DISTRICT OF COLUMBIA
WATER QUALITY ASSESSMENT

2018 INTEGRATED REPORT

TO THE US ENVIRONMENTAL PROTECTION AGENCY AND CONGRESS

PURSUANT TO

SECTIONS 305(b) AND 303(d) CLEAN WATER ACT (P.L. 97-117)

Department of Energy and Environment
Natural Resources Administration
Water Quality Division

February 2018

DEPARTMENT OF ENERGY & ENVIRONMENT

PREFACE

Effective February 6, 2017, the Department of Energy and Environment (DOEE) underwent an agencywide realignment. As a result, the Water Quality Division now consists of three branches: Monitoring and Assessment, Standards and TMDL (formerly Planning and Permitting), and Planning and Reporting (moved from the former Stormwater Management Division). The former Inspection and Enforcement Branch was moved to the new Inspection and Enforcement Division and renamed the Illicit Discharge and NPDES Branch. The wetlands permitting activities have moved to the new Regulatory Review Division and are located in the Water Resource Protection and Mitigation Branch.

DOEE's Water Quality Division prepared this report to satisfy the listing requirements of §303(d) and the reporting requirements of §305(b) of the federal Clean Water Act (P.L. 97-117). This report provides water quality information for the District of Columbia's surface and ground waters that were assessed during 2016–2017 and updates the water quality information required by law. The following DOEE divisions contributed to this report: Air Quality, Fisheries and Wildlife, Inspection and Enforcement, Regulatory Review Division, Toxic Substances, Watershed Protection, and Water Quality.

Questions or comments regarding this report should be forwarded to the following address:

District of Columbia Government
Department of Energy and Environment
Natural Resources Administration
Water Quality Division
1200 First Street NE, 5th Floor
Washington, DC 20002
Attention: N. Shulterbrandt

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ACRONYMS / ABBREVIATIONS

ADB	Assessment database
AFF	Alice Ferguson Foundation
AQD	Department of Energy and Environment Air Quality Division
AWS	Anacostia Watershed Society
BID	Business Improvement District
BMP	Best management practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGP	Construction General Permit
CEI	Compliance Evaluation Inspections
C&O	Chesapeake and Ohio
CSI	Compliance Sampling Inspection
CSO	Combined Sewer Overflow
CSN	Chesapeake Stormwater Network
CWA	Clean Water Act
CWP	Center for Watershed Protection
DCEEC	District of Columbia Environmental Education Consortium
DCPS	District of Columbia Public Schools
DCOP	District of Columbia Office of Planning
DC Water	District of Columbia Water and Sewer Authority
DDOT	District Department of Transportation
DGS	District of Columbia Department of General Services
District	District of Columbia
DO	Dissolved oxygen
DOEE	District of Columbia Department of Energy and Environment
DPR	District of Columbia Department of Parks and Recreation
DPW	District of Columbia Department of Public Works
DSLBD	District of Columbia Department of Small and Local Business Development
EA	Environmental assessment
EISA	Energy Independence and Security Act
ENF	Earth's Natural Force
EPA	United States Environmental Protection Agency
FWD	Fisheries and Wildlife Division
FY	Fiscal year
GAR	Green Area Ratio
GIS	Geographic information system
HAP	Hazardous air pollutant
ICPRB	Interstate Commission on the Potomac River Basin
IDDEP	Illicit Discharge Detection and Elimination System Program
IEB	Inspection and Enforcement Branch
IP	Implementation Plan
IPM	Integrated Pest Management
IPMT	Implementation Plan Modeling Tool
JE	Joint Evaluation
K	Kindergarten
LID	Low impact development

LMB	Largemouth bass
LTCP	Long Term Control Plan
MD	Maryland
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-Sector General Permit
MWCOG	Metropolitan Washington Council of Governments
MWEE	Meaningful watershed educational experience
NATA	National Air Toxics Assessment
NATTS	National Air Toxics Trends Station
NE	Northeast
NOI	Notice of Infraction
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NW	Northwest
OSSE	District of Columbia Office of the State Superintendent of Education
PAH	Polycyclic aromatic hydrocarbon
RSC	Regenerative stormwater conveyance
SAV	Submerged aquatic vegetation
SE	Southeast
SRC	Stormwater Retention Credit
SSO	Sanitary Sewer Overflow
SW	Southwest
SWAP	Source water assessment program
SWMD	Department of Energy and Environment Stormwater Management Division
SWRv	Stormwater retention volume
TMDL	Total maximum daily load
TSB	Department of Energy and Environment Technical Services Branch
UDC	University of the District of Columbia
US	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VA	Virginia
VCP	Voluntary cleanup program
WPD	Department of Energy and Environment Watershed Protection Division
WQC	Water Quality Certification
WQD	Department of Energy and Environment Water Quality Division
WQS	Water quality standards
WRRC	Water Resources Research Center
WWTP	Wastewater treatment plant

PART I: EXECUTIVE SUMMARY

The District of Columbia 2018 Integrated Report provides information on the state of the District's waters and the Department of Energy and Environment's (DOEE's) efforts to protect and improve water quality. The Integrated Report combines the comprehensive biennial reporting requirements of the Clean Water Act's (CWA's) Section 305(b) and the Section 303(d) listing of waters for which total maximum daily loads (TMDLs) may be required.

This draft executive summary only reflects information that was available at publication. It will be modified for the final submission to EPA with details from the EPA ATTAINS database (latest version to be soon released) and comments received during the comment period.

District of Columbia Water Quality

Thirty-six waterbody segments were monitored for water quality in order to meet the goals of the Clean Water Act (CWA) that apply to the District. Each of the waterbodies has been assigned designated uses in the District's water quality standards. The standards also outline numeric and narrative criteria that must be met if a waterbody is to support its uses. Various types of water quality data collected during the period of 2013 to 2017 were evaluated to assess use support of the waterbodies. The evaluation found that the designated uses that directly relate to the human use of the District's waters were generally not supported. Additionally, the uses related to the quality of habitat for aquatic life were not supported. No waterbody monitored by the Water Quality Division (WQD) fully supported all of its designated uses. The water quality of the District's waterbodies, while showing signs of improvement, continue to be impaired.

Tables 1.1 to 1.3 show the degree to which the waters of the District supported their designated uses.

Groundwater quality in the District is not monitored on the same basis as surface water quality. This is partly due to the fact that surface water north of the District's boundary, not groundwater, is the drinking water source for the District. However, groundwater quality is scrutinized via compliance monitoring and ongoing studies.

TABLE 1.1
DESIGNATED USE SUPPORT BY RIVERS OR STREAMS

Waterbody Type: River, Streams	Degree of Use Support			
	Supporting (mi)	Not Supporting (mi)	Insufficient Information (mi)	Not Assessed (mi)
Swimmable Use	-	38.4	-	-
Secondary Contact Recreation Use	12.8	25.6	-	-
Aquatic Life Use	-	38.4	-	-
Fish Consumption Use		38.4		-
Navigation Use	20.2	-	-	0

TABLE 1.2
DESIGNATED USE SUPPORT BY LAKES

Waterbody Type: Lake, reservoir	Degree of Use Support			
	Supporting (ac)	Not Supporting (ac)	Insufficient Information (ac)	Not Assessed (ac)
Swimmable Use	-	238.4	-	-
Secondary Contact Recreation Use	-	238.4	-	-
Aquatic Life Use	-	238.4	-	-
Fish Consumption Use	-	238.4	-	-
Navigation Use	238.4	-	-	-

TABLE 1.3
DESIGNATED USE SUPPORT BY ESTUARIES

Waterbody Type: Estuary	Degree of Use Support			
	Supporting (mi^2)	Not Supporting (mi^2)	Insufficient Information (mi^2)	Not Assessed (mi^2)
Swimmable Use	-	5.93	-	-
Secondary Contact Recreation Use	-	5.93	-	-
Aquatic Life Use	0.5	5.43	-	-
Fish Consumption Use	-	5.93	-	-
Navigation Use	5.93	-	-	-

A long term trends analysis for selected waterbodies and parameters can be found in the appendices.

Causes and Sources of Water Quality Impairment

The major causes of impairment to the District's rivers, lakes, and estuaries are elevated bacteria and pH and low dissolved oxygen (DO) concentrations.

pH

A survey of the percent exceedances of the criteria for selected constituents for the period of 2013–2017 was conducted to determine whether the effect of the activities was reflected in the data. The temperature maximum of 32.2 °C was not exceeded in any of the District's monitored surface waterbodies. In the Anacostia River, measurements for pH only exceeded water quality criteria (6.0–8.5) in 1.29% of samples. For this reason, pH does not appear to be a concern in the Anacostia. In the Potomac River, pH exceedances were observed in as many as 9.8% of the measurements in one segment of the main stem, with a drop off occurring between the 2016 and 2018 reports. Exceedances for pH are generally low with rare exceptions above the 10% threshold. For example, the 2018 report has only six tributaries (Washington Ship Channel, Tidal

Basin, C&O Canal, Normanstone Tributary, Pinehurst Tributary, and Watts Branch) with exceedances above the 10% threshold.

Dissolved Oxygen

The Anacostia River saw increased exceedances of the dissolved oxygen (DO) water quality standard in the 2018 reporting period compared with the 2016 reporting period. All measurements in the Potomac River met minimum levels of DO set by the water quality standards. The majority of the tributaries in the District typically meet DO water quality standards. For the 2018 reporting period, Fort Chaplin Tributary and Fort Davis Tributary were the only streams to not meet DO standards in greater than 10% of the measurements made on those waterbodies.

Turbidity

The most upstream segments of the Anacostia and Potomac Rivers were observed to have a higher number of turbidity exceedances than their downstream segments during this reporting period. Kingman Lake, an Anacostia watershed waterbody, consistently has the highest number of exceedances, with 58.89% of all measurements during the 2018 review period not meeting the turbidity standard.The Rock Creek tributaries are not as impacted by turbidity as the Anacostia tributaries. The average percent exceedance for all the tributaries to Rock Creek was 4.38% while the average percent exceedance for all tributaries to the Anacostia River was 20.74%. The average percent exceedance for the entire main stems of Rock Creek, the Potomac River, and the Anacostia River were 18.26%, 14.78%, and 19.27% respectively.

Bacteria (*E. coli*)

In 2008, the water quality criteria used to evaluate bacteria was updated from Fecal coliform to *E. coli*, so this survey covered the period of 2009–2015. The Potomac River has fewer *E. coli* percent exceedances than the Anacostia River. But both rivers experienced a slight increase for the period. For the tributaries, the Tidal Basin has the lowest number of exceedances, while Broach Branch, a Rock Creek tributary, has the highest number of exceedances with 87.5% for the period of study. Chronic *E. coli* percent exceedances continue to be a problem for the majority of the city's waterbodies.

The sources that have major impacts on District waters are combined sewer overflows (CSOs), urban stormwater runoff/storm sewers, municipal point sources, and pollutants from upstream jurisdictions.

Programs to Address Impairment

Several DOEE divisions conduct activities to correct water quality impairments:

- Toxic Substances Division
- Watershed Protection Division
- Water Quality Division
- Inspection and Enforcement Division
- Regulatory Review Division

The Water Quality Division and the Inspection and Enforcement Division's joint water pollution control programs implement the water quality standards, monitor and inspect permitted facilities in the District, and comprehensively monitor the District's waters to identify and reduce impairments. The water pollution control program is involved in implementing activities that will provide maximum water quality benefits.

Given the District's urban landscape, nonpoint source pollution has a large impact on its waters. The Watershed Protection Division and the Regulatory Review Division manage the sediment and stormwater control programs that regulate land disturbing activities, stormwater management, and floodplain management by providing technical assistance and inspections throughout the District. The District is also conducting stream restoration activities to improve habitat as well as implementing a RiverSmart program to reduce polluted runoff. The nonpoint source program also provides education and outreach to residents and developers on pollution prevention to ensure that their actions do not further impair the District's water quality.

Several activities are coordinated for the groundwater protection program in the Toxic Substances Division, including underground storage tank installation and remediation and groundwater quality standards implementation.

DOEE also coordinates with the District of Columbia Water and Sewer Authority (DC Water), which has begun construction of the Anacostia River segment of the stormwater storage tunnel of the District's CSO Long Term Control Plan (LTCP). The plan involves the construction of large underground tunnels that will serve as collection and retention systems for combined sewage during high flow conditions. The LTCP will be implemented over a 25-year period, including the original Consent Decree period and the 2016 modification to the Consent Decree, which extended the end date to 2030.

Conclusions

Activities to restore water quality are an integral part of the push to meet the Clean Water Act's swimmable and fishable goals. Stream restoration projects at Springhouse Run, Nash Run, Pope Branch, and Alger Park were completed in 2016 and 2017and have created conditions that will improve stream habitat gradually over many years to improve survival of desired aquatic organisms and provide nooks for respite in neighborhoods of the city. The negative impacts of stormwater, intensified by the high imperviousness characteristic of urban areas, are starting to be mitigated by the RiverSmart programs: RiverSmart Homes, RiverSmart Communities, RiverSmart Schools, and River Smart Rooftops. These programs provide valuable educational experiences and opportunities for citizens, students, and businesses to participate in improving water quality in the city. The District's Long Term Control Plan (LTCP) has guided the creation of new stormwater storage tunnels which will soon be in use and should have a significant impact on the rivers' bacteria levels. The 2013 Stormwater Rule has been identified as one of the biggest drivers for improving stormwater management in the District of Columbia. The Rule, which became fully effective during 2014, is expected to have positive impacts on water quality by requiring more retention of stormwater on-site rather than letting it runoff directly and quickly to waterbodies. In order to meet the requirements of the new regulation 897 stormwater management BMPs were installed during 2016 and 2017. The 2013 Stormwater Management

Guidebook provides a menu of water quality improvement practices that partners can choose from (see http://doee.dc.gov/swguidebook).

The improvements noted in previous years to aquatic resources, such as submerged aquatic vegetation, wetlands, and fish populations, have been sustained. The concentrations of chemicals in several fish species caught in District waters have decreased, which is progress toward achieving the fishable goal. DOEE and its partners continue to invest a variety of resources in shared pursuit of improving District and regional water quality and are optimistic about the incremental improvements current and planned activities will deliver.

PART II: BACKGROUND

The Government of the District of Columbia's environmental protection responsibilities are delegated to administrations within DOEE. DOEE's Natural Resources Administration includes the Fisheries and Wildlife Division (FWD), the Inspection and Enforcement Division (IED), the Regulatory Review Division (RRD), the Water Quality Division (WQD), and the Watershed Protection Division (WPD). The Environmental Services Administration includes the Air Quality Division (AQD), the Lead and Healthy Housing Division, and the Toxic Substances Division (TSD).

Atlas, Total Waters, and Maps

Table 2.1 provides a general view of the District's resources. Figure 2.1 provides a graph of the District's monthly and yearly total rainfall. The National Weather Service rain gauge site at Washington Reagan National Airport is the official source for the District's rainfall totals, which were above average for 2016 and 2017. Figures 2.2 and 2.3 present monthly and yearly mean flow data for the Anacostia and Potomac Rivers, from 2016 to 2017 (Source: United States Geological Survey). Appendix 2.1 provides a map outlining the major watersheds within the District.

TABLE 2.1
ATLAS

State population: 601,723 (2010 Census) / 693,972 (July 2017 Census Estimate)

State surface area: 69 square miles

Number of water basins: 1

Total number of river miles: 39 miles

- Number of perennial river miles: 39 miles
- Number of intermittent stream miles: none
- Number of ditches and canals: none[1]
- Number of border miles: none

Number of lakes, reservoirs, and ponds: 8

Acres of lakes, reservoirs, and ponds: 238 acres

Square miles of estuaries, harbors, and bays: 6.1 square miles[1]

Acres of wetlands: 289[2]

Name of border waterbody: Potomac River estuary

Number of border estuary miles: 12.5 miles

[1]Impoundments are classified according to their hydrologic behavior. The District classifies the C&O Canal as a lake. The estuary estimate includes the Washington Ship Channel, the Channel Lagoon, and Little River.

[2]In 2015, DOEE WQD released a grant to update the 1997 Wetland Conservation Plan. The update involves mapping and assessing wetlands in the District and the outcome will include a more accurate estimate of wetland acres in the District. In 2016, DOEE completed a draft version of the report and the maps associated with the project. A final version of the plan is expected to be released in 2018.

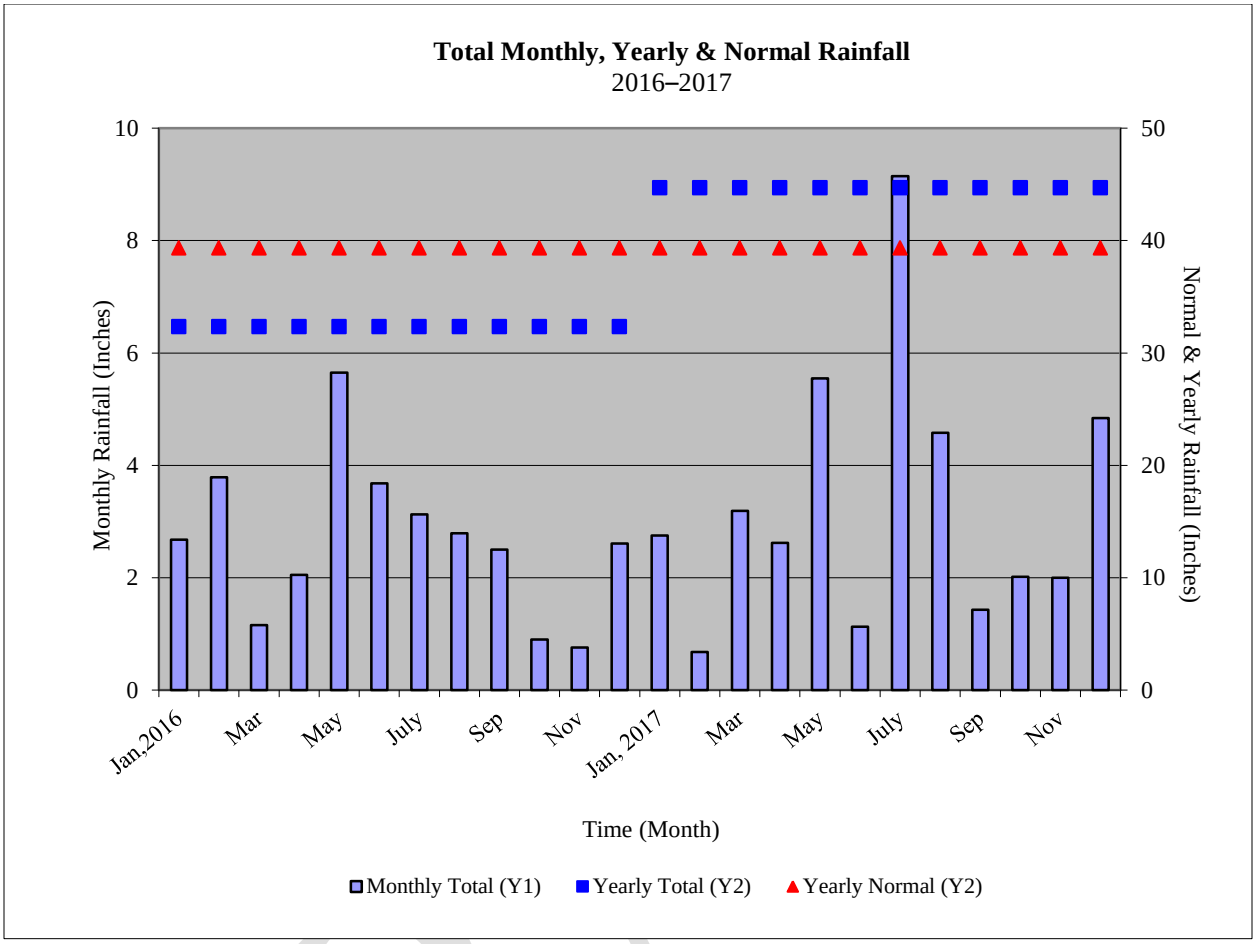

Figure 2.1: Monthly, yearly and normal total rainfall (inches), 2016–2017 (Source: National Weather Service, Washington Reagan National Airport).

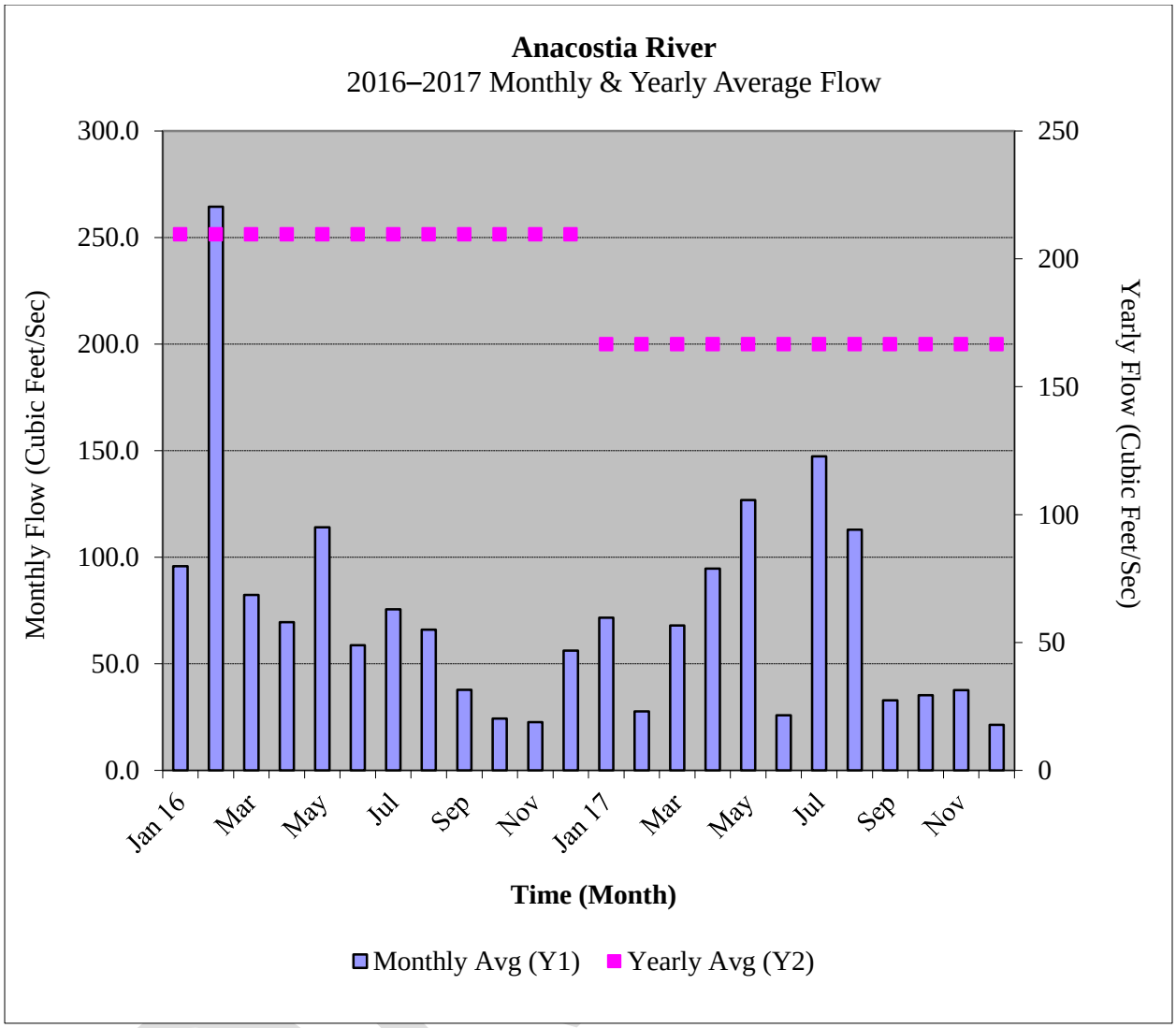

Figure 2.2: Monthly and yearly average flow on the Anacostia River, 2016–2017.

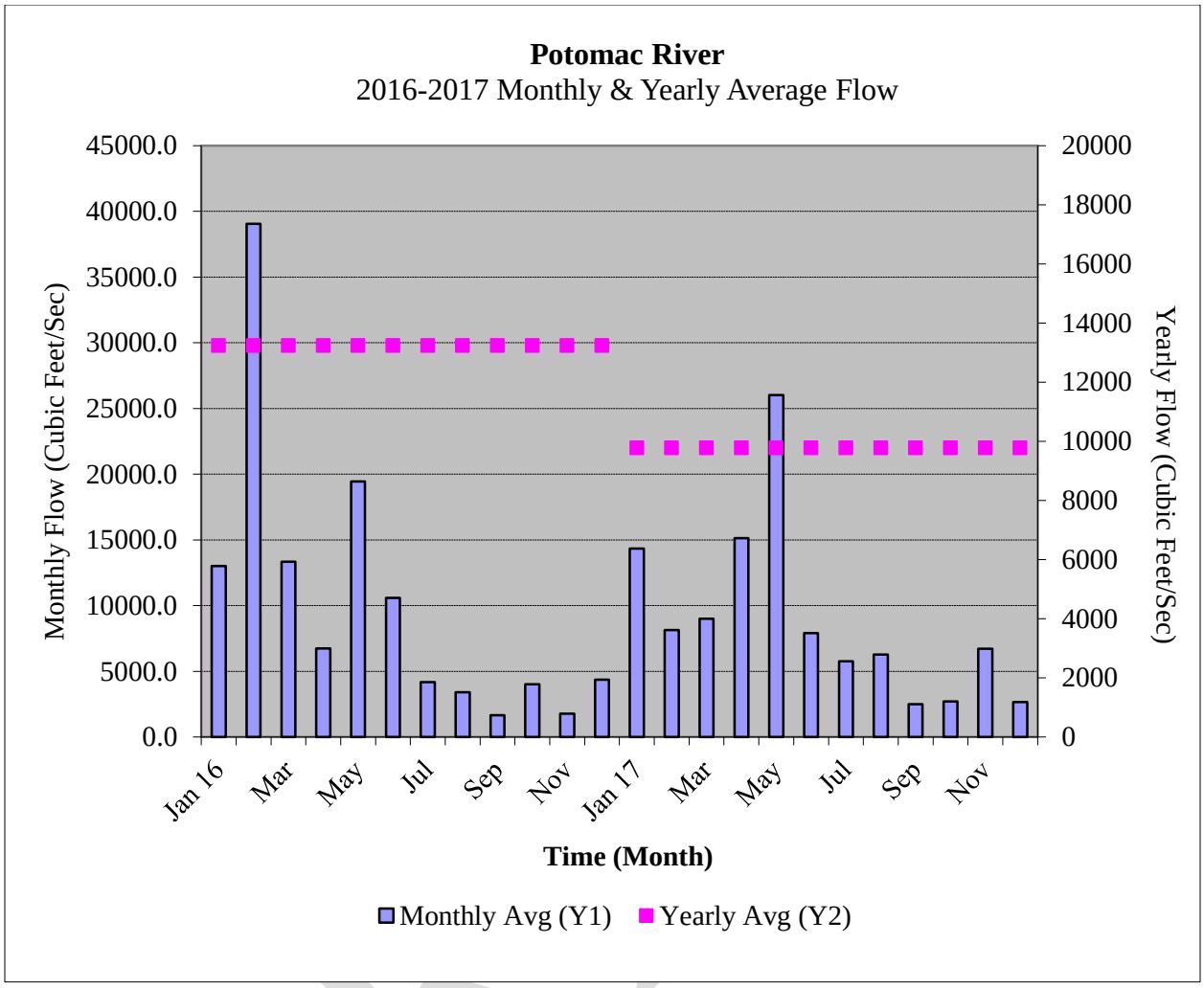

Figure 2.3: Monthly and yearly average flow on the Potomac River, 2016–2017.

Water Pollution Control Programs

Water Quality Standards Program

The District's water quality standards (WQS) regulations are developed and revised under the authority of the federal CWA and the District of Columbia Water Pollution Control Act of 1984, D.C. Official Code § 8-103-01 *et seq*. WQS plays a critical role in implementing various essential purposes and functions under CWA. WQS is used in water quality assessments for reporting, TMDL development, National Pollutant Discharge Elimination System (NPDES) permits, nonpoint source programs, and recreational water monitoring and notification. In compliance with the CWA, there is public participation and a hearing every three years to revise WQS to incorporate policy changes and new information on water quality criteria. These regulatory changes enable the District to use WQS as a programmatic tool in the water quality management process and as a foundation for water quality-based control programs. The revised criteria ensure the protection of the District's downstream waters.

2016 Triennial Review:

DOEE reviewed the District of Columbia surface water quality standards in 2016. The process started with an interdepartmental review and notice of the proposed rulemaking published on September 15, 2017, in the *D.C. Register* (Vol. 64 - No. 37, 9089) for a 60-day public comment period. Copies of the proposed rules were disseminated directly to stakeholders and interested parties. At the request of stakeholders, DOEE extended the comment period by 30 days. DOEE published a notice of extension in the *D.C. Register* (Vol. 64 No. 44, DCR 11657) on November 03, 2017, and the comment period ended on December 14, 2017.

On October 26, 2017, DOEE held a public hearing on the District's 2016 triennial review. The hearing addressed the proposed changes to the WQS as well as the scope of a socioeconomic study, the District intends to conduct, designed to evaluate the effects of the changes as required by the Water Pollution Control Act, D.C. Official Code § 8-103.04, before the final WQS is promulgated. DOEE received written comments from EPA Region 3 and Earthjustice on the proposed changes. No comments were received regarding the scope of the socioeconomic study.

DOEE updated the following for the 2016 WQS triennial review:

- Water quality criteria for 94 organics for the protection of human health based on EPA's revised methodology;
- Ammonia aquatic life criteria tables and formulae;
- Cadmium formulae for hardness based on EPA's latest scientific studies and new toxicity data and information;
- Recreational water quality criteria based on EPA's 2012 Recreational Water Quality Criteria guidance (EPA 820-F-12-058);
- The sampling duration for the geometric mean criteria from 30 days to 90 days because one of the District's stakeholders requested for their permit purposes; and
- Abbreviations and definitions.

All other provisions, tables, and definitions in the Water Quality Standards chapter remained unchanged.

DOEE will prepare responses to all public comments and post them on its website, www.doee.dc.gov. After legal sufficiency review, DOEE will publish the final rulemaking in the *D.C. Register*. After the final rulemaking is published and certified by the Office of the Attorney General (OAG), DOEE will submit it to EPA Region 3 for review and approval, with the necessary documentation.

Point Source Program

National Pollutant Discharge Elimination System (NPDES) Permits

Currently, EPA has issued site-specific industrial permits to 10 facilities in the District under the National Pollutant Discharge Elimination System (NPDES) individual permits. A wastewater treatment plant (WWTP) operated by DC Water continues to be the primary source of discharge. The WWTP and other industrial NPDES permitted facilities are inspected to ensure compliance with permit conditions and the District's WQS.

Table 2.2 lists the individual NPDES permitted facilities in the District. Table 2.2 lists the individual NPDES permitted facilities in the District. In addition to NPDES individual permitted facilities, there are several industrial facilities and construction sites that have been permitted under a Multi-Sector General Permit (MSGP), or a Construction General Permit (CGP).

Table 2.2
NPDES Permitted Facilities in the District of Columbia

Permittee/Facility	Permit No	Type of Facility	Effective Date	Expiration Date
The Washington Aqueduct	DC0000019[¥]	Major	10/20/2008	11/19/2013
Potomac Electric Power Company (PEPCO), Benning Road	DC0000094[¥§]	Major	6/19/2009	6/18/2014
DC Water, Blue Plains WWTP	DC0021199[¥€]	Major	9/30/2010	9/30/2015
Government of the District of Columbia – MS4	DC0000221[¥€]	Major	10/07/2011	10/07/2016
Commandant Naval District Washington, DC	DC0000141[¥]	Minor	1/22/2010	1/22/2015
World War II Veterans Memorial	DC0000345[¥]	Minor	5/01/2010	4/30/2015
Super Concrete Corporation	DC0000175	Minor	1/06/2014	1/05/2019
John F. Kennedy Center for the Performing Arts	DC0000248	Minor	6/06/2013	6/05/2018
Washington Metropolitan Area Transit Authority (WMATA)	DC0000337[¥]	Minor	4/20/2012	4/20/2017
General Services Administration (GSA)-NCR HOTD (Central Heating Plant)	DC0000035[¥]	Minor	5/25/2012	5/24/2017

Note:
[¥] EPA has administratively extended the permit because the facility applied for permit renewal within the required time.
[§] The facility stopped discharging process or waste water but has not formally submitted a Notice of Termination.
[€] A draft permit has been issued for public comments and the permit has not yet been finalized.

Review and Certification of Draft NPDES Permits

The District is not a delegated state under EPA's NPDES program and, therefore, does not issue discharge permits. WQD reviews the draft individual and general NPDES permits that EPA

prepares to certify they are complete and comply with federal and District laws and WQS, in accordance with Section 401 of the Clean Water Act. WQD may require revisions to the draft permit to comply with more stringent District laws and standards. Changes to draft permits may also incorporate comments received from various stakeholders during the public comment period, which EPA and the District announce jointly in one or more of the District's local newspapers. Final permits are issued for a five-year period, but they contain reopener clauses in case facility conditions, WQS, or regulations change.

Currently, eight District facilities have expired individual permits, and EPA is in the process of reviewing the permit renewal applications and drafting renewal permits. Table 2.2 lists these expired permits. EPA will request that WQD review and certify them in accordance with Section 401 of the CWA. From January 1, 2016 through June 30, 2017, WQD received (for comment and certification) one draft individual NPDES permit (NPDES Permit Number DC0000221 for the District of Columbia's MS4). WQD waived its right to issue a Section 401 water quality certification.

From January 1, 2016 through June 30, 2017, WQD reviewed and provided comments on the following NPDES permit applications and EPA's draft NPDES permits:

1. Individual and General Permits:
    a. Proposed District of Columbia Dewatering General Permit;
    b. District of Columbia Municipal Separate Stormwater Sewer System (MS4) Permit. Although WQD provided comments on the MS4 permit, WQD waived its right to issue a Section 401 water quality certification.
    c. WQD also reviewed a Pesticide Discharge Management Plan (under the Pesticide General Permit) for the U.S. Coast Guard Headquarters.
2. Groundwater Discharge Approvals: WQD reviewed, provided comments or approved discharge of groundwater into MS4 from the following construction projects:

- Square 696 at the intersection of N and Half Streets SE
- DC United Soccer Stadium Development
- 680 I (Eye) Street SW
- 222 M Street SW (St Matthews Redevelopment)
- 88 V Street SW; and
- 227 Tingey Street SE
- 1250 Half Street SE
- Washington Gas and Light's vault dewatering activities
- Portals V Development 1399 Maryland Avenue SW
- 1346 4th Street SE
- 400 4th Street SW
- 2 I (Eye) Street SE
- Oregon Avenue NW Sanitary Sewer Rehabilitation Project
- 1015 Half Street SE
- 5180 South Dakota Avenue NE Art Place at Fort Totten

Compliance Inspections

Compliance Monitoring Strategy

Each fiscal year, DOEE develops a Compliance Monitoring Strategy to document the compliance monitoring activities for facilities covered under NPDES. These proposed compliance inspections are also documented in the annual NPDES Permitting and Enforcement work plans submitted to EPA. Compliance inspections are recognized as a vital part of the District's NPDES Core Program and Wet Weather Source Program. Appropriate enforcement actions are recommended to EPA for violations and/or deficiencies noted during the compliance inspections. The objective of the NPDES Compliance Inspection Program is to provide a level of inspection coverage necessary to assess permit compliance and develop enforcement documentation. The District of Columbia NPDES Compliance Inspection Program generally conducts Compliance Evaluation Inspections (CEI), but may perform Compliance Sampling Inspections (CSI) if required. CEI inspections are designed to verify the permittee's compliance with applicable permit effluent limits, self-monitoring requirements, and compliance schedules. CEI involves records reviews, visual observations, and evaluations of the treatment facilities, effluent, receiving waters, and disposal practices. From January 1, 2016 to June, 30 2017, DOEE conducted 18 compliance inspections at the facilities listed in Tables 2.3 and 2.4.

Table 2.3
NPDES Core Program Facilities Inspected

NPDES ID	Permit Name	Type of Facility
DC0000019	Washington Aqueduct	Major
DC0000094	PEPCO Environment Management Services	Major
DC0021199	D.C. WASA (Blue Plains)	Major
DC0022004	Mirant Potomac River L.L.C.	Major
DC0000141	Washington Navy Yard	Minor
DC0000248	JFK Center for Performing Arts	Minor
DC0000345	World War II Memorial	Minor
DC0000175	Super Concrete	Minor

Table 2.4
NPDES Wet Weather Industrial Stormwater Program Facilities Inspected

NPDES ID	Permit Name	Type of Facility
DCR053008	WMATA Bladensburg Bus Facility	MSGP
DCR053037	CSX Benning Yard	MSGP
DCR05A571	Allied Aviation	MSGP
N/A	Fort Myer Construction	Unpermitted
DCR053046	Rodgers Brothers	MSGP (not permitted at the time of inspection)
N/A	Capital Paving	Unpermitted
N/A	Virginia Concrete NE DC	Unpermitted
N/A	DDOT Field Operations Warehouse	Unpermitted
N/A	DDOT Street and Bridge Maintenance Facility	Unpermitted
N/A	DGS Adams Place NE	Unpermitted

DOEE also conducts inspections of point source discharges of groundwater from temporary construction dewatering operations. These operations are typically covered under the NPDES CGP; however, DOEE reviews and certifies that the groundwater discharge will meet District surface WQS. DOEE conducts inspections of these operations to ensure they are complying with District regulations and any required groundwater discharge treatment systems are operating correctly and efficiently. From January 1, 2016 to June 30, 2017, DOEE conducted 20 inspections of temporary construction dewatering operations.

Municipal Separate Storm Sewer System (MS4) Permit

The Government of the District of Columbia owns and operates its own Municipal Separate Storm Sewer System (MS4), which discharges stormwater from various outfall locations into the District's waterways. The current MS4 Permit was issued on October 12, 2011, and became effective on January 22, 2012. On November 9, 2012, EPA finalized limited modifications to the MS4 Permit to (1) provide additional public notice and input on the permittee's development of the Consolidated TMDL Implementation Plan; (2) clarify and provide accountability for specific water quality-related outcomes, specifically on the content and timelines for the Consolidated TMDL Implementation Plan; (3) clarify that the District is the sole permittee; and (4) clarify that the District needs to notify the public in the event of a sanitary sewer system overflow.

On April 6, 2016, the District submitted an application to EPA Region 3 to renew its MS4 Permit. On October 7, 2016, the 2011 MS4 Permit was administratively extended until the new permit takes effect. EPA Region 3 issued an initial draft of the District's new MS4 Permit on November 17, 2016, and a second draft on August 25, 2017.

MS4 Permit Compliance

The District continues to implement and enforce its Stormwater Management Program in accordance with the MS4 Permit and the Revised Stormwater Management Plan (SWMP). The program uses retention practices to reduce stormwater runoff by mimicking natural landscapes through green roofs, bioretention, pervious pavers, and other green infrastructure. Table 2.5 shows the District's compliance with numeric performance standards in the MS4 Permit.

Table 2.5
Numeric Performance Standards and MS4 Permit Compliance

Numeric Requirement	Time Period	FY 2017 Achievement	Achievement During Permit Term
Retrofit 18,000,000 square feet of impervious surfaces	Permit term	6,542,725 square feet	23,150,171 square feet[1 2]
Retrofit 1,500,000 square feet of impervious surfaces in the transportation right-of-way	Permit term	214,700 square feet	2,894,818 square feet
Plant 4,150 trees within the MS4 area (net increase)	Annually	7,794 trees	42,167 trees
Install 350,000 square feet of green roofs on District properties	Permit term	336,355 square feet	1,646,505 square feet
Remove 103,188 pounds of trash annually from the Anacostia River	By the fifth year of the permit	126,312 pounds	Not Applicable

1Discussion on District retrofit program and retrofit calculation is found in Section 4.1.5.4 of this report.
2 DOEE updates data in the Stormwater Database as historical data is validated or Stormwater Management Plans are revised. The information reported in this table will be updated in future annual reports as the Stormwater Database is updated.

The District is required to comply with all schedules of compliance within the MS4 Permit. Table 2.6 shows the program elements and strategies the District is required to submit to EPA for review and approval.

Table 2.6
Required Elements and Strategies for MS4 Permit Approval

Element	Required Submittal Date	Actual Submittal Date
Anacostia River Watershed Trash Reduction Calculation Methodology	01/22/2013	01/22/2013
Tree Canopy Strategy	01/22/2013	01/22/2013
Catch Basin Operation and Maintenance Plan	07/22/2013	07/05/2013
Outfall Repair Schedule	07/22/2013	07/05/2013
Updated Stormwater Regulations	07/22/2013	07/19/13
Stormwater Retention Standards for Substantial Improvement Projects	07/22/2013	07/19/13
Off-Site Mitigation/ Fee-in-Lieu Program	07/22/2013	07/19/13
Stormwater Management Guidebook	07/22/2013	07/19/13
Retrofit Program	01/22/2014	01/22/2014
Revised Monitoring Program	05/09/2015	5/8/2015

Element	Required Submittal Date	Actual Submittal Date
Consolidated TMDL Implementation Plan	05/09/2015	5/15/2015
Revised Stormwater Management Program Plan for Public Comment	1/22/2015	2/20/2015*
Final Revised Stormwater Management Program Plan	01/22/2016	1/22/2016
MS4 Permit Reapplication	04/07/2016	04/06/2016

Critical Source Inspection and Enforcement Program

DOEE maintains a database of critical sources of stormwater pollution; this includes industrial, commercial, institutional, municipal, and federal facilities within the MS4 area. In FY16, DOEE identified and inspected 122 facilities deemed critical sources of stormwater pollution. These inspections were documented with facility-specific inspection forms and recorded in the MS4 Inspection Tracking Database. DOEE takes appropriate actions to ensure these facilities are in compliance with the District's MS4 Permit, and that structural controls and best management practices are in place and effectively protecting water quality.

Illicit Discharge Detection and Elimination Program

DOEE manages an Illicit Discharge Detection and Elimination Program (IDDEP) designed to detect and eliminate illicit and unpermitted discharges, spills, and releases of pollutants to the District's MS4 and waterbodies. This program includes the response to reported illicit discharges, spills, or releases, targeted facility inspections, and dry weather outfall inspections. During FY16, WQD responded to and investigated 71 incidents of illicit discharges, spills, or releases. In the event of an incident, DOEE applies varying strategies to enforce clean up or compliance, including: follow up inspections, site directives, notice of violations, administrative or compliance orders, and notice of infractions.
Additionally, WQD maintains a watershed based inventory of all MS4 outfalls and conducts dry weather inspections of these outfalls. In FY16, WQD identified 191 Anacostia River outfalls, 209 Potomac River outfalls, and 170 Rock Creek outfalls., DOEE conducted dry weather inspections of 124 of the 570 outfalls identified. In the event of a questionable or suspected illicit discharge from the outfall, WQD initiates an investigation and implements various techniques to identify and eliminate the discharge or suspected dry weather flow.

Wetlands Protection

Review and Certification of Permits Issued Under Section 404 of the Clean Water Act

In accordance with Section 404 of the Clean Water Act, DOEE Regulatory Review Division (RRD) reviews and certifies permits issued by the U.S. Army Corps of Engineers, Baltimore District (USACE) under Section 10 of the Rivers and Harbors Act of 1899 and/or Section 404 of the Clean Water Act, as published in the February 21, 2012 Federal Register, Final Notice of Issuance, Reissuance, and Modification of Nationwide Permits (NWPs)(72 FR 11090).

The District's policy of no net loss of wetlands or stream areas functions within its jurisdictional boundaries. To achieve this goal, RRD reviews all activities and construction projects that may have the potential to impact wetlands and streams in the District. First, USACE issues dredge and fill permits after making a jurisdictional determination with regard to what constitutes "waters of the United States" including jurisdictional wetlands. Then, RRD reviews the delineation report, jurisdictional determination, and permit issued by USACE for completeness and compliance with both Federal and the District's laws, including the District's WQS. Wetlands that do not fall under Federal jurisdiction may still fall under the jurisdiction of the District. Based on the results of the review, RRD may issue its own jurisdictional determination and certify or deny the USACE permit.

Some projects that impact wetlands and streams may be allowed to proceed. These include water-dependent projects and those for which there is no practicable alternative. The purpose of the review process is to avoid and minimize these impacts. Mitigation is always required for permanent impacts associated with these types of projects, and is considered in accordance with the following sequence:

Avoidance: Modification of the proposed activity to completely avoid the potential impacts to the wetland or stream.

Reduction/ Minimization: Reduction of the activity to the greatest extent possible.

Restoration: Repairing, rehabilitating, or restoring the affected wetlands or stream following completion of the activity.

Compensation: Compensating for the impact to the wetland or stream by creating or enhancing an alternative wetland/ stream.

Table 2.7 list permits reviewed and certified between January 2016 and June 2017.

Table 2.7
Dredge and Fill Permits reviewed and certified

Permittee	Certification Number	Project Description
District Department of Transportation (DDOT)	WQC-DC-16-016	Repairs to existing culvert located on Oregon Avenue, NW.
District Department of Transportation (DDOT)	Consultation	Rehabilitation of Rock Creek Trail within Rock Creek National Park, Washington, DC.
National Park Service (NPS)	WQC-DC-16-012	Repairs to the C&O Canal Locks 3 and 4 located in Georgetown, Washington, DC.
DDOT	Consultation and Pre-application Meeting	Replacement of the existing 31st Street Bridge over the C&O Canal; and replacement of utility lines for Verizon, PEPCO and DC Water.

Permittee	Certification Number	Project Description
DDOT	WQC-DC-17-003	Construction of a new bridge over the Anacostia River immediately adjacent and parallel to the existing Frederick Douglass Memorial bridge; and demolition of the existing Frederick Douglass Memorial bridge.
GSA	WQC-DC-16-015	To perform stream and wetland mitigation on the GSA / St. Elizabeth's West Campus.
Homeowner	Jurisdictional Determination	Jurisdictional determination (JD) and verification of the delineation of waters of the District of Columbia, including wetlands at 2991 Audubon Terrace NW, Washington, DC.
DDOT	Consultation	Repairs to the existing Anacostia Bridge No. 0078 within the floodplain of the Anacostia River.
GEI Consultants, Inc.	WQC-DC-16-013	To conduct analytical sediment sampling in the Anacostia River near 690 Water Street, NW, Washington DC.
DDOT	Consultation	Replacement of existing culvert near the intersection of 49th Street and Fulton Avenue, NW, Washington DC.
AMT, LLC Consulting Engineers and Land Surveyors	Jurisdictional Determination	Jurisdictional determination (JD) and verification of the delineation of waters of the District of Columbia, including wetlands at the Marvin Gaye Recreation Center, Washington, DC.
GSA	Consultation and Pre-application meeting	Construction of the Interstate 295/Malcolm X Avenue, SE interchange improvement project.
PEPCO	WQC-DC-16-018	Modification to WQC-13-001 for additional sediment sampling sites in the Anacostia River near 3400 Benning Road, NE, Washington DC.
Melka Marine, Inc.	Consultation	To install pilings within the Columbia Island Marina.
United Global	Consultation	Removal of pilings in the Anacostia River near Buzzard Point.
Eastern Federal Lands Highway Division	Consultation	Repairs to the existing retaining wall along Piney Branch Parkway located in Rock Creek National Park, Washington DC.
Tetra Tech, Inc.	WQC-DC-16-014	Removal of accumulated sediments and debris from the Hickey Run Outfall located near New York Ave, NE, Washington DC.
Federal Railroad Administration	Consultation	Rehabilitation and repairs to the CSX Long Bridge over the Anacostia River.
PEPCO / AECOM	Consultation	To perform a remedial investigation near the Benning Road PEPCO facility and NPS Kenilworth maintenance yard along adjacent to an existing seawall within the Anacostia River.
US Army Corps of Engineers	WQC-DC-17-001	Reissuance of 50 existing Nationwide Permits (NWPs), general conditions, and definitions with some modifications, two new NWPs, one new general condition, and five new definitions.
NPS	WQC-DC-17-002	Installation of a temporary floating dock within the Anacostia River.
DOEE	WQC-DC-17-005	To install a trash trap in a box culvert under Gallatin Street, NE, Washington DC.

Permittee	Certification Number	Project Description
Washington Gas & Light Co.	WQC-DC-17-006	To perform a remedial investigation in the Anacostia River, Washington DC.
Navy	Consultation	Repairs to a levee at Bolling Air Force Base.
AECOM/Maryland Transit Administration	Consultation	Inquiry regarding the District's GIS wetland mapping.
DDOT	Consultation	Consultation regarding repairs to nine bridges in Washington, DC.
Premier Event Management, LLC	Consultation	To install a temporary floating dock within the Potomac River for the Nations Triathlon.
DOEE Watershed Protection Division (WPD)	WQC-DC-16-002	Stream restoration in Alger Park.
DDOT	WQC-DC-16-003	Rehabilitation and repair of the existing Pennsylvania Avenue bridge.
Homeowner	JD	JD and verification of the delineation of waters of the District of Columbia, including wetlands at 4926 Glenbrook Rd NW, Washington, DC.
Florida Rock Properties, Inc.	WQC-DC-16-004	Modification to WQC-15-19 for the construction of a storm drain outfall a max of 1.5 feet channelward of the existing bulkhead to extend no further channelward than the authorized replacement bulkhead.
DC Water	WQC-DC-16-009	Emergency repairs to an existing sewer pipe spanning across a stream bed.
Anacostia Watershed Society (AWS)/National Park Service (NPS)	WQC-DC-16-005	Installation of a temporary recreational dock in the Anacostia River.
Owner - Salt Water Seafood	Consultation	Maintenance, repair, and reconfiguration of existing fish market; and replacement of permanently moored barges.
DOEE/Tetra Tech, Inc.	WQC-DC-16-007	Anacostia remedial investigation sediment sampling. Collection of 17 additional subsurface sample locations in Maryland and 147 additional sediment sample locations in Washington, DC, 0.5 to 20 feet below the sediment surface.
DDOT	Consultation and Pre-application Meetings	Repair the existing 31st Street bridge over the C&O Canal; and replacement of a bridge pier within the C&O Canal.
Environmental Systems Analysis, Inc. (ESA)	Consultation	Received final year of wetland and stream mitigation monitoring report and performed site inspection.
PEPCO	WQC-DC-16-008	Excavation of dielectric oil contaminated soil and restoration along the left-descending bank of Rock Creek near Klingle Valley Road in Washington, DC.
Norton Environmental	Consultation	Consultation and site visit regarding a brick-lined ditch located on Catholic University property.
DC Water	WQC-DC-16-009	Repair of an 8-inch pipe spanning a tributary to Rock Creek between Morrow Drive and Beach Drive.
C&O Canal - NPS	Consultation and Pre-application Meetings	Installation of a kayak and canoe launch dock in Georgetown, DC in the C&O Canal.
C&O Canal – NPS	WQC-DC-16-011	Installation of a kayak and canoe launch dock in Georgetown, DC in the C&O Canal.

Permittee	Certification Number	Project Description
NPS	Consultation	NPS called to inquire about the permits necessary for Hydrilla removal in the Pentagon Lagoon.
DDOT	Consultation	Culvert replacement near 49th Street NW.
GSA	WQC-DC-17-012	Improvements to I-295 and repair of a stormwater outfall near the I-195 Malcolm X Avenue SE interchange.
USACE	WQC-DC-17-001	Denied blanket certification and requested review of all activities that require a nationwide permit in the District.
NPS	WQC-DC-17-002	Installation of a temporary floating dock in the Anacostia River.
DDOT	WQC-DC-17-003	To demolish the existing South Capitol Street/Frederick Douglass Memorial Bridge, dredge and remove the piers, and install a new bridge in the Anacostia River immediately adjacent to the old bridge.
DDOT	WQC-DC-17-004	To perform bridge repairs over the C&O Canal and to replace a pier within the C&O Canal.
Washington Gas	WQC-DC-17-006	Remedial investigation in the Anacostia River per the East Station consent decree and CERCLA.
Federal Highway Administration	WQC-DC-17-007	Repairs to existing retaining wall along Piney Branch Parkway located in Rock Creek Park.
DOEE	WQC-DC-17-008	To install submerged aquatic vegetation structures in the Anacostia River.
DOEE	WQC-DC-17-009	To install submerged aquatic vegetation structures in the Potomac River.
DOEE	WQC-DC-17-010	To install submerged aquatic vegetation structures in the Potomac River and Oxen cove.
Premier Event Management, LLC	WQC-DC-17-011	To install a floating swim pier for the Nation's Triathlon.
DC Water	WQC-DC-17-013	To remove debris from an outfall and install a temporary coffer dam within the Anacostia River.
Bolling Air Force Base	Consultation	Repairs to a levee at the Bolling Air Force Base.
AECOM/Maryland Transit Administration	Consultation	Inquiry about District wetland mapping.

Nonpoint Source Control Program

Environmental pollution from nonpoint sources occurs when water moving over land picks up pollutants such as sediment, bacteria, nutrients, and toxicants and carries them to nearby waterbodies. Sediment and pollutant-laden water can pose a threat to public health. The pollutants may come from both natural sources and human activity. Stormwater runoff and associated soil erosion are significant causes of lost natural habitat and poor water quality in the District. Nonpoint source pollutants of concern in the District are nutrients, sediment, toxics, pathogens, oil and grease. The origins of nonpoint pollutants in the District are diverse and include:

- Stormwater runoff due to the large amount of impervious surfaces in urban areas;

- Development and redevelopment activities;
- Urbanization of surrounding jurisdictions; and
- Agricultural activities upstream of the watershed.

The District's Nonpoint Source Plan is based on the following goals, which provide the framework for the District government to continue to develop and enhance its program.

1. Support activities that reduce pollutant loads from urban runoff, construction activity, combined sewer overflows, and trash disposal, for the purpose of attaining present designated uses by 2025 and future designated uses by 2035.

2. Support and implement activities that restore degraded systems and maintain healthy habitats, species diversity, and water flows in all Anacostia River tributaries by 2025 and all surface waters of the District by 2035.

3. Coordinate efforts with outside programs and adjoining jurisdictions to prevent and control nonpoint source pollution in the District to the maximum extent with the resources available.

4. Support information and education campaigns that aim to prevent nonpoint source pollution from individual actions. These campaigns should reach at least 5,000 individuals each year and should target audiences who either visit, live, work, or teach in the District and its watersheds.

5. Implement programs that aim to increase nonpoint source pollution runoff prevention practices on private property, reaching at least 1,000 properties per year.

Nonpoint Source Updates

Inspection and Enforcement Division Construction and Maintenance Branch (IED CMB)

IED CMB inspects construction sites throughout the District to make sure they are in compliance with District regulations. DOEE also regularly inspects existing stormwater management facilities to ensure that they are in working order and properly maintained. In addition, CMB is responsible for investigating citizen complaints relating to soil erosion and drainage problems and recommending appropriate solutions. DOEE performs outreach to industrial and construction facilities through workshops, brochures, and site inspections. Inspection and Enforcement personnel use inspections to promote awareness of proper facility maintenance for stormwater regulation compliance. DOEE has also published guidelines to ensure stormwater management facilities conduct proper maintenance.

In FY 2016 and FY 2017, the Construction and Maintenance Branch accomplished the following:

- Conducted 6,779 inspections at construction sites for enforcing erosion and sediment control as well as stormwater management regulations;

- Took 266 enforcement actions, including Stop Work Orders, Notices of Infractions, Notices of Violations, and Maintenance Notices;
- Inspected 2,261 stormwater management facilities to ensure proper functioning;
- Developed a new format for self-certifying stormwater management maintenance reporting by contractors, stormwater management best management practice (BMP) owners or their agents;
- Added 3 new inspector positions;
- Continued to develop outreach and guidance materials, including brochures, web material and presentations; and
- Low Impact Development and Green Infrastructure contract awarded for DOEE maintenance activities.

Enforcement Activities

Notice of Violations
- 122 Construction
- 5 Maintenance

Administrative Orders
- 15 Construction
- 6 Maintenance

Notice of Infractions
- 130

Maintenance Notice
- 118

Erosion and Sediment Control Inspections
- 5436 Inspections

Stormwater BMP Construction Inspections
- 1343

Stormwater BMP Maintenance Inspections
- 1942 Maintenance Inspections
- 319 Post Maintenance Inspections

WPD Stream Restoration and Pollution Prevention Updates

<u>Stream Restoration</u>

Stream restoration and wetland restoration is the act of modifying a waterway or marsh to improve its environmental health and habitat. All District streams face similar threats from impervious surface runoff due to urbanization. Runoff increases stormwater flows, which in turn,

change the geomorphological flow of the stream, ultimately eroding its banks and bed. Stream restoration attempts to alleviate the stress of increased flow by creating a new channel to redirect stormwater away from the stream.

In FY 2016 and FY 2017, DOEE continued constructing several existing projects, performed pre- and post-restoration monitoring at completed and future restoration sites, and completed two stream restoration projects. WPD currently has 23,000 linear feet of restored stream under post-restoration monitoring, and is in the design phase process of restoring over 35,000 linear feet of stream reaches in the coming years.

Springhouse Run Stream Restoration

Springhouse Run is a remnant of one of the original tributaries to Hickey Run, which itself is a tributary of the Anacostia River, and has a drainage area of 152 acres. The majority of Springhouse Runis stable, although it is highly altered and armored in most areas. The armoring has resulted in a stream with poor habitat value and very limited ability to trap sediment and uptake nutrients.

DOEE awarded a construction contract to restore the stream in 2016. The project was completed in summer 2017. The stream has been reconnected to its historic floodplain and a series of grade control riffles were installed to decrease the stream's flow and return it to normal levels. This project reach measures approximately 1,800 feet in length and lies entirely within the U.S. National Arboretum.

An additional component of this project is to construct bioretention facilities in the parking areas near the Arboretum Visitor Center. This project is being funded in part with EPA 319 funds.

Nash Run Stream Restoration

The Nash Run Stream Restoration and Trash Trap project was successfully completed in June 2016. The 1,408 linear foot restoration project turned a degraded urban stream with high bank erosion rates into a stable stream with a hydrologically connected floodplain bench along both stream banks. Project work involved the excavation of over 11,000 cubic yards of sediment along both stream banks (similar to a legacy sediment removal project). Following excavation work, the contractor created log vanes (from trees removed on site) as vertical grade controls in the stream and in the floodplain benches along the stream. The 55-foot wide floodplain bench will be accessed by the stream in even small rain events, dissipating the erosive force of stream flows and watering the floodplain bench. Throughout the project area DOEE planted 99 trees, over 100 shrubs, and over 1,000 herbaceous plants and grasses. Additionally, DOEE installed a floating trash trap at the uppermost part of the project area to capture floating trash exiting the stormwater outfall at the top of the project area.

The completed project is a tremendous improvement to the surrounding neighborhood and the Anacostia River. The restoration project will reduce bank erosion, improve stream connectivity to its floodplain, increase the riparian cover along the stream, add wetland area to the stream corridor, and significantly reduce the stream's contribution of trash and debris to the Anacostia River. DOEE is monitoring the health of the stream to demonstrate water quality improvement. As the project was only recently completed, post-restoration data is not yet available.

Watts Branch Stream Restoration

The Watts Branch Stream Restoration Project was completed in early FY 2012. Since that time, DOEE has monitored the project using a combination of activities to determine whether it has achieved its design objectives. Restoration monitoring consists of photographic surveys, vegetative surveys and geomorphic assessments.

Pope Branch Stream Restoration and Sewer Line Replacement

In November 2016, DOEE and its partner, DC Water, completed the 4,780-foot-long stream restoration project at Pope Branch using regenerative stream design techniques. The stream restoration involved the construction of over 100 boulder and cobble weirs to create a step pool stream system. At high flows, the stream can access its floodplain, alleviating excess energy and depositing sediment onto the floodplain. The step pool system also helps to dissipate energy as water circulates and spreads out in the pools before overtopping the next downstream weir. The construction access road that ran along the stream is now a walking path for residents, providing better access to the restored stream valley.

Alger Park Stream Restoration

The 1,540 foot long Alger Park stream restoration was completed in 2017. The stream restoration project used regenerative stream restoration techniques and added more than half an acre of wetland to the stream corridor. The project planted over 3000 wetland plants, 300 shurbs, and 300 trees. Prior to restoration, conservative estimates showed that Alger Park was losing over 100 tons of sediment per year due to stream bank erosion and had one of the most eroded stream beds in the District. DOEE also conductedestenstive outreach in the watershed related to our RiverSmart Homes program to ensure we maximized the installation of private home low impact development (LID) practices in the area that drains to Alger Park. In addtion to DOEE's work in the watershed, in 2017, the District Department of Transportation (DDOT) completed designs for upland LID projects in the watershed area that drains into Alger Park. In 2018, DDOT will install approximately 30 LID projects in the public space areas that drain to Alger Park, which will catch, capture, and filter stormwater before it enters the stream valley.

Linnean Park and Linnean Gully Stream Restorations

In FY 2014, DOEE completed the installation of a regenerative stormwater conveyance (RSC) system in Linnean Park that restored 1,000 linear feet of in-stream habitat. The Linnean Park tributary, a perennial stream, was a highly degraded by stormwater runoff from a 24.5-acre watershed dominated by single family homes and wide suburban streets.

This project, partially funded by a National Fish and Wildlife Foundation grant, is being intensely monitored to better understand the efficacy of the RSC restoration approach. The University of Maryland Center for Environmental Science Chesapeake Biological Laboratory performed pre-installation monitoring for concentrations of nutrients, sediment, metals, bacteria, flow volume and velocity, water temperature, and habitat health. In FY 2016, the researchers continued post-restoration monitoring of the project area and a final report is expected in early 2017. The project, using a paired monitoring approach, studies the same set of parameters in Spring Valley, a stream and watershed of similar character that will be restored in the near

future. DOEE is also performing photo monitoring of the project area to document the stability of the RSC over time.

Spring Valley Stream Restoration

In FY 2017, DOEE awarded a design-build contract for the restoration of the 1,100 linear-foot-long stream that runs through Spring Valley Park. The stream is a tributary of the Potomac River. In 2017, design advanced, to the conceptual phase. DOEE hopes to have final designs in 2018, with construction commencing soon thereafter. DOEE also met with community members to inform them about this project and encourage them to adopt practices on their properties to reduce stormwater runoff to the stream.

