CHAPTER IV

WATER RESOURCES

IV. WATER RESOURCES

A. ECOLOGICAL OVERVIEW

Water resources include streams, ponds, lakes and groundwater. These resources serve as sources of drinking water, recreation, stormwater conveyance and habitat for numerous organisms. These water bodies can be significantly impacted by land disturbances and surface runoff. Over the past decade, Fairfax County has demonstrated a strong commitment to restore and protect its water resources through a variety of management efforts and public outreach initiatives. Unless water resources are managed properly, increasing demands put on watersheds, such as rapid development, can create many problems.

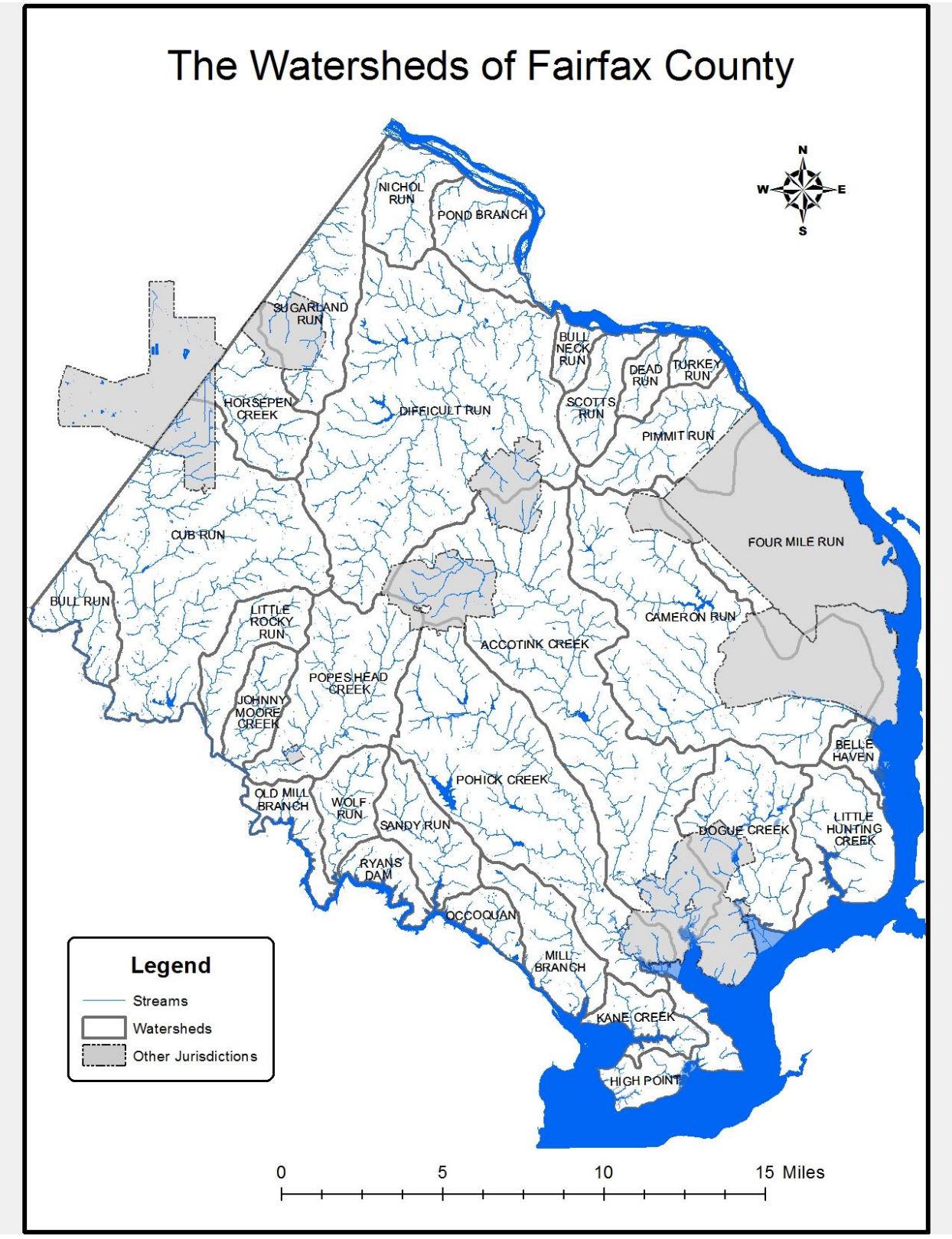
1. Watersheds

A watershed is a discrete area of land that drains to a common stream, river system or larger body of water. Watersheds include both surface water and groundwater. Everyone lives in a watershed. Large watersheds typically have sub-watersheds. There are 30 separate watersheds in Fairfax County (Figure IV-1). The largest watershed is Difficult Run (58 square miles) with ten streams that drain into the main stream, Difficult Run, which, in turn, drains into the Potomac River. The Potomac River watershed is a sub-watershed of an even larger watershed, the Chesapeake Bay watershed, which has an area of 64,000 square miles and includes portions of the states of New York, Pennsylvania, Delaware, West Virginia, Maryland and Virginia as well as the District of Columbia. All Fairfax County streams are in the Potomac River watershed and subsequently the Chesapeake Bay watershed.

2. Streams

Fairfax County is criss-crossed by a number of streams, often called runs or creeks. These streams are important aquatic habitats. Rainfall soaks into the earth and drains to low points in the surrounding land, and then emerges from the ground as seeps, springs and trickling headwaters. These small streams join with others in the same drainage area to create a stream system. There is a natural progression in size from the smallest tributaries to the largest rivers into which they eventually flow. Perennial streams flow throughout the year and intermittent streams flow only part of the year. There are approximately 860 miles of perennial streams in Fairfax County. One-third of the land in the Fairfax County Park system, approximately 7,000 acres, is comprised of stream valleys. These stream valleys are significant corridors for wildlife and the county trails system.

Figure IV-1: Fairfax County Watershed Map



The bottom, or bed, of a stream can consist of boulders, cobbles, gravel, sand and/or silt. The type and amount of substrate in a stream makes up the in-stream habitat. Within a stream are shallow, fast flowing areas called riffles. Dissolved oxygen levels are high because water is flowing over rocks, mixing air into the tumbling water. Alternating with riffles are deeper pools and runs where flows slow and particles of inorganic and organic matter fall to the bottom and oxygen levels are reduced. Streams support a diverse community of plants and animals that spend all or part of their life cycles in the water.

Figure IV-2: A Healthy Stream

Figure IV-3: Components of a healthy stream

Lakesuperiorstreams. 2009. LakeSuperiorStreams: Community Partnerships For Understanding Water Quality and Stormwater Impacts at the Head of the Great Lakes (http://lakesuperiorstreams.org). University of Minnesota-Duluth, Duluth, MN 55812.

The aquatic food chain begins with leaves and other decaying plant and animal material called detritus. These materials are carried into the stream from the surrounding forests and fields by wind and water runoff. Aquatic vegetation such as algae is also an important food source. Benthic (bottom–dwelling) macro (large) invertebrates (without a back-bone) eat this organic matter. Benthic macroinvertebrates include aquatic insect larvae such as stoneflies, mayflies, caddisflies and true flies as well as snails, clams, aquatic worms and crustaceans such as crayfish. Fish, birds and other streamside wildlife, such as frogs, salamanders and small mammals, eat these macroinvertebrates.

3. Riparian Buffers

The area of trees and other types of vegetation adjacent to and lining the banks of streams is called a stream buffer or a riparian zone. These areas are essential for healthy streams. The temperature in a stream greatly affects how much oxygen it can hold. Since cooler water holds more oxygen, shade-providing trees and vegetation are vital along the edges of streams to help maintain cooler water temperatures so the water will hold more oxygen.

Tree cover provides food and shelter when leaves and branches fall into a stream. Streamside forests offer food, nesting sites and protection to a great diversity of wildlife, including birds, turtles, beaver and snakes. Tree roots help stabilize stream banks and provide cover for fish, crayfish and aquatic insects. Riparian areas help slow down and filter runoff. Excess nutrients carried in runoff are absorbed by vegetation.

B. IMPACTS ON WATER RESOURCES

1. Point and Nonpoint Source Pollution

Water pollution originates from either nonpoint or point sources. Nonpoint sources include surface runoff, atmospheric deposition and groundwater flow. Because of their diffuse and intermittent nature, nonpoint source pollution is difficult to control. Nonpoint source pollutant loads are greatest following rainfall and high flow events. A significant part of the nonpoint source load consists of nutrients, including nitrogen and phosphorus (organic matter, fertilizer), which stimulate algal growth. Other nonpoint source pollutants are sediment (from erosion, construction sites, eroded stream banks and road sand), toxics (oil, paint, pesticides, chemicals and metals), pathogens and bacteria (animal waste, failing septic systems and leaking sewer systems) and trash.

Point sources are specific locations, such as discharge pipes, that discharge pollutants. Because they are relatively constant and provide a steady flow of pollutants, they are easier to monitor and control. In the Potomac River watershed, most point sources are wastewater treatment plants or industrial discharges. Unlike nonpoint sources, point sources contribute relatively small portions of the nutrient loads during high flows and the majority during low flows.

2. The Effect of Imperviousness

As development occurs, natural areas that once had vegetative cover capable of absorbing water and filtering pollutants are replaced by impervious surfaces such as roads, driveways and buildings. With the increase in impervious surface and loss of vegetative cover, there is a concurrent increase in the amount and speed of stormwater runoff flowing into streams. Increased uncontrolled runoff causes stream erosion, resulting in scouring, down cutting and over-widening of stream channels and loss of streamside vegetation. Loss of shade results in increased water temperatures. During summer storms, runoff from heated impervious surfaces also raises water temperatures. In urban and suburban watersheds, rain flows off impervious surfaces such as parking lots and highways, carrying oil and other automobile wastes into streams. When stream channels become incised from down-cutting, they become disconnected from their floodplains. Water cannot get out of the banks onto the adjacent floodplain where flows can be dissipated and drop their sediment loads. High flows stay in the channel, resulting in increased erosion. Silt and sediment from erosion smother the stream bottom and destroy in-stream habitat for sensitive benthic macroinvertebrates.

Simultaneously, this results in an increased number of floods in downstream areas, due to the increased volume of water. Over time, increased erosion, flooding and sediment deposition lead to habitat loss, water quality problems and damage to utilities and infrastructure.

Figure IV-4: An Unhealthy Stream

Photo provided by the Fairfax County Department of Public Works and Environmental Services.

C. SURFACE WATER MONITORING AND ANALYSES

The Fairfax County Department of Public Works and Environmental Services, Fairfax County Park Authority, Virginia Department of Environmental Quality, local water treatment plants and other organizations regularly conduct water quality monitoring and testing. The Northern Virginia Soil and Water Conservation District also collects monitoring information through its volunteer water quality monitoring programs. All of these data help provide a comprehensive understanding of the condition and health of Fairfax County's water resources.

1. Countywide Watershed and Stream Assessments

a. Stream Protection Strategy Baseline Study

The Stream Protection Strategy Baseline Study, published in 2001, provides a holistic ecological base-line assessment of county streams. The study provides information on fish taxa, benthic macroinvertebrates, general evaluation of watershed and stream features and calculations of the percent impervious cover within each watershed. The Stream Protection Strategy Baseline Study can be viewed online at: www.fairfaxcounty.gov/dpwes/environmental/sps_main.htm.

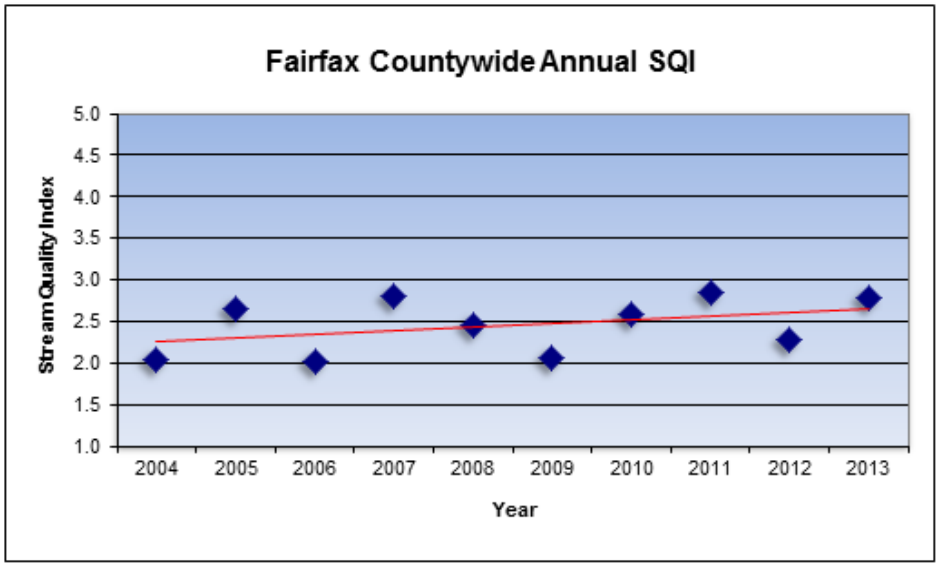
b. 2013 Annual Report on Fairfax County's Streams (now the Stormwater Status Report)

i. Overview of Biological Monitoring

This report provides data from sampling efforts conducted in 2013 and documents overall stream conditions based on the health of fish and benthic macroinvertebrate communities. In addition, the potential human health risk associated with wading or swimming in streams is assessed based on analyses of *E. coli* bacteria.

The Fairfax County biological stream monitoring program includes annual sampling of fish and macroinvertebrate communities in wadeable, non-tidal freshwater streams. Countywide biological monitoring is conducted using a probabilistic design approach, whereby statistically valid inferences may be made about the condition of the county's streams. Each year, all potential sampling sites are stratified by stream order (first through fifth order) and 40 sites are selected randomly for monitoring. At these sites, samples are collected for both benthic macroinvertebrates and fish and for *E. coli* bacteria. Water quality and stream habitat characteristics are also evaluated. The previous year's annual stream reports are available online at http://www.fairfaxcounty.gov/dpwes/stormwater/stormwater_status.htm and http://www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm. Figure IV-5 presents a summary of trends in a countywide Stream Quality Index.

Figure IV-5: Trends in the Countywide Stream Quality Index



Source: 2013 Fairfax County Stormwater Status Report, June 2014

A total of 53 sites were sampled in 2013: the 40 sites randomly selected in Fairfax County plus 11 Piedmont reference locations in Prince William National Forest Park and two Coastal Plain reference sites in the Kane Creek watershed of Fairfax County. Of the 40 sites selected, all were sampled for macroinvertebrates and 16 were sampled for fish. (Only those sites with a drainage area greater than 300 acres are sampled for fish; headwater streams have few fish.) Results from the 40 randomly selected sites suggest that approximately 50 percent of the county's waterways are in "Poor" to "Very Poor" condition based on a macroinvertebrate sampling and 50 percent are in "Poor " to "Very Poor" based on fish sampling. This is an increase in the biological ratings compared to previous years. This may be a result of the random site selection (it is possible for a group of lower quality sites to be chosen in some years). **Over the past 10 years, a small increase in the benthic Index of Biological Integrity scores has emerged. As future sampling results are added, a trend in biological integrity should begin to emerge.**

This index is reported annually to evaluate long-term trends in the overall health of streams. As more data are reported annually, emerging trends can be identified with greater certainty.

The 2013 Stormwater Status Report states the following:

The monitoring program is part of the framework to establish a baseline to evaluate future changes in watershed conditions. Monitoring results from 2008 through 2013 were reported in Fairfax County Stormwater Status Reports, which may be viewed at http://www.fairfaxcounty.gov/dpwes/stormwater/stormwater_status.htm.

Monitoring results from 2005 through 2007 may be found in Annual Reports on Fairfax County Streams at http://www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm.

ii. Bacterial Monitoring

In 2013, the Stormwater Planning Division completed its 10th year collecting data for the bacteria monitoring program since acquiring the program from the Fairfax County Health Department

To determine levels of *E. coli* in county streams, grab samples of stream water were taken at 40 sites in 16 watersheds throughout the county. Staff collected samples four times during the year. Sites are normally sampled four times during the year for the bacteria, *E. coli*. Samples are processed at the Fairfax County Health Department laboratory.

According to the Virginia Department of Environmental Quality, the following standard now applies for recreational contact with all surface water:

> *E. coli shall not exceed a geometric mean of 126 per 100 ml of water or exceed an instantaneous value of 235 per 100 ml of water.*

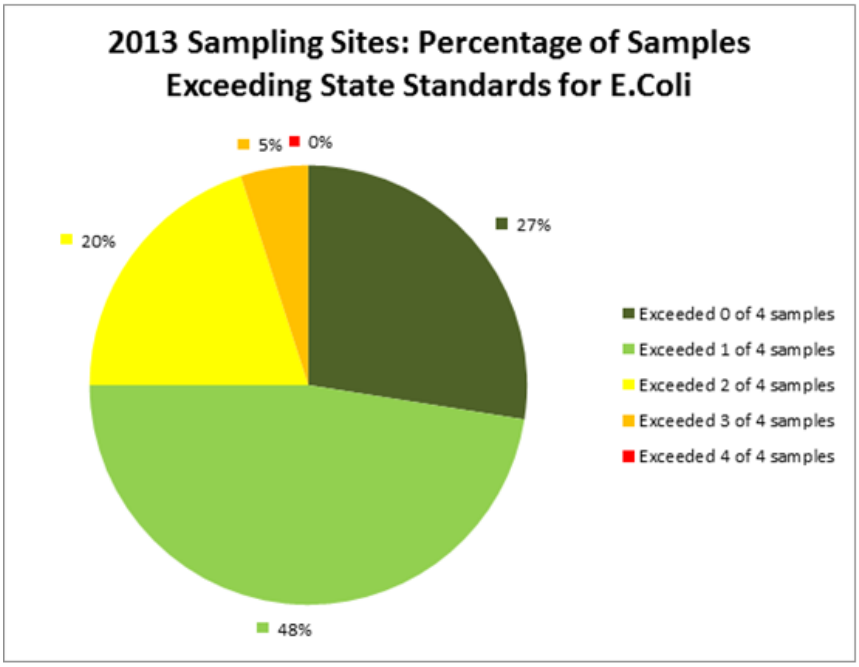
In 2013, 31 percent of Fairfax County's bacteria monitoring locations were consistently below VDEQ's standard of 235 units per 100 ml of water (Figure IV-6). Fairfax County staff concurs with officials from VDEQ and the Virginia Department of Health, who caution that it is impossible to guarantee that any natural body of water is free of risk from disease-causing organisms or injury.

Based on historical and ongoing bacteria monitoring data, the Fairfax County Health Department issues the following statement related to the use of streams for contact recreation:

> *[A]ny open, unprotected body of water is subject to pollution from indiscriminate dumping of litter and waste products, sewer line breaks and contamination from runoff of pesticides, herbicides and waste from domestic and wildlife animals. Therefore, the use of streams for contact recreational purposes such as swimming, wading, etc., - which could cause ingestion of stream water or possible contamination of an open wound by stream water, should be avoided."*

Past annual reports on Fairfax County Streams and monitoring methods are available on the Stream Quality Assessment Program page located at www.fairfaxcounty.gov/dpwes/stormwater/streams/assessment.htm.

Figure IV-6: Fairfax County Bacteria Monitoring Results, 2013



Source: 2013 Fairfax County Stormwater Status Report, June 2014

iii. Dry and Wet Weather Screening

In 2013, the county selected 108 outfalls in its Municipal Separate Storm Sewer System for dry weather screening and recorded physical parameters at each outfall. Water was found to be flowing at 58 of the outfalls and was tested for a range of pollutants (ammonia, conductivity, surfactants, fluoride, pH, phenol, copper and temperature) using field test kits. Of the outfalls tested, 10 required follow-up investigations because they exceeded the allowable limit for at least one pollutant. Of the 10 sites that required a retest, five continued to exceed the screening criteria. Further testing was conducted in an attempt to track down the source.

As reported in the 2013 Stormwater Status Report:

> *Three of the track-downs are being investigated with Fairfax Water as potential water line leaks. One of the leaks has been located while the other two are still under investigation. A fourth track-down identified an illicit connection of the sanitary line serving a set of townhomes to the storm sewer network. The connection was eliminated with the help of Fairfax County's Department of Code Compliance. The fifth track-down was initiated due to high chlorine readings. The source was identified as water line cleaning associated with construction activities at a VPDES permitted construction site. The county's MS4 permit authorizes discharges regulated*

by a separate VPDES permit. The activity was complete upon arrival to the site and no action was taken.

In 2010, the county solicited a proposal to review and update its Wet Weather Screening and Industrial High Risk Monitoring program. Wet weather screening/monitoring was conducted during 2012 using the previously developed "Wet Weather Site Selection and Screening Plan" (2006). Eight sites have been monitored twice each for the analytes listed in Appendix A of the county's MS4 permit and for metals. The preliminary water quality analysis indicates that the runoff from the eight sites is not a significant source of pollutants to the MS4. The Wet Weather Screening Program selected and field screened 20 sites and will monitor a total of 10 sites. These sites were identified in industrial, commercial and other high risk areas and ranked according to the county land use code and potential to contribute pollutants to the MS4.

As reported in the 2013 Stormwater Status Report:

Wet Weather Screening was conducted during 2013 using the "Wet Weather Site Selection and Screening Plan" (2006). Two sites were monitored over two storm events. Samples were analyzed for total suspended solids (TSS), turbidity, ortho-phosphorous, total phosphorous, total Kjeldahl nitrogen, nitrate-nitrite, ammonia, chemical oxygen demand (COD), hardness, and total petroleum hydrocarbons. Also the sites were tested for the metals copper, cadmium, lead, zinc, nickel and chromium. These two sites were part of a larger suite of ten targeted sites that were monitored during 12 storm events during an 18-month period between 2011 and 2013. These sites were primarily identified in industrial and commercial areas and were ranked according to their county land use code and potential to contribute pollutants to the MS4.

The water quality analysis indicates that the runoff from the 2013 sites is not a significant source of pollutants to the MS4. Levels of two pollutants, copper and zinc, were elevated in the majority of storms at most of the ten sites throughout the study period. Elevated copper and zinc concentrations are common in urban and suburban runoff.

c. Stream Physical Assessment

Completed in 2004, the Stream Physical Assessment study provides field reconnaissance data for the county's watershed management plans, including information on habitat conditions, impacts on streams, general stream characteristics and geomorphic classification of stream type. This countywide stream assessment can be obtained by going to http://www.fairfaxcounty.gov/dpwes/stormwater/psa-update.htm or by contacting the Fairfax County Stormwater Planning Division at 703-324-5500. TTY 711

d. Long Term Monitoring Stations

Two long-term monitoring stations were established in 2005; Station VNA is in a medium to high density residential area in the Accotink Creek watershed and Station OQN is in a low density residential area in the Sandy Run watershed. Station VNA drains 152 acres, and the drainage area has an estimated imperviousness of 25 percent. Station OQN drains 415 acres, and the drainage area has an estimated imperviousness of 10 percent. Automated sampling equipment is used to collect stormwater for water quality analysis. Sampling devices record rainfall amount, flow levels, pH and temperature at timed intervals.

In 2013, storm event sampling continued at the two monitoring sites, Henderson Road in Occoquan and Kingsley Avenue in Vienna, in accordance with Fairfax County's Watershed Water Quality Monitoring Program (2003). Samples were tested for concentrations of nine constituents, including measurements of total suspended solids, total dissolved solids, ammonia and nitrogen, phosphorus and two bacteria, E. coli and Fecal streptococcus.

These data will be incorporated with other data to give a more complete picture of stream conditions.

e. U.S. Geological Survey Monitoring Network

In June 2007, a joint funding agreement between the DPWES Stormwater Planning Division and the United States Geological Survey was signed by the Board of Supervisors. This agreement established a study designed to be an ongoing, long-term (five to 10 year) monitoring effort to describe countywide conditions and trends in water-quality (e.g. nutrients and sediment) and water-quantity. Ultimately, the information gathered will be used to evaluate the benefits of projects implemented under the watershed planning program and characterize urban and suburban streams.

This base network now is comprised of five automated stations and 15 less-intensely monitored sites. Instruments at these stations collect stream flow and water quality (water temperature, pH, specific conductance, and turbidity) data every 15 minutes; data are then transmitted via satellite and posted to a USGS Web page hourly. These automated stations also capture storm event samples to be analyzed for sediment and nutrient concentrations. Additionally, samples are collected monthly at all 20 sites under various hydrologic conditions and analyzed for the same suite of constituents. Nutrient analyses are conducted by the Fairfax County Environmental Services Laboratory and the suspended sediment analyses are conducted by the USGS Eastern Region Sediment Laboratory.

Data for this study are compiled based on the USGS "Water Year," which for 2013 ran from October 1, 2012 through September 30, 2013.

As reported in the 2013 Stormwater Status Report:

Continuous Data Collection

- *Continuous water quality and stream flow data were collected at the five intensive monitoring stations throughout the water year with no significant interruptions in data collection.*
- *Stream flow data were collected at five minute intervals, resulting in as many as 105,000 measurements per year.*
- *Continuous water quality data (water temperature, specific conductance, pH, and turbidity) were collected at 15-minute intervals, resulting in as many as 35,000 measurements per year.*
- *All data collected can be accessed online at http://va.water.usgs.gov/projects/goog/fairfax.htm.*

Discrete Data Collection

- *Grab samples were collected monthly at all 20 monitoring stations, resulting in 264 samples collected and analyzed (including QA samples). Water level and water quality parameters were measured at the time of sampling. Samples were further analyzed for nutrients and suspended sediment concentration.*
- *Storm event samples were collected using automated samplers at the five intensive monitoring stations. These samples were collected in response to elevated turbidity and stream flow conditions during storms, resulting in the collection of 114 samples that were analyzed for the same suite of nutrients and suspended sediment concentration as the monthly grab samples.*
- *Sixty-five manual stream flow measurements were made across the 20 sites to support the maintenance of the stream flow rating curve for each site.*

A report summarizing the data collected at the original 14 station network through the first five years of the study (2007-2012) has been published by the USGS (Streamflow, Water Quality, and Aquatic Macroinvertebrates of Selected Streams in Fairfax County, Virginia, 2007–12 By John D. Jastram). This can be found at: http://pubs.usgs.gov/sir/2014/5073/.

2. Volunteer Water Quality Monitoring Programs

The Northern Virginia Soil and Water Conservation District continued its successful volunteer stream monitoring program in 2013. This program supplements the county's stream bioassessment program. The data collected support the findings of the county's program and help to provide trend data. The data can also alert staff to emerging problems. Trained volunteers assess the ecological health of streams using the enhanced Virginia Save Our Streams protocol. Monitoring includes biological and chemical aspects and a physical habitat assessment. NVSWCD provides training, equipment, support, data processing and quality control. Data collected by volunteers are shared with Fairfax County, VDEQ, Virginia Save Our Streams and other interested organizations or individuals. The data help to confirm findings of biological

monitoring performed by county staff, provide information on trends and can serve as a first alert in areas where the county may monitor only once in five years. The program also builds awareness of watershed issues among participants. Approximately 30 volunteers collected data at 25 sites four times during 2013.

In addition, 435 county residents attended public stream monitoring workshops and field trips were held throughout the county. At each workshop or field trip, biological monitoring was performed and information was presented on stream ecology, stormwater runoff, urban hydrology and watersheds. The program builds awareness of watershed issues among the participants.

Volunteer monitors and monitoring sites that had been part of the former Audubon Naturalist Society's Water Quality Monitoring Program have been integrated into the Volunteer Stream Monitoring Program coordinated by NVSWCD.

Reston Association is among the organizations that participate in the monitoring program using the SOS protocol, and it submits data on Reston streams to NVSWCD. Currently, 11 sites are monitored.

A monthly *Watershed Calendar*, listing training and other events of interest, is e-mailed to over 1,000 recipients. More information about these events and about the NVSWCD volunteer monitoring program can be found at http://www.fairfaxcounty.gov/nvswcd/monitoring.htm.

3. Fairfax County Park Authority Stream Monitoring

a. Stream Monitoring in Parks

The Fairfax County Park Authority continues to support volunteer stream monitoring programs through its partnership with the Northern Virginia Soil and Water Conservation District.

During 2013-2014, NVSWCD supported ongoing stream monitoring programs at the following streams with some sites located on parkland, with sampling conducted primarily by volunteers using the Virginia Save Our Streams standard protocol (http://www.vasos.org/):

- Accotink Creek at Eakin Park
- Accotink Creek at Lake Accotink
- Big Rocky Run at EC Lawrence Park
- Big Rocky Run at Greenbriar Park
- Clark's Branch
- Colvin Run in Lake Fairfax Park
- Cub Run
- Difficult Run at Tamarack
- Difficult Run near Great Falls

- Giles Run
- Holmes Run Stream Valley Park below Lake Barcroft
- Holmes Run Stream Valley Park near Roundtree Park
- Horsepen Run at Frying Pan Farm Park
- Nichols Run
- Old Courthouse Spring Branch in Old Courthouse Stream Valley Park, Tysons
- Paul Springs Branch
- Pimmit Run
- Pohick Creek, near the southern end of the Cross County Trail
- Popes Head Creek
- Scotts Run at the Nature Preserve
- Snakeden Branch
- South Run
- Sugarland Run Tributary
- Walney Creek at EC Lawrence Park
- Wolftrap Creek at Foxstone Park, Vienna

4. Virginia Department of Environmental Quality

VDEQ performs long-term trend monitoring at 31 stations in 22 water bodies that are either in Fairfax County or border the county:

- 11 stations are long term, trend monitoring stations.
- Biological monitoring data were collected at one station.
- 10 stations were sampled to collect data to assist in the development of the Potomac Tributary TMDL.

5. Potomac River Monitoring

a. Overview

The Metropolitan Washington Council of Governments continues to serve as the water quality monitoring coordinator and regional repository for water quality and wastewater data in the Washington metropolitan region, as it has for more than two decades. Presently, COG serves as a repository for physical/chemical water quality data, hydro-meteorological data and wastewater loadings for the COG region, as produced by federal, state and local government agencies. This includes data from 99 stations on the main stem of the Potomac River and the mouths of its tributaries (Point of Rocks to Point Lookout) and 46 stations in the Anacostia watershed. In addition, more than 33 wastewater treatment plants send their monthly discharge monitoring reports and monthly operating reports to COG. COG supplements these data with flow gage data from the USGS and meteorological data from the National Weather Service.

COG continues to focus on regional water quality issues, particularly in the upper estuary of the Potomac River. A Potomac River Water Quality fact sheet (http://www.mwcog.org/environment/water/downloads/Potomac%20WQ%20factsheet_January%202014.pdf) and a summary (http://www.mwcog.org/uploads/committee-documents/bF1YX1lc20140515151124.pdf) were developed to provide a snapshot of current conditions and an assessment of water quality in the Potomac River. Success stories were highlighted, like the huge investments in improving wastewater treatment over the past thirty years, increased submerged aquatic vegetation and fish populations, and decreased occurrences of algal blooms. Yet, COG has emphasized that there is much more to be done to improve the quality of the water in the Potomac River.

COG also continues to enhance its website to provide a user-friendly location for accessing regional data and contact information and to promote the exchange of monitoring data, watershed programs, wastewater and stormwater implementation programs and related activities. A preliminary on-line interactive map has been generated for members' use at http://www.mwcog.org/environment/water/potomacmap.asp.

b. **Metropolitan Washington Council of Governments Chain Bridge Monitoring Program**

Since 1983, the Metropolitan Washington Council of Governments has contracted with the Occoquan Watershed Monitoring Laboratory to operate the Chain Bridge monitoring station on the Potomac River. The purpose of this monitoring station is to measure water quality in the Potomac River as it crosses the fall line and enters the Potomac estuary. Parameters collected include dissolved oxygen, biological oxygen demand, turbidity, temperature, conductivity, total suspended solids, fecal and total coliform bacteria, chlorophyll-a and nutrients.

The OWML data set, which provides the most comprehensive accounting of pollutant loads at this fall line station, is being used to check the accuracy of the new U. S. Geological Survey method for generating flow-adjusted trends in load and to provide a fuller picture of load trends from the watershed upstream of Chain Bridge.

6. Potomac River Water Quality

The tidal section of the Potomac River is affected by many sources of pollution. With rapid population growth in the region over the past century, the Potomac River has faced water quality problems such as bacterial contamination, low dissolved oxygen and nuisance algal blooms. The implementation of secondary and advanced wastewater treatment in the National Capital Region has resulted in significant improvements in water quality and ecological conditions in the Potomac Estuary, including healthy dissolved oxygen levels, reduced nuisance algal blooms and the

return of important living resources such as largemouth bass and submerged aquatic vegetation.

Results from a summer 2010 news release reviewing an 18-year study of submerged aquatic vegetation in the tidal Potomac River (http://water.usgs.gov/nrp/highlights/potomac_update.html) concluded the following:

- Native SAV cover increased tenfold from 288 to 3,081 acres.
- The overall area covered by SAV in the Potomac (both native and exotic) more than doubled since 1990, increasing from 4,207 to 8,441 acres.
- The diversity of SAV has increased. In 1990, the exotic hydrilla was 10 times more abundant than any other species. In 2007, the abundance of the seven most frequently occurring species were more evenly matched.
- In 1990, more than 80 percent of the total SAV was hydrilla; in 2007 hydrilla declined to 20 percent.
- Results suggest declining fitness of exotic species relative to native species during restoration.

The study was supported by: the USGS National Research Program; the U.S. Army Corps of Engineers, Baltimore; the Metropolitan Washington Council of Governments' Aquatic Plant Management Program; and the Fisheries Division of the District of Columbia Department of Health.

The United States Geological Survey monitors water quality on the Potomac River at Chain Bridge as part of the Chesapeake Bay River Input Monitoring Program.

7. Occoquan River

The Occoquan River straddles the southern border of Fairfax County and the northern border of Prince William County. The river has been dammed near the town of Occoquan. The Occoquan Reservoir, created by the damming, serves as one of two primary sources of drinking water for Fairfax Water, which operates a facility along, and withdraws water from, the reservoir. Because of its use as a drinking water source, water quality in the reservoir is highly monitored and water from a sewage treatment plant upstream of the reservoir is carefully treated.

a. Occoquan Watershed Monitoring Laboratory

The Occoquan Watershed Monitoring Laboratory has administered a comprehensive hydrologic and water quality monitoring program in the Occoquan Watershed since 1972. The program is jointly funded by Fairfax Water and the six jurisdictions within the watershed. OWML operates nine automated stream monitoring and flow gauging stations located on the major tributary streams of the watershed. These stations record stream flow and automatically collect flow-weighted composite water samples during storm events. Under base flow (non-storm flow) conditions, samples are collected weekly during the spring, summer

and fall seasons, and approximately biweekly in the winter. In late 2006, additional equipment was installed at the stream monitoring station on Bull Run at Virginia Route 28 to continuously monitor dissolved oxygen, temperature, pH, conductance, turbidity and nitrate in the stream. Seven stations in the Occoquan Reservoir are sampled on the same weekly/biweekly schedule. OWML also operates thirteen rain gage stations in the watershed, and two weather stations, including one which provides solar radiation data.

The Lake Manassas watershed monitoring program is funded by the City of Manassas; it has seven stream and eight lake stations at which water and sediment samples are taken. Lake Manassas is currently considered to be a moderately enriched lake.

Synthetic organic compounds have been monitored quarterly in the Occoquan Watershed since 1982. The program is funded by the Fairfax County Health Department and was established under a recommendation by EQAC. Initially, the program monitored water samples, but quarterly sediment and semi-annual fish samples were added at stations within the Occoquan Reservoir. The Lake Manassas program, likewise, funds the monitoring of SOCs in the Lake Manassas watershed.

As in the previous year, calendar year 2013 was a very good year for the SOC monitoring program. Very few 'detects' were found for any compound of concern, and most of those were well below limits of concern. Lindane was found at about twice the maximum contaminant level of 0.2 µg/L in four samples in the Lake Manassas watershed in the October 2013 sampling run. While this is above the MCL, the MCL applies for longer-term exposures, so one detect in the year is not really a cause for concern. Concentrations of some phthalates were detected, but they were well below levels of concern. Phthalates are practically ubiquitous in the environment, as they are widely used as plasticizers.

Lindane was also detected at low levels in sediment samples in the October 2013 sampling run, at stations mainly in the Lake Manassas watershed, and also at a station on Bull Run. The Lake Manassas station detects are likely related to those detected in the waters of the lake during the same sampling event. The station at Bull Run will be monitored to see if the Lindane detect returns in 2014.

There were no SOC compounds detected in fish samples except for some phthalates, which, as stated earlier, are ubiquitous. None were at levels of concern.

Overall, the results of the SOC monitoring in 2013 show that the watershed conditions with regard to SOCs has remained relatively stable. This is certainly good news.

General water quality in the Occoquan Reservoir has also remained stable over the years. While the reservoir continues to be enriched with nutrients (eutrophic), the water quality has not deteriorated from what it has been for some time now. The

OWML monitoring program serves as a means of providing advance notice should any conditions deteriorate, whether in the short or the long term.

The SOC program is fairly modest, with four samplings per year, one for each season, and fish sampling twice a year. This is more or less the minimum necessary to track conditions in the watershed. The program has been flat-funded for many years now, while costs have continued to go up. In program year 2014-15, the approach being taken is to continue the monitoring and stop it when the money is exhausted. It is recommended that an adjustment to the approved budget of the program be done to get it back on track.

OWML has had a website (www.owml.vt.edu) for some years now where stakeholders could access near-real-time field data at various stream sites. An update to this website was performed in the last year, and the new website is much improved.

8. Gunston Cove Aquatic Monitoring Program

Gunston Cove is an embayment of the tidal freshwater Potomac River located in Fairfax County about 12 miles (20 km) downstream of the I-95/I-495 Woodrow Wilson bridge. The cove receives treated wastewater from the Noman M. Cole, Jr. Pollution Control Plant and inflow from Pohick and Accotink Creeks, which drain much of central and southern Fairfax County. The cove is bordered on the north by Fort Belvoir and on the south by Mason Neck. Due to its tidal nature and shallowness, the cove does not seasonally stratify vertically, and its water mixes gradually with the adjacent tidal Potomac River mainstem.

The primary objective of this George Mason University program is to determine the status of the ecological communities and physical-chemical environment in the Gunston Cove area of the tidal Potomac for evaluation of long-term trends. This helps provide the basis for well-grounded management strategies to improve water quality and biotic resources in the tidal Potomac. Monitored since 1984, data from Gunston Cove and the nearby Potomac River provide valuable information regarding long-term trends; this information will aid in the continued management of the watershed and point source inputs.

Data from 2012 report (November 2013) generally reinforced the major trends which were reported in previous years. First, phytoplankton algae populations in Gunston Cove have shown a clear pattern of decline since 1989.

Accompanying this decline have been more normal levels of pH and dissolved oxygen, increased water clarity and a virtual cessation of cyanobacteria blooms such as *Microcystis*. The increased water clarity has brought the rebound of submerged aquatic vegetation, which provides increased habitat value for fish and fish food organisms. The SAV also filters nutrients and sediments and itself will inhibit the overgrowth of phytoplankton algae. This trend is undoubtedly the result of phosphorus removal

practices at the Noman M. Cole, Jr. wastewater treatment plant, which were initiated in the late 1970s. A lag period of 10-15 years between phosphorus control and phytoplankton decline has been observed in many freshwater systems, resulting at least partially from sediment loading to the water column which can continue for a number of years. Gunston Cove is now an internationally recognized case study for ecosystem recovery due to the actions that were taken and the subsequent monitoring to validate the response.

Another trend of significance to managers is changes in the relative abundance of fish species. While it is still the dominant species in trawls, white perch has gradually been displaced in seines by banded killifish. Blue catfish have entered the area recently, and brown bullhead has decreased greatly in the cove. To determine some of the most significant changes in the fish community through time, the report authors performed a community analysis using the seine collections. Overall, the fish assemblage in Gunston Cove is dynamic and supports a diversity of commercial and recreational fishing activities.

In short, due to the strong management efforts of the county and the robust monitoring program, Gunston Cove has proven an extremely valuable case study in eutrophication recovery for the Chesapeake Bay region and even internationally.

For a copy of the "Ecological Study of the Gunston Cove 2012" Final Report, see http://digilib.gmu.edu/jspui/bitstream/1920/8616/2/ExecSummary12Final.pdf or contact R. Christian Jones, Professor and Project Director at George Mason University.

9. Total Maximum Daily Loads

Under the Clean Water Act, states are required to monitor water quality and assess compliance with water quality standards every two years. Water quality standards designate uses for waters and define the water quality needed to support each use. There are six designated uses for surface waters in Virginia: aquatic life; fish consumption; public water supplies (where applicable); shellfish consumption; swimming; and wildlife. Several subcategories of the aquatic life use have been adopted for the Chesapeake Bay and its tidal tributaries. If a water body contains more pollutants than allowed by water quality standards, it will not support one or more of its designated uses. Such waters have "impaired" water quality and are listed on Virginia's 303(d) list as required under the Clean Water Act. If monitoring data indicate that a water body does not meet water quality standards, the water body is listed as impaired and a Total Maximum Daily Load must be developed. A TMDL is a watershed-specific plan for bringing an impaired water body into compliance with water quality goals. Since fulfilling the requirements of a consent decree, Virginia has developed a pacing guideline of approximately 150 TMDLs per biennium, which is expected to allow for TMDL development for currently listed waters by 2022.

a. Fairfax County Stream TMDLs

To date, the following TMDLs have been established in Fairfax County and have assigned reductions to the county's MS4:

Bacteria (Fecal Coliform and/or E. coli):
- Accotink Creek.
- Four Mile Run.
- Bull Run (includes Cub, Johnny Moore and Little Rocky Runs).
- Popes Head Creek.
- Difficult Run.
- Hunting Creek (includes Cameron Run and Holmes Run).
- Sugarland Run.
- Mine Run.
- Pimmit Run.

Sediment (Benthic Impairment):
- Bull Run (includes Cub, Johnny Moore and Little Rocky Runs).
- Popes Head Creek.
- Difficult Run.

PCBs: Tidal Potomac (includes Accotink Creek, Belmont Bay, Dogue Creek, Four Mile Run, Gunston Cove, Hunting Creek, Little Hunting Creek, Occoquan River and Pohick Creek).

Water Quality Assessments are performed by the Virginia Department of Environmental Quality and are available at: http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments.aspx.

i. Accotink Creek TMDL

Accotink Creek was first listed as impaired on the 1998 303(d) List of Impaired Waters for not meeting the recreational use due to exceedances of the bacteria water quality standard. This impaired segment of Accotink Creek begins at the confluence with Crook Branch, upstream from Route 846, downstream to the start of Lake Accotink (4.77 miles). Additional segments of Accotink Creek were listed as impaired for bacteria in 2002 (1.20 miles from the confluence with Daniels Run, in the City of Fairfax downstream to the confluence with Bear Branch) and 2004 (7.34 miles from the confluence with Calamo Branch downstream to the tidal waters of Accotink Bay), and a segment of Long Branch was listed in 2008 (4.76 miles from the headwaters of Long Branch downstream to the confluence with Accotink Creek, at rivermile 4.41.) TMDLs were developed for the upper Accotink Creek watershed in 2002 and for the lower watershed in 2008.

Fairfax County partnered with the United States Geological Survey following development of the upper Accotink Creek bacteria TMDL to identify the distribution and specific sources of the human wastewater signal within the Accotink Creek watershed. Samples were collected during low flow periods and the results indicated that many sources are transitory, making them extremely challenging to detect, locate and eliminate.

EPA established a TMDL to address the benthic impairments in Accotink Creek in April 2011. While sediment was identified as the pollutant of concern that is causing the benthic impairment, EPA used flow as a surrogate for sediment in establishing the TMDL. The TMDL called for a 48.4 percent overall reduction in in-stream flows in Accotink Creek. Utilizing a flow approach to the TMDL would not stabilize or reverse the evolution that has already occurred in Accotink Creek. This evolution has taken place in response to increased urbanization and development in the watershed, and flow reduction alone will not reverse its impacts or address the impairment that originally triggered development of the TMDL. Stream restoration is also required in order to stabilize the eroded banks, reconnect the stream to its floodplain, reduce in-stream erosion and restore habitat.

In July 2012, the county and the commonwealth challenged the flow TMDL in U.S. District Court. In January 2013, the court issued its decision that EPA is authorized to regulate pollutants using TMDLs, and that sediment is a pollutant, but flow is not. The flow TMDL was remanded to EPA for reconsideration. It is important to note that the court's decision applies only to the use of non-pollutants (such as flow) as surrogates for pollutants (such as sediment) in TMDLs. It is not a blanket prohibition on the regulation of stormwater.

In March 2013, EPA decided not to appeal the court's decision and asked the commonwealth to develop a replacement TMDL. A schedule for development of the new TMDL has been established.

ii. Potomac River--Tidal Potomac River- Polychlorinated Biphenyls

A PCB TMDL was established for the Tidal Potomac River in 2007 and includes Accotink Creek, Belmont Bay, Dogue Creek, Four Mile Run, Gunston Cove, Hunting Creek, Little Hunting Creek, Occoquan River and Pohick Creek. Loads of PCBs to the Potomac River estuary system were grouped into seven categories: the non-tidal Potomac River at Chain Bridge; lower basin tributaries; direct drainage; wastewater treatment plants; combined sewer overflows; atmospheric deposition to the water surface; and contaminated sites. An average reduction of 96 percent is required.

iii. Potomac River – *Escherichia coli* TMDL

Several streams in Fairfax County have been identified as impaired on the Clean Water Act §303(d) list for not supporting the primary contact recreation use due to elevated levels of *E. coli* bacteria. Portions of Sugarland Run, Mine Run and Pimmit Run are included in the Potomac River Tributaries Bacteria TMDL. The impaired portion of Sugarland Run extends 5.72 miles from the confluence with Folly Lick Branch downstream to the confluence with the Potomac River. The impaired reach of Mine Run extends 0.93 miles from the confluence with an unnamed tributary to the confluence with the Potomac River. The impaired portion of Pimmit Run extends 7.37 miles from the headwaters of Pimmit Run downstream to the confluence with the Potomac River.
In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml, reductions are required from point source dischargers, pet waste, residential waste and wildlife sources. This TMDL was approved by EPA on September 26, 2013.

Information on TMDL development in Virginia is available on VDEQ's website:
http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment.aspx

The TMDL project was completed and approved by EPA on September 26, 2013 and is available on the DEQ website (http://www.deq.state.va.us/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment/ApprovedTMDLReports.aspx).

b. Chesapeake Bay TMDL

EPA established the Chesapeake Bay TMDL in December 2010. In order to provide reasonable assurance that the Chesapeake Bay TMDL can be achieved, EPA required states and the District of Columbia to develop Watershed Implementation Plans that document how each jurisdiction will partner with federal and local governments to achieve and maintain water quality standards. Phase I of the Virginia WIP was approved by EPA in December 2010 and established target loads by sector and watershed. The final Phase II WIP was submitted to EPA on March 30, 2012 and does not include explicit allocations to local communities due to issues identified with using the Chesapeake Bay Watershed Model at the local scale. The WIP does include local strategies aggregated at the state scale and organized by source sector (agriculture, urban/suburban, on-sire wastewater, forest lands and resource extraction). Implementation of the urban/suburban strategies will take place through permits in MS4 communities including Fairfax County.

Information on the Chesapeake Bay TMDL is available on EPA's website at: http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/index.html.

Information on Virginia's WIP process is available on VDEQ's website at: http://www.deq.virginia.gov/Programs/Water/ChesapeakeBay/ChesapeakeBayWatershedImplementationPlan.aspx.

Northern Virginia Regional Commission Chesapeake Bay TMDL Coordination

At the request of local governments and the Virginia Department of Conservation, NVRC continues to host meetings between the department and local governments to discuss the Phase II Watershed Implementation Plan, the Virginia Assessment and Scenario Tool (which allows users to develop scenarios rapidly with varying best management practices) and the integration of the new Stormwater management regulations and the MS4 permit regulations. An NVRC staff member continues to serve as the Chairman of the Urban Stormwater Work Group for the EPA Chesapeake Bay Program.

The USWG has been charged with developing a set of recommendations for the CBP's Water Quality Goal Implementation Team regarding issues dealing with urban stormwater and the impact to the health of the Chesapeake Bay. The process of making these recommendations is to create panels populated with experts in the field from all different disciplines and geographic locations within the Bay watershed. The panel members then review the current literature about their subject areas, discuss the issues, consider any implications of the recommendations to localities, and eventually come up with a set of recommendations.

In 2013, a number of 'expert panels' were convened to define and develop nutrient and sediment load reductions for localities:

- Recommendations of the Expert Panel to Define Removal Rates for Urban Nutrient Management (short version) http://www.chesapeakebay.net/publications/title/recommendations_of_the_expert_panel_to_define_removal_rates_for_urban_nutri

- Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects (short version) http://www.chesapeakebay.net/publications/title/recommendations_of_the_expert_panel_to_define_removal_rates_for_individual

- Recommendations of the Expert Panel to Define Removal Rates for Erosion and Sediment Control Practices http://www.chesapeakebay.net/publications/title/recommendations_of_the_esc_expert_panel

A complete review of all the past and current USWG BMP Expert Panels can be found at: http://stat.chesapeakebay.net/?q=node/130&quicktabs_10=3.

c. Public Participation in the TMDL Process

Public participation is a key component of the TMDL process in Virginia. Public meetings are held at the onset and closure of each TMDL project. Anyone is welcome to attend these meetings. Meetings are advertised through several methods, including published notices in the Virginia Register, announcements in the community calendar of local newspapers, fliers posted at public locations throughout the impaired watershed and through e-mail distribution lists. The purpose of the public meetings is to educate the community about the TMDL process and allow the public to ask questions and provide feedback on how to improve the project. Any questions relating to the TMDL process should be directed to the TMDL Coordinator at the Northern Regional Office of VDEQ: http://www.deq.virginia.gov/Locations/NorthernRegionalOffice.aspx or http://deq.state.va.us/Programs/Water/WaterQualityInformationTMDLs/TMDL/Contacts.aspx.

10. Pond and Lake Monitoring and Management

There are a number of significantly-sized private and public ponds and lakes throughout the county. All ponds and lakes in Fairfax County are man-made by excavation and/or the damming of streams. Most of these ponds and lakes serve as stormwater management facilities for developments and have houses along their shorelines. There are also numerous smaller ponds associated with commercial developments, golf courses or farm properties. These open water impoundments provide habitat for a number of aquatic organisms and waterfowl as well as recreational opportunities for humans. Due to increased runoff from development and in-stream bank erosion, these water bodies are often subject to heavy sedimentation, which requires frequent dredging in order to maintain pond or lake depth. Heavy nutrient loading results in large algal blooms during warmer months. Other problems that plague urban ponds and lakes include thermal stratification, reduced water clarity, decreased dissolved oxygen levels, trash and nuisance invasive vegetation.

a. Reston Lakes

The Reston Association, the homeowners association for the planned community of Reston, has an active watershed and lake management program. Four lakes (Audubon, Anne, Thoreau and Newport), as well as two ponds (Bright and Butler), are monitored. Dissolved oxygen, dissolved oxygen saturation, temperature, pH, conductivity, total phosphorus, Secchi depth transparency, chlorophyll a, phytoplankton and zooplankton are monitored. Fecal coliform and E. coli bacteria testing have been conducted in Lake Audubon for annual swimming events. Detailed monitoring information and data can be found in the 2012 Reston Lakes Annual Monitoring Report. This report and other information about Reston's lakes can be obtained by contacting RA's watershed supervisor at 703-435-6560 or visiting the website: www.reston.org under Lake Report.

Purple loosestrife, a noxious weed in Virginia, was well established at Lake Newport and was discovered on the other three lakes in 2008. In 2013, RA staff continued the massive removal of purple loosestrife from the shoreline at all four lakes. RA also removed the large Silver Grass miscanthus ornamental grasses from the dam at Lake Newport to prevent their seeds from propagating the down-slope dam and natural area surrounding the lake. Lake Newport was treated on April 25, 2013 to control water lilies.

In 2011, Lake Thoreau's west cove was dredged and treated to control the spread of yellow floating heart. Lake Thoreau experienced dramatic growth of aquatic plants including Eurasian Water Milfoil, Yellow Floating Heart (both non-native invasive plants) and Floating Leaved Pondweed, which was the most prevalent in summer 2012 and spring 2013. The Floating Leaved Pondweed is a native plant and is typically a beneficial plant for fish habitat and waterfowl food. The Eurasian Water Milfoil is a non-native plant of high concern.

In 2013, RA's management strategy included treating Lake Thoreau for Eurasian Water Milfoil, Yellow Floating Heart and Floating Leaved Pondweed along the shoreline and other impacted areas in June of each year, contracting with a licensed aquatic herbicide company, Aquatic Environmental Consultants, Inc., to do the treatment.

RA treats Lake Anne monthly in the summer to prevent blue green algae blooms. Lake Anne is the oldest lake in Reston and has been treated since 2005.

The outfall pipes were regrouted at Lakes Anne and Audubon in November 2013.

b. Pohick Watershed Lakes

The six Pohick watershed lakes (Barton, Braddock, Huntsman, Mercer, Royal and Woodglen) are inspected annually for dam structure but are not regularly monitored for biological or chemical parameters.

Beginning in 2011, water quality in Lake Huntsman was characterized to evaluate potential management activities that could be employed in addition to the dredging planned in summer 2014. In 2012, in-lake water quality monitoring continued at Lake Huntsman through the warmer months. Preliminary analysis shows that the lake is highly nutrient enriched and is exhibiting summertime hypoxia at levels deeper than 6-10 feet. Since the initiation of the original characterization study, a solar powered water circulator has been installed in the lake and has had pronounced effects on the low-oxygen conditions occurring in the deeper areas of the lake. Dissolved oxygen is present at much higher concentrations at the deeper levels of the lake, thus allowing occupation of these areas by greater numbers of aquatic plants and animals. Despite the improvement of dissolved oxygen distribution in the lake, there are still excessive levels of nutrients in the lake,

feeding summertime algae blooms, hindering water quality and limiting sunlight penetration depths.

In spring 2014, Lake Huntsman was drained to allow for necessary dam upgrades and to dredge up to 34,500 cubic yards of accumulated sediments in the lake bottom. A lake restoration plan will be implemented as part of this work. Post construction monitoring will commence on Huntsman in 2015. In 2012, monitoring of recently-dredged Lake Barton commenced. In late 2013, the solar powered water circulator was moved from Huntsman to Lake Barton (in anticipation of dredging activities). The water quality data collected at Lake Barton will be evaluated in concert with the data from nearby Lake Huntsman.

In 2014, a more comprehensive lake monitoring scheme was developed on the Pohick lakes and two more lakes were added to the monitoring: Lakes Royal and Woodglen. These two lakes are the next two scheduled for improvements and dredging. Analysis of these data will focus on the benefits of selected management/restoration actions and the potential for these impoundments to be utilized fully as water quality improvement facilities contributing to improved stream health within the Pohick Creek watershed.

c. Lake Barcroft

The Lake Barcroft Watershed Improvement District is a local taxing district authorized under Virginia law for conservation purposes. The WID is responsible for the management of Lake Barcroft and regularly monitors water quality. Due to sediment loading, the lake is in need of dredging. Given the significant amount of sediment that needs to be removed, there are continuous concerns with the lack of adequate local disposal areas. For more information about Lake Barcroft, contact the Operations Director at 703-820-1300 or see the website: www.lakebarcroft.org.

d. Lake Accotink

Lake Accotink is owned and managed by the Fairfax County Park Authority and is a key feature of Lake Accotink Park. The lake was originally created by construction of a dam across Accotink Creek in 1918. The existing dam was constructed in 1943. Similar to other urban lakes and ponds, Lake Accotink has been significantly impacted by accelerated sedimentation, which has reduced the average depth of the lake to less than four feet. Project funding in the amount of $6.15 million was included in the 1998 Park Bond Program to dredge the lake and make repairs to the dam.

In September 2005, the Park Authority Board approved a contract award to Mobile Dredging and Pumping to hydraulically dredge 161,000 cubic yards of silt from Lake Accotink and pump the material to a property owned by Virginia Concrete for dewatering and disposal. The Department of Public Works and Environmental

Services is overseeing the construction contract because of its past experience on other similar type projects.

Mobilization began in October 2005 and the 2.8 mile long slurry pipe line installation was completed in June 2006. Dredging began in July 2006. The project also includes expanding and enhancing existing wetlands. At the Park Authority's request, DPWES performed a preliminary evaluation to determine if the Virginia Concrete disposal site could accommodate additional dredge material above the 161,000 cubic yards currently specified in the contract. Based on this review, up to 204,000 cubic yards of material can be disposed of at the Virginia Concrete site, and DPWES agreed to provide $1,545,000 in additional funding to dredge and dispose of 43,000 additional cubic yards. In June 2006, a major storm caused a significant amount of silt to flow into the marina area, reducing water depth. In combination with the drought conditions, boat access from the marina to the main lake channel has been limited. DPWES has agreed that a portion of the additional 43,000 cubic yards of dredge material could be reprogrammed for dredging in the vicinity of the marina, reducing the dredge amount at the top end of the lake by an estimated 10,000 cubic yards.

Approximately, 195,000 cubic yards of material were removed by project completion in September 2008.

11. Groundwater Monitoring

The United States Geological Survey maintains a series of wells throughout the nation to monitor groundwater levels and drought. Several wells (Site Number: 385311077215001 - 52V 25, Site Number: 385305077162101 - 52V 24, Site Number: 384956077250301 - 51U 144, Site Number: 384854077251801 - 51U 145, Site Number: 384354077135801 - 53T 59, Site Number: 385930077215901 - 52V 23 and Site Number: 385638077220101 - 52V 2D) are depicted on the Fairfax County, Virginia location map, which is provided at the following link: http://groundwaterwatch.usgs.gov/countymap.asp?sa=VA&cc=059. By clicking on the icon associated with well you can get information on how long the well has been functioning and what data are being collected.

i. Expansion of the Eastern Virginia Groundwater Management Area

On June 17, 2013, the State Water Control Board adopted final regulations developed by the Department of Environmental Quality adding portions of Fairfax County east of Interstate 95 to the Eastern Virginia Groundwater Management Area. On January 1, 2014, the Eastern Virginia GWMA was expanded (9VAC25-600-10 *et seq.*) and the Groundwater Withdrawal Regulations (9VAC25-610-10 *et seq.*) revisions became effective. As a result, all persons in the expanded area withdrawing or having withdrawn groundwater on or before January 1, 2014 in excess of 300,000 gallons per month (from well, well system or a pond recharged by groundwater with mechanical assistance) must apply for an Existing Users

Groundwater Withdrawal Permit to continue their withdrawals. Persons wanting to establish a new withdrawal or expand an existing withdrawal must apply for that New/Expanded use in accordance with 9VAC25-610-92 of the regulations.

In an attempt to assist with these new regulatory requirements, DEQ sent letters or notification (that included applications) to all known potential applicants and hosted a Pre-Application workshop in the DEQ's Northern Regional Office in Woodbridge on February 19, 2014. Several other Pre-Application workshops were held in the Northern Neck area.

More information about this effort is available on the DEQ website at: http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/GroundwaterPermitting.aspx

ii. Virginia Department of Environmental Quality Leaking Storage Tank Information

With respect to leaking underground storage tanks for regulated tanks (i.e., gas stations), there were 22 open cases and 1,118 closed cases. In 2013, seven new cases were opened and nine were closed. In terms of unregulated tanks (i.e. residential heating oil), there are 46 open cases and 1,960 closed cases. In 2013, 92 new cases were opened and 90 were closed.

D. WATERSHED MANAGEMENT

1. Perennial Stream Mapping

In 2003, the Board of Supervisors adopted a revised Chesapeake Bay Preservation Ordinance in order to comply with amendments to the state's Chesapeake Bay Preservation Area Designation and Management Regulations. The ordinance incorporated changes to the designation criteria for Resource Protection Areas to include water bodies with perennial flow, resulting in a significant expansion to the county's RPAs. Maps may be viewed at http://www.fairfaxcounty.gov/dpwes/watersheds/perennial.htm.
Fairfax County's Chesapeake Bay Preservation Ordinance is available on-line at: http://www.fairfaxcounty.gov/dpwes/environmental/cbay/.

On November 17, 2003, based on the Perennial Streams Identification and Mapping program conducted by staff of the Department of Public Works and Environmental Services, the Board of Supervisors adopted new Chesapeake Bay Resource Protection Area maps, increasing the amount of stream miles protected by 52 percent (from 520 to 860 miles).

In 2004, the Quality Assurance/Quality Control Study of the Perennial Streams Identification and Mapping was conducted. A total of 10 percent of the streams initially surveyed between 2002 and 2003 were selected for the QA/QC study. The

results of the QA/QC study were presented to the Board of Supervisors in 2005 along with revised Chesapeake Bay Preservation Area Maps, which were approved.

The Fairfax County Stream Classification Protocol, Field Data Sheets, QA/QC study and the county's revised map of Chesapeake Bay Preservation Areas are available online at: www.fairfaxcounty.gov/dpwes/watersheds/perennial.htm.

The countywide RPA map is changed occasionally to update site-specific perenniality classification changes. Additions to the RPA map are approved by the Board of Supervisors. Removal of RPAs is approved administratively through the plan review process.

2. Watershed Management Plans

In 2003, the Stormwater Planning Division of the Fairfax County Department of Public Works and Environmental Services commenced a planning initiative to develop a series of watershed management plans. The plans were developed between 2003 and 2011 with the assistance of the community through a public involvement process that included community interest meetings and stakeholder groups. A total of 13 plans, which cover all 30 county watersheds, were developed and adopted by the Board of Supervisors. From this planning effort, more than 1,700 structural and non-structural projects were proposed to help restore and protect our vital natural resources. The overarching goals for the watershed plans are:

1. Improve and maintain watershed functions in Fairfax County, including water quality, habitat and hydrology.
2. Protect human health, safety and property by reducing stormwater impacts.
3. Involve stakeholders in the protection, maintenance and restoration of county watersheds.

Many non-structural projects and policy recommendations from the watershed plans have been implemented while implementation of others is ongoing. The number of projects selected each year for implementation will be determined as part of the annual budget process. Projects under design and construction can be found on the Stormwater Improvement Project Web page at: www.fairfaxcounty.gov/dpwes/stormwater/projects/project_list.htm

3. Restoration Efforts

a. Department of Public Works and Environmental Services Stream Restoration and Stabilization Projects—Stormwater Capital Projects

In 2013, the county and its partners continued to implement stormwater management-related capital projects, including nine flood mitigation projects, eight stormwater management facility retrofits, five low impact development projects and five stream restoration projects. Some examples are listed below:

i. Stream restorations

In 2013, the county completed five stream restoration or stabilization projects:

- Beach Mill Stream Restoration: This project addressed an incised and severely eroded channel of 250 feet in the Pond Branch watershed. The improvements stabilized the eroded channel to prevent future flooding and eliminate steep channel banks with a step pool system.

- Loft Ridge Outfall Rehabilitation: This outfall project stabilized 176 feet of a severely incised, eroded channel with a step pool system for improved water quality and safety in the Cameron Run watershed. The project included native plants and seeding.

- Sandy Run Stream Stabilization: This project graded a stream channel and improved habitat with the installation of rock structures, log sills, and bank protection for 300 linear feet of a severely eroded channel. The project was planted with native trees and vegetation and provided water quality benefits.

- Tripps Run Stream Restoration: This project included the installation of in-stream structures, the stabilization of stream channel bed and banks and enhancement of the riparian buffer through the planting of native vegetation to stabilize 1,430 linear feet of stream and provide water quality benefits to Tripps Run.

- Wolftrap Creek Stream Restoration: The restoration of Wolftrap Creek and associated tributaries restored 2,089 linear feet of stream by installing in-stream structures to stabilize the streambed and banks, reduce erosion, improve habitat and improve water quality.

ii. Detention basin retrofits

Stormwater management facility retrofits are intended to improve water quality and/or quantity control beyond their original designs. Water quality retrofits enhance nutrient uptake and increase the infiltration, uptake and transpiration of stormwater while water quantity retrofits help to reduce downstream flooding and erosion. In 2013, eight retrofit projects throughout the county were completed for enhanced detention/retention and improved water quality. Specially designed native seed mixes enhanced basin function and vegetation longevity.

iii. Low Impact Development Projects

Five locations were retrofitted through partnership projects with the Department of Public Works and Environmental Services, Fairfax County Public Schools and the Fairfax County Park Authority employing various techniques for water

quality, including the installation of rain gardens, pervious pavement, underground storage, rainwater harvesting, soil amendment, native vegetation and water quality swales.

iv. Education and outreach

As part of the Government Center Stormwater Retrofits project, tours were conducted in 2013 to educate county staff, other agencies, civic and environmental groups, homeowner associations and residents on innovative stormwater techniques. Members and staff of the following participated in educational tours of the project:

- Environmental Quality Advisory Council.
- Fairfax County Board of Supervisors.
- Fairfax County DPWES Directors Office.
- Fairfax County Office of the County Attorney.
- Fairfax County Department of Planning and Zoning.
- Fairfax County Department Purchasing and Supply Management.
- Fairfax County Waste Water Management.
- Fairfax County Engineers in Training Program.

b. Collaboration between Fairfax County Public Schools and the County's Stormwater Planning Division on Stormwater Projects—

In November 2012, staff from FCPS and from the county's Department of Public Works and Environmental Services provided a briefing to EQAC regarding the identification of opportunities to enhance stormwater management efforts (beyond code requirements) on school properties through FCPS and DPWES collaboration. These efforts have targeted events of two inches or less of rainfall, which is 98% of all rainfall events. There was an identification of opportunities to implement stormwater management measures during school renovation/construction processes (the Capital Improvement Program for schools), and funding of enhancements through the Stormwater Service District revenue.

Table IV-1 shows the schools and the status of facilities being planned or implemented.

c. Riparian Buffer Restoration

Fairfax County continued its countywide riparian buffer restoration project in collaboration with various partners to mitigate stormwater runoff into local streams and to support the Board of Supervisors' adopted Environmental Agenda. NVSWCD's 2013 seedling sale helped promote urban reforestation, habitat enhancement and water quality protection, with 6,600 native tree and shrub seedlings sold. The sale offered a variety of eight seedlings chosen to help homeowners restore their landscapes.

As part of the county's buffer restoration program, Earth Sangha donated and/or installed 1,200 native woody plant seedlings, native grass and wildflower plants and

12 pounds of meadow seed mix in 2013. Earth Sangha sold, at a discount, 121 native woody plants and 782 native grass and wildflower plants to Fairfax County Park Authority sites from seedlings grown in its nursery in Springfield. In addition, Earth Sangha donated plants to approximately 14 local schools and 33 other parklands, ecological organizations and homeowner associations.

Table IV-1: Joint FCPS/DPWES Stormwater Projects

Location		Plan Status	Facility Descriptions
Annandale	High	In Design	Currently being evaluated
Bucknell	Elementary	In Design	Vegetative Swale, Permeable Pavers, Bio-Retention, Reforestation
Cherry Run	Elementary	In Design	Currently being evaluated
Hayfield	Secondary	In Design	Currently being evaluated
Herndon	High	In Design	Currently being evaluated
Hollin Meadows	Elementary	In Design	Currently being evaluated
Keene Mill	Elementary	In Design	Vegetative Swale, Permeable Pavers, Amended Soils
Langley	High	Under Construction	Underground storage / filtration
Marshall	High	Under Construction	Cistern - Irrigation system
Mt Vernon	High	In Construction	Added storage to Turf
Newington Forest	Elementary	In Design	Currently being evaluated
North Springfield	Elementary	In Design	Bio-Retention
Oakton	High	In Design	Currently being evaluated
Ravensworth	Elementary	Under Construction	Bio-Retention, Amended Soils
Rocky Run	Middle	In Design	Currently being evaluated
South Lakes	High	In Design	Currently being evaluated
Stratford Landing	Elementary	In Design	Currently being evaluated
Sunrise Valley	Elementary	Under Construction	Pervious Pavement, Vegetative Swale, Underground Detention / Infiltration Trench
Terraset	Elementary	Under Construction	Pervious Pavement, Filterras, Permeable Pavers, Underground Detention
Waynewood	Elementary	In Design	Currently being evaluated
West Springfield	High	In Design	Currently being evaluated
Westbriar	Elementary	In Design	Currently being evaluated
White Oak	Elementary	In Design	Currently being evaluated

FCPA, Fairfax ReLeaf and the Virginia Department of Forestry hosted independent stream buffer restorations in the county in 2013. The Park Authority continues to maintain and monitor the previous riparian buffer enhancement projects installed in the last five years. There are 37 projects on parkland throughout the county. These projects have focused on the conversion of mowed grass to areas of native trees and shrubs typical of riparian areas. Park Authority staff completed additional planting

projects in Resource Protection Areas unrelated to the county's buffer planting program. Examples of such projects in 2013 include: restoring half an acre at Ellanor C. Lawrence Park with native seed and planting 500 shrubs, grasses and forbs; and restoring a quarter acre at Old Colchester Park and Preserve with native seed.

In 2013, Fairfax ReLeaf planted and distributed 5,219 trees and shrubs in Fairfax County. More than 1,000 volunteers spent over 2,400 hour planting tree seedlings, removing invasive species and maintaining planting sites.

VDOF continues to plant riparian buffers in watersheds throughout Fairfax County in support of the county's riparian buffer initiative. In 2013, VDOF worked with volunteers from organizations such as Fairfax ReLeaf, Eagle Scouts, homeowner associations and school groups and planted approximately 4,100 seedlings in the county. The Tree Stewards program, initiated in 2011, is designed to create a cadre of trained volunteers to lead community tree plantings and provide information on the benefits and care of trees. An additional 11 Tree Stewards were trained in 2013.

d. NVSWCD Stream Restoration

Wakefield Run Stream Restoration:

- 800 linear feet of degraded stream restored using natural channel design techniques.
- Significant partnership among the Fairfax County Park Authority, Northern Virginia Soil and Water Conservation District, Braddock District Supervisors Office, Fairfax County DPWES – Stormwater Planning and Utilities Design and Construction Divisions, Dominion Virginia Power, Fluor/Transurban, Virginia Department of Transportation, Friends of Accotink Creek, Fairfax County Parks Foundation, Mid-Atlantic Off-Road Enthusiasts, Vanasse, Hangen, and Brustlin, Inc. and Environmental Quality Resources, Inc.
- Construction began in October 2013 and ended April 2014.
- Ribbon-cutting and volunteer planting took place in May 2014.

e. Reston

Reston's multi-year stream restoration project is under way. Reston Association continues to work with Northern Virginia Stream Restoration, L.C., managed by Wetland Studies and Solutions, Inc., to help coordinate the Reston stream mitigation bank. The project is implementing the recommended stream restoration projects outlined in the Reston Watershed Management Plan. A team of regulatory agencies, including the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality, oversees the progress of the bank.

The groundbreaking for Phase I, which covers 14 miles of stream, occurred on February 12, 2008. Approximately eight miles of stream in the Snakeden Branch, The Glade and Colvin Run watersheds have been restored, fully funded by the Northern Virginia Stream Restoration, L.C.

Engineering design plans are underway for the remaining six miles of stream restoration. For more information on the stream restoration project in Reston visit: http://reston.wetlandstudies.com or www.reston.org.

4. Low Impact Development Techniques

a. Overview

Environmentally sensitive site design and low impact development practices serve to minimize impervious cover and replicate natural hydrologic conditions. The county recommends and encourages "Better Site Design" development techniques and LID practices be used to the full extent allowed by the county's Public Facilities Manual.

In 2013, the Department of Public Works and Environmental Services, the Fairfax County Park Authority, Fairfax County Public Schools, various nonprofit organizations, individual volunteers and other partners contributed to the design and implementation of five projects within the county that incorporated one or more LID practices. Partnership projects that result in multiple LID practices being implemented on sites across the county are increasing in number and becoming a major focus of the stormwater program. Numerous projects, with LID components, are currently under way with these partners and are scheduled to be constructed in the coming months. A summary of completed projects, including those with integrated LID practices, is prepared each year and available from DPWES, Stormwater Management.

Six low impact development practices (bioretention basins and filters, vegetated swales, tree box filters, vegetated roofs, permeable paving and reforestation) were developed for inclusion in the Public Facilities Manual in 2006. In 2007, the Board of Supervisors adopted the amendments. The new Virginia stormwater regulations, including a suite of LID practices, have been integrated into the local code and PFM requirements. The revisions have incorporated Virginia DEQ's requirements from the Best Management Practices Clearinghouse and include 17 different practices (simple rooftop disconnection, rooftop disconnection to alternative practice, sheet flow to vegetated filter or conserved open space, soil compost amendment, reforestation, vegetated roof, rainwater harvesting, permeable pavement, infiltration practices, bioretention, vegetated swale, wet swale, filtering practice, constructed wetland, wet pond, extended detention and manufactured (proprietary) BMP). The amended Public Facilities Manual became effect July 1, 2014.

b. DPWES LID Monitoring Efforts

DPWES staff has conducted monitoring and evaluation of the quantity and quality of runoff from selected innovative stormwater management systems installed at Fairfax County operated stormwater facilities. The stormwater systems that were monitored are designed to retain and absorb much of the stormwater onsite through infiltration and evapotranspiration before it enters into streams and waterways. These systems attempt to replicate the natural processes that occur when stormwater is retained by forests, meadows and wetlands.

Between 2007 and 2012, monitoring occurred at four innovative stormwater facilities implemented by DPWES: the Providence District Supervisor's Office/Fire Station 30 in Merrifield, Cub Run RECenter, the Herrity Building in the Government Center complex and the Cinnamon Oaks pond retrofit. A bioretention filter and basin, a rain garden and permeable pavement blocks with underground gravel storage were installed at Providence District Supervisor's Office/Fire Station 30. A bioretention filter and basin with a vegetated swale were installed at Cub Run RECenter. The Herrity building site is located on the roof of the garage structure and demonstrates three types of vegetated roof on a 5,633 square foot area. Lastly, wetland cells and benches, a sand seepage storm outfall and organic soil amendment with native landscaping were installed at the Cinnamon Oaks pond.

The Virginia Tech Occoquan Watershed Monitoring Laboratory was contracted to conduct full analysis of the monitoring record for these four facilities. The data are being evaluated to determine performance and make design-related recommendations. The analysis is complete and the final reports are expected in late 2014.

c. Virginia Department of Transportation LID Monitoring

VDOT's research division, the Virginia Center for Transportation Innovation and Research, conducts research on current and future environmental topics related to maintenance, construction and operations of transportation systems. Current research projects include:

- ***Assessment of the Low Impact Development Strategies for the Lorton Road Widening Project, Fairfax County, Virginia:*** The primary objectives of this study is to: (1) determine the effectiveness of multiple LID systems for mitigating potential adverse impacts of highway stormwater runoff; and (2) determine the maintenance requirements, procedures and costs associated with LIDs used in the highway setting. Phase I of the project is under way and involves the characterization (both quantity and quality) of runoff coming from Lorton Road prior to LID construction. This will serve as a baseline to determine the pollutant removal efficiency of LID technologies once they are installed and monitored. This information will also help determine the performance of vegetated roadsides and the effects on performance of various

vegetation management and maintenance routines. Currently, efforts are concentrated on three automatic samplers and flow monitors located at a single location to aid in this characterization. This pre-construction monitoring will continue until the initiation of construction in the area and is expected to be completed in fall 2015. Subsequent sampling will take place at new sites as construction progress allows.

- ***Permeable Pavement Pilot Project Using Porous Asphalt:*** The purpose of the study is to address the remaining VDOT-specific questions pertaining to installation costs, constructability, maintenance requirements and long-term hydraulic performance of permeable pavements. The scope of the study will be limited to the installation, monitoring and evaluation of a single type of permeable pavement – porous asphalt – by way of a pilot project at the newly constructed I-66 / Route 234 Bypass Park and Ride Facility in Prince William County. The study began with the installation of the permeable pavement in March 2013. Following the completion of construction, initial permeability readings were taken at the six primary sampling locations and the 18 auxiliary points. In addition to the initial sampling, follow-up sampling was done in July 2013. In November 2013, permeability was measured again and then two of the four sections of the pavement were maintained using two different vacuum systems: a standard vacuum truck and a regenerative air vacuum system. Five days after the maintenance, permeability readings were taken again. Readings were taken again in May 2014, and selected sections will be cleaned, immediately followed by additional permeability tests. The project is scheduled to be complete in fall 2016.

d. LID Public Education and Outreach

There are numerous ways to reach county residents and many methods are employed by the staff of the Stormwater Planning Division of DPWES to inform and educate:

- News releases ("tell and sell" the story to the media).
- Social media (i.e. Facebook and You Tube).
- Pod casts and the "County Conversation" (audio).
- Television public service announcements (video).
- Channel 16 television programs.
- Fact sheets, brochures, newsletters and booklets.
- Slideshare (online PowerPoint presentations).
- Flickr (photo stream).
- Web pages.
- Events (SpringFest, Celebrate Fairfax, Fall for Fairfax homeowner association and project meetings).
- Reports (Stormwater Status Report).
- Personal contact by telephone, email, letter and visit.
- Volunteer opportunities (stream and litter cleanups).

- School programs (Sewer Science, Water Quality Day).
- Stormy the Raindrop (activity books, puppet shows at events).
- Tours of completed projects (e.g., Government Center stream restoration, Big Rocky Run stream restoration, Fair Ridge Pond retrofit).

Popular public education topics included: stream restorations; litter in the environment; proper disposal of pet waste; motor oil and other household hazardous waste; natural gardening techniques; completed projects; detention basins and micropools; native plants; permeable pavers; rain barrels and rain gardens; how to properly discharge swimming pool water; summer and winter tree care tips; and the Huntington levee, among other topics.

Fairfax County addresses non-point source pollution through public education in partnership with surrounding jurisdictions. As a member of the Northern Virginia Clean Water Partners, Fairfax County continued to support the regional stormwater education campaign in 2012. By pooling outreach funds with other jurisdictions to reach a wider audience, the campaign used radio and television advertising in an effort to reduce pollution-causing behaviors among Northern Virginia residents.

The 2013 campaign ran four commercials from April 2013 to August 2013 featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures. The ads aired on twelve cable TV channels, including three Spanish-speaking channels, 1,530 times. These TV ads reached four million Northern Virginia residents and resulted in more than 400 visits to the www.onlyrain.org website. Following the ad campaign, an online survey of 500 Northern Virginia residents was conducted to help determine the effectiveness of the ads, reveal changes in behavior, and aid in directing the future efforts of the campaign. Findings in the 2013 survey include:

- 20 percent of the respondents recalled hearing or seeing advertisements on the internet or on TV about reducing water pollution.
- Of those who recalled the ads, three percent state they now pick up their pet waste more often, four percent state that they are more careful with motor oil and 13 percent state they fertilize fewer times per year.
- Almost 80 percent of people surveyed reported that they always pick up after their pet, as compared with 30 percent in previous surveys.

The Clean Water Partners conducted a mini campaign featuring banner ads on the Comcast website that promote alternatives to chemical fertilizer use, how to dispose used motor oil correctly and the importance of picking up pet waste.

The Northern Virginia Clean Water Partners website may be seen here: http://www.onlyrain.org/.

e. Green Golf Course at Pohick Bay

The Pohick Bay Regional Park Authority golf course on Mason Neck gained recertification as an Audubon Cooperative Sanctuary with Audubon International, with a case study on water conservation and irrigation audit after its irrigation system replacement. The golf course also was designated by the Groundwater Foundation as a Groundwater Guardian Green Site. Pohick Bay is the first golf course in Virginia to achieve this designation and one of only 140 in the country. The Groundwater Foundation provides education and community-based action programs that creatively involve individuals, communities and public and private entities in groundwater conservation and protection. The program recognizes good stewards of groundwater by encouraging managers and superintendents of highly-managed green spaces to implement, measure and document their groundwater-friendly practices. The Pohick Bay Golf Course collects data and documents the environmental impact of its groundwater-friendly practices, such as pounds of fertilizer saved annually by using lower input plants, gallons of water saved annually by using low water/maintenance plant materials, amounts of toxic substances disposed of properly and other related items. Education is built in to the Groundwater Guardian Green Site program, with the park documenting its internal education efforts for site staff and external education for site visitors.

5. Flood Remediation/Reduction Programs

a. Belle Haven Watershed Flood Damage Reduction Study

In September 2003, Hurricane Isabel caused $1.6 billion in damages statewide, more than $10 million of which occurred in the City of Alexandria and Fairfax County. A tidal surge from the Potomac River that was nine feet in height inundated Old Town Alexandria and the Belle View neighborhood of Fairfax County, resulting in "State of Emergency" declarations. In Fairfax County, the New Alexandria and Belle View communities experienced severe flooding from the tidal surge; more than 200 structures were damaged. Both neighborhoods are located in the Special Flood Hazard Area and are vulnerable to future flooding. The SFHA is the Federal Emergency Management Agency's defined 100-year floodplain. The U.S. Army Corp of Engineers, on behalf of Fairfax County, worked to determine if there were technically-feasible and cost-effective flood damage reduction alternatives for the Belle Haven watershed. To reduce flood damages throughout the entire study area, it was determined that a floodwall/levee combination, with a pumping station for interior drainage, may be feasible. The USACE study evaluated structural options (levees and flood walls) and flood proofing alternatives (raising and modifying structures). A preliminary investigation was completed and five percent concept-level design alternatives were developed. The USACE is continuing to address National Park Service and community concerns. The USACE last updated cost estimates and cost benefit ratios for several floodwall/levee alignments in April 2014, with the most expensive alternative being approximately $34 million.

b. Huntington Flood Remediation Project

In June 2006, the Huntington community experienced flooding from Cameron Run--more than 160 homes were affected. The flood waters exceeded the Federal Emergency Management Agency 100-year floodplain elevation by approximately three feet. The community also experienced additional flooding in September 2011. Fairfax County contracted the United States Army Corps of Engineers to determine the contributing factors of the flooding and to develop a design to protect the Huntington community. The USACE completed conceptual flood mitigation plans in April 2009, which included a levee along Cameron Run. The estimated cost for the levee project is $30 million. On November 6, 2012, Fairfax County voters approved a stormwater bond referendum that included funds to design and construct the levee and pump station proposed by the USACE in its 2009 study. The scope of work will include design and construction administration services for the levee and pump station. Construction of the levee will also require utility relocations, acquisition of land rights on adjacent properties and significant public outreach. ARCADIS U.S., Inc. was selected as the design consultant and began work in June 2013. The project is expected to take five to seven years to complete.

6. Support Programs

a. Northern Virginia Soil and Water Conservation District

The Northern Virginia Soil and Water Conservation District is a political subdivision of the Commonwealth of Virginia that has the same boundaries as Fairfax County. The district's goal is to promote clean streams and protected natural resources. NVSWCD works to lessen the impacts of urban/suburban activities on land and water resources in Fairfax County by working with government agencies, industry and the general public and providing technical assistance and outreach programs.

NVSWCD provides information, educational programs, volunteer opportunities and newsletters to residents on many aspects of water quality, erosion and drainage, nonpoint source pollution and stream health. NVSWCD reviews and provides comments to the county's Department of Planning and Zoning on rezoning and special exception applications, with particular attention to the properties of soils, the potential for erosion, the impact on drainage, stormwater management and the surrounding land uses and environment. The district has partnered with many groups to implement several stream restoration and low impact development projects.

NVSWCD presented two rain garden workshops during 2013. The workshops covered rain garden function, design, location, costs, construction, maintenance, planting and materials. The workshops were attended by 59 county residents and industry professionals.

NVSWCD coordinated a regional rain barrel initiative for Northern Virginia with neighboring jurisdictions. Fourteen "build-your-own" rain barrel workshops, four pre-made rain barrel sales and one "train the trainer" event attracted a total of 309 county residents and resulted in the distribution of 388 barrels. NVSWCD continued to partner in an Artistic Rain Barrel program to renew interest in rain barrels and other best management practices. Twenty-five teams of students painted and decorated rain barrels, which were auctioned at an Earth Day event.

NVSWCD coordinated two "build-your-own" composter workshops using surplus barrels from the rain barrel program. Thirty participants constructed thirty tumbler-style composters.

In addition, NVSWCD organized the Watershed Friendly Garden Tour in June 2013, showcasing low impact development practices including green roofs, porous pavers, rain gardens, composting, rain barrels, native species, wildlife habitat and more, inspiring visitors to adopt these practices in their own yards and schools.

b. Virginia Department of Forestry

In 2013, the Virginia Department of Forestry partnered with volunteers from organizations such as Fairfax ReLeaf, Eagle Scouts, homeowner associations and school groups and completed 23 community tree plantings in the county. Volunteers donated 1,121.5 hours and planted 2,741 trees in these 23 events. Six of the tree plantings were along streams and added 1,722 feet of riparian buffer.

In an attempt to expand outreach and education and planting efforts, the Department of Forestry initiated a Tree Stewards program. The Tree Stewards program is designed to create a cadre of trained volunteers to lead community tree plantings and provide information on the benefits and care of trees. Eleven Stewards were trained in 2013.

The Virginia Department of Forestry assists Fairfax County with the Agricultural and Forestal District Program, which provides tax incentives for landowners with 20 acres or more of land in agricultural and forest management.

VDOF also writes Stewardship Plans for forestland owners and Neighborhood Forest Management Plans for homeowners and civic associations. As a matter of course, these plans include an assessment of water quality issues such as erosion, pet waste and fertilizer use.

c. Urban Forest Management Division

UFMD staff worked with Stormwater Planning Division staff, Utilities Design and Construction Division, contractors and other stakeholders as part of the planning and implementation teams for stormwater projects. Contributions included project scoping, plan review, pre-construction meetings and consultation during

construction of various projects including stream restoration, stream stabilization and stormwater facilities. Throughout the year, urban foresters provided valuable input on health and condition of existing trees, preservation potential of trees based on anticipated impacts, mitigating construction impacts to trees designated for preservation and proposed landscape planting. UFMD staff also had an integral role in pre-construction meetings and assessed impacts prior to full completion of projects by walk-throughs of sites to identify potential problems to be addressed.

d. Reston Association

The Reston Association, the homeowners association for the large, planned community of Reston (population >60,000), has an active watershed and lakes management program.

RA is actively involved in public education and innovative approaches to erosion and drainage control. Examples of watershed management practices in Reston include water quality monitoring, stream bank and shoreline stabilization, erosion abatement, fisheries monitoring, algae and invasive aquatic weed control, waterfowl management, trash removal, dredging and riparian buffer restoration.

i. Programs for All Ages:

- On March 22, 2014, RA hosted the fourth annual Reston Kid's Trout Fishing Day, where approximately 300 kids ages 2-12 enjoyed catching rainbow trout from the restored Snakeden Branch stream between Soapstone Drive and Lake Audubon.

- At RA's Spring Festival on May 3, 2014, residents rented boats at Lake Audubon, learned about stream monitoring and tried their hands at fishing at the lake.

- RA hosted a Stream Monitoring Workshop on March 30, 2013, with 20 people getting certified as stream monitors in addition to two other field days with 14 volunteers gaining experience.

- RA, working with volunteers, marked over 250 storm drains in 2013.

- RA participated in the Meaningful Watershed Experience Field Trip for Langston Hughes Middle School 7th graders. Students visited the restored Snakeden Branch or The Glade Beaver Pond where they were able to go to stations including: exploring a watershed model; chemistry; pebble count; invasive species; plant bio-density; tree wars; stream habitat and functions; stream restoration; beavers; and macroinvertebrates.

ii. Community Low Impact Development:

Reston Association provides watershed education opportunities for the public at its Walker Nature Center. The nature center conducts programs for all ages that promote watershed appreciation and conservation, including stream and lake explorations, rain barrel workshops and fishing programs. A summary of RA's activities in 2013 follows:

- Distribution of printed watershed education materials at the center and at community events, including "Helping Our Watersheds: Living in the Potomac and Chesapeake Bay Watershed," "Understanding, Preserving and Enjoying Reston's Lakes and Streams" and "Rain Barrels."

- Work with Lake Anne Elementary School Bayscapers Club on water quality monitoring.

- Assessment of the Snakeden Branch stream restoration with the South Lakes High School International Baccalaureate students.

- Inclusion of watershed education, stream and lake exploration and fishing and boating activities at eight of its summer camp programs for children ages three to 16. These programs served 1,240 campers between June 25 and August 24.

Every Reston lake has a permanent wayside exhibit with information about the lake's watershed and the flora and fauna that is supported by the lake. There is also a permanent wayside exhibit at the nature center at Snakeden Branch that includes watershed and stream restoration information. There is a stormwater trail at Brown's Chapel with educational signs explaining rain gardens, native plant gardens, rain barrels and permeable pavement sidewalks as part of the demonstration project. These interpretive signs are for all ages.

7. Reston Stormwater Trail

The Reston Association received a grant for $8,500 from the Chesapeake Bay License Plate fund, $4,000 from Fairfax Water and a donation from Deloitte LP to implement a self-guided stormwater trail in Reston that serves as a guide to help community associations, residents and youth to better understand stormwater management. It also encourages individuals to implement at least one of the demonstrated techniques to protect water quality from nonpoint source pollution and to buffer storm runoff. The stormwater trail is complete and established.

The stormwater trail includes best management practices/low impact development techniques, including an infiltration sidewalk that uses porous paver bricks. Also included is a rain garden that collects water from the gutter and downspouts at Brown's Chapel; it filters the water through a mixture of sand, topsoil and leaf mulch before

conveying the drainage into a gravel layer, a drainage swale, a garden planted with low-maintenance native species that grow well in the Northern Virginia area and a rain barrel that will be used to collect and conserve rainwater to be used to water the gardens in between rainstorms.

The stormwater trail helps satisfy the goal outlined in Reston's watershed plan of expanding environmental education opportunities in the watersheds of Reston. On-site controls have been implemented that include low impact development technologies to reduce stormwater runoff volumes and peak flows and to implement best management practices and retrofits to take advantage of natural stormwater infiltration that is provided in natural stream valleys.

Reston's watershed master plan is available online at: https://www.reston.org/ParksRecreationEvents/Nature/NaturalResources/Watershed/WatershedMasterplan/Default.aspx?qenc=HzT9ACzZbNs%3d&fqenc=nvONwrgxjZ6oyRuamln6yw%3d%3d.

8. Organized Watershed Cleanups

Staffs from the Stormwater Planning Division, Solid Waste Management Program, Wastewater Management, Fairfax County Park Authority and the Northern Virginia Soil and Water Conservation District continued to support large and small-scale volunteer cleanups coordinated by the Alice Ferguson Foundation, Clean Virginia Waterways and Clean Fairfax.

a. Clean Fairfax

Clean Fairfax reports that, last year, the organization worked with over 2,310 volunteers at 90 assisted cleanups, picking up over 7,800 bags of trash, on and around Fairfax County's roads, parks and side streets. Additional activities of Clean Fairfax are highlighted in the Solid Waste chapter of this report.

b. Reston Association

Reston Association reports the following clean-ups:

- The Potomac River Watershed Cleanup on April 5, 2014 was a success, with 81 volunteers collecting 91 bags of trash and over 100 pounds of bulk trash from six sites in Reston. RA was able to recycle 34 of the bags of trash collected. Additionally, Reston Environmental Action Group's four volunteers collected three bags on April 6, 2014 from their Adopt-a-Spot site. Seventeen volunteers including Louisa Tran and Girl Scout Troop 231 collected eight bags from their cleanup site near Cedar Ridge Apartments on April 27, 2013.

- In June 2013, RA participated in the Clean the Bay Day hosting two Lake Cleanups on Lake Audubon and Lake Thoreau, where 51 people got on boats or

walked to clean approximately five miles of shoreline and collected an estimated 460 pounds of debris (36 bags). Beer cans and water bottles were the most common items collected with lipstick, fireworks, a lampshade, buckets and a bag full of pants as the most unusual items collected. A patio chair, cushion and logs were the largest items collected.

- In October 2013, RA hosted the Fall Stream Watershed Cleanup, where 37 volunteers collected a total of 57 bags of trash. Of those bags, 32 were full of recycling material and were brought to local recycling center.

c. Alice Ferguson Foundation Potomac Watershed Clean-up

This year revealed another record-breaking year for the Annual Potomac River Watershed Cleanup, with 14,766 volunteers removing 288 tons of trash from 671 sites throughout the Watershed. In Fairfax County, 1,907 volunteers removed 39.8 tons of trash from 74 sites.

Additional activities of the Alice Ferguson Foundation are highlighted in the Solid Waste chapter of this report.

d. Clean Virginia Waterways

According to Clean Virginia Waterways, a total of 959 volunteers participated in the International Coastal Cleanup in Fairfax County during September and October 2013. At 36 sites, 13,000 pounds of trash and marine debris were removed. Plastic bags, beverage bottles, food wrappers and containers and litter from recreational activities and fast food consumption (i.e. cups, plates, forks etc.) were the most commonly collected trash items in the county.

e. Fairfax County Park Authority

Fairfax County Park Authority organized and/or assisted with a number of stream cleanups in 2013:

- Sugarland Run Stream Valley Park: Residents organized a stream clean up in April 2013 and removed 25 bags of trash.

- Lake Accotink Park: Staff organized two Watershed Clean-up Days on April 6 and October 19, 2013 that attracted as many as 220 volunteers and removed nearly 2,000 pounds of trash from the Accotink Creek watershed. Separately, Friends of Accotink Creek organized multiple clean-ups at twelve points along Accotink Creek. Throughout the year, the park supported numerous volunteer groups and individuals who collected trash.

- Countywide clean up days were also held on April 6 and October 19, 2013. Participating FCPA sites included: Frying Pan Farm Park, Hidden Oaks Nature

Center; Roundtree Park (Holmes Run); Hidden Pond Nature Center (Pohick Creek); Huntley Meadows Park (Little Hunting Creek); Riverbend Visitor Center (Potomac River); Sully Historic Site (Cain's Branch); and Walney Visitor Center in Ellanor C. Lawrence Park (Flatlick Branch, Big Rocky Run, Cub Run and Frog Branch).

f. NOVA Parks (Northern Virginia Regional Park Authority)

Occoquan, Fountainhead and Bull Run Marina Regional Parks hosted clean up events on the Occoquan River with Friends of the Occoquan, removing dozens of bags of trash from the reservoir. Pohick Bay Regional Park hosted the Alice Ferguson Foundation Rivershore Cleanup. At Sandy Run Regional Park, rowing crew teams took part in water clean-up days, removing trash from the Occoquan Reservoir around Sandy Run. New trash cans were installed at Fountainhead and the W&OD Trail to prevent tipping and foraging by wildlife.

g. Department of Public Works and Environmental Services

In 2013, the Stormwater Planning Division began to develop a logical model to organize and analyze data collected using the Trash Assessment for Improved Environments stream condition assessment protocols and data forms developed in 2012. When completed, this will enable TAFIE data collected by the county as well as by volunteer groups to be integrated and compared with stream cleanup data collected using similar methodologies (particularly the Alice Ferguson Foundation's Visible Trash Survey and the International Coastal Cleanup), as well as allow cleanup data to be merged with other permit-related information (for example, stream cleanup results and stream biomonitoring data).

TAFIE forms and guidance were provided to elementary schools and to individuals seeking volunteer services for the Virginia Master Naturalist certification program.

The county continued to promote the voluntary Virginia Adopt-a-Stream Program implemented by the Virginia Department of Conservation and Recreation. Links to information about the program are included on the county's Web pages dedicated to litter and volunteer stream cleanups.

E. STORMWATER MANAGEMENT, ENFORCEMENT AND INSPECTIONS

1. VPDES Municipal Separate Storm Sewer System Permit

Fairfax County's Virginia Pollutant Discharge Elimination System Municipal Separate Storm Sewer System permit (known as the "MS4 permit") requires the county to prevent the discharge of pollutants such as oil, fertilizer, pet waste and trash from the stormwater management system into waterways to the maximum extent practicable.

The permit also prohibits non-stormwater discharges into the storm drain system, such as from illicit sanitary sewer connections or illegal dumping. It also requires storm event monitoring and assessment of the effectiveness of stormwater controls being used in the county.

The MS4 permit is issued to the county as a whole and elements of the stormwater management program are implemented by a broad range of county agencies and partners. The Stormwater Planning Division and the Maintenance and Stormwater Management Division manage the majority of stormwater management program elements, including comprehensive watershed management planning, long term biological monitoring, infrastructure mapping, inspections and maintenance, retrofitting developed areas with water quality control facilities and public outreach and education. Inspections of privately owned stormwater management facilities are conducted on a regular basis (every five years). Water quality is monitored at selected stormwater outfalls four times per year (seasonally). Outfalls are monitored during dry weather to determine the presence of illicit discharges.

The county continues to work diligently with the state to obtain a new permit. Fairfax County MS4 annual reports can be viewed on-line at: www.fairfaxcounty.gov/dpwes/stormwater/ms4permit.htm.

DEQ administers these programs through the Virginia Stormwater Management Program Regulations, which are authorized by the Virginia Stormwater Management Act.

The county continues to work diligently with the state to obtain a new permit. Fairfax County MS4 annual reports can be viewed on-line at: www.fairfaxcounty.gov/dpwes/stormwater/ms4permit.htm.

On June 8-9, 2011, EPA Region 3 representatives and their consultants conducted an on-site compliance inspection of the county's MS4 program. The inspection focused on Structural and Source Controls, Construction Site Runoff, Industrial and High Risk Runoff, and Illicit Discharge and Improper Disposal components of the permit program. Representatives of the Department of Public Works and Environmental Services, Department of Vehicle Services, Fire and Rescue Department, Fairfax County Park Authority, Health Department, Department of Transportation and the County Attorney's Office participated in the inspection.

The county received a formal report on the results of the inspection from EPA in June 2012, and an Administrative Order in November 2012. The AO directed the county to take steps to address aspects of the Industrial and High Risk Runoff and Construction Site Runoff inspection programs. The county responded to the AO on November 30, 2012 and identified the steps being taken to attain compliance with the AO.

The county has taken the following steps related to the Industrial and High Risk Runoff inspection program:

- Drafting of a standard operating procedure to identify and control pollutants in stormwater discharges from industrial and high-risk facilities.

- Development of a database of industrial and high-risk facilities that have the potential to discharge to the MS4; this database is being used to identify facilities that will be used to prioritize inspections associated with the IHRR program.

- Updating of its list of facilities holding Virginia Pollutant Discharge Elimination System permits.

- Development of new educational materials to assist other county agencies with recognizing and reporting IHRR during their inspections.

- Hiring of two Code Specialists for the purpose of conducting IHRR inspections.

The following steps related to the Construction Site Runoff inspection programs will include:

- Updates to the site inspection database (Site Inspections 2000 or SI2K) and the Inspector's Handbook to require documentation in SI2K of:
  - Location information and comments regarding compliance or noncompliance for erosion and sediment control inspections.
  - Any verbal communications regarding erosion and sediment control inspections.
  - The content of the comments for erosion and sediment control inspections.
  - Revisions to the inspector's copy of the plan regarding any minor changes in the erosion and sediment control features made during construction. (Major revisions currently require formal submission of a plan revision and are reviewed by county engineering staff and appropriate outside agencies for compliance with state and local regulations.)

- These updates to SI2K and the Inspector's Handbook will be followed by annual training with the inspectors to ensure that revisions result in a change in practice in the field.

2. Regional Stormwater Management Pond Program

Since the early 1980s, the county's Public Facilities Manual has included a provision that encourages the concept of regional stormwater management. As opportunities arose, major developers and county staff pursued regional stormwater management, primarily through the development process. A plan identifying the most appropriate locations for regional facilities was needed to improve this process.

The Regional Pond Subcommittee, an ad hoc subcommittee of the Fairfax County Environmental Coordinating Committee, reviewed the county's stormwater management plan and developed recommendations. The Board of Supervisors tasked the subcommittee in January 2002 to examine the role of regional ponds as well as other alternative types of stormwater controls as watershed management tools. The report, which identified 61 recommendations to improve Fairfax County's stormwater management program and to clarify the role of regional ponds, was submitted to and accepted by the Board of Supervisors. The Regional Stormwater Management Plan is being replaced as countywide watershed management plans are being implemented.

Although innovative stormwater management practices are being explored and applied throughout the county, construction of regional ponds continues to be an option used by the county to retrofit areas needing stormwater controls.

3. Stormwater Management Facilities and Infrastructure

In 2013, Fairfax County inspected 1,459 of the 1,668 county-owned stormwater management facilities and 736 of the 3,716 privately maintained stormwater facilities.

The Maintenance and Stormwater Management Division of DPWES inspects and maintains all county-owned and operated stormwater management facilities and best management practice facilities and infrastructure. Pond inspections occur on a biannual basis and are balanced by fiscal year, which exceeds the permit requirement to inspect all county-maintained facilities at least once during the term of the permit. MSMD inspects and oversees private maintenance agreements for privately owned stormwater management facilities. MSMD also inspects privately-maintained facilities at least once during the term of the permit (every five years). As part of the private facility inspections, MSMD oversees private maintenance agreements.

In 2013, MSMD continued its maintenance program for county stormwater management facilities. Maintenance can include repairs to stormwater management facility structures and removal of sediment. During 2013, the county cleaned and/or mowed 1,364 dam embankments, including 52 regional ponds that were maintained four times each during the calendar year. Cleaning involves removing trash, sediment and debris from the trash rack, control structure and all inflow channels leading to the control structure. At each stormwater management facility, deposited sediment is removed from the trickle ditch upstream from the control structure and deposited offsite. The cleaning helps keep the facility functioning properly by conveying water and performing the BMP function as designed. The county completed 2,760 work orders, including: un-blocking stormwater management ponds and pipes to avoid flooding or damaging infrastructure; channel and pond cleaning; mowing; weeding; planting; outfall repair; stream restoration and bank stabilization; graffiti removal; sign repairs/installation; and responses to complaints.

In addition to routine maintenance inspections, county staff with expertise in dam design and construction continues to perform annual inspections of 19 state-regulated

dams in the county (owned by DPWES) to identify any safety or operational items in need of corrective action and to ensure that the dams satisfy state safety requirements. A work program was established and implemented to correct deficiencies and address maintenance items discovered during inspections. Critical items such as the stability of the dam embankment and the function of the water control structures are addressed on a priority basis.

As the SWM concept continues to shift its focus from flood control to water quality and environmental enhancements, the county's public maintenance inventory of low impact development facilities has grown to 168 facilities, including: bioretention gardens; green roofs; permeable pavers; vegetated swales; tree box filters; and infiltration trenches.

In 2013, MSMD continued a partnership with the Fairfax County Sheriff's department using the Community Labor Force crews to help maintain Fairfax County's public low impact development stormwater facilities. In 2013, the CLF work crews were tasked with maintaining roughly 36 publically maintained LID facilities. This successful partnership was expanded to include trash removal from public stormwater ponds.

In 2013, MSMD continued implementation of its infrastructure inspection and rehabilitation program. Staff inspected over 13,000 pipe segments and over 12,000 storm structures with video and photo documentation. Under the rehabilitation program, more than 950,400 linear feet (47 miles) of pipe were videoed, documenting the existing structural and service conditions of the interior of the storm system. These efforts represent 2.3 million linear feet, or one-third of the storm drainage network, being screened through walking and/or video documentation for obvious deficiencies. In addition, more than 19,387 linear feet of storm pipe in the county's inventory were rehabilitated or repaired through replacement or by lining entire pipe segments using cured-in-place pipe lining methods.

In addition to SWM and storm drain infrastructure assessments and maintenance, MSMD: removes snow and performs street sweeping operations on county facilities; responds to flooding complaints; maintains county trails; performs graffiti removal; mows the grass on blighted properties; and maintains an electronic database of facilities including plans, maps, inspection reports and maintenance history. Many emergencies are responded to in the middle of the night and most fixes take place with minimal disruption to Fairfax County residents' daily lives.

Much of the stormwater infrastructure in Fairfax County is reaching the end of its useful life; as the system ages it will be critical to maintain adequate inspection and rehabilitation programs to avoid infrastructure failures and ensure the functionality of stormwater treatment systems. In addition, it is critical for MSMD to implement cost effective solutions such as trenchless pipe replacement technologies, naturalizing stormwater management facilities and creating efficiencies through partnerships with other county agencies such as Fairfax County Public Schools and the Park Authority.

MSMD is increasing its stormwater management infrastructure replacement program, has created a more comprehensive LID maintenance program and continues to rehabilitate a number of older stormwater management dams and other critical facility components. In addition, MSMD and the Department of Code Compliance are continuing to enhance the private stormwater facility enforcement program to ensure all non-functional stormwater facilities are restored to their original design.

4. Erosion and Sediment Control

DPWES continues to make improvements to the county's erosion and sediment control program, resulting in a greater emphasis and a higher quality of inspection services. DPWES developed a quality assurance program and trained field specialists on how to handle erosion and sediment control violations.

In 2013, a total of 856 E&S plans for projects that would disturb a land area of 2,500 square feet or more were submitted and approved for construction. Written reports listing these individual sites were provided on a monthly basis to Virginia Department of Environmental Quality.

In 2013, 23,619 E&S inspections were performed through the county's Alternative Inspection Program on all sites under construction. Those E&S inspections represented 54.5 percent of the 43,305 total site inspections that were performed by Site Development and Inspection Division personnel. The site inspections total also included 2,110 projects that were inspected for purposes other than strictly E&S control (e.g., pre-construction, streets, sanitary sewer, storm sewer and project release).

In 2013, SDID wrote 514 E&S control reports, which identify the E&S control deficiencies developers must correct within five days. Failure to comply within the specified time frame can result in issuance of a violation to the developer. SDID issued 68 violations in 2013 and 58 of those were later cleared. The remaining 10 violations are extended until the required corrections are made or court action is initiated. SDID held 202 escrows for either landscaping or stabilization issues.

The Land Disturbance and Post Occupancy Branch of DPWES-Land Development Services investigates complaints alleging violations of the Fairfax County's Erosion and Sediment Control Ordinance (Chapter 104). The branch also investigates complaints alleging violations of the county's Chesapeake Bay Preservation Ordinance (Chapter 118 of the County Code). In 2013, the branch received 250 total complaints. In most instances there was either no violation or there was timely compliance if a violation was cited. The branch issued 23 Resource Protection Area violation notices and 44 land disturbance violation notices. The branch undertook four criminal proceedings to ensure compliance, with two proceedings resulting in fines issued by the court.

5. Illicit Discharges

a. Fire and Rescue Department

The Fire and Rescue Department's Fire and Hazardous Materials Investigative Services Section aggressively enforces County Code Chapters 62, 105 and 106 in conjunction with the Department of Public Works and Environmental Services and the Department of Planning and Zoning. FHMIS also issues criminal citations during investigations of hazardous materials incidents. Chapter 62 establishes that the Fire Marshall and all permitted members of the Fire Marshall's staff have police powers to investigate and prosecute certain offenses, including offenses related to storage, use and transportation of hazardous materials and hazardous waste, as well as environmental crimes. Chapters 105 and 106 contain provisions that address illicit discharges to state waters and the county's storm drainage system. Procedural Memorandum No. 71-01, Illegal Dump Site Investigation, Response, and Cleanup, outlines the process of follow-up action for non-emergency incidents of illegal dumping; establishes action under County Code Chapter 46, Health or Safety Menaces; and provides referrals for action on complaints that are neither public health hazards nor regulated.

In 2013, the section received 579 complaints involving hazardous materials. The actual spill, leak or release of hazardous materials into the environment occurred in 283 of these cases. Of these 283 releases, 140 involved petroleum based products. There were 21 hydraulic oil spills/releases (mostly from trash trucks), 18 gasoline releases, 30 fuel oil or home heating oil releases and 37 diesel fuel releases. The remainder consisted of a variety of materials including, paint, antifreeze, cleaners, various gases, various chemicals and mercury. There were 33 incidents where the release of hazardous materials impacted storm drains or surface waters. The section tracked 10 sites for both short and long term remediation activities.

b. Virginia Department of Environmental Quality

The Northern Regional Office of the Virginia Department of Environmental Quality reported that, in calendar year 2013, there were 119 stream pollution incidents in Fairfax County. Of those incidents, 44 were petroleum surface spills, 29 were discharges from point sources (discrete conveyances/pipes) and 41 were sewage discharges. The sources of the remaining five incidents were unknown. Water bodies were affected in 38 of the incidents.

6. Virginia Department of Transportation Wetlands, Streams and Water Quality Mitigation Actions and Policies

Due to the linear nature of highway construction projects, the presence of environmental resources varies from project to project. Impacts to stream and wetland resources on all VDOT projects are avoided and minimized to the greatest extent

feasible. For unavoidable permanent impacts, Federal/State water quality laws and regulations may require compensatory mitigation.

On April 10, 2008, the Environmental Protection Agency and the U.S. Army Corps of Engineers jointly issued a Federal Mitigation Rule giving preference first to mitigation banks, second to in-lieu funds and third to permittee responsible mitigation (i.e., preservation, enhancement, and creation) as compensation for impacts to aquatic resources. The Virginia Department of Environmental Quality also supports this preference hierarchy presented in the Rule. As a result, VDOT now purchases wetland and stream credits from approved mitigation banks to compensate for unavoidable impacts to wetlands and streams in lieu of constructing mitigation sites. To date, VDOT has purchased slightly more than 30 wetland mitigation credits and 2,085 linear feet of stream credits associated with VDOT projects within Fairfax County. For the 2013/2014 fiscal year, VDOT purchased one-tenth of a wetland mitigation credit as required compensation for unavoidable wetland impacts associated with VDOT projects within Fairfax County.

VDOT has received comments from county staff and citizens who have expressed a preference for compensatory mitigation for impacts within the county to remain within Fairfax County; however, the opportunity for the VDOT to purchase approved credits within the county is limited.

Prior to the 2008 Ruling, VDOT was required to design and construct on-site mitigation areas during construction of its projects. Within Fairfax County, VDOT has created approximately eight acres of wetlands (seven acres non-tidal and one acre tidal) and has restored 2,635 linear feet of streams as on-site compensatory mitigation for unavoidable impacts associated with previously completed VDOT construction projects (e.g., Fairfax County Parkway, Route 28 widening, Roberts Parkway Bridge Overpass, Springfield Interchange Improvements, Route 29 Bridge Replacement over Big Rocky Run, Route 1 Widening and Woodrow Wilson Bridge Replacement). These compensatory mitigation sites were constructed in the VDOT right-of-way and have fulfilled success establishment requirements set by the regulatory permitting agencies and now exist in perpetuity as protected conservation easements. The wetland and stream mitigation at the recently completed I-95/Telegraph Road interchange improvement project is one of that last remaining on-site mitigation sites under active permit required success monitoring by VDOT staff over the next five years. The compensatory mitigation requirements included wetland enhancement/creation of 1.71 acres of tidal wetlands, 0.63 acre of non-tidal wetlands near the confluence of Taylor Run and Cameron Run and 0.36 acre of stream restoration to relocated tributary to Cameron Run.

Since 1990, VDOT has been meeting its stormwater requirements by treating 858.55 acres of impervious road surface area through a system of 190 stormwater basins throughout the county. Because of new stormwater regulations that became effective on July 1, 2014, it is expected that acreage for treatment will increase as a result of these new regulations.

F. WETLAND PERMITTING—VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

In 2013, the Northern Regional Office of the Virginia Department of Environmental Quality received seven new applications to impact surface waters in Fairfax County. A total of six new Virginia Water Protection Wetland Permits were issued. Compensation for impacts to surface waters was proposed to be provided through the purchase of bank credits and on-site stream restoration or riparian buffer enhancement.

G. WASTEWATER TREATMENT

Wastewater is primarily treated two ways in Fairfax County. In most cases it is collected from homes and commercial sites and carried through the sanitary sewer pipe system to large treatment facilities that release the treated waters into local waterways. For a small percentage of Fairfax County residents, wastewater is treated on-site via septic systems where the water infiltrates into ground and ultimately reaches groundwater.

1. Treatment Facilities

a. Upper Occoquan Service Authority

The following information has been provided by UOSA:

UOSA operates an advanced water reclamation facility in Centerville, Virginia and serves the western portions of Fairfax and Prince William counties, as well as the cities of Manassas and Manassas Park. The water reclamation plant includes primary-secondary treatment followed by advanced waste water treatment processes: chemical clarification; two-stage recarbonation with intermediate settling; multimedia filtration; granular activated carbon adsorption; chlorination for disinfection; and dechlorination. The plant's rated capacity is 54 million gallons per day.

UOSA operates under a Virginia Pollutant Discharge Elimination System Permit, which is issued by the Virginia Department of Environmental Quality. The permit limits and 2013 plant performance are listed in Table IV-2.

The influent highest rolling 30-day flow was observed during the 30-day rolling period ending on March 10, 2013 at 41.55 mgd. The UOSA plant continues to produce high quality reclaimed water.

Table IV-2. UOSA Permit Requirements and 2013 Performance		
Parameter	**Limit**	**Performance**
Flow	54 mgd	32.4 mgd
Fecal Coliform	<2/100 mg/l	<1./100 mg/l
Chemical oxygen demand	10.0 mg/l	<2.8mg/l
Turbidity	0.5 NTU	<0.1 NTU
Total Suspended Solids	1.0 mg/l	<0.1 mg/l
Total Phosphorus	0.1 mg/l	<0.1 mg/l
Surfactants	0.1 mg/l	0.033 mg/l
Total Kjeldahl Nitrogen	1.0 mg/l	0.32 mg/l
Dissolved Oxygen	>5.0 mg/l	>7. 0mg/l
Dechlorination Chlorine Residual (mg/l)	Non detect	Non detect

Source: Upper Occoquan Service Authority

UOSA produces and treats two types of residuals: biosolids from conventional treatment and lime solids from chemical treatment. UOSA produces Exceptional Quality biosolids utilizing a dryer-pelletizer process. EQ biosolids have commercial potential in the agricultural and horticultural markets. As back up to the EQ biosolids process, UOSA produces Class B biosolids through a combination of digestion and dewatering followed by lime stabilization. Class B biosolids are applied to agricultural land. Thickened lime residuals are gravity thickened and dewatered on recessed chamber filter presses. All lime solids are landfilled on site in a permitted industrial landfill owned by UOSA. UOSA's lime solids are registered with the Virginia Department of Agriculture and Consumer Services as an industrial co-product for use as a soil amendment. However, because agricultural lands are located in areas far away from UOSA, their distribution is not currently cost effective.

b. Noman M. Cole Jr. Pollution Control Plant

The NMCPCP, located in Lorton, is a 67 million gallon per day advanced wastewater treatment facility that incorporates preliminary, primary, secondary and tertiary treatment processes to remove pollutants from wastewater. The original plant, which began operation in 1970 at a treatment capacity of 18 million gallons a day, has undergone three capacity and process upgrades to meet more stringent water quality standards. After treatment, the wastewater is discharged into Pohick Creek, a tributary of Gunston Cove and the Potomac River. The plant operates under a VPDES permit. The plant is required to meet effluent discharge quality limits established by the Virginia Department of Environmental Quality. Table IV-3 presents the facility's performance and current effluent monthly limitations.

Table IV-3 NMCPCP Permit Requirements and 2013 Performance Averages		
Parameter	**Limit**	**Performance**
Flow	67 mgd	37.72 mgd
$CBOD_5$	5 mg/l	< 2 mg/l
Suspended Solids	6 mg/l	1.2mg/l
Total Phosphorus	0.18 mg/l	0.09 mg/l
Chlorine Residual	0.008 mg/l	< 0.008 mg/l
Dissolved Oxygen	6.0 mg/l (minimum)	8.6 mg/l
pH	6.0-9.0 (range)	6.8
E. coli Bacteria	126/100 N/MCL*	1 N/MCL*
Ammonia Nitrogen	1.0 – 2.2 mg/l (seasonal)	< 0.11 mg/l
Total Nitrogen (Annual)	7 mg/l	3.67mg/L

*Geometric mean

Source: Fairfax County Department of Public Works and Environmental Services

In 2013, 58,044 wet tons of sludge were generated and incinerated. Inert ash from the process was disposed of in a monofill at the county's I-95 campus.

Water Reuse Project

The purpose of the project, which was completed in 2013, is to provide treated effluent that can be used by various users in lieu of potable water as allowed by state regulations. The Water Reuse project includes the design and construction of approximately 20,000 linear feet of water reuse main, an elevated water tank, a pump station upgrade at the Treatment Plant, a wastewater pump station upgrade at the county's Energy/Resource Recovery Facility, an irrigation pump station upgrade at the Laurel Hill Park Golf Course and an irrigation system at the Lower Potomac ball fields. The project will reduce the treatment plant effluent discharge into Pohick Creek by providing approximately 560 million gallons per year to E/RRF for use in its cooling towers and approximately 24 million gallons per year to the Lower Potomac ball fields and Laurel Hill Park golf course for irrigation purposes, for a total of 584 million gallons per year.

2. Septic System Permitting and Repairs

a. Overview

An estimated 21,527 homes and business are served by on-site sewage disposal systems in Fairfax County. Over 700 of these systems are alternative sewage disposal systems, which require regulating the operation and maintenance on the part of the home owner. The county's Health Department reported that, in 2013, 129 New Sewage Disposal Permits were issued for single family residences. There were 124 new sewage disposal systems installed—69 (56 percent) were alternative type systems and 55 (44 percent) were conventional systems. There were 885

sewage disposal system repair permits issued; repairs ranged from total replacement of the system to minor repairs such as broken piping or pump replacement. There were 4,405 septic tank pumps outs.

b. Septic system failures

i. Overview

There are challenges to sustainability of existing onsite sewage disposal systems through proper use, maintenance and upkeep by the homeowner. There remains a concern for future failing septic systems. There are also challenges associated with the increasing reliance on alternative systems.

There continue to be 33 properties permitted for pump and haul as a result of failing onsite sewage disposal systems with no areas for replacement or availability of public sewer.

Areas of the county with marginal or highly variable soils that have been deemed unsuitable for onsite sewage disposal systems in the past are now being considered for development utilizing alternative onsite sewage disposal technology. In addition, alternative systems are becoming the norm for developers who want to maximize lot yield from properties that are not served by the sanitary sewer system. Alternative on-site systems require more aggressive maintenance on a regular schedule for the systems to function properly. Some require maintenance contracts as part of the permitting process. Homeowners may not be aware of their responsibilities for maintaining these systems. Education from the private sector and government sector is essential.

ii. Summary/Status of present amendments to Chapter 68.1 of the Fairfax County Code

No changes have been made to the Fairfax County Individual Sewage Disposal Facilities Code (Chapter 68.1). Chapter 68.1 will continue to be reviewed for future amendments to address changes that may be necessary to comply with statutory codes related to alternative onsite sewage systems.

The Virginia Regulations for Alternative Onsite Sewage Systems supersede requirements of Chapter 68.1. This regulation establishes permanent design, operation and monitoring requirements for AOSS. The Chesapeake Bay watershed nitrogen limitations, set in the AOSS Regulations, went into effect December 7, 2013.

The Virginia Department of Health contracted the University of Virginia Institute for Environmental Negotiation to undertake a stakeholder process to examine privatization of the onsite sewage disposal system and offer consensus-

based recommendations on how the agency should proceed. The stakeholder group, Safety and Health in Facilitating a Transition, included both VDH and private sector onsite sewage practitioners, local government representatives, homeowners and other interested parties who can provide different perspectives. SHIFT was charged to produce a report of recommendations to advise VDH on how to maximize private sector participation in the onsite sewage program while providing adequate oversight to protect public health and the environment. The Division of Environmental Health is monitoring this process to determine the potential impacts to the Onsite Sewage & Water program in Fairfax County.

iii. Environmental Stewardship

The Division of Environmental Health has fact-sheets, brochures and CDs dealing with operating and maintaining sewage disposal systems properly. In addition, Environmental Health Specialists provide presentations to homeowner associations, realtors, schools and other interested persons or organizations on protecting the environment, groundwater and public health through proper operation and maintenance of sewage disposal and water well systems.

3. Sanitary Sewer Maintenance, Repairs and Rehabilitation

The Wastewater Collection Division within the Department of Public Works and Environmental Services manages the county's operation and maintenance program for the sanitary sewer system, which includes:

- Approximately 3,380 miles of gravity sewers and force mains.
- 63 wastewater pumping stations.
- 57 permanent flow metering stations.
- 11 rain gauge stations.
- 135 grinder pump and associated pressure sewer systems.

WCD takes a proactive approach toward maintenance of the county's wastewater collection and conveyance system to assure that facilities remain at a high service level:

- Sewer Rehabilitation - Utilization of trenchless technologies for sewer rehabilitation is a major initiative for both gravity and pressure lines. In 2013,138,021 linear feet of gravity sewers and 2,350 linear feet of six-inch force mains were rehabilitated using cured-in-place pipe repair. Additionally, 17 manholes were rehabilitated. Over the past 10 years, 213.6 miles of sewer lines have been rehabilitated.

- Inflow/Infiltration and Flow Monitoring Program -The WCD in-house I & I and flow monitoring programs enable the Wastewater Management Program to be proactive in diagnosing wet weather induced problem areas. The I & I program targets the system's older sewer service areas, which are then addressed by the comprehensive sewer capital project and rehabilitation program. The flow

monitoring program provides valuable data to determine problem areas and for billing of inter-jurisdictional flows.

- Sewer Maintenance-The Sewer Maintenance group integrates and optimizes the sewer maintenance activities of WCD. Staff reviews and evaluates procedures, programs, work completed to date and equipment needs. Staff also plans for any additional work necessary to improve upon WCD's reduction of sewer overflows and backups. Continual adjustments are being made to the inspection and cleaning priorities in order to establish the most effective schedules for the field staff. In 2013, 426.3 miles of sewer were cleaned and 205.8 miles were visually inspected. The work orders are planned and managed using a Web-based asset management system.

- Closed Circuit Television-The Television Inspection Group continues its documentation process for new construction as well as existing sanitary lines. Closed circuit television inspection is used to inspect sanitary sewer lines to identify defective lines in need of repair, rehabilitation and/or regular maintenance. In 2013, 232.4 miles of old sewer lines and 8.9 miles of new sewer lines were inspected using CCTV. All inspections are recorded in the Enterprise Asset Management system and are used in work order planning and management. There is a new WCD initiative to replace current process of manual visual inspection of the gravity sewer system with scanning technology (in combination with a digital camera pole) to create robust, efficient, reliable and searchable video inspections. This initiative will enhance the reliability of the inspection program.

- Sanitary Sewer Extension and Improvement Program – This program addresses pollution abatement and public health considerations by providing sanitary sewer service to areas identified by the Department of Health as having non-repairable, malfunctioning septic systems. In 2013, two Extension and Improvement projects were completed consisting of 7,175 linear feet of eight inch sanitary sewer and sanitary sewer connections for 78 existing houses.

- Pumping Stations - The Pumping Stations Branch is responsible for operation and maintenance of the county's sewage pump stations, low pressure systems and flow meters. The preventive and corrective maintenance performed by the branch is critical for reliable operation within the pumping station system. The Pumping Station Branch is also responsible for the rehabilitation of the county's pump stations, meter stations and force mains. The branch works to monitor, repair and identify future projects associated with keeping these facilities in good working order.

  The Supervisory Control and Data Acquisition system provides remote monitoring, alarm management and limited control capabilities for the pump stations on a local area network.

- Lifecycle Asset Management Initiative- In 2013, WCD began participating in Fairfax County's new program-wide strategic lifecycle asset management initiative for wastewater assets including: planning; funding; operation; management; inspection; maintenance; rehabilitation; renewal; disposal; and performance measurement. WCD Projects and Assets Branch is responsible for: monitoring and recommending adjustments to the WCD's asset management strategies and objectives; minimizing wastewater collection and conveyance asset whole life cost; and maintaining acceptable level of service and managing risk associated with asset failure.

H. DRINKING WATER

The county's water supply comes from the Potomac River, the Occoquan Reservoir, Goose Creek, community wells and private wells. Fairfax Water withdraws water from the Potomac River near the James J. Corbalis Water Treatment Plant and from the Occoquan Reservoir at the Frederick F. Griffith Water Treatment Plant. Fairfax Water provides drinking water to most Fairfax County residents. Fairfax Water also provides drinking water to the Prince William County Service Authority, Loudoun Water, Virginia America Water Company (City of Alexandria and Dale City), Town of Herndon, Fort Belvoir and Dulles Airport. As of 2014, both the City of Fairfax and Falls Church systems were incorporated into Fairfax Water's system.

Fairfax Water provided 52,637 million gallons of drinking water in 2013 (see Table IV-4).

With the exception of water from some wells, water must be treated prior to use.

Table IV-4
Fairfax Water -Water Supply Sources, 2013

Sources	Gallons (in billions)
Occoquan Reservoir (Griffith)	21,744
Potomac (Corbalis)	30,796
Wells	0.000
Purchased	0.025
Untreated	.072
TOTAL	52,637

Source: Fairfax Water

Federal regulations require water suppliers to provide annual reports on the quality of the drinking water to their customers through the Consumer Confidence Report Rule. The current Water Quality Report is available for review on the Fairfax Water website at http://www.fairfaxwater.org/water/water.htm.

1. Wells

The Fairfax County Health Department has developed and maintains an extensive data base and GIS layer of all water well systems installed in the county. The Health Department permits and inspects all new well construction, existing well repairs and well abandonments. In 2013, there were 149 new well permits, 38 well repairs and 162 Water Well Abandonments issued. There were 34 Geothermal Well Permits issued.

The Virginia State Health Department Office of Drinking Water regulates 44 public well water supplies in Fairfax County. The operators of these systems are required to conduct quarterly water sampling and analysis.

Fairfax Water no longer operates public wells.

There are approximately 13,340 single family residences and businesses that are served by individual well water supplies in Fairfax County.

2. Source Water Assessments

The 1996 amendments to the Safe Drinking Water Act provided for source water assessment and protection programs designed to prevent contamination to drinking water. Under SDWA, states are required to develop comprehensive Source Water Assessment Programs that identify areas that supply public tap water, inventory contaminants and assess water system susceptibility to contamination. Fairfax Water has completed an inventory of potential sources of contamination and a survey of land use activities within the Potomac and Occoquan Watersheds.

Fairfax Water's Source Water Assessment is available on-line at: www.fairfaxwater.org.

3. Treatment Facilities

a. Occoquan Reservoir Facilities

The Frederick P. Griffith, Jr., Water Treatment Plant, sourced by the Occoquan Reservoir, came on line in 2006 and has a current capacity of 120 million gallons per day. The plant is designed for a future capacity of 160 mgd. In addition to flocculation and sedimentation, the Griffith Plant includes advanced treatment processes of ozone disinfection and biologically active, deep bed, granular activated carbon filtration. Chloramines are used for final disinfection. Residual solids from the water treatment process flow into a nearby quarry with the decant water being discharged in compliance with a Virginia Pollutant Discharge Elimination System permit.

On June 3, 2014, the Board of Supervisors adopted an amendment to Fairfax County's Comprehensive Plan to facilitate the reconfiguration and conversion in

phases of the quarry located adjacent to the Griffith facility to a future water supply storage facility. Fairfax Water and the quarry operator are in the process of seeking zoning approvals for this proposal.

b. Potomac River Facilities

The James J. Corbalis, Jr., Water Treatment Plant, sourced by the Potomac River, has a current capacity of 225 mgd. The plant is designed for an ultimate capacity of 300 mgd. The plant uses ozone as a primary disinfectant, flocculation-sedimentation, biologically active filters with carbon caps and chloramine final disinfection. Residual solids from the water treatment process are dewatered and land applied off site.

c. Washington Aqueduct Facilities

Fairfax Water purchases treated water from the U.S. Army Corps of Engineers, Washington Aqueduct Division, treated at the Dalecarlia and McMillan water treatment plants in Washington, D.C. The original Dalecarlia plant was completed in 1928. The plant capacity was increased in the 1950s by the addition of two additional sedimentation basins, a 30 million gallon clearwell, a 577 million gallon per day finished water pumping station and additional filters. A new chemical building and an additional filter building were completed in 1964. The plant has a capacity of 164 mgd based on filtration rates of two gallons per minute per square foot, and a maximum capacity of 264 mgd. Its treatment scheme consists of screening, chemical additions for flocculation and sedimentation, rapid sand filtration and chemical additions for chlorination, fluoridation and pH control.

The original McMillan plant was constructed in 1905 as a slow sand filter plant. It was replaced in 1985 with a new rapid sand filtration plant at the same site with an average design capacity of 120 mgd based on a filter design rate of 4 gpm/sf, and a maximum capacity of 180 mgd.

4. Drinking Water Quality Monitoring

Federal regulations require water suppliers to provide annual reports on the quality of the drinking water to their customers through the Consumer Confidence Report Rule. The current Water Quality Report is available for review on the Fairfax Water website at www.fairfaxwater.org, and includes much of the following information.

a. Disinfection By-Products

Trihalomethanes are by-products of chlorination water treatment and are suspected carcinogens at elevated levels. The 2013 distribution system averages continue to be below the federally mandated Maximum Contaminant Levels for total trihalomethanes. In addition to the trihalomethanes, haloacetic acid levels, another by-product of chlorination, continue to be below the required maximum

contaminant level. The presence of chlorine in drinking water supplies remained below the required Maximum Residual Disinfectant Level.

b. Metals

Fairfax Water also tests for the following regulated elements: aluminum; antimony; arsenic; barium; beryllium; cadmium; calcium; chromium; copper; iron; lead; manganese; magnesium; mercury; nickel; potassium; selenium; silver; sodium; thallium; and zinc. The levels of these metals in 2013 continued to be below their MCLs. The concentration levels for unregulated metals were within the expected range. Test results for these and other constituents are available on-line at: http://www.fairfaxwater.org.

c. *Cryptosporidium*

Cryptosporidium is a microbial pathogen sometimes found in surface water throughout the United States. Although filtration removes *Cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Fairfax Water consistently maintains its filtration process in accordance with regulatory guidelines to maximize removal efficiency. Fairfax Water's monitoring indicates the occasional presence of these organisms in the source water. Current test methods do not help determine whether the organisms are dead or if they are capable of causing disease.

Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants, small children and the elderly are at greater risk of developing life-threatening illness. Fairfax Water encourages immuno-compromised individuals to consult their doctors regarding appropriate precautions to take to avoid infection.

Cryptosporidium must be ingested in order to cause disease. It may be spread through means other than drinking water, such as other people, animals, water, swimming pools, fresh food, soils and any surface that has not been sanitized after exposure to feces.

Fairfax Water has completed monitoring of the Potomac River and Occoquan Reservoir for compliance with the EPA Long Term 2 Enhanced Surface Water Treatment Rule. EPA created this rule to provide for increased protection against microbial pathogens, such as *Cryptosporidium,* in public water systems that use surface water sources. Fairfax Water's monitoring program began in 2004 and involved the collection of two samples from water treatment plant sources each month for a period of two years. Once monitoring for compliance with the rule was complete, Fairfax Water continued to monitor for *Cryptosporidium* at water treatment plant sources.

Under the Long Term 2 Enhanced Surface Water Treatment Rule, the average *Cryptosporidium* concentration determined whether additional treatment measures were needed. A *Cryptosporidium* concentration of 0.075 oocysts/liter would have triggered the need for additional water treatment measures. Fairfax Water's raw water *Cryptosporidium* concentrations continue to remain well below this regulatory threshold.

d. Emerging Water Quality Issues

An emerging water quality issue of particular media interest is a group of compounds including: (1) pharmaceuticals and personal care products; and (2) endocrine disrupting compounds. While the presence of these substances in source and drinking water has been a recent issue of national interest, to date research has not demonstrated an impact on human health from these compounds at the trace levels discovered in drinking water.

There are tens of thousands of compounds that are considered potential endocrine disrupting compounds or pharmaceuticals and personal care products. While it would be impossible to test for all of them, Fairfax Water considered the feasibility of monitoring and implemented a targeted program focused on constituents most likely to be relevant. First, a suitable list of compounds was carefully researched. Influences in the Potomac and Occoquan River Watersheds (industrial, agricultural uses, etc.) to determine which compounds are most likely to be present were also considered. Fairfax Water then evaluated its treatment process to determine which compounds would not be readily removed through treatment. Finally, the list was narrowed to look at which compounds can be measured in water. This provided an initial list of 20 compounds that were most likely to be present. In 2010, Fairfax Water again performed a comprehensive review which included the current project results as an additional part of the database of information. Based on this review, an updated list of 25 compounds is currently being tested on a routine basis.

Fairfax Water tests its source waters, the Potomac River and the Occoquan Reservoir, and its treated water, delivered to homes and businesses. Samples are sent to an independent laboratