the application of the PA DEP Chemistry Statistical Assessments protocol (PA DEP, 2007), are shown in Table 3. Exceedances were evaluated relative to the US EPA (2000) Subecoregion 64 guideline for orthophosphate of 0.02625 mg/L, *i.e.*, the median of the 25th percentile seasonal concentrations. Since the detection limit is greater than the guideline, all non-detected samples were considered "possible exceedances." The nonparametric statistical assessment results show that the locations at Pennypack and Wissahickon creeks, and the Schuylkill River, failed to attain water quality consistent with this guideline. The other locations are classified as needing further evaluation due to the predominance of samples below the detection limit that are all possible exceedances.

Similar examples of wastewater discharge impacts and upstream/downstream dilution have also begun to emerge with regard to the nitrate data that have been collected. The data seem to indicate a trend toward decreased nitrate concentrations during warmer months, which would correspond to the increased uptake of nutrients by plant life during those growing seasons (Table 4 and Figure 4). The only exceptions are the Pennypack and Wissahickon

Table 3. Orthophosphate Summary Statistics and Assessments. (Concentrations in mg/L)

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceedances	Possible Exceedances	Assessment
1465798	0.057	0.050	0.017	0.050	0.100	32	31	1	31	Needs more evaluation
1467042	0.374	0.286	0.242	0.099	0.953	30	0	30	0	Non-attaining
1467048	0.256	0.178	0.186	0.053	0.852	32	0	32	0	Non-attaining
1467086	0.066	0.050	0.059	0.000	0.363	31	29	2	29	Needs more evaluation
1467087	0.058	0.050	0.021	0.011	0.117	32	27	4	27	Needs more evaluation
1473900	0.292	0.259	0.133	0.050	0.723	32	1	31	1	Non-attaining
1474000	0.171	0.166	0.065	0.050	0.414	31	2	29	2	Non-attaining
1474500	0.149	0.118	0.090	0.050	0.367	32	4	28	4	Non-attaining
1475530	0.056	0.050	0.018	0.019	0.100	32	31	0	31	Needs more evaluation
1475548	0.059	0.050	0.026	0.000	0.152	32	31	1	31	Needs more evaluation

Creek gage sites, which as previously stated are directly impacted by treated wastewater discharge. It should be noted, however, that these statements and observations are in no way conclusive given that the dataset is still relatively limited in size. As this dataset grows in subsequent years, further statistical analysis can be carried out and any apparent patterns or phenomena can be explored.

Summary statistics for the nitrate samples, including results from application of the PA DEP Chemistry Statistical Assessment protocol (PA DEP, 2007), are shown in Table 4. Exceedances were evaluated relative to a) the PA DEP water quality standard for nitrite and nitrate of 10 mg/L, and b) the US EPA (2000) subecoregion 64 guideline for nitrite and nitrate of 0.995 mg/L, *i.e.*, the median of the 25th percentile seasonal concentrations. The nonparametric statistical assessment results show that with respect to the PA DEP standard, all locations were in attainment except the upstream Wissahickon gage. One exceedance at 12 mg/L was observed at that site, and more data is needed to make an evaluation. All sites failed to attain water quality consistent with the US EPA subecoregion-based guideline.

Quarterly dry-weather analysis of ammonia began in the fall of 2011, limiting the size of the current dataset to 23 results per location. PWD laboratory reporting limits for ammonia fluctuated based on the performance of lab analytical equipment with spiked and blank samples. Ammonia concentration detection limits were 0.5 mg/L for the fall 2011 sample set, and the subsequent sample set results had detection limits of 0.1 mg/L. Ammonia concentration exceeded the detection limit in only 30 of the 230 samples: The downstream Tacony site (01467087) most often exceeded the detection limit, where a maximum concentration of 0.4 mg/L was observed in both fall 2014 and summer 2015. Results are shown in Table 5 and Figure 5.

There were no observed violations of ammonia water quality criteria at any site during this period of dry-weather monitoring. With 200 of the 230 sample results characterized as non-detects due to laboratory reporting limits, ammonia criteria was calculated with corresponding temperature and pH values to determine if possible exceedances existed (i.e., the criteria fell below the detection limit). None of the non-detect samples had the potential to violate water quality criteria.

Table 4. Nitrate Summary Statistics and Assessments. Concentrations are in mg/L.

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceedances, PADEP	Exceedances, Subecoregion	PADEP Assessment	EPA Subecoregion Assessment
1465798	1.659	1.599	0.463	0.797	2.491	31	0	0	31	Attaining	Non-attaining
1467042	4.566	4.130	1.070	3.200	7.943	29	0	0	29	Attaining	Non-attaining
1467048	3.514	3.264	1.132	1.209	6.326	31	0	0	31	Attaining	Non-attaining
1467086	2.521	2.241	1.421	1.510	9.740	30	0	0	30	Attaining	Non-attaining
1467087	1.798	1.746	0.742	0.505	3.373	31	0	0	29	Attaining	Non-attaining
1473900	5.902	5.350	2.070	2.690	12.039	30	0	1	30	Needs more evaluation	Non-attaining
1474000	3.954	3.984	1.024	1.288	6.180	30	0	0	30	Attaining	Non-attaining
1474500	2.946	2.820	0.456	2.141	3.960	31	0	0	31	Attaining	Non-attaining
1475530	3.009	3.073	0.313	2.489	3.521	31	0	0	31	Attaining	Non-attaining
1475548	2.495	2.442	0.508	1.395	3.280	31	0	0	31	Attaining	Non-attaining

Table 5. Ammonia Summary Statistics and Assessments. Concentrations are in mg/L.

Gage	Mean	Median	Std. dev.	Min.	Max.	n	n, non-detects	Exceedances
1465798	0.122	0.100	0.085	0.100	0.500	23	19	0
1467042	0.130	0.100	0.091	0.100	0.500	23	21	0
1467048	0.127	0.100	0.093	0.100	0.500	23	20	0
1467086	0.118	0.100	0.083	0.100	0.500	23	22	0
1467087	0.180	0.113	0.117	0.100	0.500	23	11	0
1473900	0.117	0.100	0.083	0.100	0.500	23	23	0
1474000	0.117	0.100	0.083	0.100	0.500	23	23	0
1474500	0.131	0.100	0.087	0.100	0.500	23	17	0
1475530	0.117	0.100	0.083	0.100	0.500	23	23	0
1475548	0.118	0.100	0.083	0.100	0.500	23	21	0

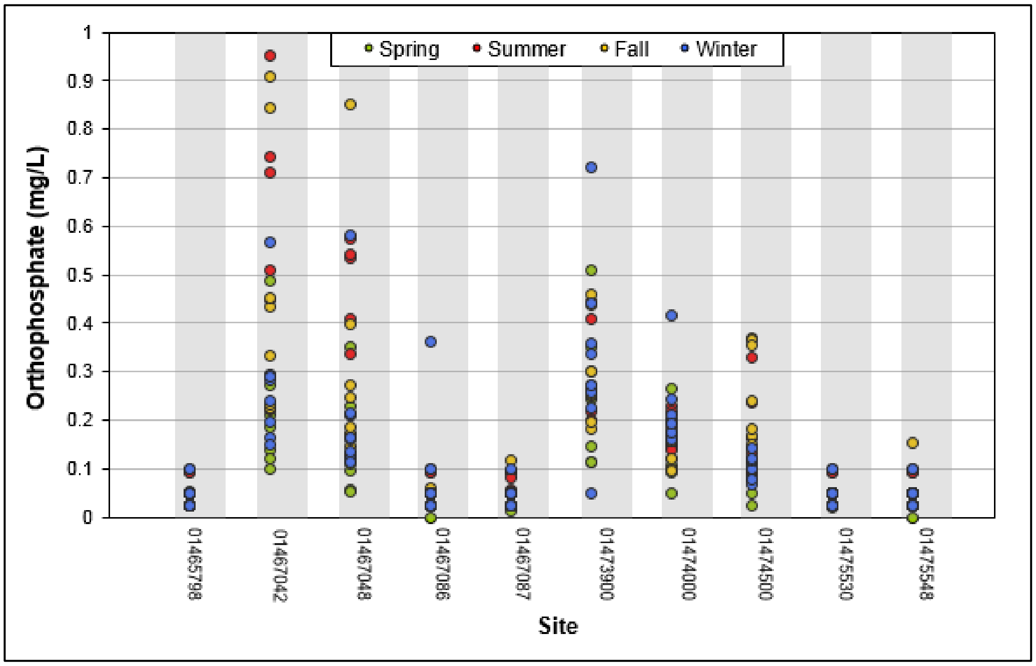


Figure 3. Orthophosphate concentration at 10 USGS gage stations, July 2009-June 2017

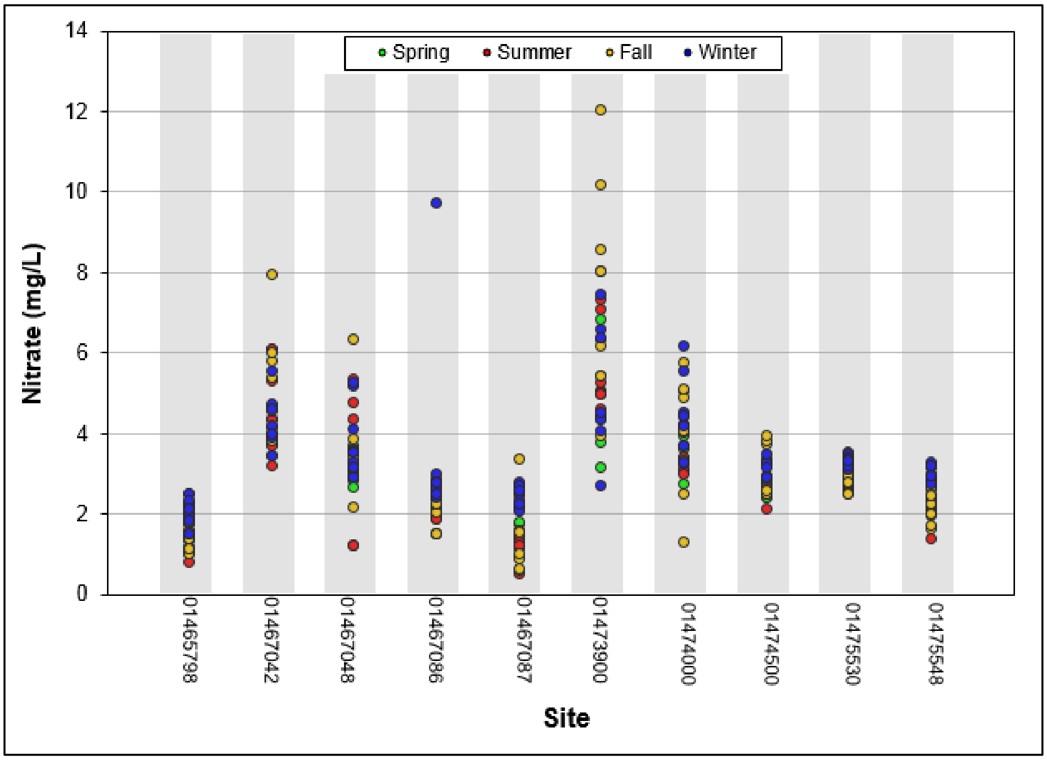


Figure 4. Nitrate concentration at 10 USGS gage stations, July 2009-June 2017

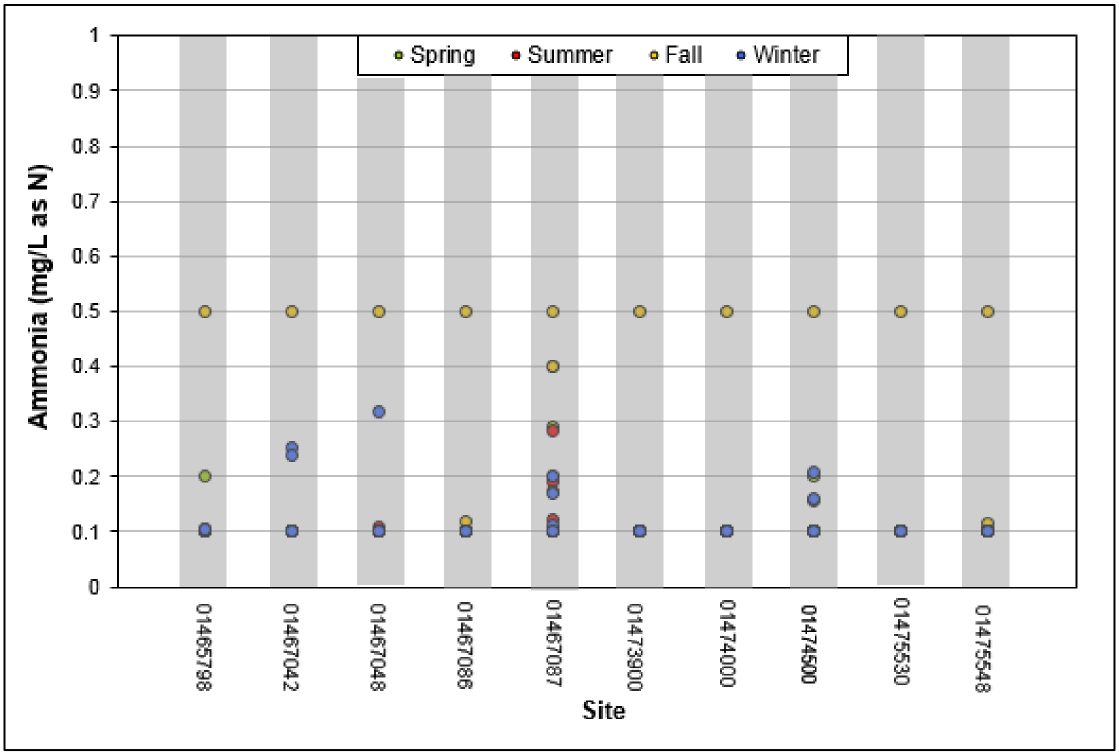


Figure 5. Ammonia concentration at 10 USGS gage stations, September 2011-June 2017

Microbial Analysis

Fecal indicator bacteria, found naturally in the gut of warm-blooded animals, can be used in the detection of human or animal waste contamination in a body of water. While these bacteria themselves are generally harmless to humans, they are considered to be very reliable indicators of the presence of other, more serious fecal-borne pathogens such as viruses, protozoa and other bacteria. The extent to which a water body is contaminated with fecal indicator bacteria can indicate the likelihood that the water has been contaminated by human or animal wastes. In urban environments, the most likely dry weather pollution sources are domestic animals, wildlife and untreated sewage from improperly connected or leaking sanitary sewers.

PWD performs three fecal indicator bacteria tests, including fecal coliform, *Escherichia coli (E. coli.)*, and enterococci. The fecal coliform test covers a relatively wide subgroup of fecal-specific bacteria; however, it does include some species that are not necessarily fecal in origin. *E. coli*, on the other hand, is a single coliform species that is noteworthy due to the fact that it occurs only in the fecal matter of humans and other warm-blooded animals. This qualifies *E. coli* as an excellent indicator of human waste. The final coliform group tested, the enterococci, are significant in that they tend to mimic many enteric pathogens with their ability to thrive in saline conditions over a wide range of temperatures. This makes the enterococci test very useful in waterways that may have a marine influence, or in any river or stream that may have above normal salinity due to geology.

Microbial Analysis Results

PA DEP has established seasonal bacteria water quality criteria that are more stringent in warmer months, or the "swimming season." For the period May 1 through September 30, water quality standards require that the geometric mean of a group of at least five samples collected on non-consecutive days over a 30-day period not exceed 200 fecal coliform CFU (colony forming unit) per 100mL. During the non-swimming season, this value increases to 2000 CFU/100mL.

While samples were collected on a quarterly basis and not within a 30-day period as required by PA DEP water quality criteria, results of microbial analyses from the seven swimming season samples generally indicate fecal coliform geometric means greater than 200CFU/100mL (Table 6). The only exceptions were the downstream Wissahickon Creek and Schuylkill River gage sites, which each had fecal coliform geometric means less than 200 CFU/100mL, based on 14 samples each. The 2000 CFU/100mL geometric mean standard for non-swimming season samples was not exceeded at any of the 10 sites, based on 18 samples at each site.

US EPA recommended water quality criteria (1986) were used as guidelines for evaluation of sample results for other microbial parameters, as PA DEP does not have recreational use water quality criteria for *E. coli* or enterococci. Guidelines used for *E. coli* and enterococci were geometric means of 126 and 33 CFU/100mL, respectively. The *E. coli* geometric mean guideline was exceeded at eight of the 10 sites. The enterococci geometric mean guideline was also exceeded at eight of the 10 sites (Table 7).

Table 6. Fecal Coliform Geometric Mean Results and PA DEP Water Quality Recreational Use Criteria Achievement Status by Season

Gage	n	n, non-detects	Geometric mean (CFU/100 mL)	Season	Attaining Standard
1465798	18	1	68	non-swimming	Yes
1465798	14	0	546	swimming	No
1467042	18	1	48	non-swimming	Yes
1467042	14	0	345	swimming	No
1467048	18	0	324	non-swimming	Yes
1467048	14	1	1414	swimming	No
1467086	18	0	229	non-swimming	Yes
1467086	14	0	1193	swimming	No
1467087	18	0	259	non-swimming	Yes
1467087	14	0	574	swimming	No
1473900	18	0	59	non-swimming	Yes
1473900	14	0	297	swimming	No
1474000	18	1	31	non-swimming	Yes
1474000	14	0	143	swimming	Yes
1474500	18	1	27	non-swimming	Yes
1474500	14	2	58	swimming	Yes
1475530	18	1	71	non-swimming	Yes
1475530	14	0	352	swimming	No
1475548	18	0	133	non-swimming	Yes
1475548	14	0	910	swimming	No

Table 7. *E. Coli* and Enterococci Geometric Mean Results and US EPA Recreational Use Water Quality Guideline Achievement

	n, non-detects		Geometric mean (CFU/100 mL)		Attaining Guideline	
Gage	E. coli	Enterococci	E. coli	Enterococci	E. coli	Enterococci
01465798	1	0	185	77	No	No
01467042	1	0	129	41	No	No
01467048	0	0	660	85	No	No
01467086	1	0	476	72	No	No
01467087	1	1	337	66	No	No
01473900	0	0	143	67	No	No
01474000	1	1	61	22	Yes	Yes
01474500	4	3	37	6	Yes	Yes
01475530	1	0	137	78	No	No
01475548	1	0	291	92	No	No

Results for all three microbial parameters were similar seasonally, with samples collected during spring and winter generally having smaller concentrations than fall and summer samples (Figures 6 through 8). Bacteria samples collected from 2009-2017 indicate a fair correlation between fecal coliform and *E. coli* (r = 0.80), and weaker correlations between fecal coliform and enterococci (r = 0.25), and *E. coli* and enterococci (r = 0.29) (Figures 9-11).

While the number of microbial samples limits trend analysis, PWD acknowledges the unusually high fecal coliform concentration at the downstream Pennypack site (01467048, Pennypack at Lower Rhawn St. Bridge). At the time of this writing, PWD is conducting additional dry weather grab sampling at strategic locations upstream of 01467048 in order to determine possible sources of the high fecal coliform concentrations (e.g., a leaking sewer pipe).

Other than the observations at 01467048, the number of samples limits further conclusive statements for microbial parameters at this time, particularly in the case of fecal coliform where the number of results is further reduced by categorization according to swimming vs. non-swimming season. Furthermore, US EPA is currently revising recommended recreational use water quality criteria for microbial parameters. As the quarterly dry weather monitoring program continues, more samples will be obtained, allowing for more rigorous statistical analyses in the future.

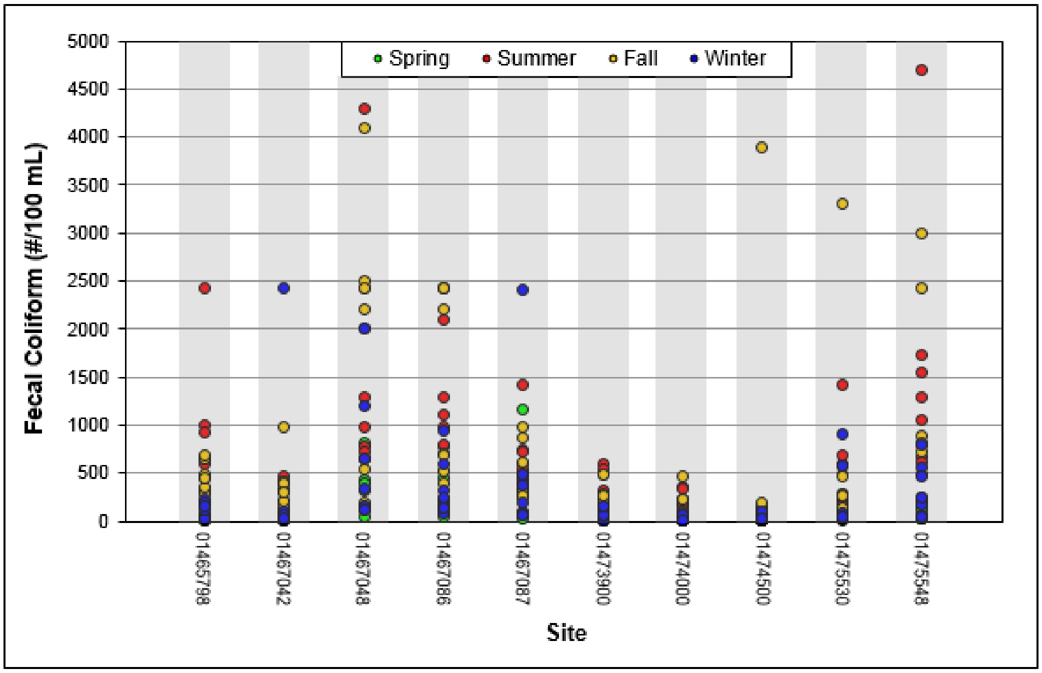


Figure 6. Fecal Coliform results at 10 USGS gage stations, July 2009-June 2017

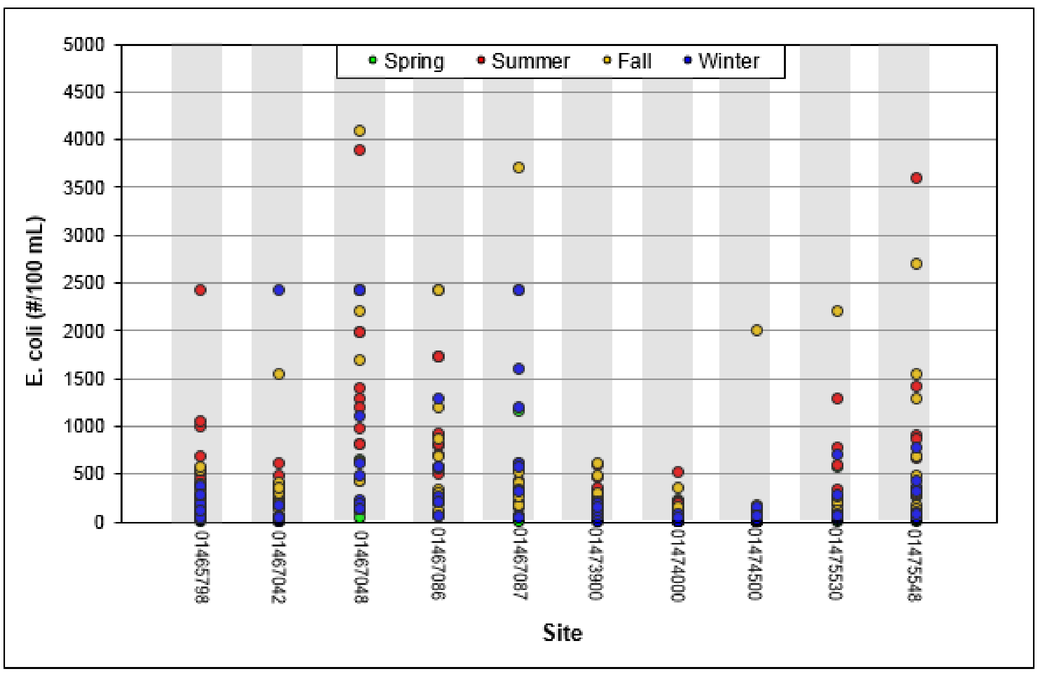


Figure 7. E. coli results at 10 USGS gage stations, July 2009-June 2017

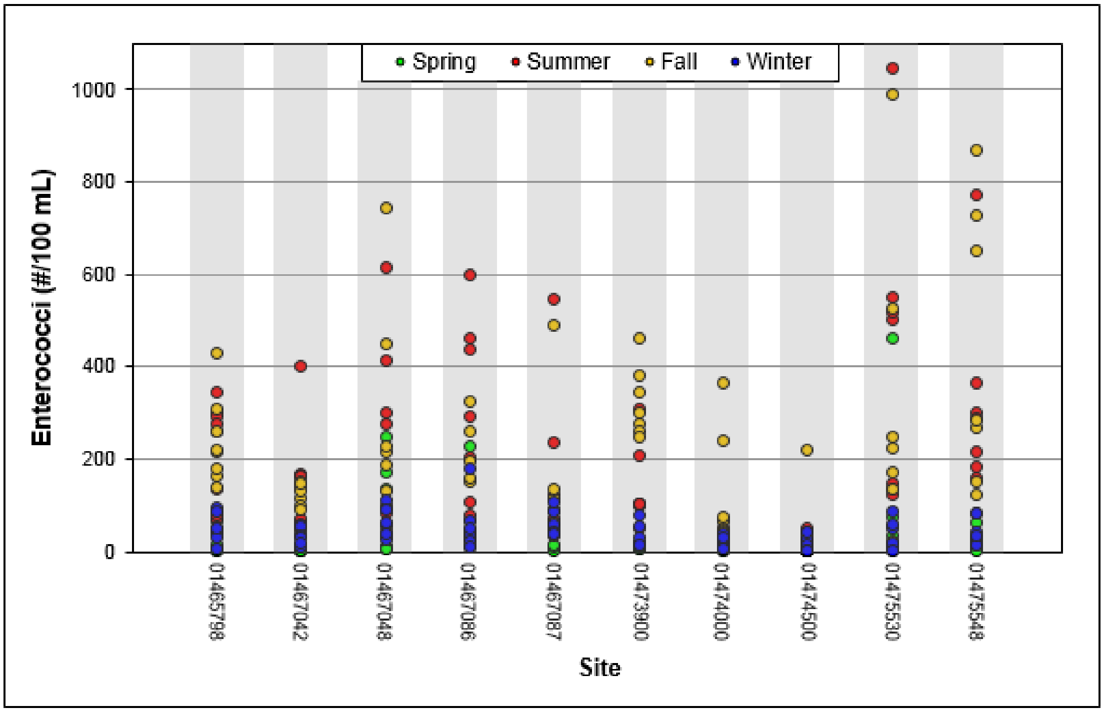


Figure 8. Enterococci results at 10 USGS gage stations, July 2009-June 2017

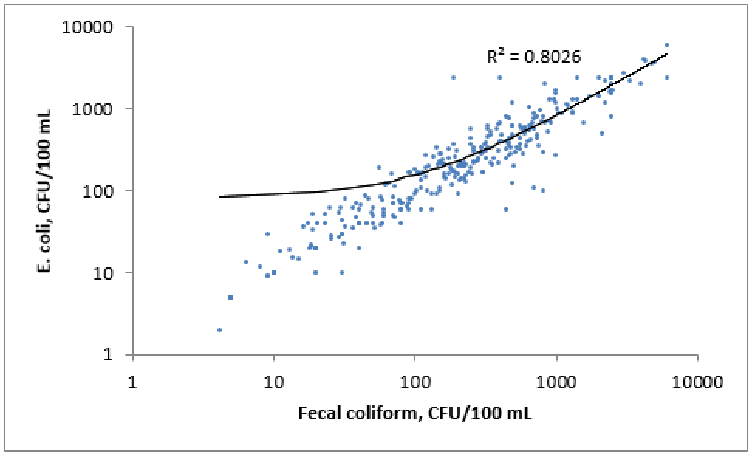


Figure 9. Scatterplot of 2009-2017 Correlating E. coli and Fecal coliform (x-y axes plotted in log10 scale)

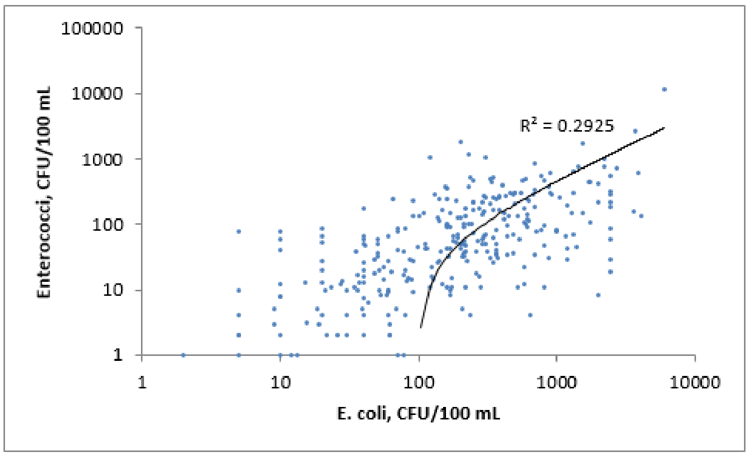


Figure 10. Scatterplot of 2009-2017 Correlating Enterococci and E. coli (x-y axes plotted in log10 scale)

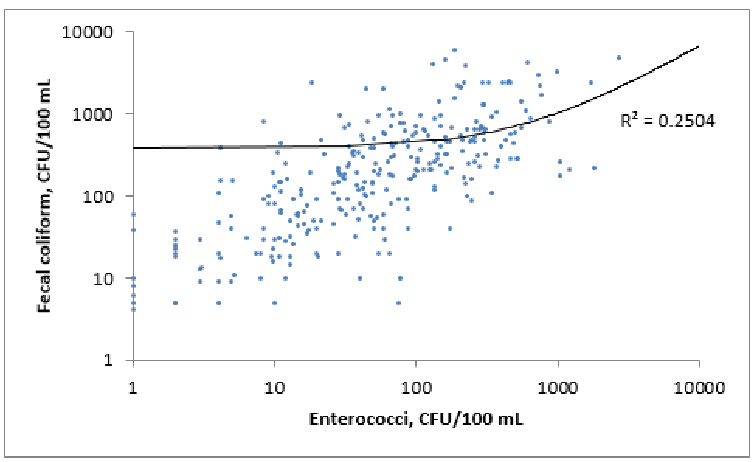


Figure 11. Scatterplot of 2009-2017 Correlating Fecal coliform and Entercocci (x-y axes plotted in log10 scale)

Physicochemical Analysis

In addition to nutrient and microbial analyses, a basic set of physicochemical parameters were also monitored as part of the discrete quarterly sampling program. These parameters (dissolved oxygen, pH, temperature, and specific conductance) were specifically chosen to coincide with those being measured by the USGS continuous water quality monitoring gages. These data can then be utilized as valuable field checks when analyzing continuous water quality data from USGS gages. The physicochemical data are summarized by parameter in Figures 12-15.

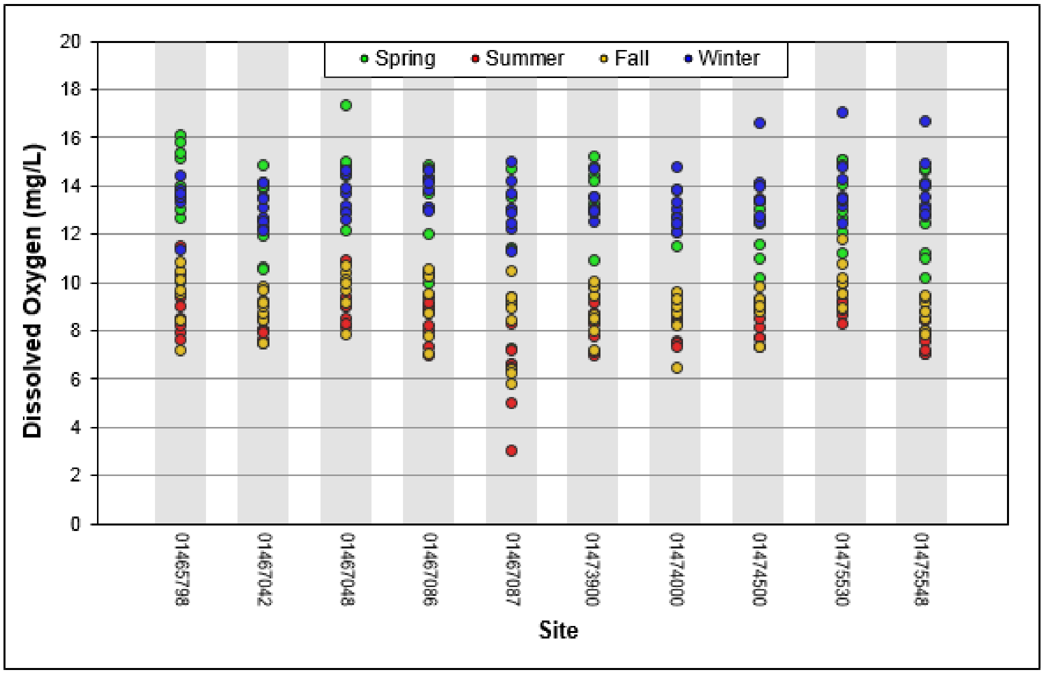


Figure 12. Dissolved oxygen results at 10 USGS gage stations, July 2009-June 2017

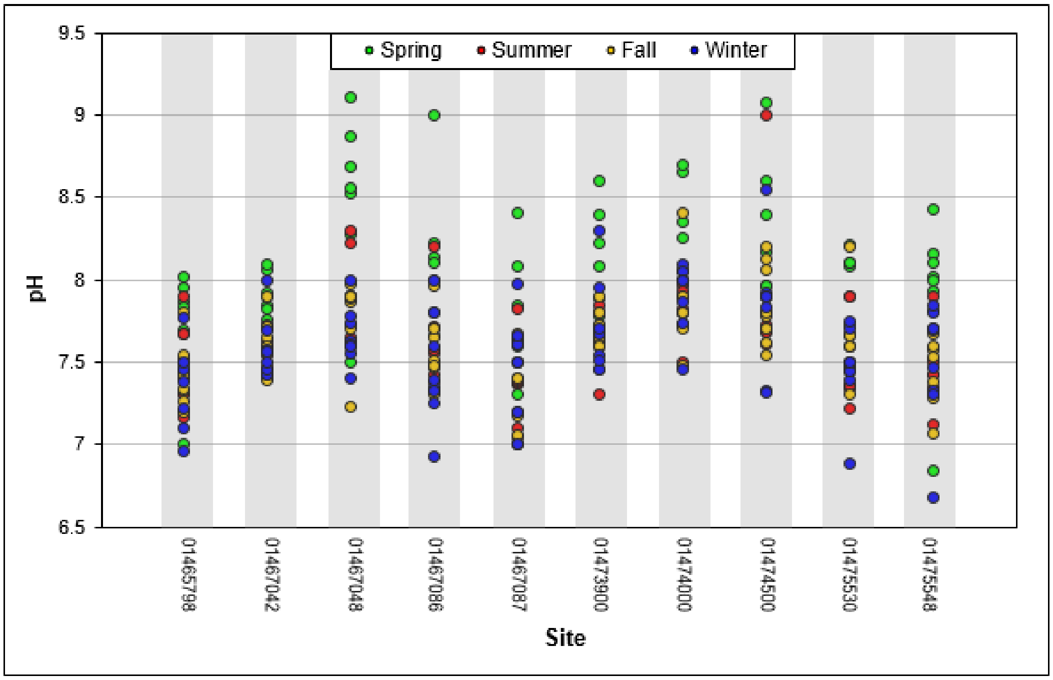


Figure 13. pH results at 10 USGS gage stations, July 2009-June 2017

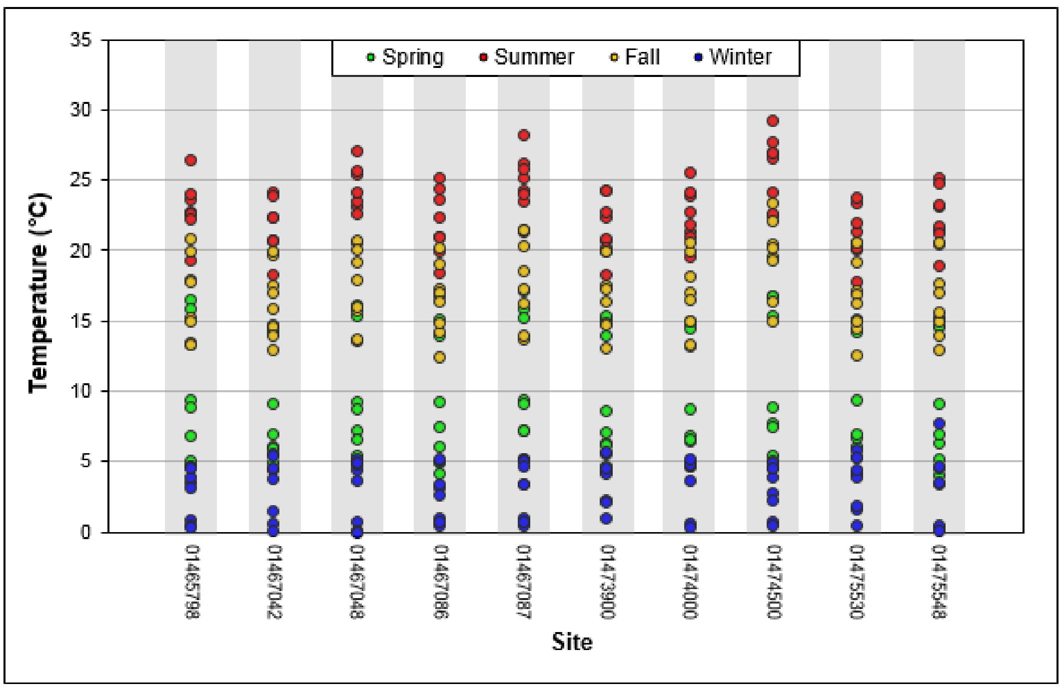


Figure 14. Temperature results at 10 USGS gage stations, July 2009-June 2017

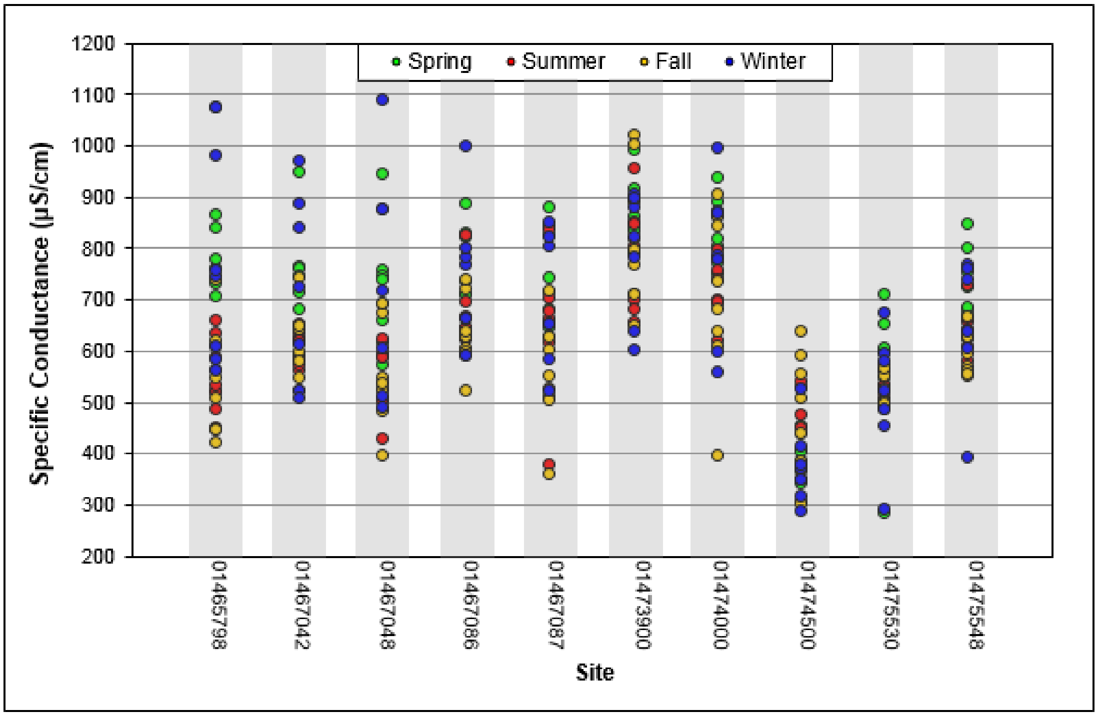


Figure 15. Specific conductance results at 10 USGS gage stations July 2009-June 2017

References

Pennsylvania Department of Environmental Protection (PA DEP). (2007). Chemistry Statistical Assessments. Harrisburg, PA. 17 p.

United States Environmental Protection Agency (US EPA). (1986). Quality Criteria for Water. EPA 440/5/86/001. Washington, D.C. 447 p.

United States Environmental Protection Agency (US EPA). (2000). Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion IX. EPA 822/B/00/019. Office of Water, U.S. Environmental Protection Agency, Washington D.C.

Appendix H –

PWD-USGS Cooperative Water Quality Monitoring Program Annual Summary

Background

PWD and the United States Geologic Survey (USGS) have constructed and/or refurbished gaging stations in 10 locations throughout Philadelphia's watersheds. USGS staff is responsible for construction and maintenance of the gage structure, stream stage monitoring instruments, data communications, maintaining and verifying stage-discharge rating curves and pumping apparatus. PWD staff is responsible for installation and maintenance of continuous water quality instrumentation. Data collected through the PWD/USGS cooperative water quality monitoring program are disseminated through the USGS National Water Information System (NWIS) Web Interface (http://waterdata.usgs.gov/pa/nwis/nwis), as well as a website specifically dedicated to Philadelphia's watersheds (Figure 1).

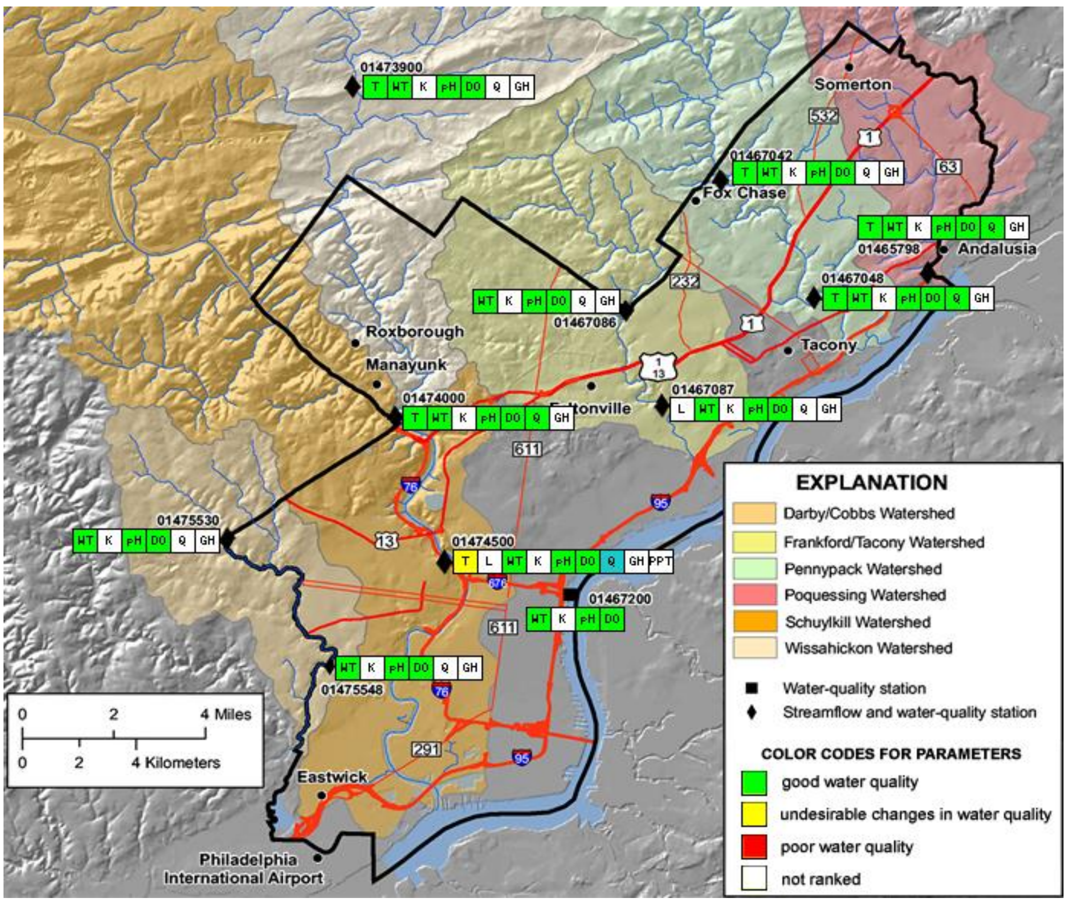


Figure 1. Philadelphia Water Quality Gauge Stations as Viewed on Cooperative USGS-PWD Website (http://pa.water.usgs.gov/pwd/).

Monitoring Locations

The PWD/USGS Cooperative Monitoring Program builds upon the widespread network of USGS gages that were formerly operated throughout Philadelphia. These gages are logically situated and/or have a continuous period of record, making them ideal for water quality monitoring purposes. Within a given watershed, downstream-most historic stations were chosen to represent water quality, as these streams flow through Philadelphia into the receiving waters (*i.e.*, the Schuylkill and Delaware rivers).

Regarding upstream stations, three gages (Pennypack Creek at Pine Rd, Tacony Creek at Adams Ave, and Cobbs Creek at US Rte. 1) are strategically located to monitor water quality of the streams as they enter Philadelphia (Figure 1). The upstream Wissahickon Creek monitoring station is located at Rte. 73 in Fort Washington, which is approximately 3.7 river miles upstream of the City. This location was chosen due to its extensive period of record (Table 1). Upstream water quality is not measured in the Poquessing-Byberry Creek Watershed. The Schuylkill River gage is in an ideal location to provide data related to the Schuylkill River Fairmount Dam Fish Ladder Renovation Project and was equipped with water quality monitoring instrumentation upon project completion in early 2009.

This annual report summarizes water quality data from July 1, 2016 – June 30, 2017, excluding the period of December 2016 through February 2017, during which time monitoring probes were not deployed in order to protect the equipment from cold temperatures. Per agreement with USGS, water quality data at the Delaware River gage 01467200 was not available for an additional month, from December 2016 through March 2017. Water quality data at the Delaware River gage 014670261 was collected year-round. Due to routine maintenance such as cleaning and calibration, gages are periodically taken offline, usually for no more than the span of two hours, and do not collect data. Significant gaps in data collection due to gage malfunction, repair, vandalism, etc. are noted in the Monthly Results section.

In order to summarize hydrologic conditions during the monitoring period, daily mean discharge was plotted along with the median of all daily flows for USGS gage 01474000 (Wissahickon Creek at Ridge Ave.). The period of record for this gage is 51 years. The influence of severe storms can be observed in Figure 2; approved daily mean discharge data was available only until May 10, 2017 at the time of this writing.

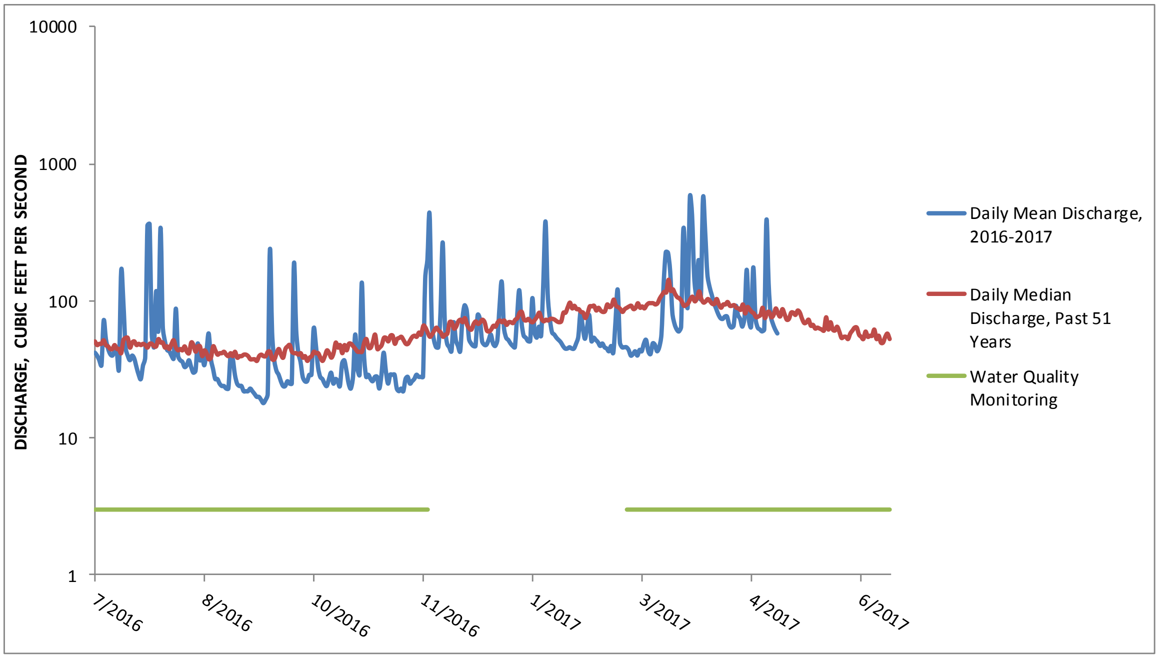


Figure 2. Daily mean flow July 1 2016 - May 10 2016 and daily median flow for 51 years of record at USGS gage 01474000 (Wissahickon Creek at Ridge Ave.).

Table 1. PWD/USGS Cooperative Water Quality Monitoring Program Gages

Gage Number	Gage name	Flow Data Record
01465798	Poquessing Creek at Grant Avenue, Philadelphia, PA	July 1965 to Present
01467042	Pennypack Creek at Pine Road, Philadelphia, PA	August 1964 to September 1974; September 2007 to Present
01467048	Pennypack Creek at Lower Rhawn St Br., Philadelphia, PA	June 1965 to Present
01467086	Tacony Creek at County Line, Philadelphia, PA	October 1965 to September 1986; September 2005 to Present
01467087	Frankford Creek at Castor Ave, Philadelphia, PA	July 1982 to Present
014670261	Delaware River near Pennypack Woods, PA	February 2011 to Present
01467200*	Delaware River at Ben Franklin Bridge, Philadelphia, PA	August 1949 to Present
01473900**	Wissahickon Creek at Ft. Washington, PA	September 1961 to September 1968; June 2000 to Present
01474000	Wissahickon Creek at Mouth, Philadelphia, PA	June 1897 to September 1903; January 1905 to July 1906; October 1965 to Present
01474500	Schuylkill River at Philadelphia, PA	October 1931 to Present
01475530	Cobbs Creek at U.S. Highway No. 1, Philadelphia, PA	October 1964 to September 1981; September 2004 to Present
01475548	Cobbs Creek at Mt. Moriah Cemetery, Philadelphia, PA	October 2005 to Present

*Funding for the operation of this gage is provided by USGS and the Delaware River Basin Commission (DRBC)
**Funding for the operation of this gage is provided by DRBC

USGS Gage Data Processing & Analysis Procedures

With 10 USGS gages collecting data for multiple water quality parameters at half-hour intervals, a large amount of data are produced. PWD Office of Watersheds (OOW) staff have developed procedures for the processing and analysis of these data using Microsoft Excel and Access software, as well as R, a free software environment for statistical computing and graphics. Most aspects of the data processing and analysis have been automated with custom Visual Basic and R code.

OOW independently maintains databases of water quality and streamflow via automated regular retrievals of these data from USGS NWIS. On a monthly basis, the databases are queried and results for each gage are imported into MS Excel workbooks. If available, any field data collected during that period (*e.g.*, hand meter readings from field maintenance checks, water quality grab samples, etc.) are also imported. Once all required data have been entered, separate plots are produced for each parameter (dissolved oxygen, turbidity, pH, specific conductance, and temperature) to enable a subjective review of data quality.

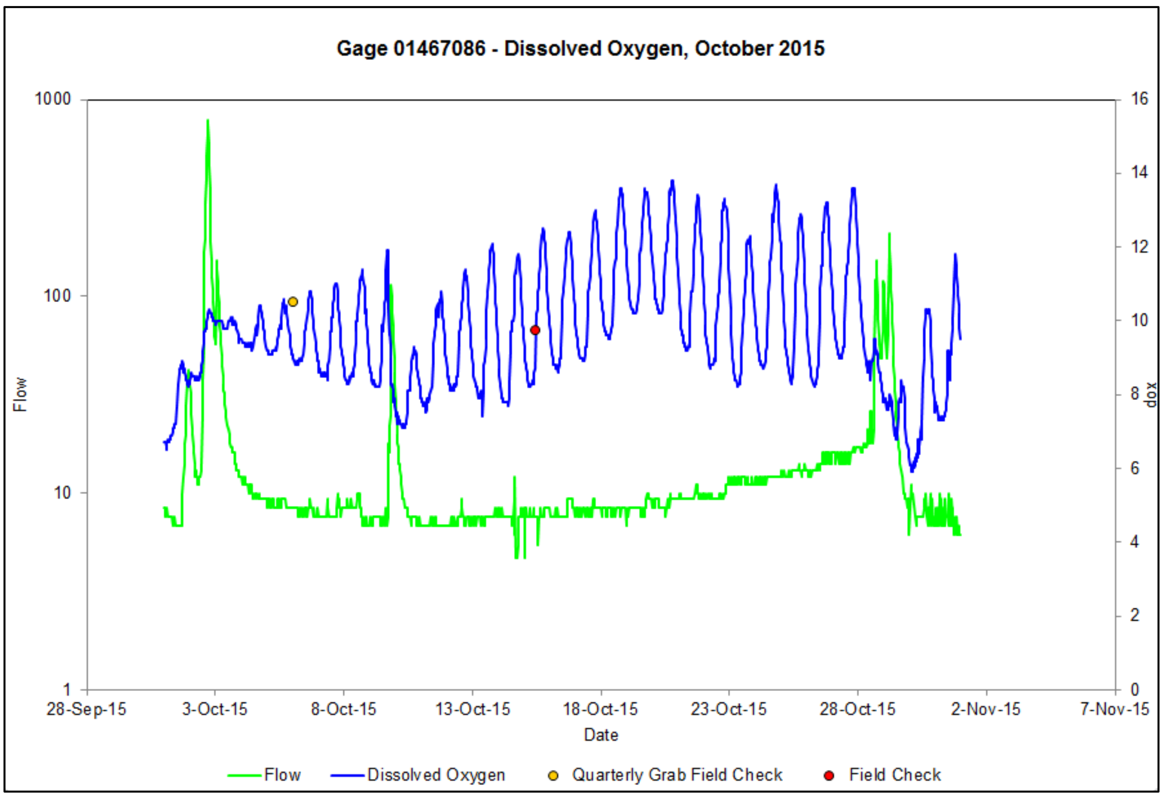


Figure 3. Example of an Excel-generated data processing/analysis plot; Gage 0146786, Dissolved Oxygen, October 2015.

These plots are examined and are the primary basis for the selection of good vs. questionable data for a given month. Intervals of questionable data are located and added to a table of "flagged" data for that particular parameter, which is then used to update the water quality database. Logs of field meter readings taken by PWD staff inform the flagging process, along with email records containing field notes and observations whenever water quality instrumentation is cleaned, calibrated, or otherwise maintained.

The final step of the procedure utilizes R, a statistical programming language and software environment. The R software code developed by OOW staff analyzes all of the water quality data in a database, as well as the good and questionable flags, and generates statistical and graphic results in a variety of forms. These include monthly plots for all data parameters for each site, showing accepted and questionable data, water quality criteria, grab sample data, and streamflow (Figure 4); assorted statistics including accepted and questionable data comparisons, monthly attainment percentages, and comparisons of wet and dry weather periods; and additional plots, including average dissolved oxygen (DO), percent DO saturation, and pH/percent DO saturation.

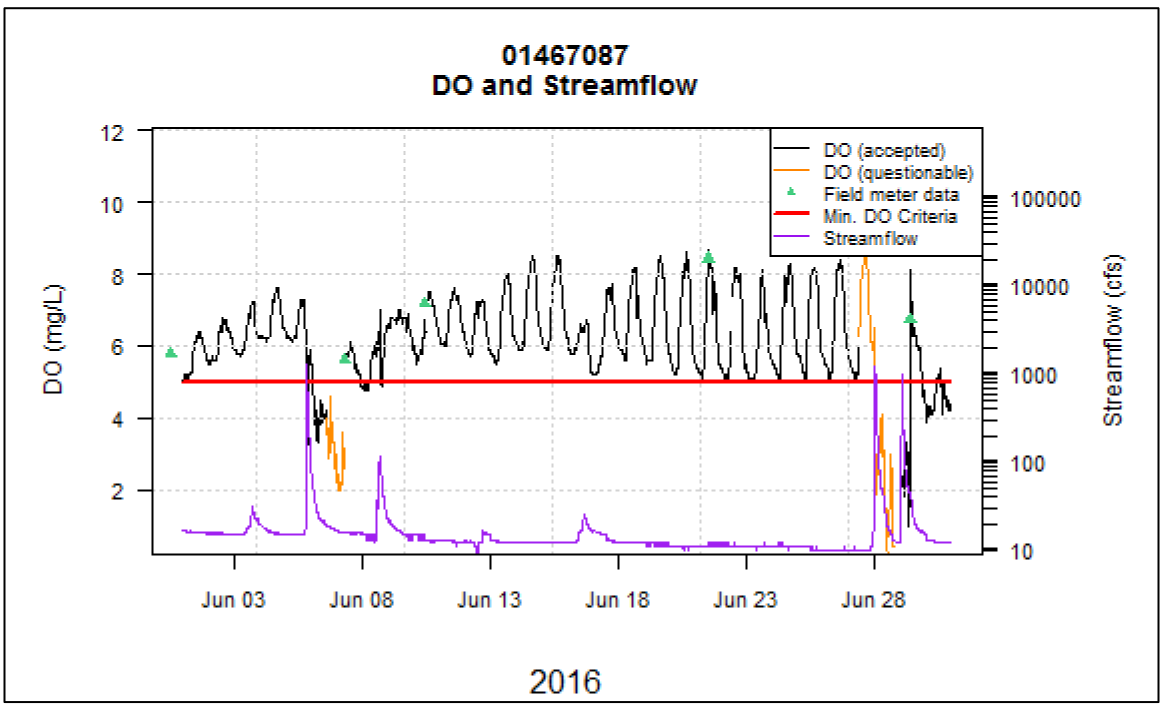


Figure 4. Example of an R-generated plot showing accepted and questionable data, and minimum water quality criteria; Gage 01467087, Dissolved Oxygen, June 2016.

Continuous Water Quality Monitoring Results Annual Summary, July 2016 - June 2017

Dissolved Oxygen

Background

Dissolved oxygen concentrations are a concern in several of Philadelphia's watersheds. Dissolved oxygen concentration is suppressed by high temperatures, respiratory activity of stream organisms, and nitrification and other oxidation reactions. Streams generally develop problems with dissolved oxygen due to water column BOD, sediment oxygen demand (SOD) and eutrophication due to increased nutrient concentration. These processes are inter-related, and physical conditions can also affect dissolved oxygen concentrations.

Designated Uses

Streams in the Philadelphia region are affected by ambient temperatures, which can be quite warm in the spring and summer months. For this reason, these streams cannot support natural self-sustaining populations of cold water fish. Different water quality criteria for dissolved oxygen and temperature are applied to different stream segments. Of the sites that were instrumented for water quality, the Wissahickon and Pennypack Creek gages (*i.e.*, 01473900, 01474000, 01467042, and 01467048) are each designated as a Trout Stocking Fishery (TSF) with conditions appropriate for maintenance of stocked trout over the period February 15 to July 31. Water quality criteria for dissolved oxygen are more stringent for these sites, with a daily instantaneous minimum criterion of 5 mg/L and a 7-day average of 6 mg/L from February 15 to July 31 and 5.5 mg/L the remainder of the year. Dissolved oxygen criteria for Warm Water Fisheries (WWF) are an instantaneous minimum of 5 mg/L and a 7-day average of 5.5 mg/L.

The 7-day average criteria was introduced in 2014 by PA DEP. Prior to 2014, DEP specified a daily average criteria for dissolved oxygen (5.0 mg/L for WWF waters; 6.0 mg/L for TSF waters from February 15 to July 31, 5.0 mg/L the remainder of the year). For informational and comparative purposes, this report continues to calculate a daily average as well as the 7-day average. It is also noted that the instantaneous minimum DO criterion for WWF waters became more stringent in 2014; it was previously 4.0 mg/L.

The Delaware River gage 01467200 dissolved oxygen criteria are defined by the Delaware River Basin Commission (DRBC) criteria for Zone 3 (DRBC, 2007) with a daily mean of 3.5 mg/L and a seasonal mean (April 1 to June 15, and September 16 to December 31) of 6.5 mg/L. The same seasonal criteria applies to Delaware River gage 014670261 (Zone 2), but there is a more stringent daily mean guideline of 5.0 mg/L (Table 2).

Table 2. PADEP Dissolved Oxygen Water Quality Criteria

Gage number	Designated Use	Minimum Criterion	7-Day Average Criterion	Daily Average Criterion

01465798	WWF	5.0 mg/L	5.5 mg/L	None
014670261	DRBC**	None	None	5.0 mg/L
01467042	TSF*	5.0 mg/L	6.0 mg/L	None
01467048	TSF*	5.0 mg/L	6.0 mg/L	None
01467086	WWF	5.0 mg/L	5.5 mg/L	None
01467087	WWF	5.0 mg/L	5.5 mg/L	None
01467200	DRBC**	None	None	3.5 mg/L
01473900	TSF*	5.0 mg/L	6.0 mg/L	None
01474000	TSF*	5.0 mg/L	6.0 mg/L	None
01474500	WWF	5.0 mg/L	5.5 mg/L	None
01475530	WWF	5.0 mg/L	5.5 mg/L	None
01475548	WWF	5.0 mg/L	5.5 mg/L	None

*TSF criteria for DO only apply from February 15 - July 31. WWF criteria are applicable from August 1 – January 31.
**A seasonal mean criterion of 6.5 mg/L also applies from April 1 - June 15 and September 16 - December 31.

Results

Results were processed as follows for Table 3. The "total hours accepted data" are the total hours of data that were not flagged; that quantity divided by 24 yields the "total days accepted data." The remainder of the table lists the percent of total hours of data that was flagged, and the percentages of accepted data that attained or failed to attain water quality standards were calculated.

Results were processed as follows for Table 4. If a single day contained at least one flagged measurement, the entire day was considered flagged for calculating the daily mean. Thus the "percent days flagged data" corresponds to the percentage of total days of data that contained at least one flag in a single day. Conversely, if none of the measurements in a single day were flagged, that day was considered one day of accepted data, and the total amount of accepted days was calculated. Finally, the percentages of accepted data that attained or failed to attain water quality standards were calculated.

Results were processed as follows for Tables 5 and 6. If more than 25% of the data in the 7-day window was flagged as questionable, the data point was considered questionable. The 7-day average was calculated as a two-sided moving average. During data processing and analysis, output files are split by calendar year; thus, statistics for 2016 and 2017 appear in separate tables.

Water quality at the downstream Tacony Creek site (gage 01467087) was most likely to exceed DO minimum and 7-day average criteria. A more in-depth discussion of potential causes of DO problems at gage 01467087 is presented in the Monthly Results section. A notable portion of flagged data at 01467087 and other sites is related to the fouling of sonde pipes due to sediment and debris that inhibit data collection. The DO probes are particularly susceptible to the effects of trapped sediment; when routine cleaning of the sonde pipes show that low DO readings were affected by fouling, the questionable data prior to cleaning is flagged.

Table 3. USGS Gage July 2016 - June 2017 Dissolved Oxygen Minimum Criterion Summary Results

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining
01465798	WWF	6388.3	266.2	2.7	2.2	97.8
014670261*	DRBC	NA	NA	NA	NA	NA
01467042	TSF	6353.5	272.3	0.4	0.0	100.0
01467048	TSF	5709.5	237.9	17.7	0.0	100.0
01467086	WWF	6407.0	267.0	1.0	1.3	98.7
01467087	WWF	5600.5	233.4	13.1	28.0	72.0
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	6178.0	257.4	2.0	0.1	99.9
01474000	TSF	6191.0	258.0	1.0	0.0	100.0
01474500	WWF	6369.0	265.4	10.7	0.1	99.9
01475530	WWF	6498.8	270.8	0.6	0.0	100.0
01475548	WWF	6334.0	263.9	3.1	8.0	92.0

*No minimum DO criterion applies at gages 01467200 and 014670261

Table 4. USGS Gage July 2016 - June 2017 Dissolved Oxygen Daily Mean Summary Results

Gage number	Designated Use	Total days accepted data	% days flagged data*
01465798	WWF	247.0	9.7
014670261	DRBC	326.0	10.7
01467042	TSF	255.0	6.7
01467048	TSF	254.0	5.8
01467086	WWF	249.0	6.9
01467087	WWF	205.0	23.6
01467200	DRBC	198.0	19.0
01473900	TSF	247.0	5.9
01474000	TSF	241.0	7.5
01474500	WWF	255.0	5.3
01475530	WWF	262.0	3.8
01475548	WWF	234.0	14.1

*Small data gaps prevent the calculation of a daily mean and are classified as flagged.

Table 5. USGS Gage July 2016 - December 2016 Dissolved Oxygen 7-Day Average Criterion Summary Results

Gage number	Designated Use	Total hours accepted data	% hours flagged data	% hours non-attaining	% hours attaining
01465798	WWF	3253.5	0	0	100
014670261	DRBC	NA	NA	NA	NA
01467042	TSF	3253.5	0	0	100
01467048	TSF	2566.0	21.1	0	100
01467086	WWF	3292.0	17.2	0	100
01467087	WWF	3153.5	20.6	30.9	69.1
01467200	DRBC	NA	NA	NA	NA
01473900	TSF	3075.0	5.5	0	100
01474000	TSF	3253.5	0	0	100
01474500	WWF	3079.0	5.4	0	100
01475530	WWF	3253.5	0	0	100
01475548	WWF	2870.0	11.8	4.9	95.1

Table 6. USGS Gage March 2017 - June 2017 Dissolved Oxygen 7-Day Average Criterion Summary Results

Gage number	Designated Use	Total hours accepted data	% hours flagged data	% hours non-attaining	% hours attaining
01465798	WWF	2508.5	0	0	100
014670261	DRBC	NA	NA	NA	NA
01467042	TSF	2508.5	0	0	100
01467048	TSF	1945.0	22.4	0	100
01467086	WWF	2551.0	21.6	0	100
01467087	WWF	2132.5	34.4	34.6	65.4
01467200	DRBC	NA	NA	NA	NA
01473900	TSF	2504.5	0.2	0	100
01474000	TSF	2455.0	2.1	0	100
01474500	WWF	2508.5	0	0	100
01475530	WWF	2508.5	0	0	100
01475548	WWF	2551.0	21.6	7.8	92.2

Table 7. USGS Gage 01467200 and 014670261 Dissolved Oxygen Seasonal Mean Criterion Summary Result

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Seasonal mean	Attained Standard?
01467200	DRBC	1751.5	73.0	4.0	8.9	Yes
014670261	DRBC	1822.0	75.9	0.1	9.1	Yes

pH

Background

pH has been identified as a parameter of potential concern for some of Philadelphia's watersheds, primarily because of algal effects on the dissolved inorganic carbon (DIC) composition of stream water. Algae take up CO_2 during photosynthesis and shift the composition of DIC toward the alkaline carbonates, resulting in occasional failure to attain maximum pH criteria at some sites (Table 8). pH fluctuations are typically observed concomitant with pronounced dissolved oxygen fluctuations, as detailed in the Monthly Results section.

At gages 01467200 and 014670261, pH criteria (regulated by DRBC) are bounded by 6.5 and 8.5. At all other gages, pH criteria are bounded by daily minima and maxima of 6.0 and 9.0, respectively, as defined by PA DEP water quality standards.

Results

Results were processed as follows for Table 8. The "total hours accepted data" are the total hours of data that were not flagged; that quantity divided by 24 yields the "total days accepted data." The remainder of the table lists the percentage of total hours of data that was flagged, the percentages of accepted hours that attained or failed to attain criteria, and the percentages of daily minima and maxima that attained or failed to attain criteria.

Minimum pH criteria were attained at all gages for the reporting time frame. Algal blooms may be responsible for daily maximum pH criterion exceedance at several sites during March and April. Significant (greater than 10%) daily exceedances occurred at the Schuylkill site and upstream Tacony site.

Table 8. USGS Gage July 2016 - June 2017 pH Criteria Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	6375.5	265.6	2.9	0.1	0.7	0.0	0.0	99.9	99.3
014670261	8726.5	363.6	0.4	0.0	0.0	0.0	0.3	99.9	99.7
01467042	6552.5	273.0	0.2	0.0	0.0	0.0	0.0	100.0	100.0
01467048	5708.5	237.9	17.8	1.3	7.4	0.0	0.0	98.7	92.6
01467086	6457.0	269.0	0.2	0.5	3.7	0.0	0.0	99.5	96.3
01467087	6427.8	267.8	0.2	0.0	0.0	0.0	0.0	100.0	100.0
01467200	5775.5	240.6	1.6	0.0	0.0	0.0	0.0	100.0	100.0
01473900	6295.5	262.3	0.1	0.3	1.5	0.0	0.0	99.7	98.5
01474000	6191.5	258.0	1.0	0.4	2.3	0.0	0.0	99.6	97.7
01474500	5463.5	227.6	24.8	0.0	0.0	0.0	0.0	100.0	100.0
01475530	6529.8	272.1	0.1	0.1	1.1	0.0	0.0	99.9	98.9
01475548	6394.5	266.4	2.2	0.3	2.2	0.0	0.0	99.7	97.8

Turbidity

Background

Turbidity in Philadelphia's streams increases with increased flow as inorganic sediment and additional constituents of stormwater runoff are introduced to the stream or scoured/eroded from the stream channel. There are no numeric PA DEP water quality criteria for turbidity, so PWD watershed management plans used a reference value for turbidity that was derived from EPA Guidance document EPA 822-B-00-023 (*i.e.*, 2.825 NTU). This value is surpassed more often in wet weather than in dry weather (Tables 84-85). Turbidity data has also been used to help investigate sediment loading and transport in the Wissahickon Creek Watershed for the Wissahickon Creek Sediment TMDL.

Results

Results were processed as follows for Table 9. The "total hours accepted data" are the total hours of data that were not flagged; that quantity divided by 24 yields the "total days accepted data." The remainder of the table lists the percentage of total hours of data that was flagged, and the percentages of accepted hours that either surpassed or fell below the maximum guideline.

Among the tributary sites, the maximum guideline was most frequently surpassed at the Schuylkill gage, and least frequently surpassed at the downstream Wissahickon gage.

Table 9. USGS Gage July 2016 - June 2017 Turbidity Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	6342.8	264.3	3.4	34.2	65.8
014670261	8728.5	363.7	0.4	98.1	1.9
01467042	6448.0	268.7	1.8	36.4	63.6
01467048	5281.0	220.0	24.1	42.4	57.6
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	6187.5	257.8	1.8	49.1	50.9
01474000	6148.5	256.2	1.7	20.4	79.6
01474500	6367.0	265.3	10.8	23.9	76.1
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA

*Turbidity is not continuously monitored at these locations

Specific Conductance

Background

Specific conductance is a measure of the ability of water to conduct electricity over a given distance, expressed as microsiemens/cm (corrected to 25ºC). Conductivity in Philadelphia streams is extremely sensitive to changes in flow, as stormwater (diluent) usually contains smaller concentrations of dissolved ions than stream baseflow. Stormwater runoff typically lowers conductivity in streams; an exception sometimes occurs in winter and early spring, when road salt applied prior to snowstorms enters the stream in runoff or during snowmelt. Data collected in the report timeframe were generally consistent with earlier observations. When significant changes in conductivity are observed during dry weather, it can be an indicator of anthropogenic influence or pollution in the stream; stations receiving inputs of treated wastewater generally had greater conductivity.

Results

There is no water quality standard for specific conductance. Table 10 merely illustrates the total hours of data that was not flagged and considered “accepted,” the equivalent quantity in day-units, and the percentage of total hours of data that was flagged. More detailed results at each site are described in the Monthly Results section.

Table 10. USGS Gage July 2016 - June 2017 Specific Conductance Summary Results

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	6374.3	265.6	2.9
014670261	8709.5	362.9	0.6
01467042	6551.5	273.0	0.2
01467048	5397.5	224.9	22.5
01467086	6456.5	269.0	0.2
01467087	6429.5	267.9	0.2
01467200	5782.0	240.9	1.5
01473900	6295.5	262.3	0.1
01474000	6192.0	258.0	1.0
01474500	6370.0	265.4	10.7
01475530	6516.3	271.5	0.3
01475548	6259.3	260.8	4.3

Temperature

Background

Streams in the Philadelphia region are designated Warm Water Fisheries (WWF) or Trout Stocking Fisheries (TSF), with separate corresponding temperature criteria (Table 11). These criteria are “stepped” (remaining constant for 15- or 30-day intervals), while streams tend to warm up and cool down more gradually due primarily to changes in ambient temperature. (Gages 01467200 and 014670261 are the exceptions and are subject to a DRBC criterion of 30°C maximum). Stream temperatures were observed to exceed these criteria, somewhat frequently in springtime. These exceedances are generally natural, as there are no major sources of heated wastes. It is possible that baseflow diminution is partially responsible for a lack of buffering against temperature increases.

Table 11. PA DEP Temperature Water Quality Criteria

Date range start	Date range end	WWF maximum (°C)	WWF maximum (°F)	TSF maximum (°C)	TSF maximum (°F)
1/1	1/31	4	40	4	40
2/1	2/29	4	40	4	40
3/1	3/31	8	46	8	46
4/1	4/15	11	52	11	52
4/16	4/30	14	58	14	58
5/1	5/15	18	64	18	64
5/16	5/31	22	72	20	68
6/1	6/15	27	80	21	70
6/16	6/30	29	84	22	72
7/1	7/31	31	87	23	74
8/1	8/15	31	87	27	80
8/16	8/30	31	87	31	87
9/1	9/15	29	84	29	84
9/16	9/30	26	78	26	78
10/1	10/15	22	72	22	72
10/16	10/31	19	66	19	66
11/1	11/15	14	58	14	58
11/16	11/30	10	50	10	50
12/1	12/31	6	42	6	42

Results

Results were processed in the same manner as the parameters described above. The highest exceedance rate occurred at the downstream Pennypack Creek gage. Aside from the Delaware River gages, the lowest exceedance rates were observed at the Poquessing, both Cobbs, both Tacony Creek, and the Schuylkill River gages (Table 12). Those six gages are all designated as WWF and have less stringent criteria.

Table 12. USGS Gage July 2016 - June 2017 Temperature Maximum Criteria Summary Results

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	6425.3	267.7	2.1	14.6	85.4
014670261	DRBC	8722.0	363.4	0.4	0.0	99.9
01467042	TSF	6552.5	273.0	0.2	28.4	71.6
01467048	TSF	6306.5	262.8	4.4	35.8	64.2
01467086	WWF	6457.0	269.0	0.2	14.6	85.4
01467087	WWF	6431.3	268.0	0.2	15.9	84.1
01467200	DRBC	5812.0	242.2	1.0	0.0	100.0
01473900	TSF	6250.0	260.4	0.8	29.2	70.8
01474000	TSF	6186.0	257.8	1.1	30.0	70.0
01474500	WWF	6370.5	265.4	10.7	14.0	86.0
01475530	WWF	6529.0	272.0	0.2	13.0	87.0
01475548	WWF	6357.0	264.9	2.8	15.4	84.6

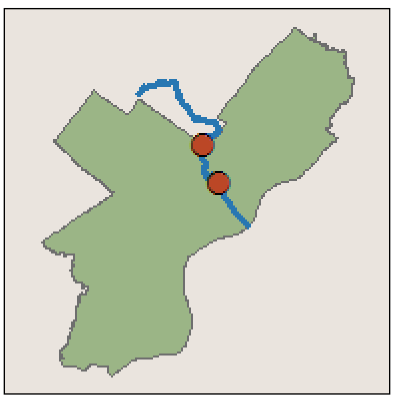
Monthly Results, July 2016 - June 2017

This section summarizes results at the monthly time scale. Results were processed in the same manner as in the previous section. Gages are grouped according to the type of sewer system that impacts water quality at the site.

Gages in Combined Sewer System Watersheds

The combined sewer system serves more than three-quarters of Philadelphia's residents and covers the oldest and densest parts of the city. Combined sewer outfalls affect the Tookany/Tacony-Frankford and Darby-Cobbs watersheds. (The Delaware and Schuylkill rivers also contain combined sewer outfalls but are detailed in a later section focused on large watersheds.) The gages in this section are subject to the deleterious effects of periodic combined sewer overflows during wet weather and snowmelt.

Tookany/Tacony-Frankford Creek (Gages 01467086 and 01467087)



Dissolved oxygen and pH

Dissolved oxygen concentrations were markedly worse between the upstream and downstream Tacony Creek gages. The monthly minima, percentage of hours the minimum criterion was not attained, exceedance of the 7-day average guideline, and percentage of days the daily mean criteria was not attained were typically much worse at the downstream gage (Tables 13-16, Figures 5-8). For example, DO was particularly poor at the downstream Tacony Creek gage during July 2016 (Figure 9). Minimum DO exceedances were also observed in the same month at the upstream gage. However, the minimum criterion was usually attained at gage 01467086 (Figure 10). This difference likely reflects the additional stormwater runoff and sewage overflows that entered the creek between the two gages.

The lowest DO concentrations are typically seen in the period after storm events, reflecting both the immediate and lingering, oxygen-depleting effects of stormwater runoff and biochemical oxygen demand (BOD) entering the stream. Diel DO fluctuations are suppressed for a few days following a storm event because the event either scours away algae or temporarily inhibits their growth. As dry weather continues, the algae recover and diel DO and pH fluctuations typically increase, sometimes resulting in non-attainment of pH maximum criteria, as observed at the upstream gage in April 2017 (Figure 11). Percent DO saturation of more than 150% in daylight were also observed at gage 01467086 in April 2017, indicating high levels of algal activity (Figure 12; PAR is defined as photosynthetically active radiation). Diel DO fluctuations tended to increase with prolonged periods of sunlight, further indicating high levels of algal activity.

A lower monthly mean pH was usually observed at gage 01467087, along with generally less pronounced diel pH fluctuations, probably due to an increased buffering capacity at the downstream gage and a lesser degree of algal growth (Tables 17-18).

Table 13. Gage 01467086 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	WWF	743.0	31.0	0.1	3.0	97.0	4.0	11.1	6.8
Aug-16	WWF	742.0	30.9	0.3	3.6	96.4	4.0	11.5	7.1
Sep-16	WWF	709.5	29.6	1.5	1.9	98.1	4.3	10.7	7.3
Oct-16	WWF	742.0	30.9	0.3	0.0	100.0	5.8	12.6	9.0
Nov-16	WWF	706.5	29.4	1.9	0.0	100.0	5.4	14.9	10.6
Mar-17	WWF	585.5	24.4	4.5	0.0	100.0	8.1	18.2	12.3
Apr-17	WWF	718.0	29.9	0.3	0.9	99.1	4.6	16.0	9.9
May-17	WWF	742.5	30.9	0.2	0.1	99.9	4.8	13.0	8.5
Jun-17	WWF	718.0	29.9	0.3	1.9	98.1	3.6	12.4	7.6

Table 14. Gage 01467087 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	WWF	678.5	28.3	0.0	68.1	31.9	0.1	8.0	3.9
Aug-16	WWF	668.5	27.9	0.0	38.3	61.7	0.7	10.6	5.4
Sep-16	WWF	717.8	29.9	0.0	34.2	65.8	0.8	10.6	5.7
Oct-16	WWF	710.5	29.6	0.0	0.2	99.8	4.2	10.0	7.7
Nov-16	WWF	661.0	27.5	0.0	0.0	100.0	5.2	11.1	8.3
Mar-17	WWF	59.0	2.5	89.9	0.4	99.6	4.7	10.4	9.0
Apr-17	WWF	670.0	27.9	0.0	18.8	81.2	0.1	11.9	6.9
May-17	WWF	730.5	30.4	0.0	30.8	69.2	1.6	9.8	6.2
Jun-17	WWF	704.8	29.4	1.9	35.7	64.3	1.4	9.2	5.6

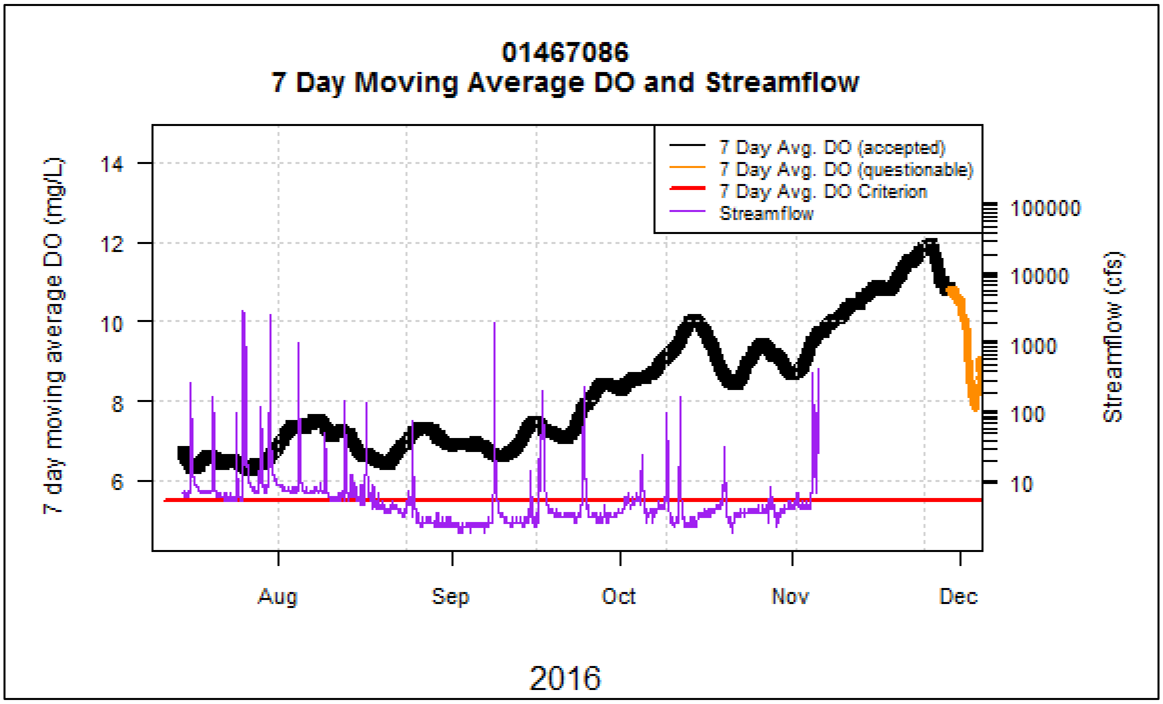


Figure 5. Gage 01467086, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

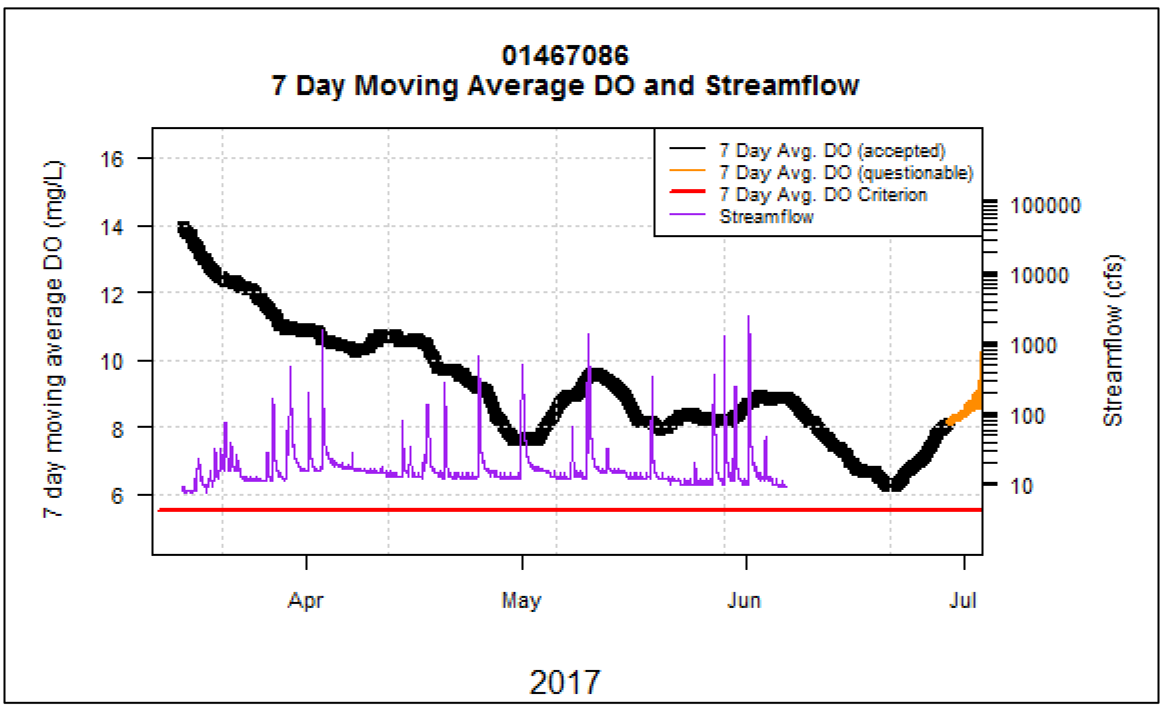


Figure 6. Gage 01467086, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

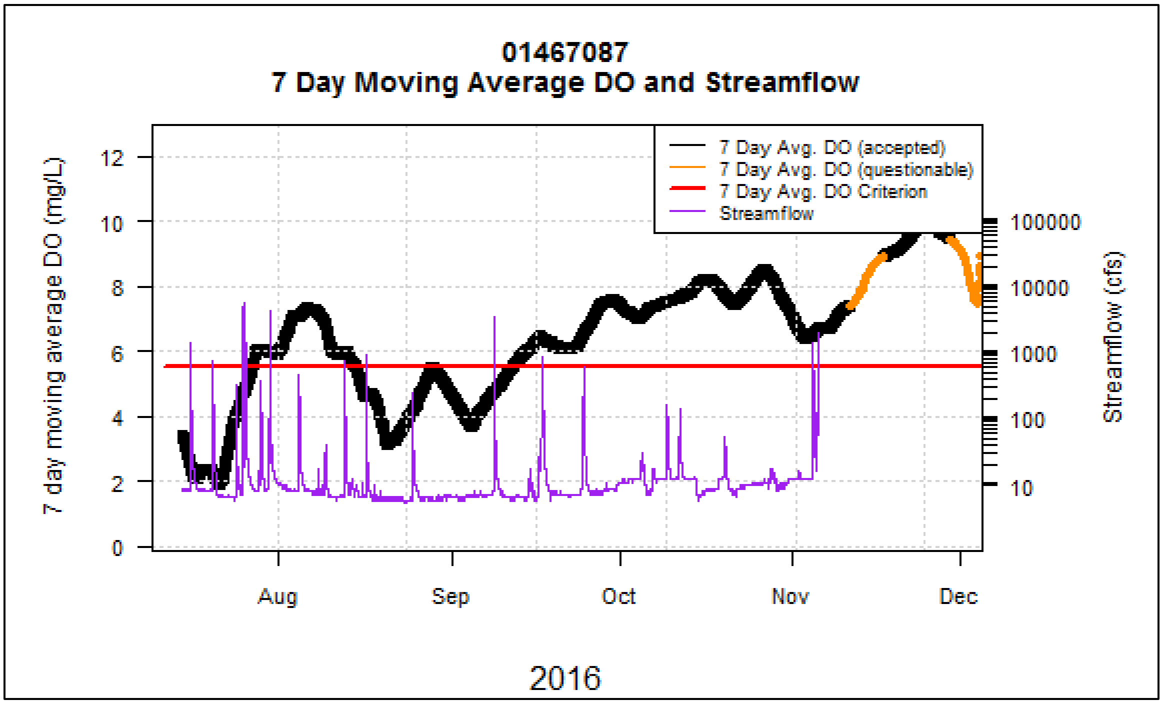


Figure 7. Gage 01467087, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

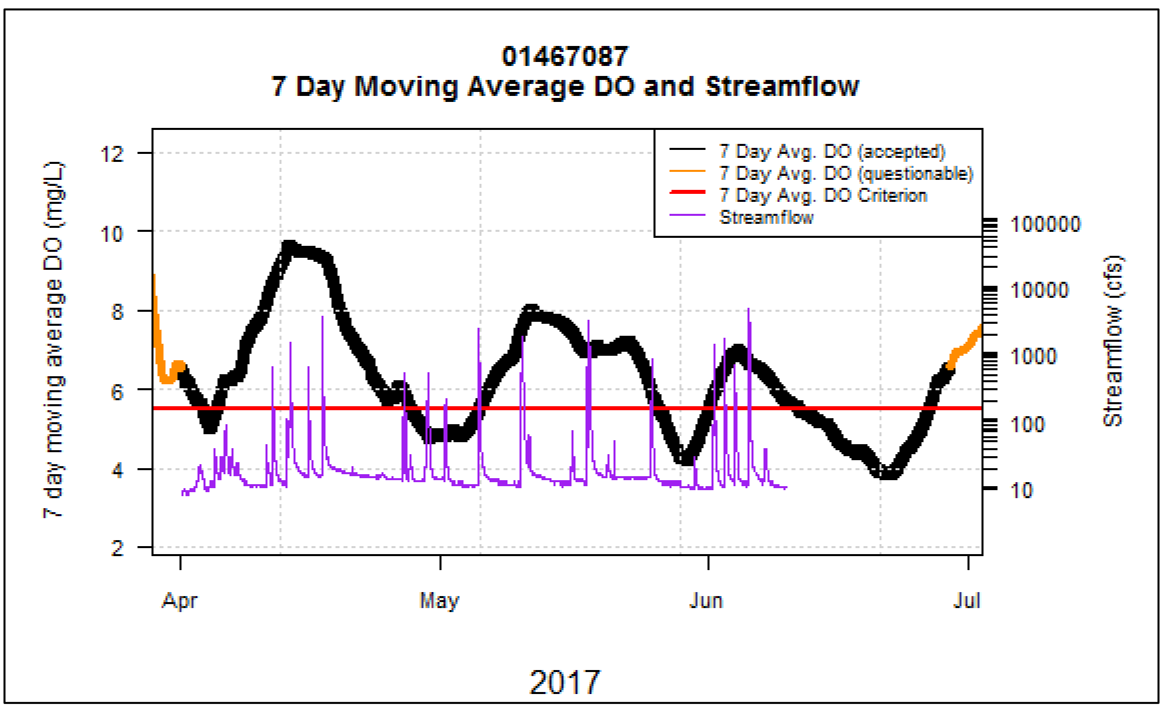


Figure 8. Gage 01467087, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

Table 15. Gage 01467086 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	WWF	30.0	3.2	5.7	8.2	6.8
Aug-16	WWF	29.0	6.5	5.9	8.1	7.0
Sep-16	WWF	29.0	3.3	6.0	9.0	7.3
Oct-16	WWF	29.0	6.5	7.3	10.4	8.9
Nov-16	WWF	28.0	6.7	8.0	12.4	10.5
Mar-17	WWF	23.0	10.0	9.8	14.9	12.2
Apr-17	WWF	28.0	6.7	6.2	11.3	9.9
May-17	WWF	30.0	3.2	7.1	10.0	8.5
Jun-17	WWF	28.0	6.7	5.6	9.5	7.7

Table 16. Gage 01467087 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	WWF	21.0	32.3	1.1	6.3	4.1
Aug-16	WWF	23.0	25.8	2.7	8.3	5.6
Sep-16	WWF	26.0	13.3	3.3	8.1	5.7
Oct-16	WWF	23.0	25.8	6.4	9.2	7.7
Nov-16	WWF	27.0	10.0	5.8	10.3	8.3
Mar-17	WWF	26.0	8.3	8.9	9.0	9.0
Apr-17	WWF	27.0	10.0	2.2	10.1	7.0
May-17	WWF	25.0	19.4	3.2	9.0	6.2
Jun-17	WWF	17.0	43.3	2.9	7.6	5.6

Table 17. Gage 01467086 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.3	8.3	7.3
Aug-16	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.5	7.5
Sep-16	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.2	7.4
Oct-16	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.0	7.5
Nov-16	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.4	7.5
Mar-17	613.0	25.5	0.0	1.4	11.5	0.0	0.0	98.6	88.5	7.3	9.2	8.0
Apr-17	718.0	29.9	0.3	3.5	23.3	0.0	0.0	96.5	76.7	6.9	9.3	7.9
May-17	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.5	7.5
Jun-17	718.0	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.7	7.6

Table 18. Gage 01467087 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	742.8	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.4	7.0
Aug-16	742.8	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.1	7.2
Sep-16	718.8	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.7	7.1
Oct-16	739.5	30.8	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.5	7.1
Nov-16	719.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.3	7.0
Mar-17	585.8	24.4	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	7.5	7.0
Apr-17	718.3	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.1	7.3
May-17	742.8	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	7.6	7.2
Jun-17	718.3	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.8	7.2

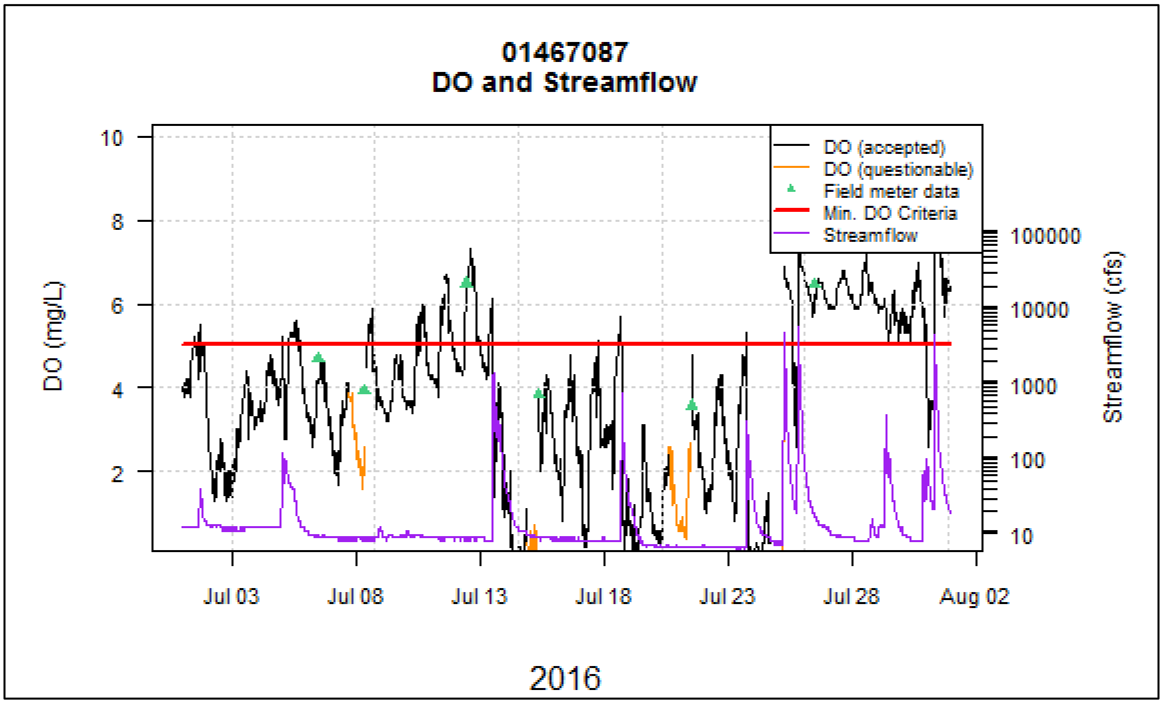


Figure 9. Gage 01467087, Dissolved Oxygen and Streamflow, July 2016.

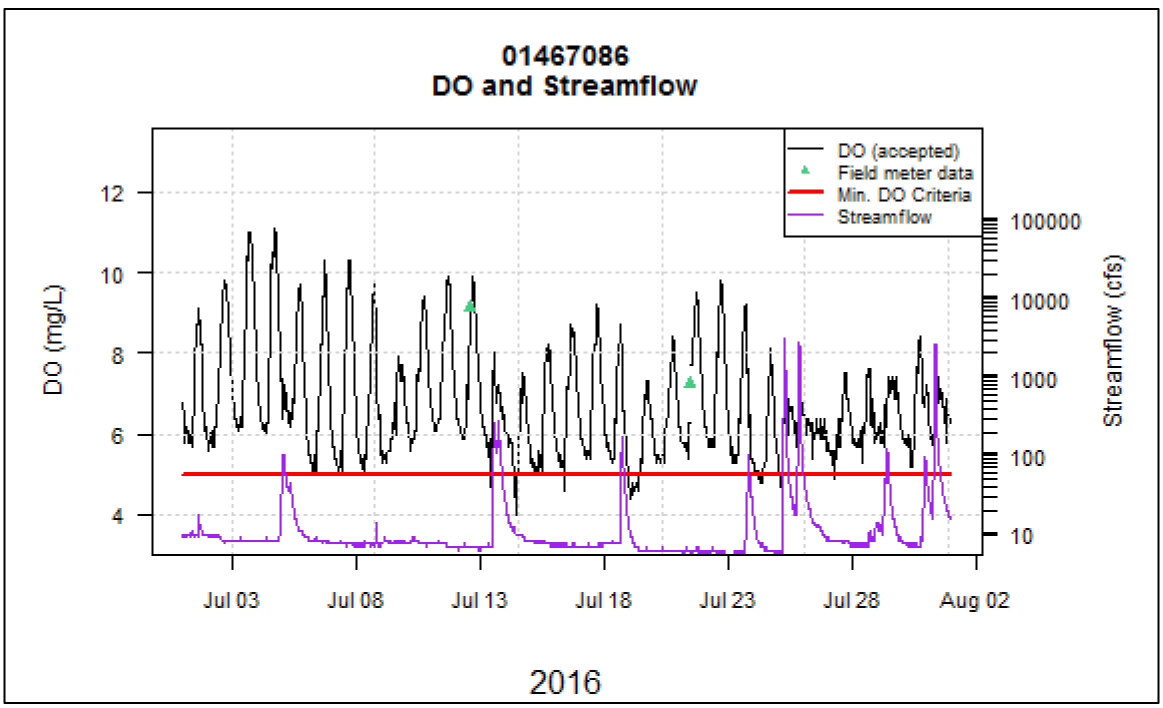


Figure 10. Gage 01467086, Dissolved Oxygen and Streamflow, July 2016.

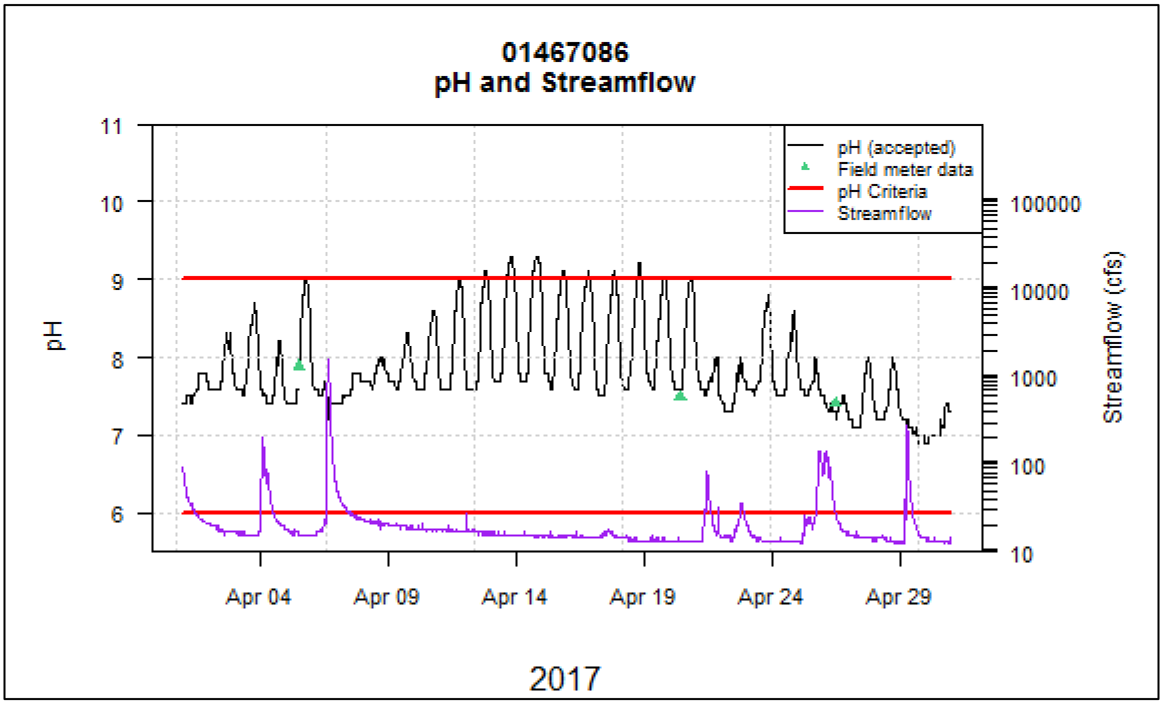


Figure 11. Gage 01467086, pH and Streamflow, April 2017.

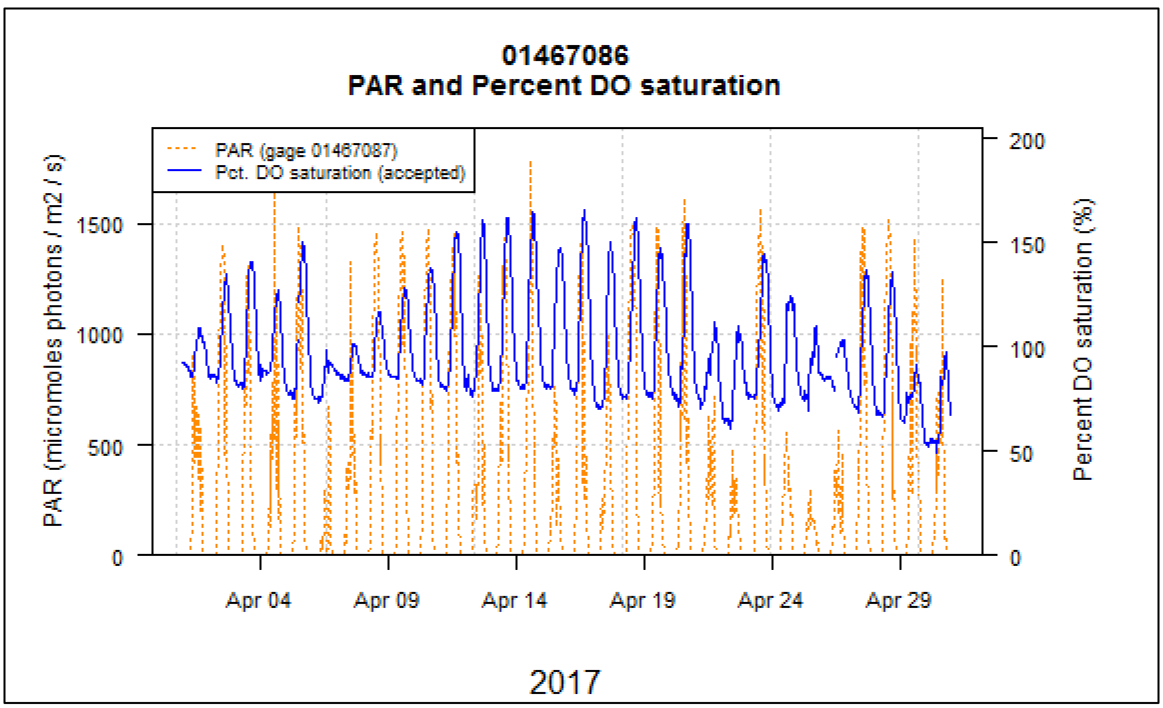


Figure 12. Gage 01467086, PAR and Percent Dissolved Oxygen Saturation, April 2017.

Figure 13. Gage 01467086, Tacony Creek at Adams Ave.

Figure 14. Gage 01467087, Frankford Creek at Castor Ave., looking downstream

Specific Conductance

Specific conductance observations were usually consistent between the two gage sites (Tables 19-20). Elevated levels of specific conductance were observed in November and March and are likely due to the effects of road salt entering the stream.

Table 19. Gage 01467086 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	743.0	31.0	0.1	58.0	842.0	608.7
Aug-16	742.0	30.9	0.3	198.0	845.0	679.2
Sep-16	719.5	30.0	0.1	96.0	887.0	728.5
Oct-16	742.0	30.9	0.3	186.0	844.0	649.0
Nov-16	718.5	29.9	0.2	140.0	838.0	719.3
Mar-17	613.0	25.5	0.0	172.0	2880.0	1183.2
Apr-17	718.0	29.9	0.3	96.0	842.0	692.3
May-17	742.5	30.9	0.2	98.0	838.0	682.1
Jun-17	718.0	29.9	0.3	58.0	847.0	653.4

Table 20. Gage 01467087 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	742.0	30.9	0.0	53.0	831.0	533.1
Aug-16	743.0	31.0	0.0	157.0	843.0	596.1
Sep-16	718.8	29.9	0.0	104.0	970.0	686.1
Oct-16	742.5	30.9	0.0	200.0	898.0	594.7
Nov-16	719.3	30.0	0.0	139.0	886.0	712.6
Mar-17	585.8	24.4	0.0	214.0	2500.0	1154.9
Apr-17	717.8	29.9	0.0	129.0	873.0	652.4
May-17	742.8	30.9	0.0	98.0	865.0	645.1
Jun-17	717.8	29.9	0.0	94.0	888.0	631.9

Temperature

Monthly mean temperatures observed at the downstream gage were usually higher than at the upstream gage. Consequently, a higher rate of temperature criteria exceedance was typically observed at the downstream gage (Tables 21-22).

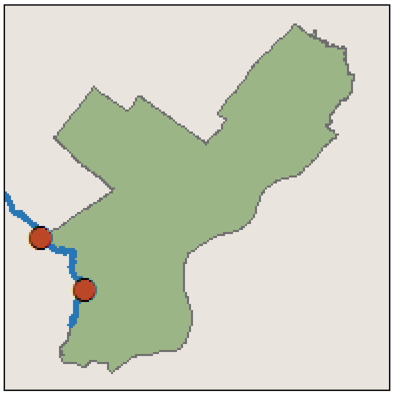
Table 21. Gage 01467086 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.1	743.0	31.0	20.3	28.3	24.5
WWF	1-Aug	15-Aug	0.0	100.0	0.3	359.0	15.0	20.0	30.0	24.8
WWF	16-Aug	31-Aug	0.0	100.0	0.3	383.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	15.4	27.3	21.2
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.6	358.0	14.9	8.8	20.7	14.6
WWF	16-Oct	31-Oct	7.3	92.7	0.0	384.0	16.0			
WWF	1-Nov	15-Nov	4.0	96.0	0.3	359.0	15.0	3.8	14.8	9.0
WWF	16-Nov	30-Nov	15.9	84.1	0.1	359.5	15.0			
WWF	1-Mar	31-Mar	41.7	58.3	0.0	613.0	25.5	0.3	15.4	6.6
WWF	1-Apr	15-Apr	69.1	30.9	0.3	359.0	15.0	6.8	23.2	14.6
WWF	16-Apr	30-Apr	75.3	24.7	0.3	359.0	15.0			
WWF	1-May	15-May	11.7	88.3	0.0	360.0	15.0	10.9	25.5	16.6
WWF	16-May	31-May	7.6	92.4	0.4	382.5	15.9			
WWF	1-Jun	15-Jun	0.0	100.0	0.1	359.5	15.0	14.4	26.7	21.1
WWF	16-Jun	30-Jun	0.0	100.0	0.4	358.5	14.9			

Table 22. Gage 01467087 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.2	742.3	30.9	21.8	30.7	25.8
WWF	1-Aug	15-Aug	0.0	100.0	0.1	359.5	15.0	22.6	31.0	26.2
WWF	16-Aug	31-Aug	0.0	100.0	0.2	383.3	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.3	358.8	14.9	16.2	28.2	22.3
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.1	359.5	15.0	11.1	19.7	15.1
WWF	16-Oct	31-Oct	2.9	97.1	0.3	383.0	16.0			
WWF	1-Nov	15-Nov	6.9	93.1	0.1	359.5	15.0	4.3	15.3	9.2
WWF	16-Nov	30-Nov	10.0	90.0	0.1	359.5	15.0			
WWF	1-Mar	31-Mar	45.9	54.1	0.0	586.0	24.4	0.2	12.8	6.9
WWF	1-Apr	15-Apr	64.5	35.5	0.1	359.5	15.0	7.6	21.8	14.9
WWF	16-Apr	30-Apr	87.8	12.2	0.2	359.3	15.0			
WWF	1-May	15-May	20.2	79.8	0.1	359.8	15.0	12.5	25.7	17.4
WWF	16-May	31-May	12.7	87.3	0.2	383.3	16.0			
WWF	1-Jun	15-Jun	2.9	97.1	0.3	358.8	14.9			
WWF	16-Jun	30-Jun	0.0	100.0	0.1	359.5	15.0	15.8	28.1	22.3

Cobbs Creek (Gages 01475530 and 01475548)



Dissolved oxygen and pH

The upstream Cobbs Creek site (01475530) always met the minimum dissolved oxygen criterion and never exceeded the 7-day average guideline (Table 23, Figures 15, 16, 19). Dissolved oxygen at the downstream site (01475548) did not always attain the minimum or the 7-day average, particularly during the warmer months. The daily mean values are presented in Tables 25-26 for informational purposes.

The pattern of dissolved oxygen and pH values between the upstream and downstream Cobbs Creek gages is likely due to greater algal activity at the downstream gage. During the spring—key months for algal growth—pH exceeded the maximum guideline at both gage sites (Tables 27-28). Algae remove CO_2 during photosynthesis, raising pH by shifting the dissolved inorganic carbon (DIC) balance toward alkaline carbonates. Furthermore, the diel fluctuations in DO were more pronounced at the downstream gage during these months (Figures 19-20).

A third indicator of increased algal activity in Cobbs Creek is the supersaturation of oxygen caused by photosynthesis. During April, the upstream gage recorded peak DO saturation levels greater than 125% during the day, while the downstream gage recorded peak DO saturation levels greater than 150% (Figures 21-22).

Table 23. Gage 01475530 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	WWF	744.0	31.0	0.0	0.0	100.0	3 4	10.7	7.5
Aug-16	WWF	711.0	29.6	0.0	0.0	100.0	5.8	11.6	7.8
Sep-16	WWF	719.3	30.0	0.0	0.0	100.0	5.9	11.9	8.2
Oct-16	WWF	740.0	30.8	0.0	0.0	100.0	7.0	12.4	9.3
Nov-16	WWF	719.0	30.0	0.0	0.0	100.0	8.2	14.5	10.5
Mar-17	WWF	682.0	28.4	0.0	0.0	100.0	8.8	15.2	11.9
Apr-17	WWF	720.0	30.0	0.0	0.0	100.0	6.0	14.3	9.8
May-17	WWF	743.3	31.0	0.0	0.0	100.0	6.7	11.1	8.8
Jun-17	WWF	719.3	30.0	0.0	0.0	100.0	5.6	10.7	8.0

Table 24. Gage 01475548 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	WWF	566.3	23.6	5.0	39.8	60.2	1.1	9.4	5.4
Aug-16	WWF	743.0	31.0	0.0	18.1	81.9	1.3	10.8	6.6
Sep-16	WWF	717.5	29.9	0.0	0.0	100.0	5.7	11.6	8.2
Oct-16	WWF	742.5	30.9	0.0	0.0	100.0	5.3	12.6	9.2
Nov-16	WWF	701.3	29.2	0.0	0.0	100.0	5.1	13.1	9.4
Mar-17	WWF	682.5	28.4	0.0	0.0	100.0	8.3	18.9	12.8
Apr-17	WWF	718.0	29.9	0.0	1.6	98.4	3.5	16.9	9.7
May-17	WWF	744.0	31.0	0.0	1.3	98.7	4.5	12.5	7.7
Jun-17	WWF	718.0	29.9	0.0	17.3	82.7	2.1	9.9	6.6

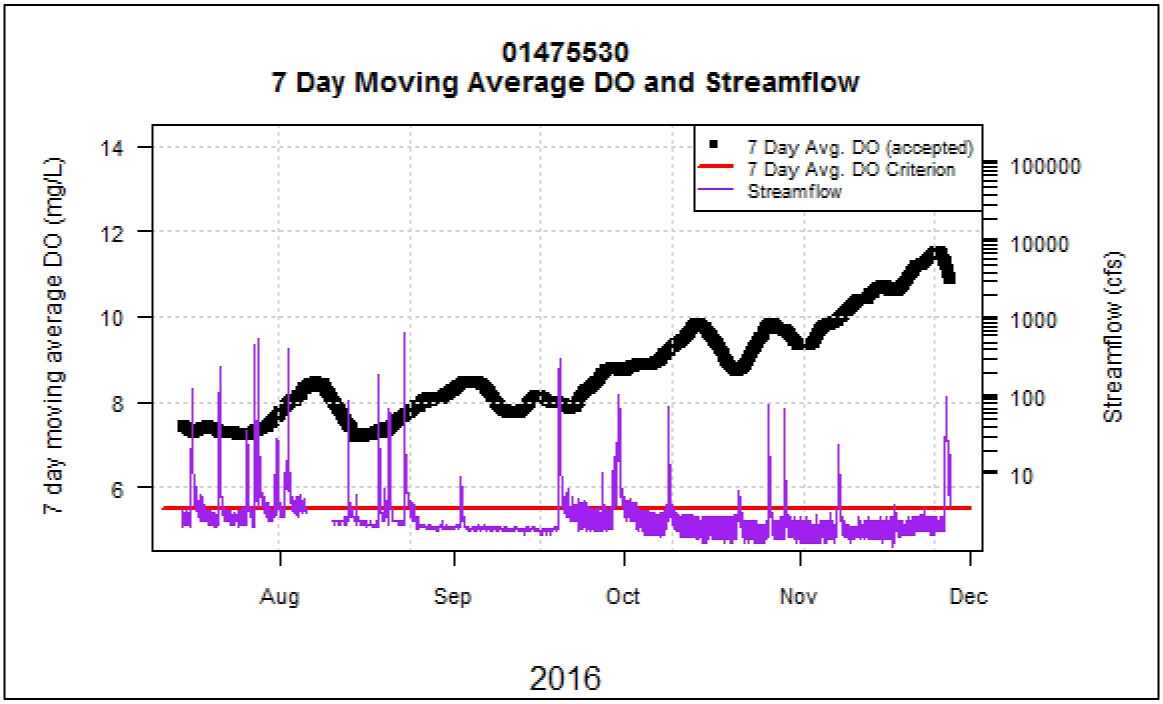


Figure 15. Gage 01475530, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

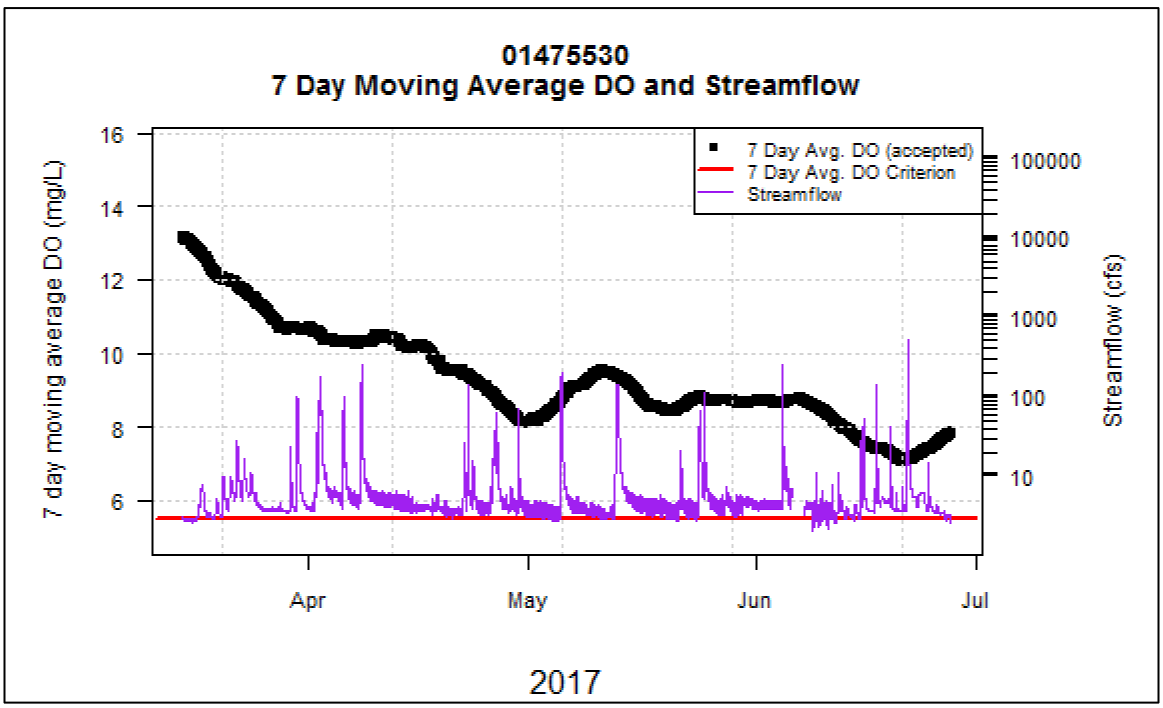


Figure 16. Gage 01475530, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

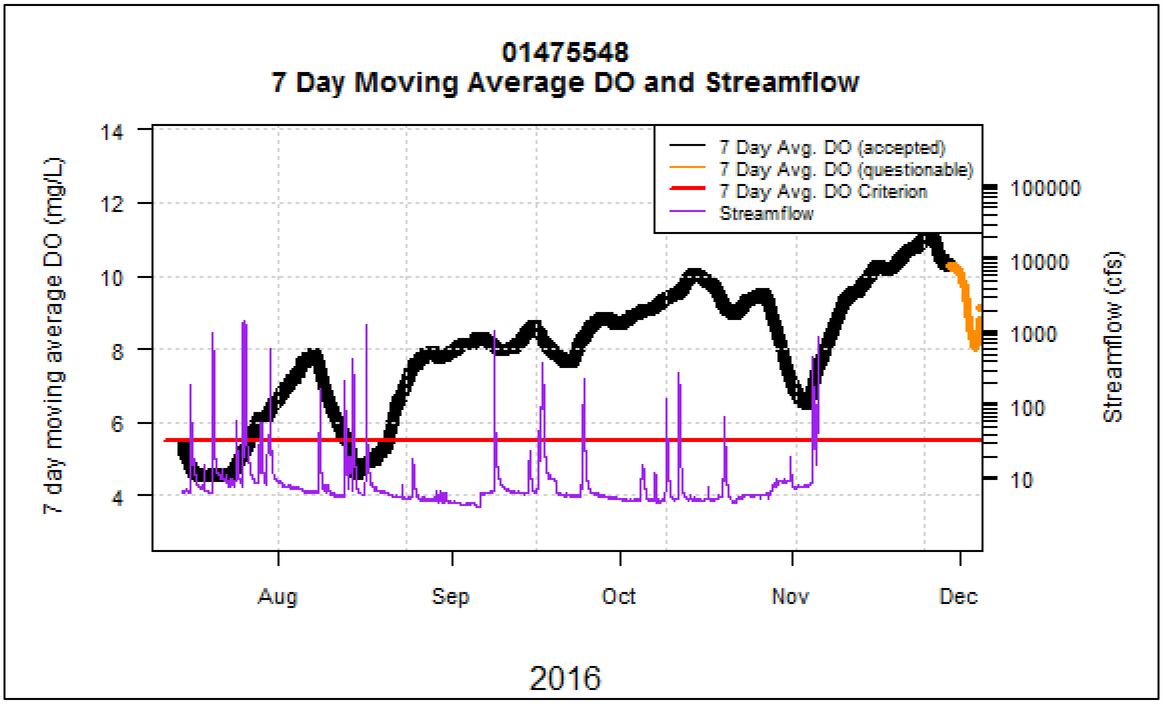


Figure 17. Gage 01475548, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

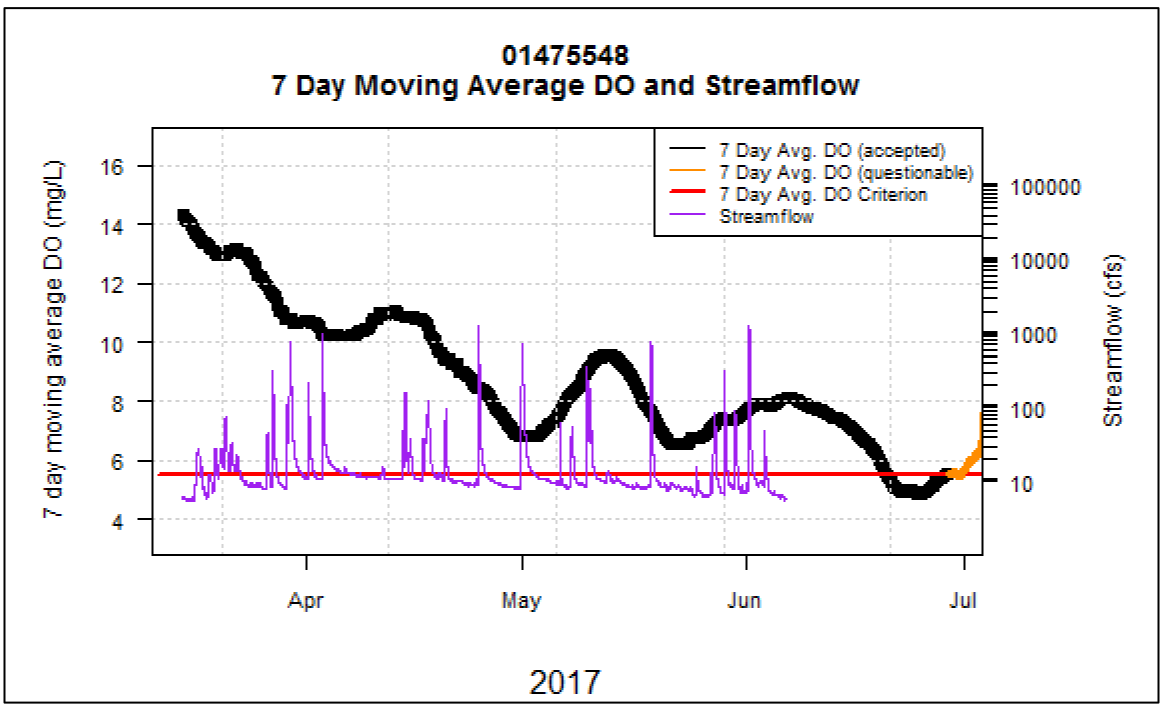


Figure 18. Gage 01475548, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

Table 25. Gage 01475530 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	WWF	31.0	0.0	6.8	8.5	7.5
Aug-16	WWF	28.0	9.7	7.0	8.6	7.9
Sep-16	WWF	29.0	3.3	7.4	9.2	8.2
Oct-16	WWF	29.0	6.5	8.0	10.5	9.2
Nov-16	WWF	29.0	3.3	9.1	12.0	10.5
Mar-17	WWF	27.0	5.0	9.8	13.7	11.8
Apr-17	WWF	30.0	0.0	7.7	11.1	9.8
May-17	WWF	30.0	3.2	7.8	9.6	8.8
Jun-17	WWF	29.0	3.3	6.9	9.0	8.0

Table 26. Gage 01475548 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	WWF	14.0	54.8	4.2	6.3	5.1
Aug-16	WWF	27.0	12.9	3.5	8.1	6.8
Sep-16	WWF	26.0	13.3	6.7	9.5	8.2
Oct-16	WWF	29.0	6.5	6.1	10.7	9.2
Nov-16	WWF	25.0	16.7	6.0	11.6	9.6
Mar-17	WWF	26.0	8.6	9.3	15.2	12.8
Apr-17	WWF	28.0	6.7	5.9	11.6	9.7
May-17	WWF	31.0	0.0	5.5	10.2	7.7
Jun-17	WWF	28.0	6.7	4.3	8.5	6.7

Table 27. Gage 01475530 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.1	7.3
Aug-16	742.0	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.9	7.5
Sep-16	719.3	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.5	7.4
Oct-16	740.0	30.8	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.0	7.4
Nov-16	719.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.0	7.3
Mar-17	682.0	28.4	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.5
Apr-17	720.0	30.0	0.0	1.1	10.0	0.0	0.0	98.9	90.0	7.0	9.2	7.7
May-17	743.3	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.8	7.5
Jun-17	719.3	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.8	8.3	7.4

Table 28. Gage 01475548 pH Criteria Summary Results by Month

Month	total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	606.0	25.3	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.1	7.3
Aug-16	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.8	7.6
Sep-16	719.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.8	8.0
Oct-16	742.8	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.6	7.8
Nov-16	719.3	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.1	7.6
Mar-17	682.5	28.4	0.0	1.1	10.3	0.0	0.0	98.9	89.7	7.1	9.2	8.0
Apr-17	718.0	29.9	0.0	1.7	10.0	0.0	0.0	98.3	90.0	7.1	9.2	7.8
May-17	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.4	7.5
Jun-17	718.0	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.0	7.4

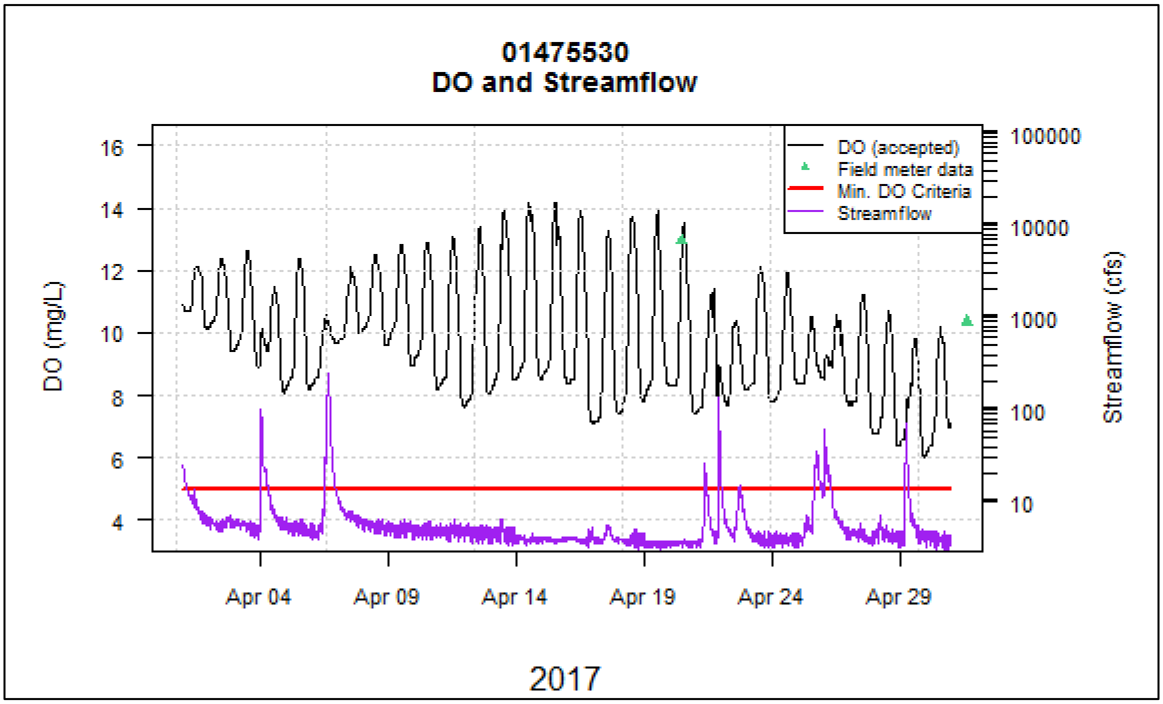


Figure 19. Gage 01475530, Dissolved Oxygen and Streamflow, April 2017.

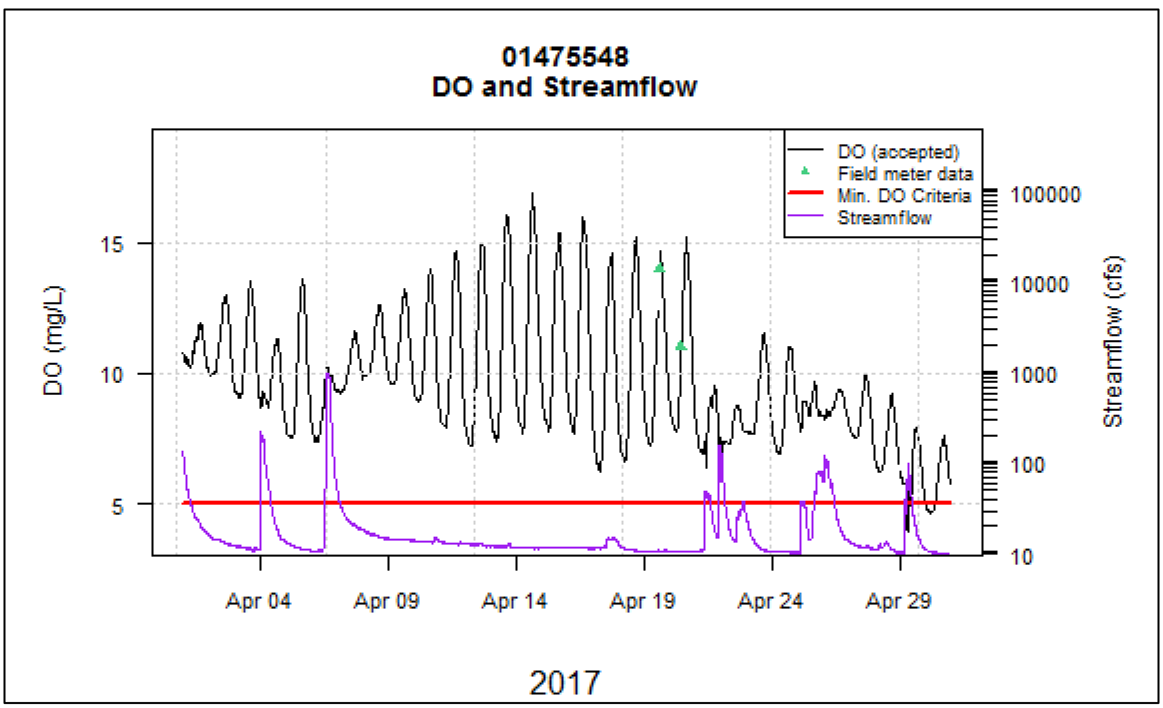


Figure 20. Gage 01475548, Dissolved Oxygen and Streamflow, April 2017.

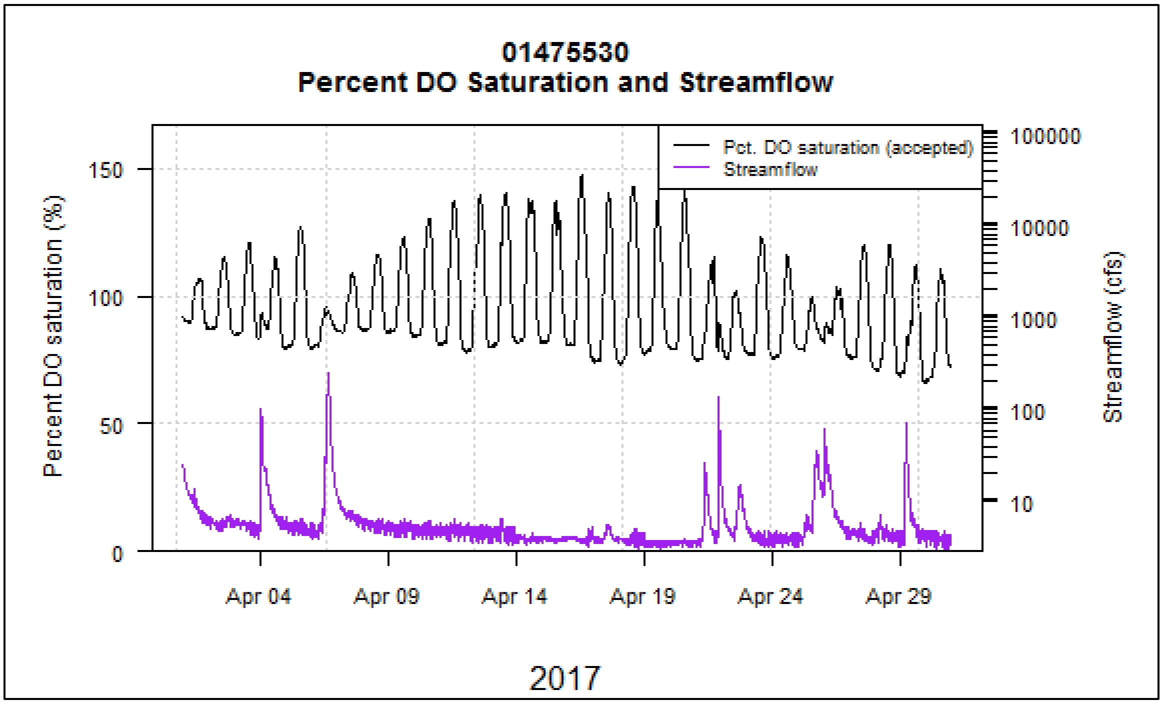


Figure 21. Gage 01475530, Percent DO Saturation and Streamflow, April 2017.

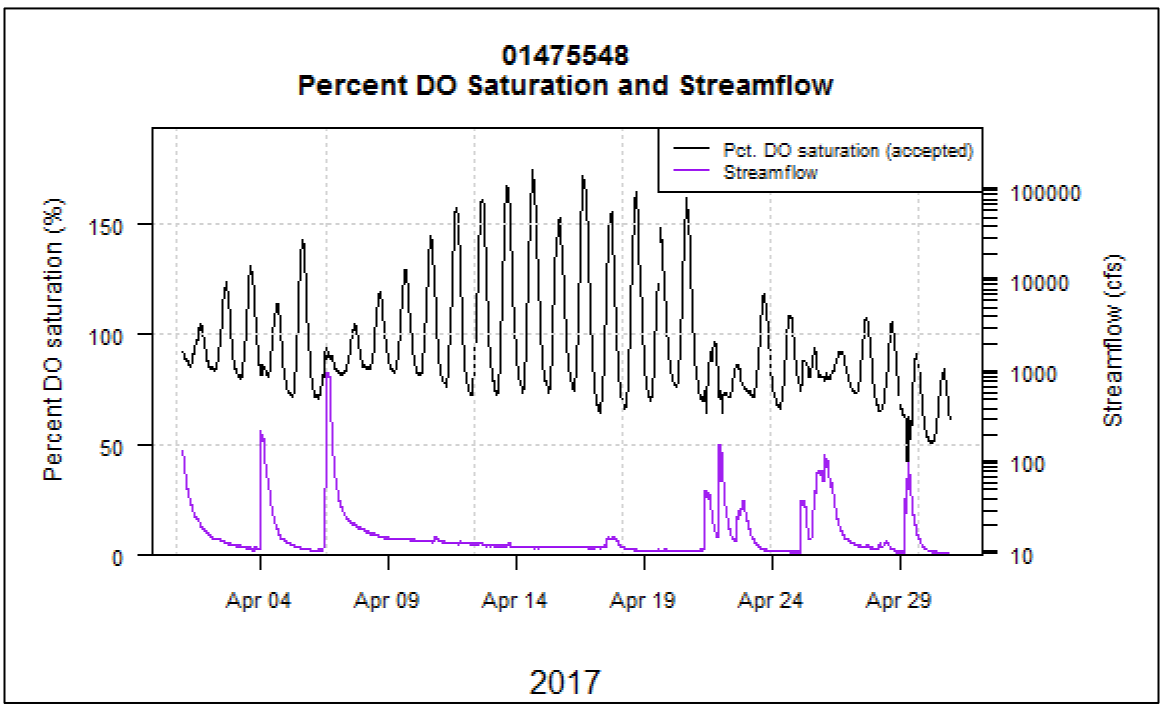


Figure 22. Gage 01475548, Percent DO Saturation and Streamflow, April 2017.

Figure 23. Gage 01475530, Cobbs Creek at Rte. 1, looking upstream

Figure 24. Gage 01475548, Cobbs Creek at Mt. Moriah Cemetery

Specific Conductance

Specific conductance observations were similar to those observed in Tacony Creek, with the exception of consistently higher conductance observed at the downstream gage 01475548 (Tables 29-30). Road salt may have had some impact on conductance at both gages in March. However, the typical pattern of stormwater lowering conductance levels in the stream is well-observed during the storms that occurred in June (Figures 25-26).

Table 29. Gage 01475530 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	744.0	31.0	0.0	41.0	593.0	460.5
Aug-16	729.5	30.4	0.0	55.0	603.0	534.2
Sep-16	718.3	29.9	0.0	90.0	619.0	554.6
Oct-16	740.0	30.8	0.0	108.0	605.0	534.3
Nov-16	719.0	30.0	0.0	72.0	602.0	545.7
Mar-17	682.0	28.4	0.0	149.0	3060.0	944.3
Apr-17	720.0	30.0	0.0	102.0	935.0	554.7
May-17	743.3	31.0	0.0	86.0	667.0	556.8
Jun-17	719.3	30.0	0.0	46.0	642.0	532.8

Table 30. Gage 01475548 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	605.8	25.2	0.0	41.0	747.0	529.8
Aug-16	706.5	29.4	0.0	84.0	744.0	566.4
Sep-16	652.5	27.2	0.0	107.0	801.0	640.0
Oct-16	742.8	30.9	0.0	188.0	754.0	603.9
Nov-16	719.3	30.0	0.0	152.0	784.0	670.6
Mar-17	682.5	28.4	0.0	148.0	3500.0	1097.8
Apr-17	687.0	28.6	0.0	175.0	771.0	559.3
May-17	744.0	31.0	0.0	101.0	757.0	591.7
Jun-17	718.0	29.9	0.0	115.0	760.0	549.2

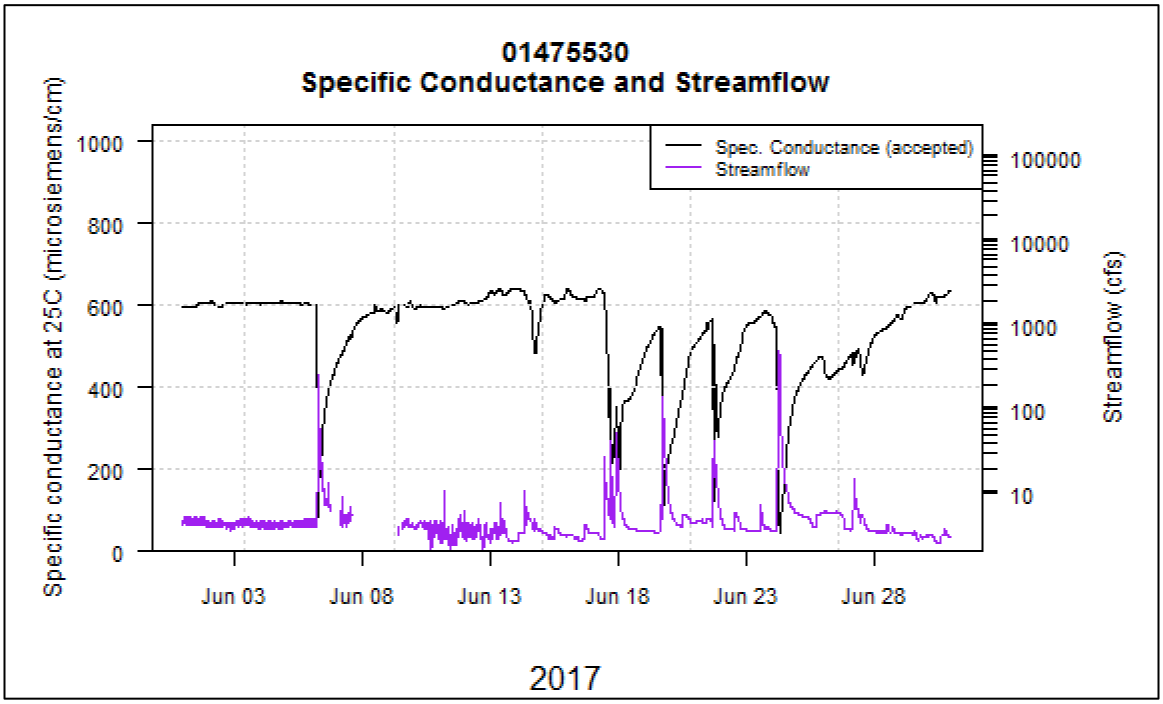


Figure 25. Gage 01475530, Specific Conductance and Streamflow, June 2017.

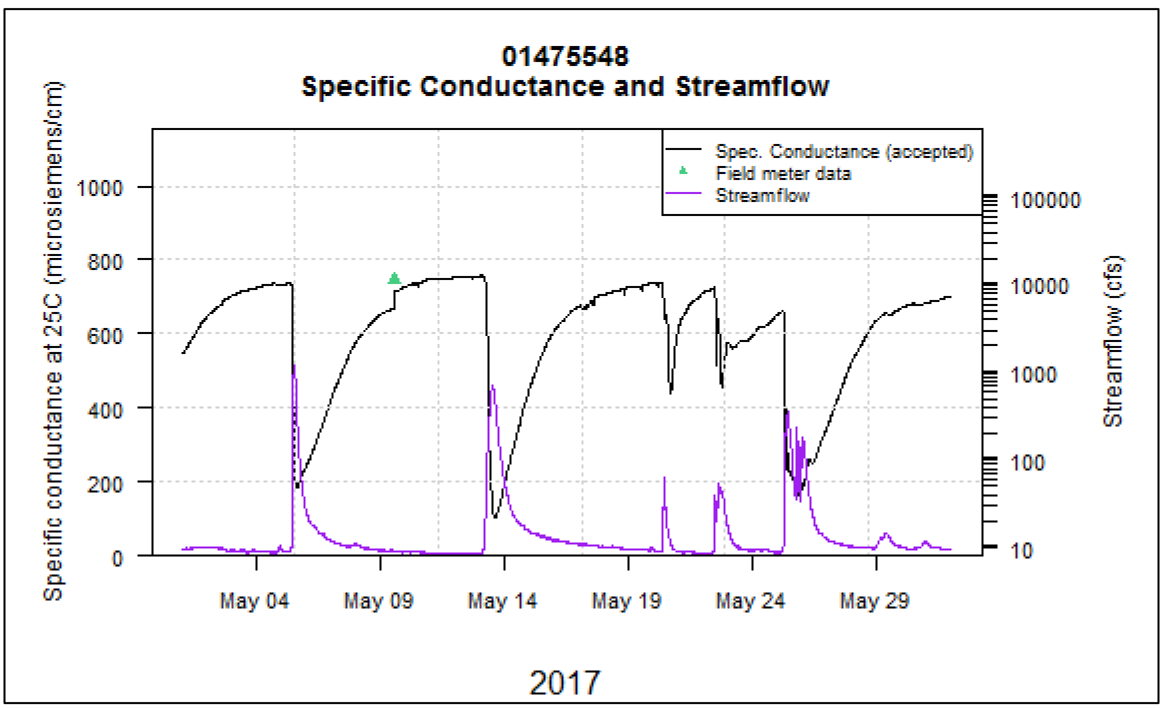


Figure 26. Gage 01475548, Specific Conductance and Streamflow, May 2017.

Temperature

As was also observed in Tacony Creek, slightly higher temperatures were usually recorded at the downstream gage in Cobbs Creek, resulting in more frequent exceedance of temperature maximum criteria at the downstream gage in March and April (Tables 31-32).

Table 31. Gage 01475530 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.0	744.0	31.0	18.7	28.9	23.1
WWF	1-Aug	15-Aug	0.0	100.0	0.5	358.3	14.9	19.3	28.6	23.6
WWF	16-Aug	31-Aug	0.0	100.0	0.0	384.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.2	359.3	15.0	15.0	25.8	20.3
WWF	16-Sep	30-Sep	0.0	100.0	0.3	359.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.3	358.8	14.9	8.8	19.7	14.4
WWF	16-Oct	31-Oct	1.6	98.4	0.7	381.3	15.9			
WWF	1-Nov	15-Nov	1.9	98.1	0.0	360.0	15.0	4.1	14.5	9.1
WWF	16-Nov	30-Nov	16.4	83.6	0.3	359.0	15.0			
WWF	1-Mar	31-Mar	36.9	63.1	8.3	682.0	28.4	0.0	14.3	6.4
WWF	1-Apr	15-Apr	68.9	31.1	0.0	360.0	15.0	7.1	22.2	14.2
WWF	16-Apr	30-Apr	68.3	31.7	0.0	360.0	15.0			
WWF	1-May	15-May	6.0	94.0	0.2	359.3	15.0	10.4	24.0	15.8
WWF	16-May	31-May	3.5	96.5	0.0	384.0	16.0			
WWF	1-Jun	15-Jun	0.0	100.0	0.0	360.0	15.0	13.7	26.4	20.2
WWF	16-Jun	30-Jun	0.0	100.0	0.2	359.3	15.0			

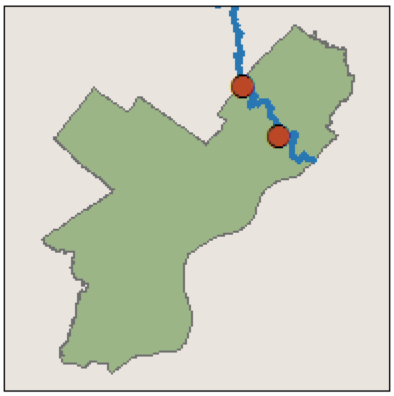
Table 32. Gage 01475548 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	18.5	606.0	25.3	20.9	28.3	25.0
WWF	1-Aug	15-Aug	0.0	100.0	0.0	360.0	15.0	20.7	30.1	25.0
WWF	16-Aug	31-Aug	0.0	100.0	9.8	346.5	14.4			
WWF	1-Sep	15-Sep	0.0	100.0	0.3	359.0	15.0	15.6	27.2	21.3
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.3	358.8	14.9	9.2	20.0	14.7
WWF	16-Oct	31-Oct	5.4	94.6	0.0	384.0	16.0			
WWF	1-Nov	15-Nov	2.6	97.4	0.2	359.3	15.0	3.9	14.7	8.9
WWF	16-Nov	30-Nov	12.9	87.1	0.0	360.0	15.0			
WWF	1-Mar	31-Mar	41.0	59.0	8.3	682.5	28.4	0.0	14.1	6.4
WWF	1-Apr	15-Apr	69.7	30.3	0.0	360.0	15.0	7.5	22.5	14.8
WWF	16-Apr	30-Apr	84.3	15.7	0.6	358.0	14.9			
WWF	1-May	15-May	12.1	87.9	0.0	360.0	15.0	11.6	25.1	16.8
WWF	16-May	31-May	7.3	92.7	0.0	384.0	16.0			
WWF	1-Jun	15-Jun	0.0	100.0	0.3	359.0	15.0	15.1	26.8	21.5
WWF	16-Jun	30-Jun	0.0	100.0	0.3	359.0	15.0			

Gages in Separate Sewer System Watersheds

Gages in the Pennypack, Wissahickon and Poquessing watersheds are situated in the separate sewer system areas of Philadelphia. Although these sites are not affected by combined sewer overflows, discharge of untreated stormwater runoff from stormwater outfalls can negatively affect water quality.

Pennypack Creek (Gages 01467042 and 01467048)



Dissolved oxygen and pH

Both the upstream (01467042) and downstream (01467048) gages of Pennypack Creek showed pronounced diel fluctuations in dissolved oxygen and pH as a result of algal activity. These patterns are most evident during dry weather periods, when algal growth is able to excel because of abundant sunshine and a lack of storm events that might otherwise scour the algal population.

At both upstream and downstream Pennypack Creek gages, periods of dry weather in warm months are conducive to excessive algal growth. During these periods, algal populations seemed to flourish, with daily DO amplitudes at times nearly 10 mg/L during April (Figures 31-32). Reconstruction of the Rhawn St. bridge prevented DO data collection during early April at the downstream site.

In April, maximum daily pH fluctuations of approximately 1.5 units were observed (Figures 33-34). Maximum pH criteria exceedance occurred mainly at the lower gage in both the spring and late summer. It would be reasonable to conclude that if not for periodic interruptions of algal activity due to rainfall, those extreme fluctuations and chronic pH criteria exceedance would likely occur through the entire season.

Algal communities in the area of both gages recover quickly after storm events, as seen in Figures 33-34. Prior to storms occurring in April 2017, both DO and pH showed the typical pronounced fluctuations indicative of strong algal activity. This stopped abruptly with the storms, when much of the algae was likely scoured away and overcast conditions likely inhibited further growth, as indicated by the PAR data at 01467042 for April 2017 (Figure 35). However, within 2-3 days of the conclusion of the rainfall and the return of sunny conditions, fluctuations of DO and pH resumed, indicative of high algal density. This not only demonstrates the resilience of the algal population in this ecosystem, but also a likely abundance of nutrients that allows regrowth to occur so quickly.

Table 33. Gage 01467042 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	TSF	737.0	30.7	0.0	0.0	100.0	5.1	11.0	7.3
Aug-16	TSF	741.8	30.9	0.0	0.0	100.0	5.4	11.1	7.8
Sep-16	TSF	718.5	29.9	0.0	0.0	100.0	5.6	11.8	8.3
Oct-16	TSF	741.8	30.9	0.0	0.0	100.0	5.5	11.9	9.2
Nov-16	TSF	719.5	30.0	0.0	0.0	100.0	7.0	13.4	10.5
Mar-17	TSF	706.5	29.4	0.0	0.0	100.0	6.1	17.0	12.0
Apr-17	TSF	719.5	30.0	0.0	0.0	100.0	5.6	16.7	9.9
May-17	TSF	731.0	30.5	0.0	0.0	100.0	5.4	12.1	8.6
Jun-17	TSF	719.0	30.0	0.0	0.0	100.0	5.7	10.2	7.9

Table 34. Gage 01467048 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	TSF	680.0	28.3	8.6	0.0	100.0	5.2	11.7	7.5
Aug-16	TSF	737.5	30.7	0.9	0.0	100.0	5.0	15.3	7.8
Sep-16	TSF	177.5	7.4	75.3	0.0	100.0	6.0	10.6	7.7
Oct-16	TSF	680.0	28.3	8.6	0.0	100.0	6.8	13.6	9.7
Nov-16	TSF	718.0	29.9	0.3	0.0	100.0	8.5	17.7	11.2
Mar-17	TSF	668.5	27.9	5.1	0.0	100.0	9.3	17.7	12.8
Apr-17	TSF	274.0	11.4	61.9	0.0	100.0	6.4	17.4	9.5
May-17	TSF	741.5	30.9	0.3	0.0	100.0	6.7	13.2	9.1
Jun-17	TSF	720.0	30.0	0.0	0.0	100.0	6.2	11.0	8.2

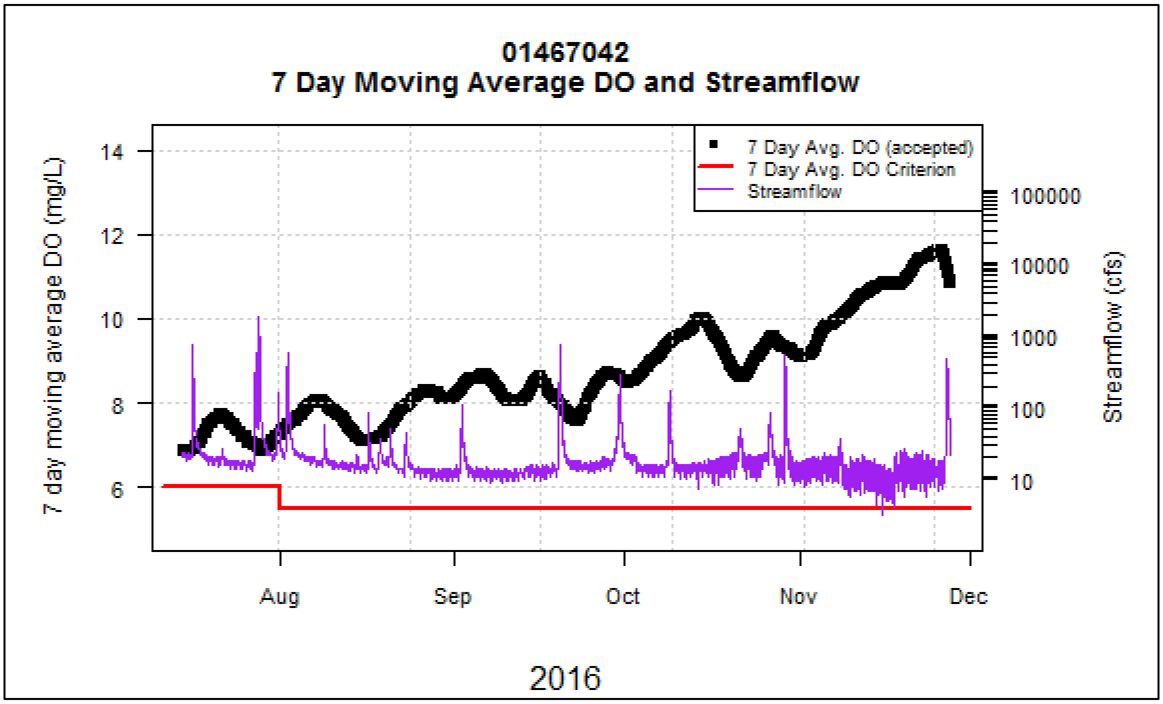


Figure 27. Gage 01467042, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

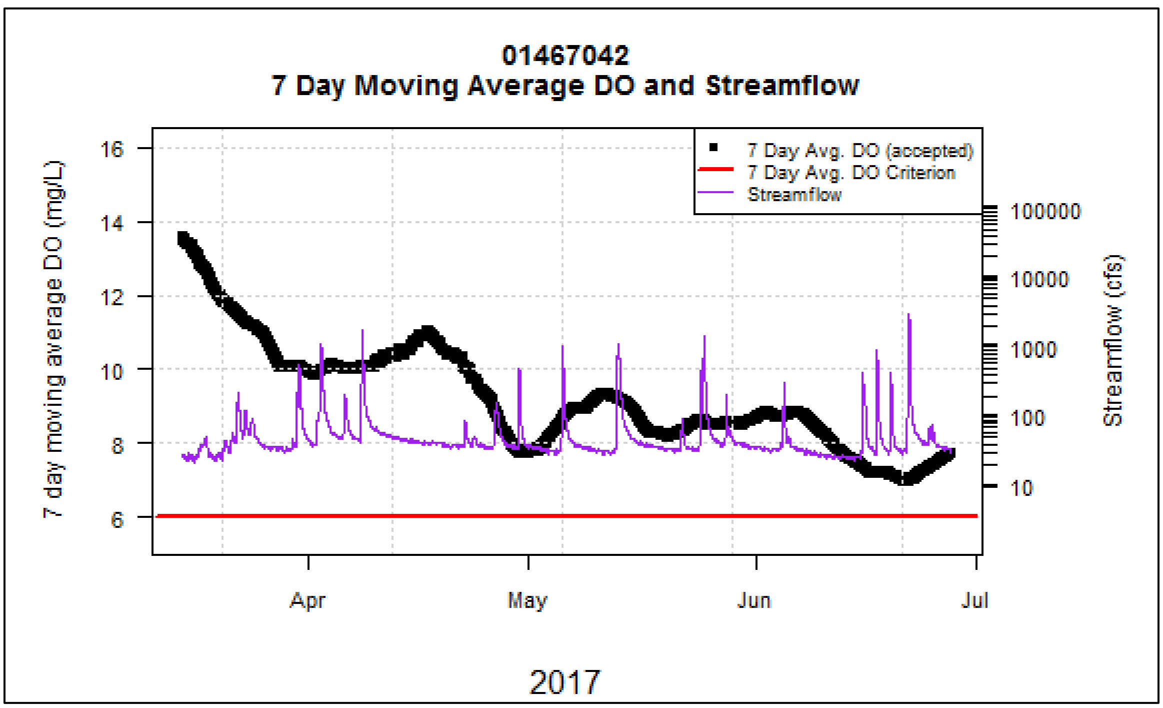


Figure 28. Gage 01467042, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

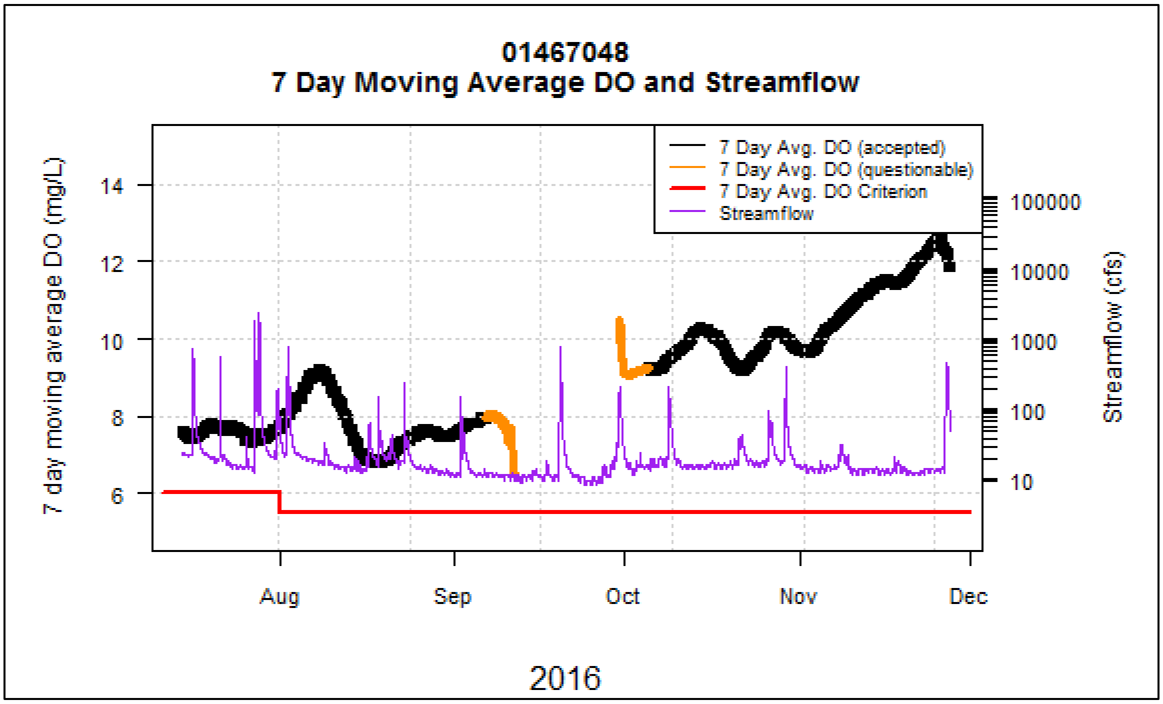


Figure 29. Gage 01467048, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

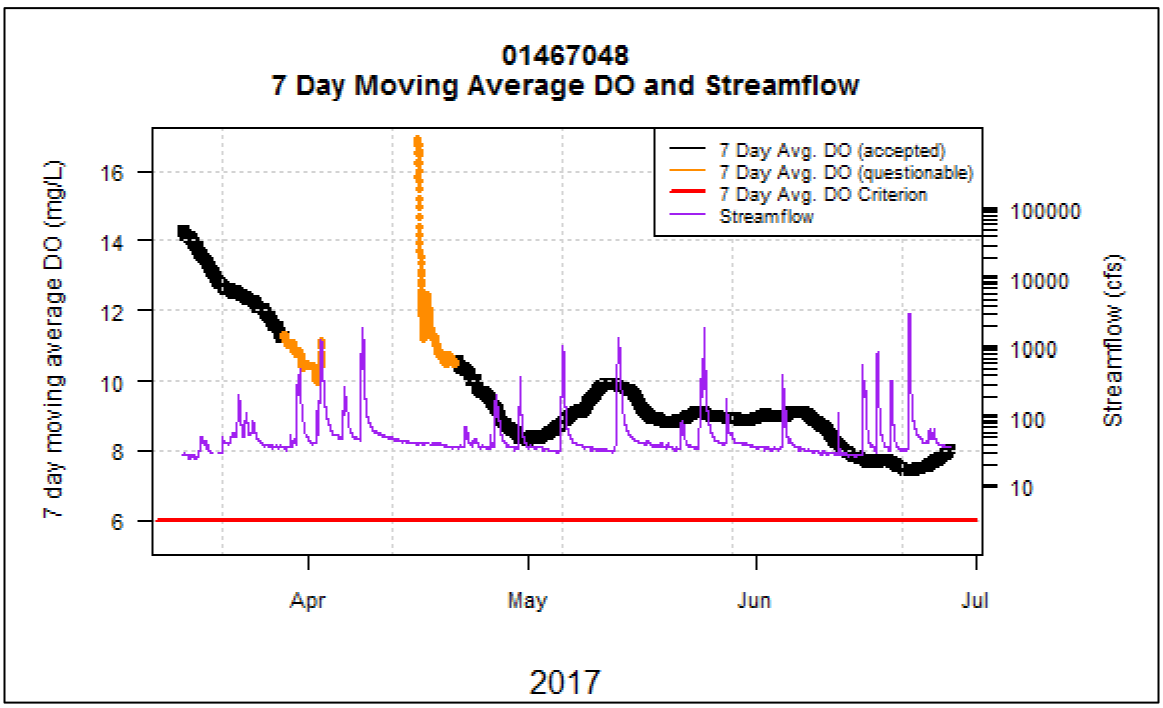


Figure 30. Gage 01467048, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

Table 35. Gage 01467042 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	TSF	28.0	9.7	6.3	8.6	7.3
Aug-16	TSF	28.0	9.7	6.7	8.6	7.7
Sep-16	TSF	28.0	6.7	6.9	9.3	8.3
Oct-16	TSF	28.0	9.7	7.9	10.3	9.2
Nov-16	TSF	29.0	3.3	8.0	12.1	10.5
Mar-17	TSF	28.0	4.9	9.0	14.1	11.9
Apr-17	TSF	29.0	3.3	6.6	11.2	9.9
May-17	TSF	28.0	9.7	7.4	9.7	8.6
Jun-17	TSF	29.0	3.3	6.5	9.1	7.9

Table 36. Gage 01467048 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	TSF	23.0	25.8	6.9	8.4	7.5
Aug-16	TSF	29.0	6.5	6.3	9.8	7.7
Sep-16	TSF	7.0	76.7	6.9	8.3	7.8
Oct-16	TSF	25.0	19.4	7.9	10.7	9.7
Nov-16	TSF	29.0	3.3	9.5	12.9	11.2
Mar-17	TSF	26.0	11.4	10.3	14.7	12.8
Apr-17	TSF	10.0	66.7	7.4	11.6	9.4
May-17	TSF	29.0	6.5	8.1	10.7	9.0
Jun-17	TSF	30.0	0.0	7.0	9.4	8.2

Table 37. Gage 01467042 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hours max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	742.3	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.9	8.3	7.5
Aug-16	742.3	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.4	7.7
Sep-16	718.5	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.4	7.7
Oct-16	741.8	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.6
Nov-16	719.5	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.8	7.5
Mar-17	706.5	29.4	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.6
Apr-17	719.5	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	9.0	7.7
May-17	742.0	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.1	7.5
Jun-17	719.3	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.8	7.5

Table 38. Gage 01467048 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	678.5	28.3	8.8	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.7	7.6
Aug-16	737.5	30.7	0.9	1.9	12.9	0.0	0.0	98.1	87.1	7.0	9.2	7.8
Sep-16	177.5	7.4	75.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.3	7.6
Oct-16	680.0	28.3	8.6	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.8	7.7
Nov-16	718.5	29.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.8	7.7
Mar-17	668.5	27.9	5.1	7.0	37.9	0.0	0.0	93.0	62.1	7.5	9.4	8.3
Apr-17	274.0	11.4	61.9	4.2	16.7	0.0	0.0	95.8	83.3	7.3	9.4	7.9
May-17	741.5	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.7	7.7
Jun-17	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.2	7.6

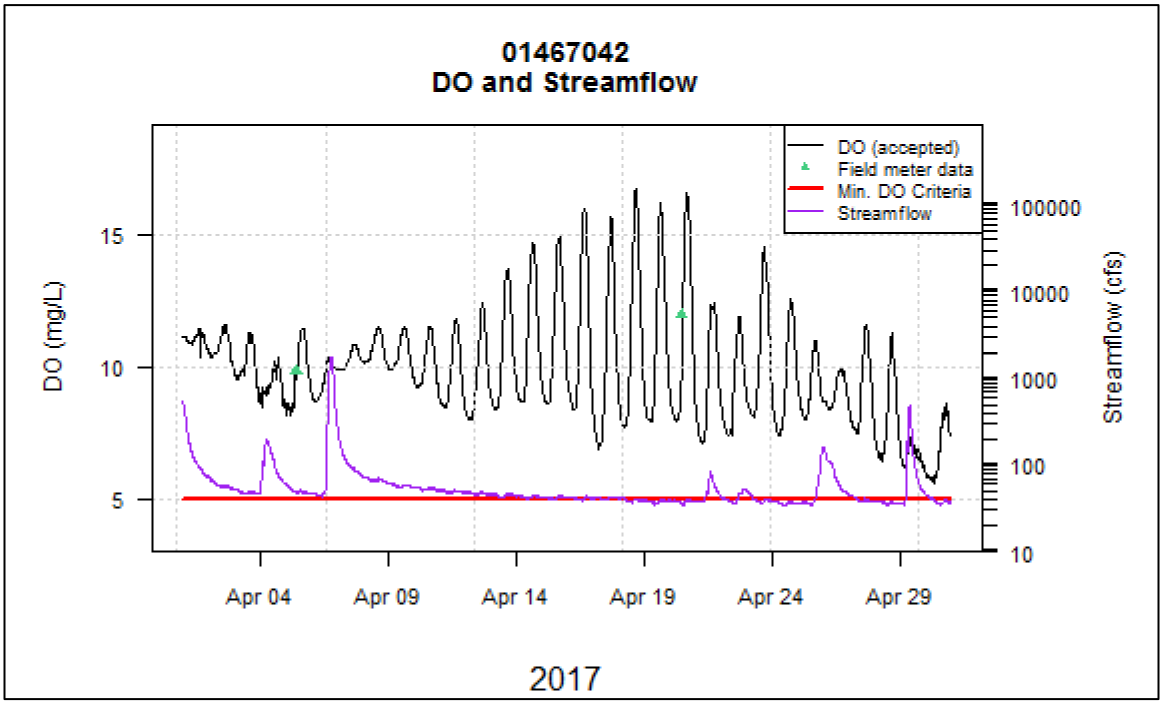


Figure 31. Gage 01467042, Dissolved Oxygen and Streamflow, April 2017.

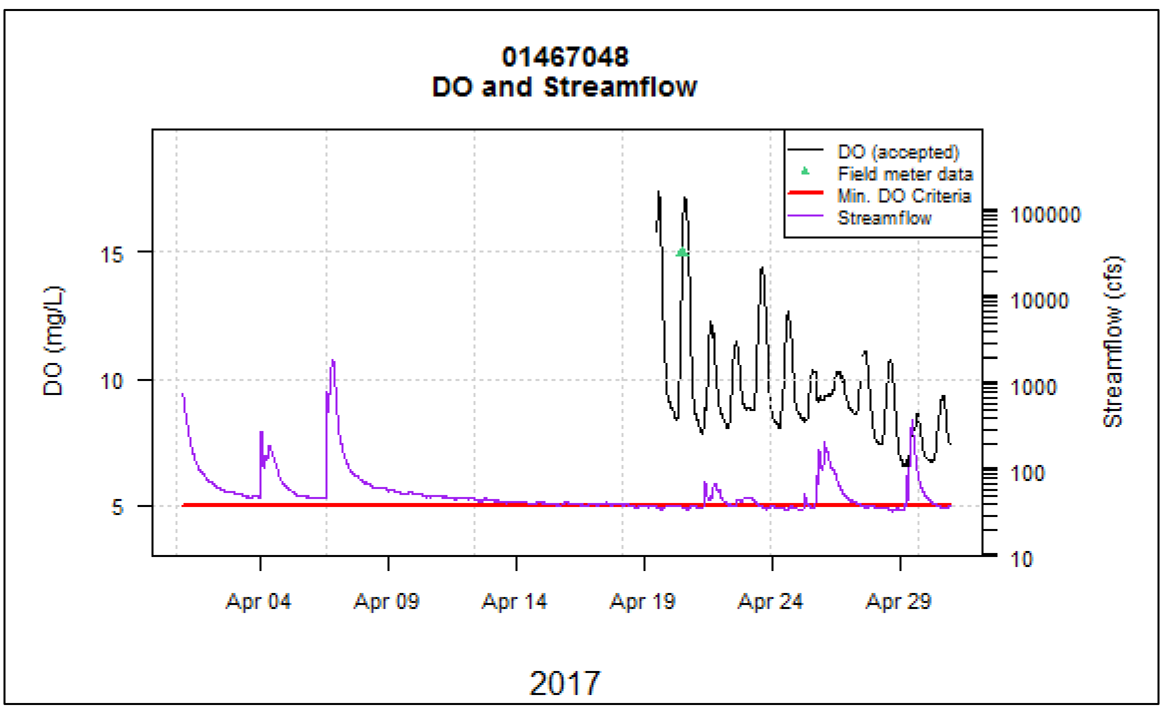


Figure 32. Gage 01467048, Dissolved Oxygen and Streamflow, April 2017.

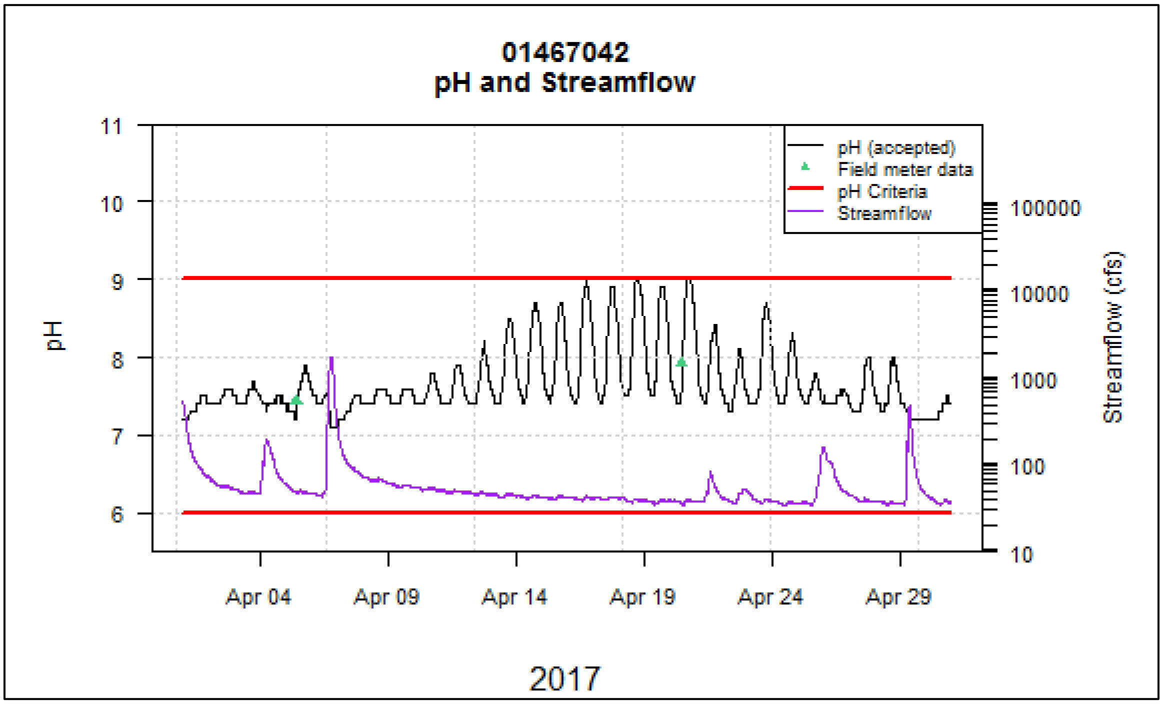


Figure 33. Gage 01467042, pH and Streamflow, April 2017.

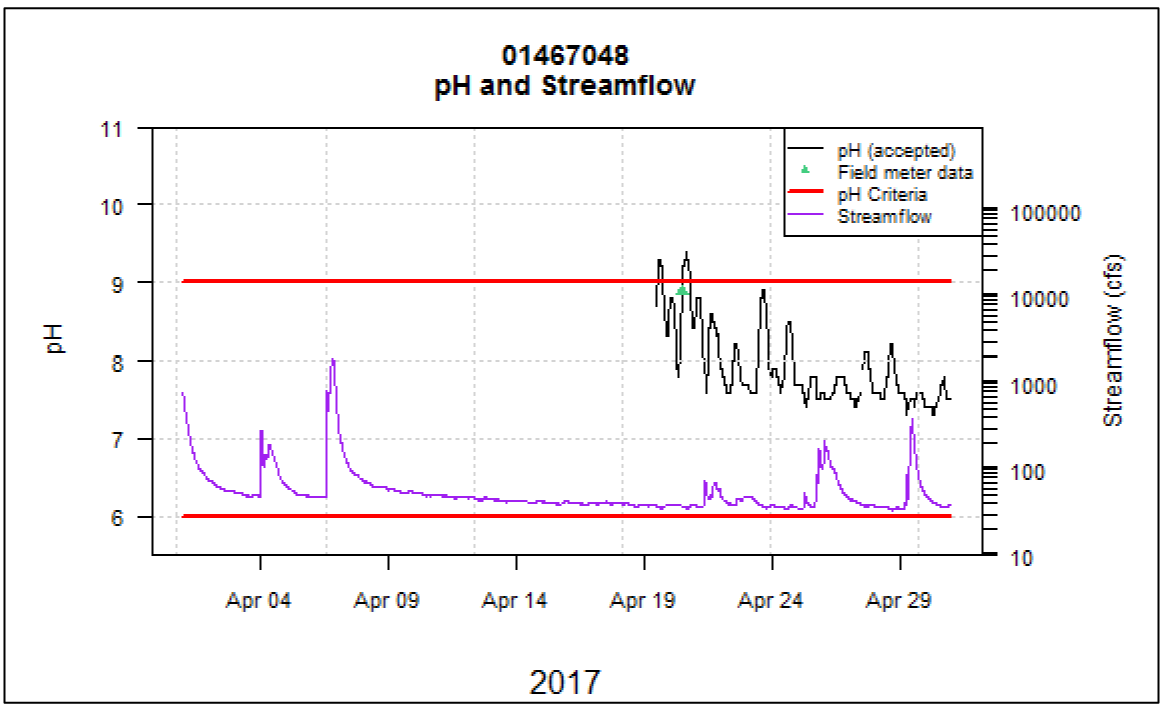


Figure 34. Gage 01467048, pH and Streamflow, April 2017.

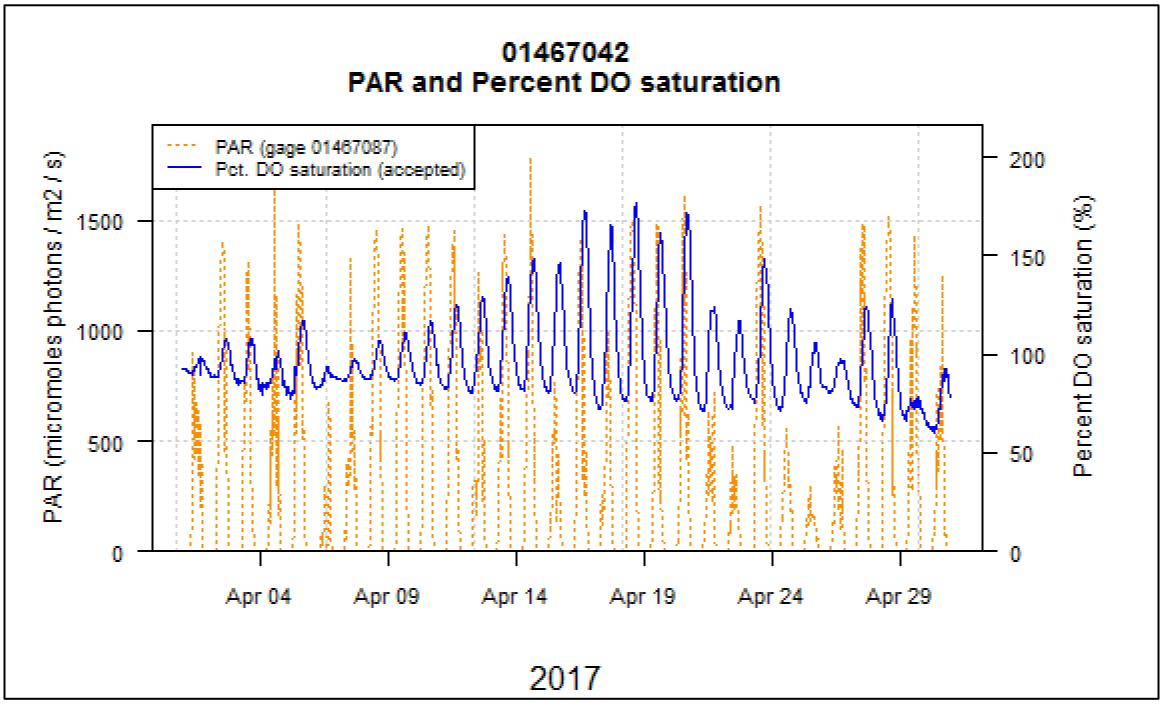


Figure 35. Gage 01467042, PAR and Percent Dissolved Oxygen Saturation, April 2017.

Figure 36. Gage 01467042, Pennypack Creek at Pine Rd., looking upstream

Figure 37. Gage 01467048, Pennypack Creek at Lower Rhawn St. Bridge, looking upstream

Turbidity

Turbidity data at the Pennypack Creek gages tend to reflect streamflow conditions. When there is high flow (*i.e.,* during and after storms), increases in turbidity are common and expected, as sediment in the creek bed is resuspended and particles present in runoff enter the stream (Figure 38). The downstream gage generally exhibited higher turbidity values throughout the year (Tables 39-40).

In September and April, the significant amount of flagged data at the downstream gage is attributable to missing data when sondes were not deployed during the Rhawn Street bridge reconstruction. Flagged data are also often due to periods during the month when sondes report high turbidity values that were corrected after the instrumentation was cleaned. After a storm, optical sensors such as those used to detect dissolved oxygen and turbidity can return inaccurate readings due to the sonde pipe becoming clogged with sediment and other debris. When turbidity readings come down after a cleaning, it is typical procedure to flag data back to the end of a storm, when the sonde pipe likely became clogged and did not reflect actual conditions in the stream.

Table 39. Gage 01467042, Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-16	728.0	30.3	0.0	56.5	43.5	0.2	280.0	10.1
Aug-16	705.3	29.4	0.0	14.5	85.5	0.2	14.0	1.7
Sep-16	713.5	29.7	0.0	13.7	86.3	0.0	160.0	2.4
Oct-16	738.5	30.8	0.0	23.5	76.5	0.0	440.0	4.4
Nov-16	719.5	30.0	0.0	8.4	91.6	0.9	130.0	2.5
Mar-17	706.0	29.4	0.0	81.6	18.4	2.2	750.0	11.5
Apr-17	699.5	29.1	0.0	29.6	70.4	0.5	439.0	8.6
May-17	717.8	29.9	0.0	66.4	33.6	0.1	447.0	11.3
Jun-17	719.0	30.0	0.0	33.6	66.4	0.0	328.0	9.2

Table 40. Gage 01467048, Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-16	667.0	27.8	10.3	66.3	33.7	1.2	440.0	14.3
Aug-16	737.5	30.7	0.9	20.6	79.4	0.2	320.0	2.6
Sep-16	177.5	7.4	75.3	29.0	71.0	1.0	71.0	3.1
Oct-16	671.5	28.0	8.6	27.0	73.0	0.0	160.0	4.4
Nov-16	704.5	29.4	0.3	46.7	53.3	0.0	730.0	7.4
Mar-17	668.5	27.9	5.1	44.0	56.0	0.9	134.0	6.8
Apr-17	267.5	11.1	62.8	68.6	31.4	1.0	77.3	9.8
May-17	741.5	30.9	0.3	49.0	51.0	0.9	325.0	10.7
Jun-17	324.0	13.5	55.0	26.1	73.9	1.1	134.0	3.6

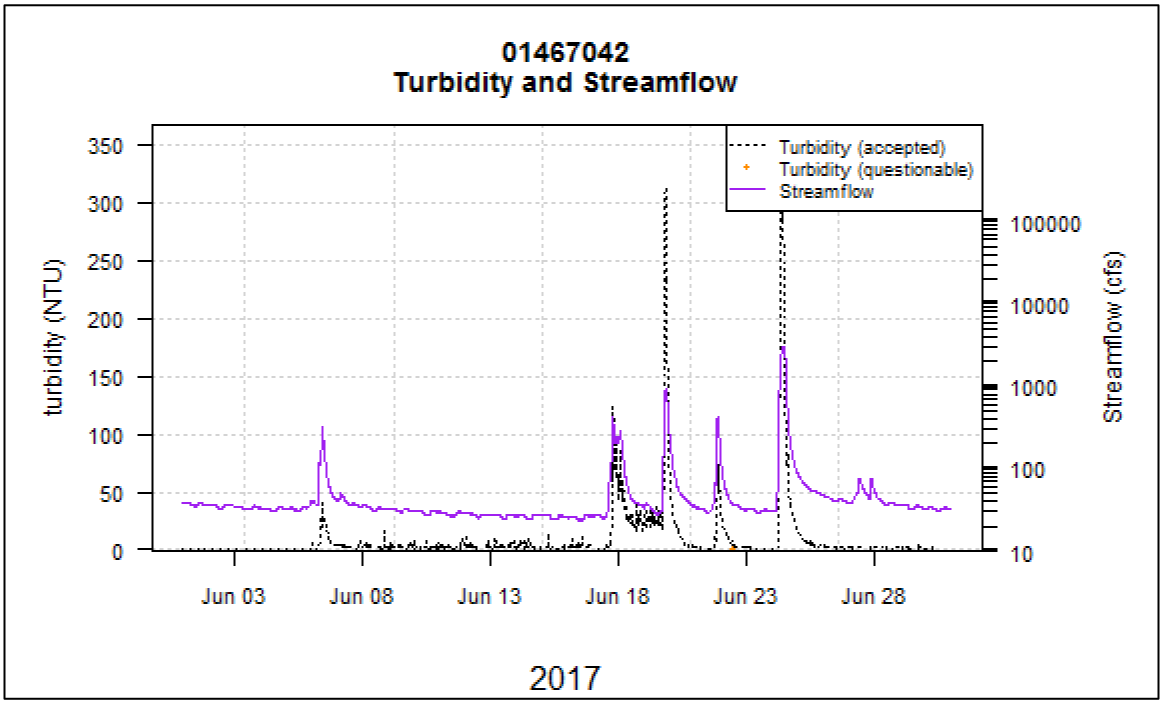


Figure 38. Gage 01467042, Turbidity and Streamflow, June 2017.

Specific Conductance

Specific conductance data were similar to other Philadelphia area streams. Elevated mean and maximum conductance values at both gages in March may be evidence of the effects of stormwater runoff and snowmelt containing road salt. Data marked as flagged at the downstream gage usually represents missing data from offline sondes during bridge reconstruction.

Table 41. Gage 01467042 Specific Conductance Summary Results by Month

Month	Total hours accepted data	Total days accepted data	Percent hours flagged data	Min.	Max.	Mean
Jul-16	742.0	30.9	0.0	114.0	802.0	576.6
Aug-16	741.8	30.9	0.0	346.0	873.0	695.1
Sep-16	718.5	29.9	0.0	227.0	908.0	721.1
Oct-16	741.8	30.9	0.0	265.0	837.0	671.5
Nov-16	719.5	30.0	0.0	275.0	810.0	711.0
Mar-17	706.5	29.4	0.0	332.0	2150.0	1073.6
Apr-17	719.5	30.0	0.0	196.0	754.0	619.1
May-17	742.0	30.9	0.0	159.0	757.0	614.1
Jun-17	719.0	30.0	0.0	107.0	791.0	605.1

Table 42. Gage 01467048 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	678.5	28.3	8.8	93.0	779.0	518.6
Aug-16	737.0	30.7	0.9	179.0	857.0	655.7
Sep-16	177.5	7.4	75.3	290.0	805.0	665.2
Oct-16	679.5	28.3	8.7	275.0	830.0	648.6
Nov-16	718.5	29.9	0.2	157.0	804.0	678.6
Mar-17	668.5	27.9	5.1	479.0	2540.0	1064.7
Apr-17	274.0	11.4	61.9	384.0	758.0	634.5
May-17	432.0	18.0	41.9	147.0	734.0	541.5
Jun-17	720.0	30.0	0.0	104.0	797.0	577.7

Temperature

Temperature data showed variable attainment of maximum temperature criteria (Tables 43-44). Spring and early summer months are always subject to major air temperature fluctuations, and reliably predicting average stream temperatures during these periods is difficult at best. Maximum criteria for the summer months, for example, do not take into account natural summer temperature peaks. Above normal air temperatures are the likely cause of high stream temperature exceedance rates in July 2016 (Figures 39-40).

Table 43. Gage 01467042 Temperature Summary Results by Maximum Criteria Period

Des. Use	Date range start	Date range end	Percent hours exceedance	Percent hours attaining	Percent hours flagged data	Total hours accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	78.0	22.0	0.2	742.3	30.9	20.4	27.2	24.2
TSF	1-Aug	15-Aug	15.0	85.0	0.2	359.3	15.0	20.6	28.8	24.4
TSF	16-Aug	31-Aug	0.0	100.0	0.3	383.0	16.0			
TSF	1-Sep	15-Sep	0.0	100.0	0.4	358.5	14.9	15.6	26.2	20.8
TSF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
TSF	1-Oct	15-Oct	0.0	100.0	0.2	359.3	15.0	9.1	19.7	14.5
TSF	16-Oct	31-Oct	4.6	95.4	0.4	382.5	15.9			
TSF	1-Nov	15-Nov	2.6	97.4	0.0	360.0	15.0	4.0	14.5	8.9
TSF	16-Nov	30-Nov	12.2	87.8	0.1	359.5	15.0			
TSF	1-Mar	31-Mar	37.4	62.6	5.0	706.5	29.4	0.0	13.0	6.4
TSF	1-Apr	15-Apr	68.2	31.8	0.1	359.5	15.0	7.2	21.8	14.2
TSF	16-Apr	30-Apr	73.5	26.5	0.0	360.0	15.0			
TSF	1-May	15-May	9.7	90.3	0.3	359.0	15.0	11.4	24.3	16.3
TSF	16-May	31-May	14.2	85.8	0.2	383.3	16.0			
TSF	1-Jun	15-Jun	28.3	71.7	0.0	360.0	15.0	14.6	25.8	20.7
TSF	16-Jun	30-Jun	54.3	45.7	0.3	359.0	15.0			

Table 44. Gage 01467048, Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	91.8	8.2	8.8	678.5	28.3	21.2	30.1	25.1
TSF	1-Aug	15-Aug	25.3	74.7	0.3	359.0	15.0	21.0	31.1	25.5
TSF	16-Aug	31-Aug	0.0	100.0	1.4	378.5	15.8			
TSF	1-Sep	15-Sep	0.0	100.0	50.7	177.5	7.4	19.3	25.4	22.5
TSF	16-Sep	30-Sep	0.0	100.0	17.4	297.5	12.4	9.1	20.5	14.6
TSF	1-Oct	15-Oct	6.0	94.0	0.4	382.5	15.9			
TSF	16-Oct	31-Oct	3.9	96.1	0.6	358.0	14.9	3.7	14.7	8.7
TSF	1-Nov	15-Nov	14.6	85.4	0.0	360.0	15.0			
TSF	16-Nov	30-Nov	33.9	66.1	11.3	330.0	14.8	0.0	13.0	6.2
TSF	1-Mar	31-Mar	82.1	17.9	23.9	274.0	11.4	12.6	22.4	16.3
TSF	1-Apr	15-Apr	16.3	83.8	0.0	360.0	15.0	12.0	25.5	16.9
TSF	16-Apr	30-Apr	19.0	81.0	0.1	383.5	16.0			
TSF	1-May	15-May	33.2	66.8	0.0	360.0	15.0	15.3	27.0	21.6
TSF	16-May	31-May	76.9	23.1	0.0	360.0	15.0	21.2	30.1	25.1
TSF	1-Jun	15-Jun	63.4	36.6	0.0	678.5	14.2	21.0	31.1	25.5
TSF	16-Jun	30-Jun	25.3	74.7	0.3	359.0	15.0			

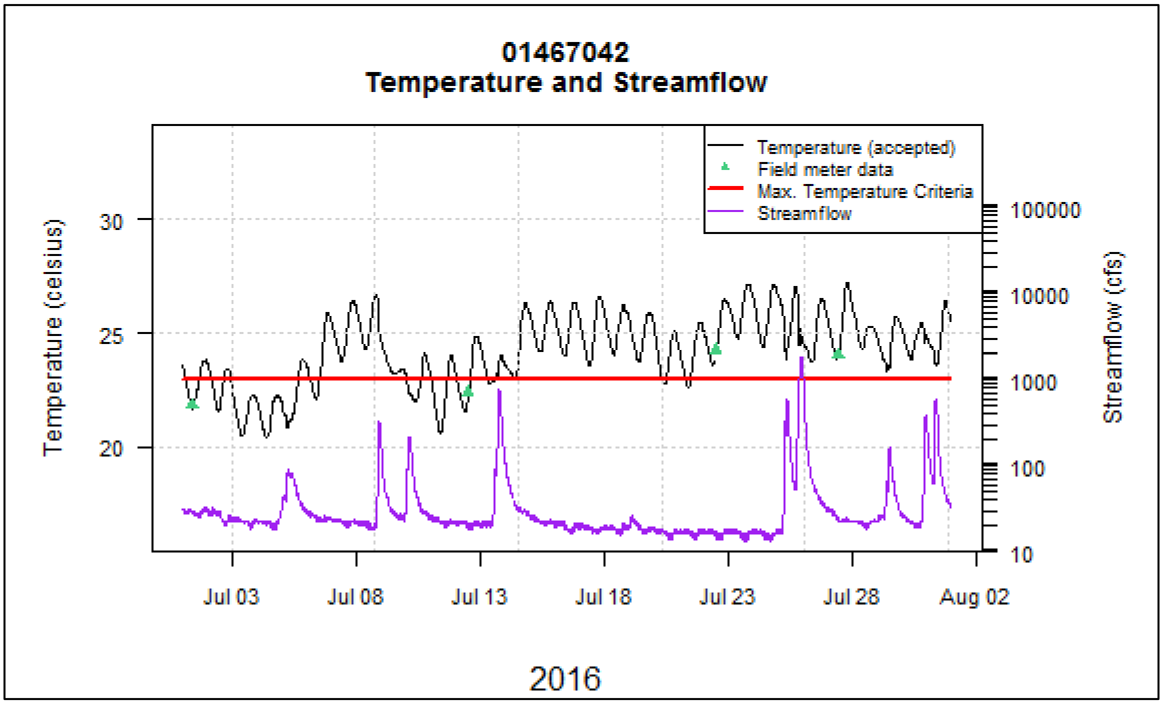


Figure 39. Gage 01467042, Temperature and Streamflow, July 2016.

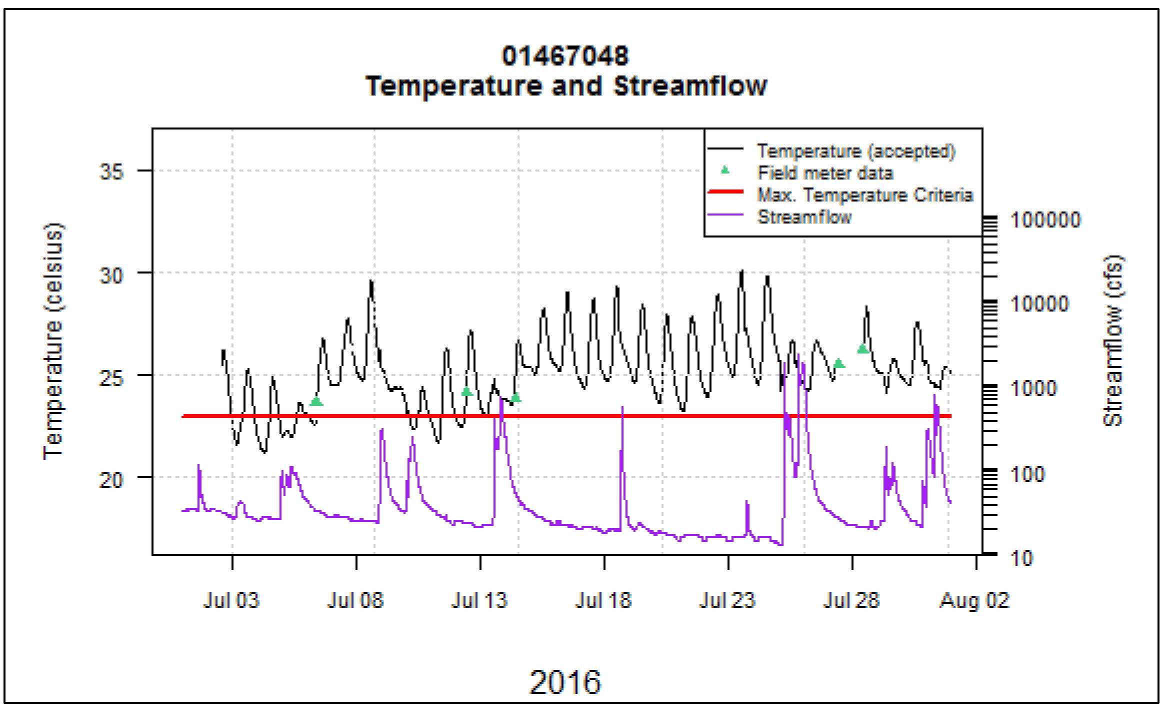
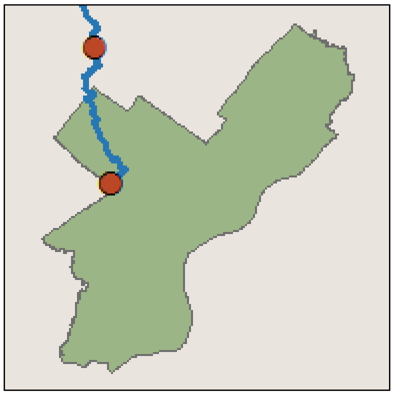


Figure 40. Gage 01467048, Temperature and Streamflow, July 2016.

Wissahickon Creek (Gages 01473900 and 01474000)



Dissolved oxygen and pH

Dissolved oxygen and pH data collected from the Wissahickon Creek gages also show signs of strong algal activity in the form of diel fluctuations. Although these two sites never exceeded the 7-day average guideline for dissolved oxygen, the upper gage (01473900) exhibits some of the most dramatic diel fluctuations of any of the Philadelphia USGS gage sites. In April 2017, dissolved oxygen can be observed to fluctuate by approximately 14 mg/L in a single day/night period (Figure 45), with pH ranging from approximately 7.5 to 9.2 at the same time (Figure 46). The pH maxima were exceeded in April, a direct result of algal activity (Table 49).

Table 45. Gage 01473900 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	TSF	662.0	27.6	11.0	0.0	100.0	5.2	12.7	7.6
Aug-16	TSF	730.5	30.4	1.8	0.9	99.1	4.8	11.8	7.6
Sep-16	TSF	719.0	30.0	0.1	0.0	100.0	5.1	14.6	8.5
Oct-16	TSF	742.5	30.9	0.2	0.1	99.9	4.9	12.9	8.9
Nov-16	TSF	719.5	30.0	0.1	0.0	100.0	7.2	14.7	10.2
Mar-17	TSF	446.0	18.6	0.0	0.0	100.0	9.5	19.5	12.5
Apr-17	TSF	720.0	30.0	0.0	0.0	100.0	5.7	20.4	10.5
May-17	TSF	719.5	30.0	3.3	0.1	99.9	4.4	15.2	8.8
Jun-17	TSF	719.0	30.0	0.1	0.0	100.0	5.5	12.5	8.0

Table 46. Gage 01474000 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	TSF	741.5	30.9	0.3	0.0	100.0	5.4	11.4	7.8
Aug-16	TSF	741.0	30.9	0.4	0.0	100.0	5.8	11.3	8.1
Sep-16	TSF	719.0	30.0	0.1	0.0	100.0	6.5	11.6	8.6
Oct-16	TSF	742.0	30.9	0.3	0.0	100.0	7.5	12.5	9.8
Nov-16	TSF	719.0	30.0	0.1	0.0	100.0	8.9	13.7	11.2
Mar-17	TSF	396.5	16.5	0.0	0.0	100.0	10.5	16.1	12.4
Apr-17	TSF	697.0	29.0	3.2	0.0	100.0	6.8	15.4	10.4
May-17	TSF	740.5	30.9	0.5	0.0	100.0	7.0	12.6	9.1
Jun-17	TSF	694.5	28.9	3.5	0.0	100.0	6.3	11.4	8.4

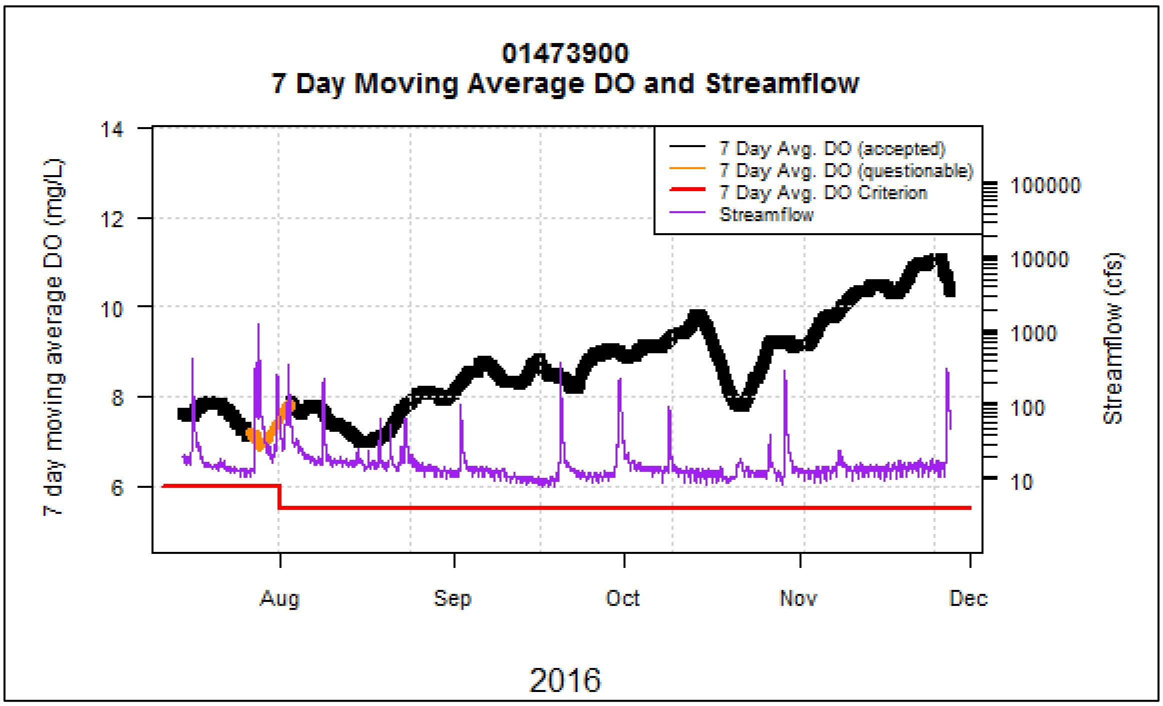


Figure 41. Gage 01473900, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

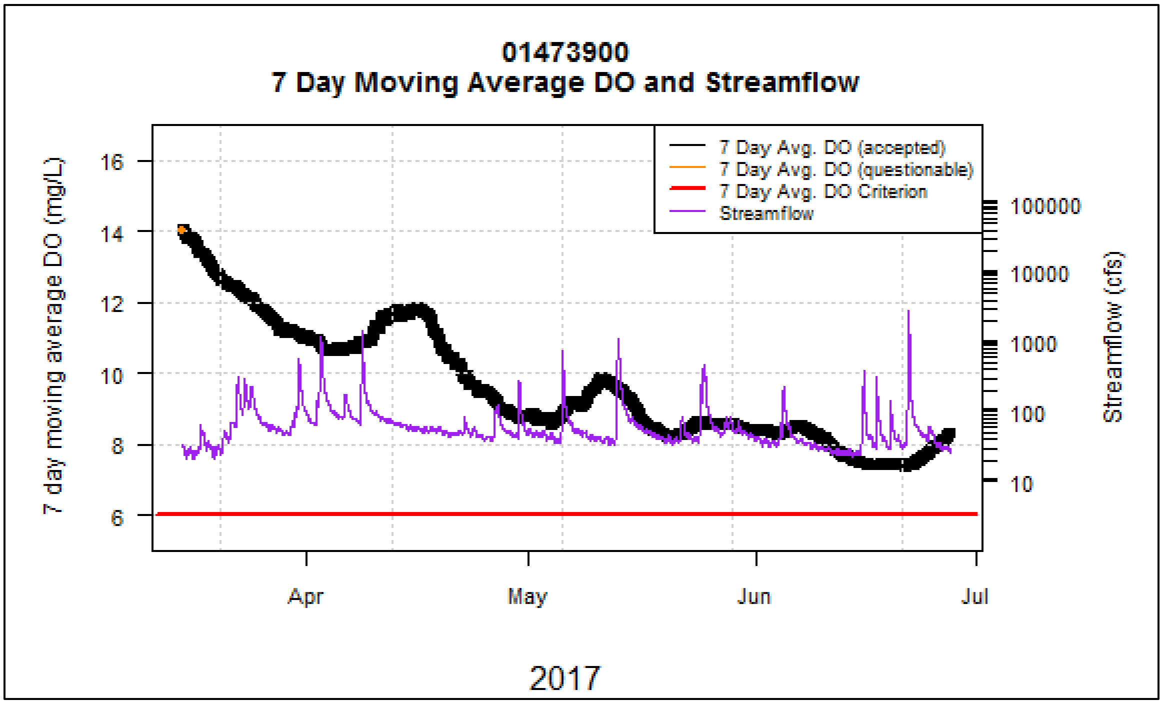


Figure 42. Gage 01473900, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

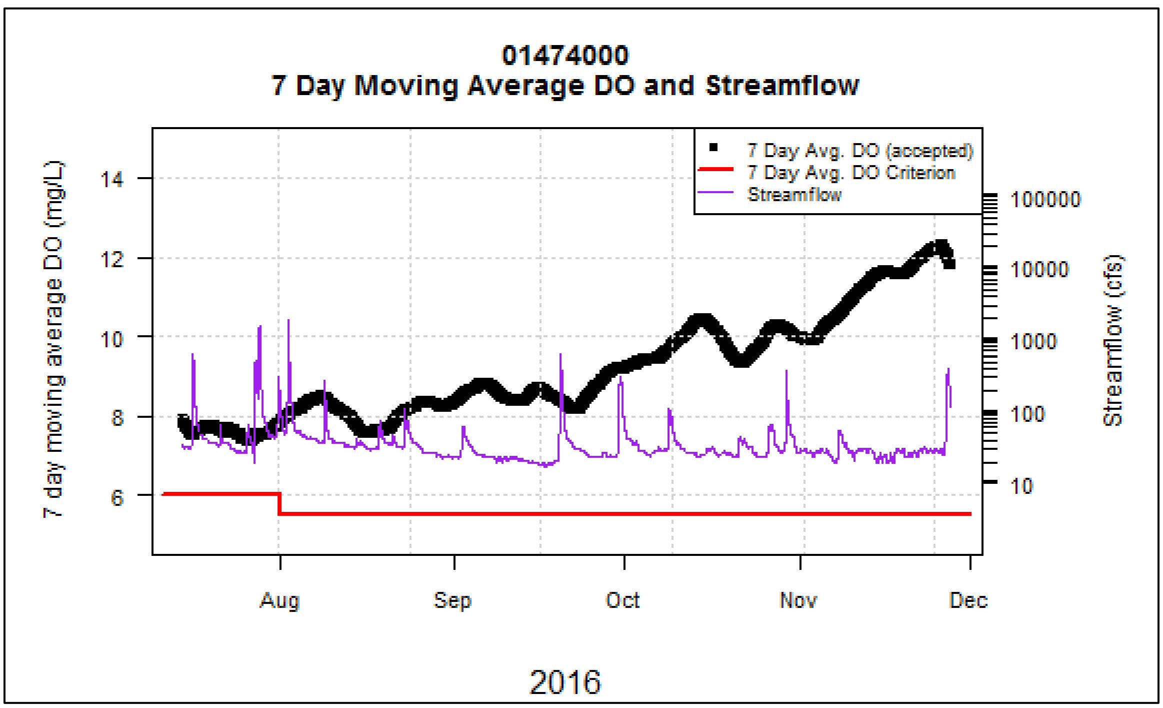


Figure 43. Gage 01474000, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

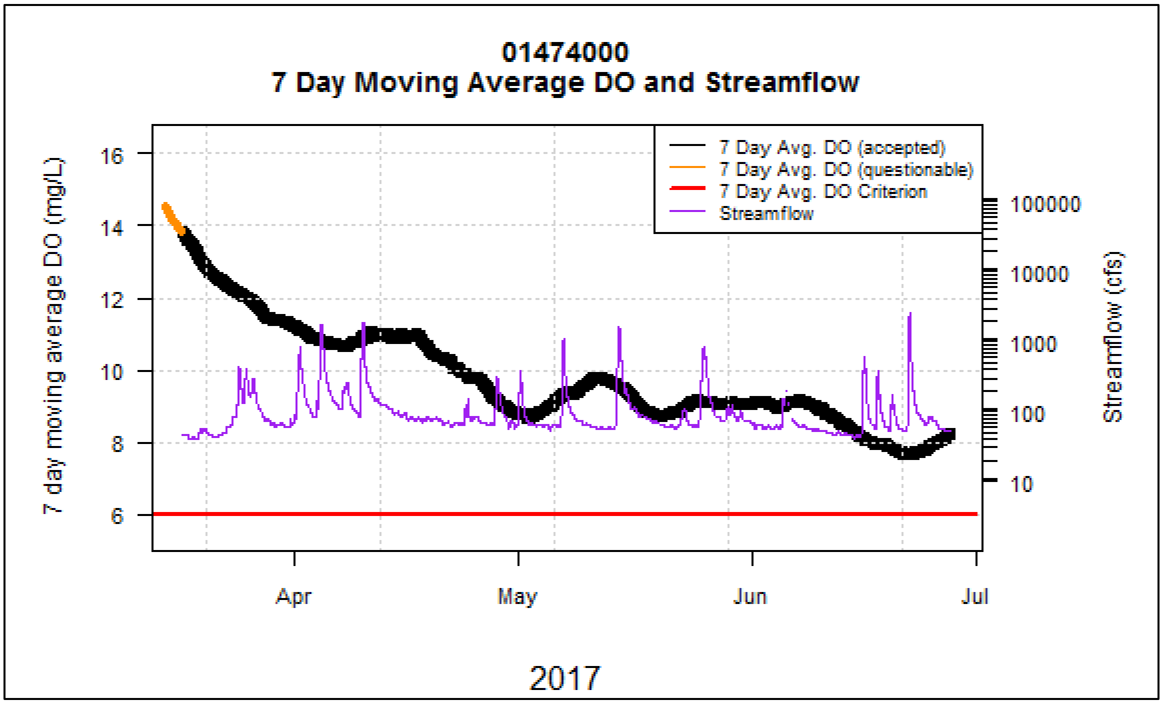


Figure 44. Gage 01474000, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

Table 47. Gage 01473900 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	TSF	26.0	16.1	6.4	8.9	7.7
Aug-16	TSF	29.0	6.5	6.6	8.3	7.6
Sep-16	TSF	29.0	3.3	7.0	9.8	8.5
Oct-16	TSF	29.0	6.5	6.7	10.1	8.9
Nov-16	TSF	29.0	3.3	8.9	11.8	10.3
Mar-17	TSF	18.0	3.1	10.1	14.6	12.3
Apr-17	TSF	30.0	0.0	7.5	12.6	10.5
May-17	TSF	29.0	6.5	7.5	10.2	8.8
Jun-17	TSF	28.0	6.7	7.0	9.0	8.0

Table 48. Gage 01474000 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	TSF	29.0	6.5	7.1	8.8	7.8
Aug-16	TSF	29.0	6.5	7.2	8.7	8.1
Sep-16	TSF	29.0	3.3	7.7	9.3	8.6
Oct-16	TSF	29.0	6.5	8.6	10.7	9.8
Nov-16	TSF	29.0	3.3	9.7	12.7	11.2
Mar-17	TSF	16.0	3.2	11.0	14.8	12.3
Apr-17	TSF	26.0	13.3	7.9	11.7	10.3
May-17	TSF	28.0	9.7	8.0	9.9	9.2
Jun-17	TSF	26.0	13.3	7.4	9.4	8.5

Table 49. Gage 01473900 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.6	7.8
Aug-16	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.5	7.8
Sep-16	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.8	8.0
Oct-16	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.3	7.7
Nov-16	719.5	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.3	7.7
Mar-17	445.5	18.6	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.8	7.8
Apr-17	720.0	30.0	0.0	2.4	13.3	0.0	0.0	97.6	86.7	7.3	9.2	7.9
May-17	744.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.6	7.7
Jun-17	719.5	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.2	7.6

Table 50. Gage 01474000 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.5	7.9
Aug-16	741.0	30.9	0.4	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.5	8.0
Sep-16	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.3	8.4	7.9
Oct-16	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.5	8.3	7.9
Nov-16	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.2	7.9
Mar-17	396.5	16.5	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.6	8.1
Apr-17	698.0	29.1	3.1	3.7	20.0	0.0	0.0	96.3	80.0	7.5	9.2	8.2
May-17	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.7	7.9
Jun-17	694.5	28.9	3.5	0.0	0.0	0.0	0.0	100.0	100.0	7.1	8.4	7.9

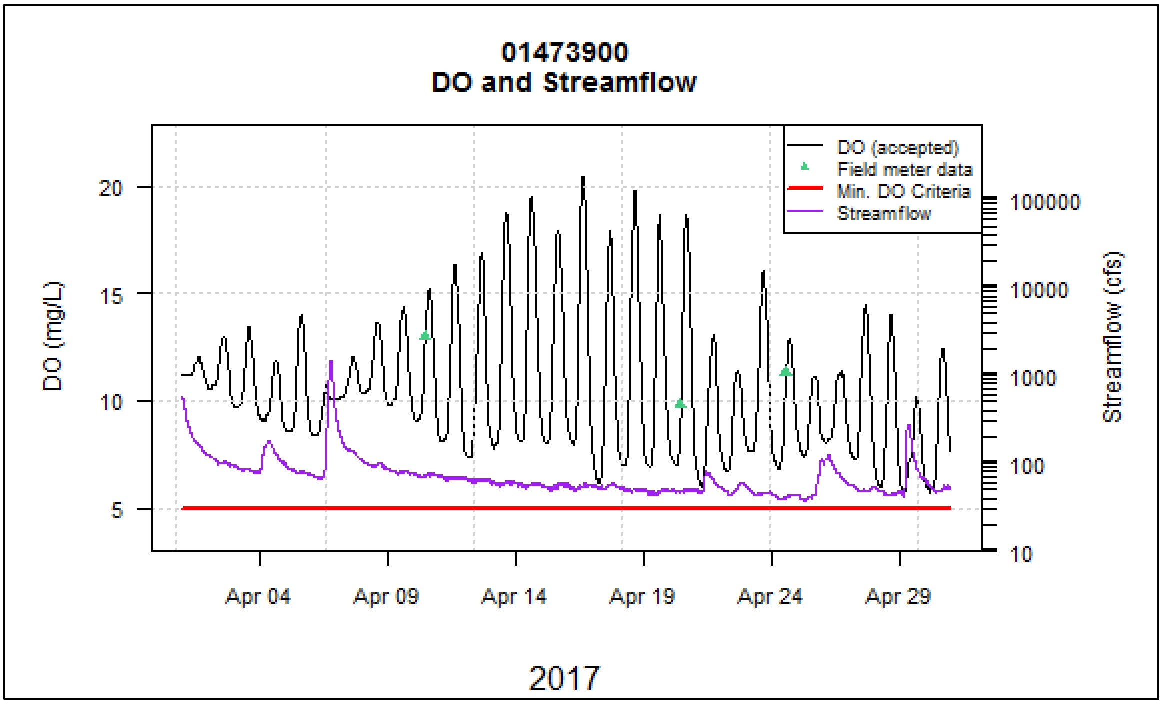


Figure 45. Gage 01473900, Dissolved Oxygen and Streamflow, April 2017.

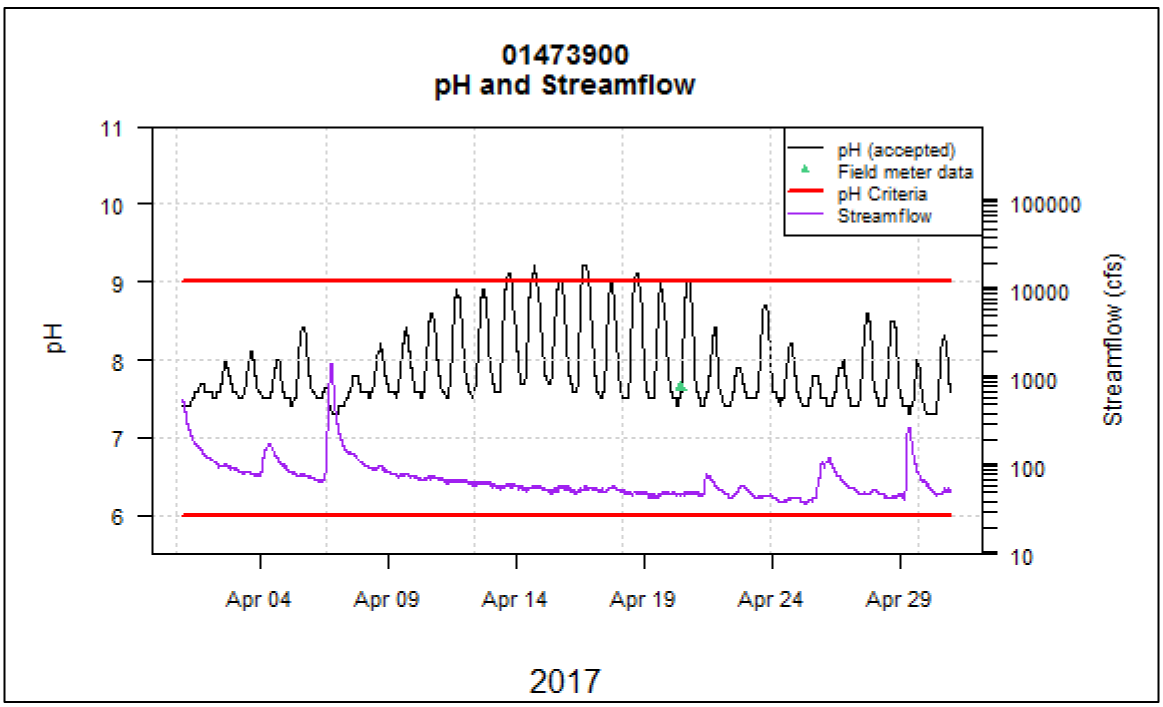


Figure 46. Gage 01473900, pH and Streamflow, April 2017.

Figure 47. Gage 01473900, Wissahickon Creek at Ft. Washington, looking downstream

Figure 48. Gage 01474000, Wissahickon Creek at mouth, looking downstream

Turbidity

Turbidity in the Wissahickon, as with most of Philadelphia's streams, increases drastically with increased flow from rainfall. The upper gage (01473900) saw greater spikes in turbidity during storms than the lower gage (Tables 51-52). It is possible that these spikes represent a temporarily fouled sensor (i.e., sediment or debris obscures the optical probe for turbidity), but the general rule in QAQC procedures is not to flag turbidity spikes that recede to normal levels on their own. If the sensor remains fouled after a storm or a field check confirms aberrant values, the data is flagged as in Figure 49.

Table 51. Gage 01473900 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-16	743.0	31.0	0.1	74.3	25.7	1.8	480.0	7.9
Aug-16	742.5	30.9	0.2	43.4	56.6	0.8	130.0	3.5
Sep-16	719.5	30.0	0.1	28.4	71.6	0.7	170.0	4.4
Oct-16	742.5	30.9	0.2	44.6	55.4	0.5	160.0	4.2
Nov-16	719.5	30.0	0.1	10.7	89.3	0.8	240.0	2.8
Mar-17	413.0	17.2	7.4	94.1	5.9	2.1	973.0	36.1
Apr-17	719.5	30.0	0.1	41.5	58.5	0.9	478.0	8.2
May-17	668.5	27.9	10.1	70.4	29.6	1.1	1260.0	70.0
Jun-17	719.5	30.0	0.1	54.9	45.1	0.9	373.0	7.7

Table 52. Gage 01474000 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-16	741.5	30.9	0.3	24.9	75.1	0.3	290.0	7.0
Aug-16	741.0	30.9	0.4	10.1	89.9	0.4	65.0	1.9
Sep-16	719.0	30.0	0.1	9.7	90.3	0.2	190.0	2.0
Oct-16	741.0	30.9	0.4	7.8	92.2	0.2	32.0	1.1
Nov-16	719.0	30.0	0.1	8.5	91.5	0.2	380.0	1.8
Mar-17	396.5	16.5	0.0	48.5	51.5	0.5	324.0	11.2
Apr-17	696.5	29.0	3.3	36.0	64.0	0.2	260.0	8.7
May-17	700.5	29.2	5.8	27.2	72.8	0.4	466.0	7.0
Jun-17	693.5	28.9	3.7	24.4	75.6	0.3	688.0	16.1

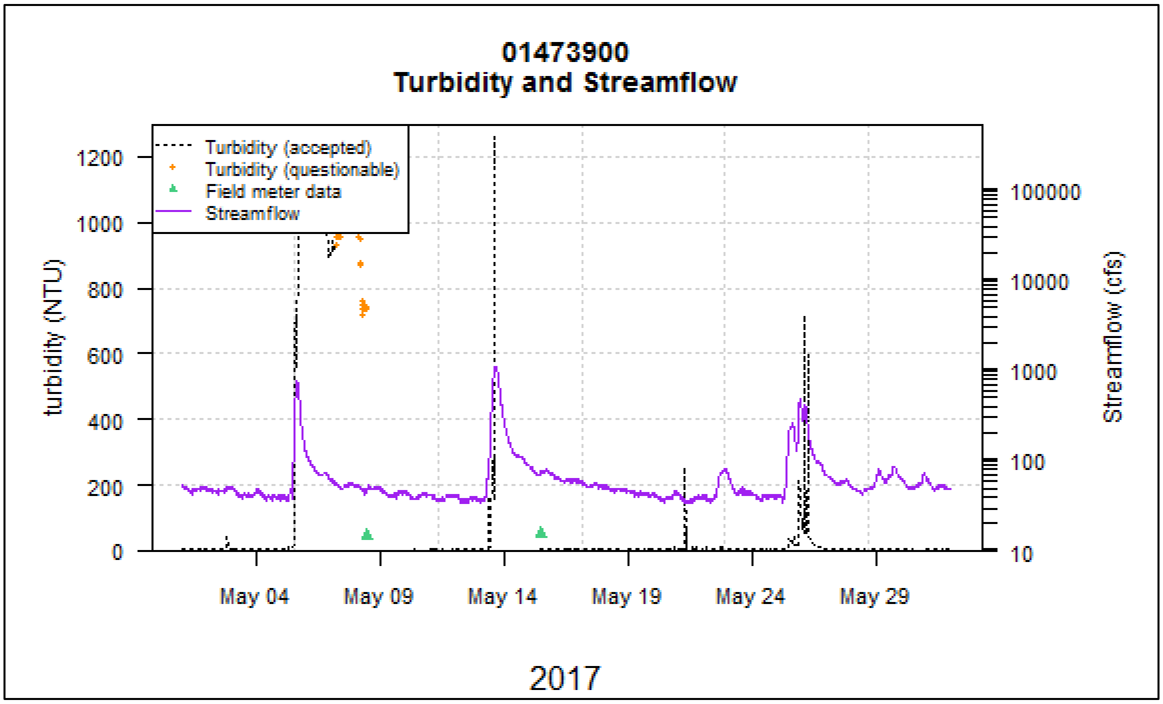


Figure 49. Gage 01473900, Turbidity and Streamflow, May 2017.

Specific Conductance

Specific conductance data at the Wissahickon Creek gage sites generally follow the established pattern in other Philadelphia streams: Runoff from rain events dilutes the stream and decreases conductivity. However, a reversal in this trend sometimes occurs during winter storms, when it is presumed that the application of road salt (sodium chloride) prior to the storm washes into Wissahickon Creek and causes conductivity to increase in conjunction with streamflow. This pattern is observed when the downstream gage comes online during mid-March 2017 (Figure 50).

Table 53. Gage 01473900 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	743.0	31.0	0.1	174.0	1040.0	801.5
Aug-16	742.5	30.9	0.2	410.0	1130.0	911.4
Sep-16	719.0	30.0	0.1	238.0	1080.0	926.8
Oct-16	742.0	30.9	0.3	410.0	1160.0	917.5
Nov-16	719.5	30.0	0.1	360.0	1220.0	1035.2
Mar-17	446.0	18.6	0.0	283.0	2400.0	1197.4
Apr-17	720.0	30.0	0.0	255.0	926.0	793.8
May-17	744.0	31.0	0.0	180.0	913.0	743.2
Jun-17	719.5	30.0	0.1	104.0	1020.0	782.7

Table 54. Gage 01474000 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	741.5	30.9	0.3	193.0	914.0	699.4
Aug-16	741.0	30.9	0.4	438.0	944.0	794.6
Sep-16	719.0	30.0	0.1	362.0	929.0	685.9
Oct-16	742.0	30.9	0.3	516.0	931.0	807.1
Nov-16	719.0	30.0	0.1	393.0	1010.0	844.2
Mar-17	396.5	16.5	0.0	334.0	1890.0	1060.3
Apr-17	698.0	29.1	3.1	276.0	848.0	723.2
May-17	740.5	30.9	0.5	228.0	860.0	688.7
Jun-17	694.5	28.9	3.5	147.0	908.0	703.9

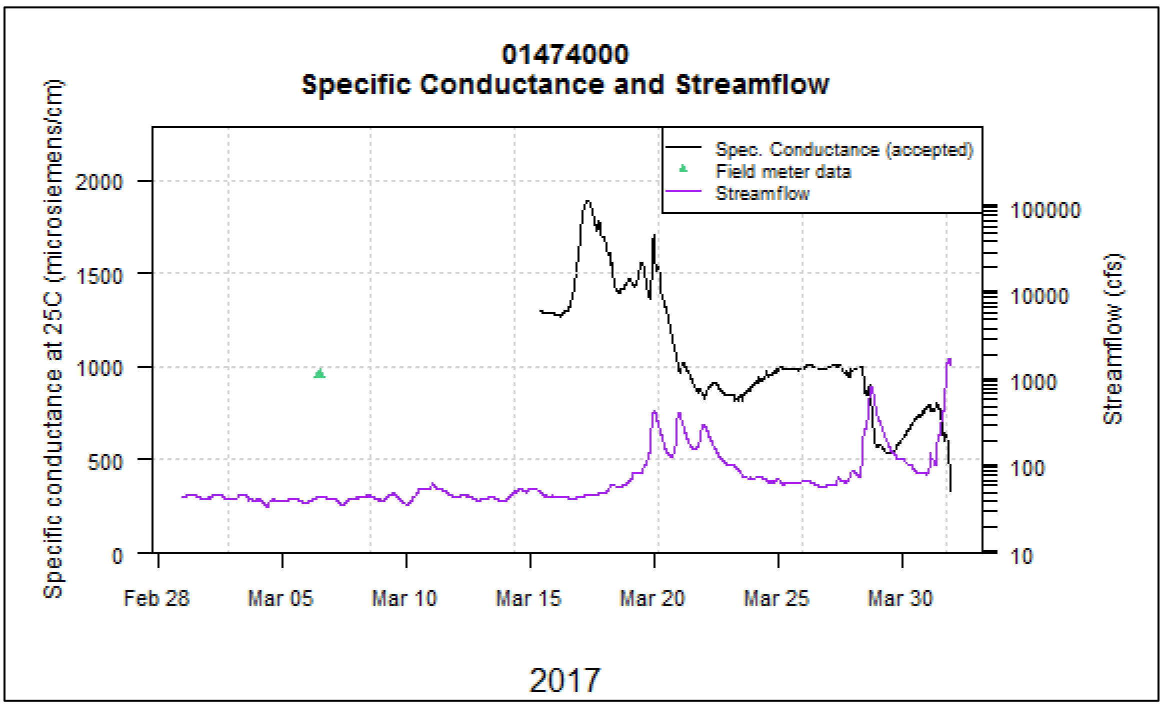


Figure 50. Gage 01474000, Specific Conductance and Streamflow, March 2017.

Temperature

Temperature trends and exceedance rates in Wissahickon Creek Watershed were similar to those observed in Pennypack Creek, with frequent exceedances during the spring and summer in conjunction with higher ambient air temperatures (Tables 55-56, Figures 51-52).

Table 55. Gage 01473900 Temperature Summary Results by Month by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	74.7	25.3	0.7	738.5	30.8	19.8	26.9	23.9
TSF	1-Aug	15-Aug	13.6	86.4	0.8	357.0	14.9	20.2	28.7	24.3
TSF	16-Aug	31-Aug	0.0	100.0	0.8	381.0	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	1.0	356.5	14.9	15.7	26.3	21.0
TSF	16-Sep	30-Sep	0.0	100.0	0.8	357.0	14.9			
TSF	1-Oct	15-Oct	0.0	100.0	0.8	357.0	14.9	9.6	20.7	15.1
TSF	16-Oct	31-Oct	13.0	87.0	0.8	381.0	15.9			
TSF	1-Nov	15-Nov	9.7	90.3	0.3	359.0	15.0	4.6	15.5	9.8
TSF	16-Nov	30-Nov	24.9	75.1	0.8	357.0	14.9			
TSF	1-Mar	31-Mar	37.3	62.7	40.9	440.0	18.3	0.0	12.8	6.5
TSF	1-Apr	15-Apr	68.8	31.2	0.4	358.5	14.9	7.1	22.0	14.2
TSF	16-Apr	30-Apr	74.1	25.9	0.8	357.0	14.9			
TSF	1-May	15-May	9.5	90.5	0.7	357.5	14.9	11.3	23.9	16.3
TSF	16-May	31-May	13.8	86.2	1.2	379.5	15.8			
TSF	1-Jun	15-Jun	27.9	72.1	0.8	357.0	14.9	14.8	25.3	20.6
TSF	16-Jun	30-Jun	52.7	47.3	1.0	356.5	14.9			

Table 56. Gage 01474000 Temperature Summary Results by Month by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
TSF	1-Jul	31-Jul	85.0	15.0	0.3	741.5	30.9	21.5	27.3	24.5
TSF	1-Aug	15-Aug	12.8	87.2	0.4	358.5	14.9	21.3	28.2	24.7
TSF	16-Aug	31-Aug	0.0	100.0	0.4	382.5	15.9			
TSF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	16.1	25.5	21.0
TSF	16-Sep	30-Sep	0.0	100.0	0.3	359.0	15.0			
TSF	1-Oct	15-Oct	0.0	100.0	0.0	360.0	15.0	9.3	18.8	14.3
TSF	16-Oct	31-Oct	0.0	100.0	0.5	382.0	15.9			
TSF	1-Nov	15-Nov	0.0	100.0	0.0	360.0	15.0	4.5	13.4	8.6
TSF	16-Nov	30-Nov	6.0	94.0	0.3	359.0	15.0			
TSF	1-Mar	31-Mar	40.7	59.3	46.7	396.5	16.5	0.0	11.9	6.7
TSF	1-Apr	15-Apr	64.3	35.7	6.1	338.0	14.1	7.2	21.0	14.2
TSF	16-Apr	30-Apr	82.5	17.5	0.0	360.0	15.0			
TSF	1-May	15-May	13.6	86.4	0.3	359.0	15.0	11.9	24.2	16.6
TSF	16-May	31-May	15.6	84.4	0.7	381.5	15.9			
TSF	1-Jun	15-Jun	30.7	69.3	7.2	334.0	13.9	15.0	25.7	21.4
TSF	16-Jun	30-Jun	76.0	24.0	1.5	354.5	14.8			

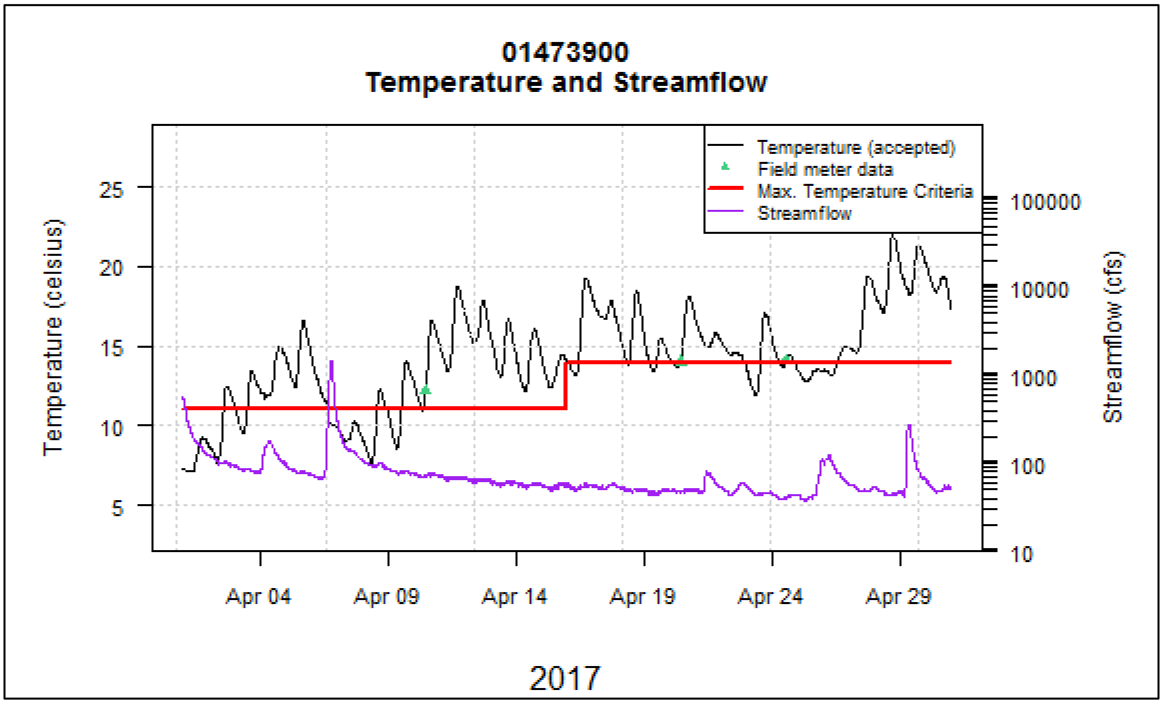


Figure 51. Gage 01473900, Temperature and Streamflow, April 2017.

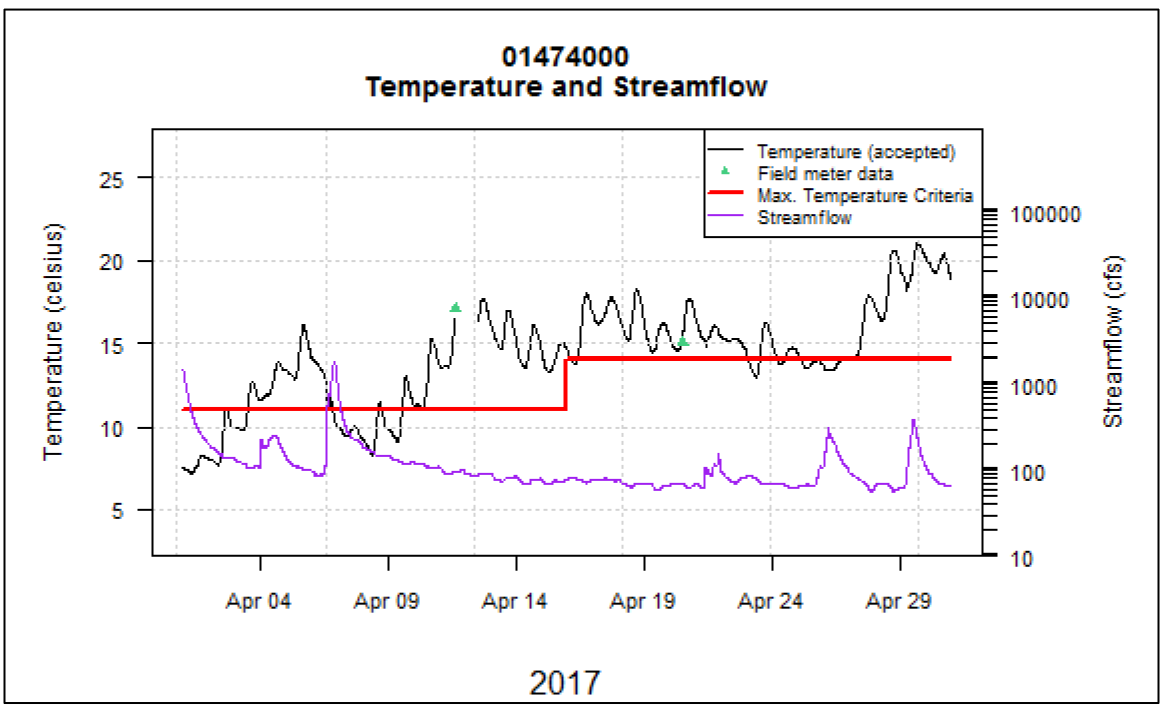
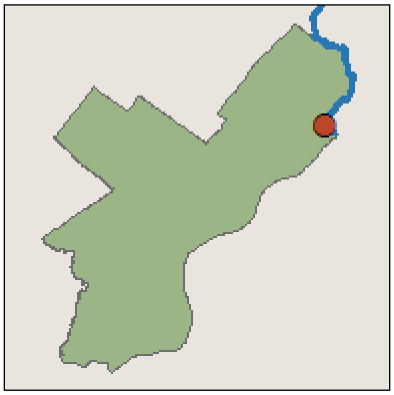


Figure 52. Gage 01474000, Temperature and Streamflow, April 2017.

Poquessing Creek (Gage 01465798)



Dissolved oxygen and pH

Dissolved oxygen and pH at this gage site were usually within acceptable ranges and only occasionally fell below the minimum DO criterion or exceeded the pH maximum criterion (Tables 57-59, Figures 53-54). Data collected from Poquessing Creek did exhibit classic signs of algal activity, as indicated by diel fluctuations in both DO and pH.

As seen with previous sites, the algal activity and related diel fluctuations in DO and pH are only suppressed by storm events. These suppressions, however, are only very temporary. Given an adequate period of uninterrupted algal growth, such as occurred in April 2016 (Figures 55-56), one can expect steadily increasing DO and pH fluctuations.

Table 57. Gage 01465798 Dissolved Oxygen Min. Criteria Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	WWF	714.5	29.8	4.0	10.6	89.4	0.6	13.5	7.0
Aug-16	WWF	743.0	30.9	0.0	4.3	95.7	3.4	14.8	7.6
Sep-16	WWF	717.8	29.9	0.0	1.1	98.9	4.2	12.2	7.7
Oct-16	WWF	742.8	30.9	0.0	0.0	100.0	5.5	12.6	8.9
Nov-16	WWF	718.8	29.9	0.0	0.0	100.0	5.3	13.2	9.5
Mar-17	WWF	708.3	29.5	0.0	0.0	100.0	7.4	16.6	12.0
Apr-17	WWF	718.5	29.9	0.0	0.2	99.8	4.4	16.4	9.7
May-17	WWF	741.8	30.9	0.0	0.2	99.8	4.2	13.0	8.4
Jun-17	WWF	696.3	29.0	0.0	5.8	94.2	0.2	11.0	7.3

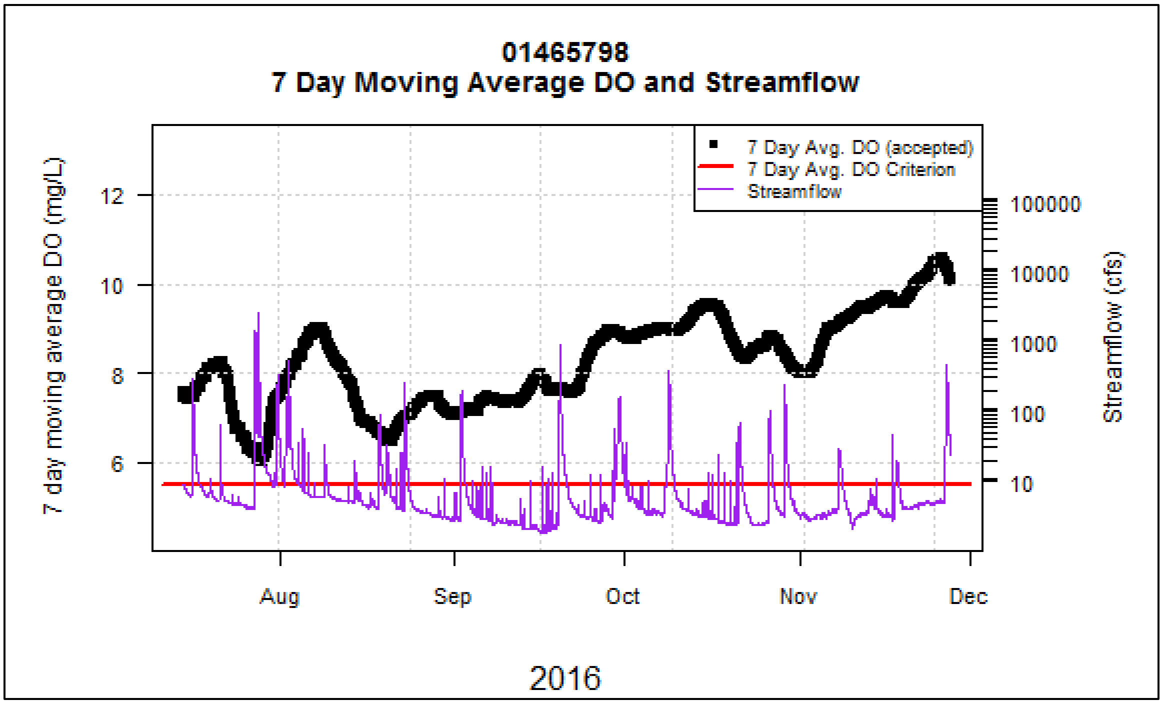


Figure 53. Gage 01465798, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

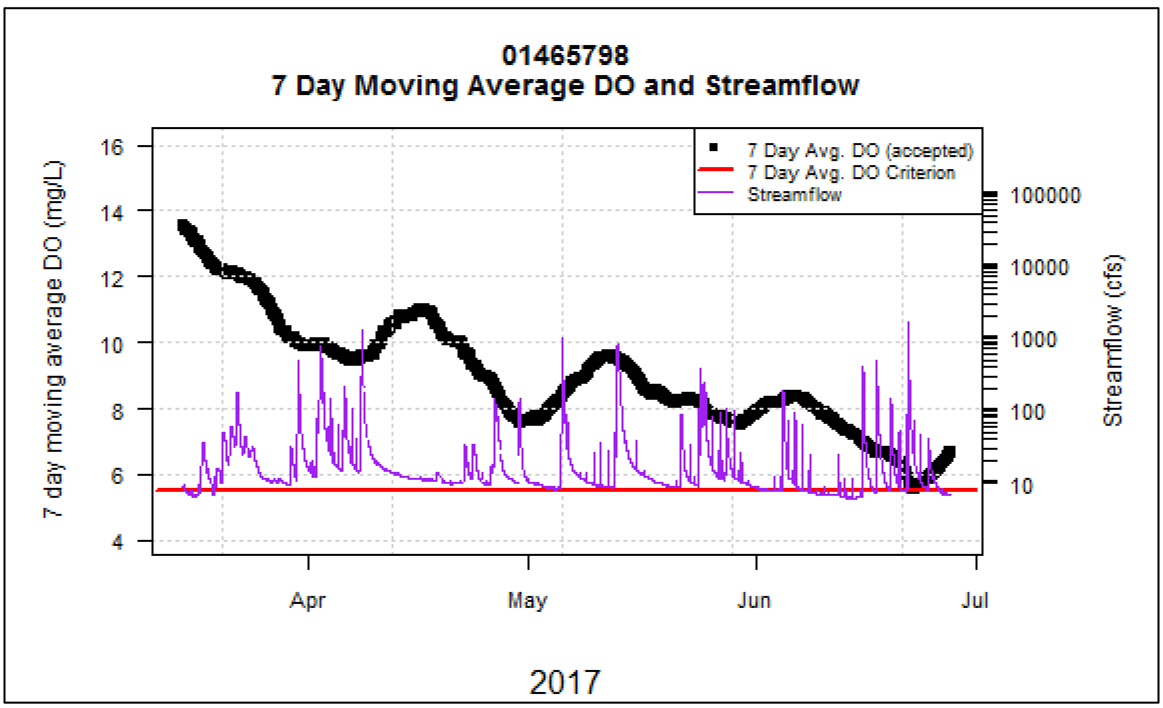


Figure 54. Gage 01465798, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

Table 58. Gage 01465798 Dissolved Oxygen Mean Criteria Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	WWF	28.0	9.7	3.1	8.8	7.1
Aug-16	WWF	29.0	6.5	5.9	9.3	7.7
Sep-16	WWF	28.0	6.7	6.2	9.4	7.8
Oct-16	WWF	30.0	3.2	6.9	10.4	8.8
Nov-16	WWF	29.0	3.3	7.5	11.0	9.5
Mar-17	WWF	28.0	5.1	9.3	14.1	12.0
Apr-17	WWF	29.0	3.3	6.5	11.5	9.7
May-17	WWF	29.0	6.5	7.2	10.3	8.4
Jun-17	WWF	26.0	13.3	4.7	8.7	7.4

Table 59. Gage 01465798 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.9	7.2
Aug-16	743.0	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.8	9.0	7.3
Sep-16	717.8	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.7	8.1	7.2
Oct-16	742.8	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.8	7.2
Nov-16	718.8	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.4	7.1
Mar-17	1416.5	29.5	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.3	7.4
Apr-17	1337.0	27.9	0.0	0.8	6.9	0.0	0.0	99.2	93.1	7.0	9.2	7.5
May-17	1483.0	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	8.1	7.3
Jun-17	1435.5	29.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.6	8.0	7.3

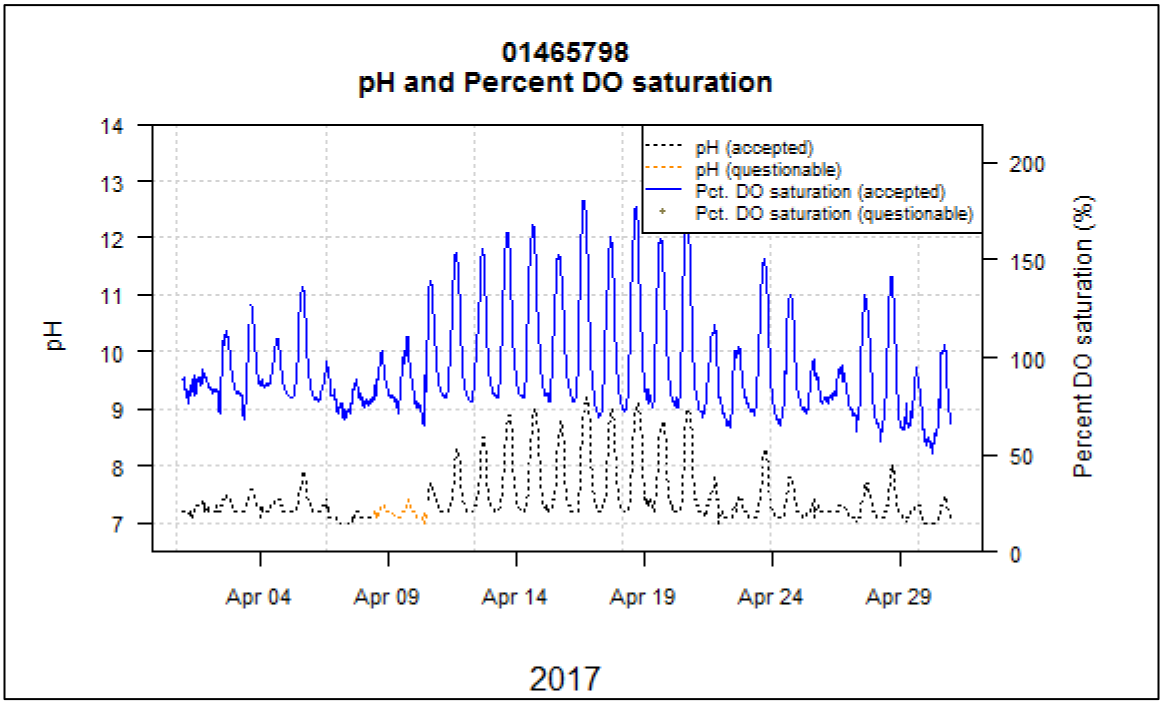


Figure 55. Gage 01465798, pH and Percent DO Saturation, April 2017.

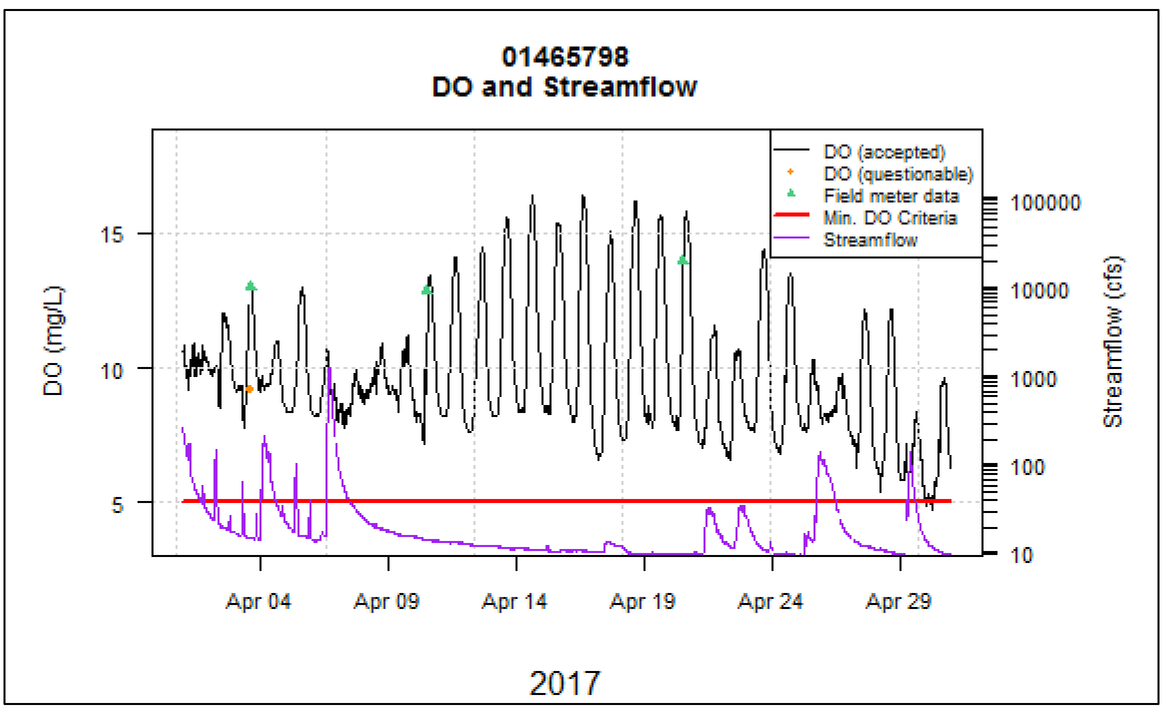


Figure 56. Gage 01465798, DO and Streamflow, April 2017.

Figure 57. Gage 01465798, Poquessing Creek at Grant Ave., looking upstream

Turbidity

As in other Philadelphia streams, high turbidity levels accompanied storm events and increased streamflow.

Table 60. Gage 01465798 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-16	701.0	29.2	5.8	76.8	23.2	1.7	1890.0	38.3
Aug-16	743.0	31.0	0.0	14.9	85.1	1.2	47.0	2.8
Sep-16	717.8	29.9	0.0	29.2	70.8	0.5	220.0	4.0
Oct-16	742.8	30.9	0.0	16.1	83.9	0.3	380.0	2.5
Nov-16	718.5	29.9	0.0	6.7	93.3	0.2	79.0	1.9
Mar-17	707.3	29.5	0.0	54.5	45.5	1.5	314.0	8.8
Apr-17	666.8	27.8	0.0	40.0	60.0	1.3	1910.0	38.8
May-17	741.5	30.9	0.0	43.9	56.1	0.8	232.0	6.0
Jun-17	716.8	29.9	0.0	31.0	69.0	0.4	1320.0	15.3

Specific Conductance

Specific conductance data were similar to other Philadelphia streams, with evidence of road salt causing spikes in specific conductance in early March.

Table 61. Gage 01465798 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	742.0	30.9	0.3	67.0	814.0	434.9
Aug-16	743.0	30.9	0.0	174.0	1680.0	618.4
Sep-16	717.5	29.9	0.0	98.0	1700.0	598.3
Oct-16	742.8	30.9	0.0	129.0	768.0	520.9
Nov-16	718.5	29.9	0.0	118.0	706.0	592.4
Mar-17	708.3	29.5	0.0	229.0	5020.0	1352.4
Apr-17	669.5	27.9	0.0	160.0	816.0	640.2
May-17	741.3	30.9	0.0	106.0	778.0	578.6
Jun-17	717.3	29.9	0.0	99.0	811.0	565.9

Temperature

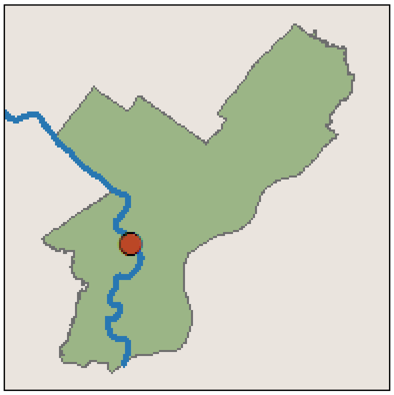
Temperature exceedance rates observed in Poquessing Creek were similar to those in other WWF designated-use creeks (*e.g.*, Tacony and Cobbs Creeks).

Table 62. Gage 01465798 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	0.2	742.5	30.9	20.4	28.9	24.4
WWF	1-Aug	15-Aug	0.0	100.0	0.1	359.8	15.0	20.4	30.5	24.9
WWF	16-Aug	31-Aug	0.0	100.0	0.4	382.5	15.9			
WWF	1-Sep	15-Sep	0.0	100.0	0.3	359.0	15.0	15.7	28.0	21.4
WWF	16-Sep	30-Sep	0.0	100.0	0.3	358.8	14.9			
WWF	1-Oct	15-Oct	0.0	100.0	0.3	358.8	14.9	9.0	20.4	14.8
WWF	16-Oct	31-Oct	7.9	92.1	0.0	384.0	16.0			
WWF	1-Nov	15-Nov	4.6	95.4	0.3	358.8	14.9	3.8	15.2	9.2
WWF	16-Nov	30-Nov	18.2	81.8	0.1	359.8	15.0			
WWF	1-Mar	31-Mar	34.4	65.6	4.8	708.3	29.5	0.0	14.2	6.2
WWF	1-Apr	15-Apr	67.4	32.6	0.4	358.5	14.9	7.1	22.9	14.5
WWF	16-Apr	30-Apr	75.3	24.7	0.1	359.8	15.0			
WWF	1-May	15-May	11.4	88.6	0.3	358.8	14.9	10.4	25.4	16.5
WWF	16-May	31-May	7.1	92.9	0.0	384.0	16.0			
WWF	1-Jun	15-Jun	1.0	99.0	0.4	358.5	14.9	14.5	27.6	21.2
WWF	16-Jun	30-Jun	0.0	100.0	0.3	359.0	15.0			

Gages in Large Watersheds

Schuylkill River (Gage 01474500)



Dissolved oxygen and pH

DO water quality criteria were rarely exceeded at this location (Table 63, Figures 58-59). pH criteria were not exceeded, and a calibration of the pH sensor invalidated data from April and March (Table 65). Supersaturated DO conditions were observed concomitant with daily pH peaks approaching 9.0 in March (Figure 60), indicating high algal activity.

Table 63. Gage 01474500 Dissolved Oxygen Minimum Criterion Summary Results by Month

Month	Des. Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining	Min	Max	Mean
Jul-16	WWF	655.5	27.3	11.9	0.8	99.2	4.3	14.2	7.5
Aug-16	WWF	741.5	30.9	0.3	0.0	100.0	6.2	12.1	7.4
Sep-16	WWF	720.0	30.0	0.0	0.0	100.0	6.4	13.3	7.8
Oct-16	WWF	742.5	30.9	0.2	0.0	100.0	8.5	10.6	9.3
Nov-16	WWF	719.0	30.0	0.1	0.0	100.0	9.7	12.6	10.8
Mar-17	WWF	609.0	25.4	0.0	0.0	100.0	10.9	16.0	12.9
Apr-17	WWF	719.5	30.0	0.1	0.0	100.0	8.0	12.1	10.1
May-17	WWF	742.5	30.9	0.2	0.0	100.0	7.2	10.2	8.8
Jun-17	WWF	719.0	30.0	0.1	0.0	100.0	6.3	9.3	8.0

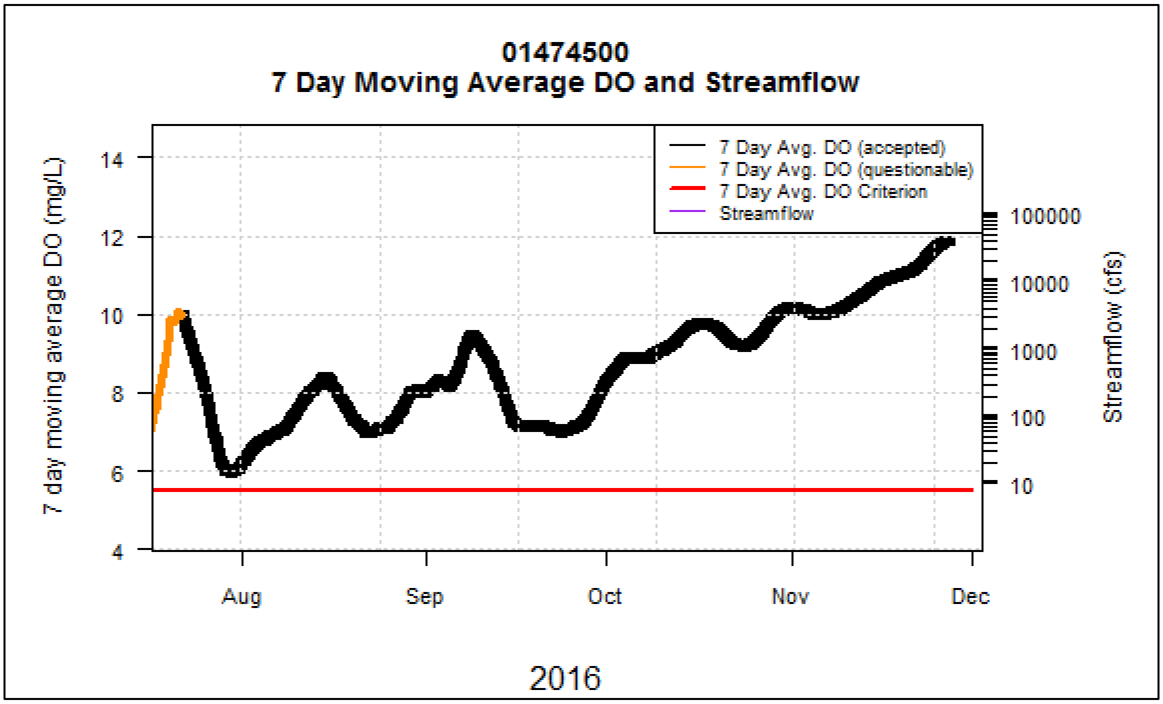


Figure 58. Gage 01474500, 7 Day Average Dissolved Oxygen and Streamflow, Jul-Dec 2016.

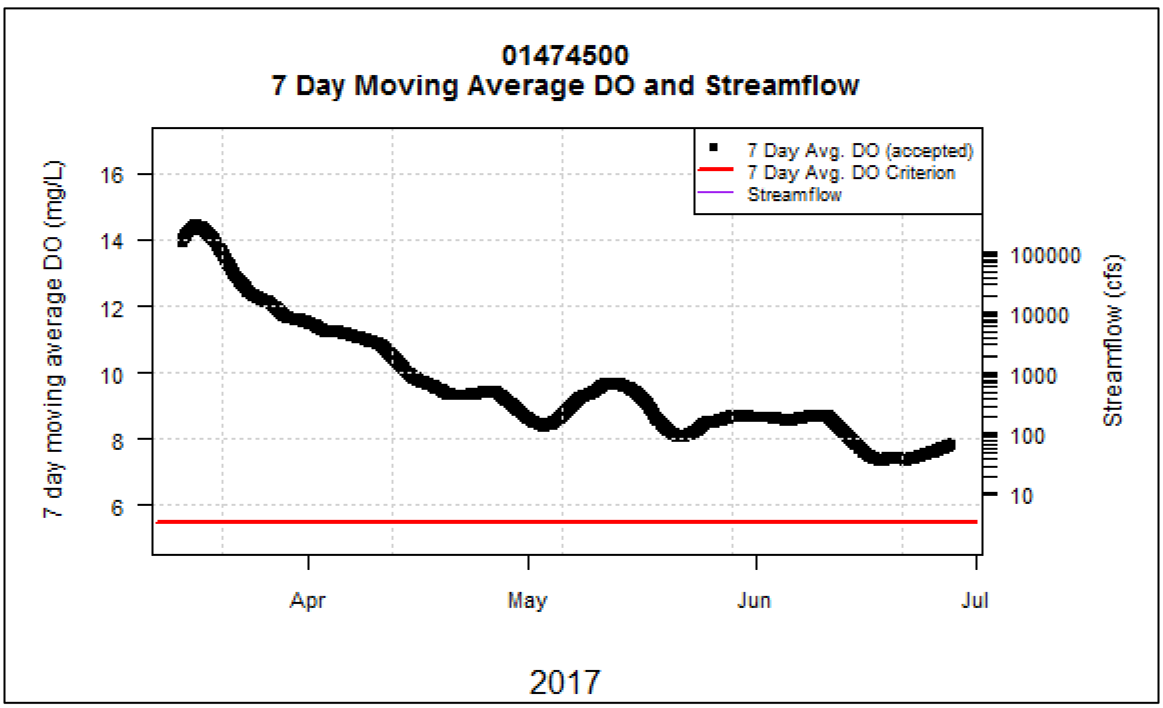


Figure 59. Gage 01474500, 7 Day Average Dissolved Oxygen and Streamflow, Mar-Jun 2017.

Table 64. Gage 01474500 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	Min.	Max.	Mean
Jul-16	WWF	26.0	16.1	5.4	11.3	7.4
Aug-16	WWF	29.0	6.5	6.4	8.9	7.3
Sep-16	WWF	30.0	0.0	6.8	10.6	7.8
Oct-16	WWF	29.0	6.5	8.7	10.4	9.4
Nov-16	WWF	29.0	3.3	9.9	12.1	10.8
Mar-17	WWF	24.0	5.4	11.1	15.2	12.9
Apr-17	WWF	29.0	3.3	8.3	12.0	10.1
May-17	WWF	30.0	3.2	7.6	10.0	8.8
Jun-17	WWF	29.0	3.3	7.2	9.0	8.0

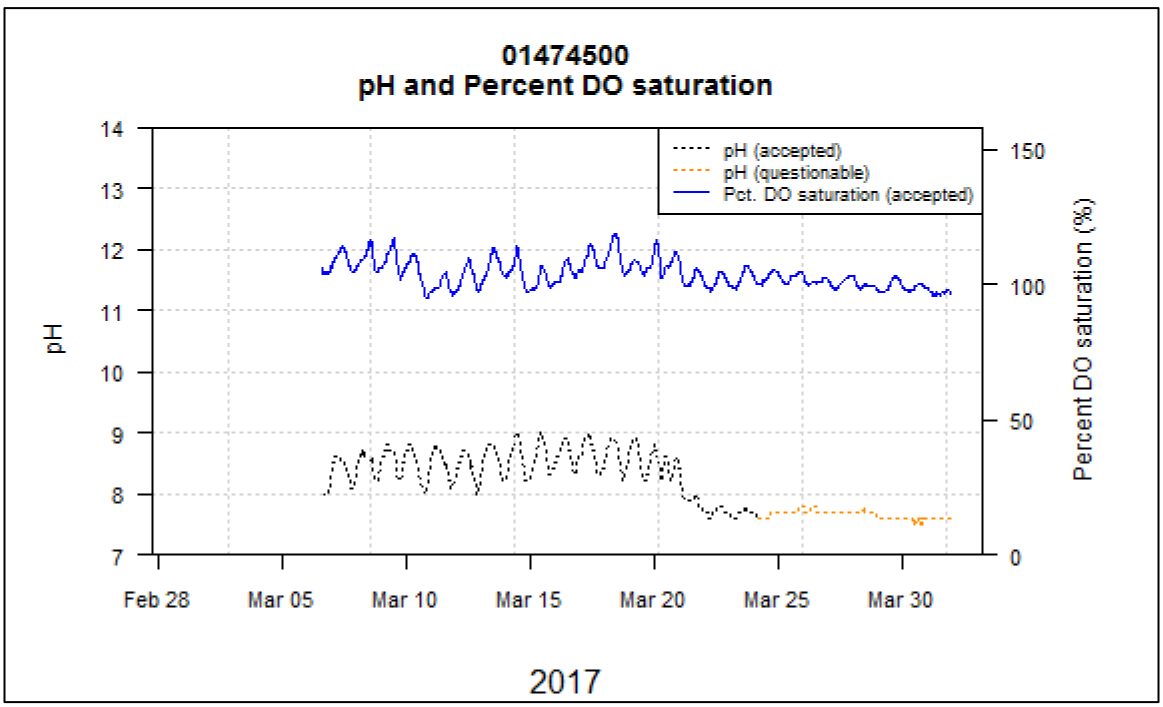


Figure 60. Gage 01474500, pH and Percent Dissolved Oxygen Saturation, March 2017.

Table 65. Gage 01474500 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	654.5	27.3	12.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	8.7	7.7
Aug-16	743.0	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.6	7.8
Sep-16	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.6	7.8
Oct-16	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.6	8.2	7.9
Nov-16	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.9	8.2	8.0
Mar-17	422.5	17.6	30.6	0.0	0.0	0.0	0.0	100.0	100.0	7.6	9.0	8.4
Apr-17*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
May-17	742.5	30.9	0.2	0.0	0.0	0.0	0.0	100.0	100.0	7.4	7.9	7.7
Jun-17	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.0	7.7

*Data flagged for entire month of April; pH sensor required calibration

Temperature

Table 66. Gage 01474500 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
WWF	1-Jul	31-Jul	0.0	100.0	11.9	655.5	27.3	25.7	30.8	27.8
WWF	1-Aug	15-Aug	4.3	95.7	0.0	360.0	15.0	25.9	31.5	28.2
WWF	16-Aug	31-Aug	0.0	100.0	0.3	383.0	16.0			
WWF	1-Sep	15-Sep	0.0	100.0	0.0	360.0	15.0	18.5	27.8	24.6
WWF	16-Sep	30-Sep	0.0	100.0	0.0	360.0	15.0			
WWF	1-Oct	15-Oct	0.0	100.0	0.3	359.0	15.0	12.4	19.5	16.5
WWF	16-Oct	31-Oct	0.0	100.0	0.1	383.5	16.0			
WWF	1-Nov	15-Nov	1.7	98.3	0.3	359.0	15.0	6.2	14.4	10.1
WWF	16-Nov	30-Nov	4.9	95.1	0.0	360.0	15.0			
WWF	1-Mar	31-Mar	22.1	77.9	18.1	609.0	25.4	0.9	10.0	6.2
WWF	1-Apr	15-Apr	54.7	45.3	0.0	360.0	15.0	7.1	21.2	14.2
WWF	16-Apr	30-Apr	100.0	0.0	0.1	359.5	15.0			
WWF	1-May	15-May	30.0	70.0	0.0	360.0	15.0	13.6	23.7	18.2
WWF	16-May	31-May	14.4	85.6	0.4	382.5	15.9			
WWF	1-Jun	15-Jun	0.0	100.0	0.0	360.0	15.0	18.1	27.4	23.4
WWF	16-Jun	30-Jun	0.0	100.0	0.3	359.0	15.0			

Figure 61. Gage 01474500, Schuylkill River at the Fairmount Dam, looking upstream

Turbidity

Turbidity levels at the Schuylkill gage were less susceptible to extreme peaks due to storms and increased flow.

Table 67. Gage 01474500 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-16	654.5	27.3	12.0	11.9	88.1	0.9	14.0	2.1
Aug-16	742.5	30.9	0.2	3.1	96.9	0.8	7.6	1.7
Sep-16	719.0	30.0	0.1	4.8	95.2	0.8	5.0	1.8
Oct-16	742.5	30.9	0.2	3.2	96.8	1.0	7.6	1.6
Nov-16	718.5	29.9	0.2	4.8	95.2	0.8	21.0	1.5
Mar-17	609.0	25.4	0.0	48.9	51.1	1.7	34.5	4.9
Apr-17	719.5	30.0	0.1	62.2	37.8	1.4	166.0	14.0
May-17	742.0	30.9	0.3	48.5	51.5	1.6	27.3	4.1
Jun-17	719.0	30.0	0.1	30.8	69.2	0.8	50.0	3.6

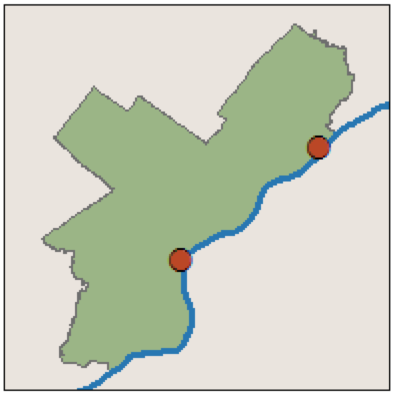
Specific Conductance

The Schuylkill River generally exhibits intermediate conductance, lower than the small Philadelphia tributary streams described elsewhere in this report, but greater than that observed in the Delaware River. Observed differences are likely due to geology and preponderance of anthropogenic sources in the respective watersheds.

Table 68. Gage 01474500 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	655.0	27.3	12.0	422.0	669.0	568.8
Aug-16	743.0	31.0	0.1	401.0	645.0	557.3
Sep-16	720.0	30.0	0.0	495.0	709.0	619.5
Oct-16	742.5	30.9	0.2	396.0	665.0	532.5
Nov-16	719.0	30.0	0.1	597.0	704.0	656.5
Mar-17	609.0	25.4	0.0	374.0	722.0	474.6
Apr-17	719.5	30.0	0.1	237.0	480.0	361.3
May-17	742.5	30.9	0.2	299.0	475.0	408.6
Jun-17	719.0	30.0	0.1	275.0	516.0	412.3

Delaware River (Gages 01467200 and 014670261)



Dissolved oxygen and pH

The DRBC DO daily mean and pH criteria for Zone 3 was attained at Gage 01467200 for the entire reporting period (Tables 69 and 71). The Zone 2 DO daily mean criteria was exceeded in August at Gage 014670261, while the pH guideline was not exceeded (Tables 70 and 72). In 2017, the collection of data at gage 01467200 began March 31. Thus, data for that month is incomplete for that location. Data is collected year-round at 014670261. Small data gaps at both gages prevent the true calculation of a 24-hour mean; this is responsible for the sometimes large percentage of days designated as containing flagged data in Tables 69 and 70.

Figure 62. Delaware River at Ben Franklin Bridge, near Gage 01467200

Table 69. Gage 01467200 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Jul-16	DRBC	26.0	16.1	0.0	100.0	3.9	5.3	4.7	3.4	5.8
Aug-16	DRBC	29.0	6.5	0.0	100.0	4.0	6.0	5.1	3.3	6.6
Sep-16	DRBC	27.0	10.0	0.0	100.0	4.4	5.5	5.1	4.0	6.3
Oct-16	DRBC	21.0	32.3	0.0	100.0	5.9	7.2	6.4	5.4	7.7
Nov-16	DRBC	28.0	6.7	0.0	100.0	7.1	9.2	8.0	6.6	9.5
Mar-17*	DRBC	0.0	100.0	N/A	N/A	N/A	N/A	N/A	11.9	12.0
Apr-17	DRBC	14.0	53.3	0.0	100.0	9.0	11.4	10.0	8.8	12.0
May-17	DRBC	27.0	12.9	0.0	100.0	6.4	9.7	8.3	5.9	9.8
Jun-17	DRBC	16.0	46.7	0.0	100.0	6.5	8.5	7.3	5.9	9.1

*Data collection at this site did not begin until March 31.

Table 70. Gage 014670261 Dissolved Oxygen Daily Mean Criterion Summary Results by Month

Month	Des. Use	Total days accepted data	% days flagged data	% days non-attaining	% days attaining	Daily Avg. Min.	Daily Avg. Max.	Daily Avg. Mean	Min.	Max
Jul-16	DRBC	29.0	6.5	0.0	100.0	5.2	6.7	6.0	4.6	7.1
Aug-16	DRBC	29.0	6.5	20.7	79.3	4.9	6.4	5.7	4.6	7.0
Sep-16	DRBC	28.0	6.7	0.0	100.0	5.5	7.3	6.3	5.2	7.5
Oct-16	DRBC	29.0	6.5	0.0	100.0	6.9	8.4	7.6	6.8	8.6
Nov-16	DRBC	23.0	23.3	0.0	100.0	8.2	10.3	9.1	8.1	10.5
Dec-16	DRBC	26.0	16.1	0.0	100.0	9.8	13.6	12.1	9.6	13.8
Jan-17	DRBC	30.0	3.2	0.0	100.0	12.0	13.5	12.8	11.6	13.7
Feb-17	DRBC	21.0	25.0	0.0	100.0	11.4	13.2	12.7	10.7	13.2
Mar-17	DRBC	23.0	25.7	0.0	100.0	11.4	13.4	12.4	11.0	14.9
Apr-17	DRBC	28.0	6.7	0.0	100.0	9.3	12.0	10.4	9.0	12.1
May-17	DRBC	30.0	3.2	0.0	100.0	6.9	9.7	8.5	6.7	10.1
Jun-17	DRBC	30.0	0.0	0.0	100.0	6.9	8.4	7.7	6.4	9.2

Table 71. Gage 01467200 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	741.0	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.1	7.0
Aug-16	743.5	31.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.1	7.0
Sep-16	719.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.1	6.9
Oct-16	731.3	30.5	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.3	7.1
Nov-16	719.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.4	7.3
Mar-17	6.8	0.3	66.7	0.0	0.0	0.0	0.0	100.0	100.0	7.4	8.0	7.5
Apr-17	675.8	28.2	33.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.5	7.4
May-17	741.3	30.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.5	7.2
Jun-17	694.5	28.9	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.3	7.2

Table 72. Gage 014670261 pH Criteria Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining	Min.	Max.	Mean
Jul-16	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.2	7.0
Aug-16	740.5	30.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	6.8	7.2	7.0
Sep-16	717.5	29.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.4	7.2
Oct-16	742.0	30.9	0.3	0.0	0.0	0.0	0.0	100.0	100.0	7.2	7.5	7.3
Nov-16	712.0	29.7	1.1	0.0	0.0	0.0	0.0	100.0	100.0	7.3	7.6	7.4
Dec-16	740.0	30.8	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.4	7.6	7.5
Jan-17	743.0	30.9	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.1	7.6	7.5
Feb-17	668.5	27.9	0.5	0.0	0.0	0.0	0.0	100.0	100.0	7.3	7.6	7.4
Mar-17	738.0	30.8	0.7	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.5	7.4
Apr-17	720.0	30.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.6	7.3
May-17	743.5	31.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	7.0	7.4	7.2
Jun-17	719.0	30.0	0.1	0.0	0.0	0.0	0.0	100.0	100.0	6.9	7.8	7.1

Temperature

Temperature criteria for the Delaware River were rarely exceeded at either gage.

Table 73. Gage 01467200 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Jul	31-Jul	0.0	100.0	0.0	743.0	31.0	25.2	28.8	27.0
DRBC	1-Aug	31-Aug	0.0	100.0	0.0	743.5	31.0	27.5	29.2	28.2
DRBC	1-Sep	30-Sep	0.0	100.0	0.0	719.3	30.0	21.8	28.1	25.5
DRBC	1-Oct	31-Oct	0.0	100.0	0.0	732.3	30.5	15.2	22.0	18.7
DRBC	1-Nov	30-Nov	0.0	100.0	0.0	719.0	30.0	9.0	15.5	12.4
DRBC	31-Mar	31-Mar	0.0	100.0	0.0	8.3	0.3	7.2	7.5	7.3
DRBC	1-Apr	30-Apr	0.0	100.0	0.0	689.3	28.7	6.4	16.0	11.9
DRBC	1-May	31-May	0.0	100.0	0.0	743.5	31.0	13.8	19.6	16.8
DRBC	1-Jun	30-Jun	0.0	100.0	0.0	711.5	29.6	19.0	25.6	22.0

Table 74. Gage 014670261 Temperature Summary Results by Maximum Criteria Period

Designated Use	Date range start	Date range end	% hrs. exceedance	% hrs. attaining	% hrs. flagged data	Total hrs. accepted data	Total days accepted data	Min.	Max.	Mean
DRBC	1-Jul	31-Jul	0.0	100.0	0.2	742.5	30.9	25.5	29.7	27.4
DRBC	1-Aug	31-Aug	0.1	99.9	0.5	740.5	30.9	26.6	30.1	28.2
DRBC	1-Sep	30-Sep	0.0	100.0	0.4	717.0	29.9	21.0	28.1	25.3
DRBC	1-Oct	31-Oct	0.0	100.0	0.3	742.0	30.9	14.2	21.1	17.9
DRBC	1-Nov	30-Nov	0.0	100.0	1.6	708.5	29.5	7.6	14.9	11.2
DRBC	1-Dec	31-Dec	0.0	100.0	0.5	740.0	30.8	1.2	9.1	4.2
DRBC	1-Jan	31-Jan	0.0	100.0	0.0	744.0	31.0	0.8	4.7	2.7
DRBC	1-Feb	28-Feb	0.0	100.0	0.6	668.0	27.8	2.0	8.7	3.8
DRBC	1-Mar	31-Mar	0.0	100.0	1.0	735.5	30.6	2.0	8.8	5.4
DRBC	1-Apr	30-Apr	0.0	100.0	0.0	720.0	30.0	6.1	16.6	11.9
DRBC	1-May	31-May	0.0	100.0	0.1	743.5	31.0	13.3	20.2	17.0
DRBC	1-Jun	30-Jun	0.0	100.0	0.0	720.0	30.0	18.1	26.0	22.3

Specific Conductance

The Delaware River exhibits much lower conductivity than the small Philadelphia tributary streams described elsewhere in this report. This is likely caused by differences in geology and proportionally fewer anthropogenic sources in the less-developed Delaware River watershed.

Table 75. Gage 01467200 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	738.3	30.8	0.0	244.0	348.0	297.2
Aug-16	743.3	31.0	0.0	238.0	326.0	274.3
Sep-16	719.5	30.0	0.0	261.0	449.0	317.0
Oct-16	732.5	30.5	0.0	308.0	480.0	366.0
Nov-16	718.8	29.9	0.0	320.0	689.0	433.6
Mar-17	6.8	0.3	0.0	219.0	247.0	230.1
Apr-17	676.8	28.2	0.0	136.0	226.0	180.8
May-17	743.3	31.0	0.0	166.0	226.0	196.6
Jun-17	701.8	29.2	0.0	157.0	258.0	211.5

Table 76. Gage 014670261 Specific Conductance Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	Min.	Max.	Mean
Jul-16	742.5	30.9	0.2	223.0	303.0	255.7
Aug-16	740.5	30.9	0.5	220.0	269.0	240.3
Sep-16	716.0	29.8	0.6	227.0	293.0	256.1
Oct-16	741.0	30.9	0.4	272.0	322.0	282.6
Nov-16	706.5	29.4	1.9	273.0	310.0	287.7
Dec-16	738.5	30.8	0.8	208.0	384.0	279.3
Jan-17	739.0	31.0	0.0	217.0	393.0	279.7
Feb-17	667.0	27.8	0.7	179.0	376.0	273.0
Mar-17	730.0	30.4	1.7	131.0	430.0	248.3
Apr-17	720.0	30.0	0.0	135.0	301.0	190.1
May-17	743.5	31.0	0.1	155.0	249.0	192.4
Jun-17	720.0	30.0	0.0	137.0	275.0	200.1

Turbidity

Turbidity guidelines at 014670261 were almost always exceeded throughout the year. Turbidity is not continuously measured at 01467200.

Table 77. Gage 014670261 Turbidity Summary Results by Month

Month	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline	Min.	Max.	Mean
Jul-16	741.5	30.9	0.3	97.8	2.2	2.1	110.0	6.8
Aug-16	739.5	30.8	0.6	97.0	3.0	2.1	25.0	5.7
Sep-16	716.5	29.9	0.5	94.7	5.3	0.7	30.0	5.7
Oct-16	741.5	30.9	0.3	97.2	2.8	2.1	23.0	6.5
Nov-16	711.0	29.6	1.3	99.2	0.8	1.6	86.0	10.2
Dec-16	739.5	30.8	0.6	100.0	0.0	4.3	89.0	13.7
Jan-17	744.0	31.0	0.0	100.0	0.0	3.4	67.3	8.8
Feb-17	671.0	27.9	0.1	99.6	0.4	0.0	60.7	8.6
Mar-17	741.5	30.9	0.2	99.6	0.4	1.1	113.0	11.1
Apr-17	718.5	29.9	0.2	96.0	4.0	1.8	115.0	11.4
May-17	743.5	30.9	0.1	99.1	0.9	1.8	76.1	8.6
Jun-17	720.0	30.0	0.0	97.5	2.5	2.0	47.2	8.3

Wet Weather and Dry Weather Results

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Water quality data was also categorized as wet or dry for the purpose of evaluating weather effects on water quality, and specifically the incidence of non-attainment of water quality criteria. A wet weather condition was defined as rainfall greater than 0.05 inches in the preceding 72 hours, as measured at the nearest PWD rain gage.

In general, more frequent non-attainment of DO criteria was observed in wet weather due to the tendency of storm events to decrease DO via the introduction of stormwater runoff and BOD (Tables 78-79). The turbidity maximum guideline was also usually more frequently surpassed in wet weather (Tables 84-85). The pH maximum criterion was exceeded in both wet and dry weather (Tables 82-83). Temperature criteria were more likely to be exceeded at Trout Stocking Fishery (TSF) gages due to more stringent seasonal criteria (Tables 88-89).

Table 78. USGS Gage July 2016 - June 2017 Dissolved Oxygen Minimum Criterion Summary Results During Wet Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining
01465798	WWF	3600	150.0	1.9	3.7	96.3
01467042	TSF	3981.5	165.9	0.9	0	100
01467048	TSF	2342	97.6	19.4	0	100
01467086	WWF	3668	152.8	0.9	1.9	98.1
01467087	WWF	3116.5	129.9	11.2	35.8	64.2
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	3412	142.2	3.7	0.2	99.8
01474000	TSF	3338.5	139.1	0.8	0	100
01474500	WWF	3409	142.0	2.6	0.1	99.9
01475530	WWF	3388	141.2	1.4	0	100
01475548	WWF	3366.5	140.3	1.7	12.0	88.0
014670261*	DRBC	NA	NA	NA	NA	NA

*No minimum DO criterion applies at these locations.

Table 79. USGS Gage July 2016 - June 2017 Dissolved Oxygen Minimum Criterion Summary Results During Dry Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. non-attaining	% hrs. attaining
01465798	WWF	2902.5	120.9	0.1	0.5	99.5
01467042	TSF	2555	106.5	0.1	0	100
01467048	TSF	2226	92.8	0.2	0	100
01467086	WWF	2739	114.1	1.3	0.5	99.5
01467087	WWF	2484.5	103.5	15.6	18.2	81.8
01467200*	DRBC	NA	NA	NA	NA	NA
01473900	TSF	2766	115.3	0.1	0	100
01474000	TSF	2852.5	118.9	1.43	0	100
01474500	WWF	2959.5	123.3	0.6	0	100
01475530	WWF	3111	129.6	0.1	0	100
01475548	WWF	3103	129.3	0.8	3.5	96.5
014670261*	DRBC	NA	NA	NA	NA	NA

*No minimum DO criterion applies at these locations.

Table 80. USGS Gage July 2016 - June 2017 Dissolved Oxygen Daily Mean Criterion Summary Results During Wet Weather

Gage number	Designated Use	Total days accepted data	% days flagged data
01465798	WWF	159	2.9
01467042	TSF	177	1.3
01467048	TSF	112	19.6
01467086	WWF	136	1.4
01467087	WWF	146	18.2
01467200	DRBC	125	1.6
01473900	TSF	129	5.1
01474000	TSF	124	1.6
01474500	WWF	129	3.7
01475530	WWF	148	1.6
01475548	WWF	150	2.3
014670261	DRBC	192	0.5

Table 81. USGS Gage July 2016 - June 2017 Dissolved Oxygen Daily Mean Criterion Summary Results During Dry Weather

Gage number	Designated Use	Total days accepted data	% days flagged data
01465798	WWF	123	0.9
01467042	TSF	114	0
01467048	TSF	86	21.5
01467086	WWF	98	1.0
01467087	WWF	107	17.9
01467200	DRBC	93	0
01473900	TSF	102	0
01474000	TSF	104	2.8
01474500	WWF	109	0.9
01475530	WWF	134	0
01475548	WWF	131	0.8
014670261	DRBC	132	0

Table 82. USGS Gage July 2016 - June 2017 pH Criteria Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	3620	150.8	1.4	0.1	0.1	0	0	99.9	99.4
01467042	3999	166.6	0.4	0	0	0	0	100	100
01467048	3054	127.3	16.8	1.0	4.6	0	0	99.0	95.4
01467086	3694	153.9	0.2	0.2	1.7	0	0	99.8	98.3
01467087	3500	145.8	0.3	0	0	0	0	100	100
01467200	3241.5	135.1	1.0	0	0	0	0	100	100
01473900	3530	147.1	0.4	0.1	0.6	0	0	99.9	99.4
01474000	3339	139.1	0.8	0.3	1.9	0	0	99.7	98.1
01474500	2765	115.2	21.0	0	0	0	0	100	100
01475530	3418	142.4	0.5	0	0	0	0	100	100
01475548	3407	142.0	0.5	0	0	0	0	100	100
014670261	5090	212.1	0.2	0	0	0	0.4	100	99.6

Table 83. USGS Gage July 2016 - June 2017 pH Criteria Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. max. non-attaining	% days max. non-attaining	% hrs. min. non-attaining	% days min. non-attaining	% hrs. attaining	% days attaining
01465798	2882	120.1	0.8	0.1	0.7	0	0	99.9	99.3
01467042	2554.5	106.4	0.1	0	0	0	0	100	100
01467048	2342	97.6	19.4	1.6	8.7	0	0	98.4	91.3
01467086	2763	115.1	0.5	0.9	4.8	0	0	99.1	95.2
01467087	2928	122	0.5	0	0	0	0	100	100
01467200	2534	105.6	0.3	0	0	0	0	100	100
01473900	2765.5	115.2	0.1	0.5	2.1	0	0	99.5	97.9
01474000	2852.5	118.9	1.4	0.5	2.1	0	0	99.5	97.9
01474500	2698	112.4	9.4	0	0	0	0	100	100
01475530	3111.5	129.6	0.1	0.3	1.9	0	0	99.7	98.1
01475548	3124	130.2	0.1	0.6	3.8	0	0	99.4	96.2
014670261	3636.5	151.5	0.2	0	0	0	0	100	100

Table 84. USGS Gage July 2016 - June 2017 Turbidity Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	3574.5	148.9	2.6	50.6	49.4
01467042	3898.5	162.4	2.9	45.7	54.3
01467048	2669	111.2	27.3	56.9	43.1
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	3421	142.5	3.5	59.3	40.7
01474000	3296	137.3	2.1	34.0	66.0
01474500	3407	142.0	2.7	31.7	68.3
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA
014670261	5090	212.1	0.2	98.3	1.7

*Turbidity not continuously monitored at this location

Table 85. USGS Gage July 2016 - June 2017 Turbidity Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. above max. guideline	% hrs. below max. guideline
01465798	2881	120.0	0.9	14.1	85.9
01467042	2548.5	106.2	0.4	22.3	77.7
01467048	2312.5	96.4	20.4	24.9	75.1
01467086*	NA	NA	NA	NA	NA
01467087*	NA	NA	NA	NA	NA
01467200*	NA	NA	NA	NA	NA
01473900	2766.5	115.3	0.1	36.5	63.5
01474000	2852.5	118.9	1.4	4.6	95.4
01474500	2959.5	123.3	0.6	14.9	85.1
01475530*	NA	NA	NA	NA	NA
01475548*	NA	NA	NA	NA	NA
014670261	3638.5	151.6	0.1	98.0	2.0

*Turbidity not continuously monitored at this location

Table 86. USGS Gage July 2016 - June 2017 Specific Conductance Summary Results During Wet Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	3619	150.8	1.4
01467042	3998	166.6	0.4
01467048	2920	121.7	20.4
01467086	3693.5	153.9	0.3
01467087	3501	145.9	0.3
01467200	3248	135.3	0.8
01473900	3530	147.1	0.4
01474000	3339.5	139.1	0.8
01474500	3408.5	142.0	2.7
01475530	3404.5	141.9	0.9
01475548	3338.5	139.1	2.5
014670261	5081.5	211.7	0.3

Table 87. USGS Gage July 2016 - June 2017 Specific Conductance Summary Results During Dry Weather

Gage number	Total hrs. accepted data	Total days accepted data	% hrs. flagged data
01465798	2881.5	120.1	0.8
01467042	2555	106.5	0.1
01467048	2165.5	90.2	25.5
01467086	2763	115.1	0.5
01467087	2928.5	122.0	0.5
01467200	2534	105.6	0.3
01473900	2765.5	115.2	0.1
01474000	2852.5	118.9	1.4
01474500	2961	123.4	0.6
01475530	3111.5	129.6	0.1
01475548	3057	127.4	2.2
014670261	3628	151.2	0.4

Table 88. USGS Gage July 2016 - June 2017 Temperature Maximum Criteria Summary Results During Wet Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	3649.5	152.0	0.6	15.3	84.7
01467042	TSF	3998.5	166.6	0.4	32.2	67.7
01467048	TSF	3054	127.3	16.8	45.2	54.8
01467086	WWF	3694	153.9	0.2	15.3	84.7
01467087	WWF	3503	146.0	0.2	16.6	83.4
01467200	DRBC	3271	136.3	0.1	0	100
01473900	TSF	3499.5	145.8	1.3	32.3	67.7
01474000	TSF	3336.5	139.0	0.9	37.9	62.1
01474500	WWF	3409	142.0	2.6	18.2	81.8
01475530	WWF	3417.5	142.4	0.6	14.7	85.3
01475548	WWF	3370	140.4	1.6	17.1	82.9
014670261	DRBC	5088	212	0.2	0	100

Table 89. USGS Gage July 2016 - June 2017 Temperature Maximum Criteria Summary Results During Dry Weather

Gage number	Designated Use	Total hrs. accepted data	Total days accepted data	% hrs. flagged data	% hrs. exceedance	% hrs. attaining
01465798	WWF	2902	120.9	0.1	13.7	86.3
01467042	TSF	2555	106.5	0.1	22.5	77.5
01467048	TSF	2335	97.3	19.6	24.1	75.9
01467086	WWF	2763	115.1	0.5	13.7	86.3
01467087	WWF	2928.5	122.0	0.5	15.0	85.0
01467200	DRBC	2541	105.9	0	0	100
01473900	TSF	2750.5	114.6	0.6	25.1	74.9
01474000	TSF	2849.5	118.7	1.5	20.7	79.3
01474500	WWF	2961	123.4	0.6	9.2	90.8
01475530	WWF	3111.5	129.6	0.1	11.2	88.8
01475548	WWF	3123.5	130.1	0.1	13.6	86.4
014670261	DRBC	3634	151.4	0.2	0	100

References

Delaware River Basin Commission, 2007. Delaware River Basin Water Code: 18 CFR Part 410 (With Amendments Through September 27, 2006). West Trenton, NJ.

Appendix I - PWD/USGS Groundwater Monitoring Program

Background

The basis of PWD's CSO LTCPU wet weather source control strategy is the "capture" and infiltration of as much rainwater as possible with green stormwater infrastructure (GSI). The direct benefits of such an effort are a reduction of stormwater discharged directly to streams, as well as the increased recharge of stormwater to supplement groundwater resources. Increased infiltration, though advantageous in several respects, must be carefully planned and closely monitored to avoid unwanted impacts. Increasing groundwater levels in areas where the depth to water is shallow could result in the saturation of soils close to the surface, potentially causing basement flooding. In addition, building foundations could be impacted by rising groundwater levels.

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

Data from the groundwater monitoring network will also be used to calibrate a Philadelphia groundwater model and update the USGS groundwater contour map of Philadelphia (Paulachok 1984). In addition to this City-wide, long term groundwater monitoring program, PWD is conducting site-scale monitoring to address the effectiveness of individual SMPs. The City-wide groundwater monitoring network and site-scale monitoring at GSI facilities provide complementary information regarding the effects of stormwater management practices at different spatial and temporal scales.

Methods

PWD and USGS identified existing wells that would be suitable for the network and obtained permission for site access. Once wells were identified and accessible, well condition and suitability for inclusion in the monitoring network were investigated by continuous water level monitoring and remote video camera inspection when accessible. Wells that met acceptance criteria were added to the monitoring network. After examining readily available information about existing wells, PWD elected to drill additional wells in order to provide better spatial distribution of wells in the monitoring network. USGS staff conduct groundwater observations monthly and upload water level data to the NWIS web server. PWD staff periodically download water level data from NWIS and summarize these data annually.

Well Network Establishment

Existing wells in the Philadelphia area were identified by USGS and PWD through digital and paper archives as well as through contacting representatives of other City agencies and large institutional landowners (*e.g.*, Philadelphia Fire Department, Philadelphia Department of Parks and Recreation, Philadelphia Gas Works, Southeastern Pennsylvania Transportation Authority, etc.). Priority was given to wells on publicly-owned or large institutional land uses in order to help ensure that wells would remain accessible in the future. The primary goal was to develop a network of wells with a spatial distribution and density sufficient to assess groundwater levels throughout the City of Philadelphia. Other criteria for establishment of the well network were:

- Sufficient density of wells in critical areas with a shallow water table
- No bias given to combined-sewered or separate-sewered areas
- Denser distribution of monitoring wells in the Northern Piedmont Ecoregion to reflect its more varied groundwater contours.

Wells that met acceptance criteria were assigned USGS location codes and added to the USGS well monitoring network and National Water Information System (NWIS) database. The well monitoring network contains 29 active sites that are monitored monthly. Additional sites are expected to be added once landowner access agreements are finalized or new wells are drilled.

Video Camera Inspection

The availability of well attribute information varied from well to well and in most cases the physical characteristics and condition of candidate wells to be added to the network was unknown. USGS staff perform remote video camera inspection, when possible, to determine physical characteristics such as screened intervals, total depth, depth to bottom of casing, and the location of potential water-bearing zones within the bore hole. Wells narrower than 4" diameter and wells with pumps or other plumbing could not accommodate the camera equipment and were not inspected with this method.

Continuous Water Level Monitoring

Monthly measurements are appropriate for monitoring long term trends in groundwater levels. However, it is important to verify that these monthly observations are representative of the unconfined aquifer and not influenced by anthropogenic activity or other conditions. USGS staff used data logging pressure transducers (LevelTroll model 500, In-Situ, Inc.) to conduct continuous water level monitoring in candidate wells. These sensors are vented to the surface of the well to provide atmospheric pressure correction. Continuous monitoring was carried out across all wells in the network to identify any aberrant trends, such as those that might be caused by local pumping operations. Sensors were deployed for three-month periods on a rotating schedule with five wells actively monitored at a time. Wells that appear to be influenced by permanent pumping operations will be removed from the monitoring network (*e.g.*, permanent wells dewatering the stadiums). Wells that are temporarily affected by local, dewatering operations (*e.g.*, a short term construction site), will remain in the system, but data collected during the period when dewatering operations affected the well will not be used in estimates of current water levels and water level trends.

Routine Groundwater Observations

USGS staff conduct groundwater observations monthly at each well using a water sensor and graduated tape. Equipment is sterilized in 10% bleach solution prior to and after measurements are taken in order to prevent introducing or transferring contamination between wells. Well level measurements are converted to elevation above the North American Vertical Datum of 1988 (NAVD88) based upon the known elevation correction factor for each well. Water level data are recorded on site in field notebooks along with any pertinent field notes and then uploaded to the NWIS web server. PWD periodically downloads data from NWIS and summarizes these data annually.

Monitoring Well Locations

Currently the well monitoring network contains 29 active sites that are monitored monthly. (Table 1, Figure 1). PWD is in the process of drilling additional wells on City-owned property in order to meet spatial distribution and other well network criteria. Of the 29 active wells, 11 are located within the Middle Atlantic Coastal Plain Ecoregion, while the remaining 18 wells are located in the Northern Piedmont (Omernik 1987). As stated above, higher well density is required in the latter region to reflect the more complex geology and interactions with groundwater.

Table 1. PWD-USGS Groundwater Monitoring Well Network Locations.

Site ID	Site Name	Lat.	Long.	Established	Observations
USGS-395342075102101	PH 12*	39.895	-75.172	10/22/1978	132
USGS-395353075151501	PH 1052	39.898	-75.254	3/7/2011	64
USGS-395408075104001	PH 63	39.902	-75.177	9/14/1954	81
USGS-395416075150301	PH 1053	39.904	-75.251	4/24/2003	63
USGS-395516075113901	PH 1051	39.921	-75.194	--	55
USGS-395656075100401	PH 136	39.949	-75.167	12/6/1978	65
USGS-395859075085401	PH 1042	39.983	-75.148	2/14/2011	67
USGS-395942075144301	MG 2164	39.995	-75.245	2/14/2011	76
USGS-400211075093701	PH 1050	40.036	-75.16	--	76
USGS-400217075142101	PH 540	40.038	-75.239	3/29/1948	66
USGS-400229075104601	PH 1043**	40.041	-75.179	2/14/2011	75
USGS-400308074592201	PH 397	40.052	-74.989	1/4/1979	80
USGS-400311075101301	PH 1040	40.053	-75.17	2/17/2011	78
USGS-400327075152201	PH 1044	40.057	-75.256	3/16/2011	71
USGS-400424075104901	PH 550	40.073	-75.18	--/--/1906	71
USGS-400512075033401	PH 1045	40.087	-75.059	7/18/2011	72
USGS-400516075033201	PH 1046	40.088	-75.059	7/18/2011	65
USGS-400524075042601	MG 2195	40.09	-75.074	--	10
USGS-400527075042801	MG 2193	40.091	-75.074	--	65
USGS-400527075042802	MG 2194	40.091	-75.074	--	71
USGS-400644074590801	PH 1041	40.112	-74.986	2/17/2011	76
USGS-400132075031001	PH 1056	40.026	-75.053	8/14/2014	34
USGS-400001075040301	PH 1057	40	-75.068	8/14/2014	34
USGS-400038075094601	PH 1058	40.011	-75.163	8/14/2014	34
USGS-395611075091301	PH 1059	39.936	-75.154	8/14/2014	35
USGS-395459075140501	PH 797	39.916	-75.259	10/15/1980	5
USGS-395656075104401	PH 1064	39.948	-75.178	6/5/2015	5
USGS-395705075135901	PH 1061	39.951	-75.232	6/5/2015	5
USGS-395849075134201	PH 1063	39.98	-75.228	6/5/2015	5
USGS-400016075102801	PH 1062	39.004	-75.174	6/5/2015	5
USGS-400055075122501	PH 1060	39.015	-75.206	6/5/2015	5

* Philadelphia County observation well

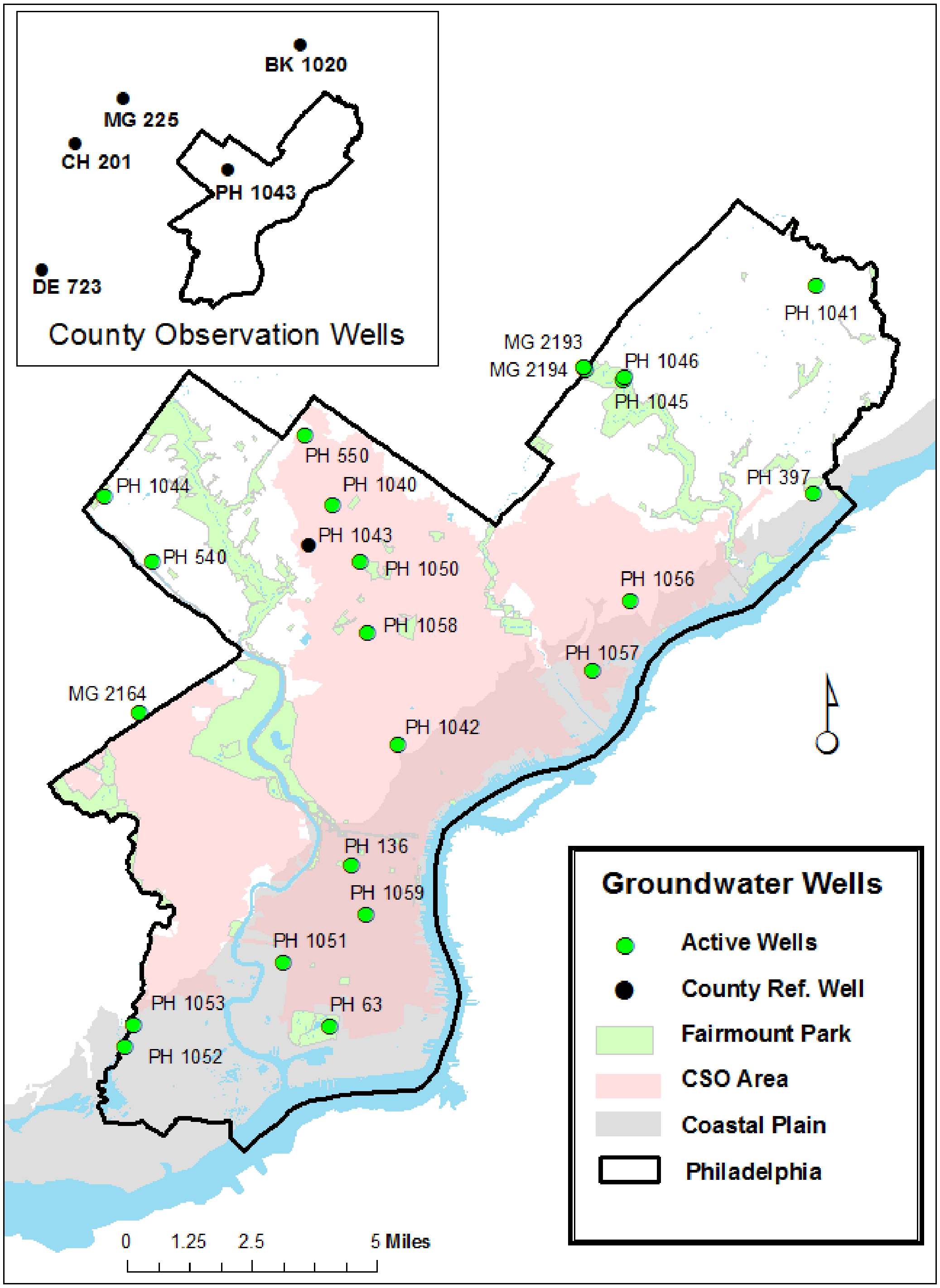

Figure 1. PWD-USGS Groundwater Monitoring Well Network Locations and (inset) County Reference Well Locations.

Wells were also classified according to predominant underlying geology and type of sewer system, *i.e.*, CSO or separate-sewered (Table 2, Figure 1). Another consideration for siting new wells was the potential influence of buried utilities and historic creek beds. During the period of rapid expansion of Philadelphia's grid-like network of streets, historic streams were encased in large brick sewers and buried in order to level and prepare land for development. Recent groundwater mapping and modeling work suggests that these brick sewers strongly influence local groundwater elevations (Paulachok 1991, Maimone et al. 2011).

Table 2. PWD-USGS Groundwater Well Geology and Sewer System Type Classification.

Site ID	Site Name	Sewer Type	Geology
USGS-395353075151501	PH 1052	Separate	Trenton Gravel
USGS-395408075104001	PH 63	Separate	Trenton Gravel
USGS-395416075150301	PH 1053	Separate	Trenton Gravel
USGS-395516075113901	PH 1051	CSO	Magothy Raritan Potomac
USGS-395656075100401	PH 136	CSO	Trenton Gravel
USGS-395859075085401	PH 1042	CSO	Pennsauken and Bridgeton Formation
USGS-395942075144301	MG 2164	Separate	Granitic Gneiss and Granite
USGS-400211075093701	PH 1050	CSO	Wissahickon Formation
USGS-400217075142101	PH 540	Separate	Wissahickon Formation
USGS-400229075104601	PH 1043	CSO	Wissahickon Formation
USGS-400308074592201	PH 397	Separate	Trenton Gravel
USGS-400311075101301	PH 1040	CSO	Wissahickon Formation
USGS-400327075152201	PH 1044	Separate	Wissahickon Formation
USGS-400424075104901	PH 550	CSO	Wissahickon Formation
USGS-400512075033401	PH 1045	Separate	Granitic Gneiss and Granite
USGS-400516075033201	PH 1046	Separate	Granitic Gneiss and Granite
USGS-400527075042801	MG 2193	Separate	Wissahickon Formation
USGS-400527075042802	MG 2194	Separate	Wissahickon Formation
USGS-400644074590801	PH 1041	Separate	Wissahickon Formation
USGS-400132075031001	PH 1056	CSO	Wissahickon Formation
USGS-400001075040301	PH 1057	CSO	Trenton Gravel
USGS-400038075094601	PH 1058	CSO	Pennsauken Formation
USGS-395611075091301	PH 1059	CSO	Trenton Gravel
USGS-395459075140501	PH 797	CSO	Trenton Gravel
USGS-395656075104401	PH 1064	CSO	Trenton Gravel
USGS-395705075135901	PH 1061	CSO	Wissahickon Formation
USGS-395849075134201	PH 1063	CSO	Wissahickon Formation
USGS-400016075102801	PH 1062	Separate	Pennsauken Formation
USGS-400055075122501	PH 1060	Separate	Wissahickon Formation

USGS maintains at least one reference well in most Pennsylvania counties. Reference wells located in neighboring counties (Figure 1, Table 3) may be used as regional reference wells for data analyses. Continuous hourly data are collected at well DE 723 in Delaware County. Reference wells in Chester, Bucks and Montgomery counties are not monitored continuously.

Table 3. Regional County Observation Wells.

Site ID	Site Name	Lat.	Long.	Est.	Observations
USGS-400453075255601	CH 201 Chester County Observation Well	40.136	-75.351	06/19/1978	463
USGS-400808075210401	MG 225 Montgomery County Observation Well	40.199	-75.052	08/15/1956	173
USGS-401157075032001	BK 1020 Bucks County Observation Well	40.081	-75.432	04/13/1968	170
USGS-395512075293701	DE 723 Delaware County Observation Well	39.920	-75.493	1983	196

Data Analysis

USEPA (2009) published detailed guidance on statistical analysis of groundwater contaminant concentrations. In many of the examples, the same logic and techniques could apply to analysis of groundwater levels. In the case of the Philadelphia groundwater monitoring network, the goal is to understand if groundwater levels are changing over time, at either a single well or group of wells. The main statistical tests to be utilized are a) Seasonal Kendall Test, and b) ANOVA. The tests are briefly described below.

The Seasonal Kendall test performs the Mann-Kendall (MK) trend test for individual seasons of the year, where season is defined by the user. It then combines the individual results into one overall test for whether the dependent variable (*i.e.,* groundwater level) changes in a consistent direction (monotonic trend) over time. The magnitude (*i.e.*, slope) of the trend is also determined. The test is nonparametric, therefore non-normal data can be analyzed (Helsel *et al.* 2006). USEPA (2009) advises that at least 10-12 measurements are needed, whereas Helsel and Hirsch (2002) recommends that the product of number of years and number of seasons be greater than 25. Helsel *et al.* (2006) further caution that with more than 10 years of data, adjusted p-values should be calculated to account for the possibility of serial correlation. The Seasonal Kendall test can be applied to data from a single well, not multiple wells. To examine seasonal trends across multiple wells, the Covariance-Sum test is used (Lettenmaier 1988), which is essentially the execution of multiple seasonal Kendall tests and calculation of the covariances between them. To analyze regional trends over time from a group of wells, the Regional Kendall test can be applied. The Regional Kendall test essentially functions the same way as the Seasonal Kendall test, except the data is categorized by region rather than season.

An alternate method to analyze temporal trends on either a single well or group of wells is the analysis of variance (ANOVA). For a single well or group of wells with data subdivided by season, a one-way ANOVA would examine the significance of seasonality as a statistical factor. A two-way ANOVA would be applied to include location or region as a statistical factor. Either form of ANOVA assumes that the datasets are normally distributed with constant variance. Group residuals should be tested for normality and for equality of variance. If the data cannot be transformed to a normal distribution, the nonparametric Kruskal-Wallis test can be used instead to detect significance of the specified statistical factor (USEPA 2009).

Well Monitoring Data Summary

Well monitoring data were summarized from July 2016 to June 2017 (Tables 4-5). These data are presented as an update of the program status. Additional data analysis will be completed as part of the groundwater model calibration and groundwater map update reports. Groundwater trends will be analyzed further once a sufficient amount of data has been collected (See Data Analysis section).

Table 4. PWD-USGS Groundwater Monitoring Well Data 7/2016-6/2017, Depth to Water Level (Feet below Land Surface).

Site ID	J	A	S	O	N	D	J	F	M	A	M	J
395408075104001	5.90	5.72	5.93	6.18	6.10	6.08	6.82	6.01	6.40	6.00	5.66	5.78
395656075100401	31.37			31.41		31.61					31.58	31.57
395859075085401	9.54	9.52	10.17	9.47	10.23	9.48	9.27	8.98	8.86	7.87	7.75	7.83
395942075144301	18.83	22.25	22.71	17.85	17.18	16.31	15.64	15.27	14.83	16.80	14.65	15.11
400229075104601	14.88	14.94	15.60	15.69	16.64	16.41	16.20	15.78	16.83	14.48	14.80	15.45
400308074592201	5.86	6.79	8.09	8.57	8.89	9.17	8.84	7.94	7.78	6.09	5.74	5.98
400311075101301	11.55	12.26	12.02	11.81	11.59	11.17	8.32	8.16	11.40	9.18	9.35	10.24
400327075152201	68.70	73.29	75.41	77.12	78.22	78.04	77.51	75.18	75.12	57.95	59.41	62.37
400424075104901	18.67	19.10	19.73	20.32	20.93	21.12	19.94	20.21	20.00	18.60	17.97	17.78
400512075033401	35.54	36.22	36.75	36.12	36.90	37.18	36.61	36.35	36.21	34.85	34.51	35.30
400516075033201	28.93	29.58	30.03	30.40	30.91	31.23	31.50	31.81	31.63	32.11	31.85	31.31
400644074590801	17.48	18.09	19.58	20.08	19.64	19.29	19.16	18.71	18.70	17.52	17.35	17.82
395353075151501	15.53	16.00	16.25	16.46	16.81	17.07	17.22	17.21	17.23	16.38	15.92	15.77
395416075150301	8.52	9.58	10.24	11.14	11.41	11.74	11.70	10.55	10.96	9.55	8.65	8.79
395516075113901	27.80	28.48	28.51	28.20	28.52	28.45	29.09	29.22	29.45	28.82	28.38	28.33
400211075093701	14.03	14.33	14.76	14.13	14.33	14.40	14.44	14.43	14.51	14.35	14.21	14.06
400217075142101	31.48	32.13	32.81	33.62	34.36	34.93	35.12	35.21	35.09	35.08	34.32	33.65
400527075042801	21.12	21.68	22.04	21.60	21.80	20.82	19.90	19.48	19.40	19.44	19.43	19.81
400527075042802	22.75	23.69	24.68	24.29	24.15	22.37	21.62	21.34	21.29	17.28	17.57	18.44
400132075031001	20.68	20.97	21.27	21.20	21.34	21.37	21.44	21.26	21.20	20.78	20.19	20.34
400001075040301	15.43	15.38	15.91	15.50	16.55	16.58	16.70	16.42	16.40	15.86	15.55	15.53
400038075094601	20.11	20.04	19.98	20.11	20.27	20.14	20.12	20.05	20.01	19.75	19.83	19.86
395611075091301	26.89	26.82	26.92	27.04	27.21	27.40	27.50	27.54	27.33	27.43	27.19	27.80
395459075140501									13.52	13.73	13.54	13.73
395656075104401									21.31	21.11	20.99	20.86
395705075135901									14.25	13.60	13.00	13.13
395849075134201									13.63	13.20	13.54	14.26
400016075102801									10.93	10.92	10.80	11.88
400055075122501									15.54	15.31	15.35	15.87

Table 5. Regional County Observation Well Data 7/2016 - 6/2017.

Site ID	J	A	S	O	N	D	J	F	M	A	M	J
400453075255601	22.86	23.96	25.55	25.6	26.07	24.8	23.28	22.42	22.33	19.49	20.6	21.49
400808075210401	12.65	13		14.64		13.13	10.98		12.4		9.89	
401157075032001	34.1	36.05		39.48	40.85	39.95	34.13		33.42		29.15	29.81
395512075293701	6.84		8.08	7.89		7.59	7.38		6.98		6.89	7.28

References

USEPA, 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities -Unified Guidance. Report no. EPA-530-R-09-007. Office of Resource Conservation and Recovery. Available online at http://www.epa.gov/epawaste/hazard/correctiveaction/resources/guidance/sitechar/gwstats/unified-guid.pdf

Helsel, D. R., and Hirsch, R. M., 2002. Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 524 p. Available online at http://water.usgs.gov/pubs/twri/twri4a3/

Helsel, D.R., Mueller, D.K., and Slack, J.R., 2006. Computer Program for the Kendall Family of Trend Tests. U.S. Geological Survey Scientific Investigations Report 2005-5275, 4p. Available online at http://pubs.usgs.gov/sir/2005/5275/pdf/sir2005-5275.pdf

Lettenmaier D.P., 1988. Multivariate Nonparametric Tests for Trend in Water Quality. *Water Resources Bulletin*, 24, 505-512.

Maimone, M., O'Rourke, D.E., Knighton, J.O., and Thomas, C.P. 2011. Potential Impacts Of Extensive Stormwater Infiltration In Philadelphia. Environmental Engineer: Applied Research and Practice. Fall 2011. 29-39.

Paulachok, G. N., and Wood C.R. (1984). Water-table map of Philadelphia, Pennsylvania, 1976-1984. U.S. Geological Survey Hydrologic investigations atlas HA-676. Washington, D.C.

Appendix J – PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments

PWD Wadeable Streams Benthic Macroinvertebrate and Physical Habitat Assessments

Background

Since 1999, the Philadelphia Water Department (PWD) has been using benthic macroinvertebrate sampling and instream physical habitat assessments in order to characterize watershed conditions and track trends in watershed health. Assessments are performed by the staff of PWD's Bureau of Laboratory Services (BLS) using PADEP Instream Comprehensive Evaluation (ICE) methods. As benthic invertebrates may be exposed to both short and long-duration stressors, data collected through this program are pertinent to all targets of PWD's Integrated Watershed Management Plan (IWMP) Strategy.

Common Acronyms Used in This Report

IBI - Index of Biotic Integrity, a biological assessment tool to indicate the capability of a stream to support a healthy aquatic community.
ICE - Instream Comprehensive Evaluation, a protocol to survey and evaluate wadeable streams.
PTV - Pollution Tolerance Values, a numeric measure of an organism's ability to withstand environmental degradation.
EPT - Ephemeroptera + Plecoptera + Trichoptera, the common names for pollution-sensitive mayflies, stoneflies and caddisflies.

Assessment Study Design

In recent years, agencies tasked with evaluating water quality have attempted to incorporate statistical sampling designs, or a "probabilistic" approach, to selecting sampling sites (Paulsen 2008, Borsuk *et al*. 2001) rather than relying on fixed sites. Statistical sampling design is particularly important when the goal of monitoring is to make an estimate of the percentage of waters affected by pollution. Another advantage of probabilistic study design is that the assessment units are distributed over a larger geographic area. When monitoring efforts are directed at individual watersheds on a rotating basis, as has been the case with PWD programs, the possibility arises that larger scale patterns may be missed. For example, the effects of floods or drought conditions are widespread, but only the watershed that is being monitored within the same time period will have data reflecting these effects. Disadvantages of a probabilistic approach include the technical demands of establishing and randomly selecting from geographic data sets containing all possible sampling locations as well as additional field reconnaissance work when conduct the actual monitoring.

The current PWD monitoring strategy is intended to be a compromise, recognizing the benefits of collecting data from randomly selected sites but also the importance of maintaining a consistent monitoring effort at selected locations over time. This plan is based on a similar monitoring program implemented by USGS in Chester County (Reif 2002, Reif 2004). The plan also reflects the manpower constraints of collecting and processing samples with the PADEP ICE protocol. It is hoped that this compromise approach (Table 1) will achieve some of the benefits of a randomized approach, while providing periodic re-evaluation of our watersheds required to inform the watershed planning process and comply with environmental mandates.

Stream Conditions

This report summarizes results from samples that were collected between March 21 and April 19, 2016. PWD is not aware of any spills, discharges or unusual conditions that would tend to cause misleading results.

Table 1. PWD Proposed Wadeable Streams Assessments Schedule

Period	Monitoring Activity (number of samples)
2011	USGS gage samples (8); Randomly selected sites (16)
2012	Cobbs Creek Assessment (6*); USGS gage samples (9); Random (10)
2013	Tookany/Tacony Creek (10*); USGS gage samples (8); Random (7)
2014	Wissahickon Creek Tributaries (11); USGS gage samples (9); Random (5)
2015	Wissahickon Creek (12*); USGS gage samples (8); Random (2)
2016	Pennypack Creek Tributaries (11); USGS gage samples (9); Random (5)
2017	Pennypack Creek (12*); USGS gage samples (9); Random (4)
2018	Poquessing Creek

* Number of monitoring sites excludes USGS gage sites in target watershed

Methods

Benthic Macroinvertebrate Sample Collection

Using the PADEP Instream Comprehensive Evaluation (ICE) protocol (PADEP 2009), macroinvertebrate samples were collected by placing a handheld D-frame net (500µm) at the downstream portion of a riffle. Stream substrate directly upstream of the D-frame net was then disturbed for approximately one minute to a depth of approximately 10 cm as substrate allowed. This procedure was repeated at other riffle locations of variable flow within the 100-m reach such that the sample at each station was a composite of six riffle samples. Composited samples from each biological monitoring location were then preserved in 95% ETOH (ethyl alcohol) and returned to the laboratory in polyethylene containers.

Benthic Macroinvertebrate Laboratory Procedures

Benthic macroinvertebrate samples were processed according to PADEP ICE protocols (PADEP 2009). Each composited sample was placed into an 18 x 12 x 3.5-inch pan marked with 28 four-square-inch grids. Four grids were randomly selected by drawing numbers. All material was extracted from the selected grids using a four-square-inch circular "cookie cutter," and placed into another identical empty pan. From this second pan, organisms were picked from randomly selected grids or "plugs" until a minimum of 200, but not more than 240, individuals were subsampled. This procedure was a misinterpretation of the actual technique, which stipulates a count of 200 (+/- 20%) individuals. When picking either the four initial "plugs" or additional plugs results in subsampling more than 240 individuals, the PADEP ICE protocol outlines a procedure for redistributing the subsample into a clean, gridded pan and "back counting" grids until a subsample consisting of 200 (+/-20%) is obtained. Invertebrates were identified under magnification, with taxonomic classification following PADEP 2009 guidelines.

Habitat Assessment

After collecting benthic invertebrates, biologists surveyed habitat features within the monitoring station and recorded scores for 12 habitat attributes according to the PADEP ICE protocol (Table 2). Biologists completed the survey independently and then discussed the interpretation of individual habitat attribute scores, averaging individual scores when necessary.

Table 2. PA DEP ICE Protocol Habitat Metrics

Habitat Parameter	Description
Instream Cover (Fish)	Mix of boulder, cobble or other stable habitat
Epifaunal Substrate	Length/width of riffles; characterization of boulders, gravel, cobble
Embeddedness	Presence/absence of fine sediment around boulders, gravel, cobble
Velocity/Depth Regimes	Presence/absence of four velocity/depth regimes
Channel Alteration	Degree of channelization or dredging
Sediment Deposition	Measure of sediment deposits, degree of change at the bottom
Frequency of Riffles	Occurrence of riffles and distance between riffles
Channel Flow Status	Degree to which water fills the available channel
Condition of Banks	Stability of streambanks and presence of erosion or bank failure
Bank Vegetative Protection	Percentage of streambank surface covered by vegetation
Grazing or Other Disruptive Pressure	Degree to which vegetation disrupted by grazing or mowing
Riparian Vegetative Zone Width	Width of riparian zone and determination of impact on vegetation by human activities

Data Analysis

Benthic macroinvertebrate and habitat data were compiled in a Microsoft Access database and queries were used to calculate scoring metrics. Individual metric standardized scores and the PADEP Index of Biotic Integrity (IBI) were calculated using the ICE protocol (Table 3).

Table 3. PADEP ICE Protocol Metrics and Metric Standardization Values

Metric	Standardization Value
Total Taxa Richness	33
EPT Taxa Richness (PTV 0-4)	19
Beck's Index, version 3	38
Hilsenhoff Biotic Index	1.89
Shannon Diversity	2.86
Percent Sensitive Individuals (PTV 0-3)	84.5

Monitoring Locations

Assessments were performed at 9 USGS gage sites, 11 tributary sites in the targeted Pennypack watershed, and 5 randomly chosen sites from PWD's watershed assessment site network between 3/21/2016 and 4/19/2016 (Figure 1, Tables 4-5). USGS stream gaging stations are used as long-term monitoring points at which streamflow and continuous water chemistry data are collected (refer to PWD-USGS Cooperative Water Quality Monitoring appendix). Water chemistry grab sampling for nutrient and bacterial parameters is also conducted at these USGS gage stations on a quarterly basis (refer to PWD Quarterly Dry Weather Water Quality Monitoring appendix). Combining different forms of monitoring at the same station allows for better integration of information and may enable more sophisticated analyses in the future.

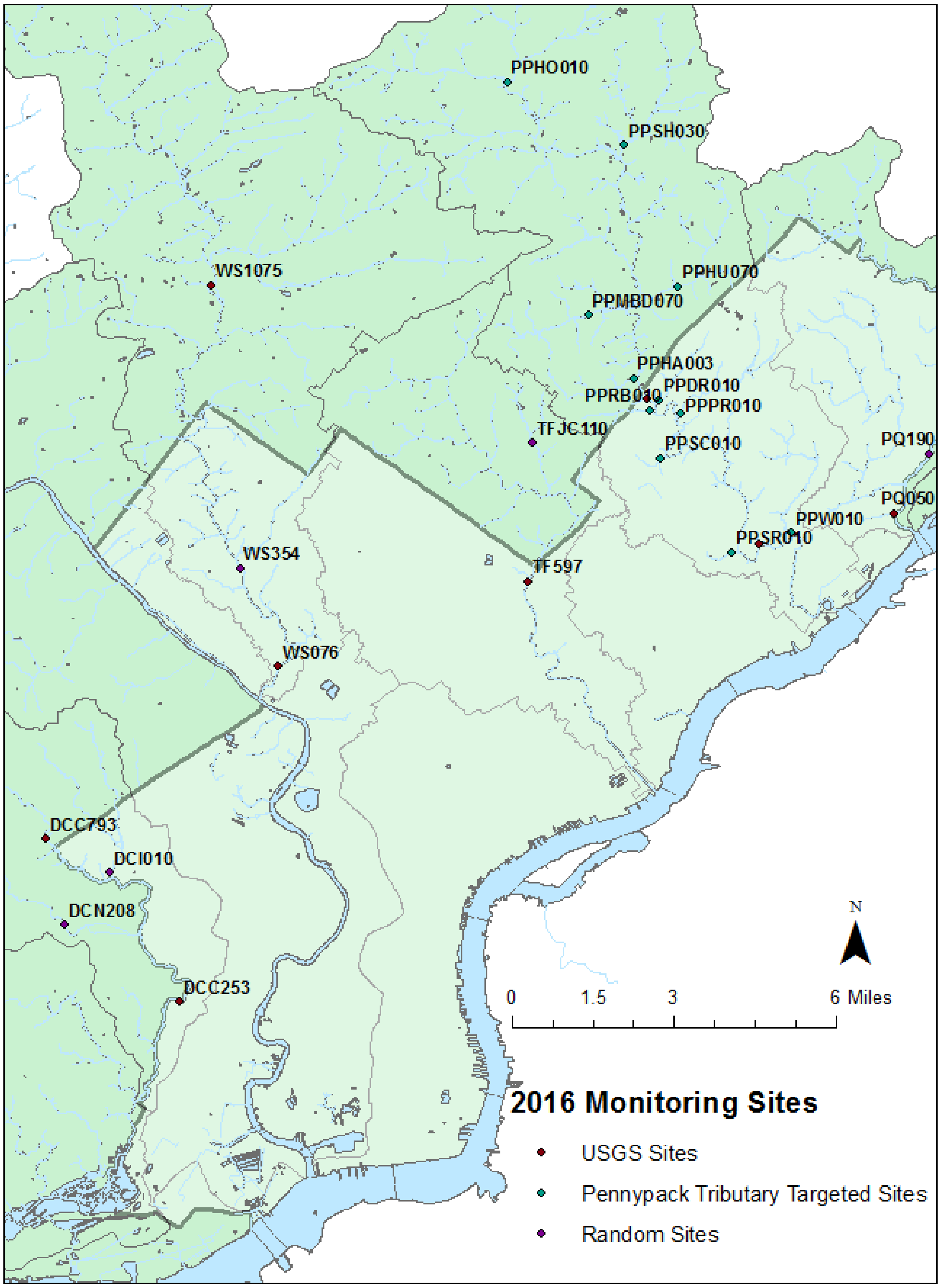

Figure 1. PWD Wadeable Streams Assessment Locations - Spring 2016

Table 4. PWD-USGS Cooperative Monitoring Program Monitoring Locations

Site ID	USGS Gage	Site Description	Drainage Area (mi²)
DCC253	01475548	Cobbs Creek at Mount Moriah Cemetery	19.78
DCC793	01475530	Cobbs Creek at City Line Ave.	4.60
PP340	01467048	Pennypack Creek at Lower Rhawn St bridge	49.84
PP970	01467042	Pennypack Creek at Pine Rd.	39.34
PQ053	01465798	Poquessing Creek at Holy Family College	21.67
TF324	01467087	Frankford Creek at Castor Ave.	29.69
TF597	01467086	Tacony Creek below Adams Ave. Bridge	16.25
WS076	01474000	Wissahickon Creek at Ridge Ave.	63.22
WS1075	01473900	Wissahickon Creek at Ft. Washington	40.44

Table 5. Pennypack Tributary and Random Monitoring Sites, Spring 2016

Site ID	Site Description	Drainage Area (mi²)
PPDR010	550 ft DS of Bloomfield Rd bridge	1.19
PPHA003	150 ft US of Pennypack conflu. (Moredon Rd)	1.25
PPHO010	450 ft US of Pennypack conflu. (Skrobul Rd Apt complex)	4.60
PPHU070	150 ft DS of Red Lion Rd bridge	3.40
PPMB070	between Mill & Valley Rd bridges	2.45
PPPR010	500 ft US of Pennypack conflu.	2.60
PPRB010	650 ft US of Pennypack conflu.	0.71
PPSC010	500 ft US of Pennypack conflu.	0.51
PPSR010	500 ft US of Pennypack conflu.	2.67
PPSH030	250 ft DS of Byberry Rd bridge	6.17
PPW010	300 ft US of Pennypack conflu.	3.47
DCN208	Garrett Rd across from Barclay Square	3.45
DCI010	CC Golf Course Near Haverford Ave; US of 2nd golf cart bridge	3.96
PQ190	3300 ft DS of Rte 63 (Woodhaven Rd) bridge; at end of Wickley Rd	13.20
WS354	500 ft DS of Livezy Rd dam	58.99
TFJC110	Cedar Rd bridge (Elkins Park)	1.18

Benthic Macroinvertebrate Monitoring Results - Spring 2016

A total of 5,540 benthic macroinvertebrates from 41 taxa were collected from the 25 sampling sites. When compared to PADEP ICE protocol metric reference conditions, all assessment sites were classified as impaired. Not one of the sites achieved 63% comparability of the reference IBI for attaining the designated use (Figure 2). All sites fell below 50% comparability, meaning that they are not meeting the Aquatic Life Use (ALU) designation. Percent comparability with the standard reference IBI score ranged from 11.2% to 39.2%. All sites were characterized by low taxa richness, low or absent modified EPT taxa, and elevated Hilsenhoff Biotic Index scores (Table 6, Figures 2-7).

Table 6. PADEP ICE Metric Scores

Site ID	Taxa Richness	EPT richness (PTV 0-4)	% Sensitive individuals	Beck's Index	HBI	Shannon Index	IBI score
PP340	19	2	3.846	0	5.36	1.451	30.1
PP970	16	2	3.478	1	5.67	1.516	28.7
PPHA003	12	4	31.696	6	4.17	1.502	39.2
PPSH030	7	0	0.461	1	5.95	0.450	15.0
PPRB010	11	1	0.505	0	6.03	0.741	19.0
PPMB070	11	1	0.463	0	5.92	0.879	20.0
PPHO010	11	1	0.000	0	5.85	1.251	22.3
PPPR010	6	0	0.000	0	6.05	0.318	13.0
PPDR010	3	0	0.000	0	5.99	0.255	11.2
PPW010	11	1	3.766	0	5.77	1.227	23.0
PPSR010	5	0	0.000	0	6.42	0.750	14.3
PPHU070	12	1	0.000	0	5.81	1.143	22.2
PPSC010	10	1	8.491	3	5.56	0.738	22.3
DCI010	8	1	0.000	0	5.90	0.585	16.7
DCN208	8	1	0.426	0	6.03	0.312	15.0
DCC793	8	1	3.004	0	5.80	0.865	19.2
DCC253	9	0	0.000	0	6.04	0.474	15.4
PQ190	14	1	2.222	1	5.82	1.068	23.6
PQ054	12	1	7.282	0	5.69	1.204	24.2
WS354	12	1	1.681	0	5.71	1.116	22.6
WS1075	9	1	0.000	0	6.00	0.593	17.1
WS076	10	1	0.000	0	5.94	0.777	18.8
TF328	9	1	0.000	0	6.28	0.702	17.2
TF597	11	2	0.976	0	6.00	0.617	19.3
TFJC013	12	2	1.304	3	5.83	0.828	22.8

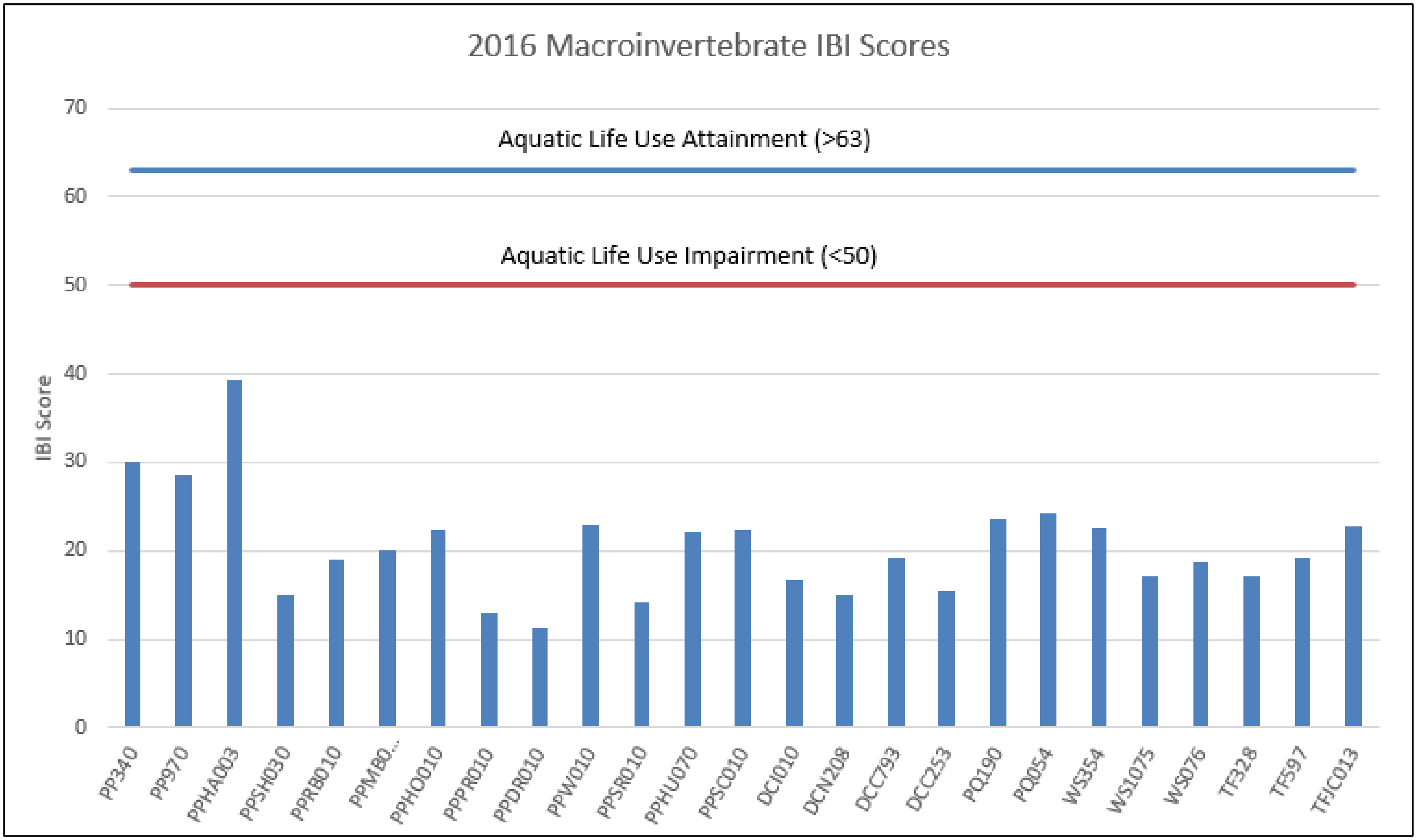

Figure 2. Macroinvertebrate IBI Scores - Spring 2016

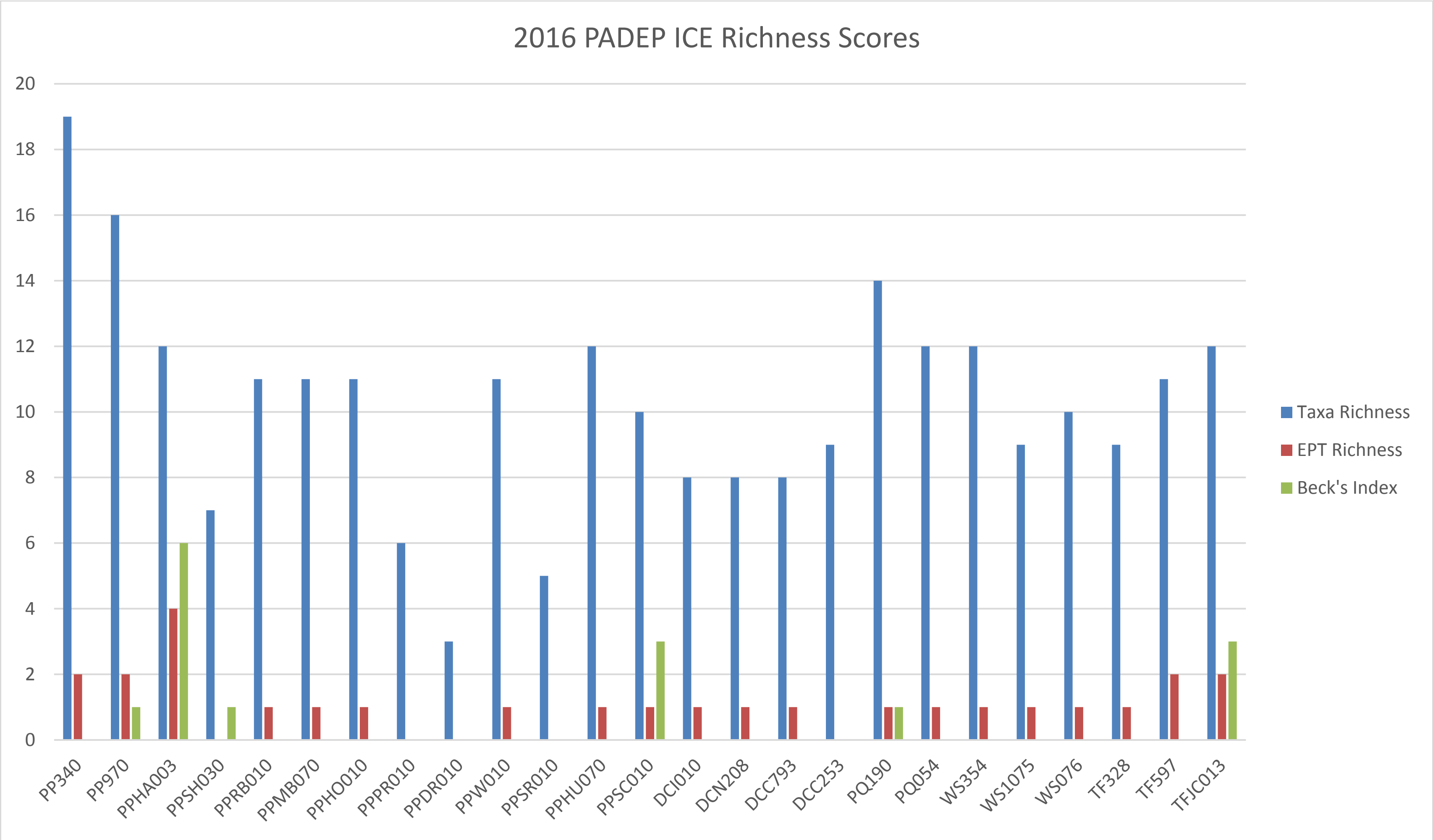

Figure 3. Macroinvertebrate ICE Richness Scores – Spring 2016

Very sensitive taxa (pollution tolerance value ≤ 2) were present at only 6 of the 25 sites assessed in spring 2016. Site PPHA003 (Harpers Run, a Pennypack Creek tributary) had the highest Beck's Index score (n=6) and included two taxa with pollution tolerance values of zero**:** *Glossosoma* (Trichoptera; Glossosomatidae) and *Dolophilodes* (Trichoptera; Philopotamidae). All sites fell below the PADEP reference standard for Percent Intolerant Taxa metric (PTV = 0 to 3) of 84.5%.

Overall diversity was low among all sites. The Shannon Diversity Index scores for all sites ranged from 0.255 to 1.516, compared to the reference metric value of 2.86. The site with the greatest diversity was the Pennypack Creek at Pine Rd. PP970 (SDI=1.516), with a taxa richness (n=16), EPT taxa richness (n=2), and HBI (5.67).

The Hilsenhoff Biotic Index (HBI) is a metric used to determine the overall pollution tolerance of a site's benthic macroinvertebrate community. This community composition and tolerance metric generally increases with increasing ecosystem stress, resulting in increasing dominance of pollution-tolerant organisms. Oriented toward the detection of organic pollution, HBI scores can range from 0 (very sensitive) to 10 (very tolerant). The average HBI for all sites was 5.82, and scores at the 25 assessment sites ranged from 4.17 to 6.42 (Figure 4).

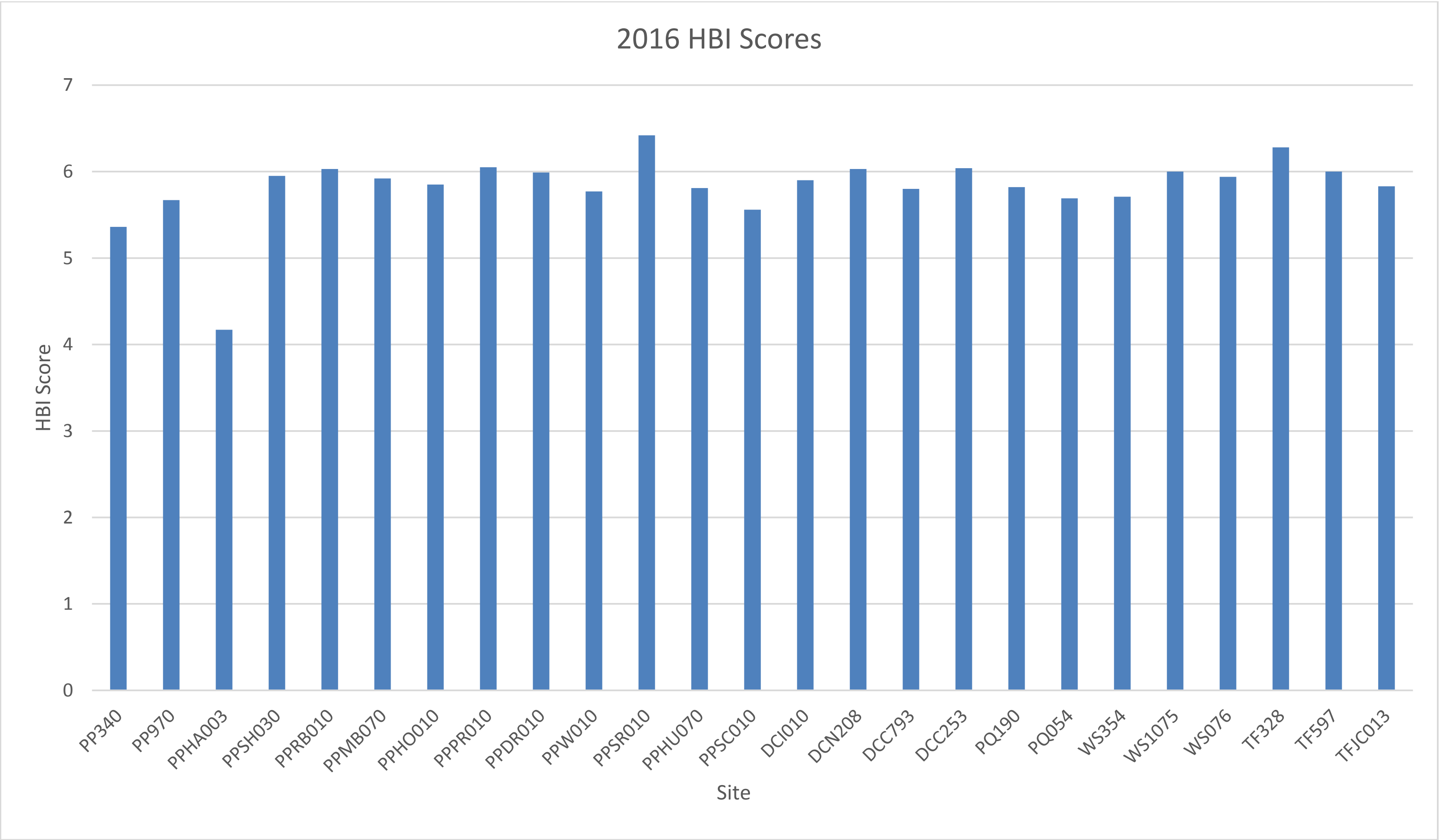

Figure 4. HBI Scores - Spring 2016

In addition to metrics used to classify sites as being impaired with respect to regional or statewide reference conditions, additional attributes of macroinvertebrate community structure were also considered at the Pennypack sites. With regard to trophic structure (*i.e.*, the distribution of feeding strategies), generalist feeders (80.41%) and filterers (14.10%) dominated at all Pennypack assessment sites (Figure 5).

Specialized feeders—a group that is generally more sensitive to perturbation than generalist feeders—were absent or found in low abundance. Scrapers comprised only 3.54% of all taxa. The scrapers in question were usually not sensitive insect larvae but rather aquatic snails and *Stenelmis* (Coleoptera; Elmidae). Other functional feeding groups, predators (1.56%) and shredders (0.38%), were observed in the macroinvertebrate assessment but to a much lesser extent. Analysis of the aquatic trophic structure can indicate potential stressors such as sedimentation/siltation and eutrophication, and it may identify food resource limitations. However, it cannot distinguish between the interactions of the two factors.

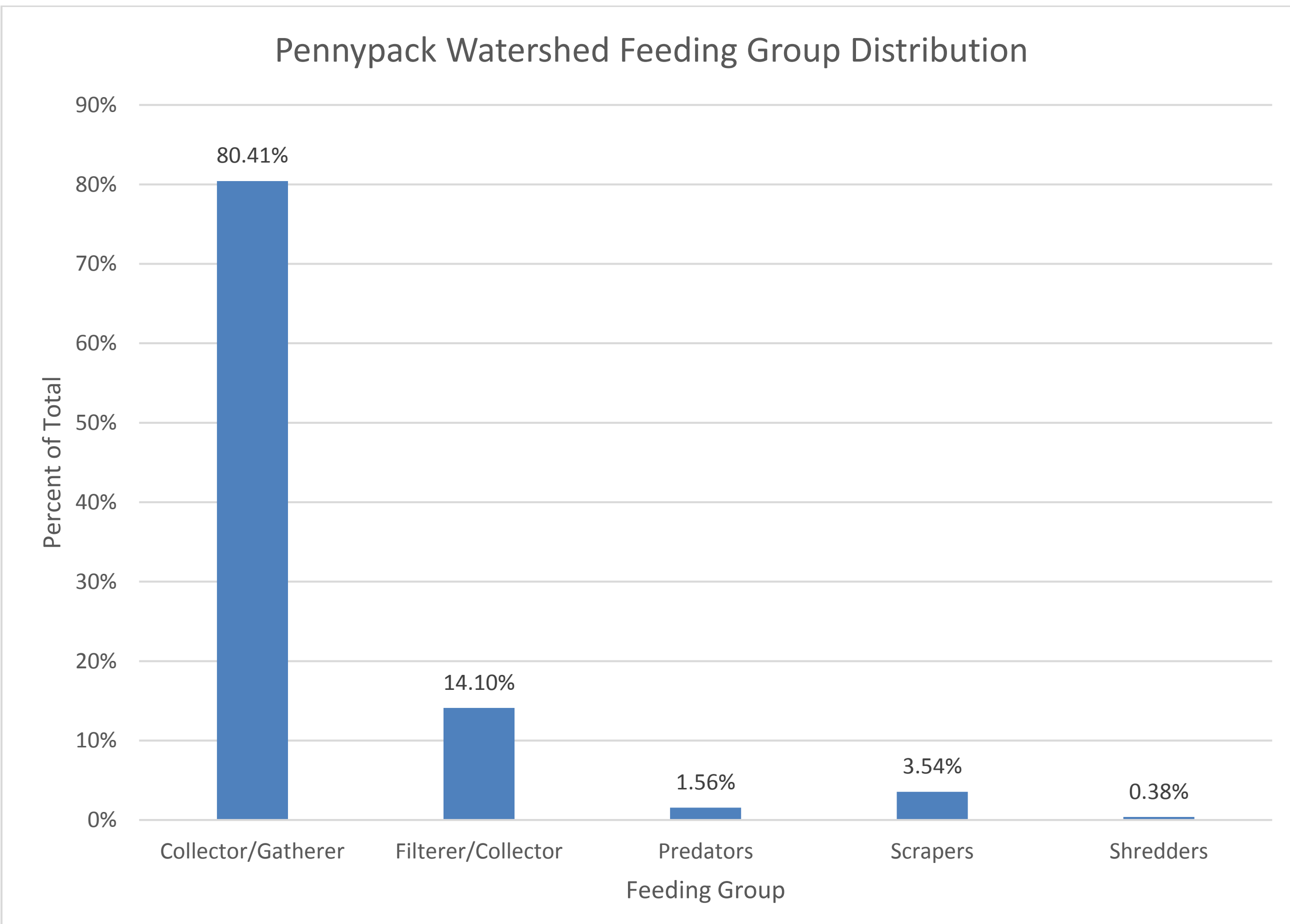

Figure 5. Feeding Group Percent Distribution - Spring 2016

Tolerance/intolerance measures are intended to be representative of relative sensitivity to perturbation and may include numbers of pollution tolerant and intolerant taxa or percent composition (Barbour *et al*., 1999). The proportion of moderately tolerant individuals at all sites averaged 92.90%, with a range of 63.84% to 99.54%. The site with the greatest proportion of moderately tolerant taxa was PPDR010, with 99.54% dominance directly related to a high number of Chironomidae (n=204) found within the sorted sample (n=218). Overall, Chironomids (Figure 6) were the dominant taxon at all of the assessment locations. The proportional dominance of Chironomids is evidence of increasingly homogenous community assemblages within the selected monitoring sites. Chironomids and other pollution-tolerant, generalist species increase in proportional dominance with increased disturbance due to the loss of optimal habitat conditions for less tolerant, more specialized species.

Figure 6. Chironomid, or non-biting midge
Photo: Simon Johnston

Tolerant taxa accounted for an average of 2.04% of all taxa, and the proportion of tolerant taxa at each monitoring site ranged from 0% to 10.50%. Intolerant taxa were also poorly represented, averaging 5.06% of all taxa collected at the sites. The proportion of intolerant taxa at each site ranged from 0% to 33.93%.

Sensitive taxa (pollution tolerance values ≤ 3) were collected at 15 of the 25 sites (Table 7). The rarity of sensitive taxa suggests a response to watershed-wide perturbation, such as water quality degradation. Other potential explanations for the rarity of sensitive taxa are habitat degradation caused by fine sediment delivered to the stream channel via bank erosion or stormwater runoff and changes in seasonal base flow and temperature that tend to accompany urbanization. *Antocha* (Diptera; Tipulidae pollution tolerance value n=3) was found at 12 sites and was the most commonly collected sensitive taxon.

Table 7. Sensitive Taxa Collected

Site	Order	Family	Genus	HBI
PP340	Trichoptera	Leptoceridae	*Ceraclea*	3
PP340	Diptera	Tipulidae	*Antocha*	3
PP970	Diptera	Tipulidae	*Antocha*	2
PP970	Plecoptera	Nemouridae	*Amphinemura*	3
PP970	Coleoptera	Elmidae	*Ancyronyx*	2
PPHA003	Trichoptera	Philopotamidae	*Dolophilodes*	0
PPHA003	Trichoptera	Glossosomatidae	*Glossosoma*	0
PPHA003	Diptera	Tipulidae	*Antocha*	3
PPHA003	Plecoptera	Nemouridae	*Amphinemura*	3
PPSH030	Coleoptera	Elmidae	*Ancyronyx*	2
PPRB010	Diptera	Tipulidae	*Antocha*	3
PPMB070	Plecoptera	Nemouridae	*Amphinemura*	3
PPW010	Diptera	Tipulidae	*Antocha*	3
PPSC010	Trichoptera	Philopotamidae	*Dolophilodes*	0
DCN208	Diptera	Tipulidae	*Antocha*	3
DCC793	Diptera	Tipulidae	*Antocha*	3
PQ190	Diptera	Tipulidae	*Antocha*	3
PQ190	Coleoptera	Elmidae	*Ancyronyx*	2
PQ054	Diptera	Tipulidae	*Antocha*	3
WS354	Diptera	Tipulidae	*Antocha*	3
TF597	Diptera	Tipulidae	*Antocha*	3
TFJC013	Diptera	Tipulidae	*Antocha*	3

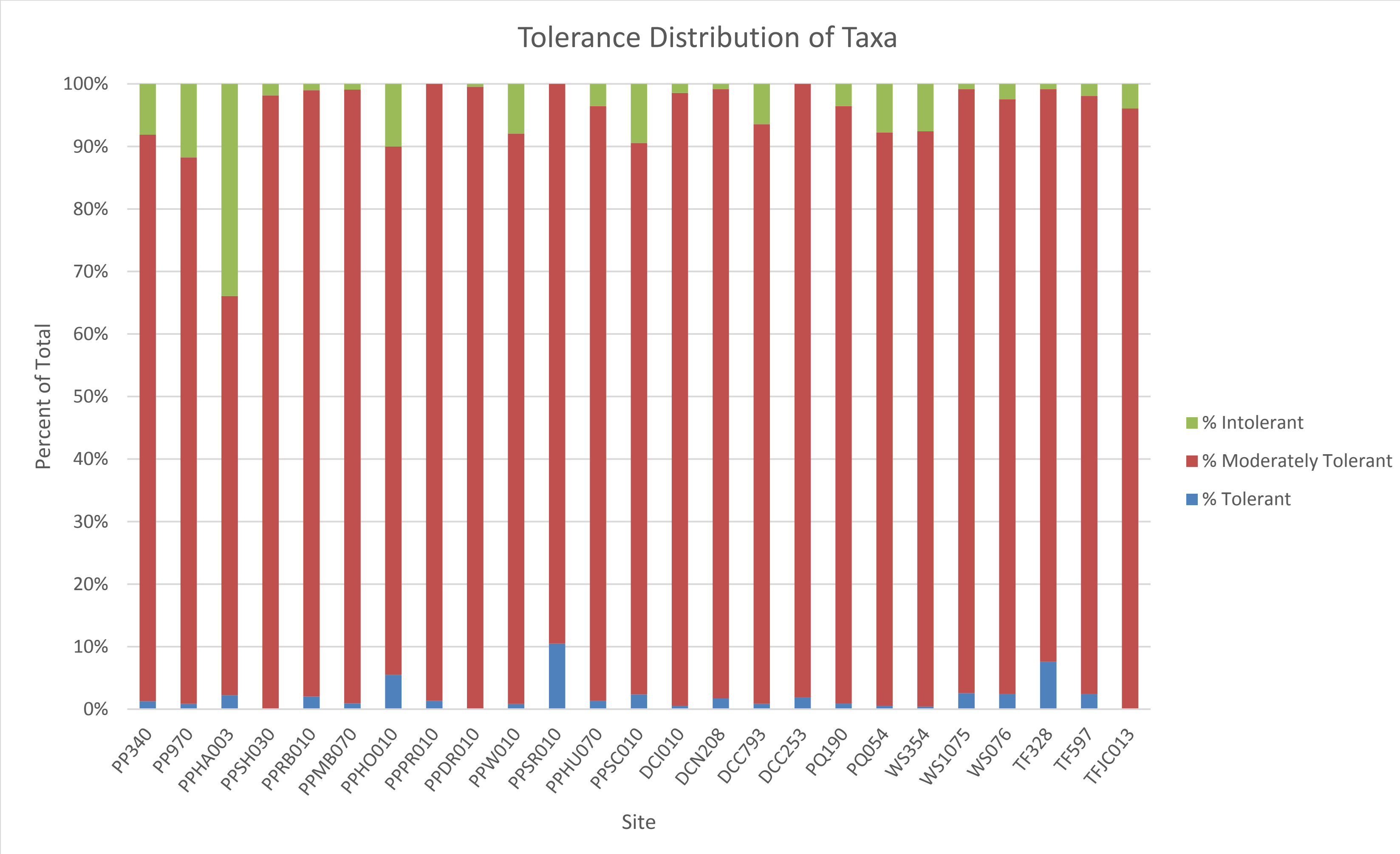

Figure 7. Tolerance Distribution of Taxa - Spring 2016

Table 8. 2016 Benthic Macroinvertebrate Taxa List

Order	Family	Genus
Amphipoda	Crangonyctidae	*Crangonyx*
Amphipoda	Gammaridae	*Gammarus*
Bivalvia	Corbicula	*spp*
Bivalvia	Corbiculidae	*Corbicula*
Coleoptera	Circulionidae	*spp*
Coleoptera	Elmidae	*Ancyronyx*
Coleoptera	Elmidae	*Optioservus*
Coleoptera	Elmidae	*Stenelmis*
Coleoptera	Psephenidae	*Ectopria*
Coleoptera	Psephenidae	*Psephenus*
Diptera	Chironomidae	*spp*
Diptera	Empididae	*Clinocera*
Diptera	Empididae	*Hemerodromia*
Diptera	Simuliidae	*Simulium*
Diptera	Tipulidae	*Antocha*
Diptera	Tipulidae	*Limonia*
Diptera	Tipulidae	*Tipula*
Ephemeroptera	Baetidae	*Acentrella*
Ephemeroptera	Baetidae	*Baetis*
Ephemeroptera	Heptageniidae	*Stenacron*
Gastropoda	Ancylidae	*spp*
Gastropoda	Lymnaeidae	*spp*
Hirudinea	n/a	n/a
Hydracarina	n/a	n/a
Isopoda	Asellidae	*Caecidotea*
Lepidoptera	Crambidae	*Petrophila*
Oligochaeta	n/a	n/a
Ostracoda	n/a	n/a
Plecoptera	Nemouridae	*Amphinemura*
Trichoptera	Glossosomatidae	*Glossosoma*
Trichoptera	Hydropsychidae	*Cheumatopsyche*
Trichoptera	Hydropsychidae	*Hydropsyche*
Trichoptera	Hydroptilidae	*Hydroptila*
Trichoptera	Hydroptilidae	*Leucotrichia*
Trichoptera	Hydrotilidae	*Hydroptila*
Trichoptera	Leptoceridae	*Ceraclea*
Trichoptera	Philopotamidae	*Chimarra*
Trichoptera	Philopotamidae	*Dolophilodes*
Turbellaria	Nematoda	*spp*
Turbellaria	Nemertea	*spp*
Turbellaria	Planariidae	*spp*

Physical Habitat Monitoring Results - Spring 2016

Habitat impairments such as hydrologic extremes (*i.e.*, low base flow and accentuated flow during storm events), physical obstructions, and sedimentation/siltation appear to be the major environmental stressors on the aquatic ecosystem. Accumulation of sediment in the interstitial spaces of riffles has been shown to limit available habitat and possibly smother benthic invertebrate life stages (Runde and Hellenthal, 2000). Only one site (PPRB010) received an optimal score for embeddedness, and no sites received optimal status for sediment deposition for habitat (Table 9, Figure 10). The Pennypack tributary site PPHU070 (Huntingdon Valley Creek) had the worst total habitat scores of all sites, while Cobbs Creek site DCC793 (Cobbs Creek at City Line Ave.) had the best scores for all sites.

Table 9. Physical Habitat Scores at All Monitoring Sites - Spring 2016

Site ID	Instream	Epifaunal	Embed	Veldep	Chanalt	Seddep	Riffreq	Chanflo	Bankcond	Vegpro	Graze	Ripveg	Total Score
DCC253	8.5	7	5	8.5	12	5	11.5	14	9.5	16	16	13	126
DCC793	15	13.5	13.5	14.5	16.5	11	13.5	10	12	16.5	16.5	17.5	170
TF324	6	5	4	12	11	8	4	10	10	13	12	12	107
WS076	11.5	10	10	16	8	8.5	8	12	8	6.5	9.5	7.5	115.5
PP340	13	13	9.5	13	14	9.5	12	10.5	12	16.5	17.5	18.5	159
PP970	16.5	16.5	14	17	18	12	14.5	10	9	14.5	12	14	168
PQ054	8.5	8.5	6.5	8	15	5	8	9	10	14.5	16	11	120
TF597	6.5	7	4	11.5	11.5	9	6.5	11	9.5	12.5	14.5	16	119.5
WS1075	10	9.5	7.5	12.5	14.5	11	7	14	8.5	17	17	17	145.5
PPW010	6.5	10	6.5	8.5	16	7	13.5	7	8	16.5	17.5	17.5	134.5
PPSR010	3.5	3	4	4.5	11	3	2.5	4	4	11	15.5	16	82
PPSC010	8.5	7.5	9	10	12	4.5	8.5	7	8	14.5	16.5	14.5	120.5
PPPR010	9.5	7	11.5	12	14	7	7	9	9.5	14	16.5	17	134
PPRB010	16.5	9.5	17	14.5	17	11	12.5	9.5	7.5	16.5	18	18	167.5
PPDR010	9.5	7	9.5	11.5	17	7	6.5	7	9	16.5	18	18.5	137
PPHA003	16.5	12.5	14.5	14.5	14.5	12	13.5	8.5	13	17	18.5	18	173
PPMB070	8.5	7.5	10	16	14.5	8	8.5	10.5	8.5	14.5	7.5	5	119
TFJC013	9.5	10	12	12	10	10	12	9.5	9	13.5	7.5	6.5	121.5
PPHU070	4.5	6.5	4.5	8.5	8	7	5	12	5	7	3.5	3	74.5
PPSH030	10	5	9	9	15.5	5	3	10	9.5	17	18	16	127
PPHO010	10	8	4	8.5	16.5	9.5	11	9	10	14	9.5	9.5	119.5
WS354	18	17	14	18.5	15	13	16.5	15	15.5	16	16.5	17	192
DCI010	16	9.5	11.5	13.5	16	6	10.5	8	6	14	15	14.5	140.5
DCN208	5	6.5	6.5	8.5	8	5	9	7.5	8	9	5	5.5	83.5
PQ190	9.5	9.5	11	12.5	16	8.5	8	9	6.5	14.5	12	9	126

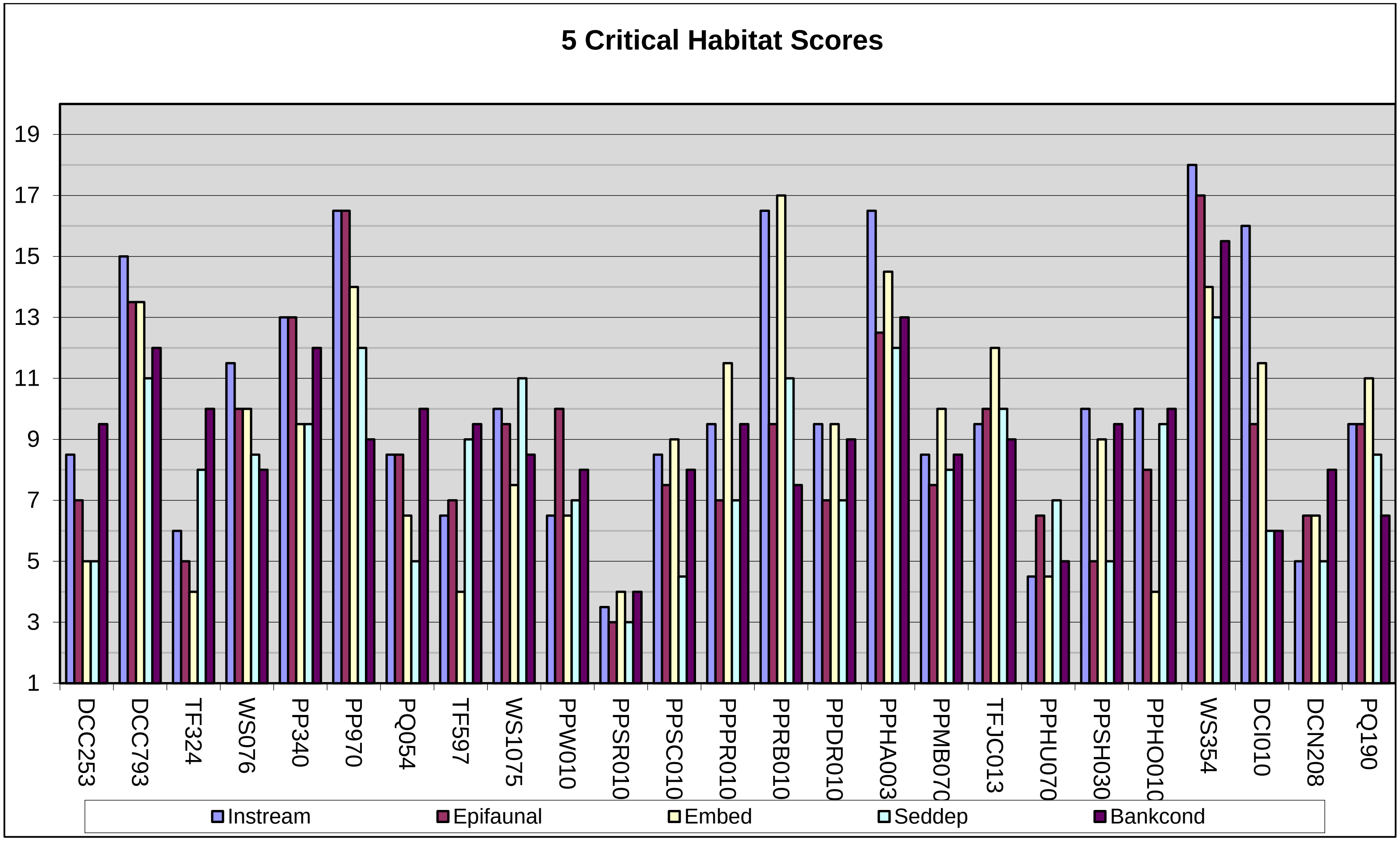

Figure 10. Critical Habitat Scores, Spring 2016

Although it is much too early to draw conclusions regarding trends at the eight long-term PWD-USGS cooperative monitoring sites, embeddedness and sediment deposition results are shown below (Figures 11-12). Many factors contribute to interannual variability in the data, and it is hoped that future work will provide some insight into long-term trends.

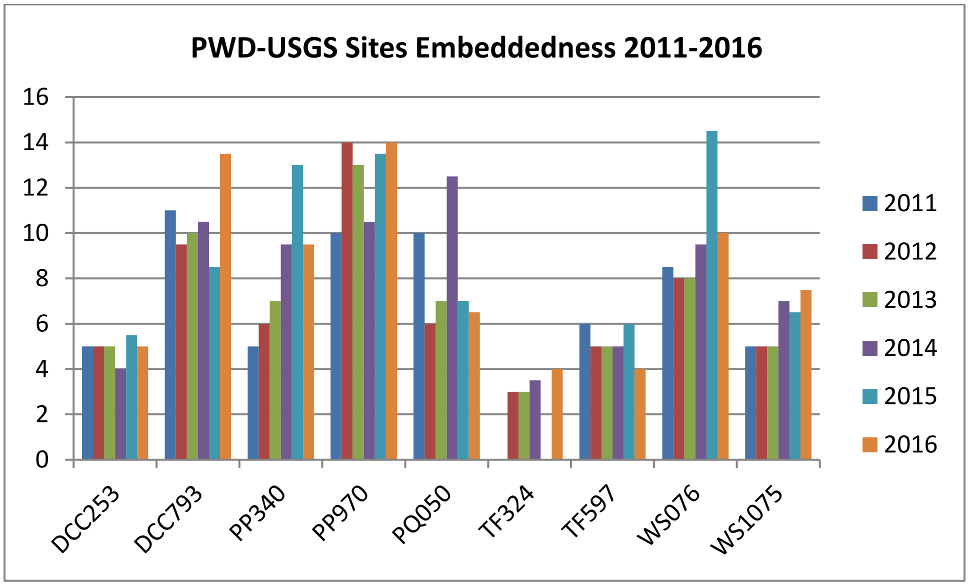

Figure 11. Comparison of PWD-USGS Sites Embeddedness Scores, 2011-2016*

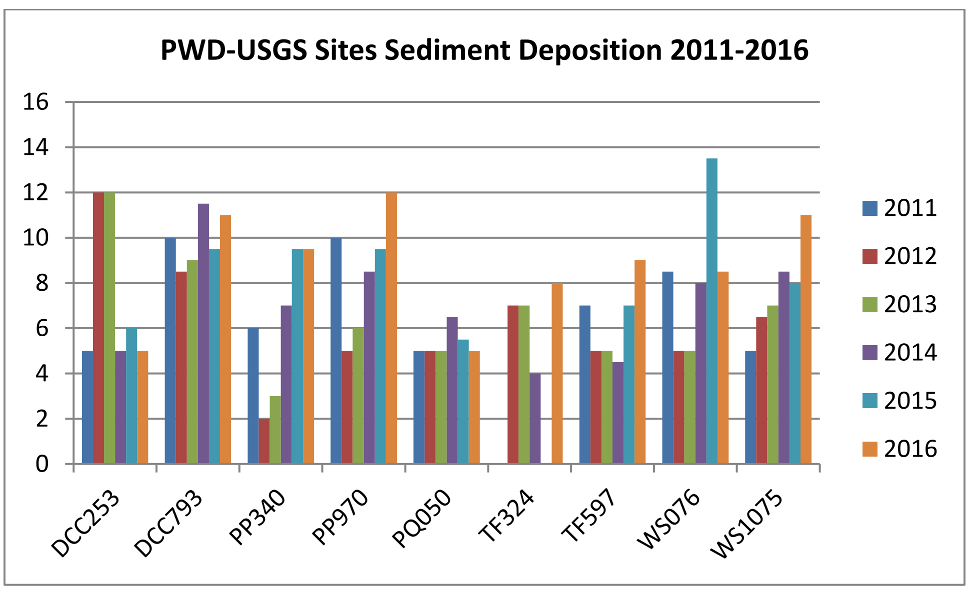

Figure 12. Comparison of PWD-USGS Sites Sediment Deposition Scores, 2011-2016*

*In 2013, samples for TF324 were taken from nearby site TF328. TF324 was not sampled in 2015.

References

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: periphyton, benthic macroinvertebrates and fish, second edition. EPA 841-B-99-002. United States Environmental Protection Agency; Office of Water. Washington, D.C.

Borsuk, M. E., C. A. Stow, and K. H. Reckhow. 2002. Predicting the frequency of water quality standard violations: A probabilistic approach for TMDL development. Environmental Science & Technology, 36: 2109-2115.

Pennsylvania Department of Environmental Protection (PADEP). (2009). Instream Comprehensive Evaluation Surveys. Harrisburg, PA. 59 p.

Paulsen, S.G. et al. 2008. Condition of stream ecosystems in the US: an overview of the first national assessment. Journal of the North American Benthological Society: December 2008, Vol. 27, No. 4, pp. 812-821.

Reif, A.G. 2002. Assessment of stream quality using biological indices at selected sites in the Red Clay and White Clay Creek Basins, Chester County, Pennsylvania, 1981-97. USGS Fact Sheet FS-118-02.

Reif, A.G. 2004. Assessment of water chemistry, habitat, and benthic macroinvertebrates at selected stream-quality monitoring sites in Chester County, Pennsylvania, 1998-2000: 84.

Runde, J. M., and R. A. Hellenthal. 2000. Behavioral responses of *Hydropsyche sparna* (Trichoptera: Hydropsychidae) and related species to deposited bedload. Environmental Entomology 29:704-709.

Appendix K – NPDES Industrial Stormwater Permitted Sites

Authority ID	Permit Type	Site Name	Program Description	Site Address
PAG-03 General				
623397	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	A&H AUTO PARTS PASSYUNK AVE FAC	Clean Water	6255 PASSYUNK AVE PHILA, PA 19153
961161	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ABF FREIGHT SYS	Clean Water	4000 RICHMOND ST PHILADELPHIA, PA 19137
548718	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ABINGTON METALS REF & MFG WELLINGTON ST FAC	Clean Water	4924 WELLINGTON ST PHILA, PA 19135
794437	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ALLEGHENY AUTO PARTS FAC	Clean Water	310-400 W ALLEGHENY AVE PHILADELPHIA, PA 19133
366971	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ALLEGHENY IRON & METAL TACONY ST FAC	Clean Water	TACONY ST & ADAMS AVE PHILADELPHIA, PA 19124
700119	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ALLIED AUTO PARTS TORRESDALE AVE FAC	Clean Water	4175 TORRESDALE AVE PHILADELPHIA, PA 19124
875199	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ALLIED TRANSPORT W. INDIANA AVE FACILITY	Clean Water	1801 W INDIANA AVE PHILADELPHIA, PA 19132
342420	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ALLIED TUBE & CONDUIT NORCOM RD PLT	Clean Water	11350 NORCOM RD PHILADELPHIA, PA 19154
329442	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	AMER AUTO PARTS 61ST STREET FAC	Clean Water	3501 S 61ST ST PHILADELPHIA, PA 19153

Authority ID	Permit Type	Site Name	Program Description	Site Address
825226	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ARCA ADVANCED PROC N DELAWARE AVE FAC	Clean Water	4301 N DELAWARE AVE BLDG A PHILADELPHIA, PA 19137
25723	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ARDEX LAB	Clean Water	2050 BYBERRY RD PHILADELPHIA, PA 19116
368140	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ATLANTIC AVIATION ENTERPRISE AVE FAC	Clean Water	8375 ENTERPRISE AVE PHILA INT AIRPORT PHILADELPHIA, PA 19153
687951	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ATLANTIC USED AUTO PARTS ESSINGTON AVE FAC	Clean Water	6544 ESSINGTON AVE PHILA, PA 19153
578226	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ATLANTIC USED AUTO PARTS W PASSYUNK AVE FAC	Clean Water	6030 W PASSYUNK AVE PHILA, PA 19153
681416	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	B & L AUTO PARTS 61ST STREET FAC	Clean Water	3404 S 61ST ST PHILADELPHIA, PA 19153
339520	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	BEMIS HEALTHCARE PKG PHILA	Clean Water	9800 BUSTELTON AVE PHILADELPHIA, PA 19115
584171	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	BIG HEAD AUTO SALVAGE CORP	Clean Water	3511 S 61ST ST PHILADELPHIA, PA 19153
605980	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	BILL'S AUTO PARTS PASSYUNK AVE FAC	Clean Water	6235 PASSYUNK AVE PHILA, PA 19153

Authority ID	Permit Type	Site Name	Program Description	Site Address
478601	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	BRITTON IND INC	Clean Water	8901 TORRESDALE AVE PHILADELPHIA, PA 19154
562436	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	BRUCE PAUL AUTO PARTS E LEHIGH AVE FAC	Clean Water	2157 E LEHIGH AVE PHILA, PA 19125
325198	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	BUDD PHILA PLT	Clean Water	2450 HUNTINGPARK AVE PHILADELPHIA, PA 19129
578917	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	BUTCHS AUTO PARTS S 61ST ST FAC	Clean Water	3301 S 61ST ST PHILA, PA 19142
608612	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	C&E AUTO PARTS ESSINGTON AVE	Clean Water	6796 ESSINGTON AVE PHILA, PA 19153
788070	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CANADIAN PACIFIC PHILA NAVY YD FAC	Clean Water	LANGLEY AVE PHILA, PA 19148
564483	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CARTEL AUTO PARTS W PASSYUNK AVE FAC	Clean Water	6330 W PASSYUNK AVE PHILA, PA 19153
351133	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CLEAN EARTH OF PHILA FAC	Clean Water	3201 S 61ST ST PHILADELPHIA, PA 19153-3502
565504	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CLEARFIELD RECYCLING	Clean Water	532 W ANNSBURY ST PHILADELPHIA, PA 19140
868314	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CLEARFIELD RECYCLING CLEARFIELD ST FAC	Clean Water	547 W CLEARFIELD ST PHILA, PA 19133

Authority ID	Permit Type	Site Name	Program Description	Site Address
1100654	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CONRAIL - ANN STREET YARD	Clean Water	2801 E ANN STREET PHILADELPHIA, PA 19134
1100667	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CONRAIL - FRANKFORD JUNCTION YARD	Clean Water	2110 E BUTLER ST PHILADELPHIA, PA 19124
1100662	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CONRAIL - SOUTH PHILLY YARD	Clean Water	11TH ST & TERMINAL RD PHILADELPHIA, PA 19112
722881	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CSX INTERMODAL CHRISTOPHER COLUMBUS AVE FAC	Clean Water	3400 S CHRISTOPHER COLUMBUS BLVD PHILA, PA 19148
360861	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	CSX TRANSPORTATION PHILADELPHIA FACILITY	Clean Water	1600 SCHUYLKILL AVE PHILADELPHIA, PA 19145
631150	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	DAVE'S DELAWARE VALLEY TOWING PASSYUNK AVE FAC	Clean Water	6159 PASSYUNK AVE PHILA, PA 19153
474561	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	DEGUSSA 36TH ST FAC	Clean Water	36TH & MOORE ST C/O CSX/BIDS TERM PHILA, PA 19145
681104	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	DELAVAU ROOSEVELT BLVD PLT	Clean Water	10101 ROOSEVELT BLVD PHILA, PA 19154
793085	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	DELCO METALS N 2ND ST FAC	Clean Water	3053 N 2ND ST PHILA, PA 19133

Authority ID	Permit Type	Site Name	Program Description	Site Address
360397	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	DHL EXPRESS COLUMBUS BLVD FAC	Clean Water	1101 N CHRISTOPHER COLUMBUS BLVD PHILADELPHIA, PA 19125
618611	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	DHL EXPRESS HOLSTEIN AVE FAC	Clean Water	7600 HOLSTEIN AVE PHILA, PA 19153
607810	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	DRIVE LINE AUTO PARTS W PASSYUNK FAC	Clean Water	6221D W PASSYUNK AVE PHILA, PA 19153
1086796	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ECO ENERGY PHILLY	Clean Water	3400 S CHRISTOPHER COLUMBUS BLVD PHILADELPHIA, PA 19148-5110
551693	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ESSINGTON AVE AUTO PARTS FAC	Clean Water	6746 ESSINGTON AVE PHILA, PA 19153
661988	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	EXELON RICHMOND GENERATING STA	Clean Water	3901 N DELAWARE AVE PHILADELPHIA, PA 19137
716852	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	FC HAAB SCHUYLKILL AVE TERM	Clean Water	SCHUYLKILL AVE & MORRIS ST PHILADELPHIA, PA 19145
383091	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	FEDEX GREYS FERRY AVE FAC	Clean Water	3600 GRAYS FERRY AVE PHILADELPHIA, PA 19146
576755	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	FEDEX TOWNSEND RD FAC	Clean Water	14300 TOWNSEND RD PHILA, PA 19154

Authority ID	Permit Type	Site Name	Program Description	Site Address
328908	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	FIBREFLEX PACKING & MFG UMBRIA ST FAC	Clean Water	5101 UMBRIA ST PHILADELPHIA, PA 19128-4345
794438	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	FIFTH STREET AUTO PARTS FAC	Clean Water	3105 N FIFTH ST PHILA, PA 19133
329466	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	FIORES AUTO PARTS 61ST STREET FAC	Clean Water	3300 S 61ST ST PHILADELPHIA, PA 19153
894585	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	FIRST TRANSIT	Clean Water	4201 TACONY ST PHILADELPHIA, PA 19124
574199	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	GIANNA TIOGA ST YARD	Clean Water	3201 E TIOGA ST PHILADELPHIA, PA 19134
752999	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	GREENWICH TERM S COLUMBUS BLVD FAC	Clean Water	3301 S COLUMBUS BLVD PHILA, PA 19148
1040038	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	GYES AUTO PARTS	Clean Water	3405 S 61ST ST PHILADELPHIA, PA 19153-3524
561976	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	HAROLDS USED AUTO PARTS WHITBY AVE FAC	Clean Water	5347 WHITBY AVE PHILA, PA 19143
495095	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	HONEYWELL FRANKFORD PLT	Clean Water	MARGARET & BERMUDA STS PHILADELPHIA, PA 19137-1193
351550	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	HYGRADE FOOD PROD	Clean Water	8400 EXECUTIVE AVE PHILADELPHIA, PA 19153

Authority ID	Permit Type	Site Name	Program Description	Site Address
571019	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	JACK'S AUTO PARTS S 61ST ST FAC	Clean Water	3517-3555 S 61ST ST PHILA, PA 19153
584318	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	JIM'S AUTO RECYCLING W PASSYUNK AVE FAC	Clean Water	6299 W PASSYUNK AVE PHILA, PA 19153
362961	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	JOWITT & RODGERS STATE RD FAC	Clean Water	9400 STATE RD PHILADELPHIA, PA 19114
336681	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	JT'S USED AUTO PARTS S 61ST ST FAC	Clean Water	3505 S 61ST ST PHILADELPHIA, PA 19153
578223	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	K&A AUTO SALVAGE E SOMERSET ST FAC	Clean Water	2160-66 E SOMERSET ST PHILA, PA 19134
807661	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	KAN CO METALS BRIDGE ST FAC	Clean Water	2275 BRIDGE ST, FRANKFORD BUS ARSENAL, BLDG 308 PHILA, PA 19137
1056063	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	KANCO METALS INC	Clean Water	4601 BATH ST PHILADELPHIA, PA 19137-2216
888145	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	KINDER MORGAN POINT BREEZE TERM	Clean Water	6310 W PASSYUNK AVE PHILADELPHIA, PA 19153-3517
885173	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	KUUSAKOSKI PHILADELPHIA ORTHODOX ST. FACILITY	Clean Water	3150 ORTHODOX ST PHILADELPHIA, PA 19137

Authority ID	Permit Type	Site Name	Program Description	Site Address
689839	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	L&B AUTO PARTS S 6IST STREET FAC	Clean Water	3508 S 61ST ST PHILA, PA 19153
350607	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	L3 COMMUNICATIONS ROOSEVELT BLVD FAC	Clean Water	13500 ROOSEVELT BLVD PHILADELPHIA, PA 19116-4201
337671	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	LKQ VENICE AUTO PARTS	Clean Water	3350 SOUTH 61ST STREET PHILADELPHIA, PA 19153
21593	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	METRO MACH OF PA SHIP REPAIR FAC	Clean Water	FOOT OF MORTON AVE CHESTER, PA 19013
385070	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	MONDELEZ GLOBAL LLC	Clean Water	12000 E ROOSEVELT BLVD PHILADELPHIA, PA 19116
1043263	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	NAVAL FOUNDRY AND PROPELLER CTR	Clean Water	1701 KITTY HAWK AVE PHILADELPHIA, PA 191125087
781605	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	NDV RECYCLING N 2ND ST FAC	Clean Water	3630 N 2ND ST PHILADELPHIA, PA 19140-4605
707026	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	NORFOLK SOUTHERN RAILWAY KITTY HAWK AVE FAC	Clean Water	200 KITTY HAWK AVE PHILA, PA 19112
373560	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	NORTHEAST PHILADELPHIA AIRPORT (PNE)	Clean Water	9800 ASHTON RD PHILADELPHIA, PA 19114
367928	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ORTHODOX AUTO UNRUH AVE FAC	Clean Water	5247 UNRUH AVE PHILADELPHIA, PA 19135

Authority ID	Permit Type	Site Name	Program Description	Site Address
330088	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	OSCAR'S AUTO PARTS PASSYUNK AVE FAC	Clean Water	6145 W PASSYUNK AVE PHILADELPHIA, PA 19153
326557	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PAARNG FT MIFFLIN FAC	Clean Water	6400 HOG ISLAND RD, BLDG 56 PHILADELPHIA, PA 19153
326472	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PAARNG OGONTZ OMS 14A	Clean Water	5350 OGONTZ AVE PHILADELPHIA, PA 19141
326466	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PAARNG SOUTHAMPTON FAC	Clean Water	2734 SOUTHAMPTON RD PHILADELPHIA, PA 19154
541949	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PASCO PASCHALL AVE FAC	Clean Water	7250 PASCHALL AVE PHILA, PA 19142
649081	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PENNSYLVANIA AUTO SALVAGE ASHLAND ST FAC	Clean Water	4001 ASHLAND ST PHILA, PA 19124
368228	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PEPSI BOTTLING ROOSEVELT BLVD PLT	Clean Water	11701 ROOSEVELT BLVD PHILADELPHIA, PA 19154-2108
624193	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PHILA GAS WORKS PASSYUNK AVE PLT	Clean Water	3100 PASSYUNK AVE PHILADELPHIA, PA 19145
459823	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PHILA WATER DEPT NE WPCP	Clean Water	3895 RICHMOND ST PHILADELPHIA, PA 19137-1418

Authority ID	Permit Type	Site Name	Program Description	Site Address
459790	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PHILA WATER DEPT SE WPCP	Clean Water	25 PATTISON AVE PHILADELPHIA, PA 19148-5607
459812	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	PHILA WATER DEPT SW WPCP	Clean Water	8200 ENTERPRISE AVE PHILADELPHIA, PA 19153-3813
796743	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	RECOMMUNITY PHILA	Clean Water	2904 ELLSWORTH ST PHILA, PA 19146
362130	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	REPUBLIC SVC OF PA PORT RICHMOND HAULING FAC	Clean Water	3000 E HEDLEY ST PHILA MARKET PLACE PHILADELPHIA, PA 19137
683967	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	REPUBLIC SVC QUICKWAY TRANSFER STATION	Clean Water	2960 ORTHODOX ST PHILADELPHIA, PA 19137
363219	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	RICHARDSAPEX MAIN ST FAC	Clean Water	4202-24 MAIN ST PHILADELPHIA, PA 19127
11073	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ROADWAY EXPRESS CHURCH ST FAC	Clean Water	CHURCH & PEARCE ST PHILADELPHIA, PA 19124
576312	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	ROCK TENN BLUE GRASS RD PLT	Clean Water	9820 BLUE GRASS RD PHILA, PA 19114

Authority ID	Permit Type	Site Name	Program Description	Site Address
367098	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	S D RICHMAN SONS WHEATSHEAF LN FAC	Clean Water	2435 WHEATSHEAF LANE PHILADELPHIA, PA 19137
579856	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	SAMMYS AUTO PARTS S 61ST ST FAC	Clean Water	3405 S 61ST ST PHILA, PA 19153
836589	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	SAVAGE SVC E OREGON AVE FAC	Clean Water	52 E OREGON AVE PHILADELPHIA, PA 19148
574096	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	SEPTA ROBERTS AVE FAC	Clean Water	2705 ROBERTS AVE PHILA, PA 19129
373069	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	SPC PENROSE AVE FAC	Clean Water	26TH ST & PENROSE AVE PHILADELPHIA, PA 19145
682478	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	SPINA AUTO PARTS & TRUCK SALES ESSINGTON AVE FAC	Clean Water	6650 ESSINGTON AVE PHILA, PA 19153
811062	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	STEFFA METALS CHURCH ST FAC	Clean Water	2180 CHURCH ST PHILADELPHIA, PA 19124-4052
589098	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	STEVE'S AUTO PARTS II S 61ST ST FAC	Clean Water	3331 S 61ST ST PHILA, PA

Authority ID	Permit Type	Site Name	Program Description	Site Address
581301	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	SUN CHEM HUNTING PARK AVE PLT	Clean Water	3301 HUNTING PARK AVE PHILADELPHIA, PA 19132
360276	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	SWEET OVATIONS TOMLINSON RD FAC	Clean Water	1741 TOMLINSON RD PHILADELPHIA, PA 19116-3847
595469	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	T&E AUTO PARTS W PASSYUNK AVE FAC	Clean Water	6219 W PASSYUNK AVE PHILA, PA 19153
1107531	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	TASTY BAKING	Clean Water	4300 S 26TH ST PHILA, PA 19112
1017690	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	THE VANE BROTHERS CO PHILLY LAUNCH	Clean Water	4700 BASIN BRIDGE RD THE NAVY YARD PHILADELPHIA, PA 19112
516387	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	TJ COPE NORCOM RD FAC	Clean Water	11500 NORCOM RD PHILA, PA 19154
674565	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	TRANSFLO TERM SVC MOORE ST FAC	Clean Water	36TH & MOORE ST PHILADELPHIA, PA 19145
683973	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	TRANSRIVER PHILADELPHIA S 26TH ST FAC	Clean Water	3600 SOUTH 26TH ST PHILADELPHIA, PA 19145

Authority ID	Permit Type	Site Name	Program Description	Site Address
365644	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	TRC TRANSFER STATION COLUMBUS BLVD FAC	Clean Water	2904 S CHRISTOPHER COLUMBUS BLVD PHILADELPHIA, PA 19148
596715	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	UNITED COLOR MFG E TIOGA ST PLT	Clean Water	2940 E TIOGA ST PHILADELPHIA, PA 19134-6106
710437	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	UNITED METAL TRADERS COMLY ST FAC	Clean Water	5240 COMLY ST PHILADELPHIA, PA 19135-4315
921671	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	US POSTAL SVC LINDBERGH BLVD FAC	Clean Water	7500 LINDBERGH BLVD PHILADELPHIA, PA 19176-9998
369475	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	USPS VEHICLE MAINTENANCE FAC	Clean Water	1900 BYBERRY RD PHILADELPHIA, PA 19116-9997
714446	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	VANE LINE BUNKERING FT MIFLIN RD FAC	Clean Water	4925 FT MIFLIN RD CITY DOCK PHILA, PA 19153
472241	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	WASTE MGMT BLEIGH AVE FAC	Clean Water	5109 BLEIGH AVE PHILADELPHIA, PA 19136
369796	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	WASTE MGMT OF PA GRAYS FERRY AVE FAC	Clean Water	3605 GREYS FERRY AVE PHILADELPHIA, PA 19146

Authority ID	Permit Type	Site Name	Program Description	Site Address
940066	PAG-03 Discharge of Stormwater Assoc w Industrial Activities	WESTWAY TERM CO LLC	Clean Water	2900 E ALLEGHENY AVE PHILADELPHIA, PA 19134-6302
No Exposure				
1109160	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	API TECH CORP - PHILA OPS	Clean Water	2707 BLACK LAKE PLACE PHILADELPHIA, PA 19154-1008
836412	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	COILPLUS BLEIGH AVE FAC	Clean Water	5135 BLEIGH AVE PHILA, PA 19136
888837	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	EFORCE COMPLIANCE	Clean Water	3115 WHARTON ST PHILADELPHIA, PA 19146
822026	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	EXELON GENERATION CO DELAWARE STA	Clean Water	1325 N BEACH ST PHILADELPHIA, PA 19125-0000
750297	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	FEDEX GREYS FERRY AVE FAC	Clean Water	3600 GRAYS FERRY AVE PHILADELPHIA, PA 19146
874750	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	FIBREFLEX PACKING & MFG UMBRIA ST FAC	Clean Water	5101 UMBRIA ST PHILADELPHIA, PA 19128-4345

Authority ID	Permit Type	Site Name	Program Description	Site Address
874186	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	FIRST TRANSIT BARTRAM AVE FAC	Clean Water	8220 BARTRAM AVE PHILA, PA 19153
1082910	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	GEN ECONOPAK FAC	Clean Water	1725 N 6TH ST PHILADELPHIA, PA 19122
536951	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	HILLOCK ANODIZING MFG FAC	Clean Water	5101 COMLY ST PHILADELPHIA, PA 19135
1011652	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	HILLOCK ANODIZING TULIP ST	Clean Water	7363A TULIP ST PHILADELPHIA, PA 19136
753380	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	INNOVATION PRINTING & COMMUNICATION	Clean Water	11601 CAROLINE RD PHILADELPHIA, PA 19154
979680	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	JOWITT & RODGERS STATE RD FAC	Clean Water	9400 STATE RD PHILADELPHIA, PA 19114
633452	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	L3 COMMUNICATIONS ROOSEVELT BLVD FAC	Clean Water	13500 ROOSEVELT BLVD PHILADELPHIA, PA 19116-4201

Authority ID	Permit Type	Site Name	Program Description	Site Address
868250	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	MATERIALS PROCESSING, LLC	Clean Water	10551 DECATUR RD PHILADELPHIA, PA 19154
788999	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	MUTUAL PHARM CO INC	Clean Water	7722 DUNGAN RD PHILADELPHIA, PA 19111-2733
758806	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	MUTUAL PHARMACEUTICAL ORTHODOX ST FAC	Clean Water	1100 ORTHODOX ST PHILADELPHIA, PA 19124
747635	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	NATL PUB ROOSEVELT BLVD FAC	Clean Water	11311 ROOSEVELT BLVD PHILA, PA 19154
575231	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	PACKAGING COORDINATORS INC	Clean Water	3001 RED LION RD PHILADELPHIA, PA 19114
591838	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	PEARL PRESSMAN LIBERTY	Clean Water	7625 SUFFOLK AVE PHILADELPHIA, PA 19153-3020
786490	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	PENN MAID DUTTON RD PLT	Clean Water	10975 DUTTON RD PHILADELPHIA, PA 19154-3288

Authority ID	Permit Type	Site Name	Program Description	Site Address
839546	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	PREFERRED FREEZER SERVICES	Clean Water	3101 S 3RD ST PHILADELPHIA, PA 19148
710655	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	RR DONNELLEY GANTRY RD FAC	Clean Water	9985 GANTRY RD PHILADELPHIA, PA 19115
781631	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	SANDMEYER STEEL	Clean Water	10060 SANDMEYER LN PHILADELPHIA, PA 19116
878099	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	SMITH EDWARDS DUNLAP	Clean Water	2867 E ALLEGHENY AVE PHILADELPHIA, PA 19134-5994
600884	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	SOUTHERN GRAPHIC SYS ROBERTS AVE FAC	Clean Water	2781 ROBERTS AVE PHILADELPHIA, PA 19129
874849	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	SPECTRUM MICROWAVE PHILADELPHIA OPERATIONS	Clean Water	2707 BLACK LAKE PLACE PHILADELPHIA, PA 19154-1008
863998	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	TASTY BAKING	Clean Water	4300 S 26TH ST PHILA, PA 19112

Authority ID	Permit Type	Site Name	Program Description	Site Address
579862	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	UNITED COLOR MFG E TIOGA ST PLT	Clean Water	2940 E TIOGA ST PHILADELPHIA, PA 19134-6106
633588	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	US POSTAL SVC LINDBERGH BLVD FAC	Clean Water	7500 LINDBERGH BLVD PHILADELPHIA, PA 19176-9998
1086399	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	USPS PHILA VEHICLE MAINTENANCE FACILITY	Clean Water	3201 SOUTH 74TH ST PHILADELPHIA, PA 19153-9996
1049958	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	USPS VEHICLE MAINTENANCE FACILITY	Clean Water	1900 BYBERRY RD PHILADELPHIA, PA 19116-9997
711143	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	VEOLIA ENERGY SCHUYLKILL GEN STA	Clean Water	2800 CHRISTIAN ST PHILADELPHIA, PA 19146
748551	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	VEOLIA ENV SVC HEDLEY ST FAC	Clean Water	3100 HEDLEY ST PHILADELPHIA, PA 19135-1540
1135081	No Exposure Certification, Discharge of Stormwater Assoc w Ind Activities, PAG-03	WUXI APPTEC INC	Clean Water	4751 LEAGUE ISLAND BLVD PHILADELPHIA, PA 19112

Authority ID	Permit Type	Site Name	Program Description	Site Address
Individual				
901759	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	AKER PHILA SHIPYARD	Clean Water	2100 KITTY HAWK AVE, PHILADELPHIA, PA 19112-1808
921879	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	AMTRAK 30TH STREET STATION	Clean Water	2955 MARKET ST PHILADELPHIA, PA 19104
1131042	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	JDM MATERIALS CO BARTRAM BATCH PLT	Clean Water	PENROSE FERRY ROAD, PHILADELPHIA, PA 19153
1131054	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	JDM MATERIALS GRANT AVE PLT	Clean Water	2750 GRANT AVE, PHILADELPHIA, PA 19114
1080980	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	METRO READY MIX & SUPPLY CASTOR AVE PLT	Clean Water	4455-65 CASTOR AVENUE, PHILADELPHIA, PA 19124
1097211	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	NE ENERGY TERMINAL COLUMBUS AVE	Clean Water	4101 S CHRISTOPHER COLUMBUS BLVD PHILADELPHIA, PA 19148-5194
6748	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	PA DOT PHILA CNTY	Clean Water	1901 RUFFNER ST PHILADLEPHIA, PA 19140
1129360	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	PBF LOGISTICS PRODUCTS TERMINALS LLC	Clean Water	1630 S 51ST ST PHILADELPHIA, PA 19154
853323	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	PHILA ENERGY SOLUTIONS REFINING & MKTG LLC	Clean Water	3144 W PASSYUNK AVE, PHILADELPHIA, PA 19145-5208

Authority ID	Permit Type	Site Name	Program Description	Site Address
318900	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	PHILA INTL AIRPORT	Clean Water	DIV AVIATION/INTL AIRPORT TERMINAL E PHILADELPHIA, PA 19153
963494	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	ROHM & HAAS PHILADELPHIA PLT	Clean Water	5000 RICHMOND ST PHILADELPHIA, PA 1913
18834	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	SEPTA VICTORY AVE TERM	Clean Water	110 & 103 VICTORY AVE UPPER DARBY, PA 19082
1072512	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	SUNOCO PARTNERS MKT & TERM FT MIFFLIN TERM	Clean Water	HOG ISLAND RR 4, NORTH PIER PHILADELPHIA, PA 19153
913561	NPDES Pmt Stormwater Industrial Site Runoff (Individual)	WHITE PINES PARTNERS GC	Clean Water	1 RED LION RD, PHILADELPHIA, PA 19115

Appendix L – Defective Connections Group FY17 Report

Sewer Maintenance Unit

Defective Connections Group

Fiscal Year 2017 Annual Report

I. BACKGROUND INFORMATION

A. Phase I Stormwater Regulations

In 1990, the Environmental Protection Agency (EPA) promulgated Stormwater Regulations that required National Pollutant Discharge Elimination System (NPDES) permits for stormwater discharges from large (populations in excess of 250,000) and medium-sized (populations between 100,000 and 250,000) municipalities with separate storm sewer systems, (MS4)[1]. The City of Philadelphia with a 1990 population of 1.4 million was one of two NPDES Stormwater Phase I permittees in Pennsylvania. The other permittee was the City of Allentown.

B. NPDES Permit for Stormwater

The City of Philadelphia received its first NPDES Stormwater Permit under the 1990 Federal Regulations as issued by the Pennsylvania Department of Environmental Protection (PA DEP) in September 29, 1995. This permit had a 5-year term. Among other requirements, the permit required the city to reduce stormwater based pollution of local streams, creeks and rivers, from (1) residential and commercial areas, (2) construction sites, (3) industrial sites and (4) defective lateral connections.

The renewal of the NPDES Stormwater Permit that expired in September 2000 was approved by the PA DEP on September 30, 2005. The new permit provides for the same scope and requirements for the Defective Laterals Detection and Abatement Program as the previous permit and incorporates some provisions from the Consent Order and Agreement (COA) of July 1998 although the COA was successfully completed on March 18, 2004.

With the Water Department's internal reorganization and creation of the Office of Watersheds (OOW) in January 1999, the responsibilities numbered (1) through (3) above, along with the periodic reporting thereon was transferred to the OOW. The Defective Connections group (DCG) continues to pursue the 4th objective of NPDES Permit, namely the detection of defective laterals that cause sanitary wastewater to be carried to the local streams and rivers.

DCG field investigations began in March 1994.

II. DEFECTIVE LATERALS DETECTION AND ABATEMENT PROGRAM

A. Scope of Investigations

The MS4 impacts the areas of the city where there are two separate sewers in the street. The sanitary sewer system, which consists of a network of pipes of smaller diameter, carries domestic wastewater to the City's three Water Pollution Control Plants located in the Northeast, Southeast and Southwest sections. The storm sewer system consists of pipes of larger diameter but significantly shorter lengths and transports the stormwater to the nearest natural waterways. In general, the relatively newer sections of the city in the northeast, northwest and southwest are served by a MS4.

[1] Municipal Separate Storm Sewer System

Due to problems generally attributed to improper installation or lack of oversight during construction, sanitary wastewater from some properties can be transported into the storm sewers and from there, to the streams and rivers. This intrusion of sanitary wastewater causes pollution of the streams and rivers, which are the source of city's water supply. The polluted streams and rivers also endanger the physical health and safety of residents and users of the streams. The NPDES Permit requires the city to identify and abate the plumbing connections (defective laterals) that cause the sanitary wastewater to drain into the streams.

The **investigations** of stream pollution are triggered by the presence of a dry weather discharge from the storm sewer outfalls into the streams. There are over 400 stormwater outfalls in city's MS4 system of which some 220 have exhibited some dry weather flow.

It should be mentioned however, that not all dry weather discharge from an outfall comes from sanitary wastewater incursion; some may come from underground natural streams or from groundwater inflow. Additional testing of chemical and biochemical composition of samples collected from the outfalls determines whether or not stream pollution may be caused by defective laterals.

B. Outfall Inspections and Sampling

A systematic sampling of the quality of dry weather flow from the 200 plus wet outfalls was performed in 1991 as part of the initial NPDES permit application process. This program attempted to document the amount of flow (gph) and in many cases, fecal coliform count (number of fecal colonies per ml of water). The outfall sampling results were updated in 1998 when additional observations of fluoride levels (mg/l) were included to provide some indication of the origin of water seen in the outfalls. This is based on the fact that the natural water coming from streams or ground water seepage does not contain any significant fluorides, but the City water contains 0.7 mg/l of fluorides.

The more likely outcomes of fluoride and fecal count analyses are interpreted as follows:

i. **High fluoride level with high fecal count:** possible intrusion of sanitary wastewater into the storm sewer
ii. **Low fluoride level with high fecal count:** possible transport of surface contamination in the non-domestic discharge
iii. **High fluoride with low fecal count**: possible drinking water source

As a part of the MS4 permit, all stormwater outfalls are to be inspected once every five years. If there is dry-weather flow present then the outfall is to be sampled and tested for fecal presence and fluoride levels. In addition, the priority outfalls of the watersheds are to be sampled on a quarterly basis. Outfall inspections and sampling are handled by the Industrial Waste unit. Laboratory analysis is completed by the Bureau of Laboratory Services.

During FY2017, 44 outfall inspections were conducted and 37 samples were taken due to observed dry-weather flow as part of the Priority Outfall Sampling program. During FY2017, 171 outfall inspections were conducted and 91 samples were taken due to observed dry-weather flow as part of the Permit Inspection program.

C. Field Screening

The object of **field screening** is to identify the areas in a sewershed that are suspected of contributing to stream pollution through defective laterals. The field screening begins systematically at an outfall that shows a dry weather flow[2].

Proceeding upstream from the outfall, the storm sewer manholes are successively opened and observed for the presence of flow. The term "**flow**" has been widened to include "**wet**" stormwater manholes on the assumption that the wetness was caused by earlier active flow. These observations are continued upstream along a specified sewer line and stop when a stormwater manhole no longer exhibits any flow or wetness. The field screening is then continued along another tributary sewer and eventually through the entire sewershed of the outfall.

D. Identification of Defective Laterals

1) Dye Tests

Dye testing is a process by which a cross-connected lateral at a property that carries sanitary wastewater to a storm sewer is identified.

(a) Initial Dye Test

Before a test is conducted, the fresh air inlets (FAIs) located at the curbside of the property are identified as being the sanitary or storm FAIs. In Philadelphia, the sanitary lateral is located downstream of the stormwater lateral in relation to the flow of the main sewer[3]. The dye test protocol adopted by the City requires the presence of two properly functioning FAIs for successful initial tests. If one or no FAI is seen at a property or one or both of the FAIs are clogged or damaged, the initial dye test is aborted with a notation "**Inconclusive**".

During the initial dye test, a water-soluble fluorescent dye is placed in the fresh air inlets (FAIs). The dye is then washed down with water.

In the case of a **"Camera Assisted Dye Test"** the emergence of the dye is observed in the **storm sewer** by a closed circuit television camera positioned in the storm sewer in front of the stormwater lateral connection of the property. Possible observations include:

- (i) Green dye placed in storm FAI is seen in the storm sewer
- (ii) Green dye paced in storm FAI is not seen in the storm sewer
- (iii) Red dye placed in the sanitary FAI is seen in the storm sewer
- (iv) Red dye placed in the sanitary FAI is not seen in the storm sewer.

The above observations are interpreted as follows:

1) Combination of (i) and (iv): **Proper Connection**
2) Combination of (i) and (iii): **Probable Cross Connection**
3) Combination of (ii) and (iv): **Inconclusive**
4) Combination of (ii) and (iii): **Probable Cross Connection**

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[2] A dry weather flow is defined as one that is detected after an elapse of 72 hours of a continuous dry spell from the previous rainfall event.

[3] As discussed in Section D. House Lateral Design, pages 5-3 and 5-4, in the PWD Water and Sewer Design Manual (2nd Edition) 2011.

In certain cases, the use of the closed circuit television camera is not possible. In such cases, the initial tests are conducted with a **"Manual Dye Test"**. Possible observations include:

In a **"Manual Dye Test"**, a green dye is placed in the storm FAI and observed in the **storm sewer**. At the same time, a red dye is placed in the sanitary FAI and observed in the **sanitary sewer**. If the red dye appears in the sanitary sewer, whether or not the green dye appears in the storm sewer, the conclusion arrived at is "**Proper Connection**".

If the red dye is not seen in the sanitary sewer, the test is repeated by placing more red dye in the sanitary FAI and observed in the **storm sewer**. If the red dye appears in the storm sewer, this result signifies the presence of a "**Probable Cross Connection**".

If dye is not seen in the sanitary and storm sewers the observation is "**Inconclusive**".

The initial dye tests, whether conducted manually or by a camera are intended to be least intrusive to the water customers. During these initial tests, no entry into the home is involved. In order to provide water for dye tests at the FAIs, field crews use portable water equipment. The Defective Connections group has two vehicles each retrofitted with water supply tanks.

(b) Confirmation Dye Test

A confirmation dye test is conducted in case of an Inconclusive test or a Probable cross connection. This test is conducted after a second notification to the customer has been sent. This test is **intrusive**; admission inside the home is required to conduct the testing.

The confirmation dye test is conducted **manually** by placing and flushing the fluorescent dye in household plumbing fixtures, such as a toilet[4]. The emergence of the dye is then observed in the **sanitary sewer**.

If the dye does appear only in the sanitary sewer, it is concluded that the property tested has a "**Proper Connection**." If the dye from the household plumbing does not appear in the sanitary sewer, then observation is made in the storm sewer. The presence of the dye in the storm sewer confirms the existence of a "**Cross Connection.**"

(c) Notification of Defective Lateral

When a confirmation dye test indicates that there exists a cross connection at the subject property, the property owner is advised that if the property qualifies as a residential property (with no more than 4 units in one of which the owner has his/her residence), the city will make repairs to the defective lateral(s) at no cost to the property owner. If later on it is discovered that the property does not fall within this category, the customer is informed by a follow up notice of his responsibility to repair the defect at their cost.

The Plumbing Repair Programs unit handles customer communications and is responsible for the abatement of these defects.

2) Customer Notifications

[4] This step was modified in CY2001 to conduct the tests from all plumbing fixtures, including any in the basement in order to identify the existence of an internal cross connection, where all fixtures but one are properly connected to the sanitary sewer, with one offending connection to the storm sewer.

(a) Initial Notification

The identification of the defective laterals begins after delineating the parts of a sewershed suspected of contributing dry weather flow to the MS4 system, after field screening. All property holders in the specified area receive an initial notification letter, generated through the Oracle-based DLS computer program. The notification provides an introduction of the program and requests the customer's cooperation in enabling **dye tests** at their property. A dye test is conducted after an initial notification is sent out to a customer. There are three possible outcomes of a dye test:

(i) A test is conducted and no cross connection is found. In this case, a result of "No Cross Connection" is entered in the database and the case is closed.

(ii) A test is conducted and it is concluded that there might exist a cross connection that results in the transport of sanitary wastewater into the storm sewer. This condition requires additional tests to confirm the existence of a cross connection.

(iii) A test cannot be conducted due to any of a variety of reasons, such as FAIs were not conclusively identified, were clogged, etc. This situation also warrants additional tests to conclude whether or not a cross connection exists.

(b) Confirmation Notification

In either of case (ii) or (iii) above, a follow up notification is sent out to the customer, informing them of the results of the previous attempt and requesting them to be available at a specified date for additional "Confirmation" tests at their property. Of course, if the date provided by the City is not suitable to the customer, they can schedule an alternative appointment that suits them.

Dye tests are then conducted at the property from within the customer's premises as described earlier. The results of the tests, (a) a Proper Connection or (b) a Cross Connection, are entered in the DLS computer program.

(c) Water Shutoff Notification

Not all dye tests are completed as a result of confirmation notifications. Some customers ignore the scheduled date and fail to make an alternative appointment. In such cases an informatory note is left at the property and a follow up attempt for tests is made. If this also results in no test, another notification is sent out informing the customer that if they do not make a firm appointment by a specified date (usually within two calendar weeks of the notification date), their water service would be scheduled to be turned off by the Customer Service unit. Of course if the customers do respond and make an appointment for dye tests, the service shutoff is withdrawn and tests are completed as soon as possible.

(d) Miscellaneous Closures

In some cases, where there was no response to dye test requests or water service shutoff notifications due to properties being vacant or abandoned, the cases were closed with a notation "**Miscellaneous Closure**". A miscellaneous closure is activated because of any of the following reasons:

- No active water service to the premises
- Property abandoned, empty or unoccupied
- No billing to the property per Revenue Department
- No sewer connection

From time to time, the miscellaneously closed accounts are revisited. If we find that the reason that caused the account to be originally closed is no longer valid, a dye test is conducted and the property is then re-classified according to the test results.

III. PRIORITY SCORE LIST OUTFALLS

The emphasis of the Defective Laterals Detection and Abatement program is on outfalls on the Priority Score List. The Priority Score List ranks all outfalls sampled with dry-weather flow based on a preset formula that includes the fecal coliform results, the estimated volume of flow, whether the outfall discharges to a drinking water source water, and a complaint factor. The Priority Score List is periodically updated based on the results of the (Permit) Outfall Inspection and Sampling Program described earlier. This list was updated in July 2013.

IV. SUMMARY OF DYE TESTS AND ABATEMENTS

Table 1 provides a summary of the work performed in detecting and abating defective laterals. It shows the cumulative numbers since the inception of the project in 1994, and the progress that was attained during FY2017.

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Table 1.
Updated Progress on Dye Tests in Philadelphia MS4 Area

	Since Inception of the Program	**During Fiscal 2017**
Dye Tests Initiated	60,865	2,020
No Cross Connections Found	58,374	2,054
Cross Connections Identified	1,440	39
Completed Tests	59,814	2,093
Abatements Completed	1,420	36

Of the 36 abatements above (in FY2017), 31 were residential properties. The cost for these abatements was $ 294,807.00. Additionally, 5 commercial properties were abated at a cost of $ 23,044.00.

V. MISCELLANEOUS

Estimates of Pollution Removed

The following data provides a rough measure of the effectiveness of the Defective Connections group's positive contribution to improving the local environment:

- Number of Cross Connections Abated

Since Inception of the Program	1,420
During FY2017	36

- Estimated gallons of Polluted Water Prevented from entering the stormwater outfalls[5]

Since Inception of the Program	199.5 million gallons per year
During FY2017	5.1 million gallons per year

VI. STAFF LEVELS

Because of the high priority assigned to the Defective Connections group, the availability of manpower is extremely important. The sanctioned personnel for the unit is as follows:

One **Water Conveyance Supervisor**

Two **Field Representative Supervisors**

Four **SM Crew Chief Is / Science Technicians**

Eight **Utility Representatives**
Four positions vacant

One **Clerk 2**

The above field and office staffs are organized under the Water Conveyance Supervisor. This position is responsible for all aspects of the unit. The two Field Representative Supervisors are each responsible for two field crews, four crews in all. Each crew is led by a SM Crew Chief I / Science Technician and has two Utility Representatives.

In addition to the field staff, the Defective Connections group has the following position which provides general support:

Clerk 2: The C2 handles the intricacies of the DLS database, creation of various correspondences related to dye tests, and follows-up with the field staff.

The C2 also handles a variety of communications with the customers, makes appointments, and follows-up with delinquent customers. They also maintain the record of water shutoff warnings and miscellaneous closures.

At the end of FY2017, 12 of the 16 approved positions in the Defective Connections group were filled.

[5] Based on an average use of 110 gallons per capita per day, over a family size of 3.5 persons.

Appendix M – City of Philadelphia Snow and Ice Operations Plan Winter 2016-2017

STREETS
PHILADELPHIA

Streets Department
1401 JFK Blvd, 7th Floor
Philadelphia, PA 19102
(215) 686-5460

City of Philadelphia

Streets Department
Winter 2016 – 2017

Snow and Ice Operations Plan

December 15, 2016

Honorable James S. Kenney, Mayor
Michael DiBeradinis, Managing Director
Michael A. Carroll, Acting Streets Commissioner
Carlton Williams, Deputy Commissioner
Christopher Newman, Deputy Commissioner
Stephen Lorenz, Chief Highway Engineer

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Section 1
Snow & Ice Removal Operations Plan

Snow & Ice Removal Operations Plan

Plan Summary

Philadelphia, like many other northeastern cities in the United States, often faces winter storms that bring potentially dangerous accumulations of ice, sleet, freezing rain, and snow.

In order to provide roadway conditions that are safe for traffic on primary, secondary, and tertiary (residential) streets throughout the entire City of Philadelphia, the Streets Department has prepared a Snow and Ice Removal Operations Plan outlining the City's response to adverse winter weather conditions. This document outlines procedures and responsibilities for responding to winter weather emergencies.

The goal of the Plan is to ensure a continuity of City services by reducing, if not eliminating, the occasions when the City government will have to close or reduce City services due to severe winter weather, particularly with regards to curbside trash collection. The chief objective for the City in all severe winter weather is to allow all Philadelphians to return to their normal daily activities as quickly as possible.

The Plan prioritizes route systems, indicates the appropriate distribution of resources, and identifies the duties and responsibilities of all personnel engaged in the response. Also, the Plan delineates necessary linkages with other City departments and agencies including but not limited to, the Office of Fleet Management and the Office of Emergency Management.

In addition, the Plan outlines areas requiring planning before, during, and after a winter weather storm, understanding that the severity of storms and the resulting conditions vary depending on many environmental factors, the plan allows for flexibility in the department's response. A matrix (see: Chart A, page 3) indicating the storm type with a brief description and resources required to respond to the emergency is provided. An in depth description of resources required to respond to each storm type is provided in subsequent sections of the plan.

Chart A - RESOURCE DEPLOYMENT WINTER 2016 / 2017

POST STORM FORECAST: ABOVE FREEZING TEMPERATURES

	STORM TYPE	HIGHWAY DIVISION	SANITATION DIVISION	NEIGHBORHOOD OPERATIONS	BRINE APPLICATION*	CONTRACTORS	LIFT SETS*
1	SLEET / FREEZING RAIN LESS THAN 1 INCH OF SNOW	X			X		
2	1 - 3 INCHES OF SNOW	X		Partial clearing focusing on higher terrain (15 routes)	X	X	
3	3 - 5 INCHES OF SNOW	X		Partial clearing focusing on higher terrain	X	X	
4	ABOVE 5 INCHES OF SNOW	X	X	Full Deployment (135 routes)	X	X	X

POST STORM FORECAST: BELOW FREEZING TEMPERATURES

	STORM TYPE	HIGHWAY DIVISION	SANITATION DIVISION	NEIGHBORHOOD OPERATIONS	BRINE APPLICATION*	CONTRACTORS	LIFT SETS*
5	SLEET / FREEZING RAIN LESS THAN 1 INCH OF SNOW	X		Partial clearing focusing on higher terrain (15 routes)			
6	1 - 3 INCHES OF SNOW	X		Partial clearing focusing on higher terrain	X	X	
7	3 - 5 INCHES OF SNOW	X	X	Partial clearing focusing on higher terrain	X	X	
8	ABOVE 5 INCHES OF SNOW	X	X	Full Deployment (135 routes)	X	X	X

* For pre-storm forecasts of rain to snow, brine will not be pre-applied. It will wash away.

* Lift sets are generally in Center City.

* Full Deployment may be deployed when the National Weather Service issues a winter storm warning.

Essential Staff

A. Purpose

The Streets Department is the primary response agency for the City in winter weather events such as snow and ice storms. As such, it is essential the Department maintain an adequate workforce in such emergencies.

B. Definitions

Weather Event – Includes all weather emergencies as declared by the Managing Director's Office (OTIS and OEM), in consultation with the Mayor's Office, and any weather event that requires the mobilization of staff to maintain clear roadways.

Essential Staff* – *All Department employees and any employees assigned to Streets Department Operations during a weather event are deemed essential, and must report to work unless otherwise instructed by the appropriate supervisor. (see: Streets Order No. 100 – Change #6, page 6)

C. Policy Statement

When a weather emergency occurs, all personnel, as determined essential by the appropriate supervisor, will be required to report to their assigned functions. Since there are significant differences in the size and severity of weather events, those employees required to report may vary from event to event. When possible, employees will be notified by the appropriate supervisor/manager as to their status prior to an event. However, since such notification is not feasible in all situations, employees should report for duty unless otherwise instructed.

During weather events all employees should monitor local news broadcasts for information, and should contact their work location to obtain direction on their work status.

Employees who are not instructed to report for duty during a weather event shall be authorized to utilize accrued vacation, comp, or AL leave during weather events. Employees not engaged in storm operations may be required to report to work, at the discretion of their supervisor, if the nature of their regular work assignments has become critical.

Employees may be assigned shift work as required by the event response plan.

D. Responsibilities

Streets Commissioner: The Commissioner will serve as incident commander for snow and ice operations. These duties include supervising the logistical response of the Streets Department to winter storm events, and consulting with the Managing Director regarding the declaration of a Snow Alert, or the declaration of a Snow Emergency and the activation of the Emergency Operations Center (EOC).

The decision to activate the EOC will be made by the Managing Director's Office.

The Streets Commissioner, MDO, and the EOC will coordinate with the Philadelphia School District and the Philadelphia Archdiocese regarding winter storm events.

Chief Highway Engineer: will develop and maintain a comprehensive snow plan that defines required staffing levels during weather events, and identifies specific job positions and functions. Direct all field operations during winter weather events. In addition, will coordinate (or delegate) with all other support departments and external partners (ie: SEPTA, PPA)

Supervisors: will maintain a list of employees and phone numbers, and notify those employees assigned to snow operations as required by this policy. Supervisors are to grant leave time only as prescribed in this policy statement, or in the event of extraordinary circumstances.

Human Resource Division: will communicate the Essential Staff Policy to all employees prior to the winter season.

Residential Snow Coordinator: under direction of the Chief Highway Engineer, coordinate all residential snow activity.

Snow Contractor Liaison: will maintain a list of contracted snow and ice removal vendors and order their services when necessary. The liaison also monitors contractors' performance and services rendered and authorizes payment for services.

Field Staff: All personnel, including all supporting departments, will be under the direction of the Streets Department personnel. In the interest of public safety, all personnel will report directly to Streets Department supervisors, and will not be released until directed by the Chief Highway Engineer. All are expected to be in place, on time, and ready to perform the duties for which they have been trained. Exceptions will be at the Streets Commissioner's or Managing Director's discretion through the Chief Highway Engineer.

Department of Streets
Office of the Commissioner
City of Philadelphia

October 2, 2006

Streets Order No. 100 – Change #6

Subject: Essential Staff Policy

General

The City of Philadelphia Streets Department's mission is to maintain clean and safe streets. The Department delivers a number of City services that are critical to maintaining public health and safety in our communities. These essential services include, but are not limited to, maintaining all traffic control devices and street lighting, the safe operation and maintenance of our roads and bridges, timely and consistent removal of trash and debris, and during winter weather events the plowing and salting of City streets. In the performance of such functions, it is essential that employees of the Department report to work on time when scheduled to provide services to the public. Since each division has varying needs, each division head is responsible for implementing staffing policies to effectively manage the number of employees required for duty on a mandatory basis, to insure that these essential services are delivered and that public health and safety are maintained in communities at all times.

To maintain the essential services identified above, employee leave may be cancelled as determined necessary by the division head. In addition, employees assigned to essential services are required to continue their assignments until properly relieved.

Winter Weather Events

During a winter weather event, all Streets Department employees are expected to report to work at their regularly scheduled time unless notified to report to a different location and/or at a different time. All employees with a valid Pennsylvania Commercial Driver's License (CDL) shall be considered essential during a winter weather event. Any employee holding a valid Pennsylvania Driver's License will be considered essential if notified of such by the Department. During an event, the times and location of reporting may vary significantly depending upon the nature of the event. The Department will notify, in a timely manner, essential employees whose starting time and location are modified. However, all employees should monitor weather conditions and are expected to report for duty during winter weather events or snow emergencies.

Since there are significant variations in the time, nature and intensity of events, the assignments of employees will vary. Some employees may be excused from reporting during an event. Those employees excluded from reporting shall be granted exemptions on a case by case basis provided their assigned function will not be required as dictated by the event, and if the Department Head, or designee, grants such exception.

Compliance

The Streets Department cannot successfully deliver core services without the participation of its entire team. Due to the critical nature and importance of the work to be performed, an employee who does not work his or her assigned hours may be subject to disciplinary action up to and including discharge.

CITY OF PHILADELPHIA

DEPARTMENT OF STREETS
ADMINISTRATION DIVISION
730 Municipal Services Building
1401 John F. Kennedy Blvd.
Philadelphia, PA 19102-1676

DAVID J. PERRI, P.E.
Streets Commissioner

TO : Streets Department Deputies and Division Directors

FROM : David J. Perri, P.E, Commissioner, Streets Department DJP

DATE : November 27, 2015

SUBJECT : Directive Prohibiting Preferential Snow/Ice Removal Activities

---

The Streets Department's mission is to maintain clean, green and safe streets. A critical component of this mission includes our snow and ice removal operations in order to maintain clear roadways and provide safe traffic flow for citizens and businesses. This is an essential public function that must be performed in a comprehensive, efficient and effective manner without any appearance of impropriety.

In that regard, Streets Department employees must perform all snow and ice removal activities consistent with operational standards and planning requirements. Employees are strictly prohibited from performing preferential snow and/or ice removal activities for their own benefit or for the benefit any departmental staff, including line employees, supervisors, managers, division directors, deputy commissioners and the commissioner. Examples of this prohibited activity include the plowing of private driveways or parking spaces or the plowing or salting of streets in a manner that is not consistent with the overall snow fighting plan for City streets.

Please ensure you communicate this directive to your staff and that you make them aware that failure to abide by this requirement will be considered gross insubordination and subject to disciplinary action.

Goals

The Streets Department is the lead City agency for development and implementation of Philadelphia's snow and ice removal program. The goal of the program is to maintain safe egress for citizens throughout the duration of a storm and to return the City to normal operations as soon as possible after the event has ceased. The Department works closely with other City agencies to clear and make safe more than 2,500 miles of streets and roadways. This allows businesses and City agencies to maintain their normal operations during most events. Significant resources in the form of vehicles, materials, and staff are dedicated to the operation. As in similar emergency response plans, priority is given to major thoroughfares, our primary route system; however, the plan also addresses the needs of all streets within the City limits.

Sanitation service is a critical function for the citizens of Philadelphia; as such, an important component of the plan is to maintain trash and recycling collections. To minimize the need to mobilize the Sanitation fleet, and the subsequent cessation of this service, the current plan augments the Streets Department's current resources with a reserve snow fighting fleet of vehicles from various departments. The Streets Department and supporting agencies are committed to providing the most efficient and effective snow and ice removal operations as possible and are continually evaluating new methods and processes.

Scope

The Roadway System

There is a network of approximately 2,575 miles of City and State roads within the boundaries of the City of Philadelphia. The responsibility for maintaining these roadways during winter storms is split among the Pennsylvania Department of Transportation (PennDOT), the Streets Department, and the Fairmount Park Commission. Of the 360 miles of state roads, PennDOT maintains 50 miles of limited access state highways, including I-95 and I-76. The remaining 310 miles are state roads that the State contracts with the City for snow and ice removal. This amounts to a total of 2,525 miles of City and State roads that the City maintains.

The Fairmount Park Commission removes snow and ice from 35 miles of Park roads, including Lincoln Drive, Kelly Drive and Martin Luther King Drive. Snow and ice removal on the remaining 2,490 miles of City streets is the responsibility of the Streets Department. The Highway Division maintains general responsibility for the organization and deployment of City forces during winter storm operations. In storms of large accumulation, the Sanitation Division will be mobilized to supplement the snow removal effort with vehicles outfitted with plows. Finally, private contractors supplement City forces in storms of significant magnitude.

In order to provide effective service during winter storms, the City's streets are divided into primary, secondary, and tertiary route systems. The primary route system encompasses 665 miles, including 110 miles of Snow Emergency Routes. The secondary route system includes another 700 miles of streets (both systems exclude the roadway maintained by the Fairmount Park Commission). The balance of City streets falls into the tertiary street system, covering approximately 1,125 miles of streets, 25 miles of which are private streets where the residents contract for private snow removal.

Route Priority

When a Snow Emergency is declared, Snow Emergency *and Primary* Routes become the first priority for snow removal efforts. *The Snow Emergency route System is clearly marked and consists of the major street network within the City.* Primary routes include major access roads through the central business district, and in and out of neighborhoods. The majority of primary routes encompass major and minor arterials, which serve the highest traffic volumes and distribute traffic throughout the City.

The secondary route system, which includes other streets that primarily convey traffic within neighborhoods, is the second focus of snow removal efforts. Most SEPTA routes fall within the boundaries of the primary and secondary route system.

The tertiary system includes most local residential streets. These streets are cleared based upon storm type as defined in this document.

The primary and secondary route systems are salted as soon as significant moisture has accumulated on roadways, thereby minimizing travel conditions that are potentially dangerous. Certain roads may also be pre-treated with salt brine when conditions warrant. Plowing begins when there is such a sufficient buildup of snow that salting is no longer effective. Plowing and salting will occur on local and residential streets as defined in this document.

Residential streets that are inaccessible for snow and ice removal efforts due to illegally parked vehicles cannot be treated until those vehicles are removed by the owner, or ticketed and subsequently towed.

Snow Emergency Declaration

The Mayor, Managing Director, Deputy Managing Director of Emergency Management (DMD-EM) and the Commissioner of Streets will consult to determine if a declaration of a Snow Emergency is necessary.

A snow emergency declaration allows curb to curb plowing on designated snow emergency routes (see: Section 2 for Snow Emergency Route Listings). No parking is allowed on snow emergency routes during a snow emergency. The Philadelphia Parking Authority and Police Department are responsible for ticketing and towing vehicles parked on snow emergency routes.

Winter Weather Action Outline

Snow and ice removal operations are divided into three elements:

Planning

The Deputy Commissioner for Transportation, the Chief Highway Engineer and the Deputy Commissioner of Sanitation, under direction of the Streets Commissioner, are responsible for developing a comprehensive winter response plan. The planning activity will include all other support departments such as Fleet, Parks and Recreation, Water and others. Planning will encompass continuing communications with the Office of Fleet Management to ensure that vehicles are properly maintained and outfitted for salting and snow removal. Further, the plan includes periodic reviews of the Snow and Ice Operations and the route structures.

During this phase, responsibilities are outlined, key positions are identified, and crews are trained. In addition, materials are requisitioned, received, and stockpiled; equipment is repaired and readied, and snow routes and route maps are reviewed and revised as needed.

Operations

The operations phase begins when the forecast is for temperatures consistent with snow, ice, sleet or freezing rain, with at least a 50 percent chance of precipitation.
The Highway District, the Residential Snow Coordinator, and Fleet Management are notified of the possibility of precipitation.
The Highway Division directs all anti-icing and de-icing efforts undertaken by the Streets Department. The Division operates under the supervision of the Chief Highway

Engineer, and is divided into six regional Highway Districts, supervised by District Highway Engineers. District Highway Engineers and the Residential Snow Coordinator, in consultation with the Snow Headquarters, located at the Bridge Maintenance Office at Whitaker Avenue and Luzerne Street, direct winter weather operations.

The 6 Highway District yards are at the following locations:

Highway District 1 --	48th Street and Parkside Avenue
Highway District 2 --	63rd Street and Essington Avenue
Highway District 3 --	22nd Street and York Street
Highway District 4 --	Stenton Avenue and Sylvania Street
Highway District 5 --	Whitaker Avenue and Luzerne Street
Highway District 6 --	State Road and Ashburner Street

The 6 Residential District Headquarters are at the following locations:

District 1 --	3033 63rd St. (Belmont & Concourse Dr.) – Carousel house
District 2 --	3033 63rd St. (63rd St & Essington). Trailer next to dome
District 3 --	Gustine Lakes Rec. Center 4700 Ridge Ave.
District 4 --	4501 G St. (G & Ramona Ave.) Street Lighting Shop
District 5 -- & Snow Headquarters	4040 Whitaker Ave. (Whitaker & Luzerne)
District 6 --	8401 State Road (State & Ashburner)

Resources are deployed as needs dictate, however, operations generally follow a set pattern. Once the storm arrives and precipitation is falling creating icy or snow-covered streets, salting operations begin. Certain roads may also be pre-treated with salt brine when conditions warrant. In additions, some trucks are equipped with a pre-wet system that will brine the salt before it is spread Salt trucks are deployed to cover the route structure. Salting will continue until it is no longer necessary or has become ineffective.

As snow continues to fall and build up on the streets, plows are deployed to the routes. Plowing will continue until the streets are passable and safe for use by vehicular traffic. At this time, individual complaints are addressed.

Cleanup and Assessment

Following each storm, the snow removal equipment is cleaned (including the pre-wet system); spreaders and plows are removed and stored; personnel are released from snow duty; and final reports are submitted. At this time, after action reviews are undertaken. If contractors are used, all paperwork will be submitted and prepared for billing before the shift is over. All vehicles are post-checked and reported to Fleet for repairs.

Participating Organizations – Assignments & Responsibilities

Assignments and Reporting Structure

All personnel involved in winter weather operations will be under the direction of Streets Department. ***Once deployed to snow operations, they will be relieved from their respective daily assignments and will not be released, except for emergency, to their respective operating departments without approval of Streets Department snow headquarters.***

Streets Department

The Streets Commissioner is the incident commander for all winter weather operations The Highway Division coordinates the citywide program for snow removal from the City street system and is directly responsible for salting and plowing the primary, secondary, and tertiary route structures. In addition, the Chief Highway Engineer is responsible for the supervision and organization of all snow removal efforts. With the approval of the Streets Commissioner, the Chief Highway Engineer is responsible for mobilizing necessary plowing and lifting operations. These operations may require the cessation of normal Sanitation Division operations under certain conditions, and the conversion of Sanitation vehicles for plow operations. However, the Department's goal is to minimize the impact on Sanitation operations and avoid the delay or interruption of curbside collection services. In addition, private contractors may be called in to supplement the efforts as conditions dictate. Sanitation personnel, Highway personnel and contractors are responsible for plowing under the direction of the Highway Division.

Parks and Recreation

Parks and Recreation maintains a portion of the roadways in and around the Park system, the Benjamin Franklin Parkway, Kelly Dr, MLK Dr, Lincoln Dr and some residential grids. In addition, they are responsible for the trail systems. They also are responsible for treating parks and recreation centers. The Chief Highway Engineer & Parks winter coordinator will discuss the event.

Office of Fleet Management

The Office of Fleet Management is responsible for the maintenance and repair of all vehicles in the City's fleet and is responsible for opening fuel sites (see: Fuel Site Locations Table) during winter weather events, providing and installing chains, and where necessary, assisting with the installation of plows, with the exception of the Sanitation Division, which installs chains and plows on compactors. The Chief Highway

Engineer and Fleet Management Liaison will discuss the event. This discussion will include Brine Salt, Plow, shifts, and shops.

Fuel Site Location

Site #	Operating Hours	Departments	Site Name	Street Address	ZIP	Contact #	Fuel Type	UNLEADED TANK CAP	DIESEL TANK CAP
02	24 / 7	Police Department	24th & Wolf	2301 S. 24th Street	19145	686-3010	U	10,000	N/A
03	24 / 7	Police Department	11th & Wharton	1100 Wharton Street	19147	686-3030	U	10,000	N/A
05	MON - FRI 7:30-3:00	Philadelphia Water Department	8200 Enterprise	8200 Enterprise Avenue	19153	685-4047	U / D	2500	2500
06	MON - FRI 7:30-3:00	Commerce / Division Of Aviation	International Airport	8500 Essington Avenue	19153	492-3056	U / D	8,000	8,000
07	24 / 7	Streets Department	51st & Grays	5014 Grays Avenue	19143	685-2612	D	N/A	10,000
08	24 / 7	Police Department	55th & Pine	5524-30 Pine Street	19143	686-3180	U	10,000	N/A
09	24 / 7	Police Department	61st & Thompson	6059 Haverford Avenue	19151	686-3190	U	6,000	N/A
11	MON - FRI 7:00 /3:30	Office of Fleet Management	25th & Tasker	2500 Tasker Street	19145	952-6201	U / D	20,000	10,000
13	24 / 7	Police Department	Girard & Montgomery	611-17 E. Girard Avenue	19125	686-3260	U	10,000	N/A
14	24 / 7	Police Department	21st & Pennsylvania	401 N. 21st Street	19130	686-3090	U	10,000	N/A
15	MON - FRI 7:00 - 10:00	Streets Department	26th & Glenwood	2601 Glenwood Avenue	19121	685-3978	U / D	10,000	10,000
17	MON - FRI 7:00 -3:00	Philadelphia Water Department	7800 Penrose	7800 Penrose Ferry Road	19145	685-4068	U / D	10,000	20,000
18	MON - FRI 7:00 -3:00	Philadelphia Water Department	3900 Richmond	3899 Richmond Street	19137	685-1336	U / D	6,000	4,000
19	MON - FRI 7:00 -3:00	Streets Department	Delaware & Wheatsheaf	3101 Castor Avenue	19134	685-1364	U / D	2EA/1,500	10,000
21	24 / 7	Office of Fleet Management	Front & Hunting Park	100 East Hunting Park Avenue	19124	685-9100	U / D	10,000	10,000

23	MON - FRI 8:00 - 4:30	Philadelphia Water Department	29th & Cambria	2900 N. 29th Street	19132	685-9633	U / D	20,000	10,000
24	24 / 7	Police Department	22nd Hunting Park	2201 W. Hunting Park Avenue	19124	686-3390	U	10,000	N/A
25	24 / 7	Police Department	Harbison & Levick	2809 Levick Street	19149	686-3150	U	10,000	N/A
26	24 / 7	Police Department	Broad & Champlost	5960 N. Broad Street	19141	685-2862	U	10,000	N/A
28	24 / 7	Police Department	Germantown & Haines	39-43 Haines Street	19126	686-3140	U	10,000	N/A
29	24 / 7	Police Department	Ridge & Cinnaminson	6666 Ridge Avenue	19128	686-3050	U	6,000	N/A
31	MON - FRI 7:00 - 11:00	Streets Department	Domino & Umbria	200 Domino Lane	19128	685-2580	U / D	10,000	10,000
32	MON - FRI 7:00 - 11:00	Office of Fleet Management	State & Ashburner	8401 State Road	19136	685-8977	U / D	10,000	20,000
33	24 / 7	Police Department	Academy & Red Lion	3100 Red Lion Road	19114	686-3080	U	10,000	N/A
34	24 / 7	Police Department	Bustleton & Bowler	1701 Bowler Street	19115	686-3070	U	10,000	N/A
35	24 / 7	Police Department	17th & Montgomery	1727 N. 17th Street	19121	686-3230	U	10,000	N/A
38	24 / 7	Fire Department	Germantown & Carpenter	6800 Germantown Avenue	19119	685-2225	U / D	600	2,500
39	24 / 7	Fire Department	3rd & Spring Garden	276 Spring Garden Street	19123	686-1372	U	6,000	N/A
40	MON - FRI 7:00 - 5:00	Philadelphia Water Department	Fox & Abbottsford	3201 Fox Street	19129	685-2054 685-2024	U / D	10,000	10,000
41	MON - FRI 6:00 - 11:00	Streets Department	4040 Whitaker	4040 Whitaker	19124	685-9800	U / D	6,000	10,000
43	24 / 7	Fire Department	28th & Thompson	1301 N. 28th Street	19121	685-3889	D	N/A	1,000
44	24 / 7	Fire Department	Cottman & Loretta	1900 Cottman Avenue	19111	685-0591	D	N/A	1,000
45	24 / 7	Fire Department	Pennypack Circle	8205 Roosevelt Blvd	19152	685-8891	D	N/A	1,000
46	24 / 7	Fire Department	Broad & Fitzwater	711 S. Broad Street	19147	685-6897	D	N/A	1,000

47	24 / 7	Fire Department	4th & Snyder	414 Snyder	19148	685-1792	D	N/A	1,000
48	MON - FRI 7:00 - 3:30	Parks and Recreations	Chamounix (Parks/Recreation)	715 Chamounix Drive	19131	685-0110	U / D	10,000	10,000
49	24 / 7	Fire Department	63rd & Lancaster	1913 N. 63rd Street	19151	685-0068	D	N/A	1,000
50	MON - FRI 7:00 -6:00	Streets Department	48th & Parkside	4804-48 Parkside Avenue	19131	685-0164	D	N/A	2,000
51	24 / 7	Fire Department	10th& Cherry	133 N. 10th Street	19107	686-1350	D	N/A	1,000
52	24 / 7	Fire Department	4th & Girard	400-08 Girard Avenue	19123	686-1349	D	N/A	1,000
53	24 / 7	Fire Department	82nd & Tinicum	8201 Tinicum	19153	492-3393	D	N/A	1,000
54	24 / 7	Fire Department	52nd & Willows	783 S. 52nd Street	19143	685-1987	D	N/A	2,000
56	24 / 7	Fire Department	Foulkrod & Darrah	1652-54 Foulkrod Street	19124	685-1295	D	N/A	1,000
57	24 / 7	Fire Department	Bustleton & Bowler	1701 Bowler Street	19115	685-0387	D	N/A	3,000
58	24 / 7	Fire Department	Bustleton & Hendrix	812 Hendrix Street	19116	685-0388	D	N/A	1,000
59	24 / 7	Fire Department	Chelten & Baynton	300 E. Chelten Avenue	19144	685-2227	D	N/A	1,000
60	24 / 7	Fire Department	30th & Grays Ferry	3023-45 Grays Ferry Avenue	19146	685-1790	D	N/A	1,000
61	24 / 7	Fire Department	Belgrade & Ontario	2520 E. Ontario Street	19134	685-9849	D	N/A	1,000
62	24 / 7	Fire Department	13th & Shunk	2600 S. 13th Street	19148	685-1783	D	N/A	1,000
65	24 / 7	Fire Department	24th & Ritner	2301 S. 24th Street	19145	685-1793	D	N/A	600
67	MON - FRI 7:00 - 3:30	Commerce / Division Of Aviation	Northeast Airport	3001 Grant Avenue	19114	685-0311	D	N/A	4,000
68	24 / 7	Fire Department	Academy & Comly	11650 Academy Road	19154	685-9374	D	N/A	600
69	24 / 7	Fire Department	Ridge & Cinnaminson	6666 Ridge Avenue	19128	685-2555	D	N/A	600
70	24 / 7	Police Department	Dungan Road	7790 Dungan Road	19111	685-5101	U	8,000	N/A

71	24 / 7	Fire Department	Park & Cambria	1325 W. Cambria Street	19132	685-9773	D	N/A	600
72	24 / 7	Fire Department	Old York Road	5931 Old York Road	19141	685-2881	D	N/A	600
73	24 / 7	Fire Department	43rd & Market	4299 Market Street	19104	685-7699	D	N/A	600
74	24 / 7	Fire Department	Belgrade & Huntington	2601 Belgrade Street	19125	685-9847	D	N/A	600
75	24 / 7	Fire Department	Rising Sun	5332 Rising Sun Avenue	19120	685-9197	D	N/A	600
80	24 / 7	Office of Fleet Management	3033 S. 63RD	3033 South 63rd Street	19125	685-4250	D	N/A	10,000
95	MON – FRI 6:00- 3:00	School District of Philadelphia	Shallcross	Byberry & Woodhaven	19154	281-2617	D	N/A	10,000
96	MON – FRI 6:00- 3:00	School District of Philadelphia	Broad & Lehigh	2600 N. Broad Street	19132	215-227-4430	D	N/A	10,000

TOTAL NUMBER OF SITES IS SIXTY TWO
"R"= RESTRICTED TO VEHICLES ASSIGNED TO THE DEPARTMENT ONLY!!!!

Managing Director's Office

The Managing Director, in consultation with the Mayor, has the authority to declare a snow emergency and if necessary close City offices. This plan should limit, if not eliminate, the need to enforce any closures during snow events.

When a snow emergency is declared the Managing Director's Office is responsible for coordinating the citywide response to the emergency. Streets Department personnel, along with personnel from other departments, participate in the staffing of the Emergency Operations Center, located at 3rd and Spring Garden Streets in the Fire Administration Building, and in other coordinated efforts as necessary.

Police Department

Police Department support is required to support existing parking regulations. Police will ticket vehicles identified as impeding snow removal efforts including, but not limited to, vehicles parked on corner radii and double-parked vehicles. Police officers will stop all private entities placing snow in previously cleared streets. During declared snow emergencies, Police support will ensure snow emergency routes are clear. The Police Department is responsible for performing de-icing activities in their facilities.

Other City Departments

The tertiary route structure is maintained by the following City Departments under the direction of the Residential Snow Coordinator.

Streets Department
Water Department
Public Property
Parks & Recreation
Managing Director's Office (CLIP)
Licenses & Inspections
Prisons Department
Revenue Department
Free Library

Snow Fighting Equipment Inventory

Streets Department 2015/2016 Fleet Summary

Listed below is the Streets Department's fleet inventory for snow operations. Due to the age of the fleet and the challenges facing the Office of Fleet Management, we have concerns about the reliability of the equipment. Winter operations place a great strain on aging vehicles, and equipment availability will have a significant impact on the Department's ability to effectively respond to weather events. With projected downtime, the City will be challenged to field a full complement of equipment to cover all routes.

The result of insufficient equipment will be slow response time, particularly on residential streets. To address this issue, in part, the Streets Department has lease agreements to provide supplemental equipment for both large and residential streets. The Department also continues to work closely with the Managing Director's Office to identify interdepartmental equipment that can supplement the inventory.

All departments are required to provide a full complement of necessary vehicles for snow operations for clearing the roadway system.

Streets Dept. Snow Vehicles	
Highway Salt	70
Loaders, Highway, Backhoe	23
Loaders, Highway, Articulated	14
Compactors	120
Brine, Highway	3
Brine. Sanitation	2
Streets Residential	18
Total:	250

Departmental Snow Vehicles	
Assigned to Residential	66
Brine, MDO (CLIP)	0
Total:	66

Other Departments (not assigned to Residential):	51

Route Designations and Treatment

The primary and secondary route systems are divided into 148 specific routes. Salting and/or plowing of these routes will continue until the routes are deemed passable and safe for vehicular traffic.

The tertiary street system is covered in a grid pattern determined by each District Highway Engineer and the Residential Snow Coordinator. These streets are salted/plowed as storm type dictates (see Chart A, page 3). Grids are assigned and the plows attempt to clear all streets in that grid. Streets that are blocked by parked cars or other obstructions will not be treated until the obstruction is removed. Double-parked vehicles or vehicles parked on corner radii will be ticketed and towed by Police to permit snow removal efforts.

All tertiary grids will not be treated during every storm. The City's topography will primarily dictate the specific areas that will be treated during every storm type. Storm severity will dictate the expansion of treatment in the tertiary network. Regional commerce, public health, mass transit issues, and time of year will guide these decisions.

Snow and ice on the tertiary street system will be cleared to provide one passable lane for each direction that the specific streets can accommodate. Residential efforts are designed to allow access to the primary and secondary route system and mass transit.

Use of Salt and Other De-icing Materials

Salt (sodium chloride) or a brine solution of the same chemical, or in extreme situations, sand or other abrasives, will be spread on Philadelphia's roadway network to ensure safety for the traveling public.

Salt brine is a liquid containing a 23 per cent sodium chloride solution. Applied at rates of 30 gallons per lane mile, this treatment should effectively melt the first 2 inches of snow before re-application is necessary. The treatment can also be applied before storms begin. The Department will utilize this program in the Northwest and Northeast sections of the city, areas that typically have higher elevations. In addition, the department may brine the sports complex if there is an event. It should provide greater service delivery at a reduced cost, especially in the higher elevation areas of the City. The decision to brine will be made 72 hours in advance. Brine is primarily used to pre-treat the roadway so snow does not bind to roadway.

Storm Types and Response

There are eight (8) basic storm types that require different responses as outlined below.

POST STORM FORECAST: Above Freezing Temperatures

Storm Type	Deployment of Fleet
1 **Sleet/Freezing Rain**	City salt truck deployment and primary and secondary routes only.
2 **1 to 3 inches of snow**	City salt truck deployment on primary and secondary routes. Partial residential deployment in limited areas of higher elevation. If cold temperatures are forecast, limited plowing may occur. (No contractors).
3 **3 to 5 inches of snow**	City and contractor salt truck deployment on primary and secondary Routes. Partial residential deployment in limited areas of higher elevation. A snow lifting may be deployed in the central business district.
4 **Above 5 inches of snow***	As above, plus the declaration of a "snow emergency." Sanitation compactors will plow the primary and secondary route system. Additional contractor equipment will be deployed. Full residential will be deployed.

POST STORM FORECAST: Borderline and Below Freezing Temperatures

Storm Type	Deployment of Fleet
5 **Sleet/Freezing Rain**	City salt trucks deployed on primary and secondary routes only. Possible partial residential deployment in limited areas of higher elevation.
6 **1 to 3 inches of snow**	City salt truck contractor deployment on primary and secondary routes. Salting Operation for tertiary streets may occur once the primary and secondary network is complete. This operation will be performed by primary and secondary route vehicles that can navigate smaller streets. Partial residential deployment in limited areas of higher elevation. If cold temperatures are forecast, limited plowing may occur.
7 **3 to 5 inches of snow**	As above, plus a snow lifting may be deployed in the central business district.
8 **Above 5 inches of snow***	As above, plus the declaration of a snow emergency. Sanitation compactors will plow the primary and secondary route system. Additional contractor vehicles will help clear snow. Full residential will be deployed.

*Full deployment may be deployed when the National Weather Service issues a winter storm warning. Lifting snow from other sections of the City will only occur when directed by the Chief Highway Engineer.

Weather Forecasting Services

The City of Philadelphia will, in addition to monitoring local national weather forecasts for our metropolitan region and maintaining contact with local media forecasts, contract with independent private weather service contractors to ensure that forecasts are made specific to our needs. The City recognizes that there are unique geographic differences within our boundaries, and expects detail in our contracted services to assist in deployment decisions.

Storm Operations

Storm Conditions

Philadelphia's geographic position contributes substantially to the forecasting uncertainties that it faces. Due to our location, with the mountains to our west and the Atlantic Ocean to our east, forecasters usually must watch storm systems for as long as possible before determining if they are going to hit Philadelphia or be deflected to the east or west. In addition, there are literally thousands of types of winter storms - each storm combines a number of factors that lends to its uniqueness.

The Streets Department must be prepared to deal with these planning uncertainties, as well as uncertainties that occur during the storm. For example, the Blizzard of March 1993 was originally forecasted as a 3" storm. It mushroomed into a major storm of upwards of 12 inches, including sleet and freezing rain. In early December, 2013, a forecasted 1" storm during an Eagles game turned into a 9 inch winter event. The unexpected changes in forecasts made it more difficult for the Streets Department to mobilize the most effective response to react to a storm of such magnitude. The Blizzard of January 2016 (Winter Storm Jonas) was suppose to start at 10PM and started at 7PM.

There are several other variables that affect the Department's timely response to storm events. These variables are briefly outlined below. Each of the variables listed may have a significant impact on the Department's response. Proper planning and the development of appropriate procedures, combined with some level of operational flexibility is a priority to develop the most appropriate, effective response possible, given the existing conditions.

- Storms may fail to materialize at the forecasted hour. Conversely, storms may stall, thereby increasing the duration of the event and the amount of accumulation. These factors increase the expense associated with responding to a storm and the chance of work force fatigue.

- During a storm, the type of precipitation may change. Different types of precipitation require different responses. For example, plowing may be hampered as ice accumulates on the top of the snow, creating a hard crust.

- The time of the year also impacts the Department's response to storms. In the late fall and early spring months when the temperature is warmer, it may be possible to fight a storm of four to five inch accumulation with salt alone. In colder months, plowing would be necessary.

- If two or more severe storms occur in rapid succession, the Department's response may be affected. Response to the initial event may be expanded in anticipation of the subsequent storm. For example, in 2015, we had 2 storms within 36 hours at accumulations of 12 inches and 5 inches respectively with 8 hours in between.

- Low temperatures increase the amount of salt necessary to melt off precipitation.

- Winds can create havoc during storms. Although light breezes help to dry roadways following storms, stronger winds may hamper snow fighting efforts by drifting snow across cleared roadways.

- Significant elevation differences exist between the southern portion of the City and the areas in the northeast and northwest. In the northeast and northwest, snow frequently accumulates to greater depths.

- The city has developed micro-climates along the rivers creating black ice.

The Department's Snow and Ice Operations Plan presents a flexible framework providing effective response to all types of storms.

It is the goal of the City of Philadelphia that for the majority of the winter weather events that typically affect this city, that we will have, depending on storm type and response protocol, all routes identified in these response protocols clear within 24 hours of the fall of the last flake. Storms outside of the protocol upper limits may lead to significant adjustments in this time line.

Storm Types 1, 2 & 3

Deployment

Streets Department

Chief Highway Engineer

- Will develop the operations plan for approval by the Streets Commissioner
- Once the plan is approved, The Chief & Assistant Chief Highway Engineers will notify as listed below:
- Notifies District Highway Engineers, Central Maintenance Unit (CMU), Bridge Maintenance Unit (BMU) of mobilization time and plan
- Notifies Residential Snow Coordinator of mobilization time
- Notifies Highway Division Snow Headquarters, located at the Bridge Maintenance Yard – 4010 Whitaker Avenue, personnel to report at specified deployment time
- Notifies OIT
- Notifies Office of Fleet Management of mobilization decision
- Notifies SEPTA
- Notifies Sanitation
- Notifies maintenance supervisors
- Notifies Parks and Recreations
- Notifies Unified Dispatch
- Notifies Water
- A E.mail notification will be sent out to all involved. The Streets Commissioner will be included so it can be shared with the MDO or Mayor's Office at his discretion.

Highway District Engineers

- Notify Maintenance Supervisors to assemble salting staff
- Notify spotters to report at specified deployment time

Highway District Maintenance Supervisors

- Notify personnel to report at specified deployment time

Residential Snow Coordinator

- Notifies residential snow operations personnel of partial residential deployment

Office of Fleet Management

- Will open garages for Fleet maintenance support and fueling sites for duration of event at determined times.

Parks and Recreation

- Responsible to activate operation for salting Park road system including Benjamin Franklin Parkway, MLK, Kelly, Lincoln Drive.

Operations

Highway Districts

Spotters monitor street conditions. Salt trucks are loaded and positioned at the start of an assigned route. As street surfaces accumulate sufficient moisture for effective salting, spotters notify Maintenance Supervisors to begin salting activity. Spotters will provide route condition reports to their district headquarters on intervals as directed. District headquarters will compile this data and forward to Highway Division Snow Headquarters.

Residential Districts

Spotters monitor street conditions. Trucks are positioned at the start of an assigned route. Treatment of the street surface begins upon notification from the Residential Snow Coordinator. Spotters will provide route condition reports to their district headquarters on three (3) hour intervals. District headquarters will compile this data and forward it to the Residential Snow Coordinator, who in turn summarizes the information and forwards it to Highway Division headquarters.

Highway Division Snow Headquarters

Snow Headquarters will:

- Inform Highway Districts of weather forecasts
- Monitor, through Highway Districts, the status of all salting operations
- Maintain a log of all service calls for snow and ice related activities
- Monitor weather conditions and forecasts
- Analyze the data and forward it to the appropriate parties
- Analyze reports from the field and make changes to future operations where required
- Forward emergency calls from Police and Fire Departments to Highway Districts
- Maintain Snow Route Status Report
- Order commodities as required to maintain an adequate supply at all Districts
- Take calls from the EOC

Office of Fleet Management

- Repair vehicles as necessary
- Report vehicle down time to Snow Headquarters

Parks and Recreation

- Treat Park road system, trails, and recreation facilities

Cessation of Operations

Highway Districts

- District Engineers release spotters to regularly assigned duties.
- District Engineers collect route inspection information

Residential Districts

- Release spotters and drivers to their respective departments
- Forward all reports to Residential Snow Coordinator who, in turn, forwards them to Highway Division Snow Headquarters
- Supervise the cleaning and redeployment of residential snow equipment

Highway Division Snow Headquarters

- Compile final report on personnel, equipment utilized and material usage and forward to Streets Commissioner.
- Estimate cost of event

Office of Fleet Management

- Compile final report on equipment costs and return to normal Fleet repair activities
- Prepare for the next event

Parks and Recreation

- Compile final report on personnel and equipment utilized
- Return to normal Park maintenance activities

Storm Types 6, 7, & 8

Same as response 1, 2 & 3, except the following additions:

Deployment

Streets Department

Chief Highway Engineer

- Notifies District Highway Engineers and Residential Snow Coordinator of decision to salt/plow tertiary system (Note: Storm type 6 only, partial to full residential deployment depending on event specifics).
- Will advise everyone for potential of multiple shifts

Residential Snow Coordinator
- Notifies residential snow operations personnel of partial to full residential deployment

Storm Types 4 & 9

Deployment

Streets Department (same as 1, 2, 3 but also includes:

Chief Highway Engineer:
- Notifies District Highway Engineers of initial mobilization time for salting operations and subsequent mobilization time for plowing operation
- Advises district that Sanitation, contractor equipment and residential roadway treatment will occur
- Notifies Highway Division Snow Headquarters, personnel to report at specified deployment time
- Notifies Snow Contractor Liaison to order contractor support equipment at specified time
- Notifies Residential Snow Coordinator of mobilization time
- Notifies Deputy Commissioner for Sanitation for full deployment of Sanitation resources, both for plowing primary and secondary routes
- Notifies Office of Fleet Management of mobilization decisions
- Advises all involved of anticipated number of shifts
- Notifies 311 Coordinator
- Notifies SEPTA
- Notifies Sanitation
- Notifies Water

Snow Contractor Liaison:
- Contact private sector vendors and orders equipment for each highway district.
- Advises of deployment time and likelihood of deployment duration
- Advises contractors of lifting set (if any) requirements

Highway District Engineers:
- Notify Maintenance Supervisors to deploy their staff at specified time
- Notify spotters to report at specified time
- Notify inspection staff for contracted equipment to report at specified time
- Are advised that residential street system snow removal has been activated

Residential Snow Coordinator:
- Notifies residential snow operations personnel of residential deployment

Highway District Maintenance Supervisors:

- Notify personnel to report at specified deployment time

Streets Department - Sanitation Division

Deputy Commissioner-Sanitation

- Mobilizes plows for primary/secondary route system at six Sanitation yards at specified time.
- Notify Chief of Operations to designate a Sanitation representative for Highway Division Snow Headquarters
- Notify division management of deployment times and subsequent suspension of curbside collections

Office of Fleet Management

- Will deploy sufficient resources to support fleet maintenance activities for duration of winter weather event
- Will open fuel sites for duration of event
- Will support Sanitation Division of Streets Department during plow and chain mounting for Sanitation compactors and support equipment

Parks and Recreation

- Responsible to activate operations for salting/plowing road system and trail system

Office of the Managing Director

- Will issue declaration of snow emergency
- Will activate the city's Emergency Operations Center located at the Fire Administration Building 3rd and Spring Garden Streets.

Operations

Streets Department

Highway Division

- Spotters monitor street conditions
- District Highway Engineers assign inspection staff to contact salting vehicles
- Salt trucks are loaded & positioned at the start of an assigned route. As street conditions accumulate sufficient moisture for salt to be effective, spotters notify districts to begin salting operation. Salt will be applied prior to plowing operations or until no longer effective
- Plowing operations will begin at 2"-3" accumulation and continue until routes are clear

- Chief Highway Engineer directs Residential Snow Coordinator to begin Tertiary Street plowing/salting when needed
- Highway District Engineers direct Sanitation plowing commencement
- All spotters & inspectors will provide route condition reports on two (2) hour intervals. Each district headquarters will compile this information & forward to Highway Division Snow Headquarters
- Highway District Engineers will insure that all routes are salted upon completion of plowing efforts
- Highway District Engineers will direct snow lifting/melting operations within their respective district

Residential Snow Districts

- Spotters monitor street conditions. Trucks are positioned at the start of an assigned route. Treatment of the street surface begins upon notification from the Residential Snow Coordinator
- Spotters will provide route condition reports to their district headquarters on three (3) hour intervals. District headquarters will compile this data and forward it to the Residential Snow Coordinator, who in turn summarizes the information and forwards it to Highway Division Snow Headquarters

Sanitation Division

- Sanitation Assistant Chiefs of Operation and District Managers direct Sanitation Operations and report progress to Highway District Engineers
- At the Highway District Engineers direction, they will adjust on-street operations for specified route assignments
- Progress reports are to be provided at two (2) hour intervals to Highway District Sanitation Coordinator
- Managers will insure that all vehicles are manned at shift change
- Personnel will not be released without replacement
- Sanitation and Highway Yard Liaison will coordinate completion of the routes so a salt truck can follow behind

Highway Division Snow Headquarters

Snow Headquarters will:
- Inform Highway Districts of weather forecasts
- Monitor, through Highway Districts, the status of all salting operations
- Maintain a log of all service calls for snow and ice related activities
- Monitor weather conditions & forecasts. Analyze the data & forward it to the appropriate parties
- Analyze reports from the field & make changes to future operations where required
- Forward emergency calls from Police and Fire Departments to Highway Districts

- Maintain Snow Route Status Report
- Order commodities as required to maintain an adequate supply at all Districts
- Provide Emergency Operations Center (EOC) reports route conditions, weather updates and identified trouble spots

Office of Watersheds (Division of PWD)

- Office of Watersheds will de ice 8 blocks of porous streets when a conditional deployment is called. During a full deployment, they will treat those streets. If they are not treated by the Office of Watersheds, then the residential program will treat the porous streets.

Office of Fleet Management (OFM)

- OFM will provide necessary manpower & garage space as need to support storm type
- OFM will supply vehicle status reports to Highway Division Snow Headquarters, the Managing Director's Office and Emergency Operations Center on an hourly basis

Parks and Recreation

- Treat Park road system and Benjamin Franklin Parkway as required by conditions
- Clear all sidewalks around recreation centers
- All trails will be treated

Cessation of Operations

Streets Department

Highway Division

- Highway District Engineers will release all equipment to their respective departments for regularly assigned duties
- Highway District Engineers will release all personnel to their regularly assigned duties
- District Maintenance Supervisors will insure salt truck operators return unused material to stockpiles and wash truck beds, augers and spinners.
- Highway District Engineers will compile final contractor billing information
- All storm related information on personnel, equipment deployed, contract support & material used will be compiled by each district and forwarded to Snow Headquarters

Residential Districts

- Release spotters and drivers to their respective departments.
- Forward all reports to Residential Snow Coordinator who in turn forwards them to Highway Division Snow Headquarters
- Supervise the cleaning and redeployment of residential snow equipment

Sanitation Division

- Sanitation Division will dismount plows, remove chains and ready fleet for return to normal collection/cleaning activities

Highway Division Snow Headquarters

- Compile final report on all elements deployed for specific storm type
- Forward report to Streets Commissioner and EOC
- Compile cost estimate for event
- Direct highway districts post storm clean up deployment

Office of Fleet Management (OFM)

- OFM to compile final report on equipment repair costs and vehicle status and return to normal fleet repair activities
- Prepare for next event

Parks and Recreation

- Compile final report on personnel and equipment utilized
- Return to normal Park maintenance activities

Office of the Managing Director

- End snow emergency declaration and close EOC
- Effective in 2015, the 686-SNOW phone number has been permanently changed to inform citizens of their responsibilities of parking on a Snow Emergency Route

Snow Removal Support Personnel Assignments

The following functions will be performed by Streets Department personnel not directly involved with the operation of snow fighting equipment:

Bridge Maintenance Unit

The Bridge Maintenance Unit will perform anti-icing activities on the sidewalks of the City's bridges as well as removing snow from the 15 stairways in Manayunk. Highway maintenance district yard personnel and Sanitation area personnel will be called to assist with this effort as dictated by storm type.

Highway Maintenance District Personnel and Sanitation area personnel

Highway maintenance district personnel and Sanitation area personnel, as dictated by storm type, will be provided hand snow removal equipment and will clear snow from curb ramps and open city inlets to allow melting snow access to the drainage system. Snow will also be cleared from areas surrounding fire hydrants. Efforts will be made to keep select bike lanes clear of snow & ice. All bike lanes will receive de icing treatment.

SWEEP Support (Streets & Walkways Education and Enforcement Program)

SWEEP Officers will, beginning in commercial corridors, enforce sidewalk clearance - Ordinance 10-719. Upon completion, enforcement will expand to schools, hospitals, etc., culminating in residential inspection.

All City Departments

- Sidewalks & ADA ramps: All City departments will be responsible for removing snow on the sidewalks abutting their facilities. Salt can be requested through snow HQ. In addition, bagged salt & Calcium Chloride is available on a City Wide contract for all Departments to purchase.
- Parking Lots: All Departments are responsible for treating & salting their respective parking lots.
    - The Police Department will coordinate with the Chief Highway Engineer for salt needed to salt all Police parking lots & driveways. The Streets Dept will treat the Round House ramp and the traffic police ramp on Erie Ave.
    - No Department will be supplied salt for the purposes of dry salting
    - Dilworth Park is the responsibility of Center City District

- Dilworth Plaza is the responsibility of Public Property. Note: It is not recommended to drive heavy equipment on Dilworth Plaza

Highway Division Support Personnel

Highway Division support personnel will continue snow removal support functions as part of their daily work activities after Sanitation workers return to regular trash collection. Snow removal equipment will supplement these efforts as it becomes available.

PWD Support (Philadelphia Water Department)

During major events, PWD crews will be dispatched to clear snow at inlets to prevent intersection flooding.

Police Department Support

The Philadelphia Police Department will enforce existing ordinance/regulations prohibiting the discharge of snow back onto city streets. Private plow contractors caught in the act of plowing snow from private property onto city streets risk fine and/or forfeiture of equipment.

Bicycle Facilities

The City of Philadelphia is becoming one of the most bicycle friendly City in the United States. In doing so, a de-icing plan shall include bike facilities:

- The City's Office of Transportation and Infrastructure Systems, (OTIS), has permitted bicycle corrals to be installed within the parking lanes. The private sponsor of the bike corral is responsible for clearing snow and de-icing. Note, throwing snow into the travel lane is not permitted. The City does not take on any responsibility for damage done by de-icing operations.
- No bike corrals are permitted on snow emergency routes during winter months
- The INDIGO bike share program is privately owned and coordinated with OTIS. INDIGO is responsible for snow removal and de-icing
- As part of the Streets Department's Deicing and snow removal program, emphasis will be placed on bike lanes where it is feasible.
    - Salting the bike lanes can occur with the salting of the travel lanes.
    - If the bike lane is next to the curb, efforts will be made to push the snow as close to the curb as possible. As the snow begins to melt, additional plowing and salting may be performed to expedite the snow melting

- The City will be treating protected bike lanes. Each protected bike lane will be treated in a different manner:
  - The bike lanes in the 5th St Tunnel are being treated by DRWC. Since most of it is in the tunnel, salt should be applicable. This is done by the Streets Dept.
  - Frankford Ave, south of Ashburner. The Streets Department will be removing the delineators prior to the first plowable event and then returned in April. This will allow Streets Department crews to push the snow to the curb.
  - Ryan Ave from Rowland to Lexington is protected bike lane with over 100 delineators. This was installed in the fall of 2016. The Highway Division will be experimenting as to the best way to plow the protected bike lane and parking lane.
  - South St, west of 27th. As of this update to the snow manual, the protected bike lane has not yet been installed. Once installed, the Highway Division will treat.

Public Relations and Education

PPA and Major Media Notification

PPA will use the local major media and community newspapers to ensure that notification of the Department's plan is timely as well as effective.

Key communications tools include:

- Issuing of press releases/advisories
- Posting information on Streets Department's website including list of FAQs, snow tips and status of departmental services as appropriate. Suggested snow tips will include:
  - "Park car as far away from the corner as possible. Cars parked too close to the corner limit the turning radius of snow equipment."
  - "Obstructions, such as, illegally parked cars affect our ability to plow effectively."
  - For effective snow and ice management partnership, City and citizens need to work together.
- Posting information on community websites/list serves
- Posting information on the City's Government Access Cable Channel 64
- Utilizing OIT to distribute announcements viaemail

Notification System

The Department uses a voice mail messaging system to reach out to residents to inform them of important updates during snow events. The system is used when needed for this purpose.

311/Streets Department Communication Protocols for Snow Events

During storm events, all snow related inquiries will be accepted by 311, however, formal service requests will not be taken until 311 is notified by the Chief Highway Engineer that the event is officially declared over. During the event, 311 will advise the public of the level of deployment and let citizens know if their street is to be serviced depending on the level of service. After the event is ended, 311 will resume taking complaints from the public and the requests will be forwarded to the Streets Department for response within a reasonable time.

Customer Affairs

Residents are also able to call the Streets Department's Customer Affairs Unit at 215-686-5560 for information. When appropriate, "updated" advisories regarding the status of services will be pre-recorded on the Customer Affairs' voice mail system.

Responding to Citizens' Complaints

- Delegation – Service requests are, as always, delegated from the centralized system to operational units for appropriate action.
- Tabulation – Information can be gathered from the Customer Affairs Unit's computerized system to provide a post-storm picture of complaints.
- Planning – This information can be further utilized to plan appropriately and change plans for future snow events.

School Closure Policy

When inclement weather is present or anticipated that may impact schools opening or closing early, Streets, SDP, MDO, and MDO/OEM will conference to determine appropriate action relating to storm conditions.

Post Season Survey/Spring Maintenance

Beginning March 1 of each year and continuing through April 30th, weather conditions permitting, sweeps will be made of Philadelphia road network, identifying defects for the upcoming spring repair season. Streets Department personnel, as well as those involved with residential inspection, may be asked to perform this task.

Operational Guidelines – Fighting Snow in Philadelphia

Material Resources

Salt inventory is dictated by several factors: storage capacity (including salt domes at secure, satellite locations throughout the city), availability of product, and environmental concerns. A salt dome is located at the six Highway District Yards and Domino Lane, Area 4. The City has the capacity to store over 50,000 tons of salt. Note, anti-skid may be added to the salt if the inventory starts to run low or if the temperatures are cold where the salt may not be as effective. The Sanitation will sweep the street as conditions allow.

The Department orders salt as the inventory is depleted to maintain maximum capacity throughout the winter. Initial salt orders are placed against purchase orders cut from a blanket purchase order under the Commonwealth of Pennsylvania's City of Philadelphia contract.

Subsequent product is obtained from the City of Philadelphia's citywide rock salt contract. This contract provides for a primary and secondary vendor, and has language that includes the product specification, testing procedures, delivery locations, quantities and requirements, and weight certifications, and liquidated damages.

Requisitioning

The District Supervisor keeps an up-to-date inventory of the materials used for snow and ice removal during the winter months. S/he notifies the Administrative Officer (AO) and Assistant Chief Highway Engineer as orders need to be placed. An overall salt inventory for all six Districts & Domino Lane is maintained by the Assistant Chief Highway Engineer.

At the end of the winter season, the Chief Highway Engineer, AO, the Director of Planning & Analysis, and the Budget Officer review the remaining salt inventory to determine the necessary amount of salt needed to meet the following year's requirements. Accordingly, the State is notified of our estimated quantities, as is the Procurement Department for use in developing contracts for the following year.

Salting Policy

The Highway Division endeavors to maximize every application of de icing salt in order to maintain the safest roads possible in the most economical way while protecting the environment. The policy includes:

Personnel Training: The Streets Department is committed to providing continuing personnel training to ensure that staff is well equipped to perform their jobs effectively.

Equipment: The Streets Department and Office of Fleet Management should update and replace equipment in an economically responsible manner.

Calibration of Spreaders: Regardless of whether automatic or manual controls are used, they should be calibrated before the snow season starts. Poorly maintained and uncalibrated controls are responsible for excessive salt use.

Use of Automatic Controls: The use of automatic controls is recommended for spreaders to make sure the correct amount of salt is being spread at all times.

Adequate Covered Storage: Storage facilities are vital to any winter operation. They must have sufficient capacity and good cover preferably under roof. Stock piles should be covered to prevent loss of materials and to protect the environment

Proper maintenance procedures should be followed around storage areas. Outside stockpiles should be properly shaped and should be on impermeable pads. There must also be proper drainage to keep the salt dry and protect the surrounding area. A method for disposal or retention of the leached salt should be in place.

The 7 salt storage locations are domes or sheds. This will protect the salt from the weather.

The Street's Department is committed to work with the MDO's & Water Dept Clean Water & GSI initiatives

Safeguarding the Environment: Salt and de-icing materials should be used in a manner that safeguards the environment. If misused, de-icing can pollute. If improperly used or stored it can get into wells or ground water. Excessive salt use can be damaging to certain plants and trees when runoff leaves sodium chloride in the soil.

Application: The application of salt alone depends on the type of precipitation, temperature, and snowfall intensity. When there is adequate frozen precipitation on the pavement (non plowable depth), and the temperature is above 25 degrees Fahrenheit, straight salt is optimized. Below 25 degrees Fahrenheit, a mixture of salt and abrasives will be used. The initial treatment of the roadway before plowing operations begin is to reduce ice or snow bonding to the pavement. Salt application rates range from 200 to 800 pounds per two-lane mile, depending on the storm conditions. Salt can be applied in a windrow or full width, which is sometimes necessary. Brine, formed by salt and water, will run to other parts of the road and be spread by traffic. Plowing operations should be timed to allow maximum melting. Salt reaction time is usually 20 to 30 minutes. (Reaction time increases as temperature decreases.)

Operation of equipment:

Within the City of Philadelphia, there are many bridges with weight restrictions. The drivers are not to drive crew cabs or tri-axles loaded with salt over bridges with low weight restrictions.

In addition, drivers who are responsible for driving vehicles with "dumps" need to be aware of the height restrictions so to avoid low clearance bridges, wires and tree limbs.

Equipment Resources

Certain specialized equipment is required to support the snow and ice removal plan; specifically, snow plows, salt spreaders, and snow loaders. Much of this equipment is available within the Department. Additional equipment is obtained through contract and is provided by other operating departments and the City's reserve fleet.

Spreaders: Spreaders including tailgate and V-box spreaders are used to apply salt or sand, which are the primary de-icing chemicals used for fighting winter storms. Application rates are set for various conditions following Salt Institute guidelines.

Plows: Plows are mounted on Highway Division dump trucks and Sanitation Division compactors of the Streets Department, as well as equipment in supporting departments for residential plowing once accumulation predictions are for 4" or more snow.

Contract Equipment: City equipment is supplemented by the use of private sector contracted equipment for significant weather events. This equipment is used to assist clearing snow and ice from the primary/secondary network, as well as hauling snow from the CBD to a predetermined snow field.

Footbridge/Sidewalk Clearance Protocol: Bridge Maintenance employees of the Streets Department are dispatched after each event ends to clear snow and de-ice from pre-determined footbridges and from the sidewalks of bridges in the CBD.

Communication: All vehicles will be equipped with either radios or cell phones for communication during the events.

Winter Maintenance Facilities: The six Highway Division maintenance facilities serve, along with Snow Headquarters, located in the Bridge Maintenance Yard, as the bases of all snow removal operations. During significant events, they are supplemented by Sanitation area and residential facilities. Salt is stored at the six Highway Division yards and Domino Lane.

Operation and Safety: Equipment will be operated in a safe, effective manner by trained, properly licensed, operators. Winter is the season when equipment fails to start, personnel take shortcuts, traction is poor, visibility is poor, and other motorists may not see the operators of other vehicles. All drivers and crews should make required checks prior to and during the use of equipment to ensure safe operations are maintained. Pre and post trip inspections are mandatory.

Personnel Resources

All Streets Department personnel are subject to reporting to duty during snow and ice storms. Failure to notify the supervisor of the inability to work during a storm is grounds for disciplinary action. Please see the Essential Staff Policy in Section 1, page 6.

The Highway Division is responsible for overall coordination of snow and ice control preparations. Supervisors are responsible for providing the direction required for effective snow and ice control.

Clothing: The lack of proper clothing is a direct cause of most frostbite occurrences, falls, and in many cases is a factor in equipment accidents. All crews are urged to dress for the possibility that they may be stranded without heat for several hours. It is contemplated that within two hours assistance will be provided to any crew experiencing difficulty.

Communications: On street communications are maintained by inspectors and spotters, who are in constant communication with the Highway and Sanitation Districts and Snow Headquarters.

Personnel Notification Lists (and equipment and other assignments) will be provided to required personnel. Phone trees are to be initiated as necessary at the beginning of a snow alert.

Reporting Procedures

Status Reports: District Highway Engineers will be responsible for maintaining contact with all supervisors and operators in their districts and reporting on the progress of the field personnel to the Snow Headquarters. District Highway Engineers or their designee will make their first report one hour after notification of the snow alert and will continue to make reports as needed throughout the duration of the snow removal operations.

Accident Reports: The following are the responsibilities of the driver if an accident should occur during snow removal operations:

- Check for injury to persons, never admit liability , call 911 immediately for medical emergencies and state that there is a medical emergency;

- Obtain identification of the other vehicle and driver;

- Notify Police immediately either through radio dispatcher or by telephone. Do not leave the scene of an accident except in cases where physical harm is threatened. If physical harm is threatened, relocate then notify the police;

- Notify supervisor by radio or telephone immediately;
- Forms 77-501 (Employee Accident/Incident Information) and 77-502 (Citizen Accident Information) should be carried in every vehicle and thoroughly completed at the scene of any accident then forwarded to either a supervisor or directly onto Form 82-S-87 (Traffic Accident Report);

- Employee should not sign statements, suggest any settlement or volunteer information about the accident except as noted above. All other requests for statements or signatures should be forwarded to the City of Philadelphia's Risk Management Department;

- The Safety Office shall be notified. Also, Email sent to the Safety Office.

Non-Municipal Employees contracted for snow removal operations should follow all of the directives listed above except completion of Form 82-S-7 which should be completed by the City on duty supervisor. The contractor is responsible for their own equipment.

Training

Requirements and Timelines: Training will be held for all personnel involved in snow removal as needs determine. Snow plow training for Highway Division and Sanitation Division personnel is part of on-going CDL training. Residential training is an intensive effort that will take place in November of each year for required personnel.

Field Inspection Procedure

Spotters/inspectors- will report on actual roadway condition. Reports will include surface condition, material application, plow progress, and problem locations. Conditions which have prevented the removal of snow and ice, such as illegally parked cars, abandoned cars, vehicles stuck in snow, etc. will be noted for follow-up removal efforts. Spotters/inspectors will file field reports with their respective coordinators after each event.

Primary/Secondary - Spotters/inspectors are to report on the condition of the network, with a focus on identifying areas that are particularly troublesome for immediate follow-up.

Residential - Spotters/inspectors, as well as the residential navigators, are to report on residential conditions, noting streets that will require follow-up work due to problems encountered during the initial effort.

Frequency of Report & Detail - Reports are to be made as needed to the district managers and forwarded to Snow Headquarters. Detail to include whether road is passable, snow covered, salted, plowed or bare pavement. Conditions are coded and noted on inspector's reports.

Expectations - It is the City's expectation that the road network be at least passable, no longer than 12 hours after the last flake has fallen. Additionally, it is the City's goal to have all routes identified in this manual's response protocols clear within 24 hours of the fall of the last flake.

Policy on Snow Plowed into Street

As noted in the Philadelphia Code, Chapter 9, Section 601 (4) (f), Chapter 9, Section 404 and Chapter 10, Section 720, snow is not permitted to be plowed or shoveled onto City streets. Enforcement and penalties are described in the respective chapters.

Police Department Responsibility - Police Department personnel are to stop private contractors from plowing snow off of parking lots and driveways into city streets.

Streets Department Responsibility - SWEEP Officers will be dispatched to warn residents about throwing snow in the streets, as well as enforcing the 6-hour timeline to have your sidewalk shoveled to a minimum of a 36-inch path.

Communication

Internal - Communication of on-street activity during winter weather events will occur as needed. Spotters and inspectors will report to their respective coordinators route conditions and any identified trouble spots on their assigned routes. Operators will report any mechanical problems to both their headquarters and the Office of Fleet Management. All district coordinators will forward the updates to Highway Division Snow Headquarters, where the information will be compiled.

External - Highway Division Snow Headquarters will disseminate all information concerning winter weather events to external sources. Route progress reports, street conditions, equipment and personnel deployed, and materials used will be included in these reports. For major events, this information will be forwarded to the Streets Commissioner. He will then forward this information. Snow Headquarters will communicate to the Emergency Operations Center.

Section 2
Snow Emergency Routes

2. - Snow Emergency Routes

2.1 Snow Declaration

The Mayor, through the Managing Director, has the authority to issue a Snow Emergency Declaration for significant events. This declaration implements parking regulations on dedicated snow emergency routes.

2.2 Citizen Responsibility

Citizens are required to remove their vehicles from snow emergency routes.

2.3 Inspector Responsibility

Inspectors are required to report locations where cars have not been moved and to ensure that designated routes are plowed completely curb to curb.

2.4 Police / Parking Authority Support and Timelines

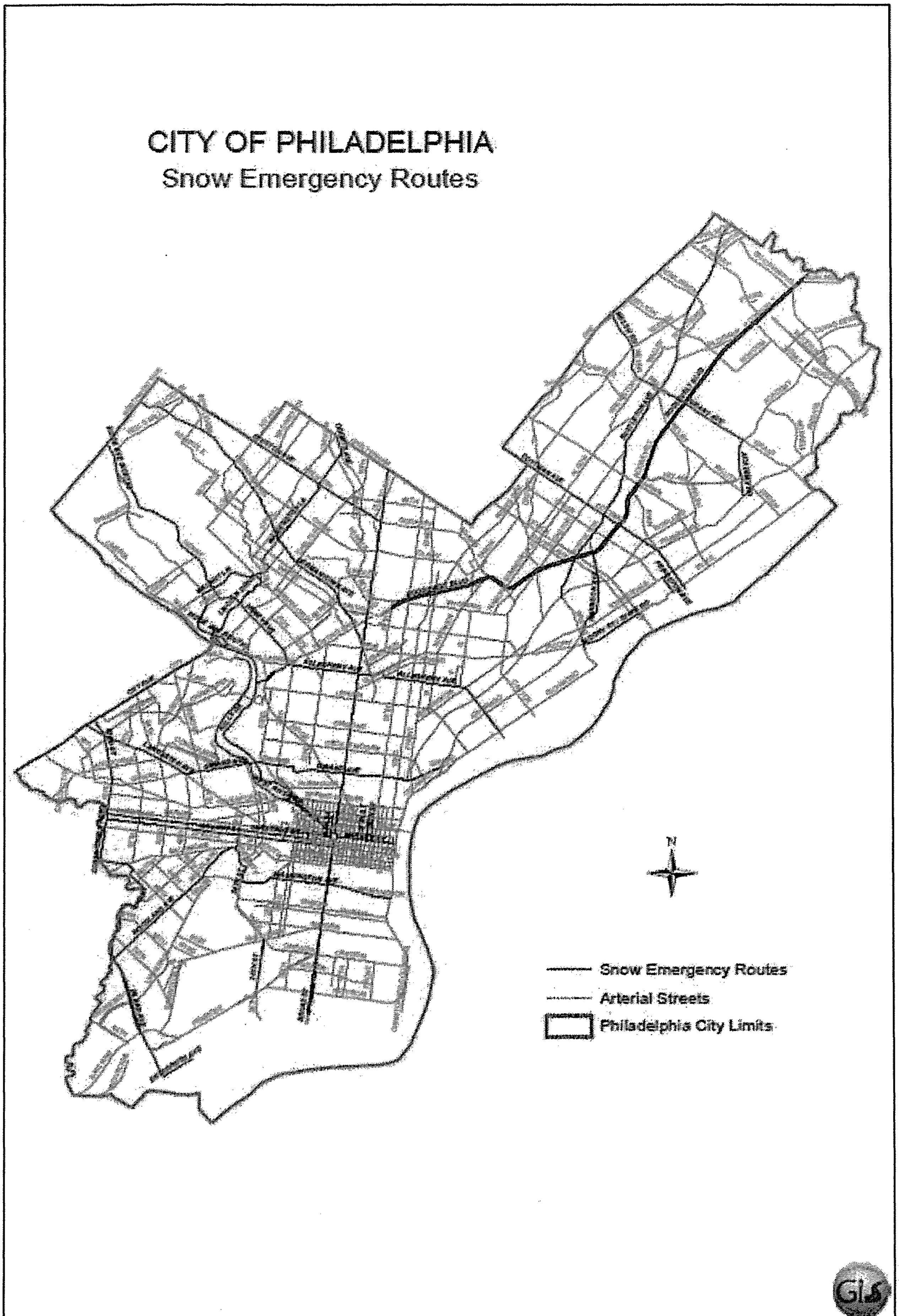
Police Tow Squad and Parking Authority tow vehicles will remove vehicles from snow emergency routes. Towing will begin at the designated snow emergency starting time and continue as necessary until the declaration is lifted.

2.5 Record Keeping

Police Department and the Parking Authority personnel will keep records of the location of the relocated vehicles.

2.6 Snow Emergency Routes

Reference Map and Route Table


CITY OF PHILADELPHIA
Snow Emergency Routes
N
Snow Emergency Routes
Arterial Streets
Philadelphia City Limits

City of Philadelphia
Snow Emergency Routes

ON	FROM	FROM_HUNDRED	TO	TO_HUNDRED
06TH ST	I-676 OFF RAMP	300 N	MARKET ST	UNIT BLOCK
07TH ST	MARKET ST	UNIT BLOCK	I-676 ON RAMP	300 N
15TH ST	I-676 OFF RAMP	300 N	MARKET ST	UNIT BLOCK
16TH ST	MARKET ST	UNIT BLOCK	I-676 ON RAMP	300 N
20TH ST	CHESTNUT ST	UNIT BLOCK	MARKET ST	UNIT BLOCK
26TH ST	I-676 ON/OFF RAMPS	2500 S	PENROSE AVE	3800 S
34TH ST	UNIVERSITY AVE	1100 S	GRAYS FERRY AVE	1100 S
38TH ST	WALNUT ST	200 S	UNIVERSITY AVE	200 S
63RD ST	CITY AVE	2100 N	WALNUT ST	100 S
ACADEMY RD	FRANKFORD AVE	9100	GRANT AVE	9400
ALLEGHENY AVE	HUNTING PARK AVE	2900 W	I-95 ON/OFF RAMPS	2800 E
BEN FRANKLIN PKWY	ART MUSEUM CIRCLE	2300	16TH ST	1600
BRIDGE ST	HARBISON AVE	2100	I-95 ON RAMP	2300
BROAD ST	CHELTENHAM AVE	7200 N	I-95 ON/OFF RAMPS	3800 S
BUSTLETON AVE	FRANKFORD AVE	5200	ROOSEVELT BLVD	6300
BUSTLETON AVE	ROOSEVELT BLVD	UNIT BLOCK	COUNTY LINE	UNIT BLOCK
CHESTNUT ST	COBBS CREEK PKWY	6200	20TH ST	2000
CITY AVE	CITY BOUNDARY	7700	I-76 ON RAMPS	3800
COBBS CREEK PKWY	WALNUT ST	200	WOODLAND AVE	2100
COTTMAN AVE	I-95 OFF RAMP	5000	FILLMORE ST	UNIT BLOCK
ENTERPRISE AVE	ISLAND AVE	8400	I-95 ON/OFF RAMPS	8200
GIRARD AVE	LANCASTER AVE	4700W	I-95 ON/OFF RAMPS	800 E
GERMANTOWN AVE	BROAD ST	UNIT BLOCK	NORTHWESTERN	UNIT BLOCK
GRANT AVE	WELSH RD	1300 E	ACADEMY RD	3000 E
GRAYS FERRY AVE	34TH ST	3300	WASHINGTON AVE	2600
HARBISON AVE	BRIDGE ST	5200	ROOSEVELT BLVD	6500
HENRY AVE	CATHEDRAL RD	8500	HUNTING PARK AVE	3000
HUNTING PARK AVE	HENRY AVE	3000 W	KELLY DR	3300
ISLAND AVE	WOODLAND AVE	2200	ENTERPRISE AVE	4000
KELLY DR	LINCOLN DR	4600	ART MUSEUM CIRCLE	2300
LANCASTER AVE	CITY AVE	6300	GIRARD AVE	4800
LINCOLN DRIVE	RIDGE AVE	3600	WISSAHICKON AVE	5900
MARKET ST	SCHUYLKILL AVE	2300	I-95 ON RAMP	100
OGONTZ AVE	WASHINGTON LN	7400	CHELTENHAM AVE	8000
POPLAR ST	WEST COLLEGE AVE	2500	GIRARD AVE	2400
PRINCETON AVE	TORRESDALE AVE	4700	I-95 ON/OFF RAMPS	5000
RIDGE AVE (NORTH)	NORTHWESTERN AVE	9100	CATHEDRAL RD	8600
RIDGE AVE (SOUTH)	WALNUT LN	5600	CITY AVE ON RAMP	4500
ROOSEVELT BLVD	09TH ST	800 W	CITY BOUNDARY	16000 E
SCHUYLKILL AVE	MARKET ST	UNIT BLOCK	WALNUT ST	100
SEDGLEY AVE	ALLEGHENY AVE	1000 W	ALLEGHENY AVE	900 W
STENTON AVE	NORTHWESTERN AVE	9600	BROAD ST	1400
TACONY ST/STATE RD	BRIDGE ST	5200	TACONY-PALMYRA BRIDGE	6300
TORRESDALE AVE	COTTMAN AVE	7200	PRINCETON AVE	7100
UNIVERSITY AVE	38TH/39TH ST	300/400	34TH ST	600
WALNUT LN	WAYNE AVE	400 W	RIDGE AVE	500
WALNUT ST	BROAD ST	1400	COBBS CREEK PKWY	6200

WASHINGTON AVE	GRAYS FERRY AVE	2600	CHRISTOPHER COLUMBUS BLVD	UNIT BLOCK
WASHINGTON LN	WAYNE AVE	200 W	OGONTZ AVE	2000 E
WAYNE AVE	WALNUT LN	6100	WASHINGTON LN	6200
WELSH RD	CITY BOUNDARY	UNIT BLOCK	GRANT AVE	1100
WEST COLLEGE AVE	POPLAR ST	900	GIRARD AVE	900
WEST RIVER DRIVE	ART MUSEUM CIRCLE	2300	FALLS BRIDGE	2700
WISSAHICKON AVE	LINCOLN DR	6000	WALNUT LN	6000
WOODLAND AVE	COBBS CREEK PKWY	7200	UNIVERSITY AVE	3800

Section 3
Snow/Plow Routes

3. - Snow / Plow Routes

Highway Snow Operations (Map Location)

Go to the Streets Department's intranet site
http://streetsweb.city.phila.local/

Select "Streets GIS"
http://streetsweb.city.phila.local/streets_gis.html

Select "Divisional Maps"
ftp://streetsweb.city.phila.local/Maps/

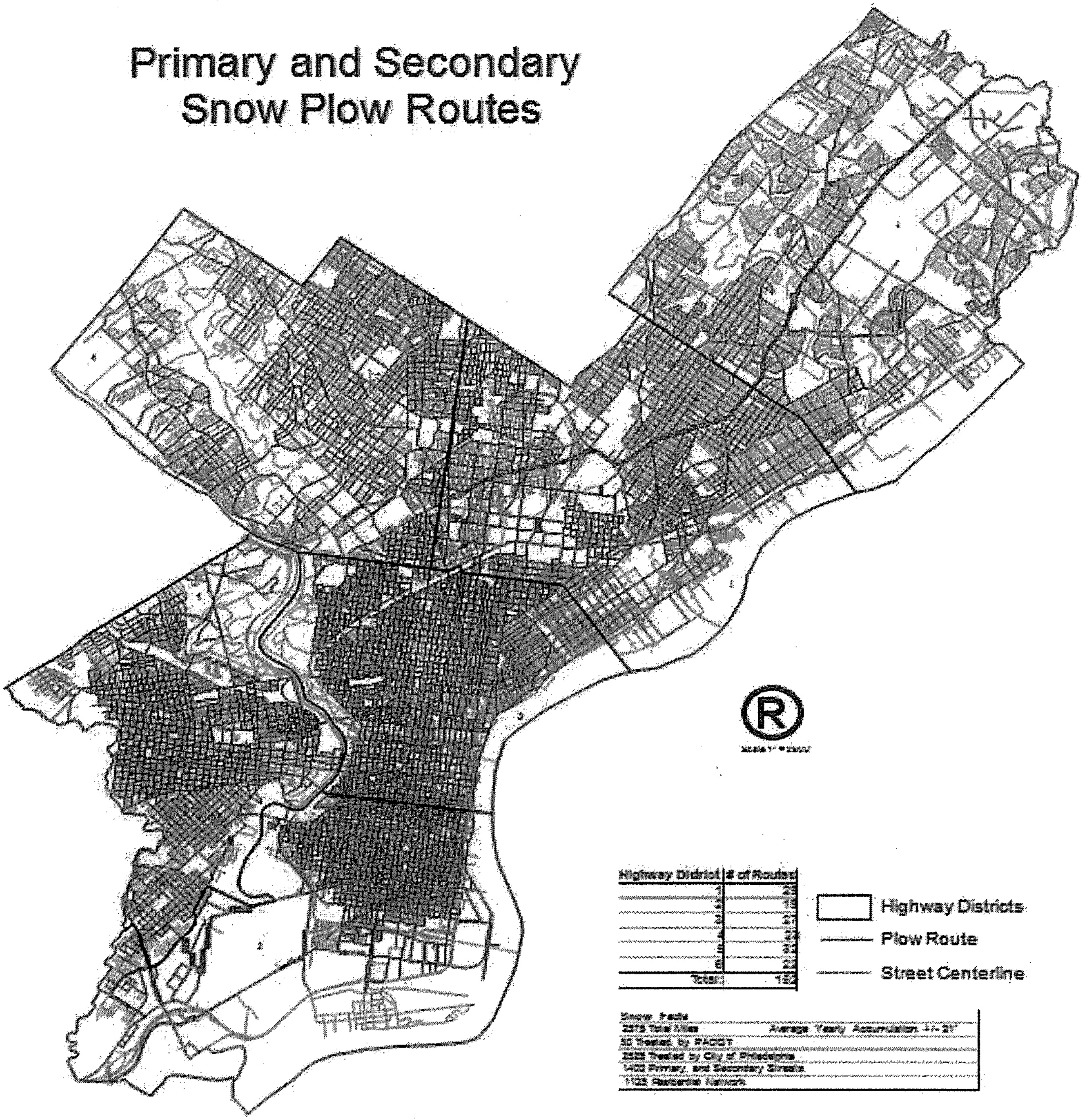
Select "Highways"
ftp://streetsweb.city.phila.local/Maps/Highways/

Select "Snow"
ftp://streetsweb.city.phila.local/Maps/Highways/Snow/

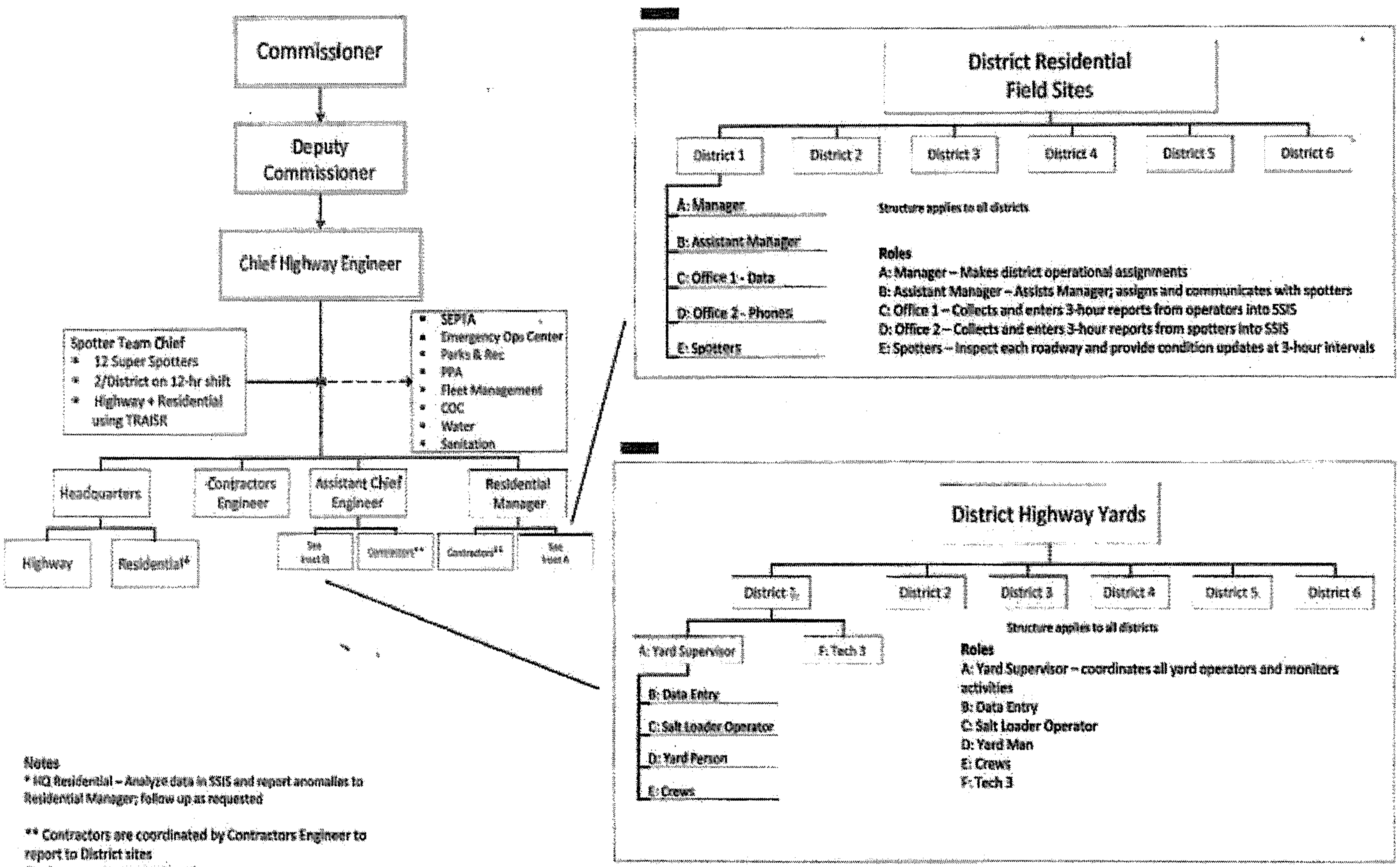
Select "Snow Maps"
ftp://streetsweb.city.phila.local/Maps/Highways/Snow/Snow%20Maps/

Select:
"Directory Overviews"
"Directory Plow Trip Packs"

Primary and Secondary Snow Plow Routes



Section 4
Key Information



Notes
* HQ Residential – Analyze data in SSIS and report anomalies to Residential Manager; follow up as requested

** Contractors are coordinated by Contractors Engineer to report to District sites
Final approval is at chief level

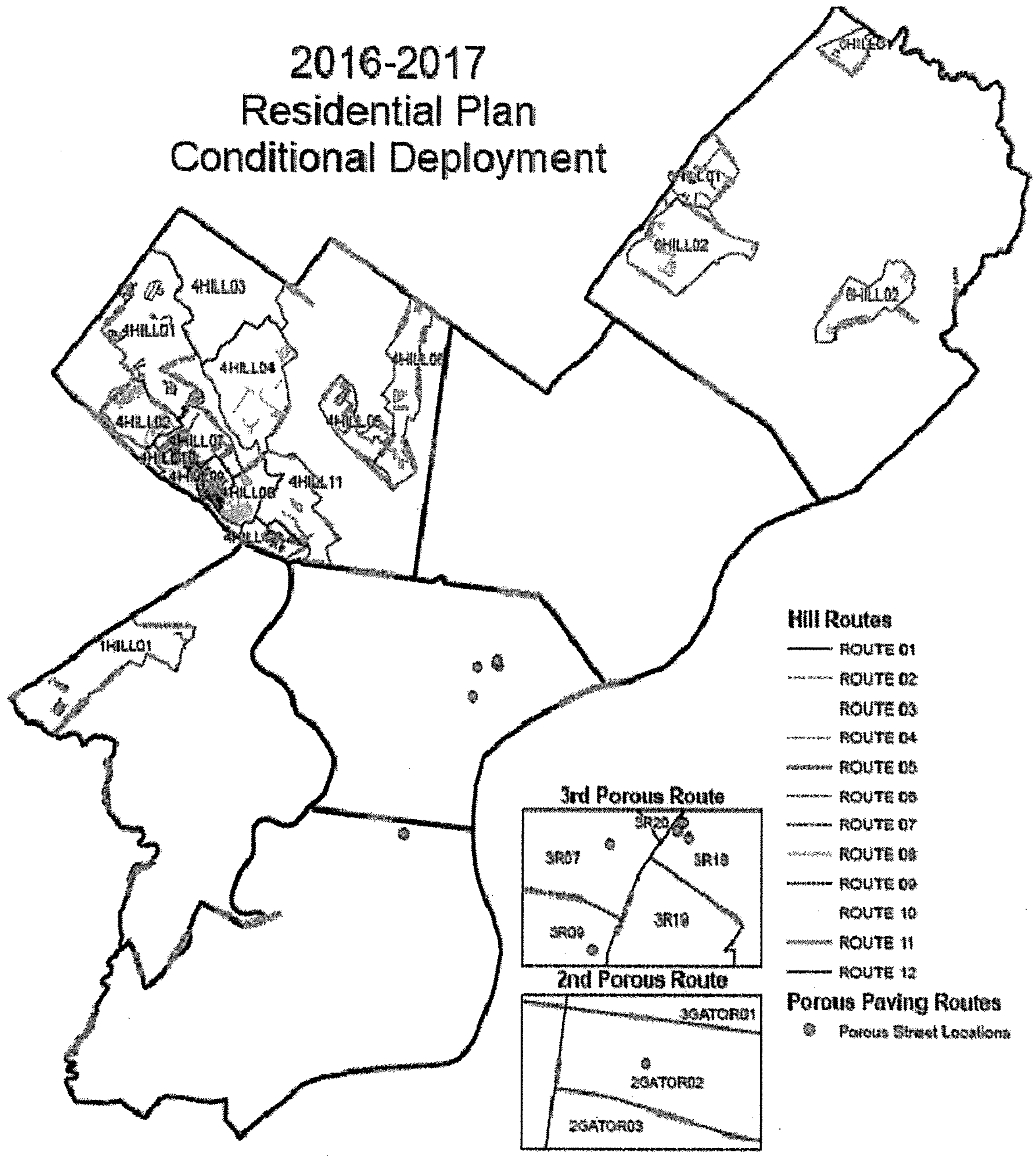
COP: Winter Weather Operations Organizational Chart

11/14/2014

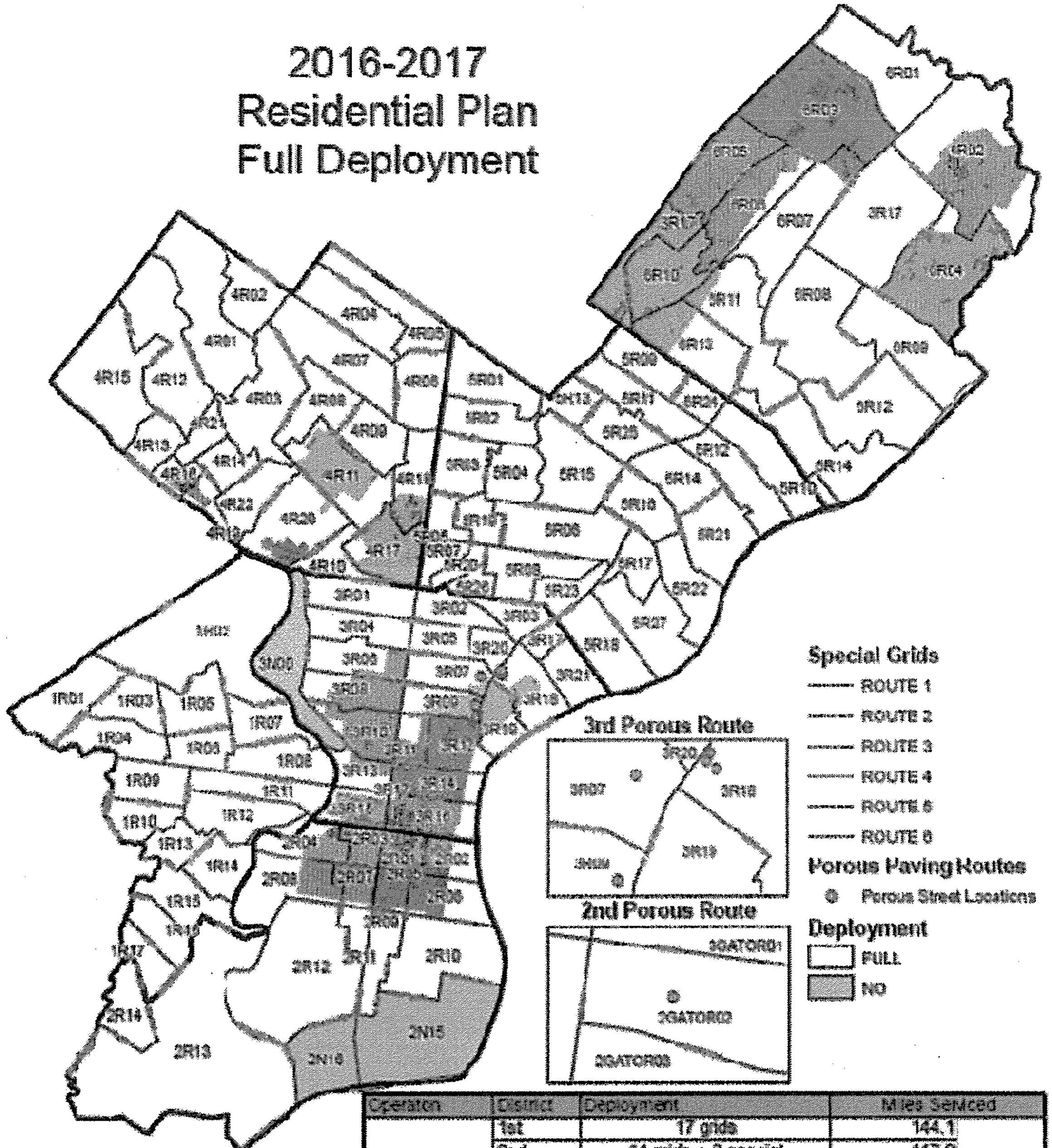
Section 5
Residential Street System

- Deployment Maps
  - Conditional Hill
  - Full
- Office Location & Phone List
- Support Departments-Manager Contacts
- Office Support Staff
- Residential Spotters

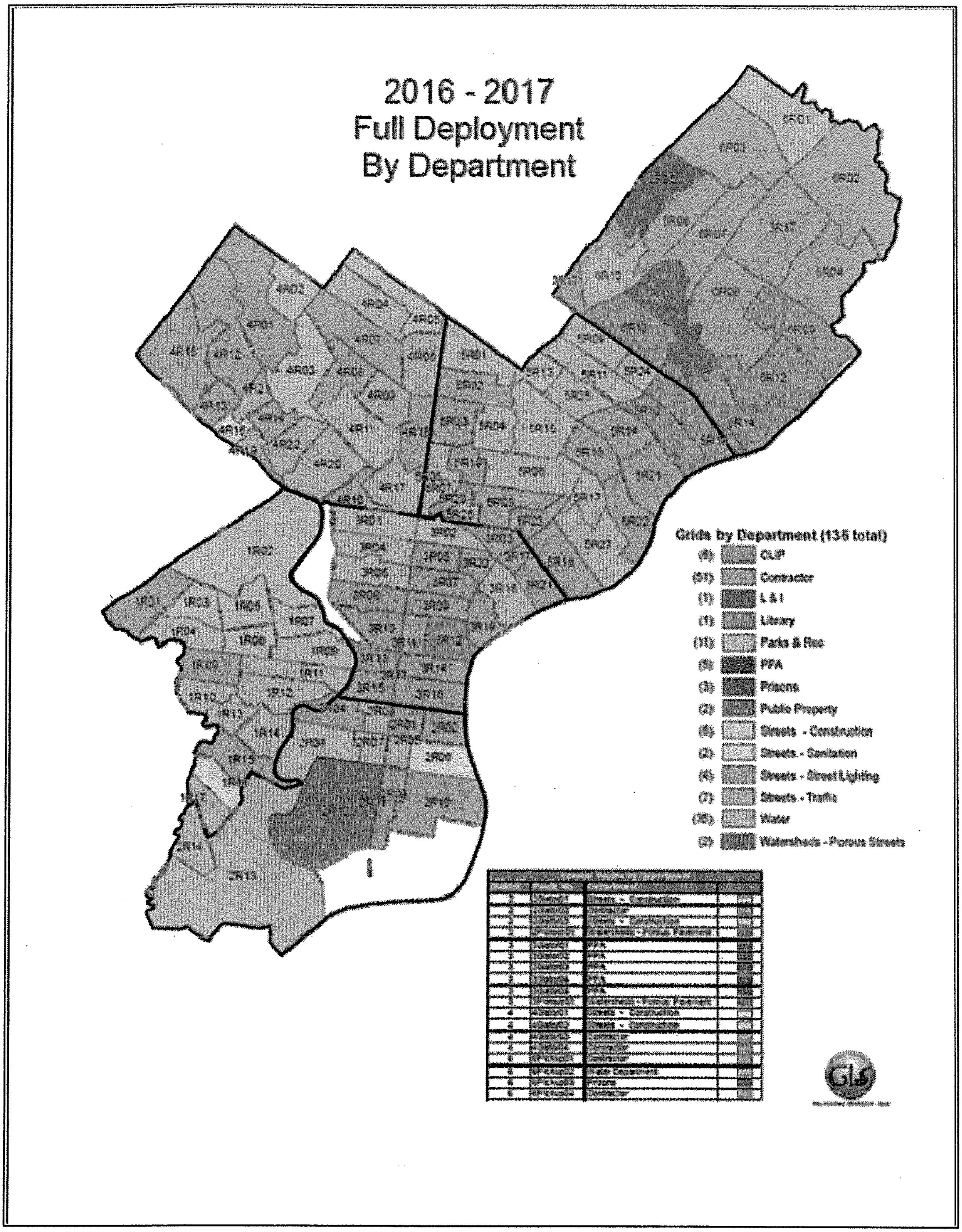
2016-2017
Residential Plan
Conditional Deployment



Operation	District	Deployment	Miles Serviced	
Hill	1st	1 Route	2.42	72
	4th	12 Routes	59.53	
	6th	2 Routes	10.11	
Porous Streets	2nd	1 Route	0.04	0.31
	3rd	1 Route	0.27	



Operation	District	Deployment	Miles Serviced	
Full	1st	17 grids	144.1	1132.8
	2nd	14 grids + 3 special	117.9	
	3rd	21 grids + 5 special	197.2	
	4th	22 grids + 4 special	206.3	
	5th	27 grids	253.8	
	6th	14 grids + 6 special	213.5	
	Summary	133 Routes		
Porous Streets	2nd	1 Route	0.04	0.31
	3rd	1 Route	0.27	
	Summary	2 Routes		


2016 - 2017
Full Deployment
By Department
Grids by Department (135 total)
CLIP
(51) Contractor
(1) L & I
(1) Library
(11) Parks & Rec
PPA
Prisons
Public Property
Streets - Construction
Streets - Sanitation
Streets - Street Lighting
Streets - Traffic
(35) Water
Watersheds - Porous Streets

Section 6
Snow Lifting Accounting Procedures

6. - Snow Lifting Accounting Procedures

Snow Lifting Records

1. **Forms Required**
   a. Streets Department Spreadsheet 77-298

2. **Snow Equipment Rental Form (77-298)**
   a. The District Engineer will be responsible for recording the following information for each piece of equipment assigned to their location.
      1. Highway District
      2. Contractor
      3. Who notified you
      4. Day of the week
      5. Time called
      6. Type of equipment ordered
      7. Operation to be performed by the equipment
      8. Where the equipment is to be assigned

   b. The contractor will assign the equipment and the operator as directed by the Streets Department, and record the license number of the equipment, and the name and address of the operator on the 77-298 form. The form will be given to the contractor operator to be used as his assignment and time record.
   c. The District Engineer will give the 77-298 form to his inspector assigned to the operation. The inspector will be told to report at the designated time and location for the start of operations. The inspector will sign-in the equipment assigned to him on the 77-298 form, recording the following information:
      1. Equipment license number
      2. Contractor's employee name
      3. Contractor's employee address
      4. Starting time
      5. Phone number

   The contractor's operator will indicate on the 77-298 form the <u>Time Started.</u>

   d. The inspector will call his District Engineer at hourly intervals and inform him of the progress being made. When the assignment is completed the inspector and the contractor's operator will each note <u>Time Stopped</u> on their form.

e. The City of Philadelphia will pay only for the operating time for the contractor's equipment. Stand-by time or lost time will be entered under "Penalty Time" and an explanation of the cause under "Penalty Remarks". When additional assignments are given to the inspector, he will complete "Location From To" on form 77-298. He will give this information to the contractor's operator, who will note this added assignment on his copy of form 77-298.

f. Whenever the contractor replaces a piece of equipment, or replaces an operator, the contractor will initiate a new form 77-298. The inspector at the worksite will then prepare a new form 77-298 to cover the replacement. Procedures will then proceed as previously outlined.

g. When a form 77-298 is completed, the city inspector will sign his copy and the contractor's operator copy. The inspector's copy of the form will be returned at the end of his tour of duty to his District Engineer.

h. When a form 77-298 is completed, the contractor's operator will sign his copy and the city inspector's copy. The operator's copy of the form will be returned to his employer.

i. The reverse side of form 77-298 can be used for remarks or explanations of unusual situations. On forms 77-298 containing the time record for dump trucks the city inspector will note on the reverse side the following information:

1. The time the dump truck leaves the work location to unload
2. The time the dump truck returns to the work location from unloading.

j. When the District Engineer receives the city inspector's forms, his personnel will enter on each line the "Total Working Hours". This is the number of hours at the site (start-finish) less the "penalty time" lost. Appropriate travel time will be added for each piece of equipment.

k. The District Engineer will check the city inspector's form and will then forward them to the Snow Contractor Liaison of Department of Streets. The contractor will use his copies of the form 77-298 to prepare his invoice, in triplicate, will be drawn on the Accounting Division, Office of the Director of Finance, Room 1330 Municipal Services Building, and sent directly to Administrative Office, Highway Division, Department of Streets for pre-auditing. The invoice will contain the following information and will be submitted for each 24 hour period:

1. Contractor's name and address
2. Snow Event
3. Number of pieces, kind and class of equipment in operation
4. Location of operations, i.e.: streets on which equipment operated
5. Dates and hours of work at specified rate per hour for
    a. Equipment with operator
        Regular time
        Premium Time
    b. Foreman
        Regular time

Premium Time

c. Laborers

Regular time

Premium Time

d. Travel time for equipment only (rate times the standard level travel time allowed)

l. The Snow Contractor Liaison, Highway Division, Department of Streets will summarize the form 77-298 and prepare a receiving report (form 71-20) in the usual manner for each 24 hour period. The receiving report and supporting form 77-298 will be forwarded to the Accounting Division, Office of the Director of Finance, Room 1300 Municipal Services Building.

m. The Accounting Division, Office of the Director of Finance will check the 77-298 forms and the contractor's invoice against each other to determine the accuracy of the invoice.

n. Time calculations for equipment and personnel will be based on full 15-minute periods. For example, a piece of equipment operating for 4 hours and 27 minutes will be paid for 4 ½ hours.

3. Contractor Labor-Snow Emergency Form (77-298)

a. Procedures applicable to "Snow Equipment Rental", form 77-298 are also applicable to "Contract Labor – Snow Emergency", form 77-298 except as indicated below.

b. The contractor's foreman will maintain the contractor's time record for the foreman and the labor crew.

4. The Chief Highway Engineer will terminate Snow lifting operations.

5. This procedure will also be included with the rental of loaders for the salt domes if needed.

Section 7
Snow Removal Cost Accounting Procedures

7. Snow Removal Cost Accounting Procedures

Snow and Salting Cost Accounting Procedures

A. Purpose

The Purpose of this procedure is to (1) provide a means for determining the cost of plowing and salting city streets and legislative routes within the city street system, and (2) provide a method for allocating these costs to both legislative routes and city streets. Most of this data is kept in the SSIS. Hard copies are not necessary to be kept.

B. Scope

The use of the forms described in this procedure shall apply to ALL agencies involved during snow and salting operations. Since the methods of attaching snow and ice storms vary, the accounting for costs will be compiled separately. The Fairmount Park Commission shall report to the Department of Streets the cost of plowing and salting the Kelly Drive (Legislative Route #67292).

C. Definitions

1. Light snow requiring only de-icing techniques shall be considered <u>Salting Operations</u>
2. Snow operations shall include storms of such magnitude that plowing and de-icing operations are necessary.
3. The Snow Season will extend from October to April of the following year.

D. Cost Accounting Policies

1. The cost of snow emergency headquarters and agencies outside the Department of Streets (other than Fairmount Park) shall be allocated to snow.

Snow headquarters is normally opened when storm conditions require plowing operations. Even though there is preliminary salting, the entire cost will be allocated to Snow Operations. However, if only salting is required, the cost of snow headquarters and that of other agencies will be allocated to Salting Operations.

2. The ratio of State and City costs shall be calculated by comparing the sum of the City and State plow miles in Snow Operations. For salting, the ratio shall be computed by applying the percentage of City and State salt route miles to the tons of salt required for each route. Plow miles and salt route miles shall be the product of the linear mileage and the number of cuts or passes made by the vehicle.

3. For Streets Department, the labor cost will be the actual hourly labor cost for each employee. The vehicle cost will be the average hourly operational cost of a vehicle by type as determined by PennDOT. The Accounting Section of the Department of Streets will supply these costs.

4. Standby time prior to plowing or salting will be charged at the district City - State ratio of the actual storm.

   a. In the event that standby personnel are not used, the cost will be shared in the ratio of existing City-State miles or roadway.

   b. For snow, this ratio shall be City 58.6%, State 41.4%; for salting operations City 66.5%, State 33.5%. These ratios are subject to change when snow and salt routes are revised.

5. The cost of snow removal on legislative routes is not chargeable to PennDOT since $2.5 million is paid to the City on an annual basis for this service.

E. Forms

The following forms will be used in conjunction with this procedure. Instructions for the use of these forms are described in the body of the procedures.

77-307 Rev. 4/71, 77-307A - Report on Snow Plowing / Salting
77-360 = Salting Report

Time and Costing Snow and Salting Operations, formerly recorded on forms 77-308 Rev. 8/98 and 77-308A, are now recorded in the Snow Storm Information System (SSIS), a MS Access database designed by the IT unit of the Streets Department.

F. Snow Operations

All personnel reporting for snow duty will sign in on the approved time sheet for their department or agency. Prior to leaving the yard the inspector will receive Form # 77-307 Rev. 4/71 which will delineate the route.

Each District prior to the snow season will type on Form 77-307 Rev. 4/71 the following information:

1. Legislative route number if the street segment is part of the State highway system.
2. The street that is to be plowed or salted.
3. The "from – to" limits of plowing or salting.
4. The mileage of the street segment.
5. The route number or letter.

The inspector (plowing) or the truck driver (salting) will complete the following items:

6. The date and day of the week.
7. The operation, plowing or salting, day or night
8. Driver's name
9. Truck number
10. The number of cuts or passes required
11. Time reported for duty
12. Time started plowing/salting
13. Time finished plowing/salting

If the inspector/driver works on more than one route, items (12) and (13) are to be completed for the time spent on the route – NOT THE TOTAL TIME. Item (11) is time reported for duty and will not change even though the route may change.

14. Any delays in route
15. Cause of delay
16. The inspector/driver will sign his name to the report

The inspector supervisor in district will calculate item (17) Total Miles plowed for each segment, total all miles plowed and determine the City and State shares, item (18).

19. Will be used during salting operations

The Highway district office will then determine the ratio of City and State plow miles for each route, and by summing the routes, the district ratio.

The time of ALL personnel combating a storm will be accounted for in the SSIS (previously tracked on form 77-308 rev. 8/72).
The District or Area Office completes this information as follows:

1. Organization – 5th Highway, Area 2, Water Department, etc.
2. Condition
3. Date personnel called in and released
4. Time personnel called in and released

5. Employee name
6. Employee number
7. Function – the particular function the person was performing (e.g.: plow driver, inspector plow, auto repair, install chains, etc.)
8. Vehicle number – if applicable
9. Hours – the district office will enter the actual number of hours worked in the appropriate column (regular, time and a half, double time)
10. Vehicle cost – the hourly operating cost multiplied by the operating hours. The Accounting Section will supply these costs.

The Sanitation Area office will complete items #1 through #10.
The following items (#11 through #13) will be completed by the Highway District Office or the Chief Highway Engineer for those not assigned to a particular district:

11. Salt – this section is used only for Salt Operations. It is the district breakdown of City-State salt used, cost of salt used, and the percentage.
12. Plow miles – the district breakdown of City-State plow miles and percentage.
13. Percentage breakdown of Labor and Vehicle costs. The percentage of City-State expense is calculated by multiplying the ratio of City-State plow miles or salt by the labor and vehicle expense.

During severe storms when contractor personnel are called to augment City personnel, it is the responsibility of the Highway District Engineers to insure that the contractors submit the following necessary information required when invoicing the City:

1. Number of pieces, kind and class of equipment in operation
2. Number of foremen, operators, laborers, regular hours worked, premium hours worked, hourly rates
3. Location of operations (e.g.: streets on which equipment operated)
4. Dates and hours of work at specified hourly rates

At the time invoices are received by Highway District Offices it will be the responsibility of each Highway District Engineer to call and discuss with the Snow Contractor Liaison cost applicable to the State as per existing agreements between the Commonwealth of Pennsylvania and the City of Philadelphia with respect to snow plowing and salting operations.

G. Salting Operations

Since the rate of salt expended on a street varies by such factors as the type of spreader and size and speed of vehicle, the use of miles salted by itself is not an indication of the labor required to complete a route. Therefore, for Salting Operations, the City - State ratio will be used and defined in Section "D".

Personnel called-in to combat an ice storm will sign in on the authorized sign-in sheet for the Highway yard. The streets repair supervisor will issue the salt truck operator Form # 77-307 rev. 4/71, which delineates the route. The equipment operator will complete the form as described under Snow Operations, and will note in column

(10) the number of passes necessary for each street segment. Upon completion of the route the operator will sign the form and return it to the streets repair supervisor.

The streets repair supervisor will perform the following tasks:

1. Issue form 77-307 rev. 4/71 to the equipment operator before he starts the route
2. Complete items (17), (18) and (19) which are the City-State mileage and the salt used for the route.
3. Complete form 77-360, which is self-explanatory for each load of salt that leaves the yard.
4. Complete SSIS information as described under Snow Plowing for each person in his district.

H. Responsibilities

1. Accounting Section Streets Department

a. The Accounting Section will determine the average fringe rates to be applied to labor, retrieve PennDOT vehicle rates, and distribute the information to all divisions of the Streets Department.

b. SSIS will accumulate the cost of each snow and ice storm. The Accounting Section will prepare any cost reports required by PennDOT on a schedule determined by PennDOT.

2. Sanitation Division Streets Department

a. Each Sanitation District will be responsible for accurately entering all necessary data in SSIS and marking the storm data complete. All data must be in the system within 24 hours of the close of each storm.

b. Time sheets and supporting data will be kept in the Area office. These will be filed chronologically by date of storm for every snow season. Records will be kept for four (4) years after the snow season.

c. Sanitation Headquarters will summarize the payroll cost of each storm and submit these costs to the Budget Officer within two (2) days after the storm.

3. Highway District Offices

a. For Snow Operations the Highway district office will calculate the plow miles for each route on Form # 77-307 rev. 4/71 and determine the City / State ratio for each route and the district as a whole.

b. For Snow Operations the District Office and Yards will be responsible for accurately entering all necessary data in SSIS and marking the storm data complete. All data must be in the system within 24 hours of the close of each storm.

c. The Chief Highway Engineer will submit a written report of the Highway snow labor cost to the Budget Officer no later than two (2) days after the storm.

d. For Salting Operations the street repair supervisor will forward form 77-360 and form 77-307 to the office of the Assistant Chief Engineer Maintenance.

e. After Salting Operations the office of the Assistant Chief Engineer will be responsible for accurately entering all necessary data in SSIS and marking the storm data complete. All data must be in the system within 24 hours of the close of each storm, and inform the Chief Highway Engineer and the Accounting Officer of the information available.

f. The Assistant Chief Engineer will submit a written report of salting costs within two (2) days of the storm.

4. Other Agencies

a. When other agencies are involved in snow or salting operations, they will submit the required SSIS information to the Chief Highway Engineer immediately after the storm. The labor cost for these agencies will be the actual wage rates for the employees assigned to snow duty. SSIS will add fringe benefits and overhead.

Conclusion

The system described herein provides a standard system for allocating the cost of snow and salting operations. Deviations from the system will be authorized only when the Chief Highway Engineer, the Accounting Officer and Budget Officer agree to the change.

Appendix N – FY17 Sanitary Infiltration Events

Report Date	Report Time	Problem Location	Spill Notes	Affected Outfall:	Abatement Date	Abatement Time	Abatement
06/24/2017	6:15 AM	MAIN ST. & SHURS LN.	WET WEATHER OVERFLOW FROM SANITARY SEWER	R20	06/24/2017	8:00 AM	WET WEATHER FLOW SUBSIDED
06/17/2017	5:07 PM	MAIN ST. & SHURS LN.	WET WEATHER OVERFLOW FROM SANITARY SEWER	R20	06/17/2017	5:15 PM	WET WEATHER FLOW SUBSIDED
06/13/2017	5:20 PM	907 RONNIE CIRCLE	CHOKED SEWER: CHOKED SEWER DISCHARGING INTO STORM SEWER	W084-3	06/13/2017	8:30 PM	FLUSHER CLEARED GREASE CHOKE.
05/31/2017	12:30 PM	1421 DICKINSON ST	OTHER: CONTRACTOR PUMPING TO STREET AND CLOGGED INLET	D66	05/31/2017	1:00 PM	NELLO CONTRACTOR AND PWD INSPECTOR AKMAL KHOLBOEV WERE INFORMED TO STOP PUMPING TO STREET AND THE STREET WAS CLEANED AND INLET WAS RELIEVED.
05/19/2017	4:30 PM	400 W. HORTTER ST	CHOKED SEWER: FOUND CHOKED SANITARY SEWER.	W068-05	05/19/2017	6:00 PM	FLUSHER CREW RELIVED CHOKED SEWER AND CLEANED AFFECTED AREA.
04/22/2017	2:30 PM	5200 RIDGE AVE.	CHOKED SEWER: FOUND CHOKED SEWER AND W/C SEWAGE AT 5200/02 RIDGE AVE.	S052-05	04/22/2017	4:30 PM	FLUSHER CREW RELIEVED CHOKED SEWER.
04/21/2017	9:40 AM	4300 MAIN ST.	CHOKED SEWER: FOUND SEWER CUASING W/C @ 4360.	S051-05	04/21/2017	12:30 PM	FLUSHER CREW RELIEVED CHOKED SEWER.
04/21/2017	10:30 AM	4500 MAIN ST.	DEFECTIVE SEWER PIPE: FOUND SEWAGE COMING THROUGH STONE WALL PARKING LOT.	S059-04	04/21/2017	3:00 PM	BY PASS PUMP--RELIVED CHOKED SEWER DOWN STREAM.

Report Date	Report Time	Problem Location	Spill Notes	Affected Outfall:	Abatement Date	Abatement Time	Abatement
04/11/2017	10:30 AM	HOLME AVE & LONGFORD ST	DEFECTIVE SEWER PIPE: SEWAGE COMING OUT OF OUTFALL	P100-14	04/12/2017	4:30 PM	STOPPED DISCHARGE BY PLUGGING UP SANITARY SEWER & MAINTAINED THE FLOW WITH VACTOR BY VACUUMING OUT UPSTREAM MANHOLE & DECANTING IN SEPARATE SANITARY SYSTEM.
03/29/2017	9:30 AM	W. HORTTER & PELHAM ST	CHOKED SEWER: SEWAGE DISCHARGE FROM FRESH AIR INLET ON LAWN OF 338 W. HORTTER ST INTO STORM INLET.	W-068-05	03/29/2017	12:20 PM	SET UP BY PASS PUMPING AND STARTED TO EXCAVATE
03/29/2017	11:00 AM	9300 DELAWARE AVE	CHOKED SEWER: CHOKED SEWER	D-092-05	03/29/2017	12:30 PM	FLUSHED OPEN CHOKED SEWER
03/29/2017	12:00 PM	5233 RIDGE AVE	CHOKED SEWER: FOUND DISCHARGE AT OUTFALL	S052-05	03/29/2017	3:00 PM	CALLED FLUSHER TO SITE--RELIEVED CHOKED SEWER ON RIDGE AVE.--CLEANED SEWER.
02/23/2017	3:30 AM	4900 MONUMENT RD	CHOKED SEWER: SEWER DISCHARGING OUT OF INLETS AND APROX 1' FROM TOP OF EXCAVATED AREA. SEWAGE DISCHARGED ONTO STREET AND INTO PROPERTY BASEMENTS UNKNOWN ADDRESSES.	S50	02/23/2017	8:10 AM	CONTRACTOR RESOLVED BY REMOVING PLUGS FROM SEWER
02/21/2017	8:00 AM	900 W. MT. AIRY	CHOKED SEWER: FOUND GRAY WATER WITH SOLIDS DISCHARGING INTO STORM SEWER	W067-06	02/21/2017	11:40 AM	FLUSHED OPEN CHOKED SEWER, REMOVED GREASE & DEBRIS WITH VACTOR TRUCK

Report Date	Report Time	Problem Location	Spill Notes	Affected Outfall:	Abatement Date	Abatement Time	Abatement
01/30/2017	10:30 AM	BUSTLETON & PEARSON	CHOKED SEWER: FOUND CHOKED SANITARY SEWER	P105-01	01/30/2017	11:30 AM	FLUSHER CREW RELIEVED GREASE CHOKE ON SAN. SEWER.
01/22/2017	11:00 AM	400 BLK. OF RENNARD ST	CHOKED SEWER: DISCHARGE TO STORM TO OUFALL P-116-02	Q117-02	01/22/2017	5:00 PM	SEWER WAS FLUSHED TO RELIEVE DISCHARGE. ALSO, ADDED 10 GALS. OF DEGREASER.
12/22/2016	11:10 AM	IN PARK AREA	CHOKED SEWER: FOUND SEWER CHOKED AND DISCHARGING FROM M/H	NA	12/22/2016	3:10 PM	FLUSHER RELIEVED GREASE CHOKE
11/15/2016	4:10 PM	4700 TOLBUT ST	CHOKED SEWER: FOUND MANHOLE WATER LEVEL HIGH UP IN MANHOLE P083-03-S0260 & SOME ONE REMOVED FRAME & COVER FROM MANHOLE S0255 & THREW DEBRIS DOWN THERE CHOKING UP SEWER. NO SEWAGE @ OUTFALL P083-03	P083-03	11/16/2016	11:00 AM	BY-PASS PUMPED DOWN MANHOLE PO83-03-S0255 FOR VACTOR TO VACUUM UP DEBRIS & CLEAR CHOKED SEWER
11/06/2016	3:30 PM	300 W MOUNT PLEASANT	DEFECTIVE SEWER PIPE	W068-05	12/21/2016	2:10 PM	EXCAVATE & REPAIR/REPLACE SANITARY PIPE AND LATERALS
11/06/2016	7:30 PM	308 W HORTTER ST	CHOKED SEWER: GRAY WATER AT OUTFALL AND FOUND HEAVY FLOW IN STORM SEWER. THE STORM SEWER HAS A MIX OF GROUND WATER SEWER WATER.	W068-05	11/11/2016	3:30 PM	EXCAVATION RECEIVED MEASUREMENT FROM CCTV AND DUG UP SAN SEWER AND REPLACED PIPE AND PORTION OF LATERAL. DISCHARGE FROM THIS AREA RESOLVED.

Report Date	Report Time	Problem Location	Spill Notes	Affected Outfall:	Abatement Date	Abatement Time	Abatement
11/05/2016	7:30 PM	6300 SHERMAN ST	DEFECTIVE SEWER PIPE: FOUND SANITARY FLOW COMING OUT OF GROUND AND BACK INTO SANITARY SEWER	W060-05	12/15/2016	9:00 AM	BYPASS PUMP INSTALLED TO MANAGE FLOW FOR REPAIRS. EXCAVATED TO REMOVE AND REPLACE DOWNED SECTIONS. LINED SEWER TO PREVENT FURTHER DEGRADATION.
10/03/2016	6:00 PM	RIDGE AVE & DAWSON ST	CHOKED SEWER: FOUND SANITARY SEWER M/H S052-05-S0387 UP AND DISCHARGE TO STORM SEWER.	S052-05	10/03/2016	8:00 PM	BROUGHT IN FLUSHER TRUCK TO RELIEVE CHOKED SEWER.
09/28/2016	3:10 PM	3044 HOLME AVE	CHOKED SEWER: SEWAGE COMING OUT OFMANHOLE	P100-13	09/28/2016	8:30 PM	HAD TO SET UP BY PASS PUMPING
09/24/2016	1:40 PM	8008 WINSTON RD	CHOKED SEWER: CLEAR WATER AT OUTFALL IN THE BEGINNING TURNED CLOUDY AT ABOUT 5PM	W086-01	09/24/2016	8:00 PM	BYPASS PUMP AND THEN EXCAVATION
08/19/2016	2:10 PM	8400 CRANE ST	CHOKED SEWER: FOUND FLOW IN STORM M/H M005-09-0175	M005-09	08/19/2016	4:50 PM	USED FLUSHER TO CLEAR GREASE CHOKE AND RESTORE FLOW IN THE SANITARY SEWER.
08/08/2016	12:30 PM	SHERMAN ST. & PAMONA ST.	CHOKED SEWER: SEWAGE WAS DISCHARGING ONTO STREET AND INTO STORM SEWER	W-68-05	08/08/2016	4:20 PM	CALLED FLUSHER TRUCK TO SITE TO RELIEVE CHOKE.
07/31/2016	6:12 AM	MAIN ST. & SHURS LN.	WET WEATHER OVERFLOW FROM SANITARY SEWER	R20	07/31/2016	6:42 AM	WET WEATHER FLOW SUBSIDED
07/25/2016	7:17 PM	MAIN ST. & SHURS LN.	WET WEATHER OVERFLOW FROM SANITARY SEWER	R20	7/25/2016	7:52 PM	WET WEATHER FLOW SUBSIDED
07/25/2016	5:12 AM	MAIN ST. & SHURS LN.	WET WEATHER OVERFLOW FROM SANITARY SEWER	R20	07/25/2016	5:17 AM	WET WEATHER FLOW SUBSIDED

Report Date	Report Time	Problem Location	Spill Notes	Affected Outfall:	Abatement Date	Abatement Time	Abatement
06/15/2016	11:00 AM	REAR OF 1239 SEROTA PL.	CHOKED SEWER: FOUND CHOKED SEWER IN PARKING LOT OF 9870 BUSTLETON AVE. MANHOLE P109-04-S0030	P109-04	06/15/2016	3:00 PM	FLUSHED CHOKED SEWER WITH VACTOR, REMOVED DEBRIS & GREASE

Appendix O – Pollution Migration/ Infiltration

Date	Location	Pollutant	Drainage Type	Follow-up Actions
7/1/2016	7th & Cheltenham	Red Heating Oil	Separate	IWBC responded to a red heating oil discharge at Mill Creek, downstream of the 7th Street and Cheltenham Ave. outfall at Coventry Road and Cheltenham Avenue. IWBC inspectors took samples and readings over several locations while trying to uncover the source of the oil. Lewis Environmental provided site cleanup services, improving the condition of the creek significantly. The cleanup concluded with the removal of the booms on July 7th, 2016. This event had a major effect on PWD operations.
7/14/2016	Ontario & Mascher Streets	Sediment	Combined	A PWD employee reported sediment clogging of standard and green stormwater inlets on Ontario and Mascher Streets. An inspector arrived and found that due to improper protection, inlets on Mascher and Ontario were clogged by dirt, stone and sand. A construction site up the street was the source of the debris. The inspector spoke to the foreman and advised the placement of silt socks at the inlets. The inspector directed correspondence to IWBC Engineering Support for issuance of a warning letter or notice of violation to the contractor. This event had a minor effect on PWD operations.
7/21/2016	1717 E. Hunting Park Ave	Oil	Combined	Industrial Waste received a report from Fire Hazmat of an oil/water mixture being used to flush a toilet at 1717 E. Hunting Park Ave. Service to the residence had been turned off prior to the incident. The resident had taken a drum previously used to store diesel fuel and used it to fill with water and flush the toilet. Clean Venture, whom the inspector contacted, said they would take the drum. The manhole upstream at MH-F07-00160 and downstream at MH-F07-00155 were monitored for presence of volatile organic compounds, which displayed a zero parts per million reading. The inspector advised the resident to contact the Water Revenue bureau to work out payment to resume service. This event had a minor effect on PWD operations.

Date	Location	Pollutant	Drainage Type	Follow-up Actions
8/11/2016	6300 Greene Street	Medical Waste	Separate	IWBC Manager responded to a choke at Sherman and Pomona Streets in Germantown. The choke was located in a 12" sanitary sewer line and caused sewage to release to outfall W-068-05 located at Wissahickon and Morris Streets. In the sewer line, workers found rubber gloves and other materials used at a nursing home nearby. The Inspector visited the living facility at 6300 Greene Street and advised the facility manager and care administrator to dispose of all gloves and waste materials properly. This event had a major effect on PWD operations.
8/13/2016	555 S. Columbus Ave.	Grease	Non-contributing	IWBC Inspector responded to a grease choked shared lateral at 555 S. Columbus Ave. along the Delaware River waterfront in South Philadelphia. Sewer Maintenance Personnel found large amounts of grease from nearby manholes. The chokes caused sewage to back up into the parking lot. Several establishments had discharged grease into the lateral. An inspection was done on the grease trap at one of the facilities. The restaurant paid for the cleanup on the shared lateral in their parking lot. This event had a minor effect on PWD operations.
8/29/2016	3331 Spring Garden St.	Oil	Combined	A contractor, working without a permit, spilled oil which trailed from the sidewalk into inlet number 25239, located 26' from the northwest corner of Spring Garden St. Leaves and debris in the inlet prevented much oil from entering the system. The IWBC inspector conducted volatile organic compound measurements which produced readings of 16 parts per million inside the inlet and zero parts per million from the manhole located on 33rd St. This event had no effect on PWD operations.

Date	Location	Pollutant	Drainage Type	Follow-up Actions
9/17/2016	2400 Sergeant St.	Heating Oil	Combined	An IWBC inspector responded to a notification from Unified Dispatch about a heating oil spill at the 2400 block of Sergeant Street. An unlicensed contractor spilled heating oil from a modified 55-gallon drum which trailed 250' from 2433 Sergeant Street to inlet number 45751 located on the NW corner of 24th and Sergeant Streets. Hazmat personnel spread oil dry on street and diked the 4' open mouth grate inlet. The IWBC inspector took volatile organic compound measurements at the manhole downstream from the inlet and received a reading of 0.9 milligrams per liter. Clean Venture completed the cleaning and flushing of inlet 45751 and removed the 55-gallon drum. Cleaning personnel also cleaned and flushed three nearby inlets at the intersection of 34th and Sergeant Streets. This event had a minor effect on PWD operations.
9/23/2016	Northeast Water Pollution Control Plant	Green Dye	Combined	The crew chief at the Northeast Water Pollution Control Plant (NEWPCP) reported florescent green water at the Delaware River outfall, the plant's chlorine contacts and final tanks. An IWBC inspector reported to the location and took samples of the three locations with the crew chief. The inspector sampled for Fluorescein and algae at leach location. They also took samples at the Somerset collector at Castor Avenue where the water was brown in color. Next, the inspector went to Abbey Color at 400 E. Tioga Street. Lab technicians tested the samples. The samples from the final tanks at NEWPCP tested at 0.04 for fluorescein (the limit is .03). Abbey Color tested four samples from the following locations with results: Northeast Pier (< 5.0 ug/L fluorescein); Northeast Outfall (5.3 ug/L fluorescein); Northeast Final Tanks (7.9 ug/L fluorescein); Somerset Collector (29 ug/L fluorescein). The discharge was postponed for three days. The green dye was no longer visible. This event had a minor effect on PWD operations.
9/23/2016	20th St. Pool Drain Request	Rancid Body Fluids	Combined	Philadelphia Police contacted PWD Emergency Desk to inquire about the disposal of water containing fluids from a decaying body in a hot tub. The Police removed the body. The Southwest Water Treatment Plant was contacted and the representative informed IWBC that the rancid water posed no threat to Plant activity. The IWBC inspector instructed to add bleach

Date	Location	Pollutant	Drainage Type	Follow-up Actions
				to the water and drain it to the sanitary sewer. This event had a minor effect on PWD operations.
10/9/2016	3454-3456 Weymouth Street.	Oil	Combined	An unidentified person attempted to pour waste oil into a fresh air inlet near 3437-3439 Weymouth Street. The Hazardous Materials Unit placed oil dry on the trailed oil and around a 55-gallon drum located in front of 3454-3456 Weymouth Street. An IWBC inspector surveyed the inlet located five feet from the drum and found no oil. They also observed the manhole MH-D22-0028207 on Weymouth Street, north of Ontario Street, which remained free of oil as well. The inspector returned on October 11th, 2016 and confirmed the removal of the drum and the oil dry from the street. This event had no effect on PWD operations.
10/13/2016	2559 N. Howard Street	Sewage	Combined	An IWBC inspector responded to a report from Philadelphia Water Customer Service of water flowing from a pipe within an abandoned and boarded residence, 2559 N. Howard Street, to the sidewalk. Water flowed from the fresh air inlet to the gutter, trailing 60' to inlet number 44596 located on Huntingdon Street. Water Emergency was contacted and informed IWBC of a notice of defect in the system (work order number 1404057) for this ongoing situation. The operator ensured they would flag the work order for completion. On October 18th, the inspector visited the site and observed water still flowing. Water Emergency was contacted again and directed IWBC to customer Field Service who informed IWBC there was a scheduled shut off on October 19th. Another notice of defect was issued on October 20th with receipt of referral on October 21st. This event had a minor effect on PWD operations.
10/26/2016	2500 block of S. American Street	Cooking Grease	Combined	An IWBC inspector responded to a grease choked sewer at the 2500 block of S. American Street. The fresh air inlet from a restaurant located at 2554 S. American Street contained excess grease. Neighbors said the restaurant workers dumped grease into the corner inlet across the street. A survey of the inlet revealed caked grease on the inside and outside. The inspector determined the grease was old due to new un-greased trash within the inlet. The Water Conveyance Unit cleared the excess grease from the inlet. The inspector spoke to the owner

Date	Location	Pollutant	Drainage Type	Follow-up Actions
				who denied dumping grease or mopping water into the inlet. The owner could not provide receipts proving the certified removal of grease or the name of the company who removed the grease. The inspector inspected the basement grease trap, lateral, and outside cooking oil storage. They advised the owner on how to prevent spillage from outside grease storage and the necessity of cleaning the grease trap more often to prevent choking of the sewer. The inspector also warned of the illegality of dumping into the inlets. The inspector requested Engineering Support's forwarding of a warning letter and grease disposal information packet to the restaurant. This event had a major effect on PWD operations.
11/5/2016	Monoshone Creek between Morris and Johnson Streets	Sewage	Separate	An IWBC inspector responded to a sewage release event at Monoshone Creek between Morris and Johnson Streets. A sewer maintenance crew flushed the line at Wayne and Washington Avenues after technicians suspected a grease choke may have contributed to the problem at that location. Technicians also discovered a leaking sewer line near Pomona Street which did not affect Monoshone Creek's outfall. After an extensive drainage area search, a compromised sanitary sewer with a blockage located 150' downstream of Cherokee Street was discovered. The sanitary sewer effected the storm sewer and creek for several days until it was repaired. This event had a minor effect on PWD operations.
11/7/2016	storm sewer T-80-02	Sewage	Combined	IWBC inspectors responded to a complaint of a sewage odor from the storm sewer T-80-02. The segments of the system between Vankirk and Howell Streets all had flow and vented sewage odors. inspectors checked Cheltenham manhole beyond the flow meter and discovered waste water flowing in and out of the location with an estimated dry flow rate of three gallons per minute. Storm water at the outfall was also sampled to confirm the presence of sewage. Due to inclement weather, the tracking of the sewage sources continued through November 11th, 2016. This event had a minor effect on PWD operations.
11/27/2016	Front & Shunk Streets	Diesel Fuel	Combined	An IWBC inspector responded to Front and Shunk Streets where the saddle tanks of a truck ruptured and released diesel fuel onto the roadway and nearby inlets. The Hazardous Materials

Date	Location	Pollutant	Drainage Type	Follow-up Actions
				Unit recovered an estimated 165 gallons of diesel fuel and water from the site and placed oil dry on affected road surfaces. The inspector did not identify fuel in the inlets as there were booms preventing them from taking on any fuel. Oil sheen covered sections of the road surface. This event had no effect on PWD operations.
12/1/2016	12th and Manning Streets	Illegal Discharge	Combined	AN IWBC inspector responded to a complaint of a garden hose releasing water from a construction site into a storm drain at 12th and Manning Streets. The inspector was unable to gain access to the property or contact the owner. The following day, December 2nd, 2016, the inspector returned and successfully contacted the project manager and gained access to the site. A survey of the garden hose, sump pump, and the pumping point revealed a broken pipe ("potentially sanitary sewer line") inside the construction site's sidewalk as the source of the water then being released at an estimated two gallons per minute. The inspector directed the removal of the garden hose from the storm sewer to a sanitary sewer line inside the building. The workers completed this task immediately. This event had a minor effect upon PWD operations.
12/8/2016	S-22 outfall	Sewage	Combined	PADEP received a call from a concerned individual who observed an outfall on the Schuylkill River attracting seagulls. PADEP contacted IWBC who investigated the outfall (S-22 outfall). The IWBC inspector had Flow Control examine the outfall and confirm the release of sewage. The event occurred downstream of department intakes. This event had a minor effect on PWD operations.
12/27/2017	Levick & Oxford Streets	Diesel Fuel	Combined	An undetermined amount of fuel from a saddle tank washed into a nearby inlet while the Philadelphia Fire Department was fighting a fire at Oxford and Levick Streets. An IWBC inspector responded to the location and took a lower explosive limit reading at the inlet which resulted in a 0% reading. The inspector called the Northeast Water Pollution Control Plant to notify them of the spill. This event had a minor effect on PWD operations.

Date	Location	Pollutant	Drainage Type	Follow-up Actions
1/22/2017	Outfall P-116-02	Sewage	Separate	An IWBC inspector responded to a report from Public Works of sewage discharge from outfall P-116-02. The Public Works Director of Lower Moreland Township and the IWBC inspector surveyed the storm and sanitary manholes in the area. They discovered a major choke between manhole P116-02-0030 and manhole P116-02-0050 in the sewer which caused the discharge to the tributary of Huntingdon Valley Creek. IWBC informed the PADEP of the discharge. A flusher truck was called and successfully cleared the choke that evening. PADEP directed PWD's Waterway Restoration Unit to clean the creek. This event had a major effect on PWD operations.
1/23/2017	Interstate 95 Bartram Ave. exit	Diesel Fuel	Separate	IWBC responded to an accident involving a tractor trailer striking a highway jersey barrier near the Interstate 95 Bartram Ave. exit. The accident resulted in the release of diesel fuel onto the roadway. The Philadelphia Fire Department placed oil dry and sand bags to contain the spill. However, an estimated 200 gallons of fuel leaked between the roadway’s expansion joints and down into the sludge lagoons for the Southwest Water Pollution Control Plant (SWWPCP). The Pennsylvania Department of Environmental Protection received notification of the spill due to the possible effect upon Mingo Creek. The IWBC inspector contacted the SWWPCP to notify the plant of the potential fuel spill into the lagoon. The inspector determined none of the fuel had entered the storm drains on the road. This event had a minor effect on PWD operations.
1/24/2017	5500 Lancaster Avenue	Cooking Grease	Combined	An IWBC inspector responded to a report of inlet dumping at 5500 Lancaster Avenue. A survey of the inlet near Oxford and Allison Streets revealed copious evidence of recently dumped food and grease. The inspector spoke to the owner of the restaurant who informed him that they had a private plumber perform the unclogging of the restaurant's grease trap. The inspector determined the inlet required cleaning and recommended vacuuming of all the residual grease, estimated at seven gallons, with expenses directed to the owner. This event had a minor effect on PWD operations.

Date	Location	Pollutant	Drainage Type	Follow-up Actions
2/14/2017	11th and Clover	Illegal Discharge	Combined	Two major job sites with ongoing construction activity were pumping muddy water from a pit of water between the sites into the street near an inlet on 11th and Clover. The water ran through a hose to 40' north of the 4' open mouth inlet. The muddy water trailed along 11th Street south toward the silt control mesh protected inlet at Clover Street. The construction company informed IWBC that a sprinkler test was conducted of the system inside 32 - 40 S. 11th Street. The IWBC inspector informed the construction company that the pumping activity required a permit and requested shutoff. The inspector provided the phone number of Engineering support and directed them to handle of the incident for potential enforcement activity. This event had no effect upon PWD activities.
2/16/2017	6211 Lansdowne Avenue	Heating Oil	Combined	An unlicensed contractor attempted to dispose of a 375-gallon tank of heating oil in the basement and backyard of a residence at 6211 Lansdowne Avenue. The Philadelphia Fire Department and an IWBC inspector responded to a neighbor's complaint of a strong odor of oil. The individual dumped an unknown amount of oil into the combined area storm drain in the back yard of the residence with some spillage occurring in the basement. Philadelphia Fire Dept. placed oil dry in the basement. The inspector conducted photo ionization detection (PID) tests with readings at 31 parts per million (ppm) in the basement and 33-ppm in the PVC pipe which extended along the basement wall. PID readings at downstream manhole MH C11-000130 on N. 62nd St. rendered a 0-ppm result. No oil appeared on or around the manholes. Dirt filled the fresh air inlet at 6213 Lansdowne Ave. and its PID registered 0-ppm. Clean Venture removed the remaining oil from the tank and other related cleaning of the site. IWBC gave approval to clean the combined area storm drain in the backyard with water and pine sol. This event had a minor effect on PWD operations.
2/23/2017		Illegal Dumping	Combined	Reports of illegal trash dumping into an inlet prompted an IWBC inspector to visit a restaurant to investigate the complaints. The inlet nearby contained trash. They contacted the owner's daughter who agreed to come to the location the next day. The next day the owner's daughter assisted the IWBC inspector to the grease trap which was poorly maintained. The inspector

Date	Location	Pollutant	Drainage Type	Follow-up Actions
				informed the owners about the illegality of dumping into the inlet, which they denied doing. The inspector requested receipts and disposal manifests for grease and oil removal, which the owners had no documentation for. The inspector advised the owners to keep the documentation from that point on. Engineering Support was advised to forward a warning letter or notice of Violation to restaurant. This event had no effect on PWD operations.
3/8/2017	Outfall T-088-01	Sewage	Separate	IWBC inspectors arrived at 7th St. and Cheltenham Ave. to check reported sewage in outfall T-088-01. After taking samples for fecal, fluoride, and total chlorine; the inspectors trailed the stream and noticed three dead fish before arrival at Asbury Ave. The inspectors proceeded to an excavation at 7th St. and Cheltenham Ave. where an excavation crew had damaged a pipe. The inspectors added dye to determine if flow would appear at the outfall. Observation of sediment in the bottom of a sewer occurred during the check of a storm manhole at 12th and Lakeside Streets. A grab sample taken at the outfall at 6:25pm had brown color with some suspended solids. The inspectors returned the following day, Thursday, March 9th at 70th and Broad Streets. They added more dye to the excavation hole and returned to the outfall. The flow from the outfall remained clear. This event had a minor effect on PWD operations.
3/17/2017	7th St. & Cheltenham Ave.	Contaminated Water	Separate	The increase of flow and flow rate of water into an excavation site at 69th St./70thth and Broad streets led contractors to believe that a plug in the 12" sanitary line had failed and allowed sewage to enter the site. A JPC employee's check of the storm system upstream revealed that no water passed the plug. An IWBC inspector surveyed the flow at the 7th and Cheltenham outfall which was grey in color but did not have the odor of sewage. The inspector proceeded to the 69th/70th and Broad Streets excavation site where the contractor informed them of the issue. The contractor had been pumping the water out of the site with 4", 6", and 8" pumps to the 12' sanitary line downstream from the job site. The inspector collected a sample from the excavation and it rendered a reading of 0.23 parts per million; indicating no fresh water leaked into the site. They returned later and took a sample for chlorine analysis. The sample rendered a reading of 0.15 which led the IWBC to believe that the reading resulted from the additional

Date	Location	Pollutant	Drainage Type	Follow-up Actions
				salt and snow melt. The reading also led the IWBC inspector to suspect the passage of sanitary/snow melt water across diversion gates located throughout the storm system into outfall T-088-01. The inspector confirmed this possibility by using the diversion gate at T-089-04 located at Franklin and Hasbrook Streets as a surrogate for diversion gates in the T-088-01 outfall system. The Chief of Water Operations was contacted. The next day the inspector returned to the 7th and Cheltenham Ave outfall T-088-01 and discovered the flow had returned to normal, clear and free of solids. Additionally, a check of T-089-04 revealed no flow and no discharge. This event had a major effect on PWD operations.
3/22/2017	3605 Grays Ferry Ave	Hydraulic Fluid	Non-contributing	An IWBC inspector responded to a spill of an estimated 35 gallons of hydraulic fluid at Waste Management's facility at 3605 Grays Ferry Ave. Some of the fluid seeped into the Schuylkill River when high tide entered the spill area. Officials from the Pennsylvania Department of Environmental Protection and the U.S. Coast Guard received notification of the situation. Lewis Environmental workers placed boom socks at the Schuylkill River to prevent additional spill into the water. Lewis Environmental also completed final cleanup at the outfall and removal of the boom socks. This event had no effect on PWD operations.
4/11/2017	Woodenbridge Run (Outfall P100-14)	Sewage	Separate	An IWBC inspector responded to a tip about sewage release at the Holme Ave. discharge to Woodenbridge Run (Outfall P100-14). The inspector met a Water Conveyance supervisor at the site and both observed the sewage discharge. IWBC informed Pennsylvania Department of Environmental Protection of the discharge. Sewer Maintenance crew arrived on site and assisted the effort in locating the source of the discharge. A defect in the sanitary sewer became apparent via the use of dye testing. The inspector determined the solution would require abatement efforts to include bypass pumping. This event had minor effect upon PWD operations.

Date	Location	Pollutant	Drainage Type	Follow-up Actions
4/22/2017	3rd & Spring Garden Streets	Diesel Fuel	Combined	An automobile accident at 3rd and Spring Garden Streets resulted in the release of nearly 80 gallons of diesel fuel into the street and combined sewer inlet nearby. Environmental workers removed 300 gallons of diesel fuel and water from the combined inlet/sanitary sewer and swept the remaining fuel from the street with oil absorbent. An IWBC inspector notified the Southeast Water Pollution Control Plant of the spill. This event had a minor effect upon PWD operations.
4/27/2017	Jefferson and N. Randolph Streets.	Illegal Discharge	Combined	An individual who claimed to be pumping water from a flooded basement had discharged water from a hose into inlets at Jefferson and N. Randolph Streets. An IWBC inspector spoke to the individual who did not have a discharge permit. The inspector informed them of the permit requirement and to cease pumping activity. The IWBC inspector informed the individual of the requirement to pump the water into an internal lateral even with an active discharge permit. Because no tie-ins existed in any of the properties, the inspector advised the individual to request a variance to discharge to the inlet after acquiring the permit or obtain the service of a pumping truck and haul the water off-site. The inspector provided a business card, a copy of the discharge permit application, and requested their forwarding to the building owner. IWBC requested Engineering Support's forwarding of a Notice of Violation to the building owner or the construction company for discharging without a permit. This event had a minor effect on PWD operations.
5/18/2017	2nd Street Transformer Spill	Oil	Separate	A fallen electric pole and transformer caught fire and spilled an estimated 25 gallons of liquid onto the ground. Oil from the transformer flowed down the street into two house storm drains. The Philadelphia Fire Department Hazardous Materials team diked the fluid with oil dry. A crew with a vacuum truck from PSC Environmental removed free standing fluid and the oil dry. An IWBC inspector determined less than a pint of oil entered the house drains which would have affected outfall T-790-01. This event had no effect on PWD operations.

Date	Location	Pollutant	Drainage Type	Follow-up Actions
5/22/2017	YMCA Sodium Hypochlorite Spill	Sodium Hypochlorite	Combined	An IWBC inspector responded to a leak of a sodium hypochlorite tote into a storm sewer in West Philadelphia. YMCA staff noticed the leak and repaired the tote and flushed an estimated 50 to 100 gallons of the chemical into the storm drain. Additionally, responding Philadelphia firefighters and the Hazmat team flushed the affected area with an estimated 2,500 gallons of water. The inspector performed a pH litmus paper test which indicated the residual water at neutral pH. IWBC contacted the Southwest Water Pollution Control Plant operator to provide a "spill to storm sewer" notification. The event had a minor effect on PWD operations.
5/31/2017	Fairmount Cement Dump	Cement Waste	Combined	An IWBC inspector responded to a Municipal Dispatcher's cement dumping complaint report. Upon arrival, the inspector discovered newly completed cement work at 4911 Fairmount Ave. The workers had washed cement runoff into a sanitary sewer drain on 49th St. It appeared most of the cement had settled before entering the drain. No contact was made with person(s) involved as the newly renovated residence remained vacant. The block captain and next door neighbor informed the inspector that the contractor performed the work at night. The inspector directed a request to Engineering Support for the issuance of a Notice of Violation. This event had a minor effect on PWD operations.
6/12/2017	Moyer & Berks Illegal Discharge	Illegal Discharge	Combined	A construction site at Moyer and Berks Streets was illegally discharging ground water into the storm inlet. An IWBC inspector contacted the site supervisor and instructed them to not discharge ground water to the storm sewer and to obtain a ground water discharge permit. A neighbor informed the inspector that the discharging had continued for nearly a year. Complaints filed to Occupational Health and Safety Administration, L&I and others had futile results. The inspector recommended Engineering Support's issuance of a Notice of Violation for Significance Non-Compliance along with a fine and including shutoff of water to the site for continued illegal discharges to the storm sewer. This event had a minor effect on PWD operations.

Date	Location	Pollutant	Drainage Type	Follow-up Actions
6/15/2017	Beulah St. Sediment Dumping	Dirt and Debris	Combined	An IWBC inspector arrived at the 1500 block of S. Beulah St. in response to a report of inlet dumping. The inspector examined broken road and dirt leading to the front wall of 1503 S. Beulah St. and determined the debris was from plumbing excavation work. A trail of dirt led from the excavation to a storm inlet 30’ away. Dirt colored water filled the storm inlet. The inspector’s effort to contact the owner of 1503 S. Beulah St. proved unsuccessful. The inspector referred cleaning of the inlets located at Beulah and Dickinson Streets to Sewer Maintenance. Engineering Support would forward a warning letter to the homeowner. This event had a minor effect on PWD operations.
6/23/2017	24th & Market Streets Diesel Fuel Spill	Diesel Fuel	Combined	An estimated 50 gallons of diesel fuel spilled onto the 2300 block of Market Street from a car to tractor-trailer accident. Fire fighters blocked inlet 101982 with sandbags and spread oil dry. The Streets Dept. placed sand over the road in front of the PECO building at 2301 Market street. The diesel fuel slick extended 300’ west of 23rd St. to the inlet within 40’ of 23rd St. An IWBC inspector determined a 1-inch layer of diesel, less than 10 gallons, remained in the 4’ inlet in front of 2351 Market Street. The PID reading on the inlet obtaining fuel rendered a 600mg/1 result. The environmental cleanup contractor swept the street and absorbed the fuel from the inlet with sweeps. This event had a minor effect upon PWD operations.

Appendix P – Defective Lateral Quarterly Reports FY17

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from July 1, 2016 to September 30, 2016)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

November 14, 2016

DLC Program Update
3rd Quarter 2016

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning July 1, 2016 and ending September 30, 2016.

The body of this report will describe the recent activities of the City during the past quarter within the 1998 COA Priority Outfall areas and at other significant outfalls on the Stormwater Outfall Priority Score list. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported wastewater spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,831 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1.	CFD-01	Plymouth St. west of Pittsville St.
2.	CFD-02	Pittsville St. south of Plymouth St.
3.	CFD-03	Elston St. east of Bouvier St.
4.	CFD-04	Ashley St. west of Bouvier St.
5.	CFD-05	Cheltenham Ave. east of 19th St.
6.	CFD-06	Verbena St. south of Cheltenham Ave.
7.	CFD-07	Cheltenham Ave. east of 7th St.
8.	CFD-08	7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	7	3	0
CFD-02	7	1	0
CFD-03	7	1	0
CFD-04	5	2	0
CFD-05	5	0	0
CFD-06	9	0	0
CFD-07	14	3	0
CFD-08	13	2	0

The most recent fecal sample value was 24196 MPN per 100 ml. at the outfall on August 10, 2016.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	6	2	0
MFD-02	6	0	0

The most recent fecal sample value was 1203.3 MPN per 100 ml. at the outfall on September 7, 2016.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,746 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was >2419.6 MPN per 100 ml. at the W-068-05 outfall on September 6, 2016.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,478 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was 2980 MPN per 100 ml. at the S-058-01 outfall, 10170 MPN per 100 ml. at the S-059-01 outfall, 198630 MPN per 100 ml. at the S-059-02 outfall, 3990 MPN per 100 ml. at the S-059-03 outfall, 517.2 MPN per 100 ml. at the S-059-04 outfall, 686.7 MPN per 100 ml. at the S-059-05 outfall and 235.9 MPN per 100 ml. at the S-059-09 outfall, all on August 4, 2016.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 5,824 Complete tests in this sewershed, identifying 87 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	16	2	0

The most recent fecal sample value was 686.7 MPN per 100 ml. at the outfall on August 10, 2016.

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,016 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	15	3	0

The outfall was found dry on August 10, 2016.

3. A current summary of additional outfalls from the Stormwater Outfall Priority Score list that the City has performed complete testing or abatements this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-091-08	0	0	1
P-091-09	1	0	0
P-091-11	0	0	1
P-091-12	43	0	0
P-099-01	9	0	1
P-100-06	1	0	0
P-100-08	1	0	0
P-100-11	0	0	1
P-100-14	60	2	2
P-103-01	2	0	0
P-104-03	1	0	0
P-104-05	33	0	0
P-104-07	(1)	0	0
P-105-13	4	0	0
P-108-09	0	0	1
P-108-16	1	0	0
P-108-21	183	1	0
P-109-01	(1)	0	0
P-109-04	30	0	0
P-109-05	39	1	0
Q-101-04	1	0	0
Q-101-15	47	0	0
Q-106-04	26	0	0
Q-106-19	5	0	0
Q-107-01	24	2	0
Q-110-11	2	0	0
Q-110-13	1	0	0
Q-113-09	2	0	0
Q-114-10	25	0	1
Q-114-11	2	0	0
Q-115-12	3	0	0
Q-115-14	40	0	0
Q-117-05	16	0	0
Q-120-01	8	0	0
Q-120-08	6	0	0
S-046-06	1	1	0
S-051-08	2	0	0
S-052-05	6	2	0

T-079-01	1	0	0
W-086-01	2	0	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-100-14

- P-108-11
- P-108-21
- P-109-05
- Q-106-14
- Q-107-01
- Q-114-10
- S-046-06
- S-051-08
- S-052-05
- W-067-01

4. Continue to perform property testing within the following outfalls.

- P-108-12
- P-109-04
- P-109-05
- Q-101-15
- Q-106-04
- Q-106-13
- Q-114-10
- Q-115-13
- Q-115-14
- Q-120-01
- Q-120-08

Table 1
DLC Program Summary
July 1, 2016 to September 30, 2016

Complete Tests:
- 58,350 Complete tests have been performed under the DLC program
- **629 Complete tests were performed this past quarter**
- 2 Complete tests were performed in outfall P-090-02
- 1 Complete test was performed in outfall P-091-09
- 43 Complete tests were performed in outfall P-091-12
- 9 Complete tests were performed in outfall P-099-01
- 1 Complete test was performed in outfall P-100-06
- 1 Complete test was performed in outfall P-100-08
- 60 Complete tests were performed in outfall P-100-14
- 2 Complete tests were performed in outfall P-103-01
- 1 Complete test was performed in outfall P-104-03
- 33 Complete tests were performed in outfall P-104-05
- (1) Complete test was performed in outfall P-104-07
- 4 Complete tests were performed in outfall P-105-13
- 1 Complete test was performed in outfall P-108-16
- 183 Complete tests were performed in outfall P-108-21
- (1) Complete test was performed in outfall P-109-01
- 30 Complete tests were performed in outfall P-109-04
- 39 Complete tests were performed in outfall P-109-05
- 1 Complete test was performed in outfall Q-101-04
- 47 Complete tests were performed in outfall Q-101-15
- 26 Complete tests were performed in outfall Q-106-04
- 5 Complete tests were performed in outfall Q-106-19
- 24 Complete tests were performed in outfall Q-107-01
- 2 Complete tests were performed in outfall Q-110-11
- 1 Complete test was performed in outfall Q-110-13
- 2 Complete tests were performed in outfall Q-113-09
- 25 Complete tests were performed in outfall Q-114-10
- 2 Complete tests were performed in outfall Q-114-11
- 3 Complete tests were performed in outfall Q-115-12
- 40 Complete tests were performed in outfall Q-115-14
- 16 Complete tests were performed in outfall Q-117-05
- 8 Complete tests were performed in outfall Q-120-01
- 6 Complete tests were performed in outfall Q-120-08
- 1 Complete test was performed in outfall S-046-06
- 2 Complete tests were performed in outfall S-051-08
- 6 Complete tests were performed in outfall S-052-05
- 1 Complete test was performed in outfall T-079-01
- 1 Complete test was performed in outfall W-068-05
- 2 Complete tests were performed in outfall W-086-01

Cross-Connections Found:
- 1,410 Cross-connections have been identified under the DLC program
- **9 Cross-connections were identified this past quarter**
- 2 Cross-connections were identified in outfall P-100-14
- 1 Cross-connection was identified in outfall P-108-21
- 1 Cross-connection was identified in outfall P-109-05
- 2 Cross-connections were identified in outfall Q-107-01
- 1 Cross-connection was identified in outfall S-046-06
- 2 Cross-connections were identified in outfall S-052-05

Abatements:
- 1,394 Abatements have been performed under the DLC program
- **8 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-091-08
- 1 Abatement was performed in outfall P-091-11
- 1 Abatement was performed in outfall P-099-01
- 1 Abatement was performed in outfall P-100-11
- 2 Abatements were performed in outfall P-100-04
- 1 Abatement was performed in outfall P-108-09
- 1 Abatement was performed in outfall Q-114-10

Outfall/Manhole Screening and Sampling:
- 13 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 10 outfall samples were taken due to observed dry-weather flow during the above inspections

- 60 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 22 outfall samples were taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
July 1, 2016 to September 30, 2016

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (MPN per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	7/21/2016	11:00	Outfall: 7th & Cheltenham	84	5700	NS	NS	
T-088-01	8/10/2016	11:15	Outfall: 7th & Cheltenham	84	5700	0.22	24196	
T-088-01	9/1/2016	12:20	Outfall: 7th & Cheltenham	84	5400	NS	NS	
T-088-01	9/21/2016	14:35	Outfall: 7th & Cheltenham	84	4500	NS	NS	
W-060-01	9/7/2016	11:45	Outfall: Monastery Lane	5'-0" x 4'-4"	420	0.11	1203.3	
W-068-05	9/6/2016	11:20	Outfall: Lincoln & Morris	90	14400	0.42	>2419.6	
S-058-01	8/4/2016	11:36	Outfall: Domino Lane	54	4200	0.19	2980	
S-059-01	8/4/2016	11:50	Outfall: Parker	60	1500	0.22	10170	
S-059-02	8/4/2016	12:00	Outfall: Fountain	42	120	0.17	198630	
S-059-03	8/4/2016	12:07	Outfall: Wright	42	5700	0.19	3990	
S-059-04	8/4/2016	12:25	Outfall: Leverington	51	NR	0.17	517.2	river influence
S-059-05	8/4/2016	12:30	Outfall: Leverington (east)	4'-0" x 2'-8"	NR	0.15	686.7	river influence
S-059-09	8/4/2016	12:50	Outfall: Green Lane	36	120	0.66	235.9	
B. Permit Inspection Program								
P-090-02	8/10/2016	11:53	Outfall: Brous & Lexington (Sandyford)	156	30	0.21	686.7	
S-051-08	7/13/2016	9:55	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.68	>241960	
S-051-08	8/2/2016	11:45	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.36	>241960	
S-051-08	9/8/2016	11:45	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.36	>2419.6	
S-052-05	7/8/2016	12:40	Outfall: Sumac & Rochelle	42	1500	NS	NS	heavy sewage odors / debris
S-052-05	7/13/2016	9:25	Outfall: Sumac & Rochelle	42	NR	0.66	>2419.6	cloudy
S-052-05	8/2/2016	11:20	Outfall: Sumac & Rochelle	42	150	0.31	>2419.6	clear flow
S-052-05	9/8/2016	11:25	Outfall: Sumac & Rochelle	42	150	0.58	>241960	clear flow
T-089-04	7/21/2016	10:45	Outfall: W of Franklin Ave. & County Line	3'-0" x 5'-6"	NF	NS	NS	no flow from city side (flow only from township side)
T-089-04	8/10/2016	10:55	Outfall: W of Franklin Ave. & County Line	3'-0" x 5'-6"	NF	NS	NS	no flow from city side (flow only from township side)
T-089-04	9/1/2016	12:05	Outfall: W of Franklin Ave. & County Line	3'-0" x 5'-6"	15	NS	NS	city side flow due to recent rainfall
T-089-04	9/21/2016	14:20	Outfall: W of Franklin Ave. & County Line	3'-0" x 5'-6"	60	NS	NS	
P-112-01	9/23/2016	10:55	Outfall: SE of Welsh & Darlington Rds	42	NF	NS	NS	
P-112-02	9/23/2016	11:00	Outfall: SE of Welsh & Darlington Rds	48	NF	NS	NS	
P-112-03	9/26/2016	11:50	Outfall: NW of Oakfield Ln & Kismet Rd	8'-0" x 8'-8"	600		>2419.6	sample from mouth of culvert
P-112-04	9/23/2016	11:15	Outfall: W of Oakfield Ln & Kismet Rd	66	1200	<0.10	1011.2	clear flow / mild musty odor
P-112-05	9/23/2016	11:12	Outfall: Kismet & Laramie Rds	21	NF	NS	NS	
P-112-06	9/23/2016	14:20	Outfall: Par Dr. & Country Club Blvd.	42	NF	NS	NS	
P-113-01	9/22/2016	12:40	Outfall: SE of Northeast Ave & Red Lion Rd	60	300	0.66	>2419.6	
P-113-02	9/22/2016	12:35	Outfall: SE of Northeast Ave & Red Lion Rd	27	NF	NS	NS	
P-113-03	8/31/2016	11:15	Outfall: SE of Northeast Ave & Gorman St	36	NF	NS	NS	
P-113-04	8/31/2016	11:45	Outfall: NE of Gorman St & Northeast Ave	6'-0" x 11'-1"	30	0.29	3448	
P-113-05	9/22/2016	11:32	Outfall: NW of Bustleton Ave & Red Lion Rd	18	<6	NS	NS	flow too low to sample
P-113-06	8/31/2016	11:40	Outfall: NE of Gorman St & Northeast Ave	42	NF	NS	NS	
P-113-07	9/22/2016	11:25	Outfall: W of Bustleton Ave & Red Lion Rd	60	30	0.36	>2419.6	
P-113-08	9/22/2016	12:00	Outfall: S of Verree Rd & Greymont St	36	180	0.13	>2419.6	
P-113-12	9/22/2016	11:35	Outfall: NW of Bustleton Ave & Red Lion Rd	18	NF	NS	NS	
P-113-13	9/22/2016	11:30	Outfall: NW of Bustleton Ave & Red Lion Rd	21	NF	NS	NS	
P-116-01	8/26/2016	12:05	Outfall: S of Rennard & Nandina Sts	60	NF	NS	NS	
P-116-02	8/26/2016	12:30	Outfall: N of Rennard St & Tomlinson Rd	54	6	<0.10	829.7	

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
July 1, 2016 to September 30, 2016

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (MPN per 100 ml)	Comments
Q-110-01	9/26/2016	12:25	Outfall: SW of Charter & Norcom Rds	36	NF	NS	NS	
Q-110-02	9/26/2016	12:40	Outfall: SW of Darnell & Decatur Rds	42	NF	NS	NS	
Q-110-03	9/26/2016	12:40	Outfall: SW of Darnell & Decatur Rds	42	NF	NS	NS	
Q-110-21	9/26/2016	11:26	Outfall: SW of Charter & Norcom Rds	66	NF	NS	NS	
Q-113-09	9/12/2016	11:55	Outfall: E of Stevens Rd & Sanibel St	4'-0" x 7'-0"	NF	NS	NS	
Q-113-10	9/12/2016	13:00	Outfall: E of Foster & Dedaker Sts	27	NF	NS	NS	
Q-113-11	9/13/2016	11:05	Outfall: W of Bennett Rd & Roosevelt Blvd	36	NF	NS	NS	
Q-114-02	9/7/2016	13:05	E of Bennett Rd & Roosevelt Blvd	42	NF	NS	NS	
Q-114-07	7/18/2016	10:17	SW of Townsend & Thornton Rds	66	NR	0.19	1986.3	creek influence
Q-114-08	7/18/2016	12:45	SW of Townsend & Thornton Rds	42	NF	NS	NS	
Q-114-09	7/18/2016	12:35	SW of Townsend & Thornton Rds (S of creek)	42	NF	NS	NS	
Q-114-10	7/7/2016	10:17	N of Colman Ter & Colman Rd	36	120	0.73	275.5	
Q-114-11	7/7/2016	11:50	NE of Coleman Ter & Coleman Rd	42	0.2	NS	NS	flow too low to sample
Q-114-12	7/7/2016	11:10	S of Medford & Woodhaven Rds	54	2	0.34	1011.2	
Q-114-13	7/7/2016	10:50	SW of Tyrone & Woodhaven Rds	30	NF	NS	NS	
Q-114-14	7/21/2016	11:35	Basile & Woodhaven Rds	21	NF	NS	NS	
Q-114-15	7/21/2016	12:25	NE of Bennet Rd & Roosevelt Blvd (N of creek)	30	NF	NS	NS	
Q-114-16	7/21/2016	12:25	NE of Bennet Rd & Roosevelt Blvd (S of creek)	30	100.2	0.65	4.1	
Q-114-18	7/21/2016	10:50	NW of Woodhaven & Thornton Rds	48	NF	NS	NS	
Q-114-19	9/7/2016	13:00	Bennett Rd & E Roosevelt Blvd	15	NF	NS	NS	
Q-114-20	9/7/2016	13:00	Bennett Rd & E Roosevelt Blvd	15	NF	NS	NS	
Q-114-21	9/7/2016	13:05	Bennett Rd & E Roosevelt Blvd.	42	NF	NS	NS	
Q-114-22	9/7/2016	13:07	Bennett Rd & E Roosevelt Blvd.	42	NF	NS	NS	
Q-114-23	9/7/2016	13:07	Bennett Rd & E Roosevelt Blvd.	18	NF	NS	NS	
W-075-02	7/5/2016		Outfall: Seffert & Lawnton Sts	27	NF	NS	NS	
W-076-07	9/6/2016	11:25	Outfall: SE of Glengarry & St Andrew Rds	42	NF	NS	NS	
W-076-08	7/12/2016	10:50	Outfall: Wolcott Dr & Cornelia Pl	18	30	0.12	866.4	
W-076-09	7/12/2016	10:35	Outfall: SW of Valley Green Rd & Wolcott Dr	48	300	0.14	248.1	
W-076-10	7/12/2016	10:25	Outfall: SW of Valley Green Rd & Wolcott Dr	42	NR	0.17	>2419.6	
W-076-14	9/6/2016	11:15	Outfall: SW of Cherokee St & Hartwell Ln	57	60	0.11	648.8	

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
01206	Fuller	St	P-099-01	12-05-2015		04-08-2016	
00408	Regina	St	Q-117-02	12-07-2015		04-20-2016	
01109	Ripley	St	P-099-01	12-16-2015		04-28-2016	
03131	Stanwood	St	P-091-11	01-30-2016		07-11-2016	
02775	Axe Factory	Rd	P-100-11	02-06-2016		08-11-2016	
09244	Darlington	Rd	P-108-09	04-09-2016		08-08-2016	

B. Properties Active As Of Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Comments
04150	Main	St	S-051-08	02-23-2016		
03847	Red Lion	Rd	Q-106-14	04-08-2016		
00206	Melite	Pl	P-108-11	05-07-2016		
00240	Rock	St	S-052-05	05-27-2016		

Table 4

Spills to Storm Sewers and/or Receiving Waters

July 1, 2016 to September 30, 2016

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
07/08/16	S-052-05 S-051-08	Sumac Street and Rochelle Avenue Main Street and Shurs Lane Schuylkill River	3009 3009	Sewage Sewage	07/08/16	Industrial Waste unit investigated a reported discharge. No active choked sewer identified. Area previously referred to the Defective Connections unit.
08/08/16	W-068-05	Sherman and West Pomona Streets Monoshone Creek	3008 3009	Sewage	08/08/16	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate 3 gpm discharge. Affected area cleaned.
08/19/16	M-005-09	South 84th and Crane Streets Mingo Creek Basin	3009	Sewage	08/19/16	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge.
08/30/16	W-076-14	West Hartwell Lane and Cherokee Street unnamed branch of Wissahickon Creek	3011		08/30/16	Industrial Waste unit investigated a reported discharge. No active sewage overflow identified.
09/15/16		Philadelphia Naval Business Center 1901 Langley Drive	3008	Sewage	09/16/16	The Flow Control unit found the force main between PS # 603 and PS # 796 leaking due to a cracked 22.5 degree bend. Damaged pipe section was replaced. Affected area cleaned by Vactor truck.
09/24/16	W-068-01	8008 Winston Road Cresheim Creek	3009	Sewage	10/03/16	Sewer Maintenance unit found choked 10" diameter sanitary sewer . Bypass pump setup. Excavate, clear choke and repair sanitary sewer.
09/28/16	P-100-13	3044 Holme Avenue Wooden Bridge Run	3008	Sewage	09/28/16	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate 10 gpm discharge. Bypass pump setup. Affected area cleaned.

Source Codes:

3008 - Spill to Ground Only | **3010 - Spill to Sanitary Sewer**

3009 - Spill to Storm Sewer | **3011 - Spill to Receiving Stream**

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from October 1, 2016 to December 31, 2016)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

February 14, 2017

DLC Program Update
4th Quarter 2016

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning October 1, 2016 and ending December 31, 2016.

The body of this report will describe the recent activities of the City during the past quarter within the 1998 COA Priority Outfall areas and at other significant outfalls on the Stormwater Outfall Priority Score list. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported wastewater spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,831 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1.	CFD-01	Plymouth St. west of Pittsville St.
2.	CFD-02	Pittsville St. south of Plymouth St.
3.	CFD-03	Elston St. east of Bouvier St.
4.	CFD-04	Ashley St. west of Bouvier St.
5.	CFD-05	Cheltenham Ave. east of 19th St.
6.	CFD-06	Verbena St. south of Cheltenham Ave.
7.	CFD-07	Cheltenham Ave. east of 7th St.
8.	CFD-08	7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	9	1	0
CFD-02	8	1	0
CFD-03	8	0	0
CFD-04	8	1	0
CFD-05	8	1	0
CFD-06	9	0	0
CFD-07	17	4	0
CFD-08	15	1	0

The most recent fecal sample value was >2419.6 MPN per 100 ml. at the outfall on October 5, 2016.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	7	0	0
MFD-02	7	0	0

The most recent fecal sample value was 261.3 MPN per 100 ml. at the outfall on November 7, 2016.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,746 Complete tests in these sewershed areas, identifying 93 Cross-connections, all of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 2419.6 MPN per 100 ml. at the W-068-05 outfall on December 16, 2016.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,478 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was 1553.1 MPN per 100 ml. at the S-058-01 outfall, >2419.6 MPN per 100 ml. at the S-059-01 outfall, >2419.6 MPN per 100 ml. at the S-059-02 outfall, 1046.2 MPN per 100 ml. at the S-059-03 outfall, all on October 19, 2016, 648.8 MPN per 100 ml. at the S-059-04 outfall, 816.4 MPN per 100 ml. at the S-059-05 outfall and the S-059-09 outfall was found almost dry , all on October 21, 2016.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 5,824 Complete tests in this sewershed, identifying 87 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	20	1	0

The most recent fecal sample value was 1119.9 MPN per 100 ml. at the outfall on October 7, 2016.

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,016 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	20	1	1

The outfall was found dry on October 5, 2016.

3. A current summary of additional outfalls from the Stormwater Outfall Priority Score list that the City has performed complete testing or abatements this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-091-12	4	1	0
P-092-02	7	0	0
P-099-01	1	0	0
P-100-14	3	0	1
P-100-15	21	0	0
P-104-05	2	0	0
P-105-03	10	0	0
P-108-11	0	0	1
P-108-12	54	0	0
P-108-21	36	0	0
P-108-23	26	0	0
P-109-04	45	0	0
P-109-05	77	0	1
P-112-02	26	1	0
P-112-05	14	0	0
P-113-03	14	2	0
P-116-01	33	0	0
P-116-02	1	0	0
Q-101-03	7	(2)	(2)
Q-101-18	13	0	0
Q-106-06	31	0	0
Q-106-09	12	1	0
Q-106-14	0	0	1
Q-106-19	2	0	0
Q-107-01	0	0	2
Q-107-02	1	0	0
Q-107-03	4	0	0
Q-114-10	1	0	1
Q-115-13	15	0	0
Q-115-14	3	0	0
Q-117-02	15	1	0
Q-117-05	1	0	0
Q-120-01	19	0	0
Q-120-08	57	1	0
S-046-06	0	0	1
S-051-08	0	0	1
S-052-05	0	0	1
W-077-02	1	1	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter
- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter
- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter
- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter
- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter
- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter
- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-091-12
- P-100-14
- P-108-21

- P-112-02
- P-113-03
- Q-106-09
- Q-117-02
- Q-120-08
- S-052-05
- W-067-01
- W-077-02

4. Continue to perform property testing within the following outfalls.

- P-092-02
- P-100-15
- P-104-05
- P-105-03
- P-108-10
- P-108-12
- P-108-21
- P-109-04
- P-109-05
- P-112-02
- P-113-03
- Q-102-01
- Q-106-06
- Q-106-13
- Q-110-13
- Q-110-14
- Q-114-10
- Q-115-14

Table 1
DLC Program Summary
<u>October 1, 2016 to December 31, 2016</u>

<u>Complete Tests:</u>

- 58,906 Complete tests have been performed under the DLC program
- **556 Complete tests were performed this past quarter**
- 4 Complete tests were performed in outfall P-091-12
- 7 Complete tests were performed in outfall P-092-02
- 1 Complete test was performed in outfall P-099-01
- 3 Complete tests were performed in outfall P-100-14
- 21 Complete tests were performed in outfall P-100-15
- 2 Complete tests were performed in outfall P-104-05
- 10 Complete tests were performed in outfall P-105-03
- 54 Complete tests were performed in outfall P-108-12
- 36 Complete tests were performed in outfall P-108-21
- 26 Complete tests were performed in outfall P-108-23
- 45 Complete tests were performed in outfall P-109-04
- 77 Complete tests were performed in outfall P-109-05
- 26 Complete tests were performed in outfall P-112-02
- 14 Complete tests were performed in outfall P-112-05
- 14 Complete tests were performed in outfall P-113-03
- 33 Complete tests were performed in outfall P-116-01
- 1 Complete test was performed in outfall P-116-02
- 7 Complete tests were performed in outfall Q-101-03
- 13 Complete tests were performed in outfall Q-101-18
- 31 Complete tests were performed in outfall Q-106-06
- 12 Complete tests were performed in outfall Q-106-09
- 2 Complete tests were performed in outfall Q-106-19
- 1 Complete test was performed in outfall Q-107-02
- 4 Complete tests were performed in outfall Q-107-03
- 1 Complete test was performed in outfall Q-114-10
- 15 Complete tests were performed in outfall Q-115-13
- 3 Complete tests were performed in outfall Q-115-14
- 15 Complete tests were performed in outfall Q-117-02
- 1 Complete test was performed in outfall Q-117-05
- 19 Complete tests were performed in outfall Q-120-01
- 57 Complete tests were performed in outfall Q-120-08
- 1 Complete test was performed in outfall W-077-02

<u>Cross-Connections Found:</u>

- 1,416 Cross-connections have been identified under the DLC program
- **6 Cross-connections were identified this past quarter**
- 1 Cross-connection was identified in outfall P-091-12
- 1 Cross-connection was identified in outfall P-112-02
- 2 Cross-connections were identified in outfall P-113-03
- (2) Cross-connections were identified in outfall Q-101-03
- 1 Cross-connection was identified in outfall Q-106-09
- 1 Cross-connection was identified in outfall Q-117-02
- 1 Cross-connection was identified in outfall Q-120-08
- 1 Cross-connection was identified in outfall W-077-02

<u>Abatements:</u>

- 1,402 Abatements have been performed under the DLC program
- **8 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-100-14
- 1 Abatement was performed in outfall P-108-11
- 1 Abatement was performed in outfall P-109-05
- (2) Abatements were performed in outfall Q-101-03
- 1 Abatement was performed in outfall Q-106-14
- 2 Abatements were performed in outfall Q-107-01
- 1 Abatement was performed in outfall Q-114-10
- 1 Abatement was performed in outfall S-046-06
- 1 Abatement was performed in outfall S-051-08
- 1 Abatement was performed in outfall S-052-05

<u>Outfall/Manhole Screening and Sampling:</u>

- 11 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 9 outfall samples were taken due to observed dry-weather flow during the above inspections

- 10 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 8 outfall samples were taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
October 1, 2016 to December 31, 2016

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (MPN per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	10/5/2016	11:40	Outfall: 7th & Cheltenham	84	4800	0.22	>2419.6	
T-088-01	10/13/2016	10:20	Outfall: 7th & Cheltenham	84	4500	NS	NS	
W-060-01	11/7/2016	11:50	Outfall: Monastery Lane	5'-0" x 4'-4"	90	0.11	261.3	
W-068-05	12/16/2016	11:20	Outfall: Lincoln & Morris	90	35	0.31	2419.6	
S-058-01	10/19/2016	11:55	Outfall: Domino Lane	54	3600	0.20	1553.1	
S-059-01	10/19/2016	12:15	Outfall: Parker	60	1500	0.21	>2419.6	
S-059-02	10/19/2016	12:25	Outfall: Fountain	42	600	0.27	>2419.6	
S-059-03	10/19/2016	12:30	Outfall: Wright	42	1800	0.10	1046.2	
S-059-04	10/21/2016	10:00	Outfall: Leverington	51	NR	0.14	648.8	river influence
S-059-05	10/21/2016	10:05	Outfall: Leverington (east)	4'-0" x 2'-8"	NR	0.15	816.4	river influence
S-059-09	10/21/2016	10:15	Outfall: Green Lane	36	<1	NS	NS	flow too low to sample
B. Permit Inspection Program								
P-090-02	10/7/2016	12:50	Outfall: Brous & Lexington (Sandyford)	156	30	<0.1	1119.9	
S-051-08	10/17/2016	11:45	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.36	17890	manhole S051-08-0010; mild sewage odor
S-051-08	11/7/2016	11:30	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.40	2419.6	manhole S051-08-0010; white bacterial growth & sheen
S-051-08	12/16/2016	12:05	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.35	17720	manhole S051-08-0010; cloudy flow, heavy sewage odor
S-052-05	10/17/2016	11:20	Manhole: Sumac & Rochelle	42	120	0.26	4960	manhole S052-05-0015; clear flow, mild sewage odor
S-052-05	11/7/2016	11:00	Manhole: Sumac & Rochelle	42	1	0.20	1203.3	manhole S052-05-0015; clear flow
S-052-05	12/16/2016	11:45	Manhole: Sumac & Rochelle	42	10	0.62	241960	manhole S052-05-0008: cloudy flow, heavy sewage odor
T-089-04	10/5/2016	11:25	Outfall: W of Franklin Ave. & County Line	3'-0" x 5'-6"	NF	NS	NS	no flow from city side (flow only from township side)
T-089-04	10/13/2016	10:05	Outfall: W of Franklin Ave. & County Line	3'-0" x 5'-6"	100	NS	NS	
T-080-02	11/14/2016	11:30	Outfall: Comly & Newtown	4'-6" x 3'-3"	180	0.39	241960	heavy sewage odor

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
02775	Axe Factory	Rd	P-100-11	02-06-2016		08-11-2016	
04150	Main	St	S-051-08	02-23-2016		11-14-2016	
03847	Red Lion	Rd	Q-106-14	04-08-2016		10-04-2016	
09244	Darlington	Rd	P-108-09	04-09-2016		08-08-2016	
00206	Melite	Pl	P-108-11	05-07-2016		11-15-2016	
12217	Sweet Briar	Rd	Q-114-10	06-17-2016		11-14-2016	
11704	Telfair	Rd	Q-107-01	07-08-2016		12-21-2016	
11742	Telfair	Rd	Q-107-01	07-13-2016		12-21-2016	
05037	Erringer	Pl	S-046-06	07-19-2016		12-21-2016	
00265	Lauriston	St	S-052-05	07-22-2016		12-07-2016	
09035	Wesleyan	Rd	P-100-14	08-06-2016		12-13-2016	

B. Properties Active As Of Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Comments
00240	Rock	St	S-052-05	05-27-2016		
09027	Wesleyan	Rd	P-100-14	08-06-2016		
00206	Rock	St	S-052-05	08-12-2016		

Table 4

Spills to Storm Sewers and/or Receiving Waters

October 1, 2016 to December 31, 2016

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
10/03/16	S-052-05	Ridge Avenue and Dawson Street Schuylkill River	3009	Sewage	10/03/16	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing approximate <1 gpm discharge.
10/06/16	W-076-14	West Hartwell Lane and Cherokee Street unnamed branch of Wissahickon Creek	3009		10/06/16	Industrial Waste and Sewer Maintenance units investigated a reported discharge. No active sewage overflow identified.
10/14/16	S-051-08	Main Street and Shurs Lane Schuylkill River	3009	Sewage	10/14/16	Industrial Waste and Sewer Maintenance units investigated a reported discharge. No active choked sewer identified. Area previously referred to the Defective Connections group.
11/04/16	W-068-05	Sherman and West Pomona Streets	3009	Sewage	11/04/16	Industrial Waste and Sewer Maintenance units investigated a reported discharge.
11/06/16	W-068-05	300 West Mount Pleasant Avenue			11/06/16	Sewer Maintenance unit investigated a reported discharge.
11/06/16	W-068-05	302 West Hortter Street Monoshone Creek			11/11/16	Sewer Maintenance unit excavated and repaired a section of 10" diameter sanitary sewer and a defective storm lateral causing approximate <1 gpm discharge.
11/05/16	W-060-05	6300 Sherman Street Wissahickon Creek	3008	Sewage	11/08/16	Sewer Maintenance unit identified approximate 3 gpm exfiltration / infiltration from 12" diamter sanitary sewer. Affected area cleaned and cleared of debris to allow further investigation.
11/15/16	P-083-03	4700 Tolbut Street Pennypack Creek	3008	Sewage	11/16/16	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate <1 gpm discharge. Bypass pump setup. Affected area cleaned.
12/22/16		Lincoln Drive and Rittenhousetown Lane Monoshone Creek	3008	Sewage	12/22/16	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge. Affected area cleaned.
12/27/16	P-099-03	Tolbut and Evarts Streets Benton Brook	3008	Sewage	12/28/16	Sewer Maintenance unit investigated a reported discharge. No active sewage overflow identified. Further investigation will continue.

Source Codes:

3008 - Spill to Ground Only **3010 - Spill to Sanitary Sewer**

3009 - Spill to Storm Sewer **3011 - Spill to Receiving Stream**

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from January 1, 2017 to March 31, 2017)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

May 15, 2017

DLC Program Update
1st Quarter 2017

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning January 1, 2017 and ending March 31, 2017.

The body of this report will describe the recent activities of the City during the past quarter within the 1998 COA Priority Outfall areas and at other significant outfalls on the Stormwater Outfall Priority Score list. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported wastewater spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,831 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1.	CFD-01	Plymouth St. west of Pittsville St.
2.	CFD-02	Pittsville St. south of Plymouth St.
3.	CFD-03	Elston St. east of Bouvier St.
4.	CFD-04	Ashley St. west of Bouvier St.
5.	CFD-05	Cheltenham Ave. east of 19th St.
6.	CFD-06	Verbena St. south of Cheltenham Ave.
7.	CFD-07	Cheltenham Ave. east of 7th St.
8.	CFD-08	7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	10	0	0
CFD-02	9	2	0
CFD-03	10	0	0
CFD-04	11	2	0
CFD-05	8	1	0
CFD-06	7	0	0
CFD-07	22	5	0
CFD-08	22	2	0

The most recent fecal sample value was 12997 MPN per 100 ml. at the outfall on February 3, 2017.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	6	0	0
MFD-02	6	0	0

The most recent fecal sample value was 461.1 MPN per 100 ml. at the outfall on February 6, 2017.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,764 Complete tests in these sewershed areas, identifying 94 Cross-connections, all but one of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was 27550 MPN per 100 ml. at the W-068-05 outfall on February 6, 2017.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,478 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was >24196 MPN per 100 ml. at the S-058-01 outfall, 11199 MPN per 100 ml. at the S-059-01 outfall, 11199 MPN per 100 ml. at the S-059-02 outfall, 521 MPN per 100 ml. at the S-059-03 outfall, 19863 MPN per 100 ml. at the S-059-04 outfall, <1 MPN per 100 ml. at the S-059-05 outfall and the S-059-09 outfall was found almost dry, all on February 15, 2017.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 5,827 Complete tests in this sewershed, identifying 87 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	17	0	0

The most recent fecal sample value was 723 MPN per 100 ml. at the outfall on January 17, 2017.

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,016 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	22	6	1

The outfall was found dry on February 3, 2017.

3. A current summary of additional outfalls from the Stormwater Outfall Priority Score list that the City has performed complete testing or abatements this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-091-06	6	1	0
P-091-08	1	0	0
P-091-12	3	0	0
P-092-02	13	0	0
P-099-01	1	0	0
P-099-03	18	0	0
P-100-14	1	0	1
P-100-15	32	0	0
P-105-02	1	0	0
P-105-03	13	0	0
P-108-01	1	0	0
P-108-07	1	0	0
P-108-09	42	0	0
P-108-10	16	1	0
P-108-11	3	0	0
P-108-12	21	0	0
P-108-16	1	0	0
P-108-21	11	1	1
P-108-23	3	0	0
P-109-04	9	0	0
P-109-05	13	0	0
P-112-02	20	1	1
P-112-05	6	0	0
P-113-01	1	0	0
P-113-03	21	2	0
P-113-06	1	0	0
P-116-01	3	0	0
Q-101-03	11	2	1
Q-101-04	2	0	0
Q-101-15	4	0	0
Q-102-01	46	1	0
Q-106-04	2	0	0
Q-106-06	5	0	0
Q-106-09	8	0	0
Q-106-13	2	0	0
Q-107-03	15	0	0
Q-107-06	28	0	0
Q-110-13	1	0	0

Q-113-09	1	0	0
Q-115-13	2	0	0
Q-115-14	3	0	0
Q-117-02	6	0	1
Q-120-01	6	0	0
Q-120-08	37	0	0
S-052-05	26	0	2
W-077-02	0	0	1

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-091-06
- P-091-12
- P-108-10
- P-108-21
- P-112-02
- P-113-03
- Q-101-03
- Q-102-01
- Q-106-09
- Q-120-08
- W-060-10
- W-067-01

4. Continue to perform property testing within the following outfalls.

- P-099-03
- P-100-14
- P-103-01
- P-108-10
- P-109-05
- Q-101-03
- Q-120-08
- S-052-05

Table 1
DLC Program Summary
January 1, 2017 to March 31, 2017

Complete Tests:
- 59,376 Complete tests have been performed under the DLC program
- **470 Complete tests were performed this past quarter**
- 3 Complete tests were performed in outfall P-090-02
- 6 Complete tests were performed in outfall P-091-06
- 1 Complete test was performed in outfall P-091-08
- 3 Complete tests were performed in outfall P-091-12
- 13 Complete tests were performed in outfall P-092-02
- 1 Complete test was performed in outfall P-099-01
- 18 Complete tests were performed in outfall P-099-03
- 1 Complete test was performed in outfall P-100-14
- 32 Complete tests were performed in outfall P-100-15
- 1 Complete test was performed in outfall P-105-02
- 13 Complete tests were performed in outfall P-105-03
- 1 Complete test was performed in outfall P-108-01
- 1 Complete test was performed in outfall P-108-07
- 42 Complete tests were performed in outfall P-108-09
- 16 Complete tests were performed in outfall P-108-10
- 3 Complete tests were performed in outfall P-108-11
- 21 Complete tests were performed in outfall P-108-12
- 1 Complete test was performed in outfall P-108-16
- 11 Complete tests were performed in outfall P-108-21
- 3 Complete tests were performed in outfall P-108-23
- 9 Complete tests were performed in outfall P-109-04
- 13 Complete tests were performed in outfall P-109-05
- 20 Complete tests were performed in outfall P-112-02
- 6 Complete tests were performed in outfall P-112-05
- 1 Complete test was performed in outfall P-113-01
- 21 Complete tests were performed in outfall P-113-03
- 1 Complete test was performed in outfall P-113-06
- 3 Complete tests were performed in outfall P-116-01
- 11 Complete tests were performed in outfall Q-101-03
- 2 Complete tests were performed in outfall Q-101-04
- 4 Complete tests were performed in outfall Q-101-15
- 46 Complete tests were performed in outfall Q-102-01
- 2 Complete tests were performed in outfall Q-106-04
- 5 Complete tests were performed in outfall Q-106-06
- 8 Complete tests were performed in outfall Q-106-09
- 2 Complete tests were performed in outfall Q-106-13
- 15 Complete tests were performed in outfall Q-107-03
- 28 Complete tests were performed in outfall Q-107-06
- 1 Complete test was performed in outfall Q-110-13
- 1 Complete test was performed in outfall Q-113-09
- 2 Complete tests were performed in outfall Q-115-13
- 3 Complete tests were performed in outfall Q-115-14
- 6 Complete tests were performed in outfall Q-117-02
- 6 Complete tests were performed in outfall Q-120-01
- 37 Complete tests were performed in outfall Q-120-08
- 26 Complete tests were performed in outfall S-052-05
- 1 Complete test was performed in outfall W-060-10
- (1) Complete test was performed in outfall W-060-11

Cross-Connections Found:
- 1,426 Cross-connections have been identified under the DLC program
- **10 Cross-connections were identified this past quarter**
- 1 Cross-connection was identified in outfall P-091-06
- 1 Cross-connection was identified in outfall P-108-10
- 1 Cross-connection was identified in outfall P-108-21
- 1 Cross-connection was identified in outfall P-112-02
- 2 Cross-connections were identified in outfall P-113-03
- 2 Cross-connections were identified in outfall Q-101-03
- 1 Cross-connection was identified in outfall Q-102-01
- 1 Cross-connection was identified in outfall W-060-10

Abatements:
- 1,410 Abatements have been performed under the DLC program
- **8 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-100-14
- 1 Abatement was performed in outfall P-108-21

- 1 Abatement was performed in outfall P-112-02
- 1 Abatement was performed in outfall Q-101-03
- 1 Abatement was performed in outfall Q-117-02
- 2 Abatements were performed in outfall S-052-05
- 1 Abatement was performed in outfall W-077-02

Outfall/Manhole Screening and Sampling:

- 10 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 9 outfall samples were taken due to observed dry-weather flow during the above inspections

- 48 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 31 outfall samples were taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
January 1, 2017 to March 31, 2017

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (MPN per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	2/3/2017	11:53	Outfall: 7th & Cheltenham	84	5700	0.17	12997	
W-060-01	2/6/2017	11:30	Outfall: Monastery Lane	5'-0" x 4'-4"	150	<0.10	461.1	clear flow, no sheen or odor
W-068-05	2/6/2017	12:24	Outfall: Lincoln & Morris	90	4500	0.31	27550	clear flow, mild sewage odor
S-058-01	2/15/2017	11:30	Outfall: Domino Lane	54	1800	0.31	>24196	cloudy, slight sewage odor and yellow tint
S-059-01	2/15/2017	12:00	Outfall: Parker	60	1800	0.28	11199	clear, mild cloudiness, no odor
S-059-02	2/15/2017	12:15	Outfall: Fountain	42	900	0.67	11199	clear, mild cloudiness and sewage odor
S-059-03	2/15/2017	12:20	Outfall: Wright	42	900	0.22	521	clear flow, no odor
S-059-04	2/15/2017	12:35	Outfall: Leverington	51	NR	0.26	19863	river influence, mild sewage odor
S-059-05	2/15/2017	12:37	Outfall: Leverington (east)	4'-0" x 2'-8"	NR	0.55	<1	river influence
S-059-09	2/15/2017	12:45	Outfall: Green Lane	36	3	NS	NS	flow too low to sample, no odor
B. Permit Inspection Program								
P-090-02	1/17/2017	11:42	Outfall: Brous & Lexington (Sandyford)	156	10	0.18	723	clear flow, mild sewage odor
T-089-04	2/3/2017	11:30	Outfall: W of Franklin Ave. & County Line	3'-0" x 5'-6"	NF	NS	NS	no flow from city side (flow only from township side)
S-051-08	1/30/2017	11:50	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.37	4352	manhole S-051-08-0010, cloudy, moderate sewage debris and odor
S-051-08	3/24/2017	10:40	Manhole: Main St & Shurs Ln	9'-0" x 7'-0"	NR	0.40	42.2	manhole S-051-08-0010, clear, no sheen or odor
S-052-05	1/30/2017	11:35	Manhole: Sumac & Rochelle	42	1200	0.64	>2419.6	manhole S-052-05-0008, cloudy, moderate sewage debris and odor
S-052-05	3/24/2017	10:21	Manhole: Sumac & Rochelle	42	3600	0.64	>2419	manhole S-052-05-0008, cloudy, moderate sewage debris and odor
P-099-03	1/10/2017	11:53	Outfall: Castor Ave & Tustin Ave	6'-0" x 7'-6"	60	0.53	>2419.6	clear flow, mild sewage debris and soap odor
P-099-03	1/17/2017	11:18	Outfall: Castor Ave & Tustin Ave	6'-0" x 7'-6"	60	0.48	>2419.6	clear flow, mild sewage debris and odor
P-099-03	2/16/2017	10:45	Outfall: Castor Ave & Tustin Ave	6'-0" x 7'-6"	180	0.50	>2419.6	clear flow, mild sewage debris and odor, mild sudsing
P-109-01	3/3/2017	11:50	Outfall: Bartlet St. & Fenwick Rd	72	30	0.62	>2419.6	mild sewage odor
P-109-02	3/3/2017	12:40	Outfall: Bustleton & Norwalk Rd	30	NR	1.07	>2419.6	submerged outfall
P-109-03	3/3/2017	12:40	Outfall: Bustleton & Norwalk Rd	24	NF	NS	NS	
P-109-04	3/6/2017	11:04	Outfall: Bustleton & Haldeman Ave	54	NF	NS	NS	
P-109-05	3/3/2017	12:00	Outfall: Norwalk Rd & Walley Ave	42	NF	NS	NS	
P-109-14	3/3/2017	12:00	Outfall: Norwalk Rd & Walley Ave	27	NF	NS	NS	
Q-101-05	3/13/2017	10:10	Oufall: Grant & Fordham (east)	54	300	0.44	121.1	clear, no sheen or odor
Q-101-09	3/13/2017	10:25	Oufall: Ditman & Eden (east)	7'-0" x 9'-0"	300	0.58	547.5	cloudy. slight sudsing
Q-101-13	3/7/2017	14:30	Outfall: Brook and Stevenson	18	NF	NS	NS	
Q-101-14	3/7/2017	14:25	Outfall: Pearson and Crispin	18	NF	NS	NS	
Q-101-15	3/13/2017	11:25	Oufall: Brook & Carteret	18	NR	0.17	116.9	submerged outfall, clear, no sheen or odor
Q-101-16	3/13/2017	11:30	Oufall: Brook & Rowena	18	NR	NS	NS	flow too low to sample, clear, no sheen or odor
Q-101-17	3/13/2017	11:45	Oufall: Morrell & Crestmont	30	NF	NS	NS	
Q-101-18	3/13/2017	11:40	Oufall: Morrell & Crestmont	27	NF	NS	NS	
Q-101-19	3/13/2017	11:00	Oufall: Morrell & Vale	36	180	<0.10	1732.9	clear, no sheen, slight musty and hydrogen sulfide odor
Q-110-12	3/13/2017	10:43	Outfall: Salina and Newberry	30	NF	NS	NS	
Q-110-13	3/13/2017	10:12	Outfall: Academy and Newberry (south)	36	NR	0.21	120.1	submerged outfall, clear, no sheen or odor
Q-110-14	3/13/2017	10:15	Outfall: Academy and Newberry (north)	54	NF	NS	NS	
Q-110-15	3/13/2017	11:20	Oufall: Waldemire and Byrne	60	60	<0.10	2419.6	clear, no sheen or odor
Q-110-16	3/13/2017	11:09	Oufall: Chalfont and Keswick	36	140	<0.10	21.8	clear, no sheen or odor
T-089-01	2/28/2017	13:58	Outfall: Passmore St & Newtown Ave	36	NF	NS	NS	partially submerged outfall

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
January 1, 2017 to March 31, 2017

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (MPN per 100 ml)	Comments
T-089-02	3/6/2017	11:35	Outfall: Hasbrook & Kerper	30	18	<0.10	<1	clear flow, no sheen or odor
T-089-03	2/1/2017	11:25	Outfall: Woodland & Lincoln Ave	42	120	0.64	8164	no odor
T-089-03	3/6/2017	11:22	Outfall: Woodland & Lincoln Ave	42	30	0.65	1112	mild musty odor
T-097-01	3/6/2017	12:35	Outfall: Cheltenham Ave & Vernon Rd	42	NF	NS	NS	
T-097-02	3/6/2017	12:47	Outfall: Cheltenham Ave & Vernon Rd	24	30	0.23	>24196	clear flow, mild musty odor
W-068-04	2/6/2017	12:15	Outfall: Johnson St & Lincoln Dr	12	600	0.11	9.4	orange colored water
W-068-06	2/6/2017	11:25	Manhole: Wayne & North Mt. Pleasant Ave	36	5	0.68	<1	sampled from manhole
W-076-11	2/6/2017	11:55	Outfall: Cherokee St & St. Martins Lane	36	5	0.69	<1	
W-076-12	2/6/2017	12:10	Outfall: St. Martins Lane & Huron St	66	NF	0.63	14140	no flow, liquid pooled in cracks between cobble stones at outfal
W-077-01	2/6/2017	11:50	Outfall: Elmen St. & Cresheim Rd	48	NF	NS	NS	
W-084-01	2/28/2017	10:05	Outfall: Bells Mills Rd & Forbidden Dr	36	180	<0.10	68.3	clear, no sheen or odor
W-084-02	2/28/2017	9:50	Outfall: Bells Mills Rd & Lykens Ln	48	1200	0.69	96	clear, no sheen or odor
W-084-03	2/27/2017	10:55	Outfall: Lykens Ln & Ronnie Cr	18	NF	NS	NS	
W-084-04	2/27/2017	11:00	Outfall: Lykens Ln & Ronnie Cr	24	NF	NS	NS	
W-085-01	2/28/2017	10:15	Outfall: Forbidden Dr & Wissahickon	48	NR	0.42	28.8	clear, no sheen or odor
W-085-02	2/21/2017	10:30	Outfall: Germantown Ave. & Cresheim Valley Rd (east)	36	180	<0.10	>2419.6	clear, no sheen or odor
W-086-01	2/21/2017	10:05	Outfall: Germantown Ave.& Cresheim Valley Rd (west)	6'-0"x 7'-6"	300	0.20	>2419.6	clear, no sheen or odor
W-086-02	2/21/2017	10:00	Outfall: Rex Ave & Seminole St	42	180	0.65	>2419.6	clear flow, slight musty odor

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
04150	Main	St	S-051-08	02-23-2016		11-14-2016	
00206	Melite	Pl	P-108-11	05-07-2016		11-15-2016	
00240	Rock	St	S-052-05	05-27-2016		01-31-2017	
12217	Sweet Briar	Rd	Q-114-10	06-17-2016		11-14-2016	
11704	Telfair	Rd	Q-107-01	07-08-2016		12-21-2016	
11742	Telfair	Rd	Q-107-01	07-13-2016		12-21-2016	
05037	Erringer	Pl	S-046-06	07-19-2016		12-21-2016	
00265	Lauriston	St	S-052-05	07-22-2016		12-07-2016	
09035	Wesleyan	Rd	P-100-14	08-06-2016		12-13-2016	
09027	Wesleyan	Rd	P-100-14	08-06-2016		01-10-2017	
00206	Rock	St	S-052-05	08-12-2016		01-19-2017	
00404	Woodhaven	Rd	Q-117-02	11-17-2016		03-24-2017	

B. Properties Active As Of Reporting:

Address	Outfall Code	Complete Date	Admin. Action	Comments

Table 4
Spills to Storm Sewers and/or Receiving Waters
January 1, 2017 to March 31, 2017

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
01/04/17	S-046-07	Greenbrier Club Apartments - 3901 Conshohocken Avenue Unnamed tributary of the Schuylkill River	3011	Sewage	01/05/17	Sewer Maintenance and Industrial Waste units investigated a reported discharge. No choked sewer identified. PA DEP to follow-up with apartment complex management.
01/15/17	Q-120-08 Q-120-09	Trevose Road and Edison Avenue unnamed tributary of the Poquessing Creek	3009		01/16/17	Industrial Waste unit investigated a reported discharge. No active overflow identified.
01/22/17	P-116-02	Lockart Road, between Lockart Lane and Alnus Place Huntingdon Valley Creek	3009	Sewage	01/22/17	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge. Affected area cleaned.
01/30/17	P-105-01	Bustleton and Pearson Avenues Wooden Bridge Run	3009	Sewage	01/30/17	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate 1 gpm discharge. Storm sewer flushed with dechlorinated water.
02/01/17	T-089-03	Tyson Avenue and Shelbourne Street	3009		02/02/17	Industrial Waste unit investigated a reported discharge. No choked sewer identified.
02/13/17	T-089-03	422 Princeton Street unnamed tributary of the Tacony Creek	3009	Water	02/14/17	Industrial Waste unit observed an orange colored discharge at the outfall. Discharge no longer visible after leaking water service line curb stop was shutoff by the Customer Service unit.
02/02/17		Saylor Grove Wetland - Wissahickon and Rittenhouse Avenues Monoshone Creek	3009		02/03/17	Sewer Maintenance and Industrial Waste units investigated a report of sewage at the influent to the wetland. No choked sewer identified.
02/20/17		Northeast Water Pollution Control Plant 3900 Richmond Street	3011	Sewage sludge	02/20/17	Industrial Waste unit investigated a possible spill at the barge pier. No problems were observed during the inspection. Report was based on a difference between the reported and actual quantity of sludge loaded.
02/21/17	W-067-06	900 West Mount Airy Avenue unnamed tributary of the Wissahickon Creek	3009	Sewage	02/21/17	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge. Storm sewer flushed with dechlorinated water. Affected area cleaned.
02/23/17	S-50	4900 Monument Road	3008	Sewage	02/23/17	Error by PWD contractor (Carusone Inc. / Work # S-40891-RDG) resulted in overnight discharge to street surface and W/C. Contractor responsible for clean up.
03/08/17	T-088-01	West Cheltenham Avenue and North 7th Street Mill Run (tributary to Tacony Creek)	3009		03/09/17	Sewer Maintenance and Industrial Waste units investigated a reported discharge. No choked sewer identified. There were multiple water distribution systems issues noted nearby (leaking hydrant - Philadelphia, water main leak - Cheltenham, water service leak - Cheltenham). No problems noted with PWD contractor at Broad Street and 70th Avenue (JPC Group Inc. / Work #40361).
03/17/17	T-088-01	West Cheltenham Avenue and North 7th Street Mill Run (tributary to Tacony Creek)	3009		03/18/17	Industrial Waste unit investigated a reported discharge. Problems noted with PWD contractor at Broad Street and 70th Avenue (JPC Group Inc. / Work #40361) not thought to be responsible for discharge. Observation of elevated flow at outfall may have been due to melting snow.
03/29/17	W-068-05	338 West Hortter Street Monoshone Creek	3008 3009	Sewage	03/29/17	Sewer Maintenance unit excavated and repaired damaged section of 10" diameter sanitary sewer causing <1 gpm discharge thru FAI to storm inlet. Bypass pump setup.
03/29/17	D-092-05	9300 North Delaware Avenue Delaware River	3009	Sewage	03/29/17	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate 1 gpm discharge. Storm sewer flushed with dechlorinated water.
03/29/17	S-052-05	Ridge and Manayunk Avenues Schuylkill River	3009	Sewage	03/29/17	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing approximate <1 gpm discharge.

Source Codes:

3008 - Spill to Ground Only | **3010 - Spill to Sanitary Sewer**

3009 - Spill to Storm Sewer | **3011 - Spill to Receiving Stream**

STORM WATER MANAGEMENT PROGRAM
NPDES PERMIT NO. PA0054712

DEFECTIVE LATERAL CONNECTION STATUS REPORT
(Covering Period from April 1, 2017 to June 30, 2017)

Submitted to

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY MANAGEMENT

By

CITY OF PHILADELPHIA
PHILADELPHIA, PA

August 14, 2017

DLC Program Update
2nd Quarter 2017

I. INTRODUCTION

This Defective Lateral Connection Status Report is submitted to the Pennsylvania Department of Environmental Protection (PADEP) as part of the reporting requirements of the City of Philadelphia NPDES Storm Water Management Permit No. PA 0054712. The report covers the three-month period beginning April 1, 2017 and ending June 30, 2017.

The body of this report will describe the recent activities of the City during the past quarter within the 1998 COA Priority Outfall areas and at other significant outfalls on the Stormwater Outfall Priority Score list. Additionally, goals for the next quarter will be listed.

Table 1 provides a summary of the program with respect to Complete tests, Cross-connections identified, and Abatements performed. Table 2 provides a listing of all laboratory analyses of samples taken at stormwater outfalls or within the stormwater system during the previous quarter. Table 3 provides a listing of properties with cross-connections outstanding greater than 120 days. Finally, Table 4 provides a listing of reported wastewater spills to the stormwater system or receiving streams.

II. PAST QUARTER REVIEW

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

DLC program activities have performed 2,831 Complete tests in this sewershed, identifying 132 Cross-connections, all of which have been Abated.

Eight (8) sites intercepting flow are listed below.

1.	CFD-01	Plymouth St. west of Pittsville St.
2.	CFD-02	Pittsville St. south of Plymouth St.
3.	CFD-03	Elston St. east of Bouvier St.
4.	CFD-04	Ashley St. west of Bouvier St.
5.	CFD-05	Cheltenham Ave. east of 19th St.
6.	CFD-06	Verbena St. south of Cheltenham Ave.
7.	CFD-07	Cheltenham Ave. east of 7th St.
8.	CFD-08	7th St. south of Cheltenham Ave.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	9	1	0
CFD-02	9	0	0
CFD-03	9	0	0
CFD-04	11	1	0
CFD-05	7	0	0
CFD-06	8	0	0
CFD-07	24	3	0
CFD-08	18	3	0

The most recent fecal sample value was 10462 MPN per 100 ml. at the outfall on April 13, 2017.

2. Monastery Ave. Outfall (W-060-01)

DLC program activities have performed 611 Complete tests in this sewershed, identifying 16 Cross-connections, all of which have been Abated.

Two (2) sites intercepting flow are listed below.

1. MFD-01 Jannette St. west of Monastery Ave.
2. MFD-02 Green La. north of Lawnton St.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
MFD-01	6	0	0
MFD-02	6	0	0

The most recent fecal sample value was 1553.1 MPN per 100 ml. at the outfall on May 3, 2017.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

DLC program activities have performed 2,764 Complete tests in these sewershed areas, identifying 94 Cross-connections, all but one of which have been Abated. The majority of the efforts have been in the W-068-05 sewershed area which is by far the largest in terms of drainage area and properties served.

The most recent fecal sample value was >2419.6 MPN per 100 ml. at the W-068-05 outfall on April 11, 2017.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

DLC program activities have performed 2,478 Complete tests in these sewershed areas, identifying 61 Cross-connections, all of which have been Abated. The majority of the efforts have been in the S-059-04 sewershed area.

The most recent fecal sample value was 17329 MPN per 100 ml. at the S-058-01 outfall, 7701 MPN per 100 ml. at the S-059-01 outfall, >24196 MPN per 100 ml. at the S-059-02 outfall, 842 MPN per 100 ml. at the S-059-03 outfall, 1918 MPN per 100 ml. at the S-059-04 outfall, >24196 MPN per 100 ml. at the S-059-05 outfall and the S-059-09 outfall was found almost dry, all on April 12, 2017.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

DLC program activities have performed 5,831 Complete tests in this sewershed, identifying 87 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. PFD-01 Sandyford Run (Brous and Lexington Aves.)

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
PFD-01	25	1	0

The outfall was found dry on April 13, 2017.

2. Franklin and Hasbrook Outfall (T-089-04)

DLC program activities have performed 1,017 Complete tests in this sewershed, identifying 46 Cross-connections, all of which have been Abated.

One (1) site intercepting flow is listed below.

1. CFD-01 Franklin and Hasbrook Aves.

The number of inspections, blockages cleared and discharges noted during this quarter are listed below.

Flap Gate	Inspections	Blockages	Discharges
CFD-01	29	6	2

The outfall was found dry on April 10, 2017.

3. A current summary of additional outfalls from the Stormwater Outfall Priority Score list that the City has performed complete testing or abatements this quarter is as follows.

Outfall #	Complete Tests	Cross-Connections	Abatements
P-091-04	2	0	0
P-091-06	1	0	0
P-091-12	0	0	1
P-092-02	1	0	0
P-099-02	1	0	0
P-099-03	7	0	0
P-099-04	1	0	0
P-100-14	4	1	0
P-100-15	1	0	0
P-100-21	1	0	0
P-103-01	1	0	0
P-104-05	1	0	0
P-104-10	1	0	0
P-105-01	2	0	0
P-105-03	1	0	0
P-105-13	103	3	0
P-108-07	1	0	0
P-108-09	4	0	0
P-108-10	2	0	1
P-108-12	1	0	0
P-108-21	2	0	1
P-109-04	2	0	0
P-109-05	2	0	0
P-112-01	1	0	0
P-112-02	1	1	1
P-112-05	2	0	0
P-113-03	0	0	4
Q-101-03	1	0	0
Q-101-04	1	0	0
Q-102-01	2	0	1
Q-106-06	18	0	0
Q-106-09	0	0	1
Q-107-06	1	0	0
Q-107-07	1	0	0
Q-110-07	1	0	0
Q-110-14	1	1	0
Q-114-10	1	1	0
Q-115-12	2	0	0
Q-115-14	1	0	0

Outfall #	Complete Tests	Cross-Connections	Abatements
Q-117-02	8	0	0
Q-117-03	1	0	0
Q-120-08	34	1	1
Q-120-11	1	0	0
S-052-05	155	1	0
S-066-01	2	2	0
T-080-02	9	1	(1)
T-089-03	47	2	0

III. NEXT QUARTER GOALS

A. Priority Outfalls

1. 7th & Cheltenham Outfall (T-088-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

2. Monastery Ave. Outfall (W-060-01)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatuses.
- Continue sampling at the outfall with dry-weather flow.

3. Monoshone Creek Outfalls (W-060-04, W-060-08, W-060-09, W-060-10, W-060-11, W-068-04 and W-068-05)

Goals for the Quarter

- Continue sampling at outfall W-068-05 with dry-weather flow.

4. Manayunk Canal Outfalls (S-051-06, S-058-01, S-059-01 through S-059-11)

Goals for the Quarter

- Continue sampling at the outfalls with dry-weather flow.

B. Other Outfalls

1. Sandyford Run Outfall (P-090-02)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

2. Franklin and Hasbrook Outfall (T-089-04)

Goals for the Quarter

- Continue to monitor the operation of the diversion apparatus.

3. Continue to perform abatements of identified cross-connections within the following outfalls.

- P-091-06
- P-100-14
- P-105-13
- P-112-02
- Q-101-03
- Q-110-14
- Q-114-10
- Q-120-08
- S-052-05
- S-066-01
- T-080-02
- T-089-03
- W-060-10
- W-067-01

4. Continue to perform property testing within the following outfalls.

- P-100-04
- P-100-17
- P-100-20
- S-052-05
- T-089-03

Table 1
DLC Program Summary
April 1, 2017 to June 30, 2017

Complete Tests:

- 59,814 Complete tests have been performed under the DLC program
- **438 Complete tests were performed this past quarter**
- 4 Complete tests were performed in outfall P-090-02
- 2 Complete tests were performed in outfall P-091-04
- 1 Complete test was performed in outfall P-091-06
- 1 Complete test was performed in outfall P-092-02
- 1 Complete test was performed in outfall P-099-02
- 7 Complete tests were performed in outfall P-099-03
- 1 Complete test was performed in outfall P-099-04
- 4 Complete tests were performed in outfall P-100-14
- 1 Complete test was performed in outfall P-100-15
- 1 Complete test was performed in outfall P-100-21
- 1 Complete test was performed in outfall P-103-01
- 1 Complete test was performed in outfall P-104-05
- 1 Complete test was performed in outfall P-104-10
- 2 Complete tests were performed in outfall P-105-01
- 1 Complete test was performed in outfall P-105-03
- 103 Complete tests were performed in outfall P-105-13
- 1 Complete test was performed in outfall P-108-07
- 4 Complete tests were performed in outfall P-108-09
- 2 Complete tests were performed in outfall P-108-10
- 1 Complete test was performed in outfall P-108-12
- 2 Complete tests were performed in outfall P-108-21
- 2 Complete tests were performed in outfall P-109-04
- 2 Complete tests were performed in outfall P-109-05
- 1 Complete test was performed in outfall P-112-01
- 1 Complete test was performed in outfall P-112-02
- 2 Complete tests were performed in outfall P-112-05
- 1 Complete test was performed in outfall Q-101-03
- 1 Complete test was performed in outfall Q-101-04
- 2 Complete tests were performed in outfall Q-102-01
- 18 Complete tests were performed in outfall Q-106-06
- 1 Complete test was performed in outfall Q-107-06
- 1 Complete test was performed in outfall Q-107-07
- 1 Complete test was performed in outfall Q-110-07
- 1 Complete test was performed in outfall Q-110-14
- 1 Complete test was performed in outfall Q-114-10
- 2 Complete tests were performed in outfall Q-115-12
- 1 Complete test was performed in outfall Q-115-14
- 8 Complete tests were performed in outfall Q-117-02
- 1 Complete test was performed in outfall Q-117-03
- 34 Complete tests were performed in outfall Q-120-08
- 1 Complete test was performed in outfall Q-120-11
- 155 Complete tests were performed in outfall S-052-05
- 2 Complete tests were performed in outfall S-066-01
- 9 Complete tests were performed in outfall T-080-02
- 47 Complete tests were performed in outfall T-089-03
- 1 Complete test was performed in outfall T-089-04

Cross-Connections Found:

- 1,440 Cross-connections have been identified under the DLC program
- **14 Cross-connections were identified this past quarter**
- 1 Cross-connection was identified in outfall P-100-14
- 3 Cross-connections were identified in outfall P-105-13
- 1 Cross-connection was identified in outfall P-112-02
- 1 Cross-connection was identified in outfall Q-110-14
- 1 Cross-connection was identified in outfall Q-114-10
- 1 Cross-connection was identified in outfall Q-120-08
- 1 Cross-connection was identified in outfall S-052-05
- 2 Cross-connections were identified in outfall S-066-01
- 1 Cross-connection was identified in outfall T-080-02
- 2 Cross-connections were identified in outfall T-089-03

Abatements:

- 1,420 Abatements have been performed under the DLC program
- **10 Abatements were performed this past quarter**
- 1 Abatement was performed in outfall P-091-12
- 1 Abatement was performed in outfall P-108-10
- 1 Abatement was performed in outfall P-108-21
- 1 Abatement was performed in outfall P-112-02
- 4 Abatements were performed in outfall P-113-03
- 1 Abatement was performed in outfall Q-102-01
- 1 Abatement was performed in outfall Q-106-09
- 1 Abatement was performed in outfall Q-120-08
- (1) Abatement was performed in outfall T-080-02

Outfall/Manhole Screening and Sampling:

- 10 outfall inspections were made as part of the Priority Outfall Inspection Program this past quarter
- 9 outfall samples were taken due to observed dry-weather flow during the above inspections

- 53 outfall inspections were made as part of the Permit Inspection Program this past quarter
- 30 outfall samples were taken due to observed dry-weather flow during the above inspections

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
April 1, 2017 to June 30, 2017

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (MPN per 100 ml)	Comments
A. Priority Outfalls								
T-088-01	4/13/2017	12:10	Outfall: 7th & Cheltenham	84	5400	0.13	10462	clear flow, no sheen or odor
W-060-01	5/3/2017	13:00	Outfall: Monastery Lane	5'-0" x 4'-4"	NR	0.11	1553.1	
W-068-05	4/11/2017	11:40	Outfall: Lincoln & Morris	90	7200	0.21	>2419.6	mild sewage and musty odor
S-058-01	4/12/2017	11:25	Outfall: Domino Lane	54	1800	0.21	17329	clear, light yellow tint
S-059-01	4/12/2017	12:05	Outfall: Parker	60	900	0.22	7701	clear, no odor
S-059-02	4/12/2017	12:15	Outfall: Fountain	42	300	0.21	>24196	clear, mild sewage odor
S-059-03	4/12/2017	12:20	Outfall: Wright	42	900	0.12	842	clear flow, no odor
S-059-04	4/12/2017	12:50	Outfall: Leverington	51	NR	0.27	1918	river influence, mild sewage odor, suds
S-059-05	4/12/2017	12:55	Outfall: Leverington (east)	4'-0" x 2'-8"	NR	0.16	>24196	river influence, minor sewage odor
S-059-09	4/12/2017	12:45	Outfall: Green Lane	36	6	NS	NS	flow too low to sample, no odor
B. Permit Inspection Program								
P-090-02	4/13/2017	11:35	Outfall: Brous & Lexington (Sandyford)	156	NF	NS	NS	
T-089-04	4/10/2017	10:40	Outfall: W of Franklin Ave & County Line	3'-0" x 5'-6"	NF	NS	NS	no flow from city side (flow only from township side)
S-051-08	5/10/2017	8:00	Manhole: Main & Shurs	9'-0" x 7'-0"	NR	0.37	17220	manhole S-051-08-0010, no sheen or odor, slight suspended solids
S-051-08	5/10/2017	10:25	Manhole: Main & Shurs	9'-0" x 7'-0"	NR	0.37	14136	manhole S-051-08-0010, no sheen, slight sweet odor, slight suspended solids
S-051-08	5/10/2017	11:52	Manhole: Main & Shurs	9'-0" x 7'-0"	NR	0.38	241960	manhole S-051-08-0125, cloudy, sewage odor, heavy suspended solids
S-051-08	5/10/2017	14:50	Manhole: Main & Shurs	9'-0" x 7'-0"	NR	0.35	72700	manhole S-051-08-0010, clear, no sheen or odor, slight suspended solids
S-051-08	5/10/2017	18:40	Manhole: Main & Shurs	9'-0" x 7'-0"	NR	0.38	9804	manhole S-051-08-0010, clear, no sheen, very slight sweet odor, slight suspended solids
S-051-08	5/10/2017	23:25	Manhole: Main & Shurs	9'-0" x 7'-0"	NR	0.37	6867	manhole S-051-08-0010, clear, no sheen or odor
S-052-05	5/10/2017	7:25	Manhole: Sumac & Rochelle	42	120	0.35	1850	manhole S-052-05-0015, clear, no sheen or odor
S-052-05	5/10/2017	10:00	Manhole: Sumac & Rochelle	42	300	0.36	1553.1	manhole S-052-05-0015, clear, no sheen or odor
S-052-05	5/10/2017	14:25	Manhole: Sumac & Rochelle	42	NR	0.36	1299.7	manhole S-052-05-0015, clear, no sheen or odor
S-052-05	5/10/2017	18:15	Manhole: Sumac & Rochelle	42	NR	0.37	1986.3	manhole S-052-05-0015, clear, no sheen or odor
S-052-05	5/10/2017	22:10	Manhole: Sumac & Rochelle	42	NR	0.36	866.4	manhole S-052-05-0015
P-099-03	4/13/2017	11:00	Outfall: Tustin & Bustleton	7'-0"X 6'-6"	120	0.55	12033	clear, no sheen, moderate sewage odor
P-105-01	5/2/2017	13:50	Outfall: Roosevelt Blvd & Goodnaw	102	NF	NS	NS	
P-105-02	6/12/2017	11:15	Outfall: Winchester & Mather	60	252	0.35	2419.6	clear, no sheen or odor
P-105-03	6/12/2017	11:40	Outfall: Grant & Roosevelt Blvd	4'-0" x 7'-7"	NF	NS	NS	
P-105-04	5/1/2017	13:55	Outfall: Bluegrass & Welsh (east side)	30	NR	0.45	980.4	creek influence
P-105-04	5/2/2017	13:25	Outfall: Bluegrass & Welsh (east side)	30	NF	NS	NS	
P-105-Unk	5/2/2017	13:15	Outfall: Bluegrass & Welsh (west side)	32	951	0.25	648.8	creek influence
P-105-05	5/2/2017	13:20	Outfall: Bluegrass & Welsh	32	95	0.11	>2419.6	no sheen or odor
P-105-06	6/12/2017	10:30	Outfall: Gregg & Old Bustleton	6'-0" x 9'-9"	NF	NS	NS	outfall submerged
P-105-07	5/18/2017	11:00	Outfall: Grant & Ashton	48	50	0.10	206.4	clear, no sheen, slight suds, moderate hydrogen sulfide odor
P-105-08	5/18/2017	11:30	Outfall: Grant & Ashton (NW)	36	95	0.10	866.4	clear, no sheen or odor
P-105-09	6/2/2017	12:35	Outfall: Grant & Blue Grass	21	NF	NS	NS	
P-105-10	6/2/2017	12:40	Outfall: Grant & Blue Grass	24	NF	NS	NS	
P-105-11	6/2/2017	13:15	Outfall: Grant & Blue Grass	36	NF	NS	NS	
P-105-12	6/2/2017	13:20	Outfall: Grant & Blue Grass	42	NF	NS	NS	
P-105-13	6/12/2017	11:55	Outfall: Grant & Blue Grass	6'-0" x 11'-11"	720	0.23	1732.9	clear, no sheen or odor
Q-107-01	6/19/2017	11:27	Outfall: SE of Greenmount and Telfair	54	NF	NS	NS	
Q-107-03	6/27/2017	10:30	Outfall: Deerpath & Parkview	24	60	<0.10	>2419.6	creek influence
Q-107-04	6/19/2017	12:13	Outfall: Dimarco & Lawnbrook	27	NF	NS	NS	
Q-107-05	6/16/2017	11:08	Outfall: SE of Dimarco & Green Dale	42	42	0.30	>2419.6	plunge pool observations: slight cloudiness and sheen, moderate sewage odor
Q-107-06	6/27/2017	10:55	Outfall: Orchard & Cresmont	42	NF	NS	NS	
Q-107-07	6/16/2017	10:39	Outfall: N of Knights & Frankford	54	NF	NS	NS	
S-051-01	5/8/2017	13:26	Outfall: Main & Harvey	36	NF	NS	NS	
S-051-02	5/8/2017	13:22	Outfall: Main & Harvey	18	NR	NS	NS	clear, flow too low to sample
S-051-03	5/8/2017	12:44	Outfall: Main & Cotton	60	NF	NS	NS	
S-051-04	5/8/2017	12:44	Outfall: Main & Grape	39	NF	NS	NS	
S-051-05	5/8/2017	13:12	Outfall: Main & Gay	48	NF	NS	NS	
S-051-07	5/8/2017	13:12	Outfall: Main & Osburn	21	NF	NS	NS	
S-059-01	5/17/2017	11:10	Outfall: Towpath & Parker	60	10800	0.20	>2419.6	clear, mild cloudiness, slight sewage odor

Table 2
Lab Analysis of Water at Outfalls and/or in the Storm Sewers
April 1, 2017 to June 30, 2017

Outfall	Date	Time	Location	Sewer Size (in)	Flow (gph)	Fluoride (mg/l)	Fecal Count (MPN per 100 ml)	Comments
T-063-01	6/30/2017	11:40	Outfall: Whitaker & Pennway	18	NF	NS	NS	
T-063-07	6/30/2017	12:20	Outfall: I & Wyoming	36	NF	NS	NS	
T-079-01	4/10/2017	11:59	Outfall: Adams & Crescentville	66	3600	0.26	>2419.6	slight musty odor
T-079-01	6/30/2017	10:58	Outfall: Adams & Crescentville	66	1200	0.25	2419	no odor
T-079-02	4/10/2017	12:12	Outfall: S of Adams & Crescentville	24	7	<0.10	9.7	creek influence
T-080-01	6/13/2017	11:53	Outfall: Levick & Tookany Creek Parkway	42	60	0.31	>2419.6	clear, no sheen, slight musty odor
T-080-02	4/10/2017	10:58	Outfall: Newtown & Comly	4'-6" x 3'-3"	600	0.33	>2419.6	suspended solids, suds, strong detergent odor
T-080-03	4/10/2017	11:30	Outfall: Newtown & Van Kirk	30	30	0.13	>2419.6	suds
T-098-01	6/13/2017	10:59	Outfall: Filmore & Shelmire	54	900	0.61	>2419.6	clear, no sheen, slight musty odor
T-098-02	6/13/2017	10:46	Outfall: Filmore & Shelmire	36	60	<0.10	121	clear, no sheen or odor
T-098-03	6/13/2017	10:30	Outfall: Central & Shelmire	30	NF	NS	NS	

Table 3
Residential Cross Connections Not Abated Within 120 Days

A. Properties Abated & Confirmed Prior to Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Abatement Confirmation Date	Comments
00404	Woodhaven	Rd	Q-117-02	11-17-2016		03-24-2017	
08222	Narvon	St	P-091-12	12-03-2016		05-12-2017	
10128	Proctor	Rd	P-113-03	12-14-2016		04-25-2017	
03512 W	Crown	Ave	Q-106-09	12-14-2016		04-20-2017	
13031	Lindsay	St	Q-120-08	12-23-2016		05-24-2017	
10120	Proctor	Rd	P-113-03	12-29-2016		05-08-2017	
10133	Proctor	Rd	P-113-03	01-14-2017		06-09-2017	

B. Properties Active As Of Reporting:

Address			Outfall Code	Complete Date	Admin. Action	Comments
08204	Bustleton	Ave	P-091-06	02-17-2017		

Table 4
Spills to Storm Sewers and/or Receiving Waters
April 1, 2017 to June 30, 2017

Date	Outfall	Address	Source Code	Material Involved	Completion Date	Remarks
04/11/17	P-100-14	Holme Avenue and Longford Street Wodden Bridge Run	3009	Sewage	04/12/17	Sewer Maintenance unit identified an approximate 1 gpm discharge, caused by a damaged abandoned sanitary sewer. Abandoned sewer was plugged and residual sewage removed by a Vactor truck.
04/21/17	S-051-05	4363 Main Street Schuylkill River	3008	Sewage	04/21/17	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge resulting in W/C.
04/21/17	S-059-04	4500 High Street Manayunk Canal	3009	Sewage	04/21/17	Sewer Maintenance unit excavated and repaired damaged section of 12" diameter sanitary sewer and adjacent manhole causing approximate <1 gpm discharge. Bypass pump setup.
04/22/17	S-052-05	5200 - 5202 Ridge Avenue Schuylkill River	3008	Sewage	04/22/17	Sewer Maintenance unit flushed 8" diameter sanitary sewer causing approximate 1 gpm discharge resulting in W/C.
05/16/17	P-108-16	1027 Welsh Road Paul's Run	3011	Sewage	05/16/17	Industrial Waste unit investigated a reported discharge. Source traced to a defective septic system. Resident stated that they have requested permission to connect to the city sewer.
05/19/17	W-068-05	427 West Hortter Street Monoshone Creek	3008 3009	Sewage	05/19/17	Sewer Maintenance unit flushed 12" diameter sanitary sewer causing approximate <1 gpm discharge. Also caused W/C. Affected area cleaned.
05/31/17	D-66	1421 Dickinson Street Delaware River	3008	Sewage	05/31/17	Construction unit supervisor discovered PWD contractor (Nello / Work # 40762) pumping sewage from excavation into street at an approximate rate of <4 gpm. Pump discharge rerouted to combined sewer manhole. Sewage was flowing along gutter to a combined sewer inlet at Dickinson and Broad Streets. Street was flushed with water. Sewer Maintenance unit cleaned the affected inlet with a Vactor truck.
06/13/17	W-084-03	907 Ronnie Circle unnamed tributary of the Wissahickon Creek	3009	Sewage	06/13/17	Sewer Maintenance unit flushed 10" diameter sanitary sewer causing approximate <1 gpm discharge.
06/17/17	S-058-01	Main Street and Shurs Lane Schuylkill River	3009	Sewage	06/17/17	Flow Control unit investigated a monitored wet weather overflow at the R-20 chamber. Monitoring data appeared accurate. Overflow weir has been raised approximately 12".

Source Codes:

3008 - Spill to Ground Only
3009 - Spill to Storm Sewer
3010 - Spill to Sanitary Sewer
3011 - Spill to Receiving Stream