Fort Dupont Watershed Restoration

The Fort Dupont watershed is part of the District of Columbia's Anacostia River Watershed Implementation Plan (WIP) approved by EPA in 2012. DOEE began a comprehensive project in 2017 to restore the Fort Dupont watershed consisting of five main components: 1) community outreach and education activities focused on watershed restoration; 2) upland LID work on private property within the watershed through voluntary implementation efforts; 3) installation of LID on NPS or public right-of-way areas; 4) stream restoration work; and 5) wetland restoration work. In 2017, DOEE commenced an environmental assessment (EA) to explore the impacts of stream and wetland restoration work in the Park which could allow for the restoration of over 10,000 linear feet of stream and 5 acres of wetlands. DOEE also partnered with NPS and the Federal Highways Administration to add LID projects along the roadways that intersect the park.

DOEE expects to complete the EA in early 2018 and then will move forward with design and construction work for stream and wetland restoraiton.DOEE expects the LID projects to be installed along the roadways in late 2018 or early 2019. DOEE will also move forward with a comprehensive plan to engage communities that surround the park so that they are a part of the restoration efforts.

Stickfoot Branch

In 2017, DOEE enterted into an agreement with DC Water to restore a headwater tributary of Stickfoot Branch in Southeast, DC which drains into the Anacostia River. Restoration work will involve restorating 800 ft of highly eroded stream channel, protection of a sanitary sewer line, and the improvement of three storm sewer outfalls in the restoration area. DOEE will commence the environmental assessment and design work for Stickfoot Branch in 2018.

Pinehurst Branch Environmental Assessment

In 2017, DOEE began the EA process for Pinehurst Branch, which originates at the District/Maryland border and flows approximately 1.3 miles east–southeast on National Park Service (NPS) property to its confluence with Rock Creek. The 619-acre Pinehurst Branch watershed land use is approximately 70%residential and commercial development and 30% parkland. Approximately 70% of the watershed lies within the District, with the remaining 30% in Montgomery County, Maryland. The large amount of impervious surfaces in the watershed has caused significant erosion in Pinehurst Branch, resulting in sediment transport to Rock Creek and exposed sanitary sewer lines in the stream. DC Water is planning to abandon or remove

existing sanitary sewer lines in Pinehurst Branch in early 2018 and DOEE will coordinate with them to restore the stream following completion of the sanitary sewer line work.

The Pinehurst Branch stream restoration project will be a comprehensive restoration project that addresses current degraded conditions in the stream, including eroding banks, exposed sewer lines, and invasive vegetation. The first step in restoration is to conduct an EA as required by the National Environmental Policy Act. The scope of work in this EA will explore options to implement the proposed actions of the Pinehurst Branch restoration project that would take place on NPS property. The EA will consider the potential to implement restoration activities that could meet the following objectives: restoring approximately 7,900 feet of degraded stream reaches; creating conditions suitable for wildlife habitat; and improving the condition of existing wetlands.

DOEE expects to complete the EA in 2018 and subsequently move forward with design and construction work.

Pollution Prevention

Private property, including commercial, residential, and nonprofit lands (religious and academic institutions), is the single largest land use in the District. These lands are one of the primary sources of pollution to District waterways, contributing pollutants through combined sewer overflow events and urban stormwater runoff.

One of the greatest needs and challenges for the District is to reduce water pollution by incentivizing retrofits at the individual property level. The District has recognized that without convincing property owners to adopt nonpoint source pollution prevention techniques on their lands, it will be difficult to achieve its water pollution reduction goals. As such, the District has developed a variety of programs to encourage property owners to adopt nonpoint source pollution reduction techniques. These efforts include an LID retrofit grant program and the following list of RiverSmart programs:

- RiverSmart Rooftops (Green Roof Rebate/Retrofit Program)
- RiverSmart Communities
- RiverSmart Homes
- RiverSmart Rebates for cisterns, impervious surface reduction, rain gardens and trees

RiverSmart Rooftops (Green Roof Rebate/Retrofit Program)

Historically, the District has offered a rebate for installation of a green roof on a new building or the retrofit of an existing roof. Programs offered through DOEE provided varying rebate amounts with varying constraints. DOEE awarded a new grant for administration of the RiverSmart Rooftops program in October 2014 which ran through the end of FY 2017. The current program offers a rebate of $10 per square foot throughout the District, and $15 per square foot in priority watersheds.

To date, the RiverSmart Rooftops Rebates program has contributed $1,866,401.75 towards the installation of 396,503 square feet of green roof in the District. In FYs 2016 and2017, the District added 613,791 square feet of green roof to its portfolio. Since the start of the current green roof rebate grant in FY 2014, DOEE's rebate program has funded 47,566 square feet of green rooftops.

RiverSmart Communities Program

In FY 2016 and FY 2017, the RiverSmart Communities program completed 47 site audits implemented stormwater management practices at multi-family complexes (e.g., condominiums, apartments, co-ops), businesses, religious and nonprofit institutions, and other private properties. Typical practices include permeable paving systems, bioretention, rain gardens, BayScaping, and tree planting. The program completed 9 rebate projects and 5 design build projects, treating 29,856 square feet of District lands.

Starting in FY 2017, DOEE modified the program to focus solely on religious and nonprofit institutions. In return for DOEE installing stormwater landscaping on their property, the nonprofit or religious institutions must perform outreach and education to the community they serve to teach them about stormwater pollution, and ways of reducing this pollution through District programs.

RiverSmart Homes Program

The District has recognized the importance of targeting homeowners for pollution reduction measures because residential property is the largest single land use in the city and, because of the relatively small lot sizes, is the least likely to be required to install stormwater management practices. In 2008, DOEE developed RiverSmart Homes, a LID retrofit program aimed at District single-family homes. The program started with eight demonstration sites, one in each of the District's wards. It then expanded to a pilot program in the Pope Branch watershed and has been open to all District residents since summer of 2009.
Through this program, DOEE performs audits of homeowner's properties and provides feedback to the homeowners on what LID technologies can be safely installed on the property. DOEE also offers homeowners subsidized installations of any LID recommended at the audit, which can include shade trees, native landscaping to replace grass, rain gardens, rain barrels, and permeable pavement.

DOEE made a few substantial changes to RiverSmart Homes in FY 2016 to increase participation. The program raised incentives from 1,600 dollars per property to 3,000 dollars total per property, began offering a new rain barrel for installation (see Figure 17), and changed the incentive for permeable pavement from a grant to a rebate of $10 per square foot. The program has continued in popularity with an average of 100 homeowners registering per month.

FYs 2016 2017 accomplishments include the following:

- Installed 793 rain barrels;
- Planted 1,188 shade trees;

- Installed 193 rain gardens;
- Implemented BayScaping at 405 properties;
- Replaced impervious surfaces with green space or pervious pavers at 121 properties; and
- Conducted 1,977 audits.

Rain Barrel Rebate Program

Property owners who purchase and install a rain barrel from an approved rain barrel list are able to apply for a rebate. In response to losing its grantee for rain barrel installations in FY 2015, DOEE increased the rebate for rain barrels from one dollar per gallon stored to two dollars per gallon stored, up to 1,000 dollars. This change ensured DOEE was able to continue offering an incentive for its most popular LID option. The rebate program includes conducting outreach to advertise the program through traditional channels and through innovative approaches, (e.g., partnerships with local hardware stores). In FY 2016 and FY2017, 206 rain barrels were installed and rebated, with an average capacity of 150 gallons of storage per property.

Rain Garden, Pervious Paver, and Impervious Surface Reduction Rebate Program

Any single-family homeowner in the District is eligible for the rain garden, pervious paver, and impervious surface reduction rebate, including homeowners who have already received funding through the RiverSmart Homes program. DOEE also made changes to this program in FY 2016. For permeable pavement and impervious surface reduction projects, DOEE changed the rebate to be based on the square footage of impervious area removed and replaced, rather than the square footage of impervious area treated with the retrofit. DOEE's rebate for rain gardens is still based on the square footage of impervious area treated by the garden. Impervious areas are defined as rooftops or areas that are covered in concrete, asphalt, or other impervious materials.

The rebate reimburses homeowners 10 dollars per square foot of impervious surface removed and replaced with permeable pavement. The rebate is five dollars per square foot of impervious surface removed and replaced with vegetation. There is no maximum square footage or rebate for permeable pavement and vegetation retrofits. The rebate for rain gardens is three dollars per square foot of treatment area with a maximum rebate of 2,200 dollars per property. In FYs 2016 and 2017, 129 rebates were issued, 8 of which were for rain gardens, treating a total of 157,337 square feet of impervious surface.

Stormwater Retention Credits Trading Program

The Stormwater Retention Credit (SRC) Trading Program is an innovative market-based program for managing stormwater in the District of Columbia. The program allows property owners to generate and sell SRCs by installing green infrastructure that has the capacity to retain stormwater and thereby reduce the runoff that harms District streams and rivers. An SRC is worth one gallon of retention for one year, and regulated development sites buy and use SRCs to meet their regulatory requirements for retaining stormwater runoff. Additional information on the FY 2017 implementation of the program, the Registry, as well as other analyses and information on the SRC trading program are available at http://DOEE.dc.gov/src.

Stormwater Database

In FY 2015, DOEE launched the Stormwater Database to manage submission, review, and inspection of Stormwater Management Plans, Erosion and Sediment Control Plans, and Green Area Ratio Plans. The database also calculates and tracks discounts in the RiverSmart Rewards program and eligibility for the Stormwater Retention Credit Program. As required by Section 4.1.2 of the MS4 Permit, the database tracks each site's regulatory obligations and compliance, including off-site retention achieved with SRCs or payment of the in-lieu fee (ILF). The public uses the database to do the following:

- Submit compliance calculations and other information to support an application for DOEE approval of a Stormwater Management Plan, Erosion and Sediment Control Plan, or Green Area Ratio Plan;
- Comply with an off-site retention obligation by applying to use SRCs or notifying DOEE of an ILF fee payment;
- Apply to certify, transfer, or retire SRCs;
- View the SRC registry; and
- Apply for a RiverSmart Rewards discount on the District's impervious surface-based fees.

After completing applications, public users submit them electronically and the database notifies DOEE of these new applications. Staff review and make a decision to approve or deny each application and the database notifies public users of DOEE's decision.

In FY 2016, DOEE continued to expand the uses of the Stormwater Database across all programs. General enhancements to the database have included streamlining database workflows, automating email notifications regarding application approval and inspection, and providing greater access to program information. Notably, DOEE is now publishing BMP data from the Stormwater Database in a GIS layer that can be publicly downloaded from http://opendata.dc.gov/.

DOEE also increased its ability to use the Stormwater Database for its inspection and enforcement programs by developing new features. DOEE's inspectors now use the Stormwater Database in the field with tablets, which allows them to record inspection events and enforcement actions on-site. Detailed inspection data is stored in the database, signed, formatted into PDF documents, and automatically sent to the site owner and the site owner's agent, if applicable.

DOEE also developed expanded reporting options for the Stormwater Database to enhance the ability of program administrators to track program implementation. Custom dashboards and queries allow program administrators to view and export data in real time. This allows DOEE to identify process bottlenecks and to assess overall program implementation across the District.

In FY 2017, DOEE added several new Stormwater Database features:

- An electronic plan approval stamp allows DOEE permit reviewers to stamp SWMPs as PDFs rather than requiring physical plans. This helps to streamline DOEE's review process and improve electronic recordkeeping of SWMP approvals.
- DOEE began tracking the RiverSmart Homes program through the Stormwater Database. This module syncs with an ArcGIS collector app that RiverSmart Homes staff use in the field to make BMP recommendations.
- DOEE implemented a Stormwater Database feature to streamline the process for inspectors to upload photo evidence from their inspections.

DOEE also continued to migrate additional BMP data sources. In FY 2017, DOEE migrated its list of voluntary green roof projects into the Stormwater Database. DOEE continued to validate BMP data from historical SWMPs.

As previously stated, DOEE will coordinate with EPA staff to identify the data fields related to the MS4 Permit performance metrics and provide the relevant data upon request.
More information about the Stormwater Database can be found at: http://doee.dc.gov/swdb.

Tree Planting

The District of Columbia has been called "The City of Trees." It has a tree canopy cover of 35%, which is high for a dense, urban environment, but lower than what the canopy cover has been historically, even when the city had a higher population density. In an effort to improve air and water quality, reduce the urban heat island effect, and offset greenhouse gas emissions, the District has adopted a 40% tree canopy goal. Mayor Bowser has adopted a Sustainability Plan that calls for achieving the canopy goal by 2032. To achieve that goal, the District will need to plant an average of 10,800 trees annually (an increase of 25% over current efforts). Currently, the Urban Forestry Administration, the agency that maintains the District's street trees, plants an average of 6,225 trees annually.

DOEE, with help from nonprofit partners such as Casey Trees and Washington Parks and People, plants trees on private, federal, and other District lands.

The following are FY 2016 and FY 2017 tree planting accomplishments:

- Planted 1,952 trees as part of the RiverSmart Homes and Tree Rebate Program;
- Planted 1,676 trees on parks and school lands and created 160 planting plans for these parcels as a part of a special effort to increase tree canopy in these areas; and
- Planted 22,000 trees planted District-wide.

Environmental Education and Outreach

District of Columbia Environmental Education Consortium (DCEEC)

DOEE helps to organize a network of environmental educators throughout the District so that ideas and resources can be shared among them. The D.C. Environmental Education Consortium (DCEEC) provides opportunities for networking, event coordination, and program partnering among its members. The members provide environmental expertise, professional development opportunities, curricula and resources, and hands-on classroom and field studies to District schools.

In FY 2016 and FY 2017, the US Botanical Garden, DOEE, and DCEEC hosted our tenth (10^{th}) and eleventh (11th) annual D.C. Teacher's Night at the Botanic Garden site. Over 200 teachers registered, and those in attendance learned about environmental programming from approximately 30 exhibitors representing local environmental and science education organizations. Participants also took part in hands-on experiments and left with lesson plans for their classrooms.

The District also held its sixth and seventh annual Growing Healthy Schools Month, a combined product of DC School Garden Week and DC Farm to School Week. Growing Healthy Schools Month reflects the components of the recent Healthy Schools Act, which encourages linkages between farm-to-school programs and school garden programs.

In FY 2017, DOEE assisted DCEEC with the Nature Near School mapping initiative. The initiative's goal is to identify public parks within 0.25 miles (five-minute walk) of all District schools in order to encourage environmental literacy among students. This effort will continue in FY 2018 with the hope that schools will take advantage of the nearby nature by having their students participate in walkable mini-field trips.

Conservation Education (Project Learning Tree)

Project Learning Tree (PLT) is an internationally recognized program that trains educators in innovative techniques for exploring a wide range of environmental concepts with students and teaching critical thinking skills that foster environmental stewardship (grades K–12).

Teacher Training Workshops

Environmental education workshops provide teachers and informal educators with environmental curricula that support the District's teaching and learning standards. Additionally, these curricula provide students with meaningful environmental education experiences via outdoor activities and events. In FY 2016 and FY 2017, these workshops included:

- Two PLT K–8 curriculum workshops for DPR staff and Mary McCleod Bethune Day Academy Public Charter School staff for 67 teachers and out-of-school time informal educators; and
- Two PLT and Aquatic WILD combo curriculum workshops. The workshops were hosted at DOEE's Aquatic Resource Education Center for 64 teachers and informal educators.

RiverSmart Schools

The RiverSmart Schools Program works with applicant schools to install LID practices in an effort to control stormwater. These practices are specially designed to be functional as well as

educational. Teachers at RiverSmart Schools receive training on how to integrate the sites into their environmental curriculum in addition to how to properly maintain the sites.

In FY 2016 and FY 2017, WPD accomplished the following:

- Conducted an 8-day workshop on RiverSmart schools site usage and programming for 67 teachers;
- Conducted 32 classroom visits and 15 boat trips to integrate RiverSmart Schools project at each participating school; and
- Engaged students, teachers, and volunteers in community work days to construct and maintain designed schoolyard conservation sites. Approximately 200 students from 3 schools participated in 8 community work days.

DOEE also completed the construction of 10 RiverSmart Schools projects: Capital City Public Charter School, Excel Academy Public Charter School, JO Wilson Elementary, Ludlow-Taylor Elementary, Sousa Middle, Hart Middle, Seaton Elementary, Payne Elementary, Mundo Verde Public Charter School, and Bruce-Monroe Elementary at Park View. DOEE also helped maintain two previous RiverSmart School projects over this reporting period.

Below are a few samples of the RiverSmart Schools' stormwater data:

1. Hart Middle – 601 Mississippi Ave SE. This project is a voluntary RiverSmart School Improvement Project to install 1,113 SF of BMPs and an outdoor classroom on asphalt to ecosystem land area. The improvements include the construction of 2 rain gardens. The site is in the MS4.
    - Drainage Area = 3,220 sq.ft.
    - Retention volume achieved = 1,070 cubic ft.
    - On-site retention achieved = 8,004 gallons
    - Total BMP area = 1,113 sq. ft.

2. Seaton Elementary – 1503 10th St NW. This project is a voluntary unregulated RiverSmart School Improvement Project to remove existing asphalt school yard and playground area and install 1,200 SF of BMPs. The improvements include the construction of bioretention areas, plant education gardend, and outdoor education areas. The site is in the CSO.
    - Drainage Area = 24,873 sq.ft.
    - Retention volume achieved = 743 cubic ft.
    - On-site retention achieved = 5,556 gallons
    - Total BMP area = 1,200 sq. ft.
3. Excel Academy – 2501 Martin Luther King Jr Ave SE. This project is a voluntary RiverSmart School Improvement Project to install 1,605 SF of BMPs and an outdoor classroom on existing compacted land. The improvements include the construction of 3 rain gardens. The total area of disturbance is 7,360. The site is in the MS4. Total cost of construction is $319,000.00.
    - On-site retention achieved = 5,395 gallons
    - On-site treatment achieved = 3,596 gallons

- Stormwater Retention Credit eligibility 2,274 gallons

4. Ludlow-Taylor Elementary – 659 G Street NE. This project is a voluntary unregulated RiverSmart School Improvement Project to remove existing asphalt school yard and playground area and install 2,834 SF of BMPs. The improvements include the construction of bioretention areas, stormwater planters, plant education gardens, and outdoor education areas. The total area of disturbance is 11,526. The site is in the CSO. Total cost of construction is $341,166.00.
    - On-site retention achieved = 9,351 gallons
    - On-site treatment achieved = 1,723 gallons
    - Stormwater Retention Credit eligibility 11,212 gallons

District Environmental Literacy Plan (ELP)

In FYs 2016 and 2017, DOEE continued to collaborate with stakeholders to implement the Environmental Literacy Plan. In partnership with nonprofit organizations, DOEE began implementation of the Environmental Literacy Framework for District schools, a grade-by-grade approach for integrating environmental education into the curriculum. Teachers from Sustainable DC Model Schools, which are exemplary schools that already include environmental programming, helped develop and pilot the framework. Four of the eight model schools were DOEE RiverSmart Schools participants. This framework will help identify places in school curriculums where DOEE programming will fit best. This project will also coordinate Green Career Expos for high school students to learn about green jobs and summer internships. DOEE continues to work with the Office of the State Superintendent of Education (OSSE) to implement the ELP, which will bring environmental education and meaningful outdoor experiences to District youth.

The Anacostia Environmental Youth Summit (AEYS)

The AEYS is a District-wide showcase that amplifies youth voices, highlights the importance of environmental literacy, and encourages stewardship for the District's major waterbodies. The AEYS emphasizes youth leadership and innovation while promoting environmental stewardship and responsibility. In FYs 2016 and 2017, the event brought together approximately 50 exhibitors and 850 students. According to feedback from teachers, the event successfully met its objectives of empowering the District's youth and providing educators with knowledge and resources to continue efforts beyond the Summit.

Meaningful Watershed Educational Experiences (MWEEs)

DOEE funded several nonprofit partners' efforts to create MWEEs through the subgrant program. The District's nonprofit partners include Living Classrooms National Capital Region, Live It Learn It, the Alice Ferguson Foundation, and Nature Bridge. In FYs 2016 and 2017, these partnerships provided MWEEs for approximately 3,000 District students, including a three day overnight program.

Storm Drain Marker Program

In FYs 2016 and 2017, WPD installed approximately 1,040 storm drain markers throughout the District. WPD worked with nine different volunteer groups, including: the Green Zone Environmental Program (GZEP); an elementary school; an afterschool program; a summer camp; a Girl Scout troop and two universities.

River Corps

In 2017, DOEE began a green infrastructure and job training program, the River Corps, run by the Latin American Youth Center. Each year, two groups of ten students will participate in a five month-long green infrastructure job training program where they will learn how to maintain LID sites, inspect RiverSmart Home installations, perform trash cleanups, remove invasive plant species, and conduct photo monitoring of upcoming and existing stream restoration projects. The River Corps' work photo monitoring of District streams gives DOEE visual representation of current and former projects, in addition to helping DOEE compare pre and post-restoration conditions at set locations.

Cost/Benefit Assessment

Cost

The District of Columbia has and continues to commit significant amounts of resources to improve the quality of its waters. Effective wastewater treatment, sanitary sewer system maintenance, combined sewer overflow control, and stormwater management are the principal elements in water pollution control. The Blue Plains Wastewater Treatment Plant (WWTP) operated by District of Columbia Water and Sewer Authority (DC WASA) provides wastewater services to over two million customers in the District of Columbia (DC) and the surrounding jurisdictions of Maryland and Virginia. Figure 2.7 shows the areas/jurisdictions served by the WWTP.

The District has embarked on an aggressive stormwater management program as part of the implementation and administration of activities required by the District of Columbia Municipal Separate Storm Sewer System (MS4) Permit issued by the EPA. The area covered under the permit is entirely within the jurisdiction of the District and constitutes approximately two thirds of the city's area (DC separate sewer area in Figure 2.8).

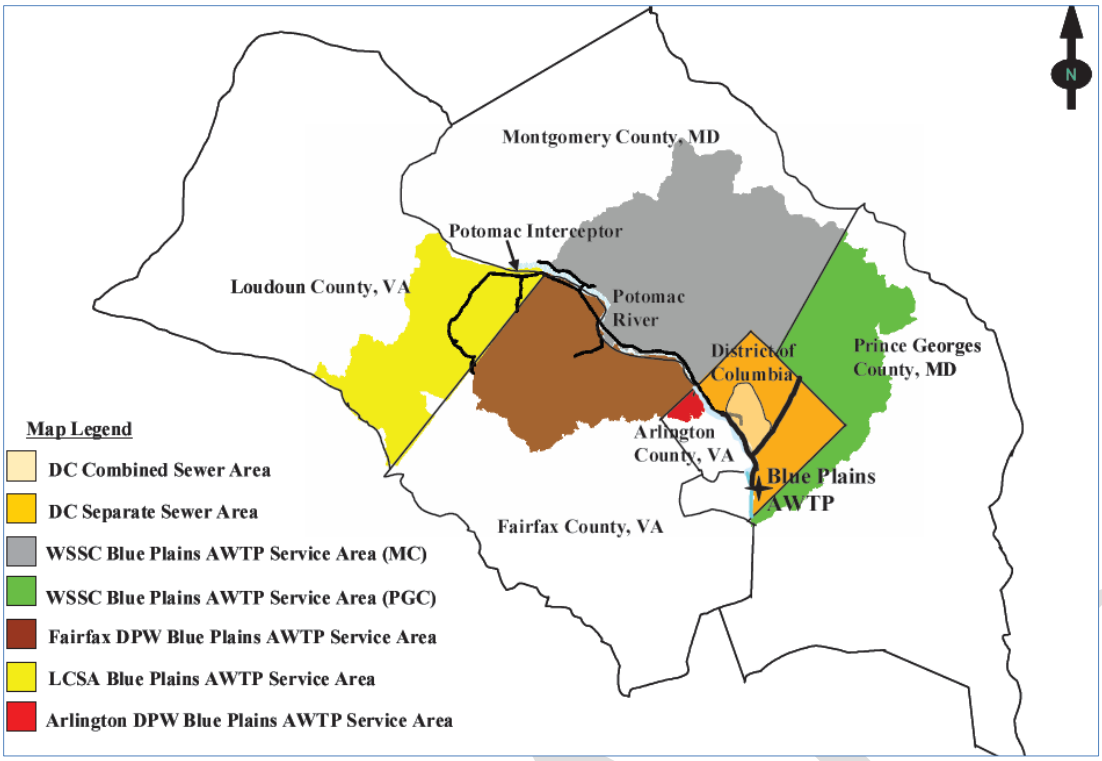

Figure 2.7: Stormwater and Wastewater Treatment Service Areas

Source: LTCP Modification for Total Nitrogen Removal/Wet Weather Plan, DC WASA, Washington, DC, may 2015.

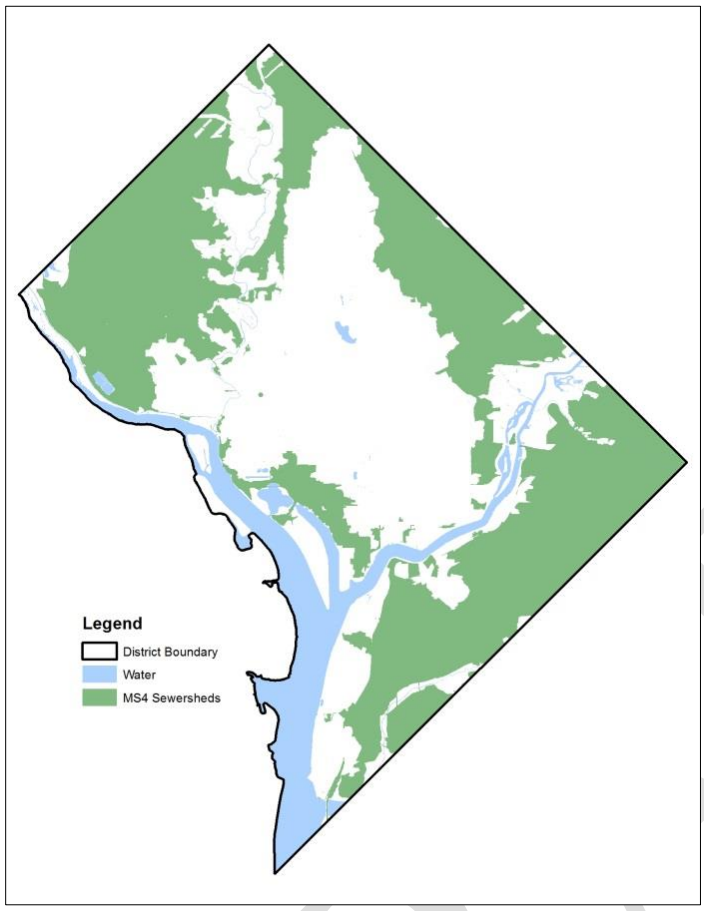

Figure 2.8: MS4 Sewershed Coverage Area

The wastewater treatment costs are apportioned between the jurisdictions served by WWTP. The financial responsibilities of each jurisdiction were updated under the new Blue Plains Intermunicipal Agreement of 2012, effective April 3, 2013 (IMA at http://www.mwcog.org/uploads/pub-documents/u15dVlc20130506094101.pdf). The District's portion of the capital and operations & maintenance costs for wastewater treatment, sanitary sewer maintenance and engineering and technical services constitute 45.8% of the total cost incurred by DC Water. As the only jurisdiction with combined sewer systems, the District is also responsible for combined sewer overflow control costs. Description of the various elements and associated costs are presented below.

Engineering and Technical Services

DC Water's Engineering and Technical Services programs provide support to the planning, design and construction of new and rehabilitation projects across all functions of the collection and treatment of wastewater. The functions include system planning, technical engineering expertise, oversight of construction, and government and private contractors by DC WASA and technical and policy coordination, including environmental policy issues related to the discharge of pollutants to the District's waterbodies.

Sanitary Sewer System Maintenance

The bulk of the cost of the wastewater collection system is associated with the assessment, rehabilitation and replacement of the aging infrastructure in the District. High bacteria counts in various waterways have been attributed to leaking sanitary sewers. Under a multi-year Sewer Assessment Program, DC WASA completed the 10-year Sewer System Facilities Plan in 2009 (Executive Summary at https://www.dcwater.com/news/publications/Sewer%20System%20Facilities%20Plan-Executive%20Summary%20June%202009.pdf). The plan addresses the evaluation of the physical condition and capacity of the sewer system, identification and prioritization of rehabilitation needs, record keeping and data management, as well as ongoing inspection and rehabilitation programs. In accordance with key findings and recommendations of the plan, priority projects to rehabilitate sewer collection systems as well as pumping facilities are currently ongoing. In particular, the rehabilitation of sewers in stream valleys is critical to the significant water quality improvement in DC streams.

Wastewater Treatment

Under the Chesapeake Bay Agreement, the Blue Plains WWTP was the first facility to meet the nutrient reduction goals of 40% from the 1985 levels. The WWTP operates under a stringent National Pollutant Discharge Elimination System (NPDES) permit. Significant plant-wide upgrades, rehabilitation and installation of support systems are continually ongoing. Among the major projects is the Nutrient Removal project to meet regulatory requirements and the goals of the Chesapeake Bay Agreement. In 2007, DC Water proposed to interface the overall Blue Plains Nutrient Removal project with the Combined Sewer Overflow Long Term Control Plan (LTCP) finalized in 2002. In 2015, DC Water finalized the Long Term Control Plan Modification for Total Nitrogen Removal/Wet Weather Plan (TN/TW Plan). The TN/WW Plan is detailed in the report "Long Term Control Plan Modification for Total Nitrogen Removal/Wet Weather Plan, District of Columbia Water and Sewer Authority, Washington, DC, May 2015."

The major components of the project under the selected alternative include construction of the Blue Plains Tunnel (extending from the Anacostia Tunnel System to Blue Plains), construction of a tunnel dewatering pumping station and enhanced clarification facilities at Blue Plains. These projects will provide nitrogen removal to meet the Blue Plains federal NPDES discharge permit requirements as well as the Chesapeake Bay Agreement for nutrient reduction. The projects will simultaneously achieve combined sewer overflow (CSO) reduction "equal or better than" the approved LTCP.

Combined Sewer Overflow Long-Term Control Plan

DC WASA completed the CSO Long Term Control Plan (LTCP) report in 2002. The plan involves the construction of large underground tunnels that will serve as a collection and retention system for the combined sewer during rainfall conditions. Under a 2005 agreement with the federal government, the LTCP is to be implemented over a 20-year period. The plan calls for reducing combined sewer overflows to District waters by 96% by 2025. In December 2012, the Environmental Protection Agency, the Government of the District of Columbia and the District of Columbia Water and Sewer Authority entered into the Green Infrastructure Partnership Agreement (GIPA). The GIPA reinforces the mutual commitments to GI to mitigate

combined sewer overflows to the District's waterways. The plan calls for a $100 million investment in the construction of GI in the Potomac River and Rock Creek watersheds and in the modification of tunnel design in those watersheds.

GIPA relocates the Anacostia Tunnel dewatering pumping station, planned at Poplar Point in the LTCP, to Blue Plains, and connects the Anacostia Tunnel to Blue Plains Tunnel. Planners predict allowing the Anacostia Tunnel to drain into the Blue Plains Tunnel will eliminate CSOs to the Anacostia River. The LTCP reduces the CSO to the Anacostia River by 97.5%. Implementation of the TN/WW Plan is expected to eliminate the remaining 2.5% CSO to the Anacostia River. Table 2.9 shows the predicted CSO reduction and project costs.

Table 2.9
Predicted CSO Reduction and Cost

	Before CSO Controls[1]	**LTCP[2]**	**After Implementation of TN/WW Plan Selected Alternative[2]**
CSS Overflow Volume (mg/yr)			
Anacostia River	2,142	54	0
Potomac River	1,063	79	79
Rock Creek	49	5	5
Number of Overflows (per yr)			
Anacostia River	82	2	0
Potomac River	74	4	4
Rock Creek	30	1(4)	1(4)
Capital Cost Opinion ($, ENR CCI=7888)			
	--	$28	$783
% above the lowest alternative	--	N/A	7%
% above the LTCP[3]	--	N/A	2,696%

1 Source: from Combined Sewer System Long Term Control Plan, Final Report, District of Columbia Water and Sewer Authority, July 2002, Table ES-4
2 Source: from Long Term Control Plan Modification for Total Nitrogen Removal/Wet Weather Plan, District of Columbia Water and Sewer Authority, Washington, DC, May 2015, Appendix C: TN/WW Plan, Table 5-1.
3 Computed

Table 2.10 summarizes the costs associated to the treatment of wastewater for the years 2017 and 2018.

Table 2.10
Cost Summary of Water Pollution Control Activities

Activity Area	**FY 2017[1]** (in thousands)	**FY 2018[2]** (in thousands)	**Total FY17–18** (in thousands)
Waste Water Treatment	123,789	98,423	**222,212**
Sewer Services	38,302	39,294	**77,596**
Combined Sewer System	184,387	130,475	**314,862**
Engineering and Technical Services	25,126	26,728	**51,814**

Source https://www.dcwater.com/budget-and-financial-planning
1 as revised
3 as approved

Stormwater Management

The District's stormwater management efforts cover a whole array of activities including research and demonstration projects, drainage improvements, monitoring and control of various types of pollutants from various sources, enforcement and public education. Six different agencies collaborate to manage stormwater in the District. These include: DOEE, DC WASA, the Department of Public Works (DPW), DDOT, the Department of General Services (DGS), and the Office of Planning (DCOP). The various agencies perform stormwater management tasks within their respective purviews. Table 2.11 outlines some of the related activities.

Table 2.11
Agency Stormwater Functions

Agency	Compliance Activity
DOEE	MS4 program administration Source identification Pollution Prevention Wet/dry weather monitoring program Wet weather screening program Flood control projects review Construction management and plan review Pollutant control from hazardous waste sites Pesticide, herbicide, and fertilizer application Promoting LID practices Illicit discharge detection Sediment erosion control Inspection/enforcement
DC WASA	Floatables reduction program Pollution prevention Operation and maintenance of sewer infrastructure Catch basin cleaning Illicit discharge detection
DPW	Street sweeping Seasonal leaf and holiday tree collection program Pollution prevention Household hazardous waste collection Deicing and snow removal Stormwater management at municipal waste transfer stations
DDOT	Pollutant reduction from vehicles and roadways Pollution prevention LID practices in public right-of-way
DGS	LID practices on District-owned properties Pollution prevention
OP	Planning for neighborhoods, public facilities, parks and open spaces, etc. Urban design and land use review

The District's Stormwater Permit Compliance Amendment Act of 2000 established the Stormwater Permit Compliance Enterprise Fund to provide revenue for the mitigation of pollutants in stormwater discharges. The cost for stormwater management is closely aligned with the MS4 permit requirements. Table 2.12 shows the subject area of the MS4 permit requirements and the associated costs.

Table 2.12
FY 2017 and FY 2018 Enterprise Fund Budget

Permit Section	Subject Area	Fiscal Year 2017[1]	Fiscal Year 2018[2]
	General MS4 Permit Management	$3,900,000	$3,691,000
4.1	Standard for Long-Term Stormwater Management	$250,000	$250,000
4.1	Impervious Surface Retrofits: bioretention, green roofs, outfall repairs, tree canopy and other capital investments	$2,000,000	$5,000,000
4.1	Green Landscape Incentives / RiverSmart	$14,400,000	$2,050,000
4.2	Operation and Maintenance of Stormwater Capture Practices	$500,000	$500,000
4.3	Management of District Government Areas	$340,000	$300,000
4.3	Enhanced Street Sweeping	$575,000	$750,000
4.4	Management of Commercial Institutional Areas	$225,000	$230,000
4.5	Management of Industrial Facilities and Spill Response	$140,000	$140,000
4.6	Stormwater Management for Construction Sites	$0,000	$0.000
4.7	Illicit Discharges and Improper Disposal	$140,000	$230,000
4.8	Flood Control Practices	$0,000	$0,000
4.9	Public Education and Public Participation	$500,000	$500,000
4.10	TMDL Wasteload Allocation Planning and Implementation	$1,550,000	$2,700,000
4.10	Trash TMDL Implementation	$1,100,000	$1,000,000
5.1	Revised Monitoring Program	$800,000	$500,000
5.2	Interim Monitoring	$325,000	$600,000
Total		**$19,495,000**	**$18,441,000**

1 Source: Government of the District of Columbia, 2016 DC MS4 Annual Report, January 23, 2017 https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/0%202016%20MS4%20Annual%20Report%20-Full%20Report_0.pdf

2 Source: Government of the District of Columbia, 2018 DC MS4 Annual Report, January 23, 2018 https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/00%20MS4%20Annual%20Report%20FY%202017.pdf

Benefits

Comprehensive stormwater and wastewater management is making the benefits of clean rivers and streams apparent in the District. The District of Columbia Comprehensive Plan provides a

foundation for policies in support of ecologically sound waterfront development, which contributes to these benefits. Among the key elements of the plan is to "create and enhance relationships between the rivers and District residents, develop urban waterfronts and water-related recreation in appropriate locations, and establish attractive pedestrian connections from neighborhoods to activities along the waterfronts." Development and rehabilitation of waterfront properties to include residential, retail, office space and green space areas have advanced significantly. One highlight is the recent development of the Anacostia River waterfront, which promotes recreational use of the waters.

When fully implemented, the TN/WW Plan estimates that there will be no combined sewer overflow (CSO) to the Anacostia River. Eliminating CSOs to the river will bring the District one step closer to achieving the primary contact recreation designated use for the Anacostia River. In addition, although no change in performance for the Potomac and Rock Creek CSO controls is projected as a result of the TN/WW Plan, the Potomac River will also benefit from the enhanced operation of the WWTP. As designed, the additional storage capacity created as an extension of the Anacostia River Tunnel is available to the WWTP for inter-basin use and during dry weather, effectively expanding the WWTP capacity. Also, the wet weather condition flows have a positive effect on the operation of the WWTP: it is noted that "… the total nitrogen in CSO captured in the tunnel is approximately 4.9 mg/L, while the total nitrogen in the mixture of sanitary wastewater and captured combined sewage is more than 16 mg/L. The performance of the ECF will be better when treating tunnel pumpout than when treating the mixture of separate sanitary wastewater captured combined sewage", (Long Term Control Plan Modification for Total Nitrogen Removal/Wet Weather Plan, District of Columbia Water and Sewer Authority, Washington, DC, May 2015). The TN/WW plan is not only beneficial to the District, but also to all Maryland and Virginia jurisdictions in the WWTP service area.

The quality of the District's waters continues to improve. Although a quantitative assessment of the benefits resulting from current water pollution control expenditures is difficult to make the long term benefits over time are evident. A fish tumor survey conducted by the US Fish and Wildlife Service (FWS) ("Temporal and Spatial Patterns in Tumor Prevalence in Brown Bullhead (*Ameiurus nebulosus*) in the Tidal Potomac River Watershed", April 2013) examined fish tissue analysis from the Anacostia River sampled in the years of 1996, 2000–2001, 2009–2011. The survey shows that there has been a marked decrease in the prevalence of tumors in bottom dwelling fish in the Anacostia River.

Recreational fishing is active in the District. Annual surveys by the Fisheries and Wildlife Division of the DOEE document the general stability of the resident and migratory fish populations in the District's waters. Consistent sales of fishing licenses since 1988 have indicated stable interest in using the District's water for recreational purposes.

Table 2.13 is a summary of licenses sold in 2014 and 2015. In 2008, the federal law for certifying fishing and hunting licenses by FWS was changed and states were required to conduct certification on a fiscal year cycle instead of the former calendar year. In 2010, FWS allowed states to certify licenses either by fiscal year or calendar year. The most recent figures US FWS has certified are from 2015.

Table 2.13
Fishing Licenses Sold in the District of Columbia

Year	Non-Resident	Resident	Total
2014	6,303	2,098	8,401
2015	6,488	2,138	8,626

PART III: SURFACE WATER ASSESSMENT

Part III: Surface Water Assessment has not been completed, with the exception of the Assessment Methodology section. Information from the ATTAINS database is needed to complete this part.

303(d) Listing, Assessment Methodology and Data Summary Report

Background

Section 303(d) of the federal Clean Water Act and regulations developed by US EPA require states to prepare a list of waterbodies or waterbody segments that do not meet water quality standards even after all the pollution controls required by law are in place. Waterbodies may be divided into segments. Waterbodies or waterbody segments not meeting the appropriate water quality standards are considered to be impaired. The law requires that states place the impaired waterbody segments on a list referred to as the 303(d) list and develop total maximum daily loads (TMDLs) for the waterbodies on the list in Category 5. The Potomac and Anacostia Rivers, Rock Creek and Watts Branch are divided into segments for the assessment purposes of this list. The Potomac River has three segments; the Anacostia River, Rock Creek and Watts Branch have two segments each.

US EPA requires that information for the assessment, listing, and reporting requirements for Section 303(d) and 305(b) of the Clean Water Act be submitted in an Integrated Report. The current guidance requires the categorization of all state waters into five assessment categories. The categories can be found in the Category Placement Methodology section.

US EPA regulations require that the Integrated Report (305(b)/303(d) list) and methodology used to categorize the waters be submitted to US EPA by April 1. The public must also be given the opportunity to comment on the IR draft 303(d) list.

Basis for Consideration of Data

Various data sources were considered for use in the preparation of the draft 2018 303(d) list. As the 303(d) list is a tool of the regulatory TMDL process, the District wants to ensure that the 303(d) list produced and eventually approved is based on data that utilized unbiased, scientifically sound data collection and analytical methods. The Water Quality Monitoring Regulations (Title 21, Chapter 19 - District of Columbia Municipal Regulations) were developed to provide for accurate, consistent, and reproducible water quality monitoring data for decision making purposes. Data that did not satisfy the monitoring regulations mentioned above is not reviewed for the development of the 2018 303(d) list.

The draft 2018 list enumerates specific pollutants of concern in various waterbodies or waterbody segments. The draft 2018 303(d) list is based on the following data:

- 2016 303(d) list;
- DC Ambient Water Quality Monitoring data for 2013–2017;
- DC Municipal Separate Storm Sewer System 2013–2017 Monitoring Data;

- Stream Survey data collected between 2002–2003 and 2010–2017;
- District of Columbia Phytoplankton, Zooplankton and Benthic Macroinvertebrate Samples Report, 2005–2009;
- USGS Non-tidal monitoring stations at Hickey Run (USGS station 01651770), Watts Branch (USGS station 01651800), and Rock Creek (USGS station 01648010), 2013–2017; and
- DC Fish Tissue Contamination Report, 2014.

In September 2017, a request for data was sent to organizations that may have data for the waters of the District of Columbia. The data received from organization(s) did not include the required quality assurance project plan, and was therefore not used in the preparation of the draft 303(d) list.

Use Support Determination

Class A

Class A water quality criteria are pH, turbidity and pathogens. *E. coli* bacteria data were used to make use support decisions about pathogens.

Class B

Class B water quality criteria are aesthetics, pH and turbidity. A regional Trash TMDL for the Anacostia River exists and the WQS include narratives that the aesthetic qualities of Class B waters shall be maintained. The waterbody segments are not fully supported. A methodology of the use support determination needs to be developed.

Table 3.1 lists the threshold used to make designated use determinations for physical and chemical pollutants and *E. coli*. For physical and chemical pollutants, the 305(b) guidelines indicated that whenever more than 10% of the water quality samples collected exceed the criterion threshold, the WQS is not attained (U.S. EPA 2002).

Table 3.1
Threshold for Physical and Chemical Pollutants and Pathogens

Support of Designated Use	Threshold for Physical and Chemical Pollutants and Pathogens
Fully Supporting	For any pollutant, standard exceeded in ≤ 10% of measurements. Pollutants not found at levels of concern.
Not Supporting	For any one pollutant, standard exceeded in > 10% of measurements. Pollutants found at levels of concern.
Not Assessed	Not assessed
Insufficient Information	Data to determine if the designated use is fully supporting/not supporting is not available.

Physical and Chemical pollutants are defined here as dissolved oxygen (DO), pH, turbidity, and temperature. For physical and chemical pollutants, the 305(b) guidelines indicated that whenever more than 10% of the water quality samples collected exceed the criterion threshold, the WQS is not attained (U.S. EPA 2002).

Class C

Biological/habitat data collected during 2002–2009, habitat data collected during 2016-2017, and physical/chemical data is used to determine aquatic life (Class C) use support for the small District streams. Biological/ habitat data for small streams was evaluated using the EPA stressor identification guidance. If a stream's aquatic life use is not supported based on the biological information found in the DC Tributary Assessment Report (draft internal document) it is listed under Category 5 of the list, if a TMDL has not been completed.

Table 3.2 indicates streams where rapid bioassessment data was collected. The reference streams are in Maryland. The Maryland Biological Stream Survey, 2014, was the data source.

Aquatic life use support is based on the relationship between observed stream biological conditions compared to the reference stream condition producing a percent of reference stream biological condition. This scale rates "impaired" at 0–79 %, and "non-impaired at 80–100 %" of reference condition. EPA 305(b) guidelines on criteria for aquatic life use support classification recommend designation of "not supporting" if impairment exists, and "fully supporting" if no impairment exists. Piedmont and Coastal Plain tributaries were assessed using reference condition data from Montgomery and Prince George's Counties, Maryland. Piedmont is characterized by relatively low, rolling hills with heights above sea level between 200 feet (50 m) and 800 feet to 1,000 feet (250 m to 300 m). Its geology is complex, with numerous rock formations of different materials and ages intermingled with one another. The Coastal Plain has both low elevation and low relief, but it is also a relatively flat landform and has an average elevation less than 900 meters above sea level and extends some 50 to 100 kilometers inland from the ocean.

Biological Integrity Class scores were determined using scoring criteria adapted from Montgomery County. These scoring ranges were also applied to the Coastal Plain values. Habitat assessments were compared directly to each ecoregion's corresponding reference condition habitat evaluation.

The following tributaries in Table 3.2 were assessed for the Aquatic Life Use category using data collected during 2002–2017:

Table 3.2
Coastal Plain and Piedmont Streams Assessed

Coastal Plain		**Piedmont**	
TDU01	Fort Dupont Tributary[1]	TFB02	Foundry Branch[1]
TFC01	Fort Chaplin Run[1]	TLU01	Luzon Branch[1]
TFD01	Fort Davis Tributary[1]	TMH01	Melvin Hazen Valley Branch[1]
THR01	Hickey Run[c]	TPO01	Portal Branch[1]
TOR01	Oxon Run[1]	TPY01	Piney Branch[1]
TWB01	Lower Watts Branch[c]	TSO01	Soapstone Creek[1]
TWB02	Upper Watts Branch[c]	TDA01	Dalecarlia Tributary[2]
TTX27	Texas Avenue Tributary[1]	TFE01	Fenwick Branch[2]
TFS01	Fort Stanton Tributary[2]	TNS01	Normanstone Creek[2]
TNA01	Nash Run[2]	TDO01	Dumbarton Oaks Tributary[2]
TPB01	Pope Branch[2]	TPI01	Pinehurst Branch[2]

Coastal Plain		Piedmont	
TFS01	Fort Stanton[2]	TKV01	Klingle Valley Creek[2]
		TBR01	Broad Branch[2]
		RCRH01	Lower Rock Creek[c]
		RCRH05	Upper Rock Creek[c]
		TBK01	Battery Kemble Creek[1]
		TPIH01	Pinehurst Branch[2]
		TBR01	Broad Branch[2]

1 - First round streams (monitored on the even number year)
2 - Second round streams (monitored on the odd number year)
c - Core streams (monitored every year)

The findings from the habitat assessment are included in the individual assessments (see Appendix 3.3).

Class D

Fish consumption use determinations (Class D) are informed by known fish consumption advisories in effect during the assessment period. Fish tissue contamination data used to issue advisories are collected at stations located on the Anacostia and Potomac Rivers. If no barrier for fish movement exists, it is assumed that fish move freely to the smaller streams and other waterbodies. In these cases, fish tissue contamination data may be considered applicable to the connected tributaries. In waters where fish tissue was collected directly from the Anacostia and Potomac mainstems, and the presence of a pollutant was found in actionable levels in the fish tissue, the pollutant will be listed as a cause of impairment for that waterbody. In tributaries that are hydrologically connected to the Anacostia and Potomac mainstems and have indirect evidence, such as fish tissue contamination data from the mainstem Anacostia or Potomac Rivers, that indicate that a tributary may be impaired by a toxic pollutant of concern, the pollutant/tributary combination is deemed to have insufficient data or information to determine if the pollutant is a cause of impairment in the tributary. Table 3.3 has the threshold for fish consumption use designation.

Table 3.3
Threshold for Fish Consumption Use Support Classification

Support of Designated Use	Threshold for Fish Consumption
Fully Supporting	No fish/shellfish advisories or bans are in effect.
Not Supporting	"No consumption" fish/shellfish advisory or ban in effect for general population, or a subpopulation that could be at potentially greater risk, for one or more fish species; commercial fishing/shellfishing ban in effect.
Not Assessed	"Not assessed" is used when fish consumption is not a designated use for the waterbody.
Insufficient Information	Data to determine if the designated use is fully supporting/not supporting is not available.

Class E

Class E use is determined by the presence or absence of unmarked submerged or partially

submerged man-made objects that pose a hazard to users of these waters.

Appendix 3.4 includes the tables of percent exceedances and statistical summary reports for the waterbodies assessed for this reporting cycle.

The District has adopted water quality standards for dissolved oxygen, water clarity and chlorophyll a in accordance with the Chesapeake Bay Water Quality Criteria Guidance Document published in 2003 (US EPA, 2003) for the Potomac Tidal Fresh and Anacostia Tidal Fresh (Chesapeake Bay Program waterbody name). For the 2018 listing year, these segments are in Category 4a because the Chesapeake Bay TMDL was established in December 2010.

Ambient Monitoring Data and Stream Survey Data

WQD uses the WQS to evaluate its surface waters. The following are designated uses for the surface waters of the District of Columbia:

- Primary contact recreation (swimmable);
- Secondary contact recreation and aesthetic enjoyment (wadeable);
- Protection and propagation of fish, shellfish, and wildlife (aquatic life);
- Protection of human health related to consumption of fish and shellfish (fish consumption); and
- Navigation (absent of man-made objects that impede free movement)

For the draft 2018 303(d) list determination, physical, chemical, and bacterial data collected from January 2013 to June 2017 are being used to make the use support decisions for primary contact, secondary contact, and aquatic life support uses for the rivers. A waterbody or waterbody segment is included on the draft 303(d) list if its designated use was not supported (i.e., greater than 10% exceedances of the physical or chemical pollutant, or bacteria measurements taken within the data period of study, EPA 2002). It is listed on Category 5 of the list if it is a new instance of non-support of a parameter and a TMDL does not exist. If it is a new instance and a TMDL does exist, the pollutant is placed in Category 4a.

Biological/habitat data collected during 2002–2009 and habitat data collected during 2013–2017, in addition to physical/chemical data is used to determine aquatic life use support for the small District streams. Biological/ habitat data for small streams was evaluated using the EPA stressor identification guidance. If a stream's aquatic life use is not supported based on the biological information found in the stream survey data it is listed under Category 5 of the list, if a TMDL has not been completed.

Municipal Separate Storm Sewer Data

The MS4 data used is the result of wet and dry weather samples collected from the stations monitored during the MS4 monitoring cycle. Only parameters for which numeric criteria was listed in the WQS were evaluated. The strictest criteria listed was used for comparison with the data results.

Category Placement Methodology

The pollutant causing impairment in a waterbody or waterbody segment must be identified. Since each waterbody is associated with multiple uses, it is possible for a single waterbody to need more than one TMDL. The guidance allows for a waterbody segment to be listed in one or more categories. Keep in mind that the main goal of this list is to have TMDLs approved and implemented so that water quality standards can be attained. These are the category descriptions:

Category 1 - All designated uses are supported, no use is threatened.
Category 2 - Available data and/or information indicate that some (at least three), but not all, designated uses are supported.
Category 3 - There is insufficient available data and/or information to make a use support determination.
Category 4 - Available data and/or information indicate that at least one designated use is not supported or is threatened, but a TMDL is not needed.

- Category 4a - A State developed TMDL has been approved by EPA or a TMDL has been established by EPA for any segment-pollutant combination.
- Category 4b - Other required control measures are expected to result in the attainment of an applicable WQS in a reasonable period of time.
- Category 4c - The non-attainment of any applicable WQS for the segment is the result of pollution and is not caused by a pollutant.
  (Category 4 and its subcategories may include TMDLs that may or may not need to be revised for one reason or another, including court orders, consent decrees, availability of new information.)

Category 5 - Available data and/or information indicate that at least one designated use is not supported or is threatened, and a TMDL is needed.

Priority and Ranking

Revisions to TMDLs required by the consent decree will supersede all other TMDLs scheduled for development.

Waterbodies that are first placed on the draft list for toxics substances, such as metals, pesticides, carcinogens, or noncarcinogens, are ranked as high priority for TMDL development on the basis of their risk to human health. Based on previous experience with the TMDL development process—data gathering, model development, public participation—the District of Columbia does not foresee the development of TMDLs for waterbodies ranked as high priority before the next six years.

If a waterbody is first listed for *E. coli* due to primary contact use exceedances that waterbody is ranked as a Medium priority waterbody for TMDL development. Bacterial impairment also poses some human health risk, though the effects seen are usually not as severe as toxic substances' effects. The primary contact use exceedances (a current use) will take higher priority than the secondary contact recreation use exceedances as it is also a more efficient use of resource to address the existing uses before the designated uses (such as secondary contact recreation). Waterbodies listed for trash will be ranked as High priority. Waterbodies listed for pH are also ranked as Medium priority as it is an aquatic life use criterion. The medium priority

waterbodies will be scheduled for TMDL preparation within nine years.

Waterbodies listed for any other pollutant not previously mentioned will also be ranked low priority. Low priority waterbodies will be scheduled for TMDL preparation within twelve years.

Georeferencing

The geographic location codes included in the draft 2018 303(d) list were taken from the National Hydrography Dataset. The District has two codes: 02070010 for the Potomac watershed and 02070008 for the Middle Potomac-Catoctin watershed. Only one District waterbody, Dalecarlia Tributary, is located in the Middle Potomac-Catoctin watershed. All the remaining waterbodies are located in the Potomac watershed. The EPA ATTAINS database is being used to compile the data for the Integrated Report.

Categorization of District of Columbia Waters

See Appendix 3.5 for Categorization List.

Please note the 2018 assessment database (User Cat.) in the sub-header of each waterbody reflects the District's 2018 303(d) category listings. For the complete list of 303(d) categories and contaminants of concern see Appendix 3.5.

Special Topics

Total Maximum Daily Load Development and Related Activities

TMDL development is an evolving process that changes as new information/data becomes available. Since 1998, WQD has developed approximately 357 TMDLs for the District's waters, all of which were approved by EPA. Many of the District's existing TMDLs were established based on limited data and narrow modeling options available at the time, and therefore need to be revised to reflect the newest data. Revising these TMDLs presents an opportunity to develop better water quality models with enhanced prediction capabilities, and consequently improve implementation plans for better protection of the environment.

WQD has started developing TMDLs by completing monitoring and modeling studies for the Anacostia and Potomac Rivers and their tributaries including Rock Creek. The §303(d) list in this report summarizes the TMDLs that are already completed or planned for development in the coming years.

Chesapeake Bay TMDL

Pursuant to Section 303(d) of the Clean Water Act (CWA), the EPA established the Chesapeake Baywide TMDL for nutrients and sediment for all impaired segments in the tidal portion of the Chesapeake Bay watershed, on December 29, 2010. As a signatory to the EPA Chesapeake Bay Agreement, the District has been actively working with EPA and the other partner jurisdictions (Maryland, Virginia, Pennsylvania, West Virginia, New York, and Delaware) to develop and implement the Chesapeake Bay TMDL.

WQD regularly participated in the Bay Water Quality Goal Implementation Team, including many technical workgroups (Land Use, Modeling, Wastewater, Point Source Data, Water Quality Trading, etc.), and took an active role in addressing issues, especially those that are specific to the District. For example, DOEE's WQD, WPD and others provided data and related information to the Bay Program as needed. WQD and DOEE's RRD also jointly collaborated with the Bay Program and EPA Headquarters on the recently finalized Technical Memoranda on "*Considerations for Interstate Trading and Offsets in the Chesapeake Bay Watershed*."

Additionally, WQD staff also participated in national and regional meetings including the R3 states' Nonpoint Source, TMDL, Water Quality Standards, and Water Quality Management Annual Meetings, and the Water Quality Goal Implementation Team face-to-face meeting. These regional meetings provided an opportunity for WQD staff to exchange information with other state representatives and to discuss specific midpoint assessment decisions, timelines, and clarification of the decision roles with relevant state and federal partners.

Bacteria TMDLs Revision

Between 2003 and 2004, DOEE developed and EPA approved a total of 25 bacteria TMDLs for the District based on fecal coliform. These TMDLs needed to be revised by expressing the load allocations in "daily" terms (Friends of the Earth v. EPA 446 F.3d 140 (D.C. Cir. 2006)). They also required translation from fecal coliform to E. coli following DOEE's 2008 adoption of E. coli as the bacteria water quality criteria.

On December 31, 2014, EPA approved the Potomac River Bacteria TMDL, thus completing all the bacteria TMDL revisions in the District as required by the consent decree. Similarly situated bacteria TMDL revisions in the District covering the Anacostia River, Kingman Lake, Oxon Run, Rock Creek, C&O Canal, and the Tidal Basin and Washington Ship Channel were approved earlier by EPA on July 25, 2014. All of the approved revised TMDLs are available on DOEE's website.

On November 23, 2015, DC Water filed a lawsuit in the United States District Court for the District of Columbia against EPA, challenging the revisions. In the lawsuit, DC Water seeks to correct what it perceived as "technical mistakes...that may force unreasonable mandates on its Blue Plains Wastewater Treatment Facility." Specifically, DC Water sought corrections to the TMDL for E. coli. On August 15, 2016, the Anacostia RiverKeeper, Kingman Park Civic Association, and Potomac RiverKeeper Network (Plaintiffs) jointly filed a lawsuit in the United States District Court for the District of Columbia against EPA, also challenging the revisions. In the lawsuit, the Plaintiffs argue that the TMDLs are missing loads to meet the single sample value criterion. Since that time, DC Water withdrew its lawsuit; the other petition is ongoing.

Toxic TMDLs Revision

In 1988, the District listed a number of waterbodies as impaired for toxics on its 303(d) list, and subsequently developed TMDLs. These TMDLs, which are in both Rock Creek and Anacostia, must be revised by expressing the load allocations in "daily" terms pursuant to Friends of the Earth v. EPA 446 F.3d 140 (D.C. Cir. 2006).

- Rock Creek Toxics TMDLs Revisions

- The revised Rock Creek's metals TMDLs were approved by EPA on November 3. 2016.
- The revised Rock Creek's PCBs and other organics TMDLs were approved by EPA on December 6. 2016.

- Anacostia Toxics TMDLs Revisions
  - Following a detailed review of the Anacostia River watershed toxic TMDLs, EPA, DOEE and Maryland Department of Environment determined that more data is needed to achieve the required revisions – and with that, additional time to collect it.
  - On September 15, 2017, the court approved EPA's request for an extension until January 31, 2020. Therefore, the additional data collection and the TMDLs revision will have to be finalized by, or before January 31, 2020.

Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program (Section 303(d) "New Vision")

On December 5, 2013, EPA announced a new collaborative framework to manage program responsibilities and to identify and prioritize waterbodies for restoration and protection, entitled *A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program*. This new Vision has six pillars (engagement, prioritization, protection, integration, alternatives, and assessment) to be addressed in stages as follows:

1. 2016 – Engagement
2. 2016 – Prioritization, Protection, Integration
3. 2018 – Alternatives
4. 2020 – Assessment (Site-specific)
5. 2022 – Evaluate accomplishments of the Vision and Goals

In 2016, DOEE is required to develop separate strategies for "engagement" and "priorities" in the context of the District's overall water quality goals and values. The engagement pillar recommends that each state, including the District, actively engage stakeholders to improve and protect water quality, as demonstrated by documented, inclusive, transparent, and consistent communication, including requesting and sharing feedback on proposed approaches, and enhanced understanding of program objectives. The prioritization piece, which also includes protection and integration pieces, recommends that each state, including the District, identify its long-term CWA Section 303(d) Program priorities in the context of its overall water quality goals by 2016.

The District's draft *Stakeholder Engagement Strategy* and *Prioritization Strategy* documents were finalized and incorporated as part of the revised 2016 Integrated Report, which was approved by EPA on February 2, 2017. In FY17, accomplishments from implementing these strategies across the District's Section 106 and Section 319 programs include the following:

1. Collaboration with EPA to implement the 303(d) New Vision pillars and elements.
2. The District stayed on course what is set out in the *Prioritization Strategy* for the 2016-2022 period, namely:

a. Priority #1: Revise TMDLs subject to court order deadlines or consent decree agreement(s) (see toxics "the TMDLs revisions" subsection above). For example, the District and EPA successfully collaborated and finalized the Rock Creek Toxics revisions. Ongoing efforts to collect additional data for the Anacostia Watershed toxics TMDLs revision are also co-funded by EPA and the District (DOEE).
b. Priority #2: Identify new TMDL projects in which DOEE's and EPA's national and/or regional priorities intersect, and where opportunities for collaboration exist.

3. With respect to WQ-27, the District prioritized revision of toxics TMDLs in Rock Creek Watershed and achieved 100 % revision (in terms of areal coverage) of its priority universe. Logistical arrangements (i.e., sourcing funds, contracting, etc.) aimed at collecting additional data needed for the Anacostia Watershed Toxics revision are at advanced stages.
4. The District engaged the relevant stakeholders across its 319 and 303(d) Programs (stream restoration efforts, TMDL development and implementation planning activities. [See, for example, the development of the "Consolidated TMDLs Implementation Plan," which is elaborated upon elsewhere in this report].
5. The District, through DOEE, also encouraged the participation of its:
    a. Staff, through various meetings, workshops and trainings to acquire new knowledge, data and information and share these widely to empower stakeholders.
    b. Stakeholders (e.g. DC Water, Metropolitan Washing Council of Governments (MWCOG), federal government facilities or their respective representatives, including member of civil societies) in the Chesapeake TMDLs Program-related conference calls and meetings. These meetings are meant to improve stakeholders' knowledge and also help them understand DOEE's expectations in terms of implementing projects and providing feedback.

TMDL Implementation Plan (IP)

DOEE submitted an updated draft of its Consolidated TMDL Implementation Plan in August of 2016. A draft of the Consolidated TMDL IP was originally published for public comment and submitted to EPA in May of 2015. DOEE received detailed comments from several stakeholders and from EPA. The August 2016 updated draft addressed these comments.
These updates primarily focused on a series of new, programmatic milestones the District has committed to in the interest of accelerating the pace of stormwater management implementation.

These programmatic milestones include:

- Committing $12.75 million to establish a Stormwater Retention Credit Purchase Agreement program.
- Developing a list of targeted watersheds and targeted implementation approaches.
- Evaluating options for increasing the District's stormwater fee.
- Working to revise and update District TMDLs, including:
    - Identifying priority TMDLs in need of revision.
    - Developing a monitoring work plan to support TMDL revisions.
    - Conducting intensive monitoring to support TMDL revisions.
    - Completing the first round of priority TMDL revisions.

- Conducting an analysis of potential changes to existing stormwater management regulations.
- Updating the Implementation Plan Modeling Tool and the TMDL IP.

DOEE expects to incorporate these programmatic milestones, as well as the numeric milestones from the original draft of the Consolidated TMDL IP, into the District's next MS4 Permit.

TMDL IP Modeling

The District's TMDL Implementation Plan Modeling Tool (IPMT) was developed in 2014 to estimate stormwater runoff, conduct an initial baseline analysis of pollutant loading, evaluate progress made toward WLA attainment (using BMP implementation to-date), and to forecast pollutant reductions associated with implementation of the new stormwater regulations. The IPMT also includes a comprehensive TMDL inventory that provides users with access to details for each waterbody, pollutant, TMDL document, decision rationale document, and numeric WLA.

DOEE updates the IPMT at the end of each annual reporting cycle with the specifications of BMPs that have been implemented in that time frame. These data are then used to model pollution reductions made toward implementation milestones and, if necessary, guide adaptive management strategies.

In FY17, DOEE continued to refine the model in response to comments received on the Consolidated TMDL Implementation Plan, wherein the model was modified to evaluate alternative BMP implementation scenarios. Other key enhancements made during this period included improved numeric (tabular) and graphic reports for tracking progress towards annual benchmarks and five-year milestones, the inclusion of updated documentation, including a new IPMT user manual, and additional BMP data that supports enhanced (District-wide) mapping functionality. Table 2.6 provides the volume of stormwater removed from the MS4 as a result of implementing stormwater controls for FY 2017

Watershed	Runoff Retained (gallons)	TN (lbs.)	TP (lbs.)	TSS (lbs.)	Fecal Coliform (billion MPN)	Copper (lbs.)	Lead (lbs.)	Cadmium[1] (lbs.)	Zinc (lbs.)	Trash (lbs.)

1 An EPA report (402-R-99-004B- linked below) that reviewed several studies with varied site conditions has documented mean partition coefficients for metals. DDOE used these metal-specific partition coefficients (Kd) and associated particle associated fraction (fp) values to model pollutant reduction for these metals through BMP implementation. Since many of the relevant low impact development (LID) practices have similar removal rates for lead and cadmium, the relationship between these two metals, their fp values, and the areas retrofitted were used to estimate cadmium reductions achieved through the Retrofit Program. DDOE will use this methodology to estimate the pollutant load reduction for cadmium in future Annual Reports. http://www.epa.gov/sites/production/files/2015-05/documents/402-r-99-004b.pdf.

Anacostia	30,141,388	991	122	24,778	19,838	16.45	5.23	5.73	38.67	1,808.99
Rock Creek	6,028,940	180	21	3,093	3,429	2.89	0.90	0.98	5.61	1,575.09
Potomac River	7,629,852	257	32	3,813	5,041	4.15	1.35	1.47	8.20	780.81
Total	**43,800,180**	**1,428**	**175**	**31,684**	**28,308**	**23**	**7.48**	**8.19**	**52**	**4,164.90**

Submerged Aquatic Vegetation

DOEE's Fisheries Management Branch has been monitoring submerged aquatic vegetation (SAV) since 1993. In this time, the Fisheries Management Branch has compiled an extensive amount of data that reflects the growth and decline of SAV species within the district. Not only does SAV provide an important habitat for juvenile and adult aquatic life, it provides sediment stabilization as well as improvements in water quality. Considered suitable areas for refuge, feeding, and reproduction, SAV beds are of utmost ecological importance in a watershed system (Kraus, Jones 2012). However, SAV is vulnerable to nutrient and sediment pollution caused by runoff. Because the District's highly urbanized area causes substantial runoff to enter the environment, monitoring the health of SAV is vital when considering the health of the aquatic ecosystem.

2016 observations revealed seven different species of SAV including*: Ceratophyllum demersum (132.23 acres), Hydrilla verticillata (456.70 acres), Najas flexilis (51.91 acres), Najas minor (10.10 acres), Heteranthera dubia (510.19), Vallisneria americana(13.36),* and *Stuckenia pectinate(1.67 acres).* DOEE recorded a total of 1176.16 acres of SAV in 2016, almost double the acreage of 2015 and a record amount of SAV recorded for the survey (Figure 3.1). Overall, SAV bed health, acreage and cover densities vastly improved in 2016. Figure 3.1 shows the District's SAV health from 2002 to 2016.

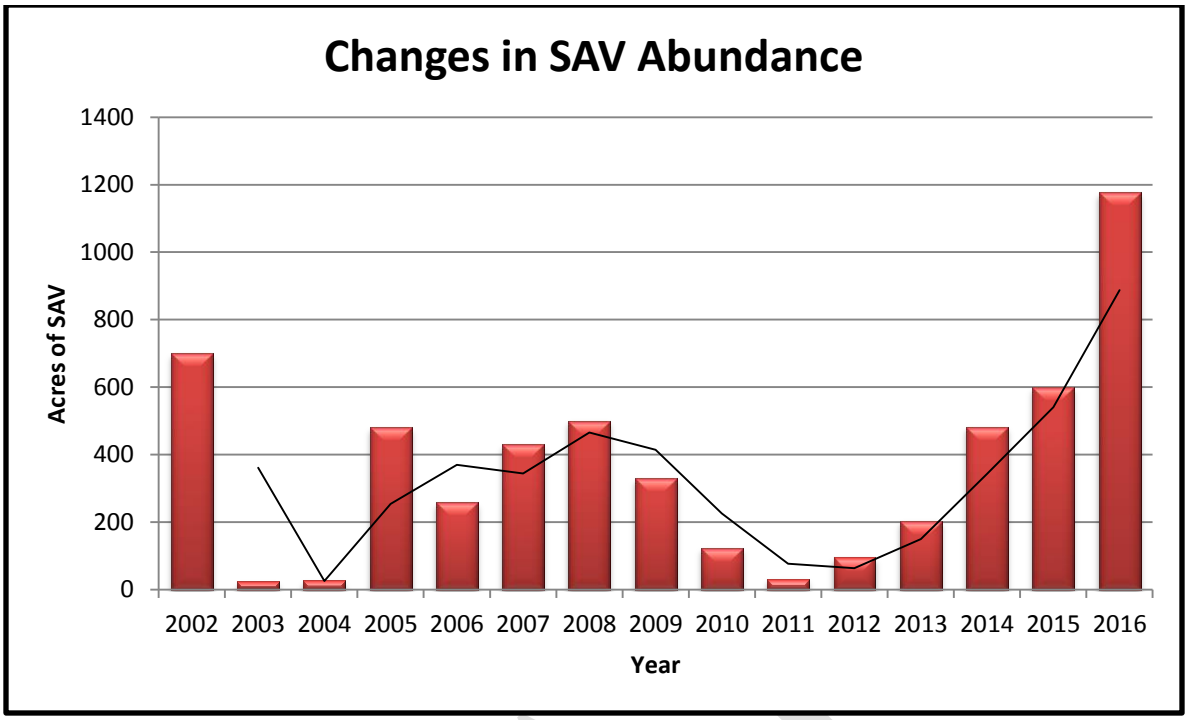

Figure 3.1: SAV Abundance by Year

Aquatic Habitat Restoration

SAV also provides vital ecosystem functions in river systems. These include water quality improvement, sediment stabilization, and habitat and forage for fish and wildlife species. The District's waters have historically supported large SAV beds in shallow areas of the Potomac and Anacostia Rivers, but because of development in the watershed, and resulting water quality degradation, these beds have been compromised or even lost. To combat these losses, DOEE has begun a restoration program in the Anacostia and Potomac Rivers. Because of its historical dominance within freshwater and brackish water systems of the Chesapeake Bay *Vallinsneria americana*, wild celery, was designated the most suitable native SAV for the restoration efforts (Davis, 1985). Based on historical maps, water quality, and the guidelines set forth in the Second Technical Synthesis for SAV restoration (Batiuk, 2000), DOEE selected three sites to begin restoration efforts using wild harvested plants and seeds from the Potomac River in Maryland. Since their planting, biologists have monitored the sites for percent crown cover of plants as well as fish community data. Initial planting in 2012 and 2013 yielded 0% crown cover with no surviving plants observed at the Buzzards Point/James Creek site. Further improvements on the enclosure structure at the same site resulted in a crown cover score of 3 (40%–70%) for the 2014 sampling season. *V. americana* returned and flourished, for the third year, at the restoration site in the Anacostia river in 2016. Flower stalks and seed pods were present in a majority of plants at the Buzzards Point/James Creek restoration site. Ground-truthing at this site in September 2016 revealed a cover density of 4 (70%–100%). The District's SAV acreage was recorded at an all-time high of 1176.15 acres, in 2017.

During 2016, DOEE successfully installed approximately 675 total plants at Buzzards Point and James Creek on the Anacostia River. DOEE also successfully planted approximately 374 plants at Oxon Cove on the Potomac River. Both plantings followed protocols set forth in the methods sections. Monthly SAV monitoring revealed that the wild celery flourished at Buzzard Point/James Creek site. DOEE observed numerous flower stalks for the third year in a row at this site (Figure 3.2).

Figure 3.2: *Vallisneria americana* at James Creek/ Buzzards Point site June 30, 2016.

At the Oxon Cove site, DOEE decided not to plant *Valliseria americana* in 2016 because of accessibility issues and because SAV growth throughout the Potomac and Anacostia Rivers was at an all time high. Wild celery planted at Oxon Cove was not visible within the month it was planted.

DOEE began collecting data on fish at the Buzzards Point/James Creek restoration site in March 2016 and completed monitoring efforts in November 2016. This is the fourth year DOEE fisheries staff have collected fish data at this site. Biomass (g/rep) has steadily increased at the Buzzard Point/James Creek site (Figure 3.3) in conjunction with an increase in SAV cover density. For biomass, DOEE used data only collected during periods where SAV may be present (May–November). This is the same method used when calculating biomass in our District SAV report.

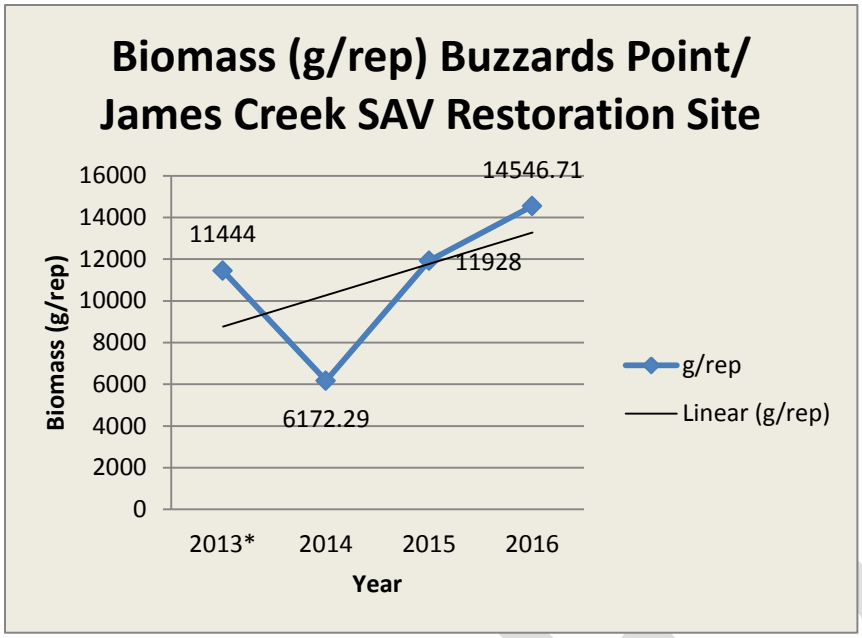

Figure 3.3: Biomass (g/rep) at Buzzards Point/James Creek site, from May 2013 to November 2016.

Although the number of fish caught and species observed declined in 2016, biomass at the Buzzard Point/James Creek site increased. The dense coverage and diversity of plant species at this site provide excellent foliage for fish to hide in. DOEE suspects this might be the reason for the decline in number of fish caught in 2016. Using biomass as indicator of fish community monitoring is helpful in visualizing the overall impact SAV in having on the area.
Fisheries staff recorded great improvements in SAV density and diversity in the Anacostia and Potomac Rivers. The increase in SAV throughout the District is improving water quality, fish habitat and foraging areas. While grazing is still a problem at all restoration sites, we hope that the growth of *V. americana* will soon outpace the loss of plants from grazing and other impacts. Restoration efforts will continue to be a priority for Fisheries staff in 2017. The program's ultimately hopes to remove enclosures once SAV plantings can sustain themselves without human intervention.

Monitoring Heavy Metals and Organic Compounds in the Air

Air toxics, or hazardous air pollutants (HAPs), are pollutants known or suspected to cause cancer, other serious health effects or adverse environmental effects. The Clean Air Act (CAA) currently regulates 188 HAPs. EPA's Government Performance Results Act (GPRA) commitments specify a goal of reducing HAP emissions by 75% from 1993 levels to significantly reduce the potential for human health risk.

The National Air Toxics Trends Station (NATTS) Network was developed to fulfill the need for long-term HAP monitoring data of consistent quality. Among the principle objectives are assessing trends and the effectiveness of emission reduction programs, assessing and verifying air quality models (e.g., exposure assessments, emission control strategy development, etc.), and

direct input to source-receptor models. The current network configuration includes 27 sites (20 urban, 7 rural) across the United States; 13 sites were established in 2003, 10 sites in 2004, and 2 sites each in 2007 and 2008. There are typically over 100 pollutants monitored at each NATTS. However, only 19 of those are required; included are volatile organic compounds (VOCs), carbonyls, heavy metals, hexavalent chromium, and polycyclic aromatic hydrocarbons (PAHs).

List of measured HAPs at NATTS sites:

- Acrolein
- Benzene
- 1,3-Butadiene
- Carbon tetrachloride
- Chloroform
- Perchloroethylene (Tetrachloroethylene)
- Trichloroethylene
- Vinyl chloride
- Acetaldehyde
- Formaldehyde
- Benzo(a)pyrene
- Naphthalene
- Arsenic compounds
- Beryllium compounds
- Cadmium compounds
- Lead compounds
- Manganese compounds
- Nickel compounds
- Hexavalent chromium2

The NATTS network continues to support the goals of EPA's strategic plan related to "Addressing Climate Change and Improving Air Quality." EPA recently released the FY 2018–2022 Draft Strategic Plan, which is available at: https://www.eenews.net/assets/2017/10/04/document_pm_02.pdf.
Since 2004, DOEE's Air Quality Division has been operating a special purpose NATTS site for ambient measurements of air toxics of primary concern, including heavy metals in the District's air. The NATTS monitoring site is located on the grounds of the McMillan Reservoir in DC.

2 Hexavalent chromium was removed from the Core Analytes list in July 2013; a few NATTS sites continued to sample for it in 2014.

Site Name Air Quality System ID	Street Address	City, State, ZIP	Latitude, Longitude
McMillan 11-001-0043	2500 First Street, NW	Washington, DC 20001	38.921847 deg N, 77.013178 deg W

Daily (24-hour) air samples are collected on a 1-in-6 day schedule throughout the year. The collected samples are sent for laboratory analysis. DC's NATTS site also includes an Aethalometer® for continuous sampling of black carbon.

DOEE reports the quality assured air monitoring data from the DC's NATTS site to EPA's national air database: https://www.epa.gov/outdoor-air-quality-data. Additionally, EPA coordinates the development of a detailed annual report for NATTS and other special purpose monitoring programs. The 2014 National Monitoring Programs Annual Report - UATMP, NATTS, CSATAM (EPA Contract No. EP-D-09-048 and EP-D-14-030, February 2017) provides data summaries and air toxics trends measured in recent years at the 27 station national network including the District's NATTS air monitoring site.

Pre- and Post-restoration Stream Water Quality Monitoring

In 2017, DOEE awarded a grant to MWCOG to conduct water quality monitoring in 11 streams in the. MWCOG will monitor water quality (flow, temperature, dissolved oxygen, and pH), macroinvertebrates, fish, geomorphology, and vegetation at Nash Run, Pope Branch, Watts Branch, Fort Dupont, Stickfoot Branch, Springhouse Run, Broad Branch, Linnean Park, Milkhouse Ford/Bingham Run, and Spring Valley. MWCOG completed its first year of monitoring and DOEE will be extending the grant into 2018 so MWCOG can continue these monitoring efforts on both restored and unrestored restoration sites.

Green Cubes" Monitoring

As a part of the American Recovery and Reinvestment Act (ARRA) DOEE worked with the DC Fire and Emergency Medical Services to install cisterns with technology that monitors the weather and automatically draws down water levels in advance of a coming storm event. Since FY 2014, DOEE has a contract with a firm to monitor these "Green Cubes" to better understand the potential of this automated rainwater harvesting technology in the District. The contract has completed pre-installation monitoring and has collected 11 of 20 post-restoration samples. The project will be completed in FY 2018.

RiverSmart Washington Monitoring

The RiverSmart Washington project began in FY 2015, when the District retrofitted two neighborhoods with stormwater retention practices to reduce stormwater volume runoff in northwest Washington. DDOT, DC Water and DOEE formed a partnership to complete the project, which was partially funded by National Fish and Wildlife Foundation grant monies. The practices installed included permeable paving in alleys, roads, and parking lanes, rain gardens in tree areas and curb bumpouts.

Prior to the project, the District monitored the area for a year to determine the amount of stormwater volume leaving the neighborhoods. In FYs 2016 and 2017, DOEE monitored the project areas and one control area to calculate the stormwater runoff reduction from the installed projects. The results of the monitoring have been inconclusive to date. There are a few potential reasons for the study results. These include:

- Active construction in one of the neighborhoods during the post-restoration monitoring time period;
- Lack of proper BMP maintenance;
- Inaccuracy of the flow meters installed at low flows; and
- No rainfall data from the control monitoring area.

DOEE and DDOT are currently working on an effort to rehabilitate the stormwater retention practices and monitor the sites for an additional year in FY 2018 to try to get more conclusive monitoring results.

Hickey Run Trash BMP Monitoring

Utilizing federal funds through ARRA, DOEE installed a BMP at the outfall to Hickey Run to capture trash and sediment. In mid-FY 2017, DOEE started a new contract to maintain the BMP and monitor the pollutant loads it captured. In July 2017, DOEE completed its first quarterly measurement of trash collected. A total of 0.91 tons of trash was removed from inside and outside of the Terre Kleen BMP. During the removal process, plastic and glass bottles and cans were set aside and bagged separately. Quarterly sediment removal occurred in August of 2017. The contractor removed 54.84 tons (109,680 lbs) of sediment that had accumulated in the BMP between April and August of 2017.

Wetlands Assessment and Protection Activities

Development of Wetland Water Quality Standards

The development of wetland water quality standards is ongoing.

Integrity of Wetland Resources

No change.

Extent of Wetland Resources

No change.

Wetland Assessment Activities

Wetlands are the link between land and water and often contain characteristics of both terrestrial and aquatic ecosystems. They are one of the world's most productive ecosystems, providing many benefits to the environment such as habitat for a vast variety of wildlife and plants; flood protection; water filtration and storage; shoreline erosion control; absorption of wind forces; sequestration of pollution from runoff; sediment control; and groundwater recharge.

Wetlands are the primary habitat used by the majority of species selected for vulnerability consideration in the District's 2015 Wildlife Action Plan. Protection and restoration of the District's wetlands is also vital to the health of the Chesapeake Bay ecosystem.

To determine the extent of wetlands in the District, WQD has undertaken a District-wide Wetlands Mapping Project. The project will map and assess the condition and functions of the wetlands in the District; map and assess the condition of unmapped streams in the District; search for potential wetland creation sites; assess existing wetlands to evaluate if restoration or enhancement would be beneficial; update the District's Wetland Conservation Plan; and compile all of the data collected in the field into a publicly available geodatabase, called the Wetland Registry.

The Wetland Registry will allow members of the public, environmental groups, development groups, and DOEE staff to identify potential restoration, enhancement, and creation projects; identify possible wetland mitigation sites; have an initial idea if wetlands are present for land-planning purposes; and protect our existing wetlands.

The Wetland Conservation Plan was developed in 1997 to outline goals for the protection, restoration, and enhancement of wetlands. The goal is for no net loss of wetlands within the District, and eventual overall net gain of wetlands.

DOEE recently awarded a grant to Wetlands Solutions & Studies, Inc., to update the District's Wetland Conservation Plan, create the Wetland Registry, and perform on-the-ground wetland delineations throughout the District. The project is expected to be completed in 2018.

Wetlands Protection Activities

The most effective approach to protect wetlands is to work with developers in the initial stages of a new project. Working with developers (designers and project coordinators) during the planning phase of a project allows DOEE, as a regulatory agency, to deal with any wetland protection issues before they arise. If, after completing an alternatives analysis, wetland impacts are unavoidable in order to achieve a project purpose, then impacts can be minimized and avoided to the greatest possible extent. Mitigation is required for any wetland impacts over 400 square feet.

Mitigation requires all temporary impacts to wetlands to be restored to their original conditions and contours (i.e., replanting). Permanent impacts can be mitigated by performing a wetland enhancement, restoration, or creation project in accordance with US Army Corps of Engineers and DOEE requirements.

WQD is proposing regulations on protecting and managing wetlands and streams in the District. The proposed regulations will establish the framework for the review of a proposed project that will impact an aquatic resource, such as a wetland or stream. Applicants will be required to take all possible steps to first avoid, and then minimize, adverse impacts to aquatic resources.
If aquatic resource impacts are unavoidable, DOEE may require mitigation to offset the impacts, using one or a combination of four possible methods. In preferred order, these methods are: 1) establishment of a new aquatic site; 2) restoration of a previously existing wetland or other aquatic site; 3) enhancement of an existing aquatic site's functions and values; or 4) preservation

of an existing aquatic site. In addition, there are two mechanisms for providing compensatory mitigation: 1) permittee-responsible compensatory mitigation (the preferred mechanism); and 2) payment into the District of Columbia's Wetland and Stream Mitigation Trust Fund. This will ensure that development occurs in a manner that adheres to the District's long-standing policy of no net loss, and the eventual overall net gain, of aquatic resource functions, acreage, and values.

Wetland Mapping Project

The Planning and Regulatory Review Division undertook a major effort in 2014 and 2015 to further protect the District's wetlands. The Division delineated wetlands throughout the District, which had not been done since 1997. The new information will be mapped using geographic information system (GIS) technology to accurately create digital maps that will be publically available. Making the map electronically available will aid developers in knowing if they may impact potential wetlands, and help the District identify areas with potential for wetland restoration. In FY 2016, DOEE completed a draft version of the report and the maps associated with the project. A final version of the plan is expected to be released in FY 2018.

Coordination among DOEE's Natural Resources Administration Divisions

FWD, SWMD, WPD and WQD, all Divisions of the Natural Resources Administration, collaborate to protect, restore and create new wetland resources in the District. WQD routinely requests habitat information or locations of species of greatest conservation need from FWD. Other divisions ask WPD for information on their creation and restoration projects and any possible areas for wetland creation. Divisions also work together on floodplain issues and regenerative stormwater conveyance systems. Both FWD and WPD have been heavily involved in the District-wide Wetland Mapping Project. WQD and the SWMD work together when BMPs like trash traps are installed in the District's waterways.

PART IV: PUBLIC HEALTH-RELATED ASSESSMENTS

Drinking Water Program Monitoring and Assessments

None of the District of Columbia's waterbodies have been designated for either public water supply or drinking water uses. Though the Potomac River is the source of the District's drinking water, the intakes are located outside the District's city limits. The drinking water intakes are located at Great Falls and Little Falls, Maryland.

The District is actively participating in the Potomac River Basin Drinking Water Source Protection Partnership organized by the Interstate Commission on the Potomac River Basin. The District is part of the Government committee and participates in spill exercise programs, agricultural issues, upstream urban source water protection efforts and continues to track Water Research Foundation projects. The District of Columbia also completed its Source Water Assessment Project (SWAP). The primary goals of the SWAP were (a) source delineation, (b) inventory of potential contaminants from upstream watersheds and within the basin, (c) susceptibility analysis of the inventoried contaminants identified in the source delineation, and (d) providing documentation to the general public and the District of Columbia Government describing the source contaminants. Additionally, nonpoint source modeling was incorporated into the SWAP to enable the District to better understand and predict conditions within the basin that might pose a threat to the water supply.

The Potomac Drinking Water Source Protection Partnership's Emerging Contaminants Workgroup is tracking and reporting on findings of research and occurrence of persistent and newly identified threats posed to the Potomac River drinking water supply. Members of the partnership also advocate and support related national-level studies with the goal of providing sound science on how this emerging challenge should be addressed. Some of the specific partnership activities include communication with the public about drinking water contaminants, proper disposal of pharmaceuticals, emerging contaminants challenges and sampling program. The partnership is also conducting a workshop on hazardous algal blooms in source waters. The workshop will focus on monitoring, identification, associated health risks, how to stop outbreaks, best management practices and serve as an educational opportunity for the water operators.

Drinking water is treated by the Washington Aqueduct which is owned and operated by the US Army Corps of Engineers. The Aqueduct is responsible for compliance with all of the regulations which pertain to water treatment such as filtration, disinfection and chemical contaminant removal, and corrosion control. DC Water purchases the treated water and distributes it to District residents. Drinking water quality is regulated by EPA Region 3. The District of Columbia does not have primacy. Persons seeking information (beyond what is provided) on the status of drinking water or other compliance issues in the District of Columbia should consult the EPA website at http://www.epa.gov.

Anacostia River Algal Bloom

In March of 2015, WQD began collecting ambient phytoplankton data to better understand the phytoplankton community structure in the District's waterbodies. Samples are collected monthly throughout the year on from two sites: PMS 10 in the Potomac River near Key Bridge and ANA 01 one in the Anacostia River near the New York Avenue Bridge. Samples are processed monthly at the Blue Plains laboratory.

Phytoplankton collected from the Anacostia River (ANA01) showed that diatoms (bacillariophyta) composed a majority of the community during the winter through early spring. In the summer through early fall, the population shifted toward green algae (chlorophytes), blue-green algae (cyanobacteria), or cryptomonads. The Anacostia River site generally saw low phytoplankton abundance with median abundance of 639 cells/mL for the 2015–2017 period. Phytoplankton abundance at the Anacostia River site usually peaked in the late summer and early fall months near 2,000 cells/mL, with the maximum abundance observed at 6,480 cells/mL in October.

At the Potomac River site (PMS 10), the phytoplankton community was dominated by diatoms for most of the year. The site saw increases in green algae (chlorophytes) and blue-green algae (cyanobacteria) on several occasions, though no specific pattern of seasonality has been observed. Overall, the site on the Potomac River saw low phytoplankton abundances, with a median abundance of 665 cells/mL during the 2015–2017 period. The Potomac River site saw a small bloom of the green algae, *Scenedesmus*, in August 2015, with an abundance near 37,000 cells/mL. Since *Scenedesmus* is a not a toxin producing organism, there was no health concern associated with the bloom.

DOEE also monitors algae blooms on the Anacostia and Potomac Rivers through the use of continuous real-time monitoring stations at 3 locations throughout the District. Water quality sondes at each station measure chlorophyll and provide continuous surveillance of the waterbodies during the spring, summer, and fall seasons. This real-time data can be viewed by the public via the DOEE Anacostia and Potomac River Monitoring Program webpage (https://doee.dc.gov/node/9752).

In addition, WQD conducts event based monitoring when suspected algae blooms are reported by the public, outside agencies, or agency personnel.

WQD has developed a public webpage regarding algae blooms. The webpage (https://doee.dc.gov/service/algaeblooms) provides a platform to share general information about algae and harmful algae blooms with the public. In addition, contact information is provided for citizens to report suspected algae blooms to WQD. In order to expand opportunities for citizen reporting, WQD is now listed as a state contact on the citizen science bloomWatch app. The app is designed to allow the public to report suspected harmful algae blooms via smartphone or tablet. The app notifies WQD staff when blooms are reported within the District.

On May 23rd, 2017, DOEE investigated a potential harmful algae bloom on the National Mall. Sampling was requested by the Inspection and Enforcement Division staff, to assist in an investigation related to wildlife deaths observed near the Reflecting Pool, on the National Mall.

WQD staff collected samples from the Reflecting Pool and identified the species as *Pseudanabaena catenata* and *Jaaginema sp*. Taxonomic verification was provided by the Maryland Department of Natural Resources. A toxin analysis was conducted by the Maryland Department of the Environment for microcystins and the results were below the detection limit of 0.15 ppb. Since toxins were not observed in the sample, it was determined they were not responsible for the wildlife fatalities observed. Further investigation by the DOEE Inspection and Enforcement Division revealed the cause of the wildlife deaths to be a snail parasite, known as schistosome.

PART V: GROUNDWATER ASSESSMENT

Introduction

This section updates the District's groundwater assessment and protection efforts for January, 2016 to June, 2017. Several changes have occurred since the last Integrated Report. The District's Well Regulations were promulgated in September 2016, and as a result of a realignment within DOEE, well permitting and groundwater enforcement roles were moved into two new divisions. The Water Quality Division continues to be responsible for policy, planning, research and some regulatory oversight. Despite the change, the divisions still coordinate and share technical information and expertise to ensure resource protection when necessary.

Through a Joint Funding Agreement with USGS, DOEE collects data from the District's groundwater monitoring network and conducts investigations to assess groundwater quantity and quality, evaluate groundwater/surface water interactions and inform groundwater protection strategies. Based on a 2016 sampling event, overall groundwater quality is still good and generally consistent with previous monitoring data. However, continued monitoring of groundwater levels revealed that the deep Patuxent Aquifer has not recovered from significant declines in hydraulic head seen after 2014.

So far, the DOEE-USGS joint investigation of the paleohistory of the Anacostia River and surrounding area has revealed the presence of paleochannels and indications of multiple geologic faults in Washington, D.C. Although buried under artificial and natural fill, the paleochannels likely influence groundwater flowpaths and groundwater quality. Where they intersect surface water, they may significantly impact those waterbodies. Like the paleochannels, faults seem to have a distinct role in shaping some surface water features in the District. Sharp, vertical, changes in topography suggest faulting, and mark where springs emerge in parts of northwest D.C. They also influence where streams intersect and formed the northern boundary of the Potomac River before it was constrained within its current shoreline. Knowledge of the paleochannel locations and understanding of paleochannel depositional history is needed to make sound engineering and water resource protection decisions. Further details are provided in the section titled Groundwater/Surface Water Interactions.

Summary of Groundwater Quality

DOEE continues to maintain the groundwater monitoring network in the Anacostia and Rock Creek Park watersheds. The wells are listed in Appendix 5.1 and their locations are shown in Appendix 5.2. Most of the wells are relatively shallow, with the deepest well extending into the Patuxent Aquifer and screened at 255 – 265 feet below ground surface. In the summer of 2016, 21 wells in the monitoring network were sampled for a wide range of parameters including major ions, nutrients, trace elements, volatile organic compounds, semi-volatile organic compounds, polycyclic biphenyls, and diesel and gasoline-range organics. Six wells also were sampled for pesticides. The results are provided in Appendix 5.3. The data are generally consistent with previous values indicating that the ambient groundwater quality is still good. Elevated trace

metals were identified at three locations and these wells are scheduled to be resampled later in 2017. All available data are published in the United States Geological Survey (USGS) Annual Water Data Report and made available to the public on the USGS website.

Groundwater Quantity Issues

Through a cooperative agreement with USGS, DOEE collects discrete and continuous groundwater elevation data from the groundwater monitoring network. The latest data are presented with measurements collected from previous years in Appendix 5.4a. The Kenilworth Aquatic Gardens tide gage was monitored every six minutes and graphs of the data are shown in Appendix 5.4b.

The declines in hydraulic pressure recorded at several wells in the Patuxent Aquifer and documented in the last report are still apparent in 2016 – 2017 (Appendix 5.4a). Some recovery was measured, such as at DCMW002-04 (WE Cb8) on the eastern bank of the Anacostia River, where a decline of about 40 feet in the potentiometric surface was reduced by approximately 16 feet in early 2017. Subsequently, groundwater levels appear to be fluctuating. The declines are most likely due to several large DC Water Long Term Control Plan dewatering projects underway along the Anacostia River. Dewatering rates for these projects and other construction sites along the Potomac and Anacostia Rivers typically exceed one million gallons per day at each location. Stresses on the Aquifer from these projects seem to be preventing full recovery at this time. Impacts to groundwater quality in the Patuxent Aquifer continue to be possible as the Arundel Clay Confining Unit is not laterally continuous especially under parts of the Anacostia River.

Overview of Groundwater Contamination Sources

Appendix 5.5 lists the major sources of groundwater contamination in the District. The major sources include those typically found in an urban area.

Overview of Programs Related to Groundwater Protection

WQD is charged with administration of the District of Columbia Water Pollution Control Act, which defines the District's waters as both groundwater and surface water. In 1993, the District enacted groundwater regulations. These regulations established numerical criteria and enforcement standards for 47 constituents. Later, the District also developed water quality monitoring regulations that set standards for groundwater monitoring supporting preventive as well as remedial activities. Well regulations were enacted in September 2016. DOEE is preparing a guidebook to accompany the well regulations and processes more than 500 well permit applications each year.

In 2017, DOEE realigned several core activities performed by various divisions. As part of the realignment, groundwater protection activities previously covered by WQD were split with two other branches in two newly created divisions. An updated list of groundwater-related programs or branches that can impact groundwater and their functions follows:

- Construction Grants Program: Pursuant to the Clean Water and the Safe Drinking Water Acts and various appropriations acts, EPA funds the District for the construction and/or

improvement of wastewater facilities, drinking water distribution and storage facilities and other water related structures. This grant-funded program is designed to select and fund projects that will protect water quality. The projects are identified to meet a variety of needs, such as Combined Sewer Overflow Long Term Control Plan (LTCP), Municipal Sanitary Storm Sewer Monitoring Network, and the implementation of pollution control measures, and the protection of the public and safety.

- Construction and Maintenance Branch: Performs compliance inspection and enforcement for sediment erosion controls and stormwater management at construction sites. The Branch also inspects permitted stormwater management devices to ensure that they are being properly maintained.
- Federal Facilities Program: The Federal Facilities Program oversees the cleanup of Formerly Used Defense Sites (FUDS), and currently active defense facilities that are contaminated.
- Groundwater Protection Program: The program coordinates and implements groundwater protection in the District. Its main activities include developing groundwater strategies, policies, laws and regulations to protect groundwater; engaging in groundwater quality planning and research; collecting, analyzing, storing and sharing groundwater monitoring data; collaborating on regulatory oversight at contaminated sites; reviewing applications for withdrawal and injection of substances into groundwater for remediation or well maintenance; providing technical expertise on groundwater-related permits; and promoting groundwater protection with internal and external stakeholders engaged in groundwater-related activities.
- Hazardous Waste Management Program: The program regulates hazardous waste from small and large quantity generators.
- Integrated Pest Management Program: The program conducts public education for pesticide use.
- Illicit Discharge and NPDES Branch, Inspection and Enforcement Division: This Branch is responsible for conducting inspections and enforcement related to well construction, use, maintenance and abandonment. The Branch also performs the same functions for spills, releases or other violations that lead to the degradation of groundwater resources.
- Nonpoint Source Program: The program plans and implements BMPs to address nonpoint source pollution, restore aquatic habitat and provide oversight of nonpoint source studies.
- Pesticide Certification and Enforcement Program: The program processes registration of pesticide products for use in the District of Columbia, certifies applicators, and performs application inspection.
- Remediation and Site Response Program (RSRP): The RSRP is in the same administration as the Voluntary Cleanup Program (VCP). It is responsible for investigating and remediating sites with historic contaminant releases. The program exercises state CERCLA-like authority and focuses on historic hazardous releases to soil and water.

- Total Maximum Daily Load (TMDL): The program develops point and nonpoint source load allocations to meet water quality standards in impaired waterbodies.
- Underground Storage Tank Management Program: The program provides oversight for installation and removal of underground storage tanks as well as remedial activities for leaking tanks.
- Voluntary Cleanup Program (VCP): Unlike the media-specific programs that require mandatory cleanup of contaminated property, the VCP oversees owner or developer initiated voluntary remediation of contaminated lands and buildings. The goal is to return actual or potentially contaminated properties to productive uses.
- The Water Resources Protection and Mitigation Branch: The Branch processes well construction and abandonment permits in private and public space. The Branch also collects and maintains records of all permitted wells in the District.

Appendix 5.6 provides additional information regarding the District's groundwater protection programs and activities.

Aquifer Vulnerability Assessment

The DC Water Resources Research Center (WRRC) assessed the District's groundwater vulnerability to contamination in 1992 in a report entitled *Urban Land Use Activities and The Ground Water: A Background Survey of the District of Columbia* (WRRC, 1992). The report mapped the probability of groundwater contamination and ranked areas accordingly. The District recognizes that this report is old and when funds are identified, it will be revised.

Aquifer Mapping

The District, in conjunction with the USGS, has developed a steady-state, three-dimensional, groundwater flow model of the shallow aquifers in the Anacostia River watershed. The model contains layers to represent the aquifers in the District. These data will be supplemented by the facies maps being developed for the paleochannel study of the Anacostia River watershed. Geologic information also will be available about the filled-in areas at the confluence of the Anacostia and Potomac Rivers.

Comprehensive Data Management System

USGS maintains and manages all data collected during joint District-USGS projects since 2002 This data is readily available on the USGS website (www.usgs.gov) and will continue to grow as funding for more projects becomes available. This data includes chemical, locational, and geological information. USGS includes monitoring well data in the regional groundwater database maintained for the District and other states, and will be available in GIS formats in the near future. Monitoring well location data from well permits issued over several years also can be accessed by the public. The boring/well data for all permitted wells in both private and public space can be found by using the ArcGIS Map for the well permitting program, available at this link:

http://dcgis.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=f497d032918e4ac09ac2356b0ffe43cd.

Summary of Groundwater Contamination Sources

Appendix 5.7 summarizes contaminant sources to the shallow groundwater aquifer. The table identifies programs with regulatory oversight over groundwater pollution and the number of open cases with shallow groundwater contamination under each program. No new major sources have been identified since the last Integrated Report.

Groundwater/Surface Water Interaction

DOEE, in cooperation with USGS, continues to investigate the paleochannels (prehistoric filled-in stream channels) in the area around the Anacostia River to determine if and how they impact groundwater flux to the waterbody. In the District, most paleochannels formed during times in the past when patterns of erosion and sea level were different from what they are today. While identifying paleochannels can be a complex task, the potential for them to become unexpected pathways for contaminant plumes to migrate to the river is a real possibility, since many shoreline facilities are recognized contaminated sites.

The paleochannel investigation has mainly focused on mapping the geologic framework of the area. Activities include: obtaining lithic data from more than 1,000 borehole records from published and unpublished sources, including DC Metro borings and Long Term Control Plan cores; sampling dozens of cores collected for the DC Water Long Term Control Plan for pollen and lithic analyses; and compiling and combining data to produce geologic cross sections and special-purpose maps. The data reveal the presence of numerous paleochannels and possible fault zones. Pollen analysis also indicates that the sediments filling the paleochannels beneath the lowlands of downtown Washington D.C. are all relatively young, and ages range from approximately 100,000 years old to recent.

Several special-purpose maps have been produced including overlays of:

- the surface of the top of crystalline basement;
- the surface of the base of Quaternary sediments (<2.58 million year old);
- the thickness of the Quaternary sediments;
- proposed faults;
- springs (historic and present);
- historic topographic maps;
- historic drainage patterns of the Potomac River and adjacent creeks; and
- numerous paleochannels that exist beneath Washington D.C. (Figure 5.1)

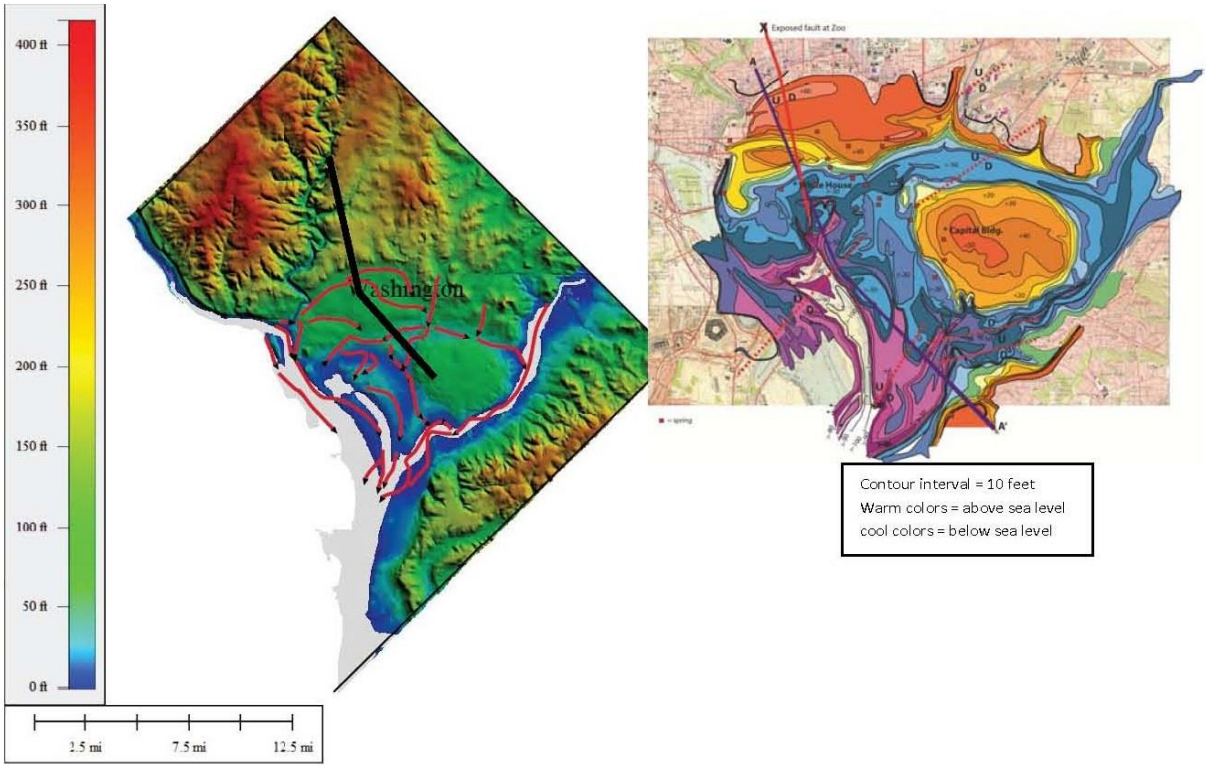

Figure 5.1: (Left) LiDAR elevation map of Washington D.C. and the paleochannels found in the current study (arrows pointing downriver). (Right) Structure contour map of base of Quaternary sediments showing numerous paleochannels and locations of proposed faults (red dashed lines) and documented fault (solid red line).

Paleochannels dramatically affect locations and flow directions for shallow groundwater movement. In some cases, parts of the paleochannels are filled with silt and/or clay sediments and may retard groundwater flow. In other parts, they are sandy, and create preferential flow paths for groundwater to discharge to the Anacostia and Potomac Rivers, and/or be pathways for surficial contamination to be transported in the subsurface. Figure 5.2 shows the complex and abrupt lithology changes within the channel-fill deposits.

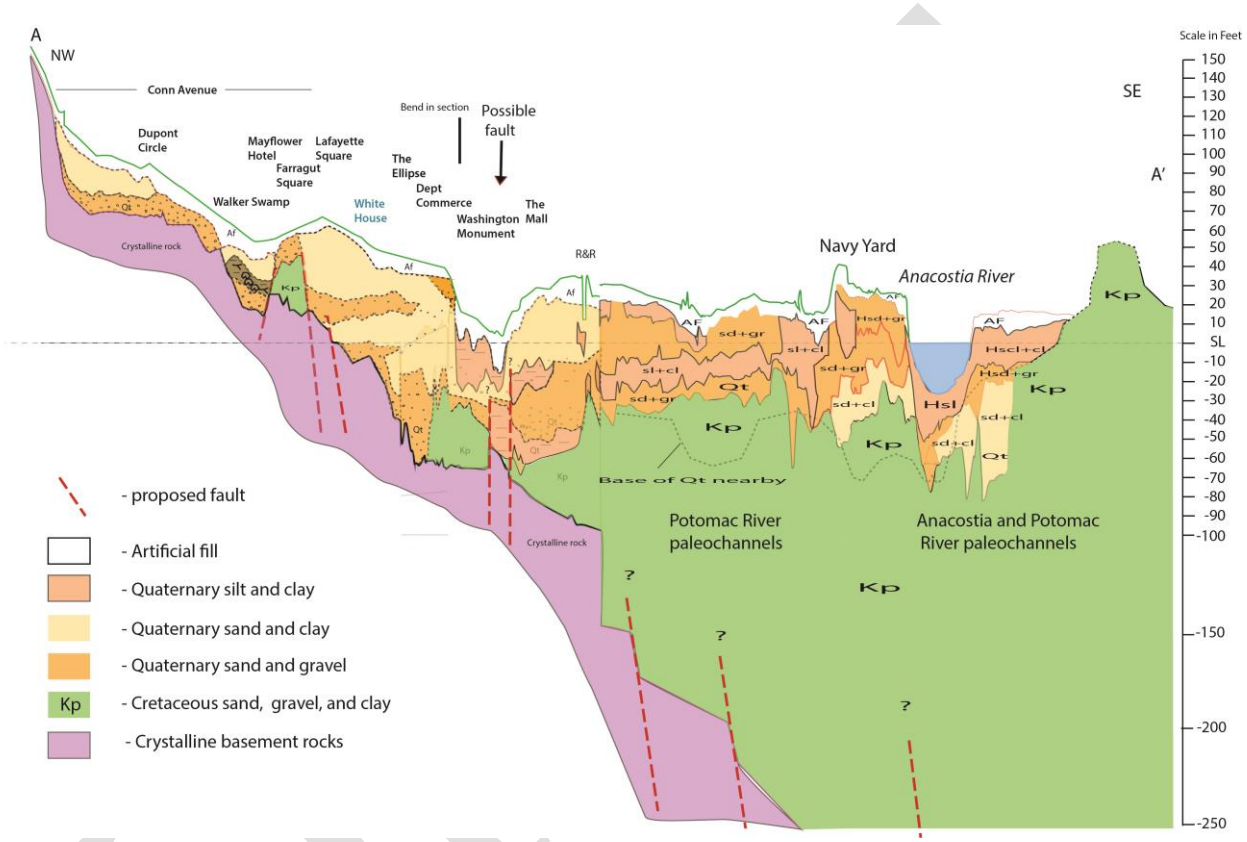

Figure 5.2: Cross section showing the highly variable lithic infilling, effects of faulting. Also shows the Quaternary is underlain by crystalline basement rocks mostly west of ~14th street NW.

Significant findings from the investigation are:

- The underlying paleochannels are a major determinant of the present day topographic relief of D.C. (139 m). Potomac River paleochannels that were filled with coarse gravel and sand may now form the highest parts of the city. Somewhat younger paleochannels are filled with sand and gravel and form midlevel terraces. The youngest paleochannels form lowlands with a complex pattern of stream sand and gravel alternating with estuarine and swamp deposits.

- Ancient faults, activated again and again, often affect both the original and final shapes of the paleochannels found beneath Washington, D.C.

- Several newly recognized Coastal Plain faults impact groundwater flow by creating conduits and barriers.

- Fault zones appear to reroute paleochannels along the down-thrown sides.

- In the past, drainage changed from shallow braided streams deposited many millions of years ago (sand and gravel that cap the hills) to deep, broad, meandering rivers of the last approximately 100,000 years.

- These young paleochannels have been filled completely with gravel, sand, and clay-silt through a fining-upward succession (see Figure 5.2). Sand and gravel intervals serve as conduits and storage areas for ground water.

- Due to the lithic variability and the irregular nature of channeling, abrupt turns and steep cliffs get preserved (see Figure 5.2). Most of the springs found and used by early Washingtonians are located where steep cliffs cut into older paleochannels.

- The margins of these paleochannels are abrupt and irregular. Rock and soil type can and will vary abruptly. Detailed understanding of variability is very important for tunnel engineering and groundwater quality. Paleochannels may thin or remove key confining units (Figure 5.3) with costly unexpected consequences (like recent tunnel collapse near the old RFK Stadium).

- Many of the paleochannels influence current groundwater movement, some buildings with deep basements within paleochannels have to pump water continuously or be flooded (for example, the National Geographic Bldg. on 17th St. NW and the DOEE Headquarters building at 1200 first Street NE).

- Knowledge of the paleochannel locations and understanding of paleochannel depositional history is needed to make sound engineering and water resource protection decisions.

- Detailed studies will provide a guide to where to expect and investigate water quality, where higher groundwater flow rates are located, and where volumetric flux to surface waterbodies occurs. These studies also should assist in finding and monitoring contaminant plume migration and evaluating pollutant loading to the Anacostia and Potomac Rivers.

If funding becomes available, DOEE and USGS propose to fill in gaps where data are missing by drilling and/or obtaining more borehole data from other sources. Plans also include continued refinement of the subsurface mapping (especially locating paleochannels), and compiling and comparing groundwater quality, storage and transport capacity data inside and outside the paleochannels. Contaminant plume migration could then be more easily identified and appropriate remedial systems designed to prevent further pollutant loading to the river.

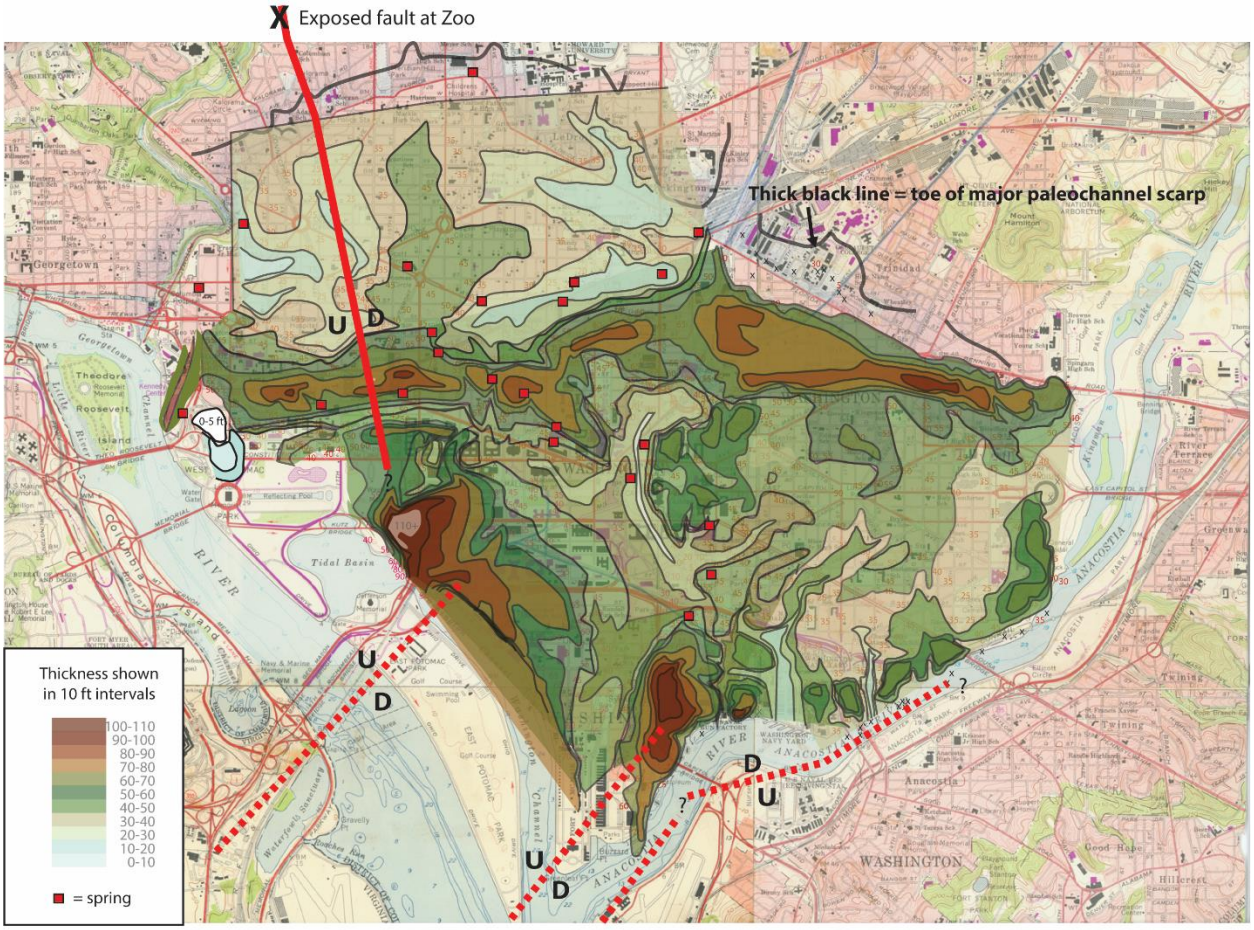

Figure 5.3: Map of the thickness of the Quaternary deposits beneath downtown Washington D.C. Thicker areas are sandy infillings of paleochannels and are groundwater reservoirs and conduits. The locations of most springs coincide with steep gradients where younger channel erosion cuts into older paleochannel deposits.

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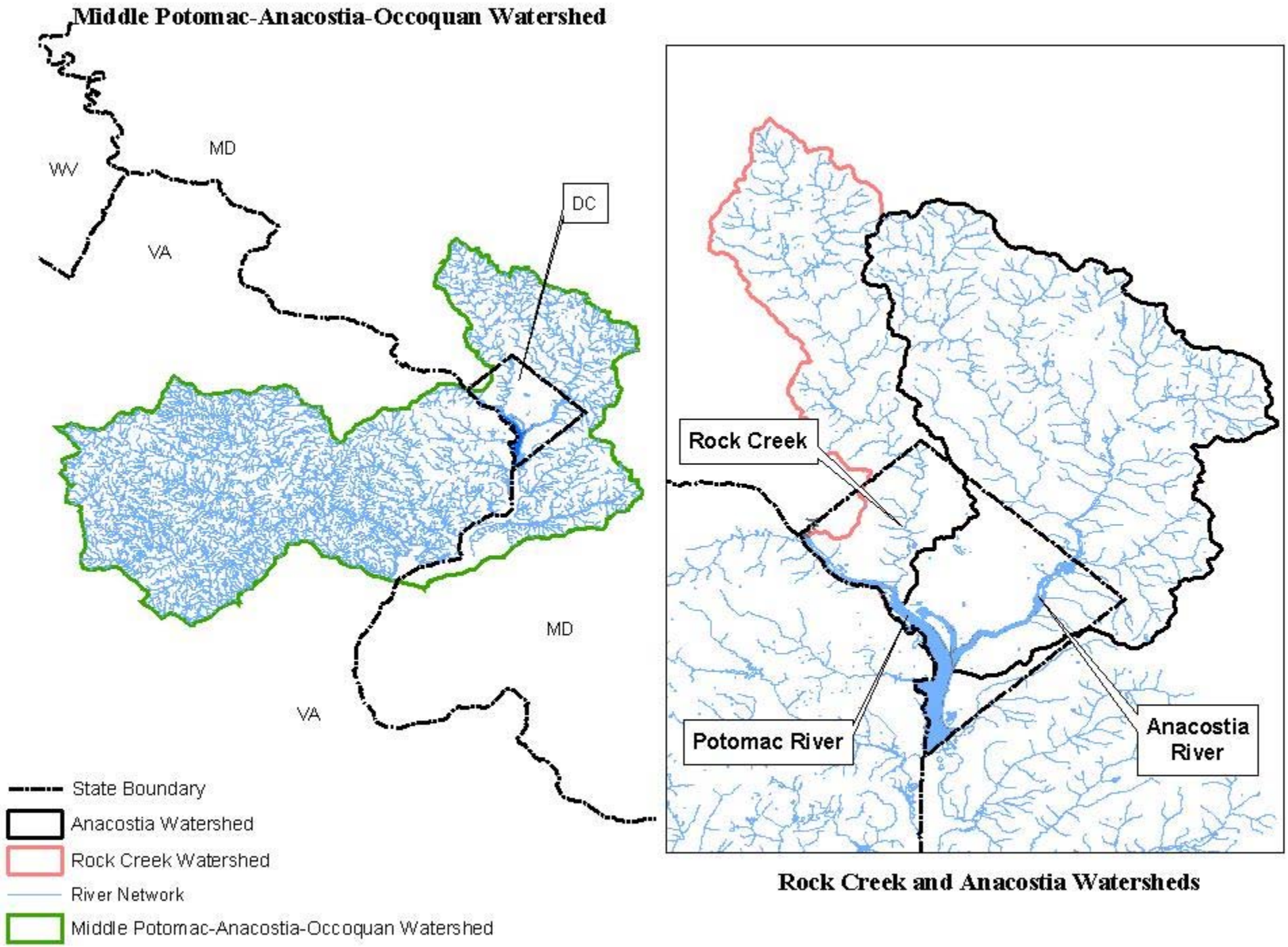
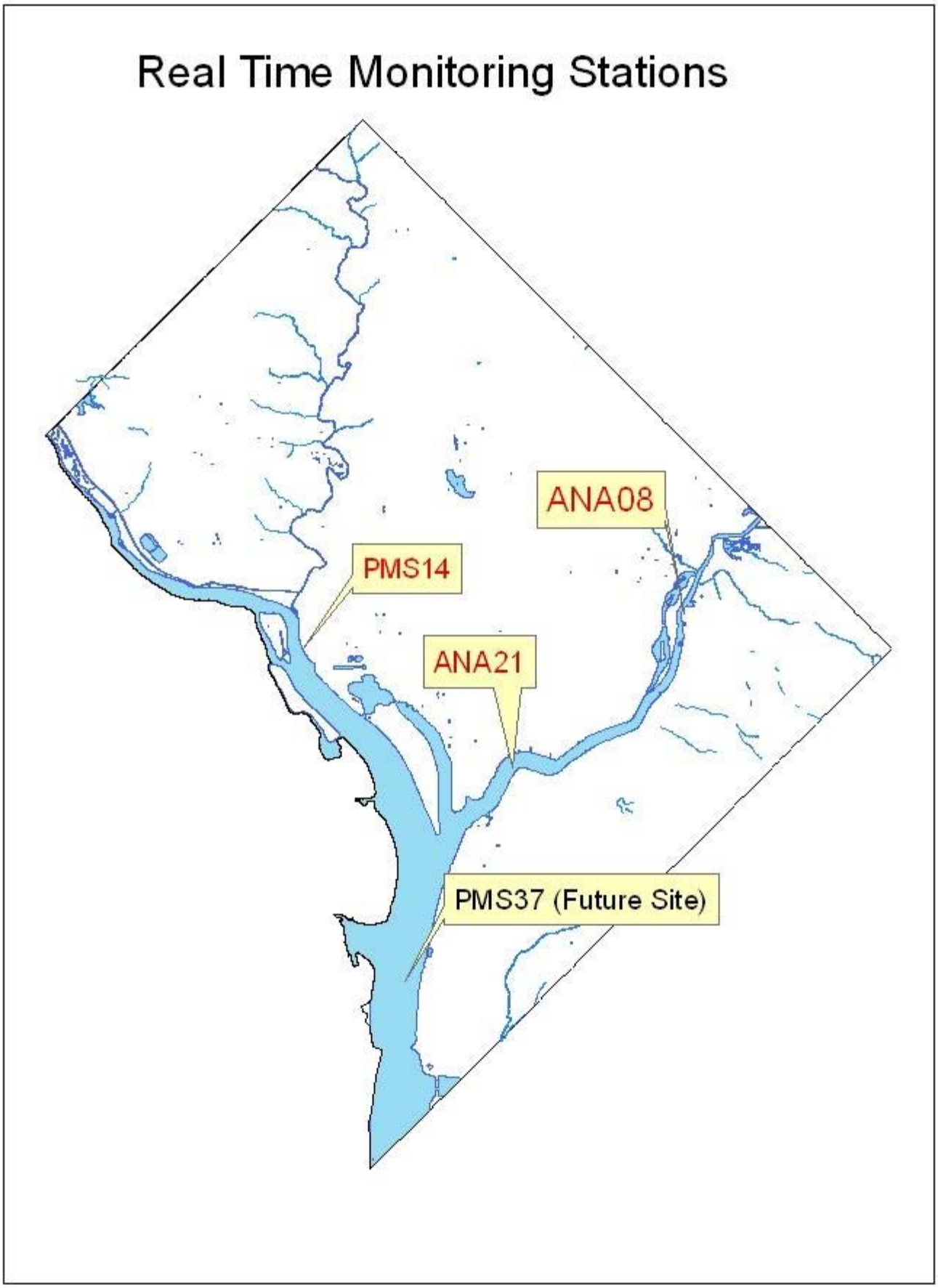
APPENDICES



Rock Creek and Anacostia Watersheds

Appendix 2.1: Major D.C. Watersheds



Appendix 3.1: Real Time Monitoring Stations

2013-2017
Statistical Summary Report
For
Total Summary Report

Waterbody	Station Data Used	Temp % Violation	pH % Violation	DO % Violation	Turb % Violation	Class A E. coli % Violation
DCAKL00L	KNG01, KNG02	0.00	0.00	13.73	58.82	24.49
DCANA00E SEG1	ANA19, ANA21, ANA24	0.00	0.55	8.51	9.09	16.36
DCANA00E SEG2	ANA01, ANA05, ANA08, ANA11, ANA14	0.00	1.29	19.53	29.45	34.62
DCPMS00E SEG1	PMS37, PMS44	0.00	1.94	0.00	12.15	5.88
DCPMS00E SEG2	PMS10, PMS21	0.56	9.20	0.00	10.61	5.56
DCPMS00E SEG3	PMS01	0.00	9.80	0.00	21.57	10.00
DCPTB01L	PTB01	0.00	13.21	0.00	1.89	12.00
DCPWC04E	PWC04	0.00	15.09	0.00	5.56	13.73
DCRCR00R SEG1	RCR09	0.00	3.85	0.00	15.38	67.35
DCRCR00R SEG2	RCR01	0.00	4.85	0.00	21.15	55.77
DCTBK01R	TBK01	0.00	0.00	0.00	0.00	17.65
DCTBR01R	TBR01	0.00	0.00	0.00	0.00	53.33
DCTCO01L	TCO01, TCO06	0.00	11.84	0.00	0.00	4.23
DCTDA01R	TDA01	0.00	0.00	0.00	12.50	70.59
DCTDO01R	TDO01	0.00	0.00	0.00	6.67	17.65
DCTDU01R	TDU01	0.00	0.00	6.25	18.75	35.29
DCTFB02R	TFB02	0.00	0.00	0.00	5.56	15.79
DCTFC01R	TFC01	0.00	0.00	11.11	11.11	52.94
DCTFD01R	TFD01	0.00	0.00	11.11	22.22	41.18
DCTFE01R	TFE01	0.00	0.00	0.00	0.00	18.75
DCTFS01R	TFS01	0.00	0.00	0.00	22.22	30.00
DCTHR01R	THR01	0.00	0.00	9.62	29.81	85.39

Waterbody	Station Data Used	Temp % Violation	pH % Violation	DO % Violation	Turb % Violation	Class A E. coli % Violation
DCTKV01R	TKV01	0.00	5.56	0.00	5.56	16.67
DCTLU01	TLU01	0.00	5.56	0.00	5.56	55.56
DCTMH01R	TMH01	0.00	5.56	0.00	16.67	29.41
DCTNA01R	TNA01	0.00	5.56	0.00	16.67	60.00
DCTNS01R	TNS01	0.00	11.76	0.00	5.88	41.18
DCTOR01R	TOR01	0.00	0.00	0.00	11.76	38.89
DCTPB01R	TPB01	0.00	0.00	0.00	17.65	44.44
DCTPI01R	TPI01	0.00	11.11	0.00	0.00	22.22
DCTPO01R	TPO01	0.00	5.56	0.00	5.56	61.11
DCTPY01R	TPY01	0.00	5.56	0.00	0.00	33.33
DCTSO01R	TSO01	0.00	11.11	0.00	5.56	33.33
DCTTX27R	TTX27	0.00	0.00	0.00	35.29	50.00
DCTWB00R SEG1	TWB01	0.00	5.66	1.92	13.46	49.02
DCTWB00R SEG2	TWB05, TWB06	0.00	16.67	0.00	20.25	58.09

2013-2017
Statistical Summary Report
For
E. coli (MPN/100mL)

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCAKL00L	KNG01, KNG02	31	24196	642.68	2452.56	229.00	24.49
DCANA00E SEG1	ANA19, ANA21, ANA24	8	2613	321.68	512.48	161.00	16.36
DCANA00E SEG2	ANA01, ANA05, ANA08, ANA11, ANA14	14	4530	510.71	715.70	195.11	34.62
DCPMS00E SEG1	PMS37, PMS44	1	2420	117.80	264.87	49.00	5.88
DCPMS00E SEG2	PMS10, PMS21	1	1414	87.57	175.41	37.98	5.56
DCPMS00E SEG3	PMS01	1	1300	132.00	273.20	20.50	10.00
DCPTB01L	PTB01	1	1986	167.56	371.56	22.50	12.00
DCPWC04E	PWC04	1	1756	182.06	291.11	75.00	13.73
DCRCR00R SEG1	RCR09	3	98000	9181.07	16417.19	1450.00	67.35
DCRCR00R SEG2	RCR01	70	4352	588.20	667.19	431.68	55.77
DCTBK01R	TBK01	34	649	215.12	191.79	142.00	17.65
DCTBR01R	TBR01	77	1986	531.60	468.17	461.00	53.33
DCTCO01L	TCO01, TCO06	1	727	101.72	142.45	48.99	4.23
DCTDA01R	TDA01	1	2420	1041.59	855.25	727.00	70.59
DCTDO01R	TDO01	27	1120	246.94	277.12	171.00	17.65
DCTDU01R	TDU01	1	2420	645.71	821.44	345.00	35.29
DCTFB02R	TFB02	2	2420	307.84	621.71	79.00	15.79
DCTFC01R	TFC01	46	2420	951.59	1002.36	548.00	52.94
DCTFD01R	TFD01	2	2420	576.00	751.65	255.00	41.18
DCTFE01R	TFE01	1	2420	435.56	734.54	83.50	18.75
DCTFS01R	TFS01	1	2420	383.40	538.24	225.00	30.00

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCTHR01R	THR01	20	410000	17736.81	61481.95	1733.00	85.39
DCTKV01R	TKV01	8	2420	468.22	806.34	135.50	16.67
DCTLU01R	TLU01	37	2421	1113.17	1064.27	730.50	55.56
DCTMH01R	TMH01	13	2420	473.41	809.10	41.00	29.41
DCTNA01R	TNA01	32	4840	1118.75	1218.77	605.50	60.00
DCTNS01R	TNS01	54	3873	907.76	1103.98	365.00	41.18
DCTOR01R	TOR01	49	2420	766.56	925.08	339.50	38.89
DCTPB01R	TPB01	1	2420	751.50	871.00	298.50	44.44
DCTPI01R	TPI01	15	2421	504.50	748.85	266.50	22.22
DCTPO01R	TPO01	18	1986	663.78	554.87	579.00	61.11
DCTPY01R	TPY01	40	2420	614.72	848.51	235.50	33.33
DCTSO01R	TSO01	59	3784	839.94	1110.97	288.00	33.33
DCTTX27R	TTX27	9	2420	777.11	848.04	390.00	50.00
DCTWB00R SEG1	TWB01	13	2421	772.14	811.20	410.00	49.02
DCTWB00R SEG2	TWB05, TWB06	1	41000	2397.60	5502.99	596.00	58.09

2013-2017
Statistical Summary Report
For
Dissolved Oxygen (mg/L)

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCAKL00L	KNG01, KNG02	2.25	12.51	6.62	3.05	5.40	13.73
DCANA00E SEG1	ANA19, ANA21, ANA24	1.63	15.60	7.84	2.94	7.48	8.51
DCANA00E SEG2	ANA01, ANA05, ANA08, ANA11, ANA14	0.88	13.80	6.68	3.29	6.11	19.53
DCPMS00E SEG1	PMS37, PMS44	5.88	14.34	10.06	2.49	9.89	0.00
DCPMS00E SEG2	PMS10, PMS21	4.96	15.35	10.06	2.34	9.50	0.00
DCPMS00E SEG3	PMS01	7.13	15.01	10.70	2.31	10.70	0.00
DCPTB01L	PTB01	5.19	14.73	10.50	2.12	10.38	0.00
DCPWC04E	PWC04	5.81	14.70	10.34	2.22	10.66	0.00
DCRCR00R SEG1	RCR09	7.94	14.68	10.81	2.12	10.25	0.00
DCRCR00R SEG2	RCR01	5.47	13.98	10.14	2.14	10.20	0.00
DCTBK01R	TBK01	8.54	14.08	10.83	1.85	10.94	0.00
DCTBR01R	TBR01	7.43	16.43	11.60	2.94	11.46	0.00
DCTCO01L	TCO01, TCO06	5.02	16.25	10.08	2.25	9.88	0.00
DCTDA01R	TDA01	6.96	15.40	10.29	2.41	9.85	0.00
DCTDO01R	TDO01	7.93	15.13	10.68	2.29	10.40	0.00
DCTDU01R	TDU01	1.83	12.78	8.95	3.02	9.95	6.25
DCTFB02R	TFB02	7.47	15.65	9.95	2.55	9.07	0.00
DCTFC01R	TFC01	3.98	11.94	9.12	2.69	10.35	11.11
DCTFD01R	TFD01	4.32	11.55	8.22	2.46	8.97	11.11
DCTFE01R	TFE01	6.64	13.43	10.27	2.12	10.11	0.00
DCTFS01R	TFS01	6.34	13.00	10.10	1.87	9.83	0.00

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCTHR01R	THR01	2.45	15.73	8.60	2.52	8.32	9.62
DCTKV01R	TKV01	7.93	14.62	10.55	2.00	10.11	0.00
DCTLU01R	TLU01	7.28	14.08	10.05	2.02	9.81	0.00
DCTMH01R	TMH01	8.19	15.30	10.85	2.04	10.57	0.00
DCTNA01R	TNA01	5.19	18.10	9.88	3.22	9.52	0.00
DCTNS01R	TNS01	6.29	14.20	10.14	2.50	10.02	0.00
DCTOR01R	TOR01	6.36	14.60	10.05	2.44	9.84	0.00
DCTPB01R	TPB01	5.40	12.41	8.81	2.10	8.78	0.00
DCTPI01R	TPI01	7.66	15.60	10.95	2.59	10.58	0.00
DCTPO01R	TPO01	6.97	14.60	9.70	2.27	8.59	0.00
DCTPY01R	TPY01	5.72	13.95	10.08	2.53	9.71	0.00
DCTSO01R	TSO01	7.87	15.45	10.79	2.45	9.62	0.00
DCTTX27R	TTX27	6.45	11.97	8.83	1.63	8.62	0.00
DCTWB00R SEG1	TWB01	4.37	17.62	10.13	3.06	9.98	1.92
DCTWB00R SEG2	TWB05, TWB06	5.84	13.78	10.18	2.03	10.34	0.00

2013-2017
Statistical Summary Report
For
pH

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCAKL00L	KNG01, KNG02	6.80	8.44	7.50	0.36	7.44	0.00
DCANA00E SEG1	ANA19, ANA21, ANA24	6.70	8.51	7.49	0.35	7.43	0.55
DCANA00E SEG2	ANA01, ANA05, ANA08, ANA11, ANA14	6.56	8.66	7.34	0.39	7.29	1.29
DCPMS00E SEG1	PMS37, PMS44	6.90	8.53	7.90	0.30	7.91	1.94
DCPMS00E SEG2	PMS10, PMS21	6.84	9.11	8.11	0.32	8.10	9.20
DCPMS00E SEG3	PMS01	7.55	9.48	8.11	0.35	8.15	9.80
DCPTB01L	PTB01	7.08	9.02	8.15	0.37	8.21	13.21
DCPWC04E	PWC04	7.23	8.78	7.96	0.42	7.95	15.09
DCRCR00R SEG1	RCR09	7.26	8.74	7.90	0.31	7.84	3.85
DCRCR00R SEG2	RCR01	6.60	13.50	7.76	0.69	7.70	4.85
DCTBK01R	TBK01	7.43	8.09	7.88	0.16	7.95	0.00
DCTBR01R	TBR01	7.61	8.28	7.95	0.21	7.90	0.00
DCTCO01L	TCO01, TCO06	7.20	9.00	8.13	0.31	8.10	11.84
DCTDA01R	TDA01	7.47	8.20	7.76	0.20	7.74	0.00
DCTDO01R	TDO01	7.60	8.18	7.80	0.18	7.77	0.00
DCTDU01R	TDU01	6.70	8.31	7.51	0.40	7.49	0.00
DCTFB02R	TFB02	7.27	8.38	7.73	0.33	7.77	0.00
DCTFC01R	TFC01	6.84	8.40	7.54	0.37	7.53	0.00
DCTFD01R	TFD01	6.29	8.26	7.21	0.55	7.10	0.00
DCTFE01R	TFE01	7.43	8.23	7.74	0.27	7.61	0.00
DCTFS01R	TFS01	7.20	8.45	7.77	0.35	7.74	0.00

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCTHR01R	THR01	7.20	8.26	7.75	0.24	7.76	0.00
DCTKV01R	TKV01	7.02	8.72	7.74	0.38	7.71	5.56
DCTLU01R	TLU01	7.20	8.62	7.70	0.34	7.67	5.56
DCTMH01R	TMH01	7.38	8.55	7.81	0.28	7.77	5.56
DCTNA01R	TNA01	7.35	9.47	7.89	0.49	7.86	5.56
DCTNS01R	TNS01	6.76	8.61	7.75	0.45	7.76	11.76
DCTOR01R	TOR01	7.16	8.28	7.69	0.29	7.68	0.00
DCTPB01R	TPB01	6.99	8.40	7.44	0.39	7.34	0.00
DCTPI01R	TPI01	7.48	8.82	7.94	0.36	7.83	11.11
DCTPO01R	TPO01	6.82	8.60	7.64	0.42	7.57	5.56
DCTPY01R	TPY01	6.87	8.58	7.67	0.40	7.62	5.56
DCTSO01R	TSO01	6.98	8.99	7.84	0.44	7.80	11.11
DCTTX27R	TTX27	7.12	7.95	7.47	0.29	7.46	0.00
DCTWB00R SEG1	TWB01	7.37	8.74	7.88	0.33	7.85	5.66
DCTWB00R SEG2	TWB05, TWB06	7.32	9.00	7.95	0.43	7.84	16.67

2013-2017
Statistical Summary Report
For
Temperature (Degree Celsius)

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCAKL00L	KNG01, KNG02	0.55	30.06	15.25	8.73	14.91	0.00
DCANA00E SEG1	ANA19, ANA21, ANA24	0.76	30.58	17.03	8.97	17.20	0.00
DCANA00E SEG2	ANA01, ANA05, ANA08, ANA11, ANA14	-0.17	30.32	16.71	8.73	16.38	0.00
DCPMS00E SEG1	PMS37, PMS44	0.10	29.37	15.22	9.42	14.48	0.00
DCPMS00E SEG2	PMS10, PMS21	0.18	32.50	16.98	9.18	17.70	0.56
DCPMS00E SEG3	PMS01	0.15	28.70	14.74	9.55	13.58	0.00
DCPTB01L	PTB01	0.30	30.32	15.24	9.28	14.84	0.00
DCPWC04E	PWC04	1.20	29.84	15.48	9.73	13.75	0.00
DCRCR00R SEG1	RCR09	0.86	25.32	12.81	7.78	12.80	0.00
DCRCR00R SEG2	RCR01	1.10	25.63	12.44	7.31	12.50	0.00
DCTBK01R	TBK01	1.76	22.70	12.19	6.90	11.23	0.00
DCTBR01R	TBR01	0.46	23.38	12.04	7.42	11.48	0.00
DCTCO01L	TCO01, TCO06	0.96	30.48	17.45	8.81	17.13	0.00
DCTDA01R	TDA01	2.24	26.17	13.44	6.89	12.61	0.00
DCTDO01R	TDO01	2.66	22.88	13.66	6.34	13.00	0.00
DCTDU01R	TDU01	3.80	23.23	12.22	6.43	11.08	0.00
DCTFB02R	TFB02	1.95	23.54	12.36	6.82	12.08	0.00
DCTFC01R	TFC01	5.12	22.83	12.26	6.23	11.10	0.00
DCTFD01R	TFD01	4.15	23.02	11.76	6.52	10.65	0.00
DCTFE01R	TFE01	1.88	23.62	12.92	7.33	12.22	0.00
DCTFS01R	TFS01	2.18	24.77	11.83	6.78	11.93	0.00

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCTHR01R	THR01	3.94	25.85	14.28	6.24	13.35	0.00
DCTKV01R	TKV01	0.96	23.88	11.74	6.84	11.55	0.00
DCTLU01R	TLU01	4.43	23.23	13.27	5.69	12.87	0.00
DCTMH01R	TMH01	1.05	24.11	11.85	6.85	11.33	0.00
DCTNA01R	TNA01	4.60	31.49	14.38	7.20	14.50	0.00
DCTNS01R	TNS01	2.95	21.29	12.38	6.44	13.55	0.00
DCTOR01R	TOR01	1.54	24.37	13.53	8.13	14.90	0.00
DCTPB01R	TPB01	2.90	23.05	13.08	7.08	14.57	0.00
DCTPI01R	TPI01	0.90	21.10	12.16	7.06	13.68	0.00
DCTPO01R	TPO01	3.38	21.97	13.52	6.69	15.25	0.00
DCTPY01R	TPY01	0.00	21.63	12.91	7.41	14.76	0.00
DCTSO01R	TSO01	2.50	21.50	12.77	6.92	14.24	0.00
DCTTX27R	TTX27	3.97	22.16	13.24	5.95	14.82	0.00
DCTWB00R SEG1	TWB01	2.72	26.94	13.84	7.26	13.40	0.00
DCTWB00R SEG2	TWB05, TWB06	1.97	28.00	13.50	6.92	12.68	0.00

2013-2017
Statistical Summary Report
For
Turbidity (NTU)

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCAKL00L	KNG01, KNG02	7.40	253.10	27.64	27.19	21.90	58.82
DCANA00E SEG1	ANA19, ANA21, ANA24	0.00	66.63	11.33	9.72	8.78	9.09
DCANA00E SEG2	ANA01, ANA05, ANA08, ANA11, ANA14	2.30	144.43	21.45	17.71	17.02	29.45
DCPMS00E SEG1	PMS37, PMS44	0.00	68.00	11.40	13.07	7.70	12.15
DCPMS00E SEG2	PMS10, PMS21	0.00	138.40	9.52	15.40	4.96	10.61
DCPMS00E SEG3	PMS01	0.00	165.30	21.74	39.65	4.04	21.57
DCPTB01L	PTB01	0.00	27.30	6.93	4.70	5.72	1.89
DCPWC04E	PWC04	0.00	33.70	5.65	6.80	3.58	5.56
DCRCR00R SEG1	RCR09	0.00	175.90	12.80	29.37	3.15	15.38
DCRCR00R SEG2	RCR01	0.21	380.91	20.36	52.66	4.70	21.15
DCTBK01R	TBK01	0.00	10.28	1.84	3.22	0.45	0.00
DCTBR01R	TBR01	0.00	8.53	0.85	2.08	0.19	0.00
DCTCO01L	TCO01, TCO06	0.00	19.32	6.86	4.58	6.29	0.00
DCTDA01R	TDA01	0.00	50.90	4.88	13.60	0.18	12.50
DCTDO01R	TDO01	0.01	24.16	2.94	5.95	1.63	6.67
DCTDU01R	TDU01	1.90	752.00	61.26	185.64	6.67	18.75
DCTFB02R	TFB02	0.00	138.49	8.59	32.48	0.35	5.56
DCTFC01R	TFC01	1.21	49.90	10.03	11.89	6.19	11.11
DCTFD01R	TFD01	1.60	927.07	70.25	219.15	5.72	22.22
DCTFE01R	TFE01	0.00	13.80	1.62	4.26	0.00	0.00
DCTFS01R	TFS01	0.60	620.00	59.61	154.88	7.77	22.22

Waterbody	Station Data Used	Min. Value	Max Value	Avg. Value	Std. Dev.	Median Value	% Violation of WQ Std.
DCTHR01R	THR01	1.10	119.00	21.50	25.42	11.05	29.81
DCTKV01R	TKV01	0.00	367.91	21.58	86.53	0.05	5.56
DCTLU01R	TLU01	0.00	115.02	7.27	26.94	0.38	5.56
DCTMH01R	TMH01	0.00	400.83	26.34	93.96	0.40	16.67
DCTNA01R	TNA01	0.86	70.00	12.32	19.61	3.73	16.67
DCTNS01R	TNS01	0.00	25.27	2.63	6.20	0.50	5.88
DCTOR01R	TOR01	0.00	109.88	12.87	30.18	1.50	11.76
DCTPB01R	TPB01	1.07	429.25	37.51	102.33	8.07	17.65
DCTPI01R	TPI01	0.00	16.87	1.28	3.94	0.00	0.00
DCTPO01R	TPO01	0.00	67.70	5.12	15.91	0.35	5.56
DCTPY01R	TPY01	0.00	11.36	1.51	3.60	0.10	0.00
DCTSO01R	TSO01	0.00	27.03	2.50	6.33	0.34	5.56
DCTTX27R	TTX27	5.30	197.31	33.36	47.21	17.20	35.29
DCTWB00R SEG1	TWB01	0.00	240.00	16.96	42.69	4.55	13.46
DCTWB00R SEG2	TWB05, TWB06	0.00	253.40	17.84	35.55	5.80	20.25

DRAFT

Categorization of District of Columbia Waters

Category 1- All designated uses are supported, no use is threatened.

No DC waters fit this category.

Category 2- Available data and/or information indicate that some, but not all, designated uses are supported.

No DC waters fit this category.

Category 3- There is insufficient available data and/or information to make a use support determination.

Category 4- Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed.

See subcategories below:

Category 4A- TMDLs needed to result in a designated use attainment have been approved or established by EPA.

Category 4B- TMDL not required. Other pollution control requirements (such as permits, strategies) are expected to address waterbody/pollutant combinations and result in attainment of the water quality standards in a reasonable period of time.

Category 4C- Impaired or threatened waters for one or more designated uses. TMDL is not required as impairment is not caused by a pollutant.

Category 5- Available data and/or information indicate that a designated use is not being supported or is threatened, and a TMDL is needed.

Geographic Location:
02070010- Potomac watershed

02070008- Middle Potomac-Catoctin watershed

DISTRICT OF COLUMBIA
LIST OF IMPAIRED WATERBODIES
Category 3

Category 3- There is insufficient available data and/or information to make a use support determination.

303d Assessment Year[1]	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment
2014	02070010	DCTWB00R	Upper Watts Branch-segment 2	DDD DDE DDT Heptachlor Epoxide PAH 1,2,3
2014	02070010	DCTWB00R	Lower Watts Branch-segment 1	DDD DDE DDT Heptachlor Epoxide PAH 1,2,3
2014	02070010	DCAKL00L	Kingman Lake	DDD DDE Dieldrin Heptachlor Epoxide Copper Zinc
2014	02070010	DCTDU01R	Fort DuPont Creek	Copper Zinc
2014	02070010	DCTPB01R	Popes Branch	DDD DDT Dieldrin

303d Assessment Year[1]	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment
				Arsenic Copper Zinc
2014	02070010	DCPWC04E	Washington Ship Channel	Chlordane DDD DDE DDT Dieldrin Heptachlor Epoxide PAH 1,2,3
2014	02070010	DCTOR01R	Oxon Run	Chlordane DDT Heptachlor Epoxide PAH 1,2,3 Arsenic Copper Zinc
2014	02070008	DCTDA01R	Dalecarlia Tributary	Chlordane DDD DDE DDT PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCTNA01R	Nash Run	DDD DDE DDT Copper

303d Assessment Year[1]	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment
				Zinc
2014	02070010	DCTHR01R	Hickey Run	DDD DDT Dieldrin Heptachlor Epoxide Arsenic Copper Zinc
2014	02070010	DCTDO01R	Dumbarton Oaks	DDD DDE DDT PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCTFE01R	Fenwick Branch	Chlordane DDE DDD PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCTKV01R	Klingle Valley Creek	Chlordane DDD DDE DDT PAH 1,2,3 Arsenic Copper

303d Assessment Year[1]	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment
				Zinc
2014	02070010	DCTLU01R	Luzon Branch	DDD DDE DDT PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCTMH01R	Melvin Hazen Valley Branch	Chlordane DDD DDE DDT Heptachlor Epoxide PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCTPI01R	Pinehurst Branch	Chlordane DDD DDE DDT PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCTPY01R	Piney Branch	DDD DDE DDT PAH 1,2,3

303d Assessment Year[1]	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment
				Arsenic Copper Zinc
2014	02070010	DCTPO01R	Portal Branch	Chlordane DDD DDE DDT PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCTSO01R	Soapstone Creek	DDD DDE DDT PAH 1,2,3 Arsenic Copper Zinc
2014	02070010	DCPTB01L	Tidal Basin	Chlordane DDD DDE DDT Dieldrin Heptachlor Epoxide PAH 1,2,3
2014	02070010	DCTBK01R	Battery Kemble Creek	Arsenic Copper Zinc

1Note:These pollutants moved from Category 4a to Category 3. Current fish tissue studies conducted in the District were based on fish caught in the Anacostia and Potomac Rivers, not the tributaries.

The Tetratech study did not detect the pollutant, but a TMDL exists for the pollutant. More information is needed to determine if the pollutant is the cause of non-attainment.

Category 4A- TMDLs needed to result in a designated use attainment have been approved or established by EPA.

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
2008	02070010	DCPTF[1]	Potomac Tidal Fresh	DO, Chla	Dec 2010
2008	02070010	DCATF[1]	Anacostia Tidal Fresh	DO, Chla	Dec 2010
2006	02070010	DCANA00E	Lower Anacostia River- segment 1	Trash	Sep 2010
2006	02070010	DCANA00E	Upper Anacostia River- segment 2	Trash	Sep 2010
1998	02070010	DCTWB00R	Upper Watts Branch-segment 2	E. coli Chlordane Dieldrin Total PCBs Total Suspended Solids	Oct 2003 (Revised Jul 2014) Oct 2003 Jul 2007

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCTWB00R	Lower Watts Branch-segment 1	E. coli Chlordane Dieldrin Total PCBs Total Suspended Solids	Oct 2003 (Revised Jul 2014) Oct 2003 Jul 2007
1998	02070010	DCAKL00L	Kingman Lake	BOD* E. coli Chlordane DDT Total PCBs PAH 1,2,3 Arsenic Oil and Grease Total Suspended Solids	Oct 2003 Oct 2003 (Revised Jul 2014) Oct 2003
2018	02070010	DCAKL00L	Kingman Lake	DO	Dec 2010
1998	02070010	DCTDU01R	Fort DuPont Creek	E. coli Arsenic	Oct 2003 (Revised Jul 2014) Oct 2003

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCTFD01R	Fort Davis Tributary	BOD E. coli Arsenic	Oct 2003 Oct 2003 (Revised Jul 2014) Oct 2003
1998	02070010	DCTFS01R	Fort Stanton Tributary	E. coli PAH 1,2,3 Total PCBs Arsenic	Oct 2003 (Revised Jul 2014) Oct 2003
1998	02070010	DCTFC01R	Fort Chaplin Tributary	E. coli Arsenic	Oct 2003 (Revised Jul 2014) Oct 2003
1998	02070010	DCTPB01R	Popes Branch	E. coli DDE Chlordane Heptachlor Epoxide PAH 1,2,3 Total PCBs	Oct 2003 (Revised Jul 2014) Oct 2003
2018	02070010	DCTPB01R	Popes Branch	Total Suspended Solids	July 2012

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCTTX27R	Texas Avenue Tributary	E. coli Chlordane DDD DDE DDT Dieldrin Heptachlor Epoxide PAH 1,2,3 Total PCBs Arsenic	Oct 2003 (Revised Jul 2014) Oct 2003
1998	02070010	DCRCR00R	Upper Rock Creek-segment 2	E. coli Copper Lead Mercury Zinc	Feb 2004 (Revised Jul 2014) Feb 2004
1998	02070010	DCRCR00R	Lower Rock Creek- segment 1	E. coli Copper Lead Mercury Zinc	Feb 2004 (Revised Jul 2014) Feb 2004
1998	02070010	DCTOR01R	Oxon Run	E. coli Dieldrin	Dec 2004 (Revised Jul 2014) Dec 2004

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCPWC04E	Washington Ship Channel	E. coli pH	Dec 2004 (Revised Jul 2014) Dec 2010
1998	02070010	DCTBK01R	Battery Kemble Creek	E. coli	Dec 2004 (Revised Dec 2014)
1998	02070008	DCTDA01R	Dalecarlia Tributary	E. coli Dieldrin Heptachlor Epoxide PCBs	Dec 2004 (Revised Dec 2014) May 2005
1998	02070010	DCTCO01L	Chesapeake and Ohio Canal	E. coli	Dec 2004 (Revised Jul 2014)
2014	02070010	DCTCO01L	Chesapeake and Ohio Canal	pH	Dec 2010

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCTNA01R	Nash Run	E. coli Chlordane Dieldrin Heptachlor Epoxide PAH 1,2,3 Total PCBs Arsenic	Oct 2003 (Revised Jul 2014) Oct 2003
2018	02070010	DCTNA01R	Nash run	Total Suspended Solids	July 2012
1998	02070010	DCPMS00E	Upper Potomac River- segment 3	E. coli Total PCBs Nitrogen Phosphorus Total Suspended Solids	Dec 2004 (Revised Dec 2014) Oct 2007
2014	02070010	DCPMS00E	Upper Potomac River- segment 3	pH	Dec 2010
1998	02070010	DCPMS00E	Middle Potomac River- segment 2	E. coli Total PCBs	Dec 2004 (Revised Dec 2014) Oct 2007
2014	02070010	DCPMS00E	Middle Potomac River- segment 2	pH	Dec 2010

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
2018	0270010	DCPMS00E	Middle Potomac River- segment 2	Total Suspended Solids	Dec 2010
1998	02070010	DCPMS00E	Lower Potomac River- segment 1	E. coli Total PCBs	Dec 2004 (Revised Dec 2014) Oct 2007
2018	02070010	DCPMS00E	Lower Potomac River- segment 1	Total Suspended Solids	Dec 2010
1998	02070010	DCTFB01R	Foundry Branch	E. coli	Dec 2004 (Revised Dec 2014)
1998	02070010	DCTBR01R	Broad Branch	Chlordane Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004
1998	02070010	DCTDO01R	Dumbarton Oaks	Chlordane Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCTFE01R	Fenwick Branch	DDT Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004
1998	02070010	DCTHR01R	Hickey Run	E. coli Chlordane DDE PAH 1,2,3 Total PCBs	Oct 2003 (Revised Jul 2014) Oct 2003
2018	02070010	DCHR01R	Hickey Run	Total Suspended Solids	July 2012
1998	02070010	DCTKV01R	Klingle Valley Creek	Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004
1998	02070010	DCTLU01R	Luzon Branch	Chlordane Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCTMH01R	Melvin Hazen Valley Branch	Dieldrin Total PCBs	Feb 2004
1998	02070010	DCTNS01R	Normanstone Creek	Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004
1998	02070010	DCTPI01R	Pinehurst Branch	Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004
1998	02070010	DCTPO01R	Portal Branch	Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004
1998	02070010	DCTPY01R	Piney Branch	Chlordane Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCTSO01R	Soapstone Creek	Chlordane Dieldrin Heptachlor Epoxide Total PCBs	Feb 2004
1998	02070010	DCPTB01L	Tidal Basin	E. coli Total PCBs	Dec 2004 (Revised Jul 2014) Dec 2004
2002	02070010	DCPTB01L	Tidal Basin	pH	Dec 2010

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCANA00E	Lower Anacostia River- segment 1	BOD	June 2008
				E. coli	Oct 2003 (Revised Jul 2014)
				Chlordane	Oct 2003
				DDD	
				DDE	
				DDT	
				Dieldrin	
				Heptachlor Epoxide	
				PAH 1,2,3	
				Total PCBs	
				Arsenic	
				Copper	
				Zinc	
				Total Suspended Solids	July 2007
				Oil and Grease	Oct 2003
				Nitrogen	Oct 2007
				Phosphorus	

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
1998	02070010	DCANA00E	Upper Anacostia River- segment 2	BOD	June 2008
				E. coli	Oct 2003 (Revised Jul 2014)
				Chlordane	Oct 2003
				DDD	
				DDE	
				DDT	
				Dieldrin	
				Heptachlor Epoxide	
				PAH 1,2,3	
				Total PCBs	
				Arsenic	
				Copper	
				Zinc	
				Total Suspended Solids	July 2007
				Oil and Grease	Oct 2003
				Nitrogen	Oct 2007
				Phosphorus	
2014	02070010	DCTDU01R	Fort DuPont Creek	Total Suspended Solids	Jul 2007
2014	02070010	DCTFC01R	Fort Chaplin Tributary	Total Suspended Solids	Jul 2007

303d Listing Year	Geographic Location	WBID	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	TMDL Establishment Date
2014	02070010	DCTFD01R	Fort Davis Tributary	Total Suspended Solids	Jul 2007
2014	02070010	DCTFS01R	Fort Stanton Tributary	Total Suspended Solids	Jul 2007
2014	02070010	DCTTX27R	Texas Avenue Tributary	Total Suspended Solids	Jul 2007

*BOD means biochemical oxygen demand

Category 4B- TMDL not required. Other pollution control requirements (such as permits, strategies) are expected to address waterbody/pollutant combinations and result in attainment of the water quality standards in a reasonable period of time.

Category 4C- Impaired or threatened waters for one or more designated uses. TMDL is not required as impairment is not caused by a pollutant.

No DC waters fit this category

Category 5- Available data and/or information indicate that a designated use is not being supported or is threatened, and a TMDL is needed.

303d Listing Year	Geographic Location	WBID[1]	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	Priority Ranking for TMDL Development	Targeted for TMDL within 2 years	TMDL Establishment Date
2002	02070010	DCTHR01R	Hickey Run	Chlorine (total Residual)	Low	No	Dec 2022
2014	02070010	DCANA00E	Upper Anacostia River –Segment 2	DO	Medium	No	Dec 2022
2014	02070010	DCRCR00R	Lower Rock Creek- segment 1	Total Suspended Solids	Medium	No	Dec 2022
2014	02070010	DCTFC01R	Fort Chaplin Tributary	DO	Medium	No	Dec 2022
2014	02070010	DCTFD01R	Fort Davis Tributary	DO	Medium	No	Dec 2022
2014	02070010	DCTHR01R	Hickey Run	DO	Medium	No	Dec 2022
2014	02070010	DCTBR01R	Broad Branch	E. coli	High	No	Dec 2022
2014	02070010	DCTDO01R	Dumbarton Oaks	E. coli	High	No	Dec 2022
2014	02070010	DCTFE01R	Fenwick Branch	E. coli	High	No	Dec 2022

303d Listing Year	Geographic Location	WBID[1]	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	Priority Ranking for TMDL Development	Targeted for TMDL within 2 years	TMDL Establishment Date
2014	02070010	DCTKV01R	Klingle Valley Creek	E. coli	High	No	Dec 2022
2014	02070010	DCTLU01R	Luzon Branch	E. coli	High	No	Dec 2022
2014	02070010	DCTMH01R	Melvin Hazen Valley Branch	E. coli	High	No	Dec 2022
2018	02070010	DCTMH01R	Melvin Hazen Valley Branch	Total Suspended Solids	Medium	No	Dec 2026
2014	02070010	DCTNS01R	Normanstone Creek	E. coli	High	No	Dec 2022
2018	02070010	DCTNS01R	Normanstone Creek	pH	Medium	No	Dec 2026
2014	02070010	DCTPI01R	Pinehurst Branch	E. coli	High	No	Dec 2022
2018	02070010	DCTPI01R	Pinehurst Branch	pH	Medium	No	Dec 2026
2014	02070010	DCTPO01R	Portal Branch	E. coli	High	No	Dec 2022
2014	02070010	DCTPY01R	Piney Branch	E. coli	High	No	Dec 2022
2014	02070010	DCTSO01R	Soapstone Creek	E. coli	High	No	Dec 2022

303d Listing Year	Geographic Location	WBID[1]	WB Name	Pollutant(s) or Pollutant Categories Causing Impairment	Priority Ranking for TMDL Development	Targeted for TMDL within 2 years	TMDL Establishment Date
2018	02070010	DCTSO01R	Soapstone Creek	pH	Medium	No	Dec 2026
2018	02070008	DCTDA01R	Dalecarlia Tributary	Total Suspended Solids	Medium	No	Dec 2026
2018	02070010	DCTOR01R	Oxon Run	Total Suspended Solids	Meduim	No	Dec 2026
2018	02070010	DCTWB00R	Upper Watts Branch-segment 2	pH	Medium	No	Dec 2026

Attachment 2 Good Cause Justification Table

Waterbody ID	Waterbody Name	River Basin	Cause (Pollutant)	Removed (R) or Recategorized (C)	Good Cause Justification
Potomac River	Middle Potomac River- segment 2	Potomac	Total Suspended Solids (TSS)	C	The first time listing of the Middle Potomac River – segment 2 for TSS in 2018 in Category 4a instead of Category 5 is appropriate as the approved December 2010 Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment references the tidal Potomac River. The tidal Potomac River includes the District of Columbia. The model used to develop the TMDL was a watershed model. The model used inputs and water quality standards relevant to the Middle Potomac River – segment 2, as it was a source of loads to the watershed.
	Lower Potomac River- segment 1	Potomac	Total Suspended Solids	C	The first time listing of the Lower Potomac River – segment 1 for TSS in 2018 in Category 4a instead of Category 5 is appropriate as the approved December 2010 Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment references the tidal Potomac River. The tidal Potomac River includes the District of Columbia. The model used to develop the TMDL was a watershed model. The model used inputs and water quality standards relevant to the Lower Potomac River – segment 1, as it was a source of loads to the watershed.
Anacostia River Tributaries	Hickey Run	Anacostia	Total Suspended Solids	C	The first time listing of Hickey Run for TSS in 2018 in Category 4a instead of Category 5 is appropriate as the approved July 2012 approved Anacostia River Watershed for Sediments/Total Suspended Solids Montgomery and Prince George's Counties Maryland TMDL references the Anacostia River and its tributaries. Hickey Run is a tributary to the Anacostia River in the District of Columbia. The model used inputs and water quality standards relevant to Hickey Run, as it was a source of loads to the watershed.
	Nash Run	Anacostia	Total Suspended Solids	C	The first time listing of Nash Run for TSS in 2018 in Category 4a instead of Category 5 is appropriate as the approved July 2012 approved Anacostia River Watershed for Sediments/Total Suspended Solids Montgomery and Prince George's Counties Maryland TMDL references the

Waterbody ID	Waterbody Name	River Basin	Cause (Pollutant)	Removed (R) or Recategorized (C)	Good Cause Justification
					Anacostia River and its tributaries. Nash Run is a tributary to the Anacostia River in the District of Columbia. The model used inputs and water quality standards relevant to Nash Run, as it was a source of loads to the watershed.
	Popes Branch	Anacostia	Total Suspended Solids	C	The first time listing of Popes Branch for TSS in 2018 in Category 4a instead of Category 5 is appropriate as the approved July 2012 approved Anacostia River Watershed for Sediments/Total Suspended Solids Montgomery and Prince George's Counties Maryland TMDL references the Anacostia River and its tributaries. Popes Branch is a tributary to the Anacostia River in the District of Columbia. The model used inputs and water quality standards relevant to Popes Branch, as it was a source of loads to the watershed.
Anacostia River Tributary	Kingman Lake	Anacostia	Dissolved Oxygen	C	The first time listing of Kingman Lake for DO in 2018 in Category 4a instead of Category 5 is appropriate as the approved December 2010 approved Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment references the Anacostia River watershed. Kingman Lake is in the Anacostia River watershed, a tributary to the Potomac River and Chesapeake Bay watershed in the District of Columbia. The model used inputs and water quality standards relevant to Kingman Lake, as it was a source of loads to the watershed.

District of Columbia
Department of Energy & Environment

303(d) Program New Vision

Prioritization Strategy
(2016-2022)

DRAFT

May 2016

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

Contents

Summary

As part of the implementation of the US EPA "Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act (CWA) Section 303(d) Program" (Vision), the Department of Energy & Environment (DOEE) is required to develop a prioritization strategy to express CWA 303(d) Program priorities in the context of specific District of Columbia's (District) broader, overall water quality goals and values. This strategy provides a framework for identifying high, medium, and low priority waters for total maximum daily loads (TMDL) development efforts, and alternative actions that are best suited to the broader water quality goals and values in the District.

The Vision's Prioritization goal states that "for the 2016 integrated reporting cycle and beyond, States review, systematically prioritize, and report priority watersheds or waters for restoration and protection in their biennial integrated reports to facilitate State strategic planning for achieving water quality goals."

The intent of the Vision's *Prioritization Goal* is for states, including the District, to express their Clean Water Act's Section 303(d) Program priorities in order to ensure that the available District resources are used efficiently to achieve water quality goals.

In determining priority waters for restoration and protection in the District, a "universe" is first compiled comprising of new Category 5 listings, the existing TMDLs which are earmarked for revisions (for various reasons, e.g., court order or new information, etc.), and TMDL development projects that stakeholders would like to be prioritized.

As a first prioritization step, each item in the universe's subsets is evaluated for priority ranking by using a combination of "mechanisms" and "factors." *Mechanisms* are the primary level factors that include protection of human health and aquatic life, support non-violations of the District's water quality standards, etc. - and are rated as *high*, *medium*, or *low*. *Factors* are secondary level considerations that, amongst others, examine the severity of impairment to the designated use classification(s) – and are also rated as *high*, *medium*, or *low*. Where both mechanisms and factors are rated as high, those waters would be deemed high priority. The result of this priority ranking and similar analyses are then summarized and put in a list consistent with Section 303(d) of the CWA. Impairments that are candidates for *alternative* are also annotated in the list at this stage. In the second step, the listings of ranked priorities are assigned a schedule for TMDL development based on a matrix approach. The matrix consists of six criteria: urgency, potential impact, actionable/ feasible, resources, stakeholder interest and readiness, and integration, each of which, if ranked as high earns 3 points; medium, 2 points; and low, 1 point. The points awarded are then summed up and the project that receives the highest total points is then slated as the one to move forward first. The results of both steps one and two are then consolidated into a preliminary list called "Pre-303(d) list" and made available for an initial public comments. A revised "Pre-303(d) list" following public comments is called "draft 303(d) List." Upon completion, a draft Integrated Report (IR) incorporating "draft 303(d) List" will be made available to the public for comment for 30days. If no comments are received on the "draft 303(d) List", the list will be considered final and submitted to EPA.

Consistent with this strategy, the District's overall TMDL development priority for the fiscal year (FY) 2016 through 2022 will be dominated by the need to satisfy the 2009 TMDL consent decree.

DOEE will publish this draft *Prioritization Strategy* to solicit feedback. Comments received will be considered and used to revise the document as appropriate before submittal to EPA for approval. After EPA approval this strategy will become final and implemented

1. Introduction

As part of the implementation of the "*Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program"* (Vision)[1], the Department of Energy & Environment (DOEE) is required to develop a prioritization strategy to express CWA 303(d) Program priorities in the context of specific District of Columbia's (District) broader, overall water quality goals and values. This strategy provides a framework for identifying high, medium, and low priority waters for total maximum daily loads (TMDL) development efforts, including alternative actions that are best suited to the broader water quality goals and values in the District.

1.1. Background[2]

On December 5, 2013, the U.S. Environmental Protection Agency (EPA) announced a new collaborative framework for managing CWA 303(d) program responsibilities, entitled *"A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program*[3]*"* (Vision). This new Vision reflects the successful collaboration among states and the EPA, which began in August 2011. The vision enhances the overall efficiency of the CWA 303(d) program. For example, it encourages states to focus attention on priority waters. It also provides states with the flexibility to use available tools beyond TMDLs to effectively restore and protect water quality. There is no "one size fits all" approach to restoring and protecting water resources; flexibility allows each state, including the District, to more efficiently develop tailored strategies to implement their CWA 303(d) Program responsibilities within the context of its own water quality goals. While the Vision provides a new framework for implementing the CWA 303(d) Program, it does not alter state and EPA responsibilities or authorities under the CWA 303(d) regulations. The Vision's Prioritization goal states:

> "*States should review, systematically prioritize, and report priority watersheds or waters for restoration and protection in their biennial integrated reports to facilitate state strategic planning for achieving water quality goals*."

Priorities are important because they provide the foundation to guide the planning and implementation of the other Vision goals. Specifically, the CWA 303(d) program priorities are essential to ensure that the available resources are used efficiently to achieve water quality goals and that allocation is not done in an ad hoc way, but in a manner respectful of the entirety of the District's water quality values.

The Vision expects states, including the District to engage their general public and stakeholders in the establishment of CWA 303(d)-related priorities. EPA also expects states and the District to articulate how input from the public is considered and addressed as part of their rationale for supporting prioritization.

2. Definition and Principles of Prioritization

2.1. Definition

Prioritization is the process of evaluating[4] a group of projects/activities and ranking them in their order of importance or urgency.

[1] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/vision_303d_program_dec_2013.pdf
[2] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/programvision.cfm
[3] A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program (PDF)
[4] Evaluation is the process of taking different possible courses of action, setting them side by side and drawing a conclusion as to their respective merits.

2.2. Principles of Prioritization

Principles are statements of *values* that guide actions. Principles are used to frame a concise set of criteria which, in turn, are used to develop priorities or ranking. The following principles guide DOEE's approach to its Vision prioritization:

1. **Transparency:** Prioritization should be clear and contain robust and transparent selection criteria developed to maximize measurable water quality improvements and positive environmental impacts.
2. **Engagement:** Constructive engagement, supported by timely and accurate information containing analysis based on reliable data, enables dialogue and genuine discussions, which, in turn, increases the chance of quality *prioritization* decision-making.
3. **Resources:** Consideration of resource implications of doing a TMDL project/activity, including, but not limited to, whether or not the resource requirements of the project are within budgetary limits; the period over which resources will be needed; DOEE's institutional and technical capacity to implement the plan; and benefits.
4. **Impact:** Prioritizing TMDLs for development starts by considering the scope and severity of water pollution and risks to public health and aquatic life[5]. Also consideration should be given to whether or not the proposed TMDL development/activity has additional strategic significance or impacts (e.g., risk to threatened or endangered species).
5. **Influence:** *Priorities* should reflect input of stakeholders' involvement.
6. **Inclusiveness:** Prioritization is effective when a wide range of stakeholders are *engaged* in their diversity, uniqueness and perspective. Accounting for all these and developing a unified set of *priorities* requires balance and judgment.
7. **Time:** Prioritization is multi-dimensional, in part, because values, which are at the core of it, are. Time is the other dimension. The time dimension involves consideration of scheduling issues (such as re-programming to meet court orders) to determine what comes first, and what follows later. Timing and phasing are key factors in aligning priorities.
8. **Alignment:** TMDL development *priorities* should fit within DOEE's overall strategic water quality improvement agenda and be in accord with the new Vision goals.
9. **Implementation Potential:** Assessing the implementation potential of a TMDL project/activity is a real challenge. Three factors that are closely related to the potential for a successful TMDL project/activity implementation include the following: assessment data reliability; organizational resources readiness; consistent application of *prioritization* appraisal criteria; and uncertainty.

2.3. Prioritization Best Practices

Best practices are effective procedures that reliably tend to lead to a desired result. They are chosen to fit with goals, including what needs to be done and how. Since not each and every best practice is related to each and every issue of interest, or necessarily aimed at the same target outcomes, they should always be reviewed and updated.

The following are some best practices that apply to the District's 303(d) prioritization.

It is good practice to:

1. Give careful consideration to the criteria for prioritizing projects and agree on them in advance;
2. Systematically evaluate all potential projects at the same time - to minimize bias;

[5] **Hall, *et. al.* (2014).** An ecological function and services approach to total maximum daily load (TMDL) prioritization. Environmental Monitoring and Assessment, Vol. 186, Issue 4, pp 2413-2433.

3. Schedule priorities;
4. Allow limited priority overrides due to executive prerogative on special cases;
5. Ensure that the people impacted by priorities are informed and know what those priorities are; and
6. Review periodically the priority status of projects.

3. Strategy Goal and Objective

3.1 Goal

The strategy goal is to ensure that DOEE and stakeholders review, systematically prioritize, and report priority watersheds or waterbodies for restoration and protection in the bi-annual Integrated Report (IR) to facilitate strategic planning for achieving water quality goals.

3.2 Objective

The strategy objective is to identify where DOEE and stakeholders should focus resources for TMDLs development in fiscal year (FY) 2016 through FY2022.

4. General 303 (d) Prioritization Framework

4.1. Framework Elements

The following are examples of how the framework elements may apply to DOEE:

1. **Mechanism for Prioritization** - Protection of human and aquatic life, consent decree.
2. **Factors Considered in Prioritization** - Funding availability, indicators used in Recovery Potential Screening, pollutants/impairments, sources.
3. **Consideration of EPA National and Regional Priorities** - An explanation of how the District collaborates with the Region on prioritization and how EPA's priorities fit into its framework. This does not mean that the District must choose EPA priorities as their designations; rather the District should recognize EPA's priorities as an important factor in the prioritization process.
4. **Plan for Where the State Will Begin Work** - This could be general, and may be based on monitoring or permitting cycles, or other appropriate processes.
5. **Statement on Flexibility** - Reflecting the District's approach to changing priorities.
6. **Description of Shifts or Changes** - Evaluate the past prioritization scheme compared to what the District will be doing under the new Vision by explaining what is different or new compared to what stays the same.

4.2. Other Considerations

1. **Public Engagement Approach** - An explanation regarding how the District will involve stakeholders in the process and share the final designated priorities. At a minimum, priorities should be clearly identified in the 2016 Integrated Report (2016 IR) for the public to provide comments. DOEE's Stakeholders' Engagement Strategy (SES) is incorporated herein by reference.
2. **Integration Approach** - Deals with how DOEE will use a combination of District-wide programs and other on-the-ground projects to achieve water quality benefits; and the extent to which water quality improvement efforts are harmonized with other relevant District and Federal programs; namely:
    a. **When and how the District will Review and Update the Prioritization Scheme** - Assessment is a critical piece of the new Vision; the District will consider and adapt new information on the status of waters, interest and engagement from stakeholders and partners, and the effectiveness of their chosen scheme.

b. **Choice of Priority Designations** - Once the District has completed the process of determining its 303(d) priorities, the information should be included as an appendix/update to the strategy document.
c. **Availability of the Prioritization Framework to the Public** - The District plans to make the prioritization documents available to the public (via DOEE's website, public notice in the DC Register, including joint public-notice with the 2016 IR) to facilitate transparency and stakeholder engagement.

5. Detailed District's Priority and Ranking Assignment Scheme

The District assigns TMDL development priority in two main steps, namely: an *Initial Ranking and Scheduling Step*, and the *Integrated Report Step*; with each step having sub-steps as follows:

Step 1: *Initial Ranking and Scheduling Step*

a. Assessment:

Assessment identifies water bodies requiring TMDLs and consolidates these into an IR form pursuant to Sections 303(d), 305(b), 314 and 319 of the Clean Water Act.

Section 303(d) and the implementing regulations at 40 CFR 130.7 require states and the District to identify those water bodies that are not meeting surface water quality standards and to prioritize and schedule them for the development of TMDLs. The 303(d) listing process classifies waters impaired by point and non-point sources of pollutants into the following categories.

- *Category 1*: Waters with the status that all designated uses are being met.
- *Category 2*: Waters that meet some (at least three) of their designated uses, but there is insufficient data to determine if remaining designated uses are met.
- *Category 3*: Waters for which insufficient data exists to determine whether any designated uses are met.
- *Category 4*: Waters that are impaired or threatened but a TMDL is not needed. (*This category and its sub-categories may include TMDLs that may or may not need to be revised for one reason or another, including court orders, consent decrees, availability of new information.)*
- *Category 5*: Waters that are impaired or threatened and need new TMDLs to be developed. (*The development of new TMDLs is the primary driver for prioritization and ranking*.)

Section 305(b) codifies the process in which water bodies are evaluated with respect to their capacity to support designated uses as defined in each of the states'/District's surface water quality standards. These uses include aquatic life support, fish and shellfish consumption, and primary (e.g., swimming) and secondary (e.g., boating) contact recreation. Where possible, the causes and sources of use impairment are also identified.

Section 314 is mostly concerned with lakes and reservoirs and has little or no relevance in the District's assessment scheme.

Section 319 grants and State Revolving Funds (SRF) are given to watershed clean-up projects that are consistent with TMDL Program requirements.

a (i). Priority Assignment Process

The District defines its Section 303(d) list *initial* priority assignment in terms of broader programmatic primary factors (or *mechanisms*) and secondary factors (hereinafter referred to simply as *factors*).

Mechanisms are based on consideration of primary factors such as severity of impairment to the designated use classification(s) for a water body. There are also secondary factors (or simply, "*factors*") which are used to modify the initial prioritization to an overall or final prioritization. *Factors* may either elevate a water body into a higher priority group (e.g., public interest, executive prerogative needs) or reduce the priority ranking (e.g., funding availability, cleanup action in progress). Together, both mechanisms and factors help to provide structure to the prioritization process by explaining, for example, the extent or complexity of impairment. They help to describe the availability of information (e.g., monitoring data, models), and thus indicate whether or not priority decisions are made based on substantial or scanty information. At the same time, factors are meant to be:

- Flexible for each water body;
- Subject to periodic review to reflect new scientific information, newly developed water quality criteria;
- Accommodative of changing stakeholder considerations or concerns; and
- Cognizant of efficient and effective use and allocation of resources.

Mechanisms' and factors' levels are rated as *high*, *medium*, and *low* as briefly described below:

Mechanisms' Rating Levels and Description:

- **High level**: Includes protection of human health and aquatic life; factors supporting non-violations of the District's water quality standards, recreational use; programmatic geographic focus; funding.
- **Medium level**: Includes, partnership with stakeholders e.g., federal agencies; issue complexities; national water quality initiatives; environmental justice.
- **Low level**: Includes, a variety of technical screening tools (e.g., EPA's Recovery Potential Tool).

Factors' Rating Levels and Description:

- **High level**: Includes, funding availability; specific pollutant that is causing or contributing to water quality impairment; data availability; restoration potential.
- **Medium level**: e.g., straight-to-implementation via NPDES Permit; water quality trends.
- **Low level**: e.g., pollutant source.

A list of *mechanisms* and *factors* and their ratings that DOEE uses to prioritize District's waters, is provided in Appendix A, Table 1 and Table 2.

A generalized ranking scheme based on combining *mechanisms* and *factors* information into an initial priority designation for TMDL projects, is shown in Table 3.

Table 3: Combination of *Mechanisms* and *Factors* to assign overall priority level

		Levels of Factor(s) (Complexity/Cost/Other Considerations)		
Levels of Prioritization Mechanisms		High	Medium	Low
	High	High	High	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Low

a (ii). Rank Schedule Assignment Process

This strategy uses a prioritization matrix approach to evaluate the relative order of importance of candidate TMDL development projects by deriving a criteria-based numerical value for the priority (rank) of each project or activity. See Appendix B.

b. Pre-303(d) List development

Pre-303(d) list is developed by consolidating *priority* and *ranking*/ *scheduling* information into a single list. The list will be shared with stakeholders. The comments received, and any additional information will be considered and the Pre-303(d) list may be revised, as appropriate. Stakeholders can identify specific projects of interest through a process outlined in Appendix F. The revised Pre-303(d) list will be used to develop the *draft 303(d) list* to be incorporated into the draft Integrated Report.

Step 2: *Integrated Report Step*

Upon completion, the draft IR incorporating the revised Pre-303(d)[6] list will be made available to the public for comment. If a comment is received on the priority and schedule assignment, consultation, or in some cases the prioritization matrix scheme (Appendix B), will be used to resolve the issue(s). If no comments are received on the "draft 303(d) List", the list will be considered final and will be submitted to EPA.

Appendix C shows a detailed process flow diagram (scheme) of the two steps discussed herein. The diagram also indicates that stakeholder input is considered in the prioritization process.

6. Changes and Shifts from Past Efforts

6.1. Past TMDL Development Efforts in the District

Before the Vision, the District managed its TMDL development priority process based on "Pace" framework; consent decree requirements; and to meet the Chesapeake Bay (Bay) TMDL Program needs.

6.1.1. The "Pace" Framework

"Pace" refers to the number of TMDLs that needed to be established consistent with national policy[7], i.e. generally within 8-13 years of listing of a waterbody as impaired. Under the "pace" framework, the District's priority was based on human health concerns, risk to aquatic life, programmatic needs (e.g., waste load allocations needed for permits), and availability of EPA-approved models and other technical

[6] A revised "Pre-303(d) list" that is incorporated in the IR is called a "draft 303(d) List."

[7] Perciasepe, R. 1997. New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs). http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/ratepace.cfm. *Last Accessed June 2011*. *Last Accessed June 2015.*

tools. Also within the "pace" framework, high priority TMDLs are typically developed within two years, medium priority within two to five years, and low priority more than five years.

Issues with the "pace" framework include the following:

1. It fails to properly reflect significant variability in types of TMDLs, or state/District listing methods.
2. It does not give credit to more robust TMDLs that better support implementation and water quality outcomes, i.e., "implementation-ready."
3. It does not take into account water quality improvement (output vs. outcome).
4. It improperly conveys the notion that states and the District require litigations to drive TMDLs development; i.e., the development of new TMDLs will not occur without litigation.
5. It incorrectly implies that as historic litigation driven TMDL consent decrees taper off, that TMDL "pace" (i.e. rate at which at which TMDLs are developed) will diminish.
6. It puts less emphasis on robust consultation of stakeholders and systematically incorporating their views in TMDL development process.
7. It places little emphasis on the integration among the CWA programs (303(d), 305(b), 314 and 319), or other collaborations.
8. It is weak in flexibly aligning TMDLs development with available resources.

DOEE is working collaboratively with stakeholders and EPA to develop strategies for each of the six Vision goals to address these issues – in order to improve the TMDLs development environment in the District.

6.1.2. Consent Decree

From FY2010 through FY2022, DOEE set its TMDL work load priority to revisions to satisfy the requirements of the settlement agreement reached between EPA and Anacostia Riverkeepers, Friends of the Earth, and Potomac Riverkeepers (Case No.: 1:09-cv-00098-JDB of January 15, 2009) that certain District TMDLs did not have a daily load expression established as required by *Friends of the Earth vs. the Environmental Protection Agency, 446 F.3d 140, 144* (D.C. Cir. 2006). The consent decree deadline is January 1, 2017.

Meeting consent decree dates remain a top priority in the District.

6.1.3. The Chesapeake Bay (Bay)TMDL Program Framework

The Bay TMDL is required under the federal Clean Water Act and responds to consent decrees in Virginia and the District of Columbia from the late 1990s. It represents a keystone commitment of a federal strategy to restore and protect the Bay, and covers approximately 64,000-square-mile watershed that includes all the jurisdiction partners (the District of Columbia and large sections of six states: Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia.

The TMDL set limits that are necessary to meet applicable water quality standards in the Bay and its tidal rivers. The limits (for total nitrogen (TN), total phosphorus (TP), and sediment) are based on state-of-the-art modeling tools, and involve extensive monitoring data, peer-reviewed science, and close interaction with jurisdiction partners.

Because the Bay TMDLs are an important part of the District's water quality improvement strategy, no changes are expected on the District's commitments to the Bay TMDL programs and efforts.

6.2. Shifts and Changes

This strategy shifts the prioritization process from past practice in the following ways:

1. It places greater emphasis on systematic coordination of watershed and Municipal Separate Storm System (MS4) implementation action plans (collaborative non-point source management and implementation plans) by:
    a. Incorporating 319 Program elements into TMDL implementation plans (Appendix D).
    b. Programmatic needs (e.g., waste load allocations needed for MS4 permits).
    c. Increased number of stakeholder meetings to discuss and review water quality improvement (e.g., meeting stakeholders to review the District's performance against the Bay commitments, MS4 implementation plans).
2. It enhances the current 303(d) list development and TMDL development priority planning process by incorporating a new two-step public solicitations and notices:
    a. Step 1- which involves an initial publication of a *Pre-Draft 303(d) List* for public comment gives stakeholders a chance to familiarize themselves with what the 303(d) list will look like. It also ensures that stakeholders are made part of the 303(d) process as early as possible.
    b. Step 2 - which comprises using initial comments received following the publication of the *Pre-Draft 303(d) list* to refine the draft IR, provides stakeholders a second opportunity to re-engage, and also to verify that their views have been considered.
3. It includes an *alternative* provision, which allows for "*direct-to-implementation*" projects. This makes it easier to deal with those impairment cases where the development of a TMDL would be inappropriate.
4. It introduces a pathway to "*direct prioritization*" in which stakeholders can petition the Director of DOEE in special cases to have a project included in the priority list at any stage in the process (Appendix F). This provides additional opportunities to stakeholders to engage management on specific priority outcomes. Stakeholders can submit their priorities of interest(s) at any time, however, they will only be considered for the next IR.

7. Statement on Flexibility

This prioritization strategy term runs from 2016 to 2022 and will be flexible in the following respects (to account for new listings in the intervening period before 2022, including court orders and consent decrees, exercise of executive prerogative, and/or local public demand):

1. Aware that the development of this prioritization strategy in support of the Vision in the District will NOT be completed in time for adoption for the 2016 Listing Methodology, DOEE will:
    a. Include language in the 2016 Listing Methodology to recognize the shift in focus to the Vision's new prioritization approach; and that the changes that emerge following the adoption of the Vision's new prioritization approach will be applied in full in the 2018 listing/delisting.

        - The rationale: At this time, the District's TMDLs development priority is dominated by the need to satisfy the consent decree (see Appendix E). Under this scenario, it is clear that even if the District were to use the Vision prioritization approach, the final priority outcome would not change.

2. New 303(d) listings concerning pollutants that threaten human health and aquatic life will be added and prioritized in each IR's cycle.

3. Applicable new federal regulations, criteria or guidance will be incorporated as they become available. For waters with impairments related to new national and regional concerns, monitoring and assessment will be adjusted and, if necessary, re-prioritized to protect and restore the District's waters.

4. Adaptive management:
   In consultation with stakeholders and EPA, DOEE will incorporate the principles of adaptive management so that lessons learned are used to inform the next steps of prioritization plans.

8. Plan for Where the District Will Begin Work

In order of priority, DOEE will begin work by addressing TMDLs:

1. That are subject to court order deadlines or consent decree agreement(s);
2. TMDL projects in which DOEE's and EPA's national and/or regional priorities intersect and where opportunities for collaboration exist.

Collaboration enhances efficiency and resources mobilization, and helps ensure that successful restoration will be more likely.

9. Implementation

This strategy will be implemented by DOEE's Natural Resources Administration (NRA) Divisions: Water Quality Division (WQD), Stormwater Management Division (SWMD), and Watershed Protection Division (WPD). Implementation will be coordinated:

1. To ensure prioritization consistency and integration across (CWA's 303(d), 305(b), and 319) programs in support of the new Vision;
2. To provide feedback to stakeholders on key outcomes of prioritization through robust engagement and other DOEE's existing communication protocols.

10. This Strategy's Priorities

This strategy's priorities include:

1. The District's FY2016-to-FY2022 Priority List (Appendix E).
2. Anacostia River Watershed in the District as the geographic focus for TMDL development.
3. Improving DOEE's data infrastructure by developing:
   - Data Management Plan.
   - Data Analysis Plan.
   - Data Sharing Plan.

APPENDICES

APPENDIX A

Table 1: Prioritization Mechanisms

	MECHANISM	MECHANISM LEVEL		
		High	Medium	Low
1.	Protection of human health and aquatic life	✓		
2.	Supporting DOEE's implementation and or revision of existing TMDLs and water quality improvement plans	✓		
	a) Court order/consent decree TMDLs			
	b) The Long-Term Control Plan (LTCP) and the Green Infrastructure (GI) projects			
	c) The MS4 TMDL Implementation Plan (MS4 TMDL-IP)			
	d) Implementation of the Chesapeake Bay TMDL WIPs			
	e) Anacostia River watershed and related restoration plan(s)			
3.	Geographic focus	✓		
	a) Anacostia River watershed			
4.	Partnerships and stakeholder interests		✓	
	a) Federal agency partnerships			
	b) Other partnerships			
5.	Issue complexity (e.g., modeling)		✓	
6.	Participation of volunteers and watershed groups		✓	
7.	National Water Quality Initiatives (NWQI)		✓	
	a) General			
	b) Specific national priorities			
	i. Nutrients			
8.	Regional priorities		✓	
	a) The Chesapeake Bay TMDLs			
9.	Protections of the District's waterbodies with sources upstream (i.e., watersheds in Maryland)		✓	
10.	Other strategic frameworks		✓	
	a) Environmental Justice (EJ)			
11.	Screening Tools			✓
	a) Recovery Potential Tool			
	b) USGS' SPARROW			
	c) WATERSCAPE			
12.	Emerging mechanisms			✓

Table 2: Prioritization Factors

	FACTOR	FACTOR LEVEL		
		High	Medium	Low
1.	Funding availability	✓		
2.	Pollutant causing impairment	✓		
3.	Available quality data	✓		
4.	Restoration potential	✓		
5.	Regulatory tools		✓	
6.	Straight to implementation		✓	
7.	Water quality and watershed related programs activities		✓	
8.	Water quality standards		✓	
9.	Water quality characteristics and trends		✓	
10.	Watershed characteristics		✓	
11.	Water quality/watershed models		✓	
12.	Pollutant sources			✓
13.	Other strategic frameworks			✓
14.	Screening tools			✓
15.	Emerging mechanisms			✓
16.	Funding availability			✓

APPENDIX B

GENERAL PRIORITIZATION MATRIX
for
Use with Stakeholders on TMDLs Development

How to Use this Prioritization Analysis Matrix

The Process:

1. As a group freely discuss all the project activities/projects that need to be prioritized.
2. Review list of activities/projects to determine relevance to disparities, reduce redundancy or duplication and clarify meaning. Consolidate activities/projects, if appropriate.
3. As a group, use the Prioritization Matrix below to rank order activities/projects. Rank activities/projects for each criterion using the following scale:

   High = 3 points; Medium = 2 points; Low = 1 point
   [This scale range is deliberately kept small because the line between high, medium, or low can be very thin]

4. Assign total points for each activities/projects.
5. Sum up all the total points for each project/activity to determine the priority score. Record the results in the provided worksheet.
6. Analyze the results and identify the top three activities/projects.
7. Continue discussions until DOEE and stakeholders achieve a consensus on the top three activities/projects.
8. Document the results of the consensus on priority, if consensus is achieved. If not, keep trying.

Criteria:

1. **Urgency:**
   a. Is this a priority project/activity that needs to be addressed in the next 1 year?
   b. Is this a priority project/activity that needs to be addressed in the next 2 years?
   c. Is this a priority project/activity that needs to be addressed in the next 3 years, or longer?
2. **Potential Impact:**
   a. Is it likely that addressing this critical issue will have a significant impact on one or more stakeholders?
   b. Is there a reason or reasons to believe you can be successful on this issue?
   c. Is it likely that addressing this critical issue will have a significant impact on one or more specific populations?
3. **Actionable/Feasible:**
   a. Are there opportunities for action to address the critical issue?
   b. Is there room to make meaningful improvement on the issue?
   c. Is this a priority issue subject to a court order/consent decree?
4. **Resources** (*funds, staff, water quality values/technical complexity interface, and expertise*)**:**
   a. Are resources readily available or likely resources can be obtained to address the critical issue?
   b. Are there stakeholder resources to work on the issue?
   c. If not, are there alternative ways to get the needed resources?
5. **Stakeholder Interest and Readiness:**
   a. Is this a critical issue identified as important by stakeholders?
   b. Are people in the community interested in the issue?
   c. Is there stakeholder definitive push to move this initiative forward?
6. **Integration:**
   a. Is there opportunity for collaboration?
   b. Is there opportunity to build on existing initiatives?
   c. Will this duplicate efforts?

Prioritization Analysis Matrix
(An Example)

Issue(s) to be Ranked/Scheduled:

Revision of consent decree TMDLs and their priority/ranking

Goal:

DOEE is collaborating with EPA and other stakeholders to revise toxic TMDLs to satisfy the requirements of the settlement agreement reached between the United States Environmental Protection Agency (EPA) and Anacostia Riverkeepers, Friends of the Earth, and Potomac Riverkeepers (Case No.: 1:09-cv-00098-JDB of January 15, 2009) that certain District TMDLs did not have a daily load expression established as required by *Friends of the Earth vs. the Environmental Protection Agency, 446 F.3d 140, 144* (D.C. Cir. 2006).

The settlement agreement requires the establishment of daily loads in District TMDLs by January 1, 2017.

Activity	Urgency	Potential Impact	Actionable/ Feasible	Resources	Stakeholder Readiness	Integration	Total Points
Sample Project/Activity #1: Toxics TMDLs revision	3	2	3	1	3	2	**14**
Sample Project/Activity #2: TSS TMDL revision.	3	2	3	2	3	3	**16**
Sample Project/Activity #3: Bacteria TMDLs revision	3	3	3	2	3	3	**17**

Note: High = 3 points; Medium = 2 points; Low = 1 point

Prioritization Analysis Matrix Sample Worksheet

Critical Issue: _____

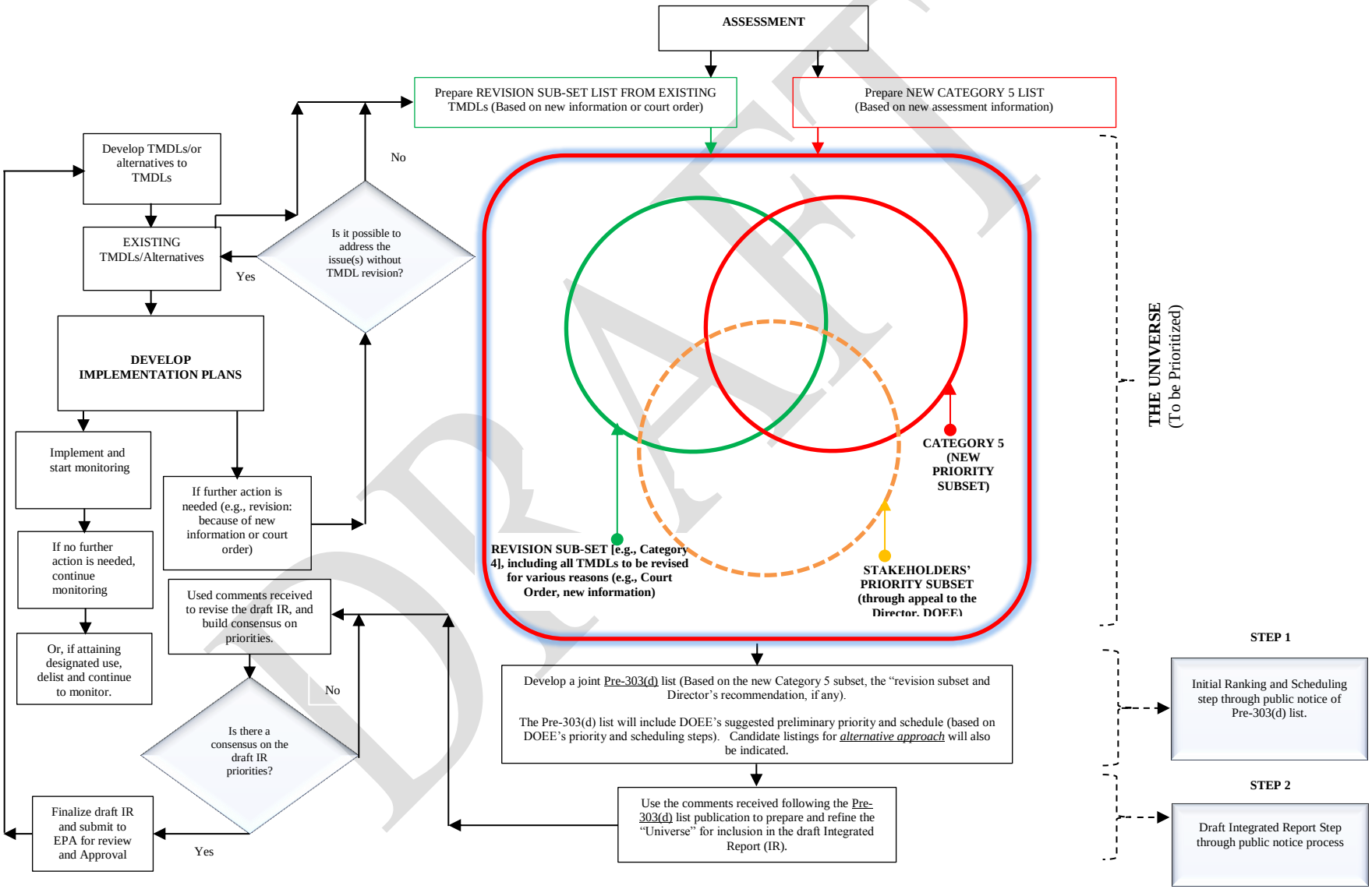
Goal: _____

Activity	Urgency	Potential Impact	Actionable /Feasible	Resources	Stakeholder Readiness	Integration	Total Points
Project/Activity #1:							
Project/Activity #2:							
Project/Activity #3:							
Project/Activity #4:							
Project/Activity # n:							

Note: High = 3 points; Medium = 2 points; Low = 1 point

APPENDIX C

DOEE's PROPOSED SCHEME TO IMPLEMENT THE 303(D) NEW VISION'S PRIORITIZATION GOAL



APPENDIX D

The 319 Program Elements, Integration and Reporting

Table 4: Key Elements of an effective Section 319 & DOEE's Non-Point Source (NPS) program

Key Elements of an Effective NPS Program	How NPS addresses them in the District
1. Explicit short- and long-term goals, objectives, and strategies	• Annual grant solicitation for actions on high priority waters and District- wide stewardship goals. • 5 year goals in NPS Strategy.
2. Strengthened partnerships	• WPD process is a joint effort of multiple programs within DOEE (WQD, SWMD & WPD). • Grants are provided to local, community groups, NGOs. • WPD process is used to facilitate partnerships with federal agencies either through coordinating environmental projects for waters of common interest (e.g., NWQI, or by use of pass through funding to other agencies.
3. Integration of programs	• WPD factors in approved TMDLs. Partnerships include federal programs such as NWQI.
4. Resource allocation for protection and restoration	• Performance Partnership Agreement/ Performance Partnership Grant (PPA/PPG) annual commitments. • NPS Five-Year priority. • WPD annual process for allocating resources. DOEE's decisions regarding funding of the CWA Sections 303(d) are also considered.
5. Identification and prioritization of waters	• NPS Strategy – Five-year priority for waterbodies and actions. • b) Use WPD process for prioritizing waterbodies and identifying actions.
6. Adaptive management to achieve and maintain water quality standards	• WPD annual actions development considers previous activities and data collection and uses these to decide on best next steps to address areas of concern.
7. Efficient and effective implementation	WPD has an established process that effectively identifies priority waterbodies needing actions. Implementation occurs through: • PPA/PPG commitments • EPA grant administration • WPD/DOEE project funding mechanisms
8. Review, evaluation, and revision using measures of success	WPD process includes review and analysis step prior to annual grant solicitation. Projects are also subject to revision depending on ongoing communication and quarterly reporting.

Table 5: 303(d) New Vision's Goals & 319 Program Integration Interface

Schedule	The New 303(d) Vision Goal	How the District's WPD Addresses the Goal
2014	**Engagement** – inclusive, transparent, feedback loops	WPD selects priority watersheds based on community interest and restoration opportunities. Final WPD/Nonpoint Source (NPS) priorities and actions shared with stakeholders online.
	Assessment – initiate ongoing statewide statistical surveys	**Alternative approach:** WPD process targets water quality assessments reported in DOEE's Integrated Report and DOEE TMDL plan. Additional WPD's assessment and evaluation are also used.
2016	**Integration** – coordinate actions with other CWA programs; other agencies	WQD and SWMD participate in the WPD process. Increased internal CWA program integration including permitting, compliance, and water quality standards programs are also used.
	Prioritization – Priorities identified in the Integrated Report	WPD process provides for an annual review of priority waters and actions. Results of this review are incorporated in the NPS strategy and Integrated Report.
	Protection – Identify protection planning priorities and schedules for healthy waters consistent with the high priorities identified	Currently, no water body in District falls under the "Protection" goal. Instead, the WPD targeting process identifies water bodies for purposes of restoration. Restoration actions on waterbodies are identified in the NPS Strategy and posted on the DOEE's web page.
2018	**Alternatives** – Incorporate adaptive management and use alternative approaches to develop TMDLs implementation plans.	WPD actions are annually reviewed and are water body specific; includes elements of TMDL implementation.
2022	**Assessment** – Identify the extent of impaired and healthy waters within the District of Columbia	Assessment results and reviews are components of DOEE's Integrated Report. The Integrated Report's assessments results are subsequently incorporated in the NPS strategy.

Section 319 Reporting and Accountability

DOEE's NPS Program is accountable for implementing the District's requirements under CWA Sections 303(d) and 319. WPD demonstrates this accountability through numerous reports and obligations, including the following:

- Grants Reporting and Tracking System (GRTS)[8] reporting on WPD grants, contracts.
- PPA and PPG work plans and reports.
- Annual NPS Report.
- Integrated Report.
- Web posting of TMDLs, BMPs, Project Reports, Annual WPD priorities in grant solicitation, and other Nonpoint Source pages on DOEE's website.
- Annual EPA 319 Progress Evaluation.
- PPA and PPA work plan development and grant review process.
- Participation in annual WPD process.
- EPA review and approval of DOEE's 303(d) impaired waters list.
- Public participation:
    - Outreach events – public presentations/fairs/ Questions &Answers (Q&A) sessions at community meetings.
    - WPD water body targeting is based on active community engagement and restoration opportunities.
    - Chesapeake Bay Program participation.

[8] http://iaspub.epa.gov/apex/grts/f?p=110%3A199

APPENDIX E

Table 6: District's FY2016-to-FY2022 Priority List (The Consent Decree is incorporated herein by reference for specific schedules).

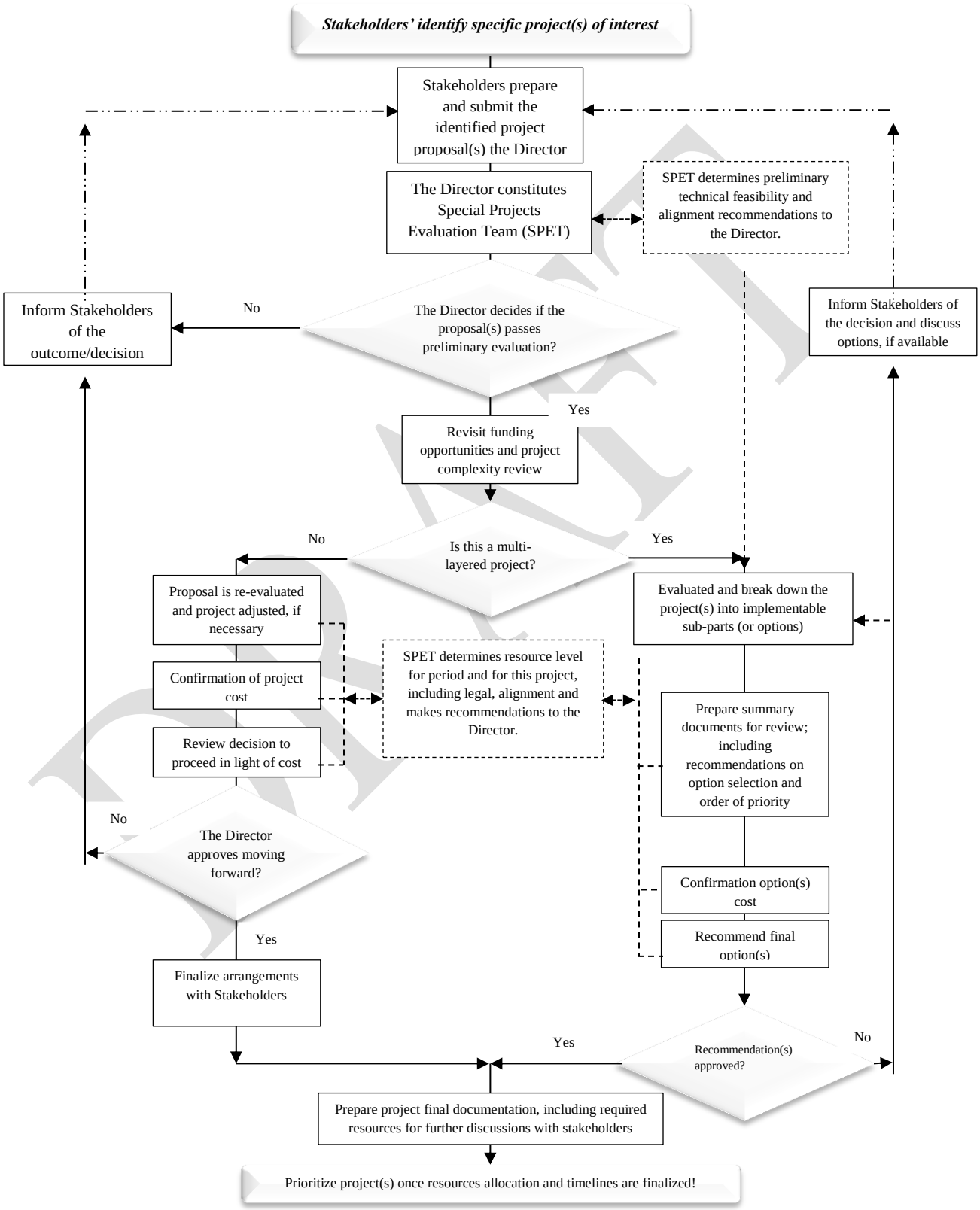
Assessment Unit ID	Assessment Unit Name	Cause Name
DCAKL00L_00	Kingman Lake	Arsenic
DCAKL00L_00	Kingman Lake	Chlordane
DCAKL00L_00	Kingman Lake	DDT
DCAKL00L_00	Kingman Lake	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCANA00E_01	Anacostia River	Arsenic
DCANA00E_01	Anacostia River	Chlordane
DCANA00E_01	Anacostia River	Copper
DCANA00E_01	Anacostia River	DDD
DCANA00E_01	Anacostia River	DDE
DCANA00E_01	Anacostia River	DDT
DCANA00E_01	Anacostia River	Dieldrin
DCANA00E_01	Anacostia River	Heptachlor Epoxide
DCANA00E_01	Anacostia River	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCANA00E_01	Anacostia River	Zinc
DCANA00E_02	Anacostia River	Arsenic
DCANA00E_02	Anacostia River	Chlordane
DCANA00E_02	Anacostia River	Copper
DCANA00E_02	Anacostia River	DDD
DCANA00E_02	Anacostia River	DDE
DCANA00E_02	Anacostia River	DDT
DCANA00E_02	Anacostia River	Dieldrin
DCANA00E_02	Anacostia River	Heptachlor Epoxide
DCANA00E_02	Anacostia River	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCANA00E_02	Anacostia River	Zinc
DCRCR00R_01	Rock Creek	Copper
DCRCR00R_01	Rock Creek	Lead
DCRCR00R_01	Rock Creek	Mercury
DCRCR00R_01	Rock Creek	Zinc
DCRCR00R_02	Rock Creek	Copper
DCRCR00R_02	Rock Creek	Lead
DCRCR00R_02	Rock Creek	Mercury
DCRCR00R_02	Rock Creek	Zinc
DCTBR01R_00	Broad Branch	Chlordane
DCTBR01R_00	Broad Branch	Dieldrin
DCTBR01R_00	Broad Branch	Heptachlor Epoxide
DCTBR01R_00	Broad Branch	Polychlorinated Biphenyls (PCBs)
DCTDA01R_00	Dalecarlia Tributary	Dieldrin
DCTDA01R_00	Dalecarlia Tributary	Heptachlor Epoxide
DCTDO01R_00	Dumbarton Oaks	Chlordane
DCTDO01R_00	Dumbarton Oaks	Dieldrin
DCTDO01R_00	Dumbarton Oaks	Heptachlor Epoxide
DCTDO01R_00	Dumbarton Oaks	Polychlorinated Biphenyls (PCBs)
DCTDU01R_00	Fort Dupont Creek	Arsenic
DCTFC01R_00	Fort Chaplin Run	Arsenic
DCTFD01R_00	Fort Davis Tributary	Arsenic

Assessment Unit ID	Assessment Unit Name	Cause Name
DCTFE01R_00	Fenwick Branch	DDT
DCTFE01R_00	Fenwick Branch	Dieldrin
DCTFE01R_00	Fenwick Branch	Heptachlor Epoxide
DCTFE01R_00	Fenwick Branch	Polychlorinated Biphenyls (PCBs)
DCTFS01R_00	Fort Stanton Tributary	Arsenic
DCTFS01R_00	Fort Stanton Tributary	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCTHR01R_00	Hickey Run	Chlordane
DCTHR01R_00	Hickey Run	DDE
DCTHR01R_00	Hickey Run	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCTKV01R_00	Klingle Valley	Dieldrin
DCTKV01R_00	Klingle Valley	Heptachlor Epoxide
DCTKV01R_00	Klingle Valley	Polychlorinated Biphenyls (PCBs)
DCTLU01R_00	Luzon Branch	Chlordane
DCTLU01R_00	Luzon Branch	Dieldrin
DCTLU01R_00	Luzon Branch	Heptachlor Epoxide
DCTLU01R_00	Luzon Branch	Polychlorinated Biphenyls (PCBs)
DCTMH01R_00	Melvin Hazen Valley Branch	Dieldrin
DCTMH01R_00	Melvin Hazen Valley Branch	Polychlorinated Biphenyls (PCBs)
DCTNA01R_00	Nash Run	Arsenic
DCTNA01R_00	Nash Run	Chlordane
DCTNA01R_00	Nash Run	Dieldrin
DCTNA01R_00	Nash Run	Heptachlor Epoxide
DCTNA01R_00	Nash Run	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCTNS01R_00	Normanstone Creek	Dieldrin
DCTNS01R_00	Normanstone Creek	Heptachlor Epoxide
DCTNS01R_00	Normanstone Creek	Polychlorinated Biphenyls (PCBs)
DCTOR01R_00	Oxon Run	Dieldrin
DCTPB01R_00	Popes Branch (Hawes Run)	Chlordane
DCTPB01R_00	Popes Branch (Hawes Run)	DDE
DCTPB01R_00	Popes Branch (Hawes Run)	Heptachlor Epoxide
DCTPB01R_00	Popes Branch (Hawes Run)	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCTPI01R_00	Pinehurst Branch	Dieldrin
DCTPI01R_00	Pinehurst Branch	Heptachlor Epoxide
DCTPI01R_00	Pinehurst Branch	Polychlorinated Biphenyls (PCBs)
DCTPO01R_00	Portal Branch	Dieldrin
DCTPO01R_00	Portal Branch	Heptachlor Epoxide
DCTPO01R_00	Portal Branch	Polychlorinated Biphenyls (PCBs)
DCTPY01R_00	Piney Branch	Chlordane
DCTPY01R_00	Piney Branch	Dieldrin
DCTPY01R_00	Piney Branch	Heptachlor Epoxide
DCTPY01R_00	Piney Branch	Polychlorinated Biphenyls (PCBs)
DCTSO01R_00	Soapstone Creek	Chlordane
DCTSO01R_00	Soapstone Creek	Dieldrin

Assessment Unit ID	Assessment Unit Name	Cause Name
DCTSO01R_00	Soapstone Creek	Heptachlor Epoxide
DCTSO01R_00	Soapstone Creek	Polychlorinated Biphenyls (PCBs)
DCTTX27R_00	Texas Avenue Tributary	Arsenic
DCTTX27R_00	Texas Avenue Tributary	Chlordane
DCTTX27R_00	Texas Avenue Tributary	DDD
DCTTX27R_00	Texas Avenue Tributary	DDE
DCTTX27R_00	Texas Avenue Tributary	DDT
DCTTX27R_00	Texas Avenue Tributary	Dieldrin
DCTTX27R_00	Texas Avenue Tributary	Heptachlor Epoxide
DCTTX27R_00	Texas Avenue Tributary	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)
DCTWB00R_01	Watts Branch	Chlordane
DCTWB00R_01	Watts Branch	Dieldrin
DCTWB00R_02	Watts Branch	Chlordane
DCTWB00R_02	Watts Branch	Dieldrin

APPENDIX F

Process for Stakeholders to Submit TMDL Priority of their interest to the Director



District Department of Energy and Environment (DOEE)

303(d) Program New Vision

Stakeholders Engagement Strategy (SES)

(2016-2022)

DRAFT

April 2016

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

Summary

- A stakeholder is an individual or group with an interest in the District's Department of Energy & Environment's (DOEE's) broader environmental management mandate, stewardship, and services.

- DOEE has a large and diverse stakeholder group. DOEE therefore recognizes that it should engage with different stakeholders for different reasons and that it should enable diverse interests and individuals to contribute to DOEE policy making, including engaging in constructive dialogue in which all voices have an opportunity to contribute.

- This stakeholder engagement strategy outlines DOEE's approach to communicating and working with stakeholders for water resource related topics. It is an integral part of developing an understanding of its stakeholders. This helps DOEE shape regulations and future plans and priorities.

- Stakeholder engagement is a key part of DOEE's regulatory activities and an important contributor to DOEE's mandate and responsibility to the residents of the District of Columbia.

- DOEE also recognizes the level of interest and the degree of influence on the agency varies among its stakeholders. Because different issues have different stakeholders, DOEE engagement will vary as appropriate. As issues emerge, DOEE will develop new relationships to better manage change in service provided to District residents.

- DOEE will publish this draft *Engagement Strategy* to solicit feedback. Public comments will be incorporated into Section 6 of this draft strategy to ensure stakeholders' contributions are not just visible, but are also items for implementation and further action.

1. Introduction

As part of the implementation of the "*Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act (CWA) Section 303(d) Program,"* the District's Department of Energy & Environment (DOEE) is required to develop a strategy to "engage" stakeholders[1]. This "Stakeholder Engagement Strategy" outlines DOEE's engagement framework, consultation approaches, and includes metrics by which outcomes will be measured.

1.1 Background[2]

On December 5, 2013, the U.S. Environmental Protection Agency (EPA) announced a new collaborative framework for managing CWA 303(d) program responsibilities, entitled *"A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program[3]"* (Vision). This new Vision reflects the successful collaboration among states and the EPA, which began in August 2011. The vision enhances the overall efficiency of the CWA 303(d) program. For example, it encourages states to focus attention on priority waters. It also provides states with the flexibility to use available tools beyond Total Maximum Daily Loads (TMDLs) to effectively restore and protect water quality. There is no "one size fits all" approach to restoring and protecting water resources; flexibility allows each state, including the District of Columbia (the District), to more efficiently develop tailored strategies to implement their CWA 303(d) Program responsibilities within the context of its own water quality goals.

Accountability is ensured through new CWA 303(d) Program measures by which the success of implementation efforts is tracked. This ensures restoration and protection of the nation's streams, rivers and lakes is achieved. While the Vision provides a new framework for implementing the CWA 303(d) Program, it does not alter state and EPA responsibilities or authorities under the CWA 303(d) regulations.

[1] Within the meaning of this strategy, a stakeholder is an individual or group with interest in DOEE, its mandate and its services as it implements the CWA 303(d) Program, including Sections 319 and 305. Stakeholder engagement is a key part of DOEE's regulatory activities and an important contributor to DOEE's objectives. See Appendix B for a list of categories of DOEE stakeholders. See Appendix C for a "Snapshot of the District of Columbia's community."

[2] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/programvision.cfm

[3] A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program (PDF)

2. Stakeholder Engagement Framework

2.1 Definition of Stakeholder Engagement

Stakeholder engagement is the process of involving people in the decisions that affect their lives. It lends transparency to the process and increases accountability. It illustrates the value of stakeholders and provides them with a sense of ownership and shared responsibilities for decision making. More importantly, stakeholder engagement helps build trust in the decisions DOEE makes consistent with its mandate.

Stakeholder engagement is a key part of DOEE's plan to deliver on the six goals of the Vision. DOEE will use collaboration, partnerships and innovative media initiatives to bring this plan to fruition.

2.2 The spectrum of stakeholder engagement[4]

The International Association of Public Participation (IAP2) is the gold standard framework for best management practices in planning public engagement in a decision making process. A standard approach in the IAP2 framework is that the level of engagement is determined from within the best practices spectrum. Informing is at one end of the spectrum; empowerment is at the other (Fig. 1).

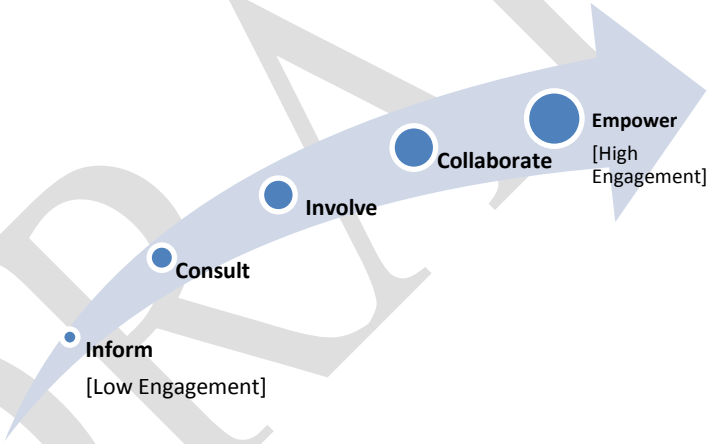


Figure 1: A diagrammatic representation of IAP2 Public Participation Spectrum.

The meaning of each level of participation in the spectrum is as follows:

- **Informing:** takes place when a decision has already been made or action is required, and the stakeholders are being informed to ensure that those affected are aware of the facts.
- **Consultation:** learning about stakeholders' views.
- **Involving:** a deepening of the consultation process, i.e., using stakeholders as advisors on an ongoing basis.
- **Collaboration:** working in partnership with the stakeholders to reach a decision.
- **Empowerment**: putting decision-making responsibility in the hands of the stakeholders.

[4] https://www.iap2.org.au/documents/item/84

In all engagement processes, DOEE will lead in determining the level of stakeholder participation. See appendix A.

3. Principles of Stakeholder Engagement

The following principles guide DOEE's approach to stakeholder engagement:

1. **Transparency:** Engagement should be clear in scope and purpose.
2. **Consistent communication:** Engagement should promote dialogue and enable genuine discussion. It should be supported by timely and accurate information, providing a space to weigh options and develop a common understanding.
3. **Enhanced understanding of program objectives:** Ensuring stakeholders are well informed increases the probability decisions in a consistent manner, rooted in scientific understanding.
4. **Influence:** Engagement should be reflected in outcomes; stakeholders should be able to identify the impact of their involvement.
5. **Inclusiveness:** Engagement should be accessible and balanced; it should capture a full range of values and perspectives. Mechanisms and frameworks that support an accessible and inclusive engagement program include:

    - Stakeholder Advisory Panel;
    - District government inter-agency forums;
    - Regularly scheduled meetings with federal agencies;
    - A range of avenues for the public to provide feedback on new policies and projects;
    - Workshops with local schools and organizations;
    - A network of neighborhood service centers that provide information on current state of engagement;
    - Targeted outreach to the broad range of cultural groups in the District; and
    - Platforms to facilitate online engagement.

These principles are informed by the IAP2 core values[5] and reflect DOEE's values of quality, partnership, integrity, and respect.

DOEE will:

1. Ensure engagement is timely, accessible, and consistent;
2. Undertake engagement activities to overcome barriers to stakeholder participation and build their capacity play a role in the decision-making process.
3. Review and evaluate, with the stakeholders, the effectiveness of this engagement strategy.
4. Implement any statutory consultation required by the District or federal laws.

[5] http://www.iap2.org/?page=A4

4. Strategy Goal and Objectives

4.1 Goal

To ensure that DOEE stakeholders have an opportunity to contribute to the full range of the *Section 303(d) Vision Program* goals[6] (engagement, prioritization, protection, integration, alternatives, and assessment, including evaluation of accomplishments) in a manner that meets their needs.

4.2 Objective

To ensure a stakeholder's opportunity to participate is meaningful and effective.

Specific engagement objectives include:

1. Providing opportunities for stakeholders to participate in DOEE's decision-making process to ensure outcomes that benefit District residents;
2. Building a strong foundation for understanding and working with stakeholders to promote confidence in DOEE's decision-making process;
3. Developing and sustaining partnerships and utilizing modern approaches to empower stakeholders to achieve the Section 303(d) Long-Term Vision goals.

5. Stakeholder Engagement Approaches

DOEE will offer a range of opportunities and activities for stakeholders to provide feedback to help inform and improve DOEE's environmental decision-making, policies and actions.

Specific engagement opportunities and activities include:

1. Stakeholder meetings: workshops, seminars, talks, conversations, community and/or local events, drop-in sessions, and roundtables.
2. Public exhibitions, etc.
3. Information sharing using traditional and new media, e.g., websites, social media, and public libraries).
4. Online consultation portal.
5. Stakeholder/community reference groups.
6. Advisory panels, non-governmental organizations (NGOs) fora, and outreach to volunteers and other interest groups.
7. High school/college outreach workshops.
8. Stakeholders/community satisfaction surveys.
9. Notifications/signage.
10. Neighborhood service centers and community centers.

[6] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/vision_303d_program_dec_2013.pdf

6. This Strategy's Priorities[7]

DOEE's specific priorities to make sure that the new Vision's stakeholder engagement goal is realized in the District include the following:

1. Establishing a Stakeholder Advisory Panel (SAP).
2. Strengthening partnerships.
3. Holding community forums or open houses.
4. Providing support and services to stakeholders (e.g., gathering a task force to target a specific, ongoing issue).
5. Creating volunteer opportunities.
6. Giving public presentations.
7. Getting the word out.
8. Letting someone else open the door for us (DOEE).
9. Inviting the community to contact us (DOEE).
10. Performing stakeholder surveys to evaluate achievement and progress.
11. Developing a DOEE policy on stakeholder engagement.
12. Strengthening data collection, data quality, utilization and sharing.

7. Implementation

This strategy will be implemented by DOEE's Natural Resources Administration (NRA) Divisions: Water Quality Division (WQD), Stormwater Management Division (SWMD), and Watershed Protection Division (WPD). NRA will:

1. Coordinate the execution of this strategy's priorities (section 6 above) to ensure consistency and integration across programs and services offered by NRA in support of the Section 303d New Vision.
2. Deliver feedback to stakeholders on key outcomes of engagement through DOEE's existing communication protocols.
3. Ensure this strategy is integrated with the other goals of the Section 303(d) New Vision.
4. Review the strategy as necessary.

[7] See **Appendix D** for details on additional *Strategic Areas* under consideration.

Appendix A: Stakeholder Matrix on Engagement Processes

Engagement Level	Goal	Communication	What DOEE will do	Engagement Approach
INFORM	Inform or educate stakeholders.	One-way (DOEE to stakeholder – no invitation to reply).	DOEE will keep stakeholders informed.	Forums Periodic meetings Surveys Campaigns Digital media Social media Integrated Reports (IR) [issued every 2 years]
CONSULT	Gain information and feedback from stakeholders to inform decision made internally.	Limited two-way: DOEE will share documents, or ask questions and receive stakeholders' comments or answers.	DOEE will keep stakeholders informed, listen to their concerns, consider their insights and provide feedback on its decision.	Regulatory impact assessments Surveys One-to-one meetings Periodic meetings IR
INVOLVE	Work directly with stakeholders to ensure their concerns are fully understood and considered in decision-making.	Two-way or multi-way between DOEE and stakeholders. Learning on both sides, but each act separately.	DOEE will work with stakeholders to ensure their concerns are understood, to develop alternative proposals and provide feedback about how stakeholders' views influenced the decision-making.	Forums Periodic Meetings Surveys Campaigns Digital media Social media IR
COLLABORATE	Partner with or convene a network of stakeholders to develop mutually agreed solutions and joint plan of action.	Two-way or multi-way: Learning, negotiation and decision-making on both sides. Stakeholders work together to take action.	DOEE will look to stakeholders for direct advice and participation in finding and implementing solutions to shared challenges.	Projects; Memorandum of Understanding (MOU), IR; Memorandum of Agreement; Joint Funding Agreement; Grants; etc.
EMPOWER	Delegate decision-making on a particular issue to stakeholders.	Stakeholders have formal role in decision-making or decision-making is partly or wholly delegated to stakeholders.	DOEE will implement what stakeholders decide.	Partnerships IR

Appendix B: Categories of DOEE Stakeholders

Category	Sub-category
Employee	Senior Management Staff Consultants Staff Forum
Customer	Engineers Scientists Consultants District of Columbia Building Industry Association (DCBIA) District of Columbia Water and Sewer Authority (DC Water) Companies Public
Technical Services Providers	Vendors of materials/ services Agencies, companies, etc. Consultants/engineers
Government and Regulators	Federal government regulators (e.g., EPA) Surrounding local government departments (e.g., DC Water)
Political	Federal Government • United States Congress DC Government • Council of the District of Columbia (DC Council) • Executive Office of the Mayor (EOM)
Partners	Local Authorities (e.g., Prince George's County) Other Government Departments Awarding Organizations
Local District Wards and Communities	Community/Ward Representatives/Leader Community Job Training Centers (e.g., THEARC) Coordinators
Academic	Universities • University of District of Columbia (UDC) • University of Maryland (UM) Approved training providers (e.g., US Army Corps of Engineers)
Media	Print Broadcast Digital (Bloggers, etc.)
Industry and Trade Associations	DCBIA
Local Non-Governmental Organizations	Anacostia Riverkeeper Potomac Riverkeeper Anacostia Watershed Society (AWS) DC Environmental Network Anacostia Watershed Citizens Advisory Committee (AWACS)
National Non-Governmental Organizations (with Chapters in the District)	Earthjustice Natural Resources Defense Council (NRDC)
Non-Governmental Organizations (with Specific Regional Mandates)	Interstate Commission on Potomac River Basin (ICPRB) Metropolitan Washington Council of Governments (MWCOG)
Others	To be identified

Appendix C: A Snapshot of the District's Community[8,9]

Category	Description
National/ International Stakeholders Nexus	District of Columbia: • Has a total land area of 69 square miles. • Is the nation's (United States of America's) capital and is home to the three branches of US Federal Government (The Legislature (the House and the Senate; the Judiciary; and the Executive (under which are 16 Departments and approximately 121 agencies and quasi-agencies)). The federal footprint is approximately 30% of the total physical land area (21 square miles). The District also hosts 187 accredited foreign embassies. • Is home to over 658,000 residents and provides over 760,000 jobs. Including visitors and students, it is estimated that there are more than one (1) million people in the District during the day. • Is one of the fastest growing local government areas in Washington Metropolitan Area (WMA) in terms of residential population in the last 10 years. The July 2014 population estimate was 658,893 people. • It is also home to many national museums, creative and performing arts, and businesses. • Is the Headquarters of the United States Environmental Protection Agency (EPA). • The District bequeathed the "Daily Means Daily" mantra to the nation following the *U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015, (April 25 2006,)*).
Demographic Profile	• Median age of 33.8 years – some 2.5 years younger than the metropolitan area average. • Nearly half of city residents are aged between 18 and 44 years, compared to less than 37% in all of the United States (The 2010 Census). • 82 % of city residents live in family households with a partner and/or children or other relatives or non-relatives; over 17.7% of city residents live alone in one-person households. • 25% of city residents are currently attending an educational institution, including more than one (1) in 7 of those aged 15 and over undertaking a postsecondary course. • 55% of residents have a bachelor degree or higher and 24 % of the city resident workforce work is in a professional occupation.
Cultural Diversity	• 14% of city residents were born overseas. Residents born in Africa now comprise 2.5 % and Asia another 2.5 % of the population of the city, respectively. Currently, nearly 17 % of the city workforce was born overseas. • 18 % of the resident population speaks a language other than English. Apart from English, the most common languages spoken at home are Spanish, French, Chinese, Korean and Tagalog.
Residents, Workers and Transportation	• 66 % of residents who work do so at a location within the city. • 63 % of households in the city own a car, compared to 94% for the WMA. • The number of walk-to-work workers increased by 2.5 % and those bicycling has gone up by 2.3 % in the last 5 years.
Housing	• 42% of the city households own their dwellings (the 2010 Census).

[8] Most of the data and information were provided by DC Office of Planning (DCOP) on 06/12/15 (Courtesy: Dr. Joy Phillips).
[9] http://quickfacts.census.gov/qfd/states/11000.html

Appendix D: An Expanded "Low Hanging Fruit" Version of the Strategic Direction

1. Involving stakeholders in the planning process.
During the design and development of problem-solving projects, WQD, SWMD and WPD personnel will engage key stakeholders as follows: holding focus groups and meetings, convening steering committees, and conducting surveys, etc. In meetings, conversations and surveys, DOEE wants to focus on getting the stakeholders talking about what they see as local resources as well as local problems and suggested responses. The goal is to inform program design and build a base of long-term support – based on trust; shared responsibility for decisions or actions; come up with solutions; cost-saving; improved working relationships; and enhanced communication and coordination.

"Stakeholders need to be involved at each stage of the watershed planning process. Their knowledge of local social, economic, political, and ecological conditions provides the yardstick against which proposed solutions must be measured. Also, the goals, problems, and remediation strategies generated by stakeholders define what's desirable and achievable. Weaving stakeholder input, legal requirements, and resource protection strategies into an integrated tapestry for managing surface water and groundwater resources is what the watershed approach is all about."

http://www.epa.gov/owow/watershed/outreach/documents/stakeholderguide.pdf

Objective key measure(s):

   a. DOEE developing its own version of "Outreach" Guidance and documents, or simply incorporate by reference all relevant EPA documents.
   b. Number of outreach initiatives

2. Assembling stakeholder's advisory panel.
Adding stakeholders' voices is often useful. A "Stakeholder Advisory Board" can be an effective vehicle for adding stakeholders' voices. A "Stakeholder Advisory" board may comprise key members who meet regularly to discuss a variety of local problems and how they are being resolved. Representatives can include Riverkeepers, other environmentalists or their representatives and volunteers, thereby ensuring accountability to District citizens and residents. This added voice brings both diversity and outside perspective into the inside and helps keep DOEE grounded and focused on the stakeholders DOEE is serving.

Objective key measure(s):

   a. DOEE assembling a "Stakeholder Advisory Board/Panel."
   b. Number of stakeholder advisory board's meetings held.
   c. Number of advisory board recommendations that are incorporated in decision making.

3. Holding stakeholder/community forums or open houses.
Some problem-solving initiatives require holding open houses to help educate the public and to brainstorm solutions to problems. These meetings are typically held in the early evening and may have open agendas or be focused on an urgent problem (e.g., the on-going dialogue with stakeholders regarding the MS4 Implementation Plan). Stakeholders may also use these gatherings to discuss other topical public issues amongst themselves. DOEE officials may also use these opportunities to answer questions or complaints, highlight successes, address issues and begin discussions on new or emerging initiatives.

Objective key measure(s):

a. Number of "open houses" held.
b. Number of invitations received by DOEE staff to attend "open houses."
c. Number of invitations sent by DOEE staff to stakeholders to attend "open houses."

4. Gathering a task force to target a specific ongoing issue.
A task force/ Tiger Team or standing committee can successfully be used to target a specific problem. For example, DOEE can create a task force to address problems associated with illegal dumping sites. At monthly meetings, members may focus on new sites, track clean-ups, and come up with a strategic plan to prevent further dumping.

Objective key measure(s):

a. Number of task force groups/ Tiger Teams constituted.
b. Number of issues raised and resolved, or not resolved.
c. Number of invitations sent by DOEE staff to stakeholders to attend "open houses."

5. Creating opportunities for volunteers.
Volunteers can strengthen bonds between DOEE and the communities it serves. Volunteers can perform tasks, conduct surveys and act as mentors or tutors to younger and budding volunteers. Some problem-solving initiatives use volunteers to identify areas in their community in need of attention (e.g., site cleanup, illegal dumping). Here in the District, volunteers have participated in removing trash from rivers in response to trash menace and the trash TMDL. They have helped remove litter and clean up schools, streets, and parks. They have also participated in DOEE's own "all-hands-on-deck" community clean-ups. These kinds of volunteer participation are great ways of making volunteers, particularly the young, learn to take responsibility in creating a healthier environmental setting not just for them, but also for the entire District community. Volunteerism also inculcates into the participants concrete skills that people like and easily support. Learned skillsets can easily be built into practical and specific problem-solving skills, which could then be extended and integrated into deepening DOEE's community outreach.

Sample "Involving Youth in your Agency Sustainability Activities" Guidance:

http://www.ca-ilg.org/document/involving-youth-your-agencys-sustainability-activities

Objective Key Measure(s):

a. Development of a clear DOEE volunteer support strategy.
b. Number of volunteer groups supported.
c. Number of volunteer activities organized by DOEE in support of, or jointly in collaboration with, volunteers.

6. Giving presentations at public meetings and agencies.
Public meetings hosted by DOEE's technical "Administrations," such as the NRA, and Environmental Services Administration (ESA), are a great place for practitioners to talk about their programs. To get stakeholder/community buy-in, the lead technical personnel give presentations about the project's goals and objectives and then invite stakeholder/community representatives to offer their views.

Objective Key Measure(s):

a. Number of presentations held.
b. Number of public meetings held.
c. Number of project's information made available online.

7. Perform stakeholders/community surveys.
A survey gathers information from hundreds and potentially thousands of stakeholders, giving planners and practitioners a detailed picture of a community's priorities, expectations, and awareness. Survey design should be simple and as readily accessible as possible. The surveys, where appropriate, should be conducted using low-cost online survey tools (e.g., http://www.surveymonkey.com) and used to evaluate impact(s) of, say, a potential decision, on DOEE's communities/stakeholders. Assessment of impact(s) on a community is a critical input in decision-making.

Sample "Making Decision Process Visible" Guidance:

http://www.ca-ilg.org/making-decision-process-visible

http://www.ca-ilg.org/sites/main/files/file-attachments/part_2_making_the_decision_process_visible_1.pdf

Objective Key Measure(s):

a. Number of surveys conducted.
b. Number of different topics on which surveys are conducted.
c. Support for analysis of survey responses received.
d. Number of survey results incorporated in decision-making and made visible.

8. Getting the word out.
DOEE can use a number of methods to share information (e.g., success stories) with stakeholders and obtain feedback. These methods include using local media, websites, newsletters, listservs, emails, public libraries, campaigns/events, new media (Facebook, Twitter, etc.). By regular sharing information with and receiving feedback from stakeholders on problem-solving strategies, alternative solutions, implementation outcomes, and other results, DOEE can demonstrate to stakeholders that it is their real partner on issues that matter to them. For example, DOEE project staff can create an online journal (or "blog"), say, "Successes and Issues in District Watersheds" (http://whatishappeninginyourdcwatershed.blogspot.com/), that details the project's successes and failures and invites stakeholders and the general public to engage in discussions.

Sample "Getting Word out" Guidance and documents:

http://www.ca-ilg.org/getting-word-out

http://www.ca-ilg.org/sites/main/files/file-attachments/part_3_getting_the_word_out_1.pdf

Samples "Providing & Storing Detailed Information" Guidance:

http://www.ca-ilg.org/providing-storing-detailed-information

http://www.ca-ilg.org/sites/main/files/part_1_no_page_numbers.pdf

Sample "Emerging Technologies" Guidance:

http://www.ca-ilg.org/sites/main/files/file-attachments/part_5_no_page_numbers.pdf

http://www.ca-ilg.org/overview/emerging-technologies

Objective Key Measure(s):

a. Number of campaigns held.
b. Creation of a website for sharing success stories.
c. Traffic/number of visitors to the website.
d. Number of issues of newsletters shared with the stakeholders/public.
e. Setting up of listserv.
f. Number of articles/advertisements in local media.
g. Number of issues/subject matter of the advertisements.
h. Development of DOEE's own guidance documents similar to the above examples.

9. Letting someone else open the door for DOEE.
To gain credibility with District wards, neighborhoods and community groups, NRA divisions will work to form relationships with respected community members and let them introduce NRA staff to their wards and neighborhoods. For example, DC Council members or neighborhood leaders should be appropriately approached and encouraged to help introduce DOEE events at their respective Wards and neighborhood events.

Objective Key Measure(s):

a. Number of "open houses" held.
b. Number of invitations received by DOEE staff to attend "open houses."
c. Number of invitations sent by DOEE staff to stakeholders to attend "open houses."

10. Inviting Stakeholders to contact DOEE.
Make staff accessible to the stakeholders and the community at large. Include contact information and/or feedback forms on websites and in brochures.

Sample "Inviting Public Input" Guidance and documents:

http://www.ca-ilg.org/overview/inviting-public-input

http://www.ca-ilg.org/sites/main/files/file-attachments/part_4_inviting_public_input_1.pdf

Objective Key Measure(s):

a. DOEE's own version of "Inviting Public/Stakeholder Input" guidance and documents.

11. Develop DOEE policy on Stakeholder Engagement and related issues.
DOEE believes that having a stakeholder engagement policy will signal agency commitment and help strengthen and improve DOEE's overall communication and involvement with its stakeholders.

Objective Key Measure(s):

a. DOEE's own version of "Inviting Public/Stakeholder Input" Guidance and documents.

12. Strengthening data collection, data quality, utilization and sharing.
Data is or will be the new currency of communicating with DOEE's stakeholders. Many of the District's stakeholders are digitally empowered. DOEE should enhance this digital empowerment by collecting and sharing high quality data with its stakeholders. Quality enhancement should occur both in the geographic and monitoring data spaces.

Objective Key Measure(s):

a. Support and develop finer-scale mapping that meet federal geospatial data standards and to improve water resources planning.
b. Support and allocate funds to acquire modern laboratory equipment with capabilities to meet both the requirements of 40 CFR Part 136 and the "Most Sensitive Methods."
c. Support the establishment of Water Quality Exchange (WQX) and Integrated Compliance Information System–National Pollutant Discharge Elimination System (*ICIS-NPDES*) data flows to facilitate both Quality Assurance/ Quality Control (QA/QC) and public sharing of water quality monitoring data.

Appendix 5.3b. – Discrete/Manual Water-Level Measurements.

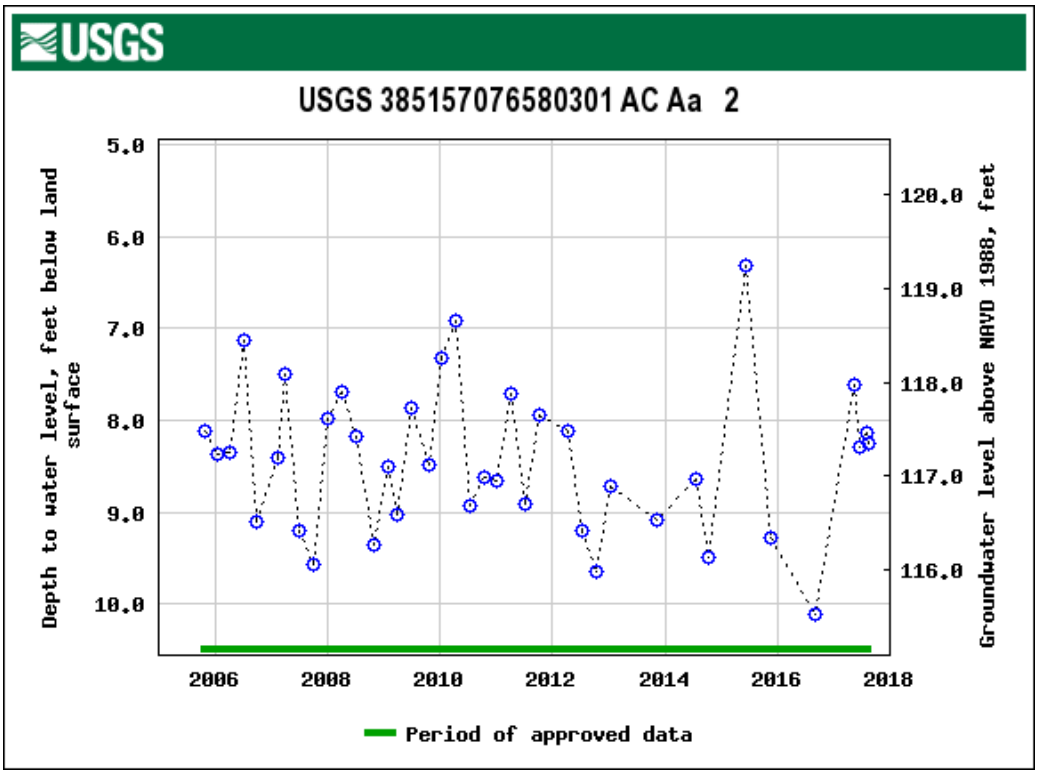


Figure 4-A. Graph of manual water-level measurements for well DCMW010-05 (AC Aa 2).

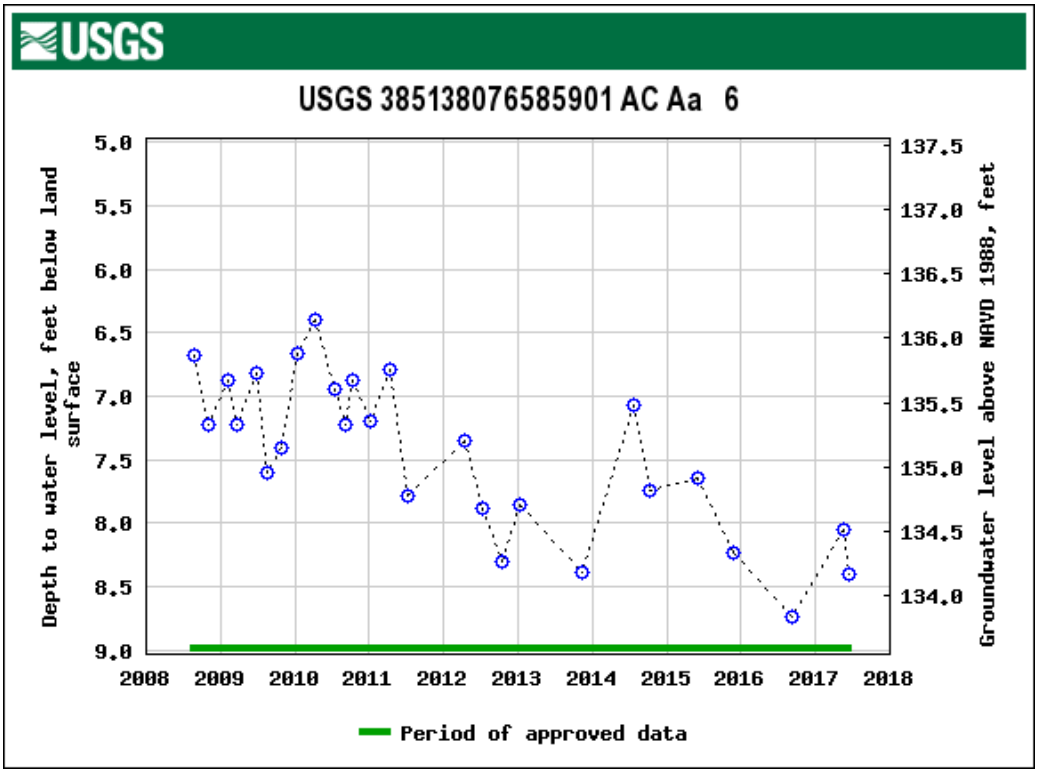


Figure 4-B. Graph of manual water-level measurements for well DCMW001-08 (AC Aa 6).

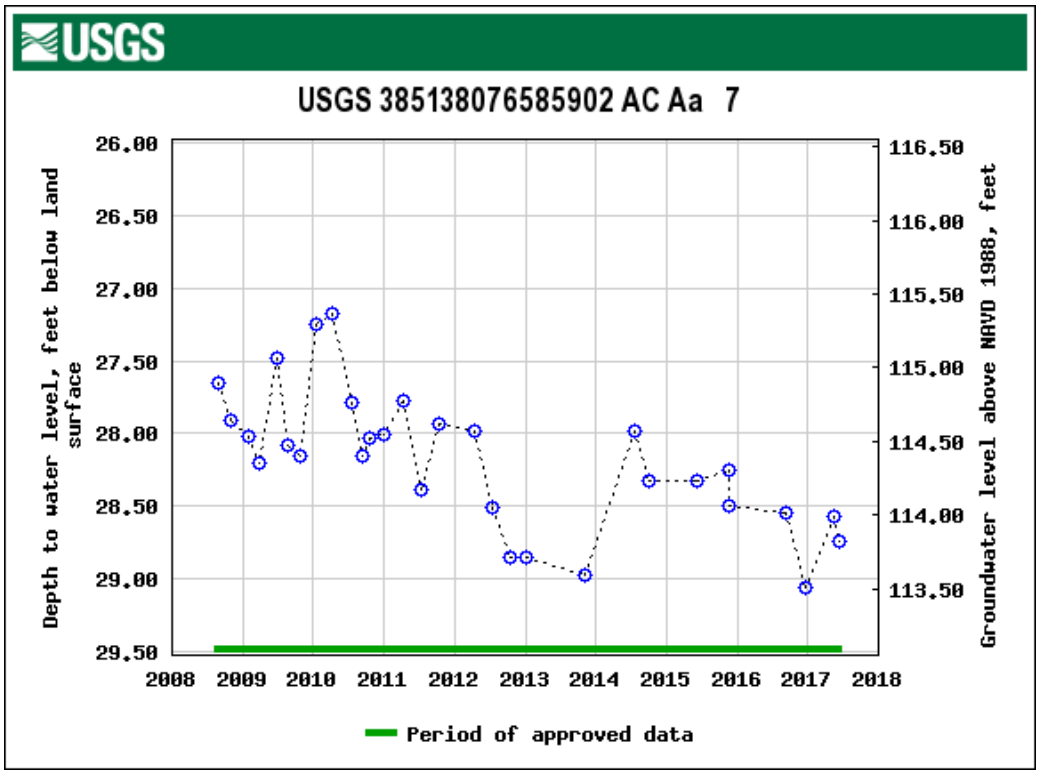


Figure 4-C. Graph of manual water-level measurements for well DCMW002-08 (AC Aa 7).

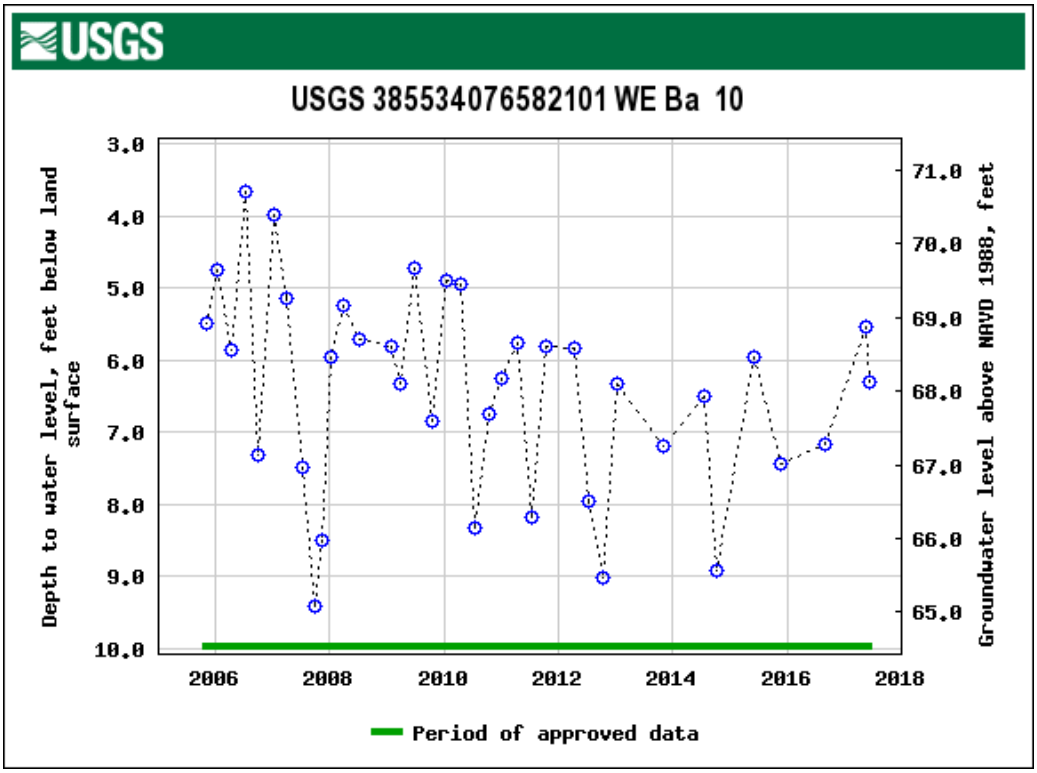


Figure 4-D. Graph of manual water-level measurements for well DCMW007-05 (WE Ba 10).

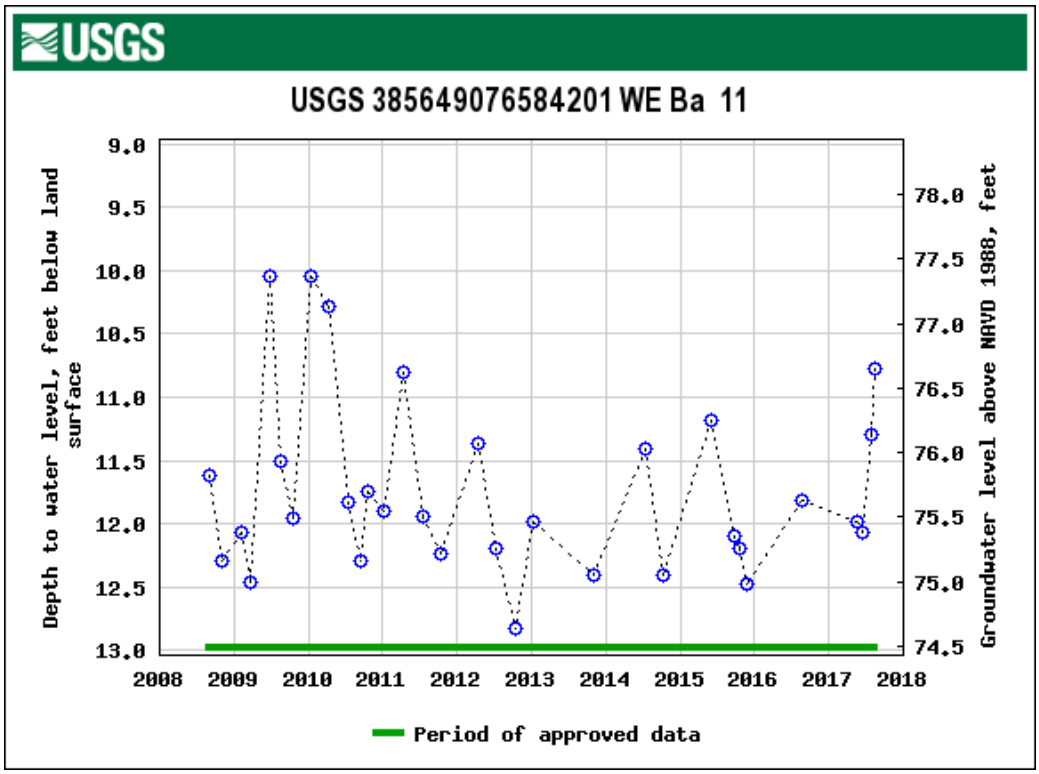


Figure 4-E. Graph of manual water-level measurements for well DCM003-8 (WE Ba 11).

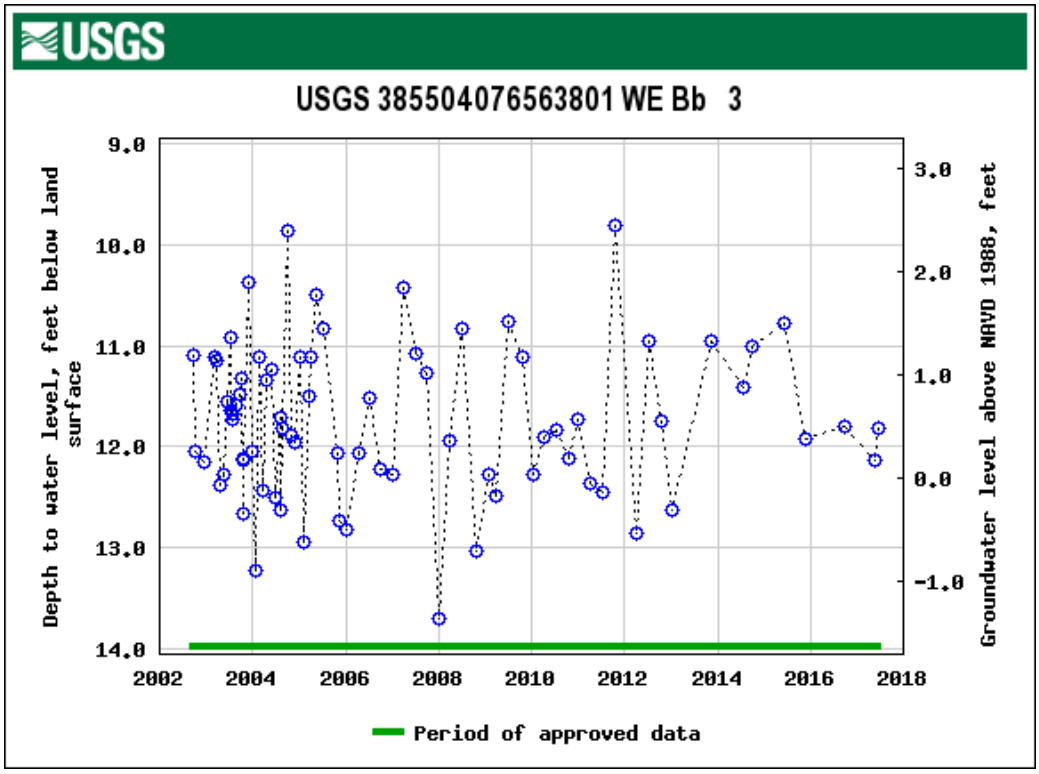


Figure 4-F. Graph of manual water-level measurements for well DCMW001-02 (WE Bb 3).

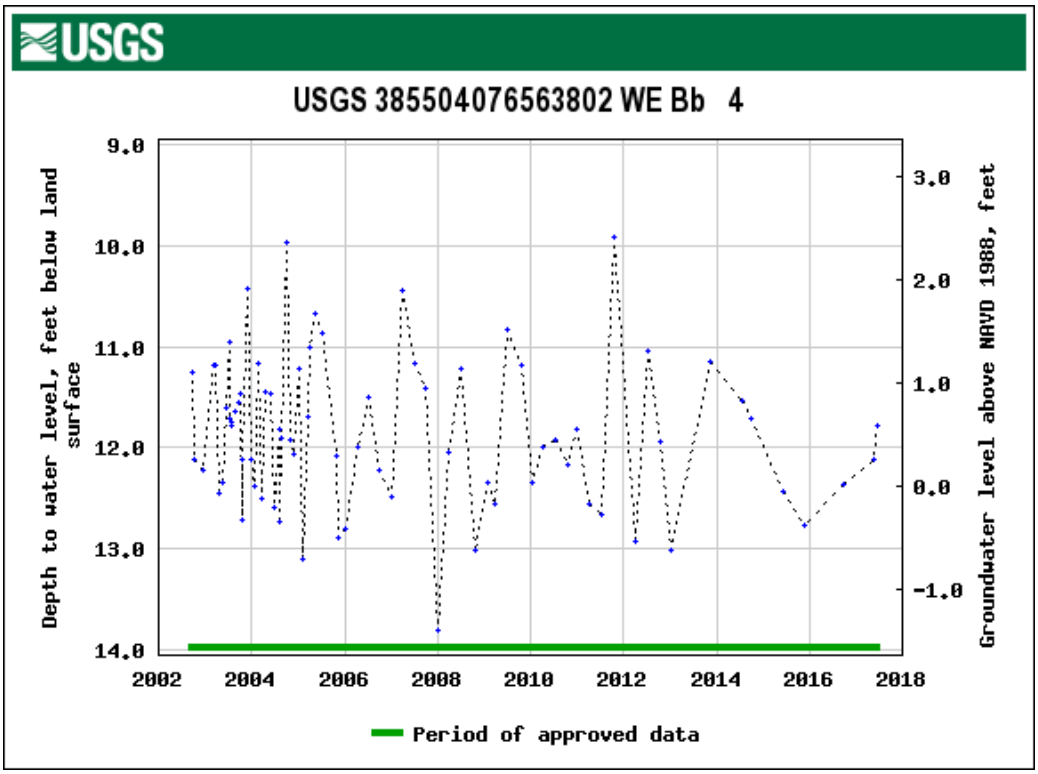


Figure 4-G. Graph of manual water-level measurements for well DCMW004-02 (WE Bb 4).

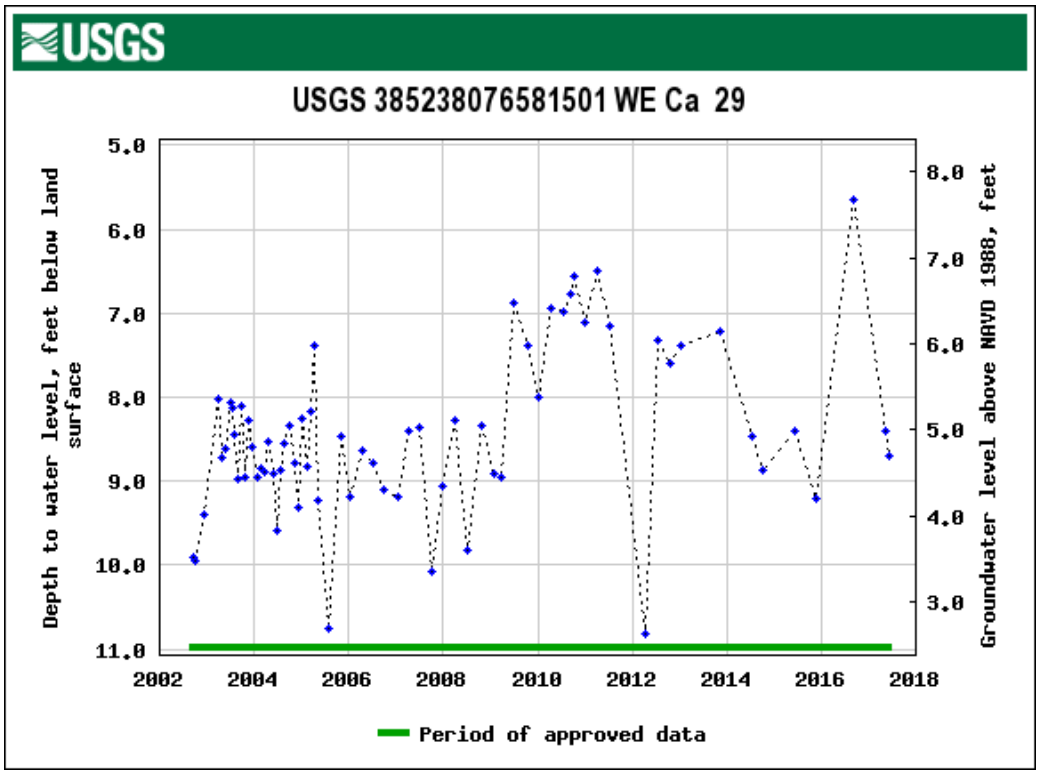


Figure 4-H. Graph of manual water-level measurements for well DCMW005-02 (WE Ca 29).

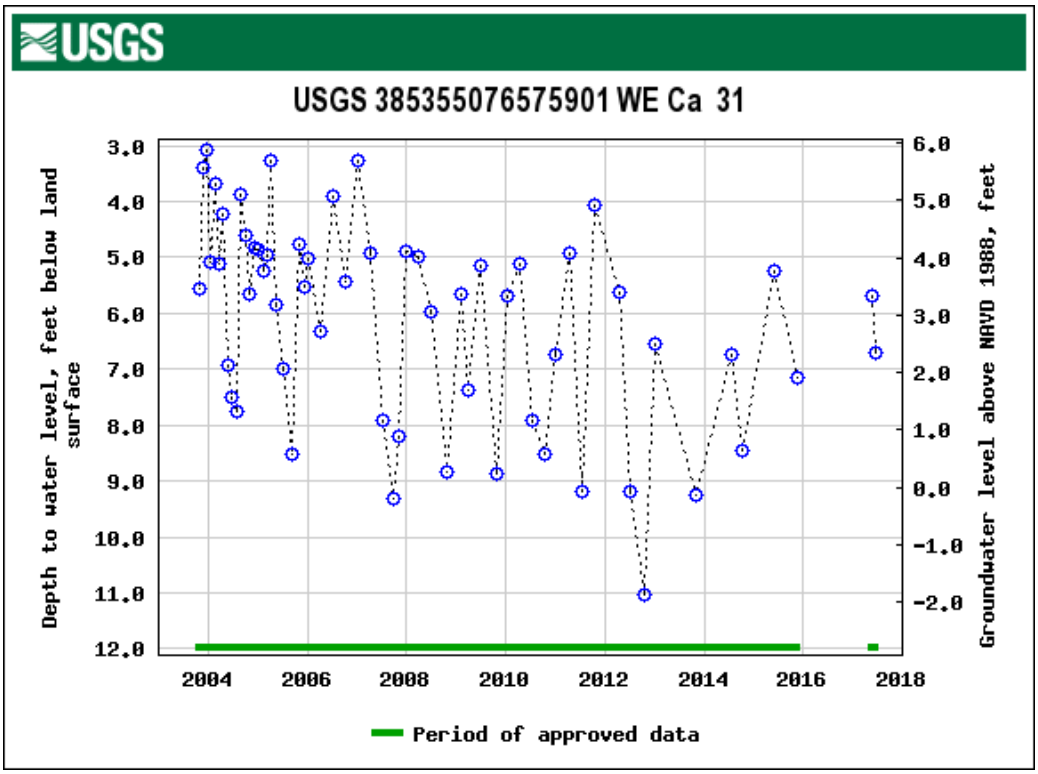


Figure 4-I. Graph of manual water-level measurements for well DCMW002-03 (WE Ca 31).

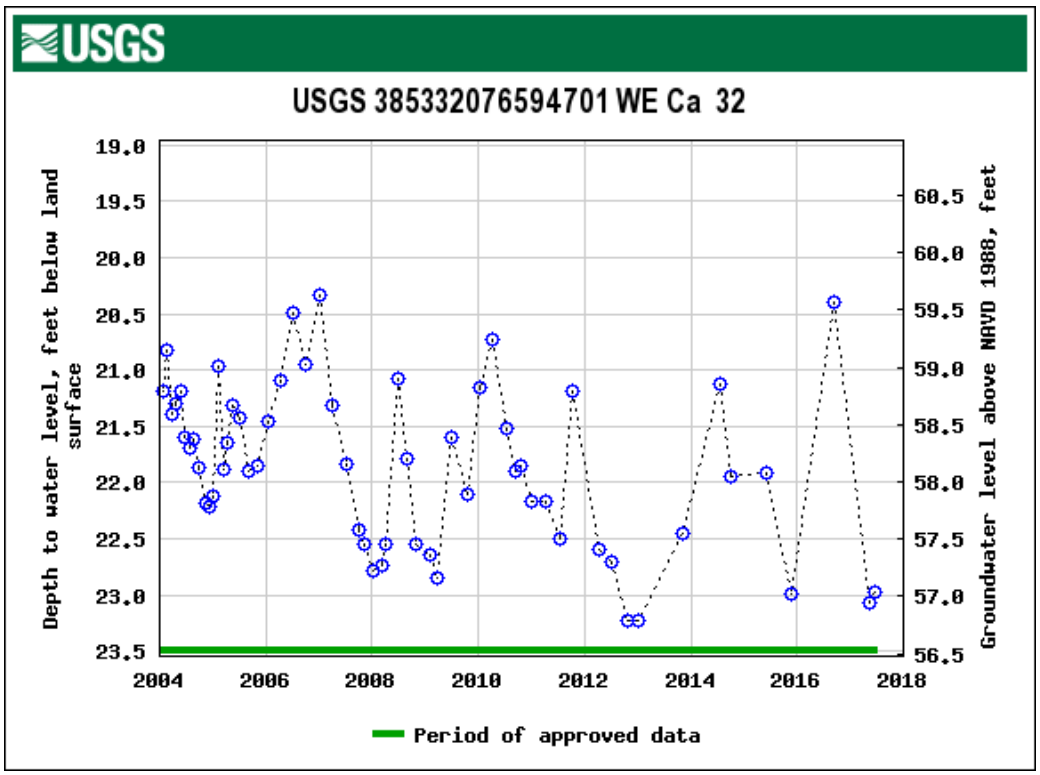


Figure 4-J. Graph of manual water-level measurements for well DCMW001-04 (WE Ca 32).

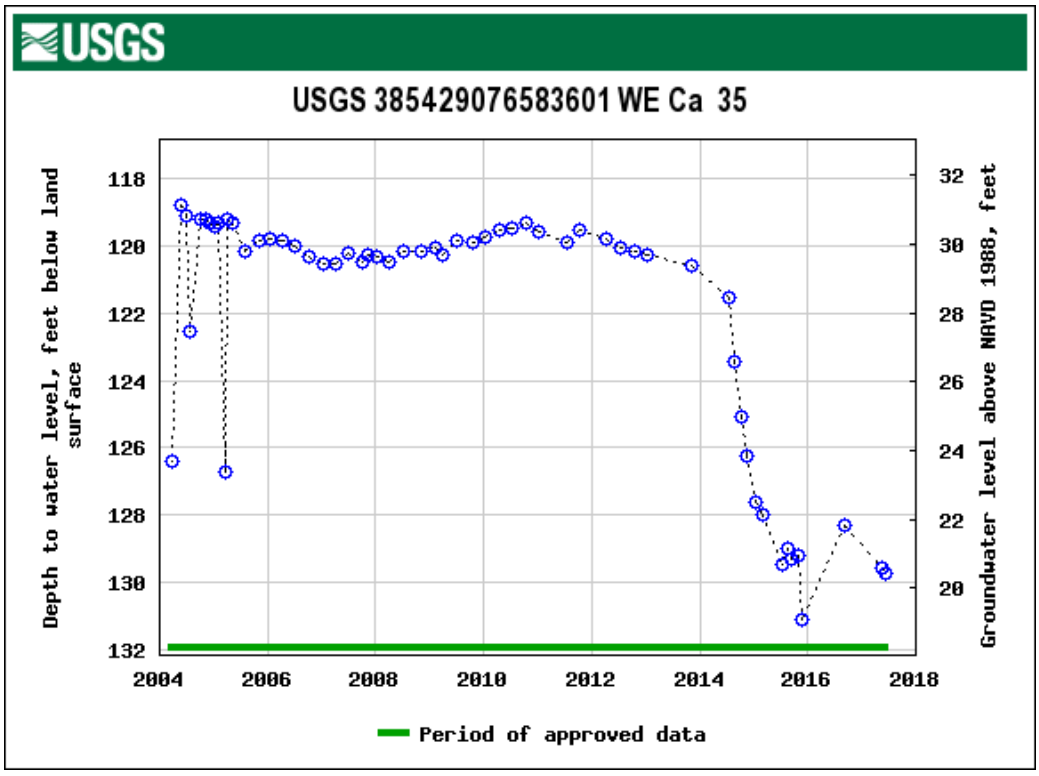


Figure 4-K. Graph of manual water-level measurements for well DCMW004-04 (WE Ca 35).

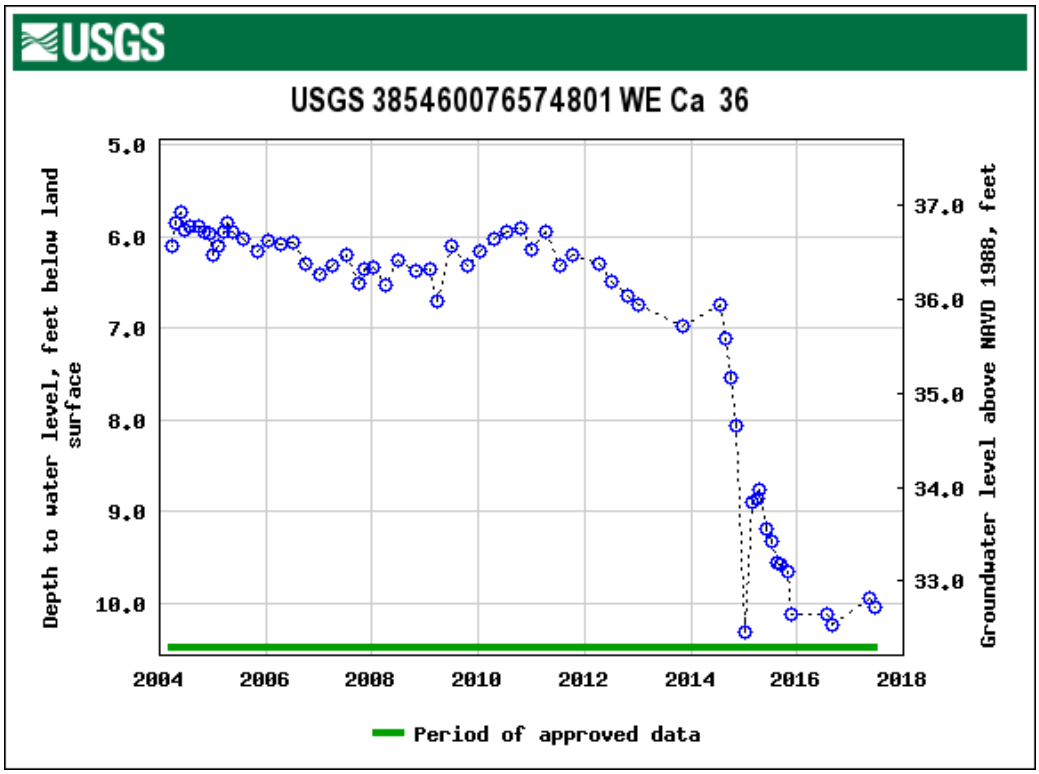


Figure 4-L. Graph of manual water-level measurements for well DCMW003-04 (WE Ca 36).

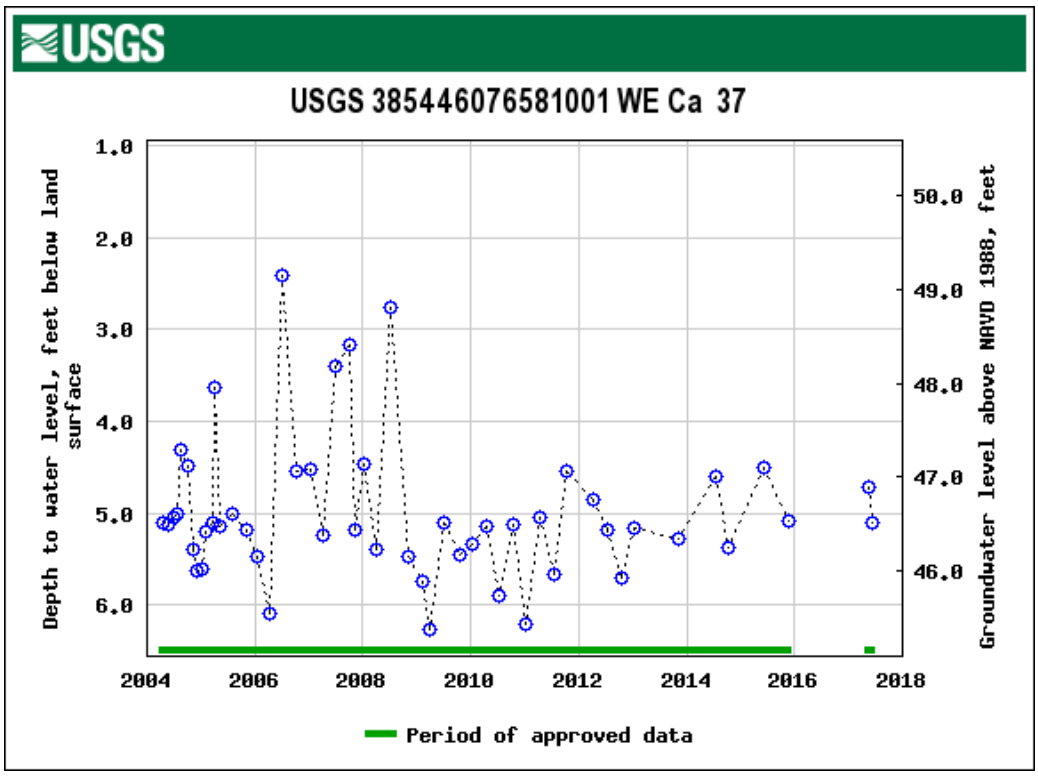


Figure 4-M. Graph of manual water-level measurements for well DCMW005-04 (WE Ca 37).

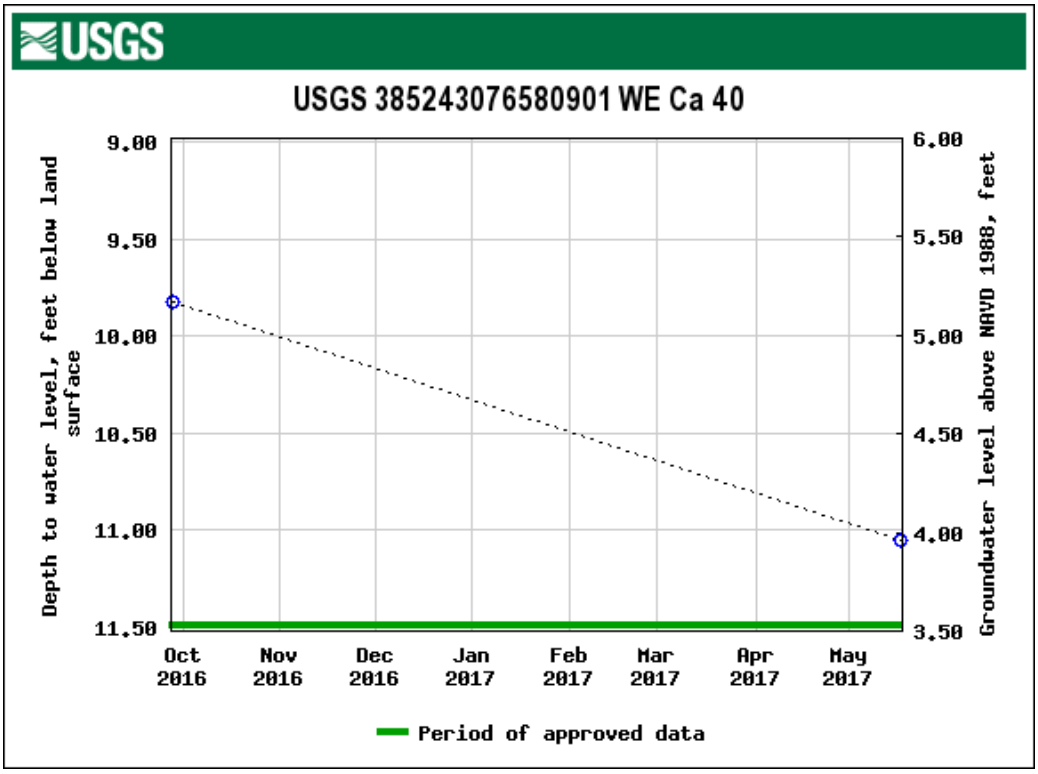


Figure 4-N. Graph of manual water-level measurements for well DCMW016-01 (WE Ca 40).

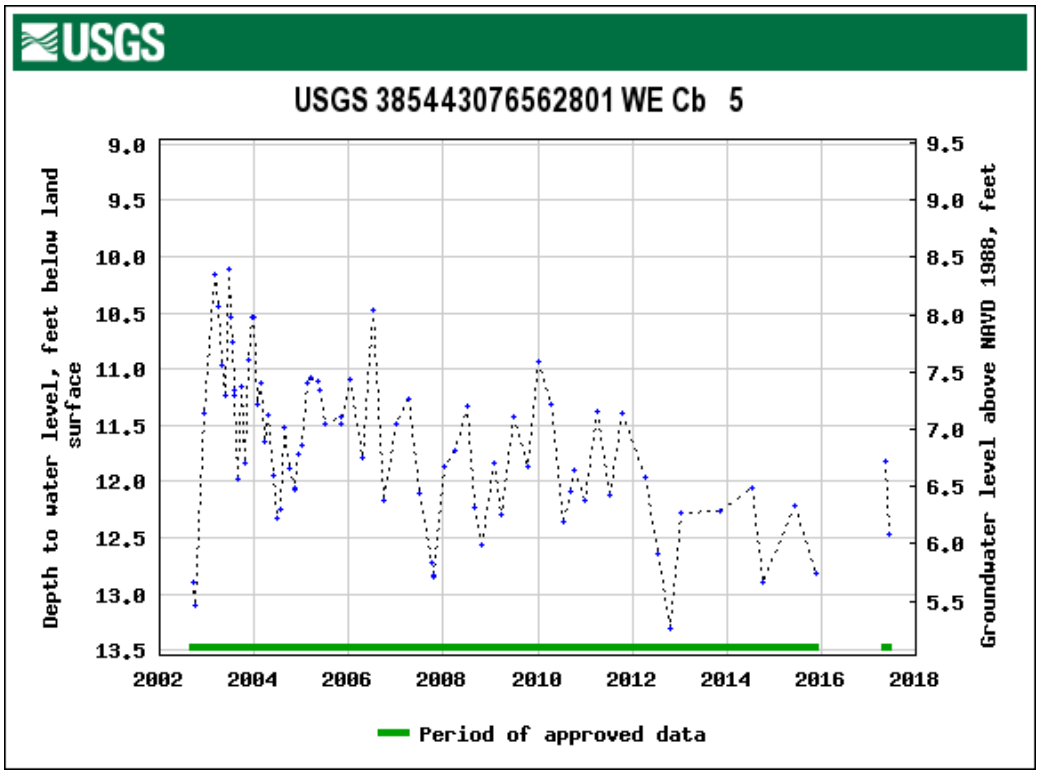


Figure 4-O. Graph of manual water-level measurements for well DCMW002-02 (WE Cb 5)

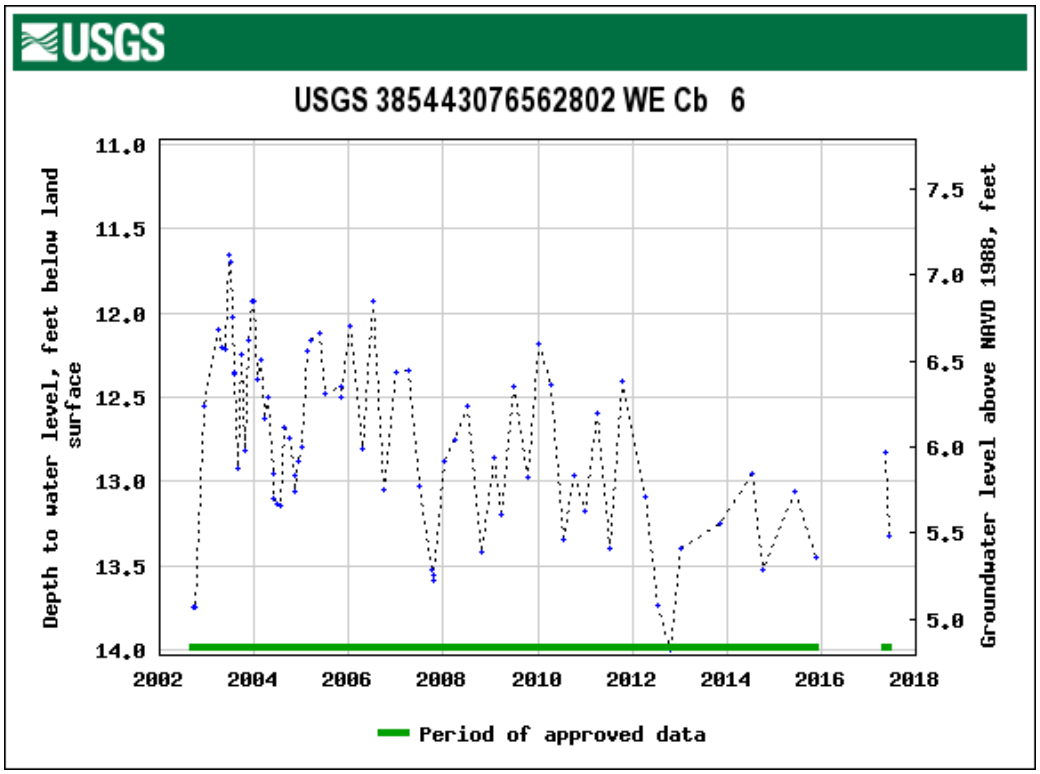


Figure 4-P. Graph of manual water-level measurements for well DCMW003-02 (WE Cb 6).

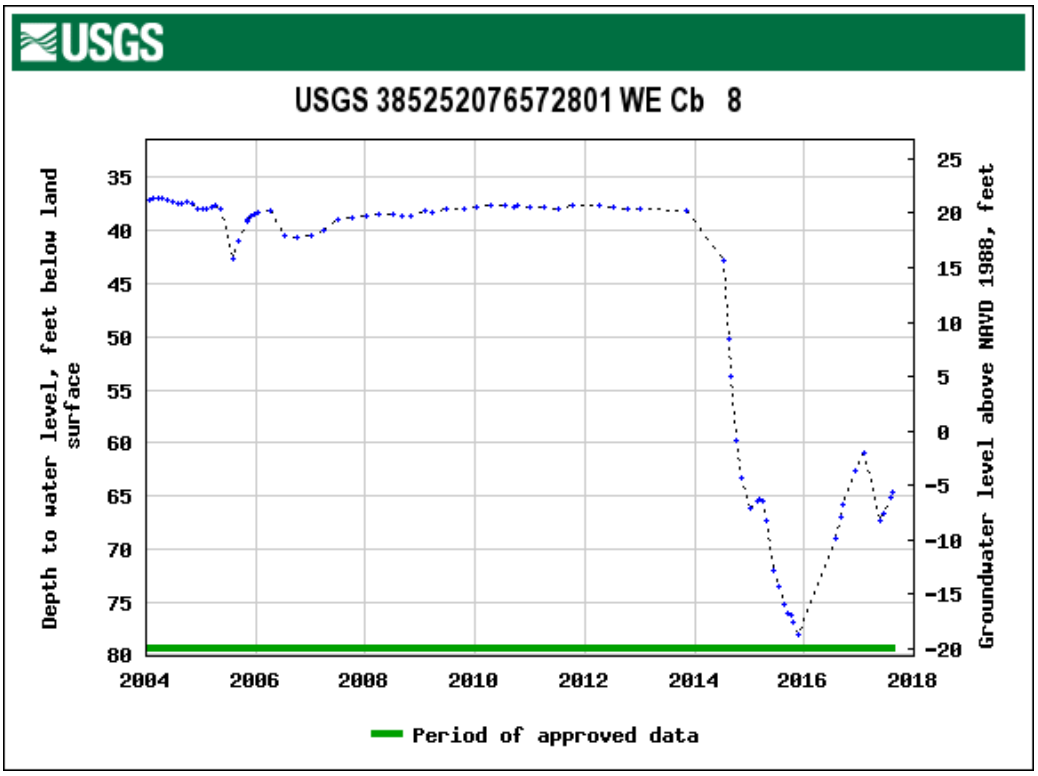


Figure 4-Q. Graph of manual water-level measurements for well DCMW002-04 (WE Cb 8).

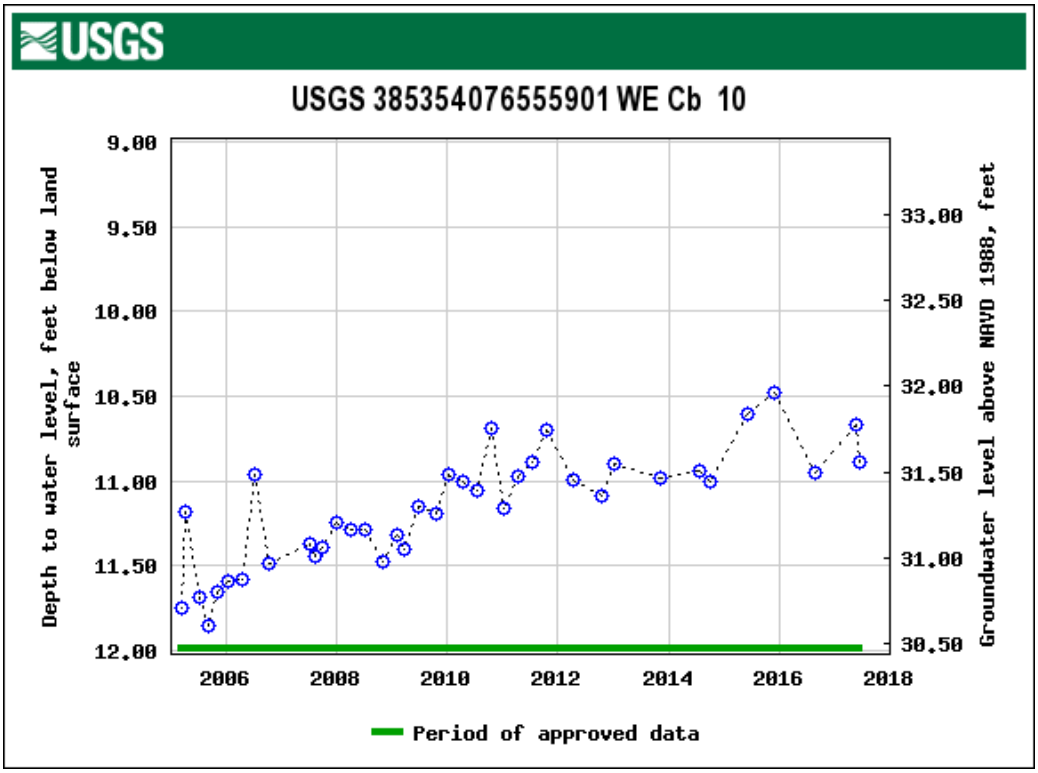


Figure 4-R. Graph of manual water-level measurements for well DCMW002-05 (WE Cb 10).

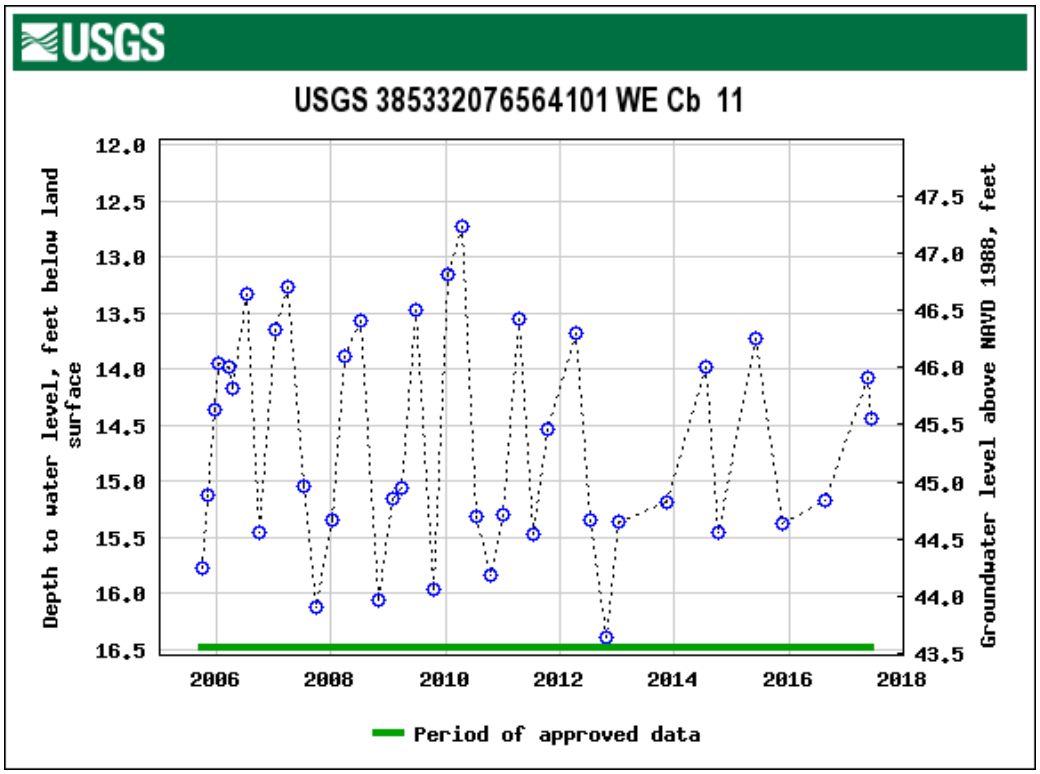


Figure 4-S. Graph of manual water-level measurements for well DCMW003-05 (WE Cb 11).

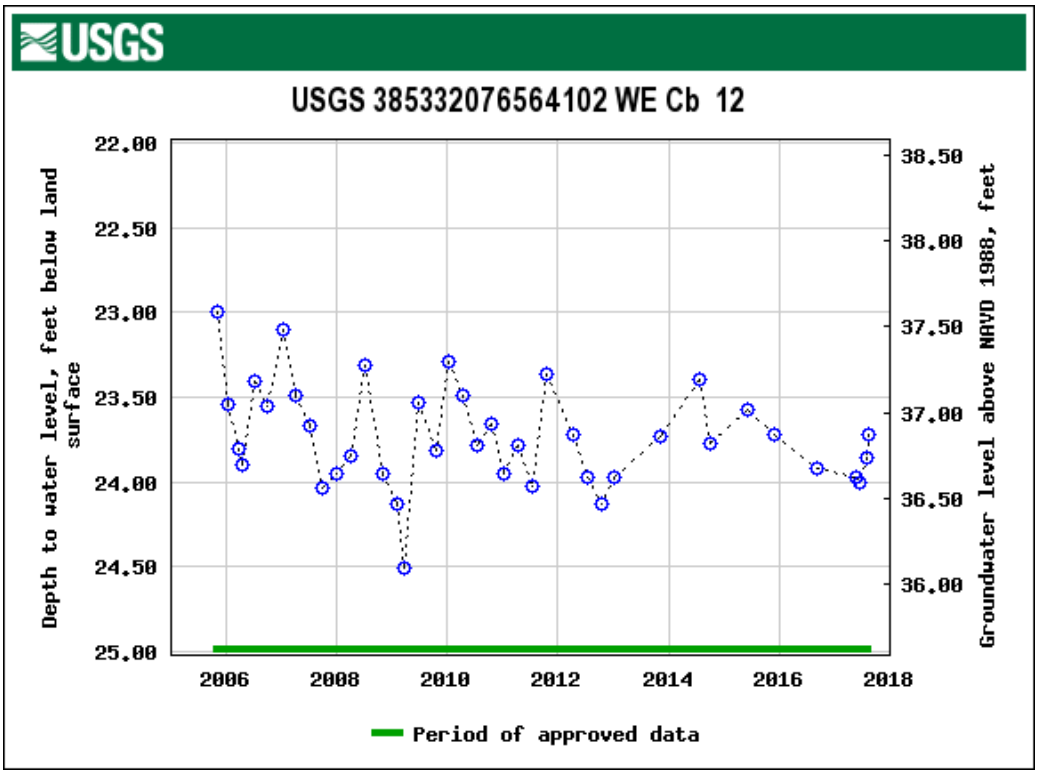


Figure 4-T. Graph of manual water-level measurements for well DCMW004-05 (WE Cb 12).

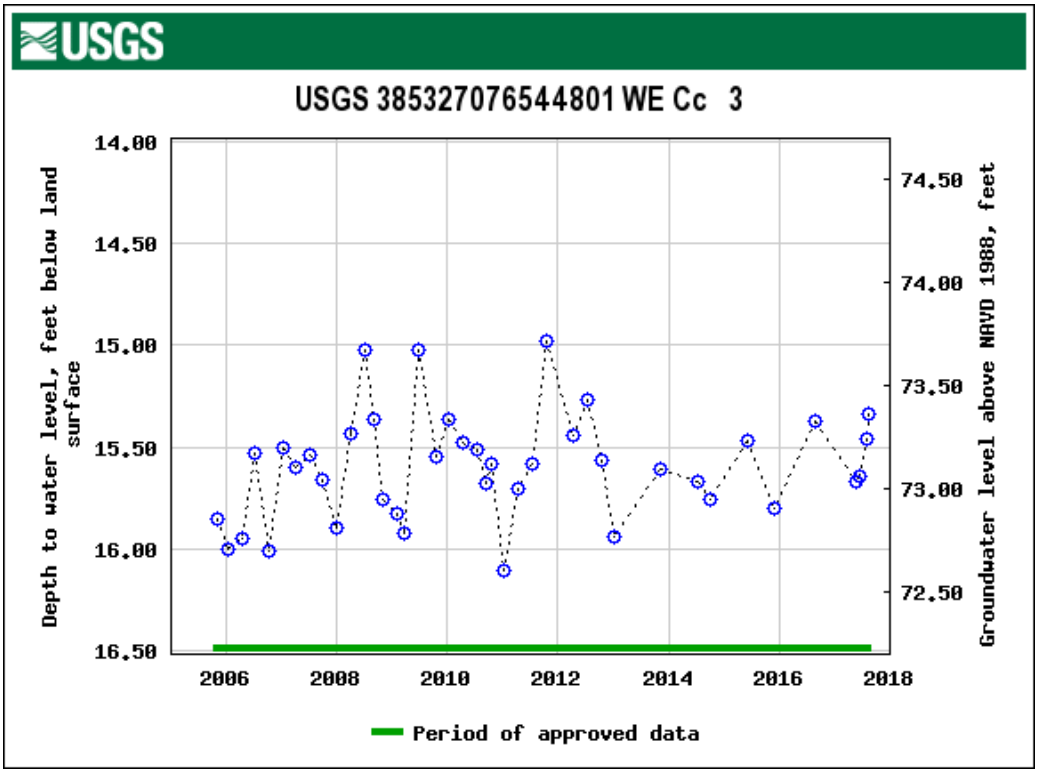


Figure 4-U. Graph of manual water-level measurements for well DCMW008-05 (WE Cc 3).

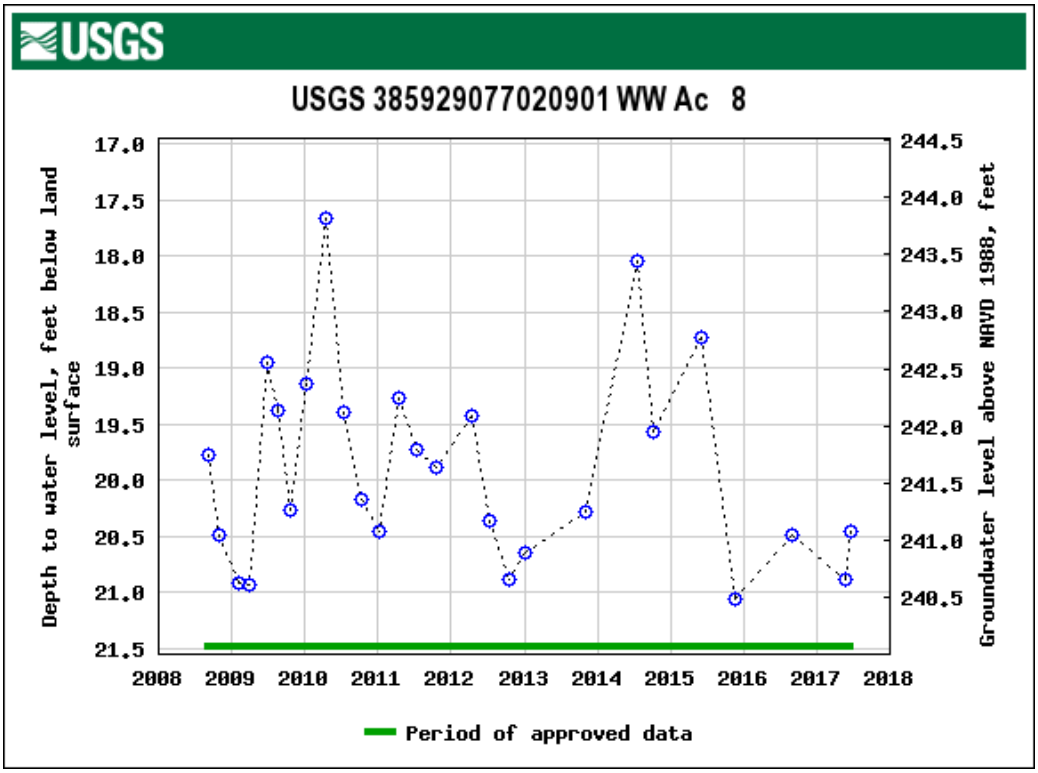


Figure 4-V. Graph of manual water-level measurements for well DCMW004-08 (WW Ac 8).

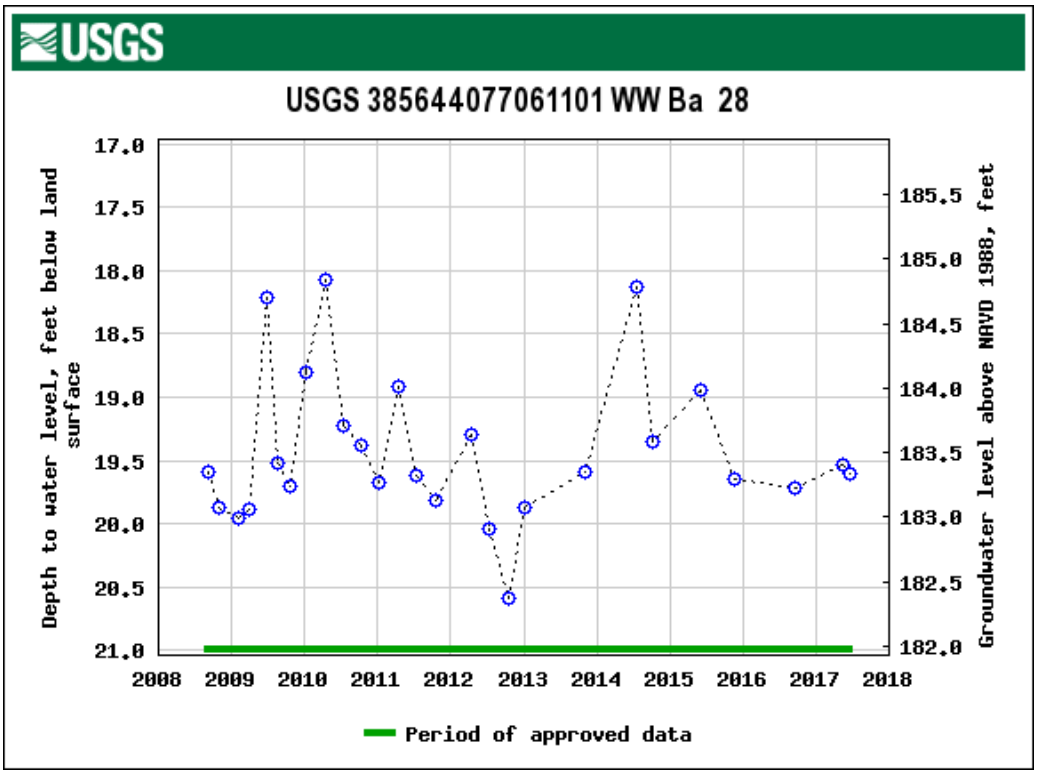


Figure 4-W. Graph of manual water-level measurements for well DCMW007-08 (WW Ba 28).

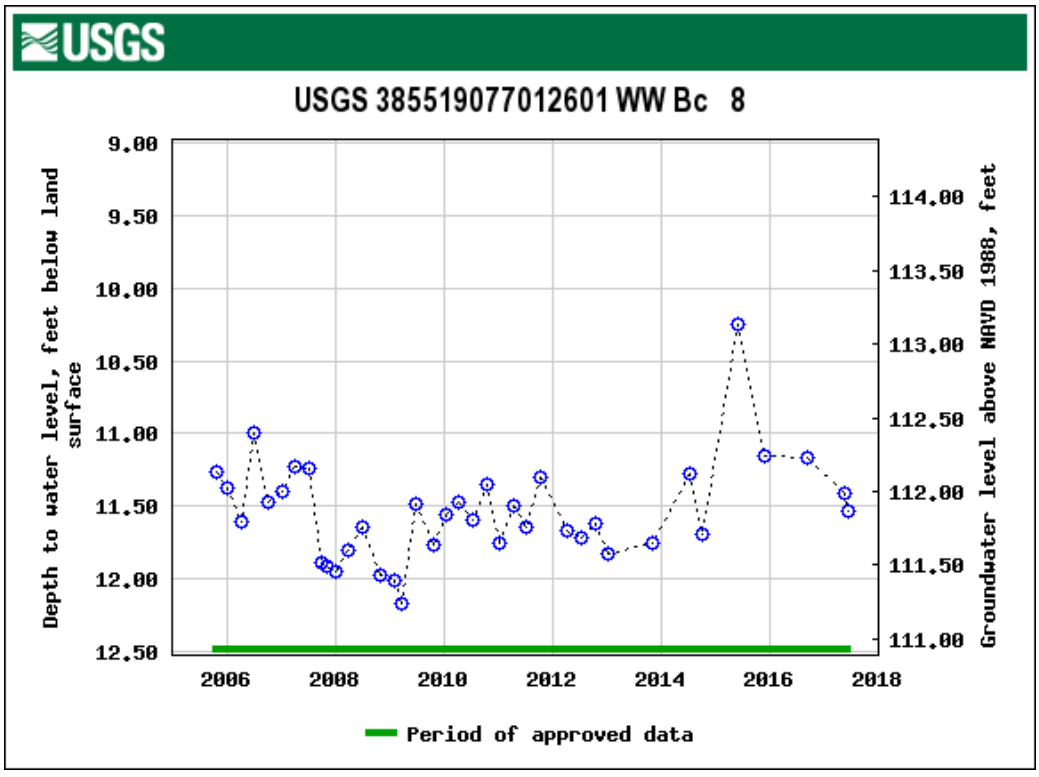


Figure 4-X. Graph of manual water-level measurements for well DCMW009-05 (WW Bc 8).

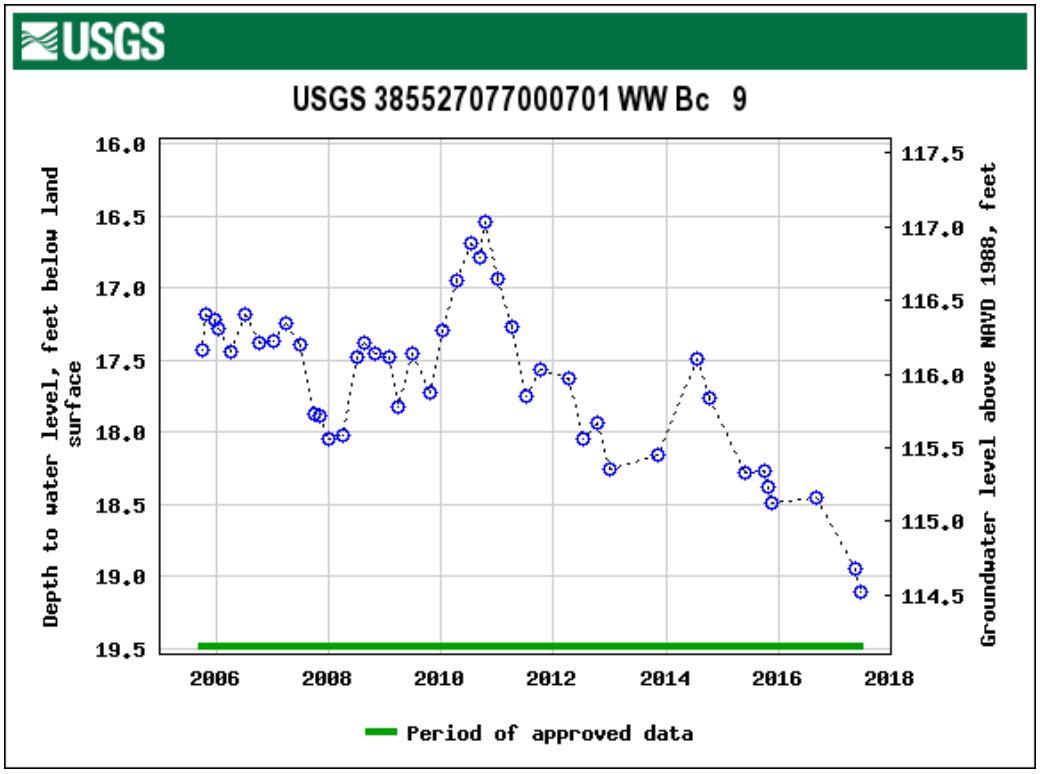


Figure 4-Y. Graph of manual water-level measurements for well DCMW0011-05 (WW Bc 9).

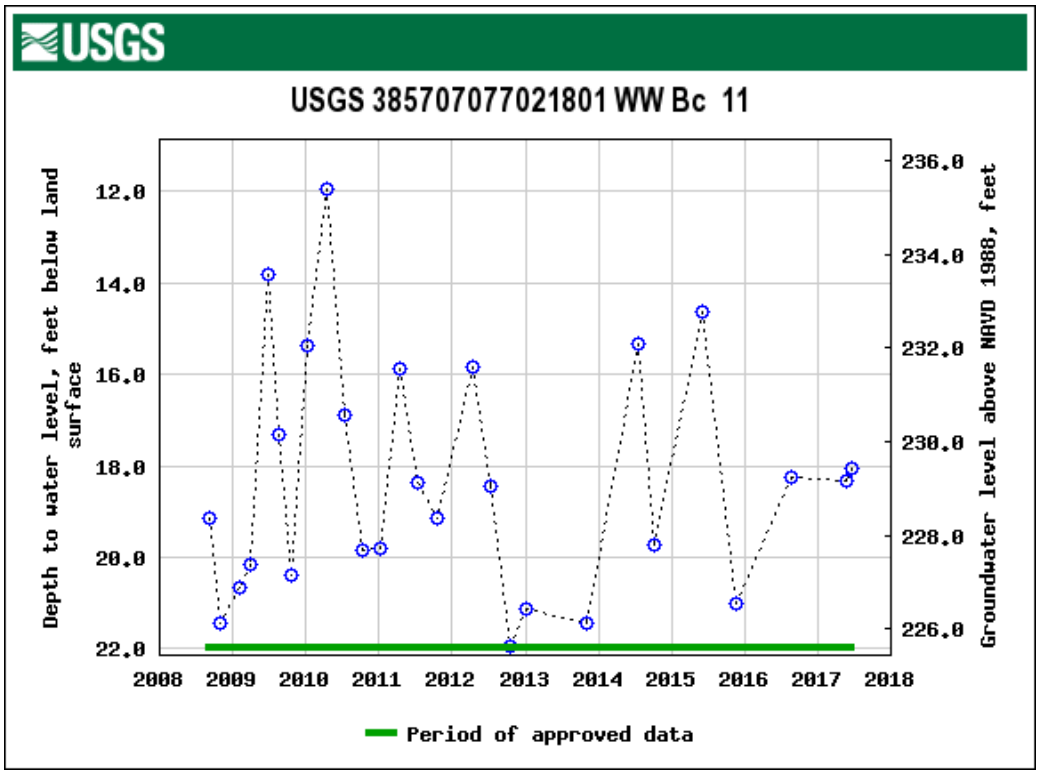


Figure 4-Z. Graph of manual water-level measurements for well DCMW006-08 (WW Bc 11).

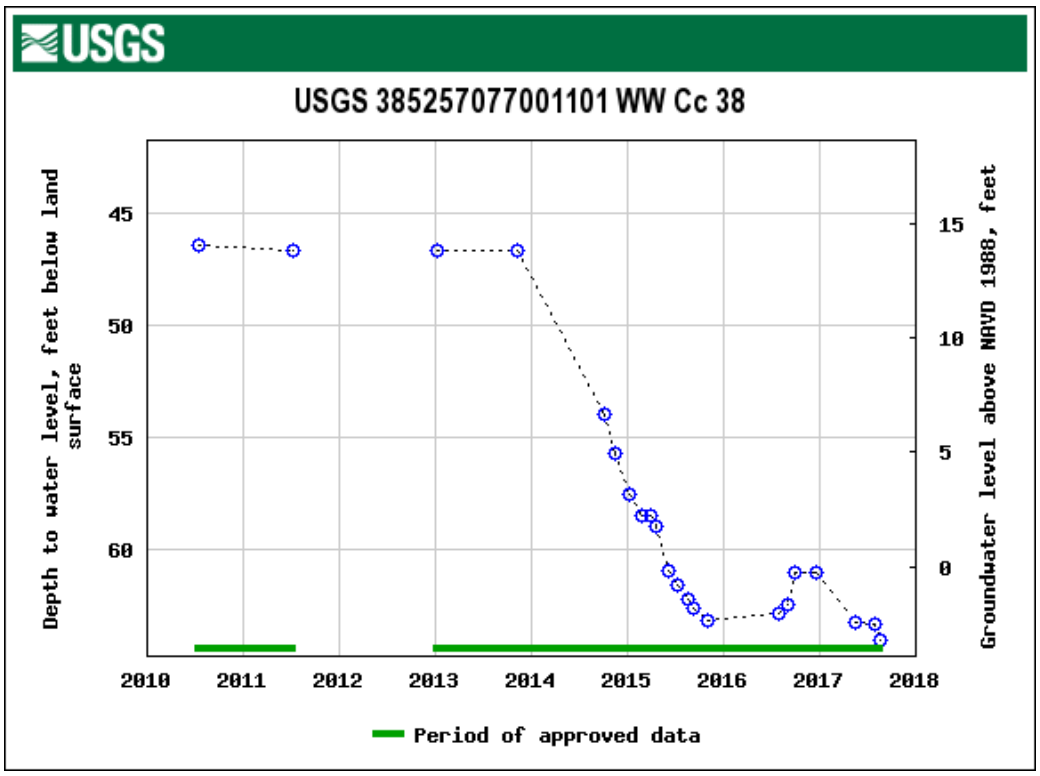


Figure 4-AA. Graph of manual water-level measurements for well DCMW001-13 (WW Cc 38).

Appendix 5.4. – Tide gage measurements. 2-month segments

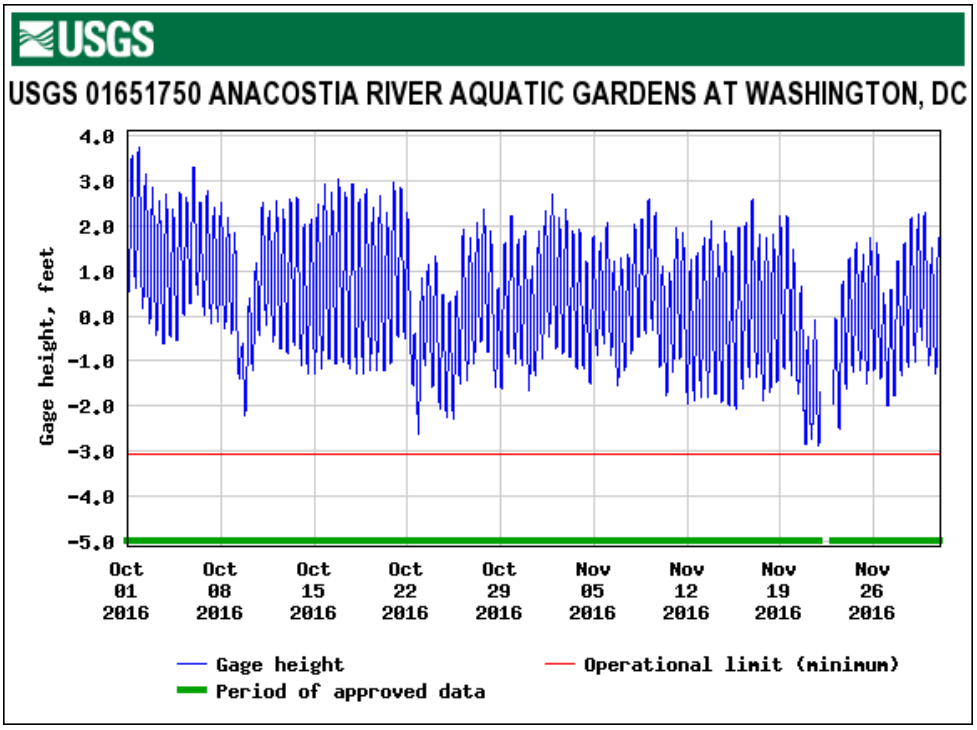


Figure 5-A. Tidal stage from October 1, 2016 through November 30, 2016, in feet (NAVD88).

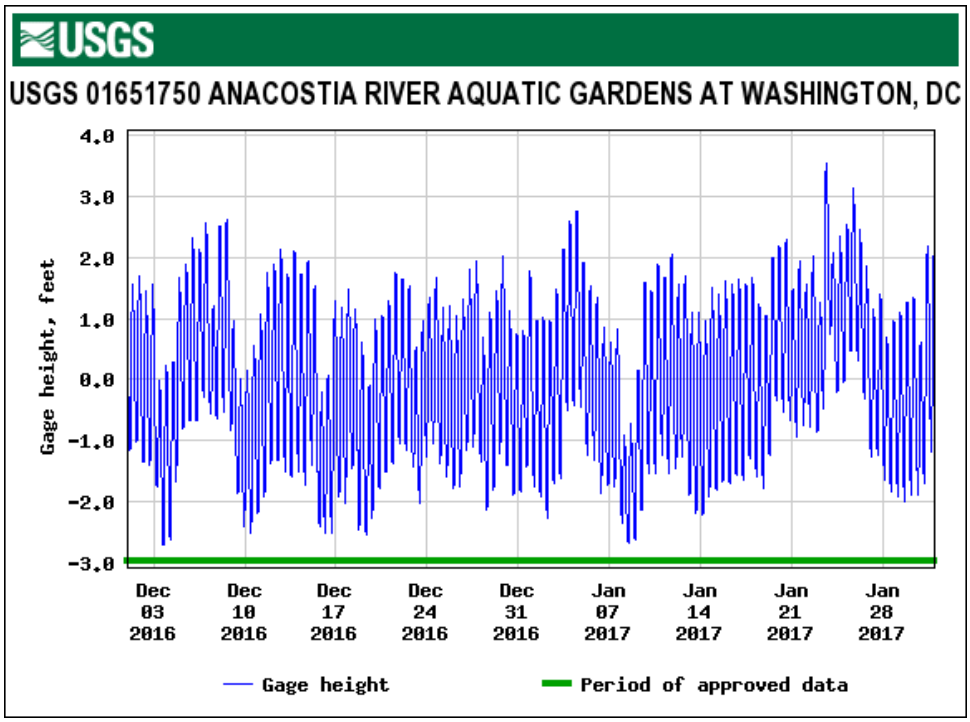


Figure 5-B. Tidal stage from December 1, 2016 through January 31, 2017, in feet (NAVD88).

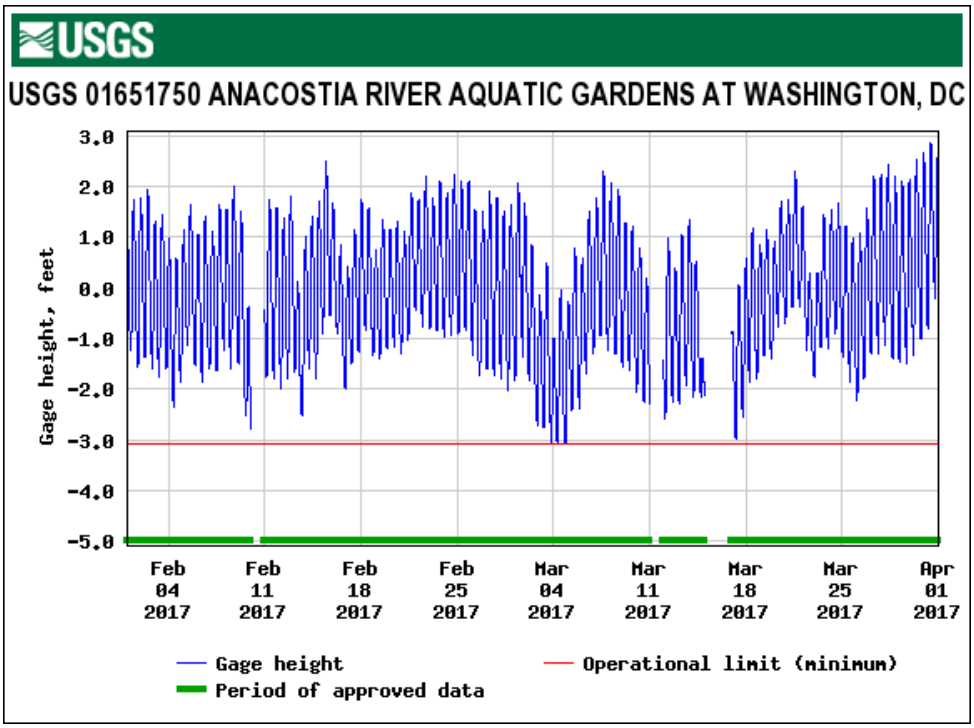


Figure 5-C. Tidal stage from February 1, 2017 through March 31, 2017, in feet (NAVD88).

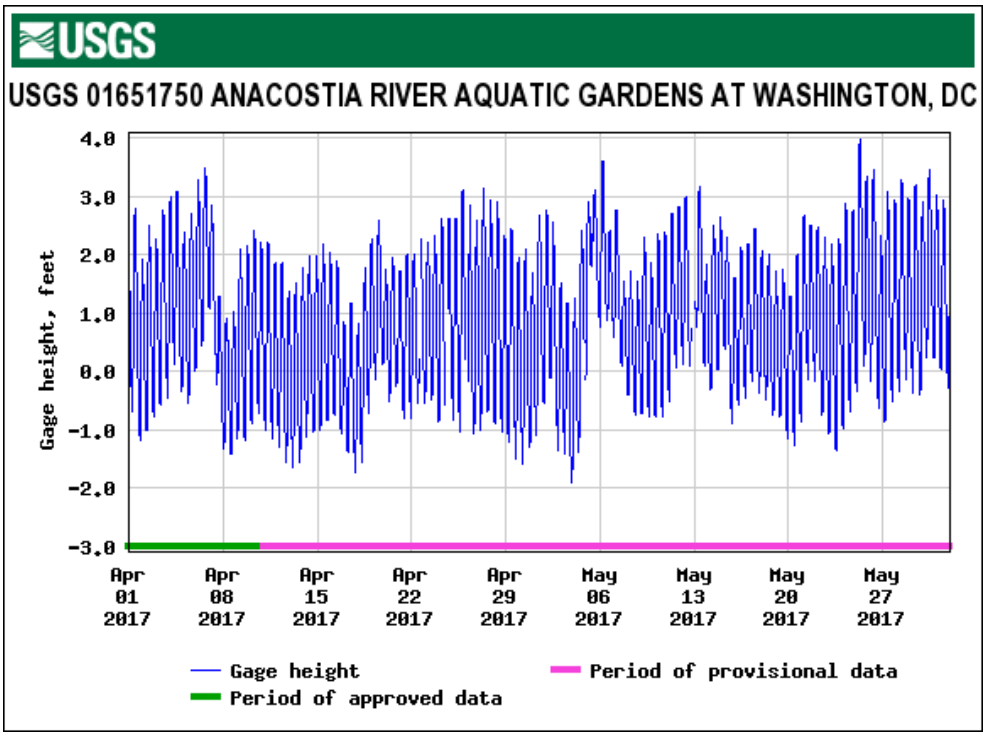


Figure 5-D. Tidal stage from April 1, 2017 through May 31, 2017 in feet (NAVD88). [Data above the magenta bar are provisional and subject to revision.]

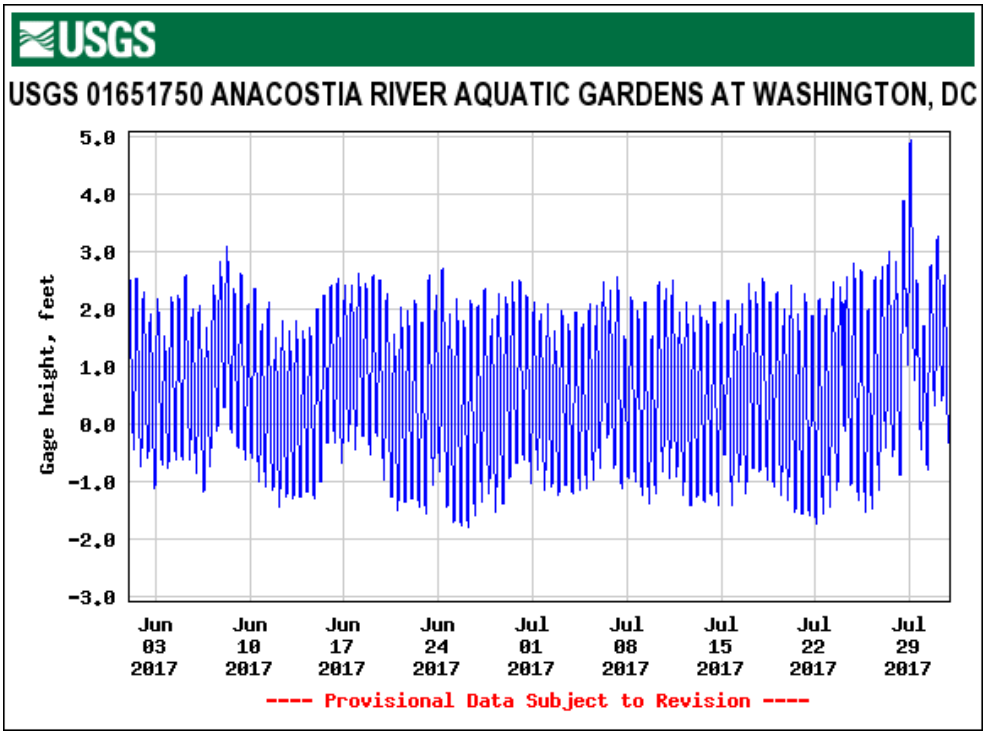


Figure 5-E. Tidal stage from June 1, 2017 through July 31, 2017 in feet (NAVD88). [These data are provisional and subject to revision.]

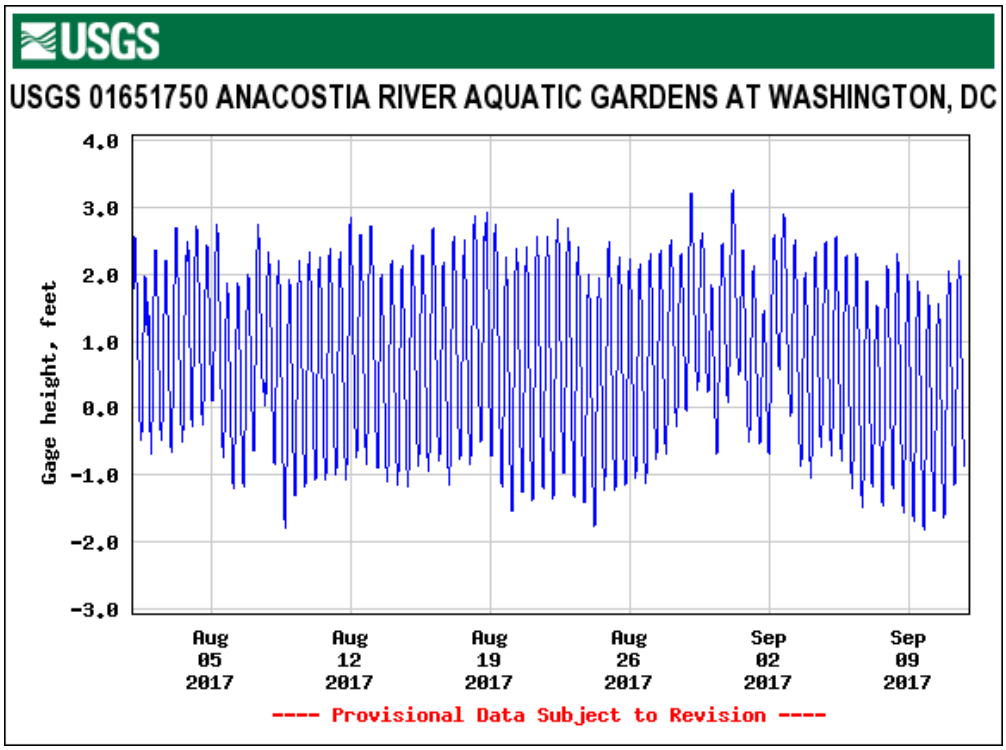


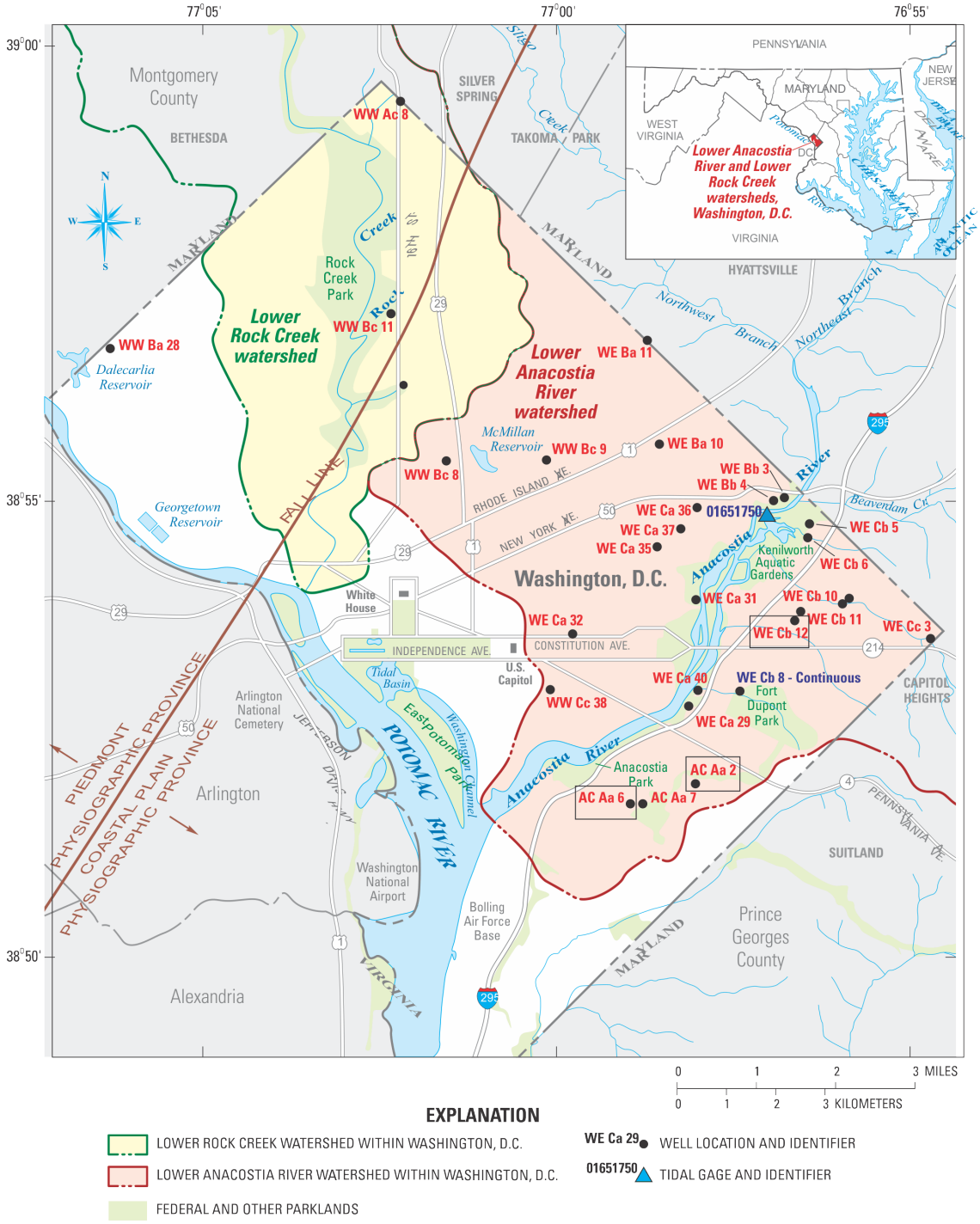
Figure 5-F Tidal stage from August 1, 2017 through September 12,, 2017 in feet (NAVD88). [These data are provisional and subject to revision.]

Appendix 5.1. List of monitoring wells

USGS site name	USGS site number	DOEE well number	Site location
AC Aa 1**	385225076590101	DCMW001-03	Anacostia Park Recreation Center
AC Aa 2	385157076580301	DCMW010-05	28th Street SE (near Hillcrest Drive and Park Drive)
AC Aa 6	385138076585901	DCMW001-08	Ft. Stanton Park (shallow)
AC Aa 7	385138076585902	DCMW002-08	Ft. Stanton Park (deep)
AX Ac 1**	385219077002201	DCMW006-04	Earth Conservation Corps (ECC)
WE Ba 9	385606076584101	DCMW012-05	Taft Recreation Center
WE Ba 10	385534076582101	DCMW007-05	Langdon Park
WE Ba 11*	385649076584201	DCMW003-08	Ft. Totten
WE Bb 3	385504076563801	DCMW001-02	New York Ave. (shallow)
WE Bb 4	385504076563802	DCMW004-02	New York Ave. (deep)
WE Ca 29	385238076581501	DCMW005-02	Anacostia Park
WE Ca 31	385355076575901	DCMW002-03	Langston Golf Course
WE Ca 32	385332076594701	DCMW001-04	Massachusetts Avenue and 7th Street
WE Ca 33	385349076592801	DCMW006-05	Reservation 210 (Maryland and F Street)
WE Ca 34**	385245076583501	DCMW005-05	RFK near Barney Circle
WE Ca 35	385429076583601	DCMW004-04	U.S. National Arboretum Azalea Hill
WE Ca 36	385460076574801	DCMW003-04	U.S. National Arboretum Weather Station
WE Ca 37	385446076581001	DCMW005-04	U.S. National Arboretum Administration Building
WE Ca 39	385241076580901	DCMW001-14	DDOE Aquatic Education Center
WE Cb 5	385443076562801	DCMW002-02	Kenilworth Aquatic Gardens (shallow)
WE Cb 6	385443076562802	DCMW003-02	Kenilworth Aquatic Gardens (deep)
WE Cb 8	385252076572801	DCMW002-04	Ft. DuPont Park
WE Cb 9**	385355076555501	DCMW001-05	Lederer Gardens #1
WE Cb 10	385354076555901	DCMW002-05	Lederer Gardens #2
WE Cb 11	385332076564101	DCMW003-05	Clay and Flint (shallow)
WE Cb 12	385332076564102	DCMW004-05	Clay and Flint (deep)
WE Cc 3	385327076544801	DCMW008-05	Watts Branch Park
WW Ac 8*	385929077020901	DCMW004-08	16th Street NW and Eastern Ave.
WW Ba 28*	385644077061101	DCMW007-08	Dalecarlia Parkway NW at Warren Place NW
WW Bc 8	385519077012601	DCMW009-05	Banneker Recreation Center
WW Bc 9	385527077000701	DCMW011-05	Edgewood Recreation Center
WW Bc 10*	385619077020701	DCMW005-08	Piney Branch Parkway
WW Bc 11*	385707077021801	DCMW006-08	Carter Barron Amphitheater
WW Cc 38	385257077001101	DCMW001-13	Capitol Hill Day School

*Well installed as part of the DC Pesticides project, but monitored as part of the District Groundwater Network

**Well no longer exists



Appendix 5.2. Location of study area, including lower portions of the Anacostia River and Rock Creek watersheds, and Federal and other parklands in Washington, D.C. Wells enclosed with a rectangle designate locations where water quality samples were collected in 2017. Well WE Cb 8 which is screened in the Patuxent Aquifer and is continuously monitored is shown in blue text.

	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
1	**Appendix 5.3**																										
2																											
3	**Parameter**	**AC Aa 2**	**AC Aa 6**	**AC Aa 7**		**WE Ba 10**	**WE Ba 11**		**WE Bb 3**	**WE Bb 4**	**WE Ca 29**	**WE Ca 32**	**WE Cb 8**			**WE Cb 10**	**WE Cb 12**	**WE Cc 3**	**WW Ac 8**	**WW Ba 28**	**WW Bc 8**	**WW Bc 9**		**WW Bc 10**	**WW Bc 11**	**WW Cc 38**	
4	**Agency**	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS	USGS
6	**Sample Date**	9/7/2016	9/7/2016	9/7/2016	12/20/2016	8/30/2016	10/21/2015	8/23/2016	9/22/2016	9/22/2016	9/13/2016	9/6/2016	10/20/2015	9/20/2016	12/6/2016	9/1/2016	8/31/2016	8/31/2016	8/29/2016	9/21/2016	9/12/2016	10/21/2015	8/30/2016	9/12/2016	8/24/2016	10/1/2016	12/19/2016
7	**Sample time**	14:30	11:20	9:15	14:00	12:45	10:00	13:45	11:30	10:00	9:00	10:45	14:00	12:00	13:00	10:45	10:00	14:15	12:45	11:00	11:00	12:30	10:00	13:15	9:40	12:00	13:00
9	Sampling depth, feet	12	15	53	45	12	17	23	20	25	43	25	252	256	240	13	33	19	25	75	34	24	31	25	32	150	200
10	Temperature, water, degrees Celsius	19.9	20.8	15.6	13.5	20.5	18.9	17.6	15.4	15.3	16.3	18.3	15.6	16.6	15.4	19	15.3	17.4	16.7	16.2	18.7	17.3	18	17.7	15.8	16.9	16.1
11	Temperature, air, degrees Celsius	31	30	28	2.2	32	27.4	26	23	23		33	17.7		4	22	2.8	32	31		24	20.9	27.5	29	27	18.4	1
12	Barometric pressure, millimeters of mercury	762	762	762	773	764	768	759	766	766		765	766	769	758	764	766	766	765		766	766	769	770	768	765	778
13	Flow rate, instantaneous, gallons per minute	0.1	0.2	0.2	0.25	0.15	0.3	0.34	0.17	0.2	0.5	0.6	1.3	4	4	0.5	0.3	0.15	0.5	1	0.1	<0.10	0.08	0.1	0.5	3.6	4
14	Oxidation reduction potential, reference electrode not specified, millivolts	-76.9	247	34.7		144		170	-97.7	-57.3	-112	207		-109		21.4	69.6	173	173	-26.5	215		209	-105	148		
15	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius	1070	1000	67	67	296	389	419	450	305	128	2000	154	158	157	1130	231	782	1470	457	558	577	557	1600	96	120	118
16	Hydrogen ion, water, unfiltered, calculated, milligrams per liter	0.00058	0.06073	0.00142	0.00149	0.00199	0.02975	0.02907	0.00083	0.00098	0.00037	0.00231	0.00023	0.0002	0.0002	0.00121	0.00175	0.00106	0.00941	0.00006	0.00358	0.01834	0.02363	0.0003	0.00651	0.00179	0.00149
17	Dissolved oxygen, water, unfiltered, milligrams per liter	1.1	1.6	0.2	0.2	0.2	6.3	6.2	0.1	0.1	0.1	4.5	0.13	0.1	0.2	0.1	0.1	4.1	3.6	0.3	0.8	5	4.6	0.3	4.4	<0.2	0.5
18	Dissolved oxygen, water, unfiltered, percent of saturation	12	18	2	2	3	67	65	0	1		47	1	0	2	1	0	42	37		9	52	48	4	44	<2	4
19	pH, water, unfiltered, field, standard units	6.2	4.2	5.9	5.8	5.7	4.5	4.5	6.1	6	6.4	5.6	6.7	6.7	6.7	5.9	5.8	6	5	7.2	5.5	4.7	4.6	6.5	5.2	5.8	5.8
20	pH, water, unfiltered, laboratory, standard units	6.8	4.4	E 6.0 wc	E 6.4 wc	6.2	4.9	5	6.2	6.2	E 6.7 wc	6.2	7.3	7.4	7.2	6.7	6.4	6.6	5.5 d	8	6.2	5.2	5.1 d	6.9	E 6.0 wc	6.6	6.7
21	Carbon dioxide, water, unfiltered, milligrams per liter	185	361	53	54	224			263	215	29	128	25	23	22	260	155	49	154	11	206	162		328		92	78
22	Organic nitrogen, water, filtered, milligrams per liter as nitrogen				<0.05										<0.06												<0.03
23	Ammonia (NH3 + NH4+), water, filtered, milligrams per liter as nitrogen	1.51 d	0.02 n	0.03	<0.02 d	<0.01	<0.01	<0.01	5.02 d	1.54 d	0.36	<0.01	0.02	0.02	0.03	0.42	0.06	<0.01	<0.01	0.01 n	1.30 d	<0.01	<0.01	12.5 d	<0.01	0.02 n	0.02
24	Nitrite, water, filtered, milligrams per liter as nitrogen	0.002 n	<0.001	<0.001	<0.001	0.001 n	<0.001	<0.001	0.012	<0.001	0.001 n	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001 n	<0.001	<0.001	0.01	<0.001	<0.001	<0.001
25	Nitrate, water, filtered, milligrams per liter as nitrogen	0.021	4.4	<0.010	<0.040	0.859	4.38	4.46		0.016	<0.009	9.57	<0.010	<0.010	<0.040	<0.010	<0.010	3.15	7.06	0.014	8.05	2.99	2.98	0.001	1.83	<0.010	<0.040
26	Nitrate plus nitrite, water, filtered, milligrams per liter as nitrogen	0.02 c	4.40 d	<0.01	<0.040	0.86	4.38 d	4.46 d	<0.01	0.02 n	<0.01	9.57 d	<0.01	<0.01	<0.040	<0.01	<0.01	3.15 d	7.06 d	0.01 n	8.05 d	2.99 d	2.98 d	0.01 n	1.83 d	<0.01	<0.040
27	Orthophosphate, water, filtered, milligrams per liter as PO4	<0.025	0.037	0.323	0.167	<0.012	<0.012	<0.012	0.238	0.235	0.589	<0.012	0.641	0.619	0.572	0.305	<0.012	<0.012	0.087	0.051	<0.012	0.02	0.015	0.148	0.117	1.1	1.15
28	Phosphorus, water, filtered, milligrams per liter as phosphorus	<0.003	0.011	0.136		<0.003	<0.003	<0.003	0.687 d	0.410 d	0.231 d	<0.003	0.261 d	0.330 d		0.118	<0.003	<0.003	0.029	0.014	<0.003	0.005 n	0.005 n	0.326 d	0.037	0.344 d	
29	Orthophosphate, water, filtered, milligrams per liter as phosphorus	<0.008 d	0.012	0.105	0.055 d	<0.004	<0.004	<0.004	0.078 d	0.077 d	0.192	<0.004	0.209 d	0.202 d	0.186	0.099	<0.004	<0.004	0.028	0.017	<0.004	0.007 n	0.005 n	0.048 d	0.038	0.360 d	0.374 d
30	Organic carbon, water, filtered, milligrams per liter	4.67 b	1.82 b	<0.23	<0.23	0.60 b	0.72 b	0.39 bn	<0.23	<0.23		1.00 b	0.79 b	4.15 b	0.24 bn	3.49 b	<0.23	1.08 b	0.63 b	2.28 b	0.76 b	0.57 b	0.42 bn	5.29	<0.23	2.67 b	<0.23
31	Hardness, water, milligrams per liter as calcium carbonate	272	239	10.2	10.3	119	77.8	89.6	58.5	51.2	25	246	52.2	54.7	55.9	258	69.7	126	407	182	146	102	109	626	25.5	36	38
32	Noncarbonate hardness, water, filtered, field, milligrams per liter as calcium carbonate	109	236			62						218				148	24	103	399	84	116	98		75		10	11
33	Calcium, water, filtered, milligrams per liter	81.3 d	56.2	2.05	2.09	28.1	14.2	16.3	14.8	11.3	5.13	71.0 d	10.2	10.7	11	64.8	14.1 d	35.7	94.4	56.6	30.3	19.8	20.9	182 d	4.63	6.81	7.27
34	Magnesium, water, filtered, milligrams per liter	16.7 d	24	1.21	1.22	11.9	10.3	11.8	5.16	5.48	2.95	16.6 d	6.46	6.72	6.81	23.2	8.28 d	8.98	41.4	9.87	16.9	12.8	13.7	41.3 d	3.35	4.58	4.78
35	Sodium, water, filtered, milligrams per liter	83.2 d	79.4	1.58	1.76	10.9	29.6	35.2	11.6	12	4	284 d	4.6	4.82	5.15	126	7.33 d	104	117	16	40.2	55.1	55	39.8 d	7.33	1.87	2.14
36	Sodium adsorption ratio (SAR), water, number	2.2	2.23	0.22	0.24	0.44	1.46	1.62	0.66	0.73	0.35	7.89	0.28	0.28	0.3	3.4	0.38	4.04	2.52	0.52	1.45	2.37	2.3	0.69	0.63	0.14	0.15
37	Sodium fraction of cations, water, percent in equivalents of major cations	39	41	20	21	16	44	44	29	32	24	71	15	15	15	51	18	63	38	16	36	53	51	12	38	9	10
38	Potassium, water, filtered, milligrams per liter	5.09 d	6.78	3.16	3.11	1.21	4.61	4.96	2.73	3.63	1.89	9.69 d	5.18	5.52	5.53	6.02	3.68 d	4.25	7.6	3.48	10.5	4.8	4.92	23.2 d	0.9	4.53	4.74
39	Chloride, water, filtered, milligrams per liter	196 d	159 d	2.36	2.42	22.3	77.7	84.8	25.8	26	4.47	532 d	3.35	3.57	3.56	223 d	34.5	169 d	371 d	54.1	120 d	145 d	133 d	178 d	13.2	13.5	13.5
40	Sulfate, water, filtered, milligrams per liter	0.89 d	202 d	7.09	7.46	44.6	33.2	33.9	0.11	0.07	3.99	69.1 d	12.2	12.4	12.3	83.3 d	2.5	51.1 d	53.5 d	41.2	19.4 d	39.8 d	37.4 d	8.10 d	2.66	7.42	7.57
41	Fluoride, water, filtered, milligrams per liter	0.24 d	1.60 d	0.08	0.07	0.03	0.1	0.08	0.07	0.08	0.07	0.06 d	0.12	0.12	0.12	0.08 nd	0.07	0.27 d	0.03 nd	E 0.07 ic	0.09 d	0.13 d	0.10 d	0.24 d	0.06	0.1	0.09
42	Silica, water, filtered, milligrams per liter as SiO2	28.2 d	13.6	17.2	15.9	10.7	8.26	8.81	26.7	20.7	20.1	5.66 d	11.5	12.6	12.1	12.4	15.8 d	6.98	19	24.8	10.7	10.6	11.8	29.6 d	23.3	25.1	26.2
43	Arsenic, water, filtered, micrograms per liter	11.1	0.43	0.36	0.37	<0.10	0.30 c	0.18	0.38	0.45	3.6	0.08 n	<0.10	0.1	0.05 n	2.6	0.20 n	0.15 n	0.37	1.6	0.07 n	0.20 c	0.21	0.46	<0.10	<0.10 d	0.05 n
44	Barium, water, filtered, micrograms per liter	130	24.5	32.9	35.6	34.9	135 c	138	210	190	85.1	119	169	164	172	81.7	355	48	81.2	14.6	587 d	213 c	205	672 d	74.6	62.5 d	64.6
45	Beryllium, water, filtered, micrograms per liter	0.010 n	2.05	0.1	0.123	0.023 n	0.881 c	0.83	0.035	0.06	0.03	0.02	<0.020	<0.010	0.013 n	0.071	0.027 n	0.209	1.28	0.010 n	1.01	0.569 c	0.475	0.02	0.148	0.060 d	0.073
46	Boron, water, filtered, micrograms per liter	46	40	6 n	7 n	31	14 c	13	11	8 n	11	54	15	15	16	72	18	44	20	14	18	11 c	10	241	5 n	<10 d	10 n
47	Cadmium, water, filtered, micrograms per liter	<0.030	20.6	<0.030	<0.030	<0.030	0.306 c	0.38	<0.030	<0.030	<0.030	0.09	<0.030	<0.030	<0.030	0.058 n	0.037 n	0.204	0.573	0.030 n	0.31	0.643 c	0.643	<0.030	0.068	<0.060 d	<0.030
48	Chromium, water, filtered, micrograms per liter	<0.50	0.84 n	<0.50	<0.50	<0.30	0.72 c	0.99 n	<0.50	<0.50	<0.50	<0.50	<0.30	<0.50	<0.50	<0.30	<0.30	0.92	0.65	<0.50	<0.50	0.49 nc	0.43 n	0.72 n	0.99	<1.0 d	<0.50
49	Cobalt, water, filtered, micrograms per liter	0.2	98.7	7.84	7.74	0.124	17.8 c	18.7	0.94	1.46	0.08	0.47	<0.050	0.050 n	0.17	7.98	16.1	5.12	0.149	2.47	25	7.27 c	6.36	0.99	0.171	0.410 d	0.482
50	Copper, water, filtered, micrograms per liter	<0.20	13.7	<0.20	8.5	<0.80	9.0 c	8	<0.20	<0.20	<0.20	0.24 n	<0.80	<0.20	0.23 n	<0.80	<0.80	<0.80	<0.80	<0.20	6	2.5 c	2.3	<0.20	<0.80	<0.40 d	<0.20
51	Iron, water, filtered, micrograms per liter	39100 d	11.3	7950	7360	<4.0	6.7 n	5.1 n	60000 d	37600 d	17100 d	<8.0 d	3390	3360	3440	8560	2710 d	<4.0	<4.0	31.8	<4.0	<4.0	<4.0	36000 d	5.6 n	3950	4240
52	Lead, water, filtered, micrograms per liter	<0.020	0.12	<0.020	<0.020	<0.040	0.783 c	0.63	<0.020	<0.020	0.020 n	<0.020	<0.040	<0.020	0.134	<0.040	<0.040	<0.040	0.046 n	0.020 n	0.51	<0.040 c	<0.040	0.04	<0.040	<0.040 d	0.074
53	Manganese, water, filtered, micrograms per liter	777	1050 d	486	539	101	120 c	125	2460 d	1580 d	158	3.44	170	162	176	980	2240	74	152	470	626	359 c	331	3240 d	17.5	190 d	206
54	Thallium, water, filtered, micrograms per liter	<0.020	0.15	0.04	0.044	196	0.076 c	0.06	<0.020	<0.020	<0.020	0.07	<0.030	<0.020	<0.020	<0.030	<0.030	0.061	<0.030	0.030 n	0.2	0.088 c	0.088	<0.020	<0.030	<0.040 d	<0.020
55	Molybdenum, water, filtered, micrograms per liter	1.39	0.13	0.070 n	0.084 n	<0.050	<0.050 c	<0.050	0.18	0.16	0.57	0.050 n	<0.050	0.060 n	0.124	0.776	0.075 n	0.064 n	0.137	1.77	0.070 n	<0.050 c	<0.050	0.779 d	<0.050	<0.100 d	<0.050
56	Nickel, water, filtered, micrograms per liter	0.28 n	131 d	6.3	8.2	2.3	15.1 c	17.8	<0.20	1.1	0.36 n	2.2	<0.20	<0.20	0.28 n	8.4	7.7	8.7	2.6	3.6	24.8	22.5 c	21.3	1	4.9	0.65 nd	0.75
57	Silver, water, filtered, micrograms per liter	<1.00	<1.00	<1.00	<1.00	<0.020	<0.020 c	<1.00	<1.00	<1.00	<1.00	<1.00	<0.020	<1.00	<1.00	<0.020	<0.020	<0.020	0.507	<1.00	<1.00	<0.020 c	<0.020	<1.00	<0.020	<2.00 d	<1.00
58	Strontium, water, filtered, micrograms per liter	269	242	11.7	13	129	116 c	127	134	122	40.8	354	121	130	139	254	114	160	864	219	233	120 c	114	1440	48.4	75.1 d	83.9
59	Vanadium, water, filtered, micrograms per liter	0.10 n	0.15 n	<0.10	0.13 n	<0.10	<0.10 c	<0.10	0.53	0.55	0.3	<0.10	<0.10	<0.10	0.20 n	0.37	<0.10	0.31	0.88	0.29	<0.10	0.11 nc	0.22	0.45	0.17 n	<0.20 d	<0.10
60	Zinc, water, filtered, micrograms per liter	<2.0	447 d	16.9	23.2	<2.0	26.5 c	27.7	3.5 n	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	10.2	7.1	16.6	3.4 n	8.2	78.9	46.1 c	46.3	<2.0	29.2	<4.0 d	6.8
61	Antimony, water, filtered, micrograms per liter	0.040 n	0.030 n	<0.030	<0.030	<0.027	0.029 nc	<0.030	<0.030	<0.030	<0.030	0.050 n	<0.027	<0.030	<0.030	<0.027	<0.027	<0.027	<0.027	0.06	<0.030	<0.027 c	<0.027	0.030 n	<0.027	<0.060 d	<0.030
62	Aluminum, water, filtered, micrograms per liter	<3.0		4.2 n	3.8 n	<3.0	298 c	305	4.8 n	6.3	<3.0	4.1 n	5.2 n	<3.0	48.2	6.4	<3.0	25.2	31.1	<3.0	149 d	226 c	193	<3.0	36.6	<6.0 d	<3.0
63	Lithium, water, filtered, micrograms per liter	2.55	10.7	8.5	10	1.36	1.69 c	1.62	3.92	5.43	1.12	0.63	6.99	6.53	6.68	4.65	18.4	5.29	2.59	17.4	2.45	5.54 c	5.1	199 d	2.56	12.6 d	13
64	Selenium, water, filtered, micrograms per liter	0.08 n	0.79	<0.05	<0.05	<0.05	0.67 c	0.72	<0.05	<0.05	<0.05	2.1	<0.05	<0.05	<0.05	0.14	<0.05	0.98	0.57	<0.05	0.32	1.1 c	1	0.1	<0.05	<0.10 d	<0.05
65	Terbuthylazine, water, filtered, recoverable, micrograms per liter							<0.008				<0.008		<0.008				<0.008							<0.008		
66	Hexazinone, water, filtered, recoverable, micrograms per liter							<0.012				<0.012		<0.012				<0.012							<0.012		
67	Simazine, water, filtered, recoverable, micrograms per liter							0.017				0.013		<0.006				0.007 b							<0.006		
68	Prometryn, water, filtered, recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
69	Prometon, water, filtered, recoverable, micrograms per liter							<0.012				0.010 n		<0.012				0.007 bn							<0.012		
70	2-Chloro-4-isopropylamino-6-amino-s-triazine, water, filtered, recoverable, micrograms per liter							<0.010 mc				E 0.019 mc		<0.010 mc				E 0.011 mc							<0.010 mc		
71	Cyanazine, water, filtered, recoverable, micrograms per liter							<0.022				<0.022		<0.022				<0.022							<0.022		
72	Fonofos, water, filtered, recoverable, micrograms per liter							<0.0048				<0.0048		<0.0048				<0.0048							<0.0048		
73	Tritium, water, unfiltered, picocuries per liter				R 0.1										R 0.1												R -0.5
74	Radium-226, water, filtered, picocuries per liter				0.18										0.2												0.26
75	Lead-210, water, filtered, picocuries per liter				0.5										R -0.04												0.5
76	Polonium-210, water, filtered, picocuries per liter				R 0.08										0.2												0.16
77	Uranium (natural), water, filtered, micrograms per liter	0.06	1.19	<0.010	<0.010	<0.014	0.283 c	0.31	<0.010	<0.010	0.010 n	<0.010	<0.014	<0.010	<0.010	0.14	<0.014	0.096	0.034	21.7	0.04	0.065 c	0.077	0.11	<0.014	<0.020 d	<0.010
78	2-Methylnaphthalene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
79	2-Nitroaniline, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
80	4-Nitroaniline, water, unfiltered, recoverable, micrograms per liter		<9.3 c	<9.3 c		<9.3 c	<9.9 c	<9.3 c		<9.3 c		<9.3 c	<9.5 c	<9.3 c		<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.7 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	
81	2-Methyl-4,6-dinitrophenol, water, unfiltered, recoverable, micrograms per liter		<9.3 c	<9.3 c		<9.3 c	<9.9 c	<9.3 c		<9.3 c		<9.3 c	<9.5 c	<9.3 c		<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.7 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	
82	Depth to water level, below land surface datum (LSD), meters	3.08	2.66	8.7	8.86	2.19	3.72	3.6	3.66	3.77	1.72	6.21	23.4	20	19.1	3.36	7.29	4.65	6.25	6.01	3.4	5.6	5.62	6.53	5.56	18.6	18.6
83	Dibromomethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
84	4-Chloroaniline, water, unfiltered, recoverable, micrograms per liter		<9.3 c	<9.3 c		<9.3 c	<9.9 c	<9.3 c		<9.3 c		<9.3 c	<9.5 c	<9.3 c		<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.7 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	
85	Bromodichloromethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
86	Tetrachloromethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
87	1,2-Dichloroethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	1.2 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
88	Tribromomethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
89	Dibromochloromethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
90	Trichloromethane, water, unfiltered, recoverable, micrograms per liter		1.8 c	<1.0 c		<1.0 c	1.0 c	0.9 cn		<1.0 c		8.4 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	8.8 c	<1.0 c	5.2 c	3.0 c	2.6 c	<1.0 c	<1.0 c	<1.0 c	
91	Toluene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
92	Benzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
93	Acenaphthylene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
94	Acenaphthene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	2.5 cn	<4.7 c	<4.7 c	
95	Anthracene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
96	Benzo[b]fluoranthene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
97	Benzo[k]fluoranthene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
98	Benzo[a]pyrene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
99	Bis(2-chloroethyl) ether, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
100	Bis(2-chloroethoxy)methane, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
101	Bis(2-chloroisopropyl) ether, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
102	Benzyl n-butyl phthalate, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
103	Chlorobenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
104	Chloroethane, water, unfiltered, recoverable, micrograms per liter		<2.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c		<2.0 c		<2.0 c	<2.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	
105	Chrysene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
106	Diethyl phthalate, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
107	Dimethyl phthalate, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
108	alpha-Endosulfan, water, filtered, recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
109	Ethylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
110	Fluoranthene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	1.0 cn	<4.7 c	<4.7 c	
111	9H-Fluorene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	1.9 cn	<4.7 c	<4.7 c	
112	Hexachlorocyclopentadiene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
113	Hexachlorobutadiene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
114	Hexachloroethane, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
115	Indeno[1,2,3-cd]pyrene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
116	Isophorone, water, unfiltered, recoverable, micrograms per liter		<5 c	<5 c		<5 c	<5 c	<5 c		<5 c		<5 c	<5 c	<5 c		<5 c	<5 c	<5 c	<5 c	<5 c	<5 c	<5 c	<5 c	<5 c	<5 c	<5 c	
117	Bromomethane, water, unfiltered, recoverable, micrograms per liter		<2.0 c	<2.0 c		<2.0 c	<5.0 c	<2.0 c		<2.0 c		<2.0 c	<5.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<5.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	
118	Chloromethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	0.5 cn		0.7 cn	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		0.4 cn	0.5 cn	0.5 cn	<1.0 c	<1.0 c	<1.0 c	0.3 cn	0.6 cn	<1.0 c	<1.0 c	<1.0 c	
119	Dichloromethane, water, unfiltered, recoverable, micrograms per liter		0.4 cn	0.4 cn		0.4 cn	<2.0 c	0.3 cn		<5.0 c		0.5 cn	0.5 cn	<5.0 c		0.5 cn	0.4 cn	0.7 cn	0.4 cn	<5.0 c	0.5 cn	<2.0 c	0.4 cn	0.4 cn	0.3 cn	<5.0 c	
120	N-Nitrosodi-n-propylamine, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
121	N-Nitrosodiphenylamine, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
122	N-Nitrosodimethylamine, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
123	Nitrobenzene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<3.0 c	<4.7 c		<4.7 c		<4.7 c	<2.9 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<2.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
124	4-Chloro-3-methylphenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
125	Phenanthrene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	1.9 cn	<4.7 c	<4.7 c	
126	Pyrene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
127	Tetrachloroethene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	36 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
128	Trichloroethene, water, filtered, recoverable, micrograms per liter						<1.0 c						<1.0 c									<1.0 c					
129	Trichlorofluoromethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
130	1,1-Dichloroethane, water, unfiltered, recoverable, micrograms per liter		<2.0 c	<2.0 c		<2.0 c	<1.0 c	<2.0 c		<2.0 c		<2.0 c	<1.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<1.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	
131	1,1-Dichloroethene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
132	1,1,1-Trichloroethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
133	1,1,2-Trichloroethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
134	1,1,2,2-Tetrachloroethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
135	Benzo[ghi]perylene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
136	Benzo[a]anthracene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
137	1,2-Dichlorobenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
138	1,2-Dichloropropane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
139	trans-1,2-Dichloroethene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
140	1,2,4-Trichlorobenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
141	Dibenzo[a,h]anthracene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
142	1,3-Dichlorobenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
143	1,4-Dichlorobenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
144	2-Chloronaphthalene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
145	2-Chlorophenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
146	2-Nitrophenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
147	Di-n-octyl phthalate, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
148	2,4-Dichlorophenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
149	2,4-Dimethylphenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
150	2,4-Dinitrotoluene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
151	2,4-Dinitrophenol, water, unfiltered, recoverable, micrograms per liter		<23 c	<23 c		<23 c	<25 c	<23 c		<23 c		<23 c	<24 c	<23 c		<23 c	<23 c	<23 c	<23 c	<23 c	<23 c	<24 c	<23 c	<23 c	<23 c	<23 c	
152	2,4,6-Trichlorophenol, water, unfiltered, recoverable, micrograms per liter		<3.7 c	<3.7 c		<3.7 c	<4.0 c	<3.7 c		<3.7 c		<3.7 c	<3.8 c	<3.7 c		<3.7 c	<3.7 c	<3.7 c	<3.7 c	<3.7 c	<3.7 c	<3.9 c	<3.7 c	<3.7 c	<3.7 c	<3.7 c	
153	2,6-Dinitrotoluene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
154	3,3'-Dichlorobenzidine, water, unfiltered, recoverable, micrograms per liter		<19 c	<19 c		<19 c	<20 c	<19 c		<19 c		<19 c	<19 c	<19 c		<19 c	<19 c	<19 c	<19 c	<19 c	<19 c	<19 c	<19 c	<19 c	<19 c	<19 c	
155	4-Bromophenyl phenyl ether, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
156	4-Chlorophenyl phenyl ether, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
157	4-Nitrophenol, water, unfiltered, recoverable, micrograms per liter		<23 c	<23 c		<23 c	<25 c	<23 c		<23 c		<23 c	<24 c	<23 c		<23 c	<23 c	<23 c	<23 c	<23 c	<23 c	<24 c	<23 c	<23 c	<23 c	<23 c	
158	Dichlorodifluoromethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
159	Aroclor 1016, water, unfiltered, recoverable, micrograms per liter		<0.1 c	<0.1 c		<0.1 c	<0.10 c	<0.1 c		<0.1 c		<0.1 c	<0.09 c	<0.1 c		<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.10 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	
160	Phenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
161	Naphthalene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
162	trans-1,3-Dichloropropene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
163	cis-1,3-Dichloropropene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
164	Dicrotophos, water, filtered, recoverable, micrograms per liter							<0.08 mc				<0.08 mc		<0.08 mc				<0.08 mc							<0.08 mc		
165	Dichlorvos, water, filtered, recoverable, micrograms per liter							<0.04 mc				<0.04 mc		<0.04 mc				<0.04 mc							<0.04 mc		
166	Chlorpyrifos, water, filtered, recoverable, micrograms per liter							<0.0100				<0.0100		<0.0100				<0.0100							<0.0100		
167	Pentachlorophenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
168	Alkalinity, water, filtered, inflection-point titration method (incremental titration method), field, milligrams per liter as calcium carbonate	163	0	19	18.5	57.4			162	112	40.2	28.1	57.2	58.9	56.4	110	45.3	23.8	7.8	98.4	29.3	3.5		551		26	26.6
169	Bis(2-ethylhexyl) phthalate, water, unfiltered, recoverable, micrograms per liter		<4.7 c	7.0 c		<4.7 c	0.5 cn	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
170	Di-n-butyl phthalate, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
171	Vinyl chloride, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	2.2 c	<1.0 c	<1.0 c	
172	Trichloroethene, water, unfiltered, recoverable, micrograms per liter		<1 c	<1 c		<1 c		<1 c		<1 c		<1 c		<1 c		<1 c	<1 c	<1 c	<1 c	<1 c	M cn		<1 c	<1 c	<1 c	<1 c	
173	Dieldrin, water, filtered, recoverable, micrograms per liter							0.023				0.017		<0.012				<0.012							<0.012		
174	Metolachlor, water, filtered, recoverable, micrograms per liter							<0.012				0.013		<0.012				0.006 bt							<0.012		
175	Aroclor 1221, water, unfiltered, recoverable, micrograms per liter		<0.1 c	<0.1 c		<0.1 c	<0.10 c	<0.1 c		<0.1 c		<0.1 c	<0.09 c	<0.1 c		<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.10 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	
176	Aroclor 1232, water, unfiltered, recoverable, micrograms per liter		<0.2 c	<0.2 c		<0.2 c	<0.21 c	<0.2 c		<0.2 c		<0.2 c	<0.19 c	<0.2 c		<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.20 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	

	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
177	Aroclor 1242, water, unfiltered, recoverable, micrograms per liter		<0.2 c	<0.2 c		<0.2 c	<0.21 c	<0.2 c		<0.2 c		<0.2 c	<0.19 c	<0.2 c		<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.20 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	
178	Aroclor 1248, water, unfiltered, recoverable, micrograms per liter		<0.1 c	<0.1 c		<0.1 c	<0.10 c	<0.1 c		<0.1 c		<0.1 c	<0.09 c	<0.1 c		<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	<0.10 c	<0.1 c	<0.1 c	<0.1 c	<0.1 c	
179	Aroclor 1254, water, unfiltered, recoverable, micrograms per liter		<0.2 c	<0.2 c		<0.2 c	<0.21 c	<0.2 c		<0.2 c		<0.2 c	<0.19 c	<0.2 c		<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.20 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	
180	Aroclor 1260, water, unfiltered, recoverable, micrograms per liter		<0.2 c	<0.2 c		<0.2 c	<0.21 c	<0.2 c		<0.2 c		<0.2 c	<0.19 c	<0.2 c		<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	<0.20 c	<0.2 c	<0.2 c	<0.2 c	<0.2 c	
181	Malathion, water, filtered, recoverable, micrograms per liter							<0.016				<0.016		<0.016				<0.016							<0.016		
182	Diazinon, water, filtered, recoverable, micrograms per liter							<0.0060				<0.0060		<0.0060				<0.0060							<0.0060		
183	Atrazine, water, filtered, recoverable, micrograms per liter							<0.008				0.035		<0.008				0.01							<0.008		
184	Hexachlorobenzene, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c		<4.7 c	<1.0 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<1.0 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
185	Hexachlorobutadiene, water, unfiltered, recoverable, micrograms per liter		<2.0 c	<2.0 c		<2.0 c	<5.0 c	<2.0 c		<2.0 c		<2.0 c	<5.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<5.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	
186	Alachlor, water, filtered, recoverable, micrograms per liter							<0.008				<0.008		<0.008				<0.008							<0.008		
187	Acetochlor, water, filtered, recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
188	1-Naphthol, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.0500 mc				<0.0500 mc		<0.0500 mc				<0.0500 mc							<0.0500 mc		
189	Gasoline range organic compounds, water, unfiltered, recoverable, micrograms per liter		19 cn	25 cn		24 cn	V 28 cn	22 cn		22 cn		28 cn	V 31 cn	23 cn		140 c	22 cn	22 cn	23 cn	19 cn	38 cn	V 36 cn	26 cn	39 cn	28 cn	20 cn	
190	Carbon-14, water, filtered, percent modern				59.78										8.61												64.72
191	Carbon-14 counting error, water, filtered, percent modern				0.14										0.09												0.26
192	Site visit purpose, code	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001
193	Radium-224, water, filtered, picocuries per liter				0.46										0.41												0.38
194	Dibromofluoromethane, surrogate, water, unfiltered, percent recovery		109 c	109 c		106 c	94.3 c	103 c		92.9 c		109 c	95.7 c	95.3 c		101 c	108 c	108 c	108 c	92.6 c	106 c	92.8 c	106 c	103 c	104 c	96.7 c	
195	Diesel range organic compounds (C10-C28), water, unfiltered, recoverable, micrograms per liter		76 cn	32 cn		29 cn	<190 c	29 cn		61 cn		52 cn	<190 c	24 cn		96 cn	24 cn	25 cn	28 cn	47 cn	57 cn	V 40 cn	36 cn	650 c	21 cn	<190 c	
196	Cyfluthrin, water, filtered, recoverable, micrograms per liter							<0.016 mc				<0.016 mc		<0.016 mc				<0.016 mc							<0.016 mc		
197	Cypermethrin, water, filtered, recoverable, micrograms per liter							<0.020 mc				<0.020 mc		<0.020 mc				<0.020 mc							<0.020 mc		
198	Endosulfan sulfate, water, filtered, recoverable, micrograms per liter							<0.016				<0.016		<0.016				<0.016							<0.016		
199	Fenamiphos, water, filtered, recoverable, micrograms per liter							<0.030				<0.030		<0.030				<0.030							<0.030		
200	Iprodione, water, filtered, recoverable, micrograms per liter							<0.014 mc				<0.014 mc		<0.014 mc				<0.014 mc							<0.014 mc		
201	Isofenphos, water, filtered, recoverable, micrograms per liter							<0.014				<0.014		<0.014				<0.014							<0.014		
202	lambda-Cyhalothrin, water, filtered, recoverable, micrograms per liter							<0.014 mc				<0.014 mc		<0.014 mc				<0.014 mc							<0.014 mc		
203	Metalaxyl, water, filtered, recoverable, micrograms per liter							<0.014				<0.014		<0.014				<0.014							<0.014		
204	Methidathion, water, filtered, recoverable, micrograms per liter							<0.012				<0.012		<0.012				<0.012							<0.012		
205	Myclobutanil, water, filtered, recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
206	Oxyfluorfen, water, filtered, recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
207	Phosmet, water, filtered, recoverable, micrograms per liter							<0.140 mc				<0.140 mc		<0.140 mc				<0.140 mc							<0.140 mc		
208	Tefluthrin, water, filtered, recoverable, micrograms per liter							<0.014 mc				<0.014 mc		<0.014 mc				<0.014 mc							<0.014 mc		
209	Tribufos, water, filtered, recoverable, micrograms per liter							<0.018 mc				<0.018 mc		<0.018 mc				<0.018 mc							<0.018 mc		
210	2-Chloro-2',6'-diethylacetanilide, water, filtered, recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
211	2-Ethyl-6-methylaniline, water, filtered, recoverable, micrograms per liter							<0.010 mc				<0.010 mc		<0.010 mc				<0.010 mc							<0.010 mc		
212	3,4-Dichloroaniline, water, filtered, recoverable, micrograms per liter							<0.0060 mc				E 0.0039 bmn		<0.0060 mc				<0.0060 mc							<0.0060 mc		
213	3,5-Dichloroaniline, water, filtered, recoverable, micrograms per liter							<0.006				<0.006		<0.006				<0.006							<0.006		
214	4-Chloro-2-methylphenol, water, filtered, recoverable, micrograms per liter							<0.0080 mc				<0.0080 mc		<0.0080 mc				<0.0080 mc							<0.0080 mc		
215	Azinphos-methyl oxygen analog, water, filtered, recoverable, micrograms per liter							<0.042 mc				<0.042 mc		<0.042 mc				<0.042 mc							<0.042 mc		
216	Chlorpyrifos oxygen analog, water, filtered, recoverable, micrograms per liter							<0.08 mc				<0.08 mc		<0.08 mc				<0.08 mc							<0.08 mc		
217	Disulfoton sulfone, water, filtered, recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
218	Fenamiphos sulfone, water, filtered, recoverable, micrograms per liter							<0.054				<0.054		<0.054				<0.054							<0.054		
219	Fenamiphos sulfoxide, water, filtered, recoverable, micrograms per liter							<0.08 mc				<0.08 mc		<0.08 mc				<0.08 mc							<0.08 mc		
220	Malaoxon, water, filtered, recoverable, micrograms per liter							<0.022				<0.022		<0.022				<0.022							<0.022		
221	Methyl paraoxon, water, filtered, recoverable, micrograms per liter							<0.014 mc				<0.014 mc		<0.014 mc				<0.014 mc							<0.014 mc		
222	Phorate oxygen analog, water, filtered, recoverable, micrograms per liter							<0.027 mc				<0.027 mc		<0.027 mc				<0.027 mc							<0.027 mc		
223	Phosmet oxygen analog, water, filtered, recoverable, micrograms per liter							<0.0511 mc				<0.0511 mc		<0.0511 mc				<0.0511 mc							<0.0511 mc		
224	Terbufos oxygen analog sulfone, water, filtered, recoverable, micrograms per liter							<0.045				<0.045		<0.045				<0.045							<0.045		
225	Fipronil, water, filtered, recoverable, micrograms per liter							<0.018 mc				E 0.007 bmt		<0.018 mc				<0.018 mc							<0.018 mc		
226	Fipronil sulfide, water, filtered, recoverable, micrograms per liter							<0.016				0.014 n		<0.016				<0.016							<0.016		
227	Fipronil sulfone, water, filtered, recoverable, micrograms per liter							0.008 t				0.009 t		<0.024				<0.024							<0.024		
228	Desulfinylfipronil amide, water, filtered, recoverable, micrograms per liter							<0.029 mc				<0.029 mc		<0.029 mc				<0.029 mc							<0.029 mc		
229	Desulfinylfipronil, water, filtered, recoverable, micrograms per liter							<0.012				<0.012		<0.012				<0.012							<0.012		
230	Gross alpha radioactivity, 72 hour count, water, filtered, Th-230 curve, picocuries per liter				1.7 (										1.1												1.7 \
231	Gross alpha radioactivity, 30 day count, water, filtered, Th-230 curve, picocuries per liter				R 0.5										1.2												R 0.6
232	Gross beta radioactivity, 72 hour count, water, filtered, Cs-137 curve, picocuries per liter				3.4										6.1												4.4
233	Gross beta radioactivity, 30 day count, water, filtered, Cs-137 curve, picocuries per liter				4.3										7												4
234	Total nitrogen [nitrate + nitrite + ammonia + organic-N], water, filtered, analytically determined, milligrams per liter				<0.05										0.09 n												<0.05
235	Oxidation reduction potential, relative to the standard hydrogen electrode (SHE), millivolts						350						-70									330					
236	Turbidity, water, unfiltered, broad band light source (400-680 nm), detection angle 90 +-30 degrees to incident light, nephelometric turbidity units (NTU)				4																						
237	Turbidity, water, unfiltered, broad band light source (400-680 nm), detectors at multiple angles including 90 +-30 degrees, ratiometric correction, NTRU	290	0.8	12			0.3	2.5	7.2	1	3.4	0.4	3.2	2.1	28	1	12	1.6		0.3	6.2	0.3		5.4		0.6	0.4
238	Total Aroclors, water, unfiltered, recoverable, micrograms per liter		<0.21 c	<0.20 c		<0.20 c	<0.21 c	<0.20 c		<0.20 c		<0.21 c	<0.19 c	<0.19 c		<0.20 c	<0.20 c	<0.20 c	<0.20 c	<0.19 c	<0.20 c	<0.20 c	<0.20 c	<0.20 c	<0.22 c	<0.19 c	
239	Dissolved solids dried at 180 degrees Celsius, water, filtered, milligrams per liter	616	574	43	40	184	219	236	222	149	88	1140	92	91	97	641	120	437	904	274	313	325	302 r	898	79	89	87
240	Dissolved solids, water, filtered, sum of constituents, milligrams per liter	552		55	53	168			254	188	85	1050	92	96	95	615	119	409	741	E 266	305	305		890		85	88
241	Dissolved solids, water, filtered, short tons per acre-foot	0.84	0.78	0.06	0.05	0.25	0.3	0.32	0.3	0.2	0.12	1.55	0.13	0.12	0.13	0.87	0.16	0.59	1.23	0.37	0.43	0.44	0.41	1.22	0.11	0.12	0.12
242	Hydroxide, water, filtered, inflection-point titration method (incremental titration method), field, milligrams per liter												<0.1									<0.1				<0.1	
243	Ammonia (NH3 + NH4+), water, filtered, milligrams per liter as NH4	1.94	0.019	0.041	<0.026	<0.013	<0.013	<0.013	6.47	1.98	0.467	<0.013	0.03	0.032	0.039	0.542	0.075	<0.013	<0.013	0.014	1.68	<0.013	<0.013	16	<0.013	0.023	0.03
244	Nitrate, water, filtered, milligrams per liter as nitrate	0.093	19.5	<0.044	<0.177	3.8	19.4	19.7		0.072	<0.038	42.4	<0.044	<0.044	<0.177	<0.044	<0.044	13.9	31.3	0.06	35.6	13.2	13.2	0.006	8.1	<0.044	<0.177
245	Nitrite, water, filtered, milligrams per liter as nitrite	0.005	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	0.04	<0.003	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.004	<0.003	<0.003	0.032	<0.003	<0.003	<0.003
246	Bromide, water, filtered, milligrams per liter	0.074	0.218	0.010 n	0.015 n	0.034	0.04	0.042	0.154	0.096	0.022	0.224	0.014 n	0.015 n	0.015 n	0.110 d	0.094	0.077	0.197	0.076	0.207	0.152	0.155	<0.010	0.025	0.027	0.028
247	Hydrogen sulfide, water, unfiltered, milligrams per liter	U	U	U		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
248	Sample purpose, code	50	50	50	15	50	10	50	50	50	50	50	10	50	10	50	50	50	50	50	50	10	50	50	50	50	10
249	Pump or flow period prior to sampling, minutes	26	35	60	120	60		80	50	65	45	50		250	200	35	77	45	65	120	35		50	55	40	225	120
250	Sample source, code	47	47	5	47	5		47	5	5	47	47		47	5	5	47	47	47	5	5		47	47	5		5
251	Sampling condition, code	0.1	0.1	0.1		0.1		0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1		0.1
252	Depth to water level, feet below land surface	10.1	8.74	28.55	29.06	7.17	12.19	11.82	12	12.36	5.65	20.39	76.82	65.77	62.65	11.01	23.92	15.25	20.49	19.71	11.17	18.38	18.45	21.43	18.25	61.06	61.03
253	Carbon disulfide, water, unfiltered, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	0.6 cn		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
254	cis-1,2-Dichloroethene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	0.7 cn	<1.0 c	<1.0 c	9.3 c	<1.0 c	<1.0 c	
255	n-Butyl methyl ketone, water, unfiltered, recoverable, micrograms per liter		<2.0 c	<2.0 c		<2.0 c	<5.0 c	<2.0 c		<2.0 c		<2.0 c	<5.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<5.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	
256	Styrene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
257	o-Xylene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
258	p-Cresol, water, unfiltered, recoverable, micrograms per liter		<9.3 c	<9.3 c		<9.3 c	<9.9 c	<9.3 c		<9.3 c		<9.3 c	<9.5 c	<9.3 c		<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.7 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	
259	Benzyl alcohol, water, unfiltered, recoverable, micrograms per liter		<23 c	<23 c		<23 c	<25 c	<23 c		<23 c		<23 c	<24 c	<23 c		<23 c	<23 c	<23 c	<23 c	<23 c	<23 c	<24 c	<23 c	<23 c	<23 c	<23 c	
260	o-Cresol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
261	1,1-Dichloropropene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
262	2,2-Dichloropropane, water, unfiltered, recoverable, micrograms per liter		<2.0 c	<2.0 c		<2.0 c	<1.0 c	<2.0 c		<2.0 c		<2.0 c	<1.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<1.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	
263	1,3-Dichloropropane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
264	1,2,4-Trimethylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
265	Isopropylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
266	n-Propylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
267	1,3,5-Trimethylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
268	Benzoic acid, water, unfiltered, recoverable, micrograms per liter		<23 c	<23 c		<23 c	<25 c	<23 c		<23 c		<23 c	<24 c	<23 c		<23 c	<23 c	<23 c	<23 c	<23 c	<23 c	<24 c	<23 c	<23 c	<23 c	<23 c	
269	2-Chlorotoluene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
270	4-Chlorotoluene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<2.0 c	<1.0 c		<1.0 c		<1.0 c	<2.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<2.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
271	Bromochloromethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
272	n-Butylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
273	sec-Butylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
274	tert-Butylbenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
275	4-Isopropyltoluene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
276	1,2,3-Trichloropropane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<5.0 c	<1.0 c		<1.0 c		<1.0 c	<5.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<5.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
277	1,1,1,2-Tetrachloroethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
278	Carbazole, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
279	1,2,3-Trichlorobenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
280	1,2-Dibromoethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
281	1,1,2-Trichloro-1,2,2-trifluoroethane, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
282	2,4,5-Trichlorophenol, water, unfiltered, recoverable, micrograms per liter		<4.7 c	<4.7 c		<4.7 c	<5.0 c	<4.7 c		<4.7 c		<4.7 c	<4.8 c	<4.7 c		<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	<4.9 c	<4.7 c	<4.7 c	<4.7 c	<4.7 c	
283	Methyl tert-butyl ether, water, unfiltered, recoverable, micrograms per liter		2.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		8.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	1.0 c	<1.0 c	<1.0 c	3.0 c	<1.0 c	<1.0 c	
284	Isobutyl methyl ketone, water, unfiltered, recoverable, micrograms per liter		<10 c	<10 c		<10 c	<10 c	<10 c		<10 c		<10 c	<10 c	<10 c		<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	
285	3-Nitroaniline, water, unfiltered, recoverable, micrograms per liter		<9.3 c	<9.3 c		<9.3 c	<9.9 c	<9.3 c		<9.3 c		<9.3 c	<9.5 c	<9.3 c		<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	<9.7 c	<9.3 c	<9.3 c	<9.3 c	<9.3 c	
286	cis-Propiconazole, water, filtered, recoverable, micrograms per liter							<0.008 mc				<0.008 mc		<0.008 mc				<0.008 mc							<0.008 mc		
287	trans-Propiconazole, water, filtered, recoverable, micrograms per liter							<0.018 mc				<0.018 mc		<0.018 mc				<0.018 mc							<0.018 mc		
288	Dibenzofuran, water, unfiltered, recoverable, micrograms per liter		<3.7 c	<3.7 c		<3.7 c	<4.0 c	<3.7 c		<3.7 c		<3.7 c	<3.8 c	<3.7 c		<3.7 c	<3.7 c	<3.7 c	<3.7 c	<3.7 c	<3.7 c	<3.9 c	<3.7 c	<3.7 c	<3.7 c	<3.7 c	
289	Radium-228, water, filtered, picocuries per liter				0.46										0.81												0.9
290	Xylene (all isomers), water, unfiltered, recoverable, micrograms per liter		<3.0 c	<3.0 c		<3.0 c	<3.0 c	<3.0 c		<3.0 c		<3.0 c	<3.0 c	<3.0 c		<3.0 c	<3.0 c	<3.0 c	<3.0 c	<3.0 c	<3.0 c	<3.0 c	<3.0 c	<3.0 c	<3.0 c	<3.0 c	
291	Acetone, water, unfiltered, recoverable, micrograms per liter		1.7 cn	2.6 cn		3.1 cn	<10 c	3.8 cn		1.7 cn		1.6 cn	V 6.0 cn	1.5 cn		3.8 cn	3.2 cn	2.2 cn	7.0 cn	0.8 cn	2.2 cn	V 2.1 cn	2.6 cn	2.1 cn	2.9 cn	1.4 cn	
292	Bromobenzene, water, unfiltered, recoverable, micrograms per liter		<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c		<1.0 c	<1.0 c	<1.0 c		<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	<1.0 c	
293	Methyl ethyl ketone, water, unfiltered, recoverable, micrograms per liter		<10 c	<10 c		<10 c	<10 c	<10 c		<10 c		<10 c	<10 c	<10 c		<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	<10 c	
294	Aroclor 1262, water, unfiltered, recoverable, micrograms per liter		<0.21 c	<0.20 c		<0.20 c	<0.21 c	<0.20 c		<0.20 c		<0.21 c	<0.19 c	<0.19 c		<0.20 c	<0.20 c	<0.20 c	<0.20 c	<0.19 c	<0.20 c	<0.20 c	<0.20 c	<0.20 c	<0.22 c	<0.19 c	
295	Aroclor 1268, water, unfiltered, recoverable, micrograms per liter		<0.110 c	<0.100 c		<0.100 c	<0.10 c	<0.100 c		<0.099 c		<0.110 c	<0.09 c	<0.094 c		<0.100 c	<0.100 c	<0.100 c	<0.099 c	<0.095 c	<0.100 c	<0.10 c	<0.100 c	<0.100 c	<0.110 c	<0.095 c	
296	delta carbon-13/carbon-12, water, unfiltered, per mil				-20.39										-17.38												-21.51
297	delta hydrogen-2/hydrogen-1, water, unfiltered, per mil				-46.2										-45.8												-44.2
298	delta oxygen-18/oxygen-16, water, unfiltered, per mil				-7.52										-7.93												-7.16
299	Radon-222, water, unfiltered, picocuries per liter				780										177												310
300	Ethion, water, filtered, recoverable, micrograms per liter							<0.005				<0.005		<0.005				<0.005							<0.005		
301	Sampling method, code	4033	4047	4040	4040	4080	4040	4047	4080	4040	4047	4047	4040	4047	4040	4040	4047	4033	4047	4040	4080	4080	4080	4047	4040	4040	4040
302	1,2-Dibromo-3-chloropropane, water, unfiltered, recoverable, micrograms per liter		<5.0 c	<5.0 c		<5.0 c	<1.0 c	<5.0 c		<5.0 c		<5.0 c	<1.0 c	<5.0 c		<5.0 c	<5.0 c	<5.0 c	<5.0 c	<5.0 c	<5.0 c	<1.0 c	<5.0 c	<5.0 c	<5.0 c	<5.0 c	
303	Metribuzin, water, filtered, recoverable, micrograms per liter							<0.012				<0.012		<0.012				<0.012							<0.012		
304	2,6-Diethylaniline, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.0060				<0.0060		<0.0060				<0.0060							<0.0060		
305	Trifluralin, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.018				<0.018		<0.018				<0.018							<0.018		
306	Dimethoate, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.0100 mc				<0.0100 mc		<0.0100 mc				<0.0100 mc							<0.0100 mc		
307	Phorate, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.020				<0.020		<0.020				<0.020							<0.020		
308	Methyl parathion, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.008				<0.008		<0.008				<0.008							<0.008		
309	EPTC, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.0056				<0.0056		<0.0056				<0.0056							<0.0056		
310	Tebuthiuron, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.028				0.061		<0.028				<0.028							<0.028		
311	Molinate, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.0080				<0.0080		<0.0080				<0.0080							<0.0080		
312	Ethoprop, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.016				<0.016		<0.016				<0.016							<0.016		
313	Benfluralin, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.014				<0.014		<0.014				<0.014							<0.014		
314	Carbofuran, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.060 mc				<0.060 mc		<0.060 mc				<0.060 mc							<0.060 mc		
315	Terbufos, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.018				<0.018		<0.018				<0.018							<0.018		
316	Propyzamide, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.0080				<0.0080		<0.0080				<0.0080							<0.0080		
317	Disulfoton, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.040 mc				<0.040 mc		<0.040 mc				<0.040 mc							<0.040 mc		
318	Propanil, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
319	Carbaryl, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.060 mc				<0.060 mc		<0.060 mc				<0.060 mc							<0.060 mc		
320	Thiobencarb, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.016				<0.016		<0.016				<0.016							<0.016		
321	DCPA, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.0076				<0.0076		<0.0076				<0.0076							<0.0076		
322	Pendimethalin, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.012				<0.012		<0.012				<0.012							<0.012		
323	Propargite, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.020				<0.020		<0.020				<0.020							<0.020		
324	Azinphos-methyl, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.120 mc				<0.120 mc		<0.120 mc				<0.120 mc							<0.120 mc		
325	cis-Permethrin, water, filtered (0.7 micron glass fiber filter), recoverable, micrograms per liter							<0.010				<0.010		<0.010				<0.010							<0.010		
326	Sampler type, code	4080	4045	4040	4030	4080	4045	4045	4080	4040	4045	4045	4035	4045	4045	4040	4045	4080	4045	4040	4080	4080	4080	4045	4040	4035	4040
327	m-Xylene plus p-xylene, water, unfiltered, recoverable, micrograms per liter		<2.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c		<2.0 c		<2.0 c	<2.0 c	<2.0 c		<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	<2.0 c	
328	Specific conductance, water, unfiltered, laboratory, microsiemens per centimeter at 25 degrees Celsius	1000	973	E 43 b	E 52 b	299	395	416	214 @c		E 78 b	2020	148	150	151	1130	218	787	1490 d	463	570	582	563 d	1520	E 98 b	115	120
329	1,2-Dichlorobenzene-d4, gasoline-range organic surrogate, water, unfiltered, percent recovery		86.0 c	92.8 c		97.7 c	107 c	100 c		88.2 c		78.9 c	98.0 cv	84.4 c		105 c	81.8 c	80.3 c	75.0 c	83.1 c	82.6 c	103 c	72.6 c	95.5 c	95.5 c	104 c	
330	n-Eicosane (C20), diesel-range organic surrogate, water, unfiltered, percent recovery		61.5 c	69.8 c						81.8 c		70.6 c		69.0 c						68.8 c	84.3 c			88.5 c			
331	Squalene, diesel-range organic surrogate, water, unfiltered, percent recovery		90.3 c	97.3 c		76.7 c	112 c	77.1 c		118 c		96.8 c	122 cv	80.0 c		69.4 c	63.9 c	57.4 c	53.2 c	96.0 c	124 c	121 c	89.6 c	125 c	74.2 c	69.2 c	
332	2,4,6-Tribromophenol, surrogate, water, unfiltered, percent recovery		101 c	94.2 c		94.4 c	83.1 c	110 c		104 c		94.4 c	87.6 c	110 c		101 c	104 c	84.8 c	108 c	91.3 c	106 c	70.1 c	95.8 c	106 c	121 c	96.5 c	
333	Trihalomethanes, water, unfiltered, minimum summation, micrograms per liter		1.8				1	0.9				8.4							8.8		5.2	3	2.6				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
1	Ethinylestradiol and Levonorgestrel Prevacid Heartburn Sumatriptan, Hydroxyzine and Diet																												
2	Pharyngoplasty (Uvulopalatopharyngoplasty) and Physiotherapy of CC, cryrogenic, water, LDR/polyp, percutaneous approach		4.8		4.8			4.8		4.9			4.8			113.4		4.8		4.9			4.8		4.8		4.8		4.8		4.8		4.8		4.8	
3	Excision of Left Ovary, Open Approach		53.6		47.2			59.2		59.6			57.7			63.5		72.2		55.1			45.4		72.8		56.3		59.8		45.8		65.3		111.5		72.8	
4	Removal of CC, cryrogenic, water, LDR/polyp, percutaneous approach		58.8		55.8			51.6		64.1			58.9			63.6		57.8		57.8			55.7		58.1		53.8		64.1		64.3		63.6		62.2		58.2	
5	Introduction of CC, cryrogenic, water, LDR/bead, percutaneous approach		68.6		70.4			73.8		66.1			59.4			87.9		76.7		82.8			81.5		82.6		75.2		72.6		73.5		72.3		81.1		109		73.9	
6	Physical Exam of CC, cryrogenic, water, LDR/polyp, percutaneous approach		56.6		67.4			101		57.1			109			84.1		69.6		72.9			63.1		108		109		93.6		74.5		59.3		114		55.7		
7	Excision of CC, cryrogenic, water, LDR/bead, percutaneous approach		63.1		69.1			77.6		66.6			53.4			83.1		81.8		69.5			87.1		82.3		71.2		79.6		73.2		75.5		84.4		84.1		
8	Type of Vaccine															20									20												
9	Synthetic code		1		1			1		1			1			1		1		1			1		1		1		1		1		1		1		1		1
10	CAPLIA, anti-RANKL6 Inj cocktail, 4.5 TC, 1 mL, prefilled syringe, Tofacitinib (HPRA) drug number 014/HSA		40218		40218			40218		40218			40218			40218		40218		40218			40218		40218		40218		40218		40218		40218		40218		40218	
11	Xeris, anti-RANKL6 cocktail, 4.5 TC, 1 mL, prefilled syringe, Tofacitinib (HPRA) drug number 014/HSA		40218		40218			40211		40255			40218			40218		40218		40218			40218		40218		40218		40211		40218		40218		40211		40218	
12	CAPLIA, anti-RANKL6 Inj cocktail, 6.3 TC, 1 mL, prefilled syringe, Tofacitinib (HPRA) drug number 014/HSA		40218		40218			40218		40218			40188			40218		40218		40218			40218		40218		40218		40218		40218		40218		40218		40218	
13	Xeris, anti-RANKL6 cocktail, 6.3 TC, 1 mL, prefilled syringe, Tofacitinib (HPRA) drug number 014/HSA		20218		20218			20218		20178			20178			20178		20178		20178			20178		20178		20178		20178		20178		20178		20218			
14	RANS Ist rumble, capsule filler, 0.43 micron		10044		10043			10034		10044			10039			10044		10039		10044			10044		10044		10044		10039		10044		10044		10039		10033	
15	Wrist Fx, Closed, Cryrogenic, water, LDR/bead, percutaneous approach		109.1		102.1			108.2		78.1			101.1			93.1		92.7		96.9			105.1		102.1		103.1		104.1		97.1		108.1		108.1		78.1	
16	Excision of Right Metacarpocarpal, cryrogenic, 5000g, 24/0, schedule, water, LDR/bead, percutaneous approach		56.6		60.3			55.1		53.6			60.1			68.4		62.7		66.1			67.1		64.7		70.3		59.8		69.1		58.1		58.1		57.6	
17	Human volume, RANS, schedule 24/0, cellfilter, injection 4/10, cryrogenic, RANS, schedule 24/0, water, filtered, percutaneous approach									127						424				363					516												424	
18	Excision of Left Ovary, Open Approach									65.7						68.2				62.6					74													
19	Xeris ANS-08, cryrogenic, RANS, schedule 24/0, water, filtered, percutaneous approach									47.3						41.3				70					69.8												41.3	

Appendix 5.5. Major Sources of Ground Water Contamination

Sources	Ten Highest-Priority Sources (✓)	Relative Priority	Factors[a]
Animal Feedlots	NA	--	--
Containers		L	A, B, D, E
CERCLIS Sites	✓	H	A, B, D, E, F, G, H
De-icing Applications		M	A, D, F, G, H
Federal Superfund (NPL)	✓	H	A, B, D, E, F, G, H
Fill	T	H	A, D, E, F, G, H
Graveyards		M	--
Landfills (permitted)	T	M	A, B, D, E, F, G, H
Landfills (unpermitted)	✓	U[b]	A, B, D, E, F, G, H
Material Transfer Operations		M	A, B, D, E, F, H
Material Stockpiles		L	A, B
Mining and Mine Drainage	NA	--	--
Pesticide Applications	✓	M	A, B, C, F, G, H
Pipeline and Sewer Lines	✓	M	F, H
Radioactive Disposal Sites	NA	--	--
RCRA Sites	✓	M	A, B, D, E, F, G, H
Septic Tanks		--	--
Shallow Injection Wells		M	A, F, G
Storage Tanks (above ground)		M	A, B, D, F, G, H
Storage Tanks (underground)	✓	H	A, B, D, E, F, G, H
Storm Water Drainage Wells		M	E, F, I
Surface Impoundments		L	A, B
Transportation of Materials	✓	M	A, B, C, D, E, G, H
Urban Runoff		M	F, H
Waste Tailings	NA	--	--
Waste Piles		M	A, D, E

A. Human health and/or environmental risk (toxicity)
B. Size of the population at risk
C. Location of the sources relative to drinking water sources
D. Number and/or size of contaminant sources
E. Hydrogeologic sensitivity
F. State findings, other findings
G. Documented from mandatory reporting
H. Geographic distribution/occurrence
I. Assigned for pipelines and sewer lines and is a combination of the age and construction material of the lines (in D.C., there still are brick lines at least 100 years old).

[a] Unknown. The locations and nature of the materials disposed in unpermitted landfills are not yet known.

NA - Not Applicable
L - Low
M - Medium
H - High
(–) - Not a Priority

Appendix 5.6. Summary of District Ground Water Related Programs and Activities

Programs or Activities	Check	Implementation Status	Responsible State Agency
Ambient ground water monitoring system	✓	Partly established	DOEE
Aquifer vulnerability assessment[(1)]	✓	Fully established	DOEE
Aquifer mapping[(2)]	✓	Under development	DOEE
Aquifer characterization	✓	Partly developed	DOEE
Comprehensive data management system [(3)]	✓	Partly developed	DOEE
Emergency Response	✓	Fully established	HSEMA
EPA-endorsed Core Comprehensive State Ground Water protection Program (CSGWPP)	✓	Under development	DOEE
Ground water discharge permits	✓	Under development	DOEE
Ground water Best Management Practices	✓	Under development	DOEE
Ground water legislation	✓	Fully established	DOEE
Ground water classification	✓	Fully established	DOEE
Ground water quality standards	✓	Fully established	DOEE
Interagency coordination for ground water protection initiatives	✓	Under development	DOEE
Land Remediation and Development (Brownfields Revitalization Program)	✓	Fully established	DOEE
Nonpoint Source Controls	✓	Partly developed	DOEE
Pesticide State Management Plan	✓	Fully established	DOEE
Pollution Prevention Program	✓	Under development	DOEE

Programs or Activities	Check	Implementation Status	Responsible State Agency
State RCRA Program incorporating more stringent requirements than RCRA Primacy (except for corrective action)	✓	Fully established	DOEE
State septic system regulations			
Underground storage tank installation requirements	✓	Fully established	DOEE
Underground Storage Tank Remediation Fund	✓	Fully established	DOEE
Underground Storage Tank Permit Program	✓	Fully established	DOEE
Underground Injection Control Program		Joint oversight	DOEE & EPA
Vulnerability assessment for drinking water/wellhead protection	✓	Fully established	DOEE
Well abandonment regulations	✓	Fully established	DOEE
Wellhead Protection Program (U.S. EPA-approved)	**T**		
Well installation regulations	✓	Fully established	DOEE

HSEMA – Homeland Security Emergency Management Agency
DOEE –Department of Energy and Environment

Appendix 5.7. Shallow Aquifer Quality/ Contamination.

Aquifer: Shallow Aquifer				
Source Type	Present in reporting area	Number of sites in area	Number of sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination
NPL	Yes	1	1	1
SEMS (formerly CERCLIS)	Yes	30	14	13
DOD/DOE	Yes (a)	47	9	8
UST- Total opened and closed	Yes	3125 (b) (c)	1457 (c)(d)	438 (c)(d)
UST Active/Opened	Yes	586 (b)(e)	147 (f)	87 (f)
RCRA Corrective Action	Yes	0	0	0
Underground Injection	Yes (g)	2	—	39
State Sites (Voluntary Clean Lands Program)	Yes (h)	27	27	17
Nonpoint Sources	(i)	—	—	---
Other	Yes	6	6	26
Totals		3824	1661	609

NPL - National Priority List
SEMS - (Superfund Enterprise Management System (formerly CERCLIS - Comprehensive Environmental Response, Compensation, and Liability Information System)
DOE - Department of Energy
DOD - Department of Defense
UST - Underground Storage Tanks
RCRA - Resource Conservation and Recovery Act

(a) Only DOD facilities. The number represents the number of facilities. Within a facility, there are several areas of concern resulting from distinct sources (e.g., LUST, landfill, maintenance shops, etc). Ground water contamination assessment is on going for the majority of the sites. Numbers were provided by the Hazardous Waste Division.

(b) Data represent the number of UST facilities known to DC from previous and current annual registration. This value includes sites with heating oil and hazardous materials tanks. Numbers were provided by the Underground Storage Tank Branch, DOEE.

(c) Most of these sites (facilities) are not closed, either the USTs were removed or abandoned in-place or the soil and/or groundwater contamination was remediated and the LUST case closed. There are 3,125 facilities with 1,826 open and closed LUST cases in the District. A total of 506 facilities have or had LUST cases with groundwater contamination. However, facilities with more than one LUST case are counted more than once. There are 149 open LUST cases and 88 have groundwater contamination.

(d) Each facility is counted only once independent of the number of LUST cases.

(e) This value applies to active and temporarily closed tanks.

(f) There is on-going groundwater contamination assessment/remediation and monitoring by responsible parties for many of the open LUST cases pending closure. These cases include heating oil contaminated sites.

(g) Data provided by the USEPA Region 3 Underground Injection Program

(h) Source type data make no distinction between State and non-State sites

(i) See Nonpoint Source Section

Appendix – Long-Term Trend Analysis

Since the mid-1980s, the District Department of Energy and Environment (DOEE) has collected grab samples at various stations to assess water quality conditions. DOEE reviewed a subset of these data to evaluate whether there is statistical evidence of trends in water quality. The parameters assessed were ammonia, dissolved oxygen (DO), *E. coli* (a type of bacteria associated with feces), nitrate, pH, and total suspended solids (TSS). A different analysis was conducted for copper, lead, and zinc, in which, instead of looking for trends, the valid monitoring data was evaluated as to whether the results exceeded the corresponding water quality criteria.

Exceedance Analysis for Metals

All of the available metals data from 1990 through 2012, the last year available, were evaluated in this analysis. The first step was to select those measurements that were properly collected. The evaluation of metals against their water quality criteria depends on hardness of the water and on the concentration of total suspended solids (TSS). These two parameters should be sampled simultaneously with the metals. Hardness affects the criterion maximum concentration (CMC) against which the measurements were to be evaluated. TSS concentrations are essential because the water quality standards are specified for dissolved metals, which are the bioavailable component, that is, the component that can affect living organisms. Therefore, TSS concentrations are needed to properly partition the total metal concentration into its dissolved fraction. Data points that did not have this paired sampling, approximately half of the dataset, were excluded from the analysis.

The measurements that were properly paired were compared against the CMC adjusted for hardness. The results of these comparisons are shown in Figures A-1 to A-3. In this figures, all of the valid sampling data points have been aggregated by major watershed, Anacostia, Potomac, and Rock Creek, to provide a comprehensive snapshot of the mainsteam of each of these waterways. This averaging procedure also avoids the high variability typical of individual monitoring stations.

The figures show large numbers of non-detects, that is, water samples in which the metal was not detected by the methods employed in the laboratory. Although these observations do not indicate that the metal is completely absent, the detection limits are usually very low; therefore, if the metal is present, its concentration is minimal and, for these metals, always below the CMC.

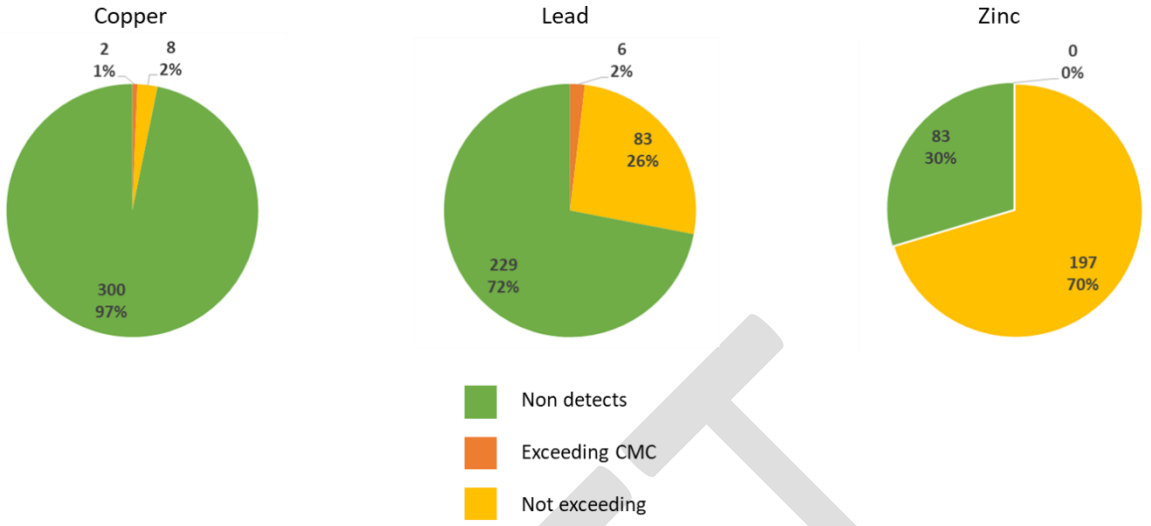


Figure A-1. Summary of results for the Anacostia River.

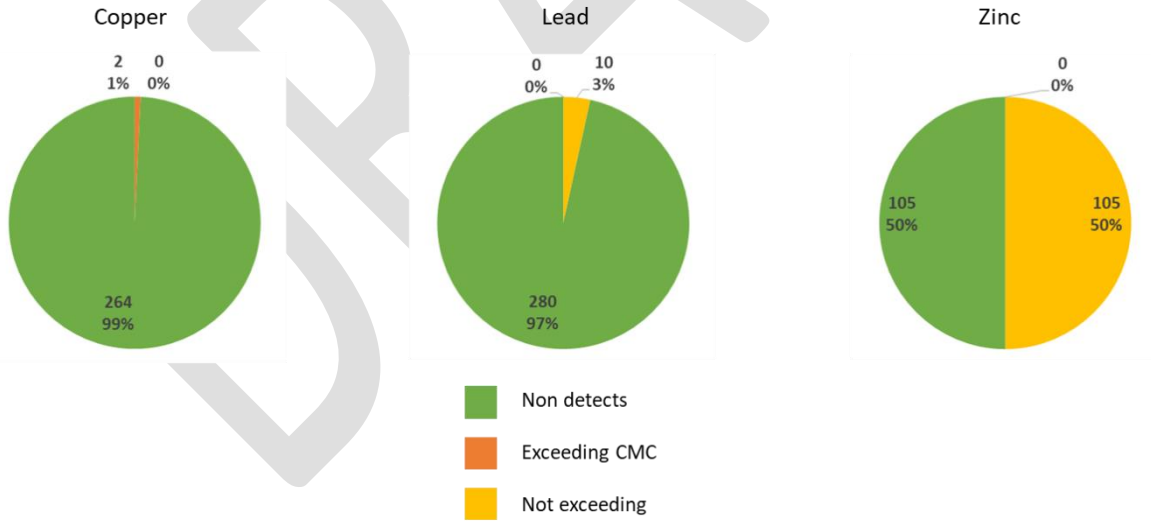


Figure A-2. Summary of results for the Potomac River.

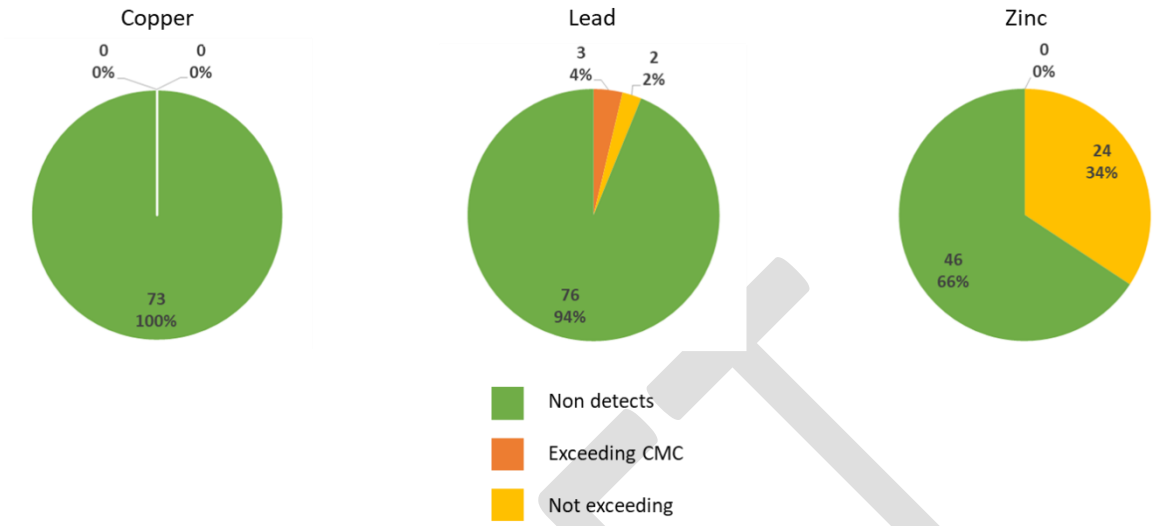


Figure A-3. Summary of results for Rock Creek.

This analysis reveals a very small number of exceedances in the monitoring record for these metals. For all of the three water bodies, most of the laboratory analyses did not detect the metals and for those samples in which there was a detection, the concentration did not exceed the CMC. The exceedances measured are: In the Anacostia River, 2 exceedances for copper (1%) and 6 for lead (2%), in the Potomac River 2 exceedances for copper (1%), and in Rock Creek 3 exceedances for lead (4%). In summary, there is no evidence from the analytical results that these metals are causing impairments.

Trend Analysis

The trend analyses for ammonia, dissolved oxygen (DO), *E. coli*, nitrate, pH, and TSS focused on the mainstems of Anacostia River, Potomac River, and Rock Creek, where the long-term data collection has been consistent. To provide a meaningful snapshot, all of the monitoring stations in each mainstem were averaged for each year in the record. For some constituents, the evaluations depend on the season; therefore, in these cases the aggregation was performed for defined periods in each year. Geometric means[1] were calculated for *E. coli*. This procedure yielded one data point per mainstem, either per year or per season, depending on the constituent.

[1] Geometric means are used instead of arithmetic means whenever there are large variations in the contaminant concentrations, as is the case for microorganisms. The *E. coli* samples range from the single digits to the thousands. For an explanation of how geometric means are calculated see http://www.mathsisfun.com/numbers/geometric-mean.html.

The resulting series was analyzed with a Mann-Kendall statistical test, a non-parametric test widely used to detect monotonic trends[2]. When appropriate, the seasonal version of the test was applied; for example, for DO, which has different criteria depending on the time of the year and for ammonia for which the standard varies with temperature and pH. The Mann-Kendall test is well documented in a variety of sources, *e.g.*, https://vsp.pnnl.gov/help/vsample/Design_Trend_Mann_Kendall.htm.

The Mann-Kendall test detected four significant trends for the constituents that were evaluated (Table A-1). DO concentrations were decreasing in both the Anacostia River and Potomac River between the months of June-January, annual mean pH measurements were increasing in Rock Creek, and annual mean TSS concentrations were decreasing in the Anacostia River. All other data sets did not show a trend.

Table A-1: Results of the Man-Kendall analysis when a trend was detected.

Mainstem	Constituent	Trend
Anacostia	Dissolved Oxygen (June-Jan)	Decreasing
Potomac	Dissolved Oxygen (June-Jan)	Decreasing
Rock Creek	pH	Increasing
Anacostia	TSS	Decreasing

Plots for all of the datasets analyzed are shown in Figures A-3 to A-9. A trend line was added only for those datasets for which the Mann-Kendall test indicated that there was a trend. Instantaneous maximum and minimum measurements were also included as a measure of variability.

For comparison purposes, one or two water quality criteria were included in the plots whenever they were specified in the District's water quality standards. However, the comparison against these criteria is not strictly correct because of the averaging

[2] Statistical tests are mathematical procedures to compare data records and detect changes in them. The math behind these tests is complex. The Mann-Kendall test selected for this analysis is useful to detect whether there is a consistent (monotonic) decrease or increase in a series of numbers.

procedure by mainstem described above. Whereas the data points are geographic and temporal averages of instantaneous measurements, the criteria have varying definitions. For example, DO has an instantaneous minimum and 7-day and 30-day mean minima, which depend on the time of the year. *E. coli* has a maximum 30-day geometric mean for five samples and also a single-sample value. The purpose of presenting the criteria is to provide relevant reference values but not to make compliance determinations.

Ammonia

Ammonia data from 2000 to 2015 were analyzed. The water quality standard for this constituent is a function of temperature and pH. Therefore, it is not a fixed value. To account for the variation of temperature in the year, ammonia data were aggregated into monthly "seasons." A monthly approximation of the standard was calculated based on the monthly means of observed temperature and pH. The formulas to compute the 30-day Criterion Continuous Concentration (CCC) are listed in the District's Water Quality Standard document from November 1, 2013. The result of this computation is not strictly the CCC because the pH and temperature are monthly averages, but it serves as a reference value. A seasonal Mann-Kendall test was performed and no significant trends were found (Figure A-3). However, all of the data points are below the standard in each of the three mainstems.

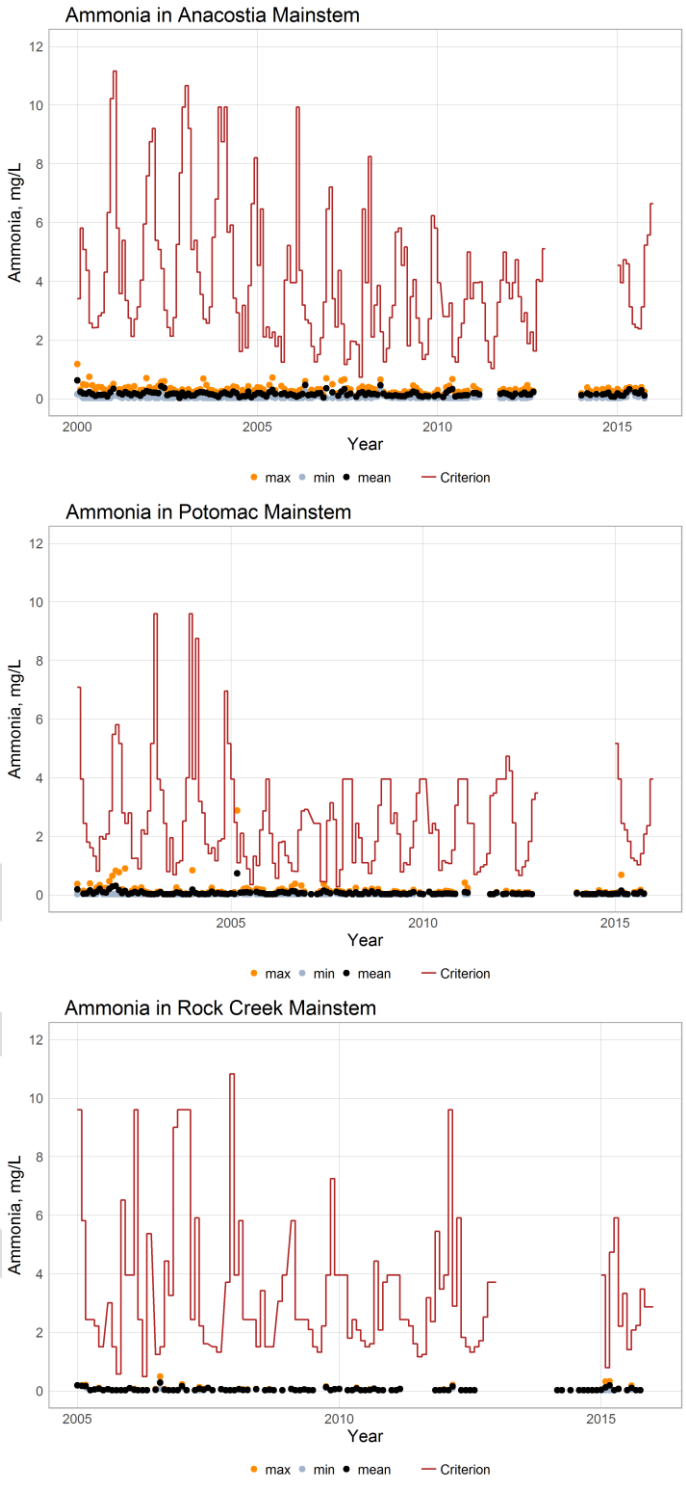


Figure A-3. Results of the trend analysis for ammonia. The criterion (red line) varies with monthly temperature and pH. These measurements were unavailable between 2012 and 2015. No trends were detected.

Dissolved Oxygen

DO data from 2001 to 2015 were used in the analysis. Water quality standards in surface water are defined seasonally. During the period of June to January, dissolved oxygen must exceed a 30-day mean of 5.5 mg/L, a 7-day mean of 4 mg/L, and an instantaneous minimum of 3.2 mg/L. Between February and May, no 30-day minimum is designated; however, DO should exceed a 7-day minimum mean of 6 mg/L and an instantaneous minimum of 5 mg/L.

Long term trends in dissolved oxygen were assessed independently for each water quality standard period. Data collected during each season was aggregated annually by mainstem and a Mann-Kendall test was performed for each season. Significant trends were found in both the Anacostia and Potomac mainstems during the June-January season. Observed DO values are compared against the instantaneous water quality standards (Figure A-4). For this parameter, values greater than the standard are indicative of good water quality.

E. coli

The period for the available *E. coli* monitoring data was 2008 to 2015. Water quality standards for *E. coli* in the District specify that no single sample shall exceed 410 MPN/100 mL and that the 30-day geomean should not exceed 126 MPN/100 mL.

Long terms trends in *E. coli* were assessed on an annual basis. A Mann-Kendall test, performed on the annual geomeans, showed no significant trend in any of the mainstems. Although not directly comparable to the annual geomean, the 30-day geomean standard is shown on the plots in order to provide a reference value (Figure A-5).

Nitrate

There are no water quality standards for nitrate. Data from 1984 through 1995 were aggregated annually and long term trend analysis was performed using the Mann-Kendall test. No significant trends were found in any of the mainstems (Figure A-6).

pH

The record for pH data ranges from 2000 to 2015. Water quality standards in the District specify that pH of surface water should fall between 6 and8.5. Data was aggregated annually and a Mann-Kendall test was performed. A statistically significant increasing trend was identified in the Rock Creek mainstem. No trends in pH were found in either the Anacostia or Potomac mainstems.

Total Suspended Solids (TSS)

TSS data are available from 1984 to 2015. There are no water quality standards for TSS. Data were aggregated annually for the Mann-Kendall test. Based on these results, a

significant trend in TSS over time was found in the Anacostia mainstem. No trend in TSS was found in the Potomac or Rock Creek mainstems.

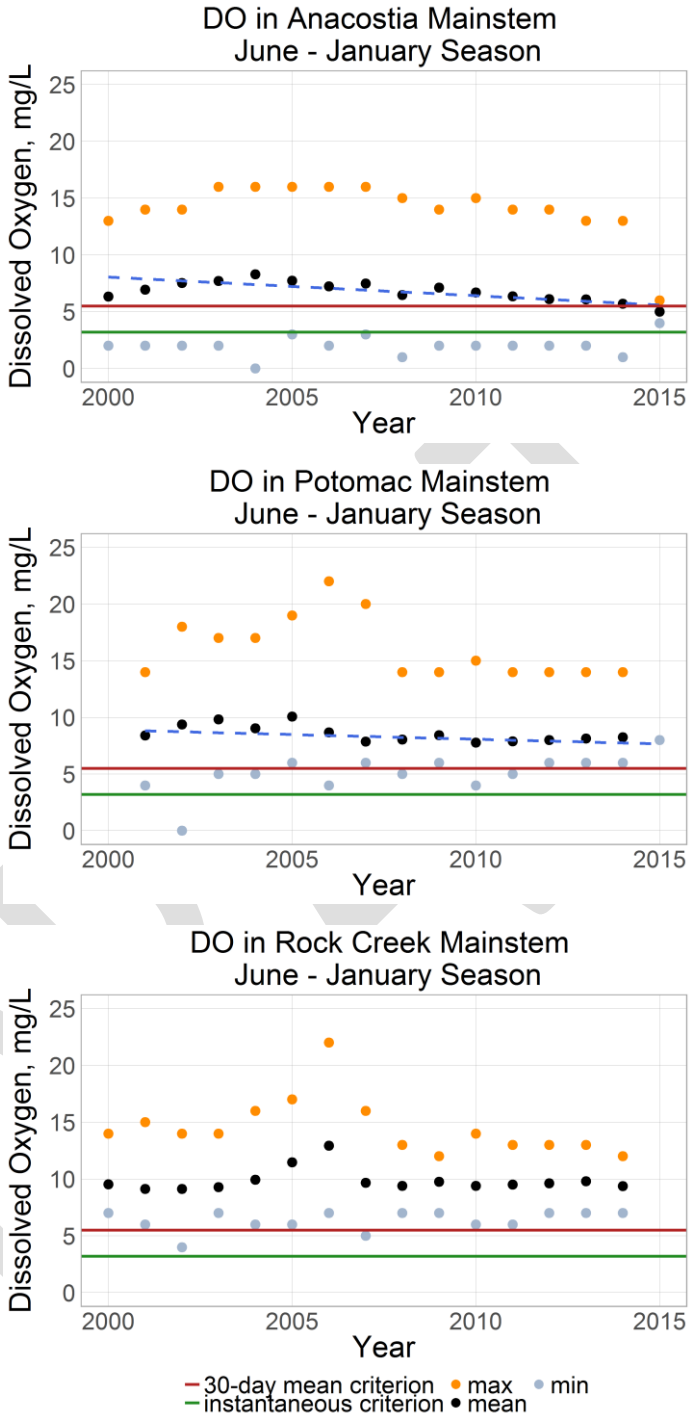


Figure A-4. Trend analysis for DO during the June – January period. The criteria shown are the instantaneous minimum (3.2 mg/L in green) and the 30-day mean minimum (5.5 mg/L in red). Values above the criteria indicate good water quality. Decreasing trends possible for Anacostia and Potomac.

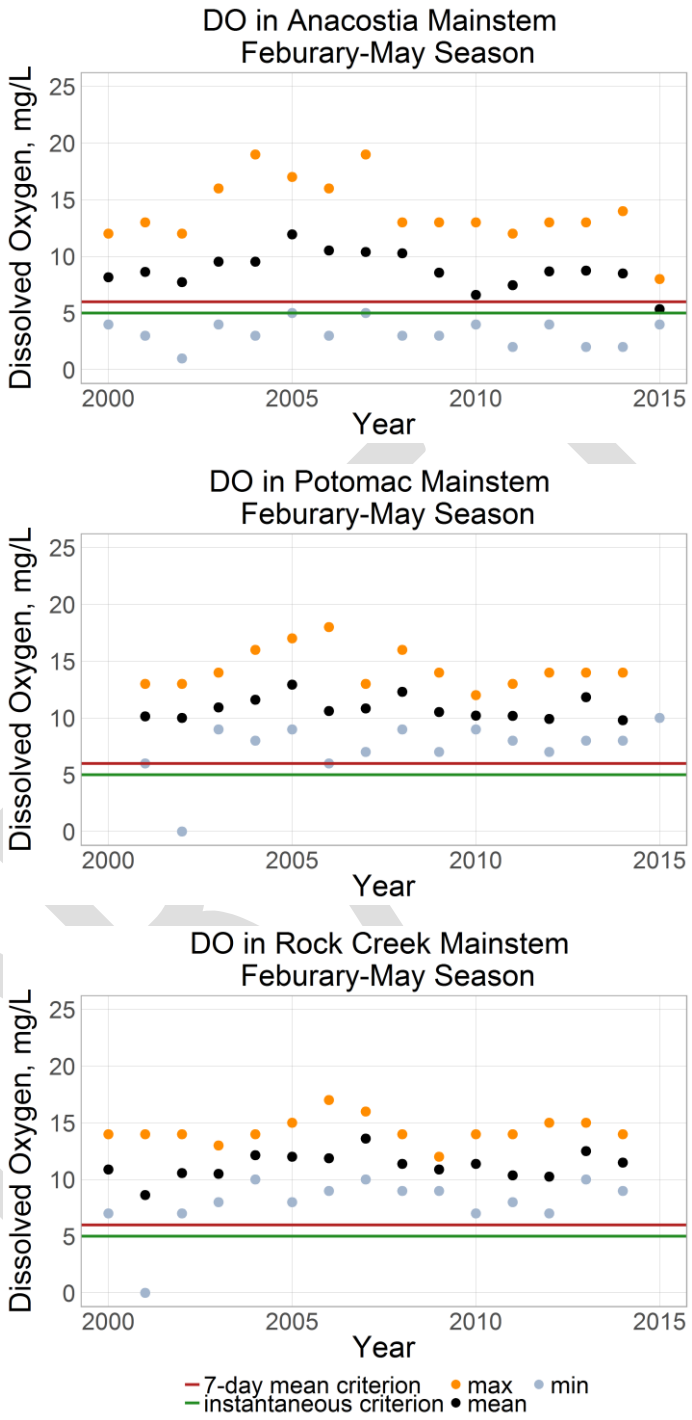


Figure A-5. Trend analysis for DO during the February – May period. The criteria shown are the instantaneous minimum (5 mg/L in green) and the 7-day mean minimum (6

mg/L in red). Values above the criteria indicate good water quality. No trends were detected.

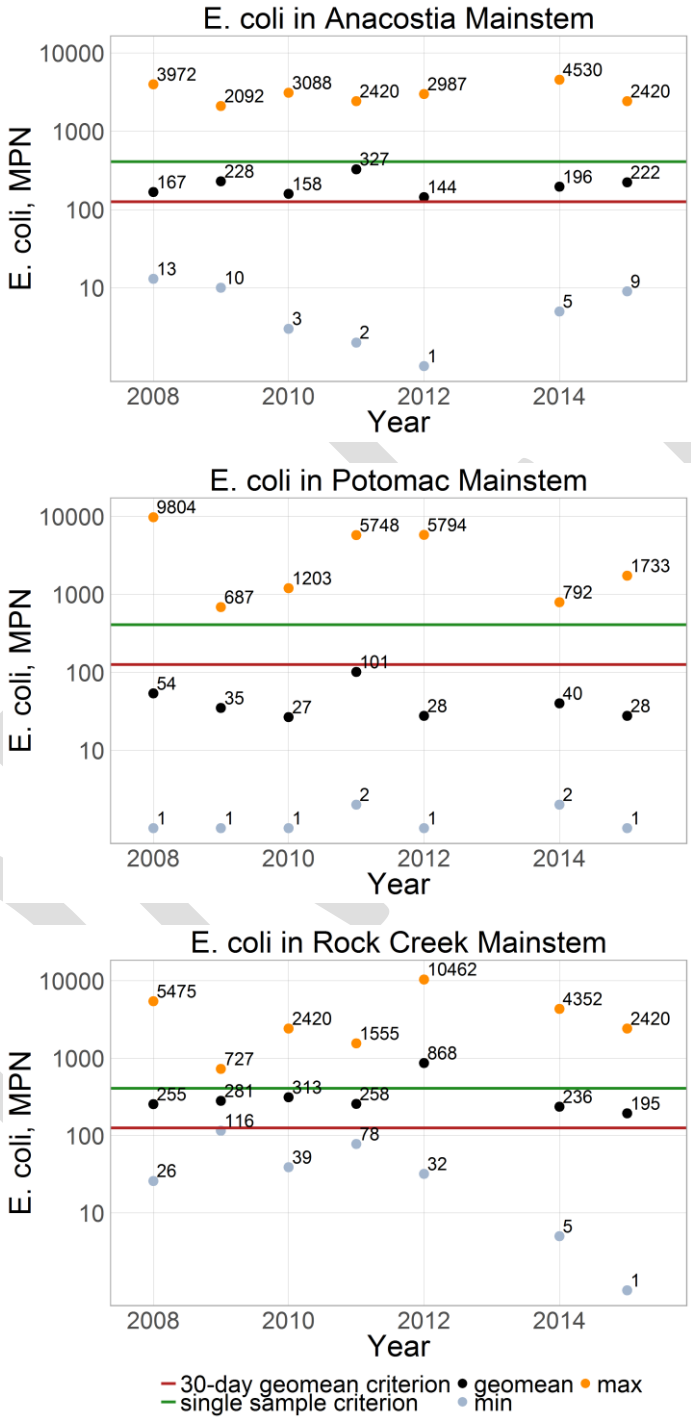


Figure A-6. Trend analysis for E. coli *in log scale. The criteria shown are the instantaneous maximum 30-day geometric mean for five samples (126 MPN/100 mL in red) and the single-sample maximum (410 MPN/100 mL in green). Values are shown next to each data point. No trends were detected.*

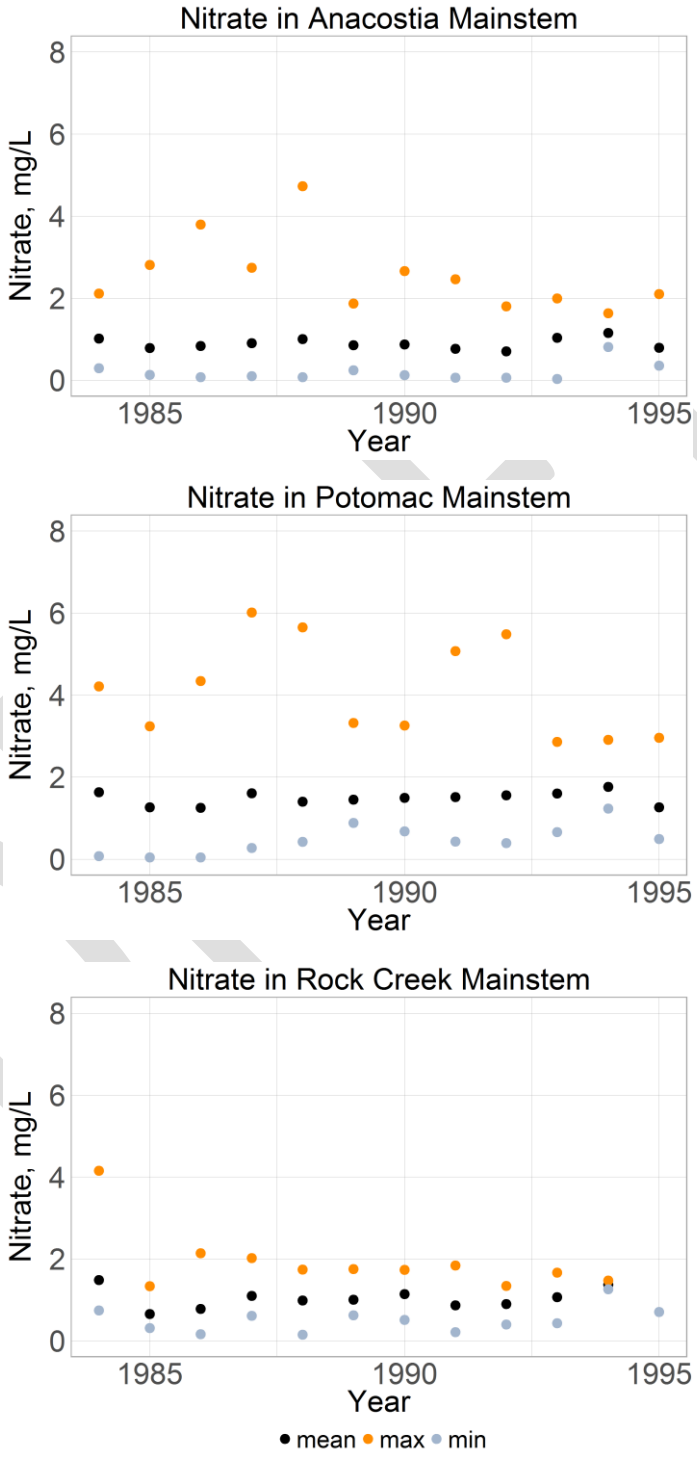


Figure A-7. Trend analysis for nitrate. There is no criterion for this constituent. No trends were detected.

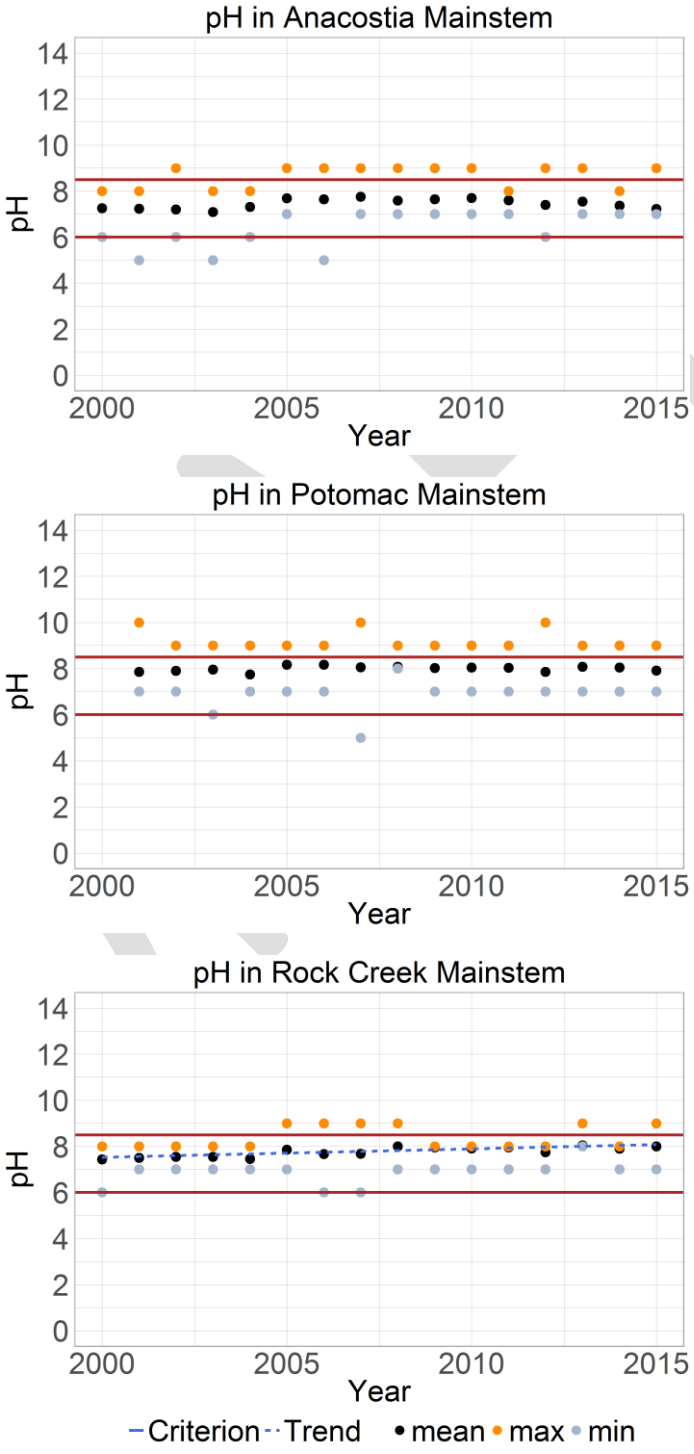
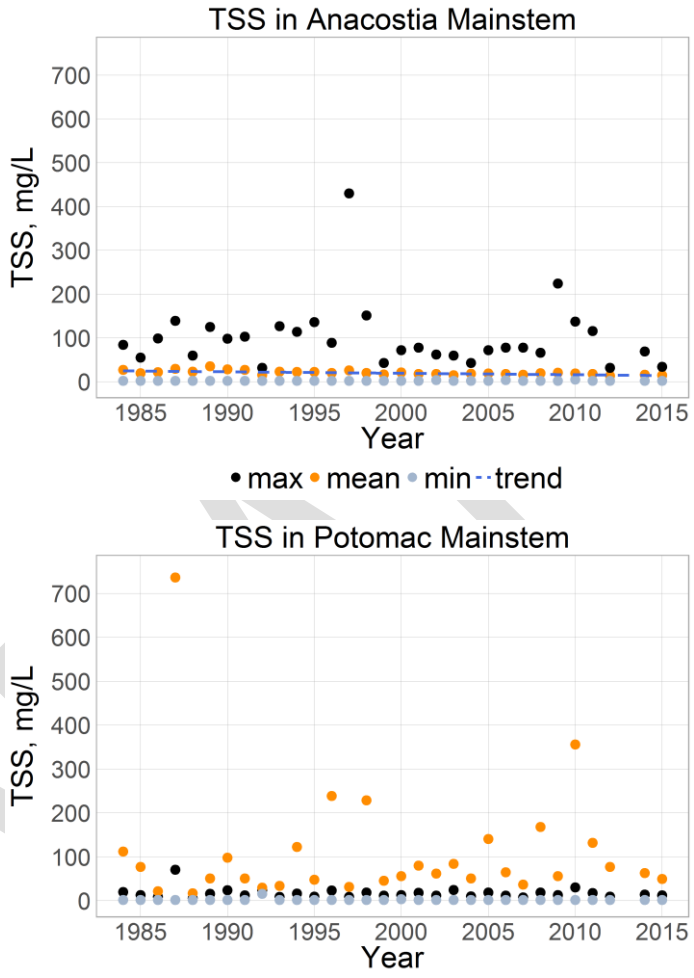


Figure A-8. Trend analysis for pH. The criterion is a range between 6 and 8.5 for instantaneous samples. Increasing trend detected for Rock Creek.



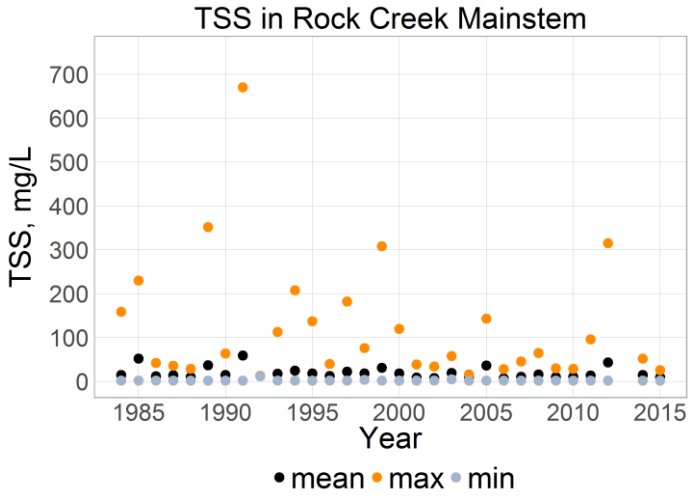


Figure A-9. Trend analysis for TSS. There is no criterion for this constituent. Decreasing trend detected for Anacostia.

Conclusion

The analysis for lead, copper and zinc reveals that there is a very small number of exceedances in the monitoring record for these metals. Most of the laboratory analyses did not detect the metals and for those samples where there was a detection, the concentration did not exceed the CMC. There is no analytical evidence that these metals are causing impairments.

The trend analyses for ammonia, DO, *E. coli*, nitrate, pH, and TSS yielded mixed results and trends were detected only for four cases. In the Anacostia mainsteam, a decreasing trend in DO for the period of June to January was detected. A decreasing trend was also noted for TSS. In the Potomac mainstem, a decreasing trend in DO between June and January was observed. In Rock Creek, an increasing trend in pH was identified.

Ammonia measurements are all below the criterion.

For DO, the vast majority of the average data points were better than the criteria. In the Anacostia, one of the average points was below the 7-day mean criterion and all of the minimum measurements were below the instantaneous criterion.

For *E. coli*, the average values for Anacostia are below the single-sample criterion but above the 30-day criterion. In the Potomac, the average points are all below both criteria. In Rock Creek, all points are below the single-sample criterion but above the 30-day criterion, except for one point that exceeds both criteria.

The values of pH show moderate variability and all of the averages are within the range that defines the criterion. In Potomac, all of the instantaneous maxima exceeded the

upper limit of the range but only one minimum was below the lower limit. There are no values below the lower limit in Rock Creek but several are greater than the upper limit. In Anacostia, deviations from the range are present for both limits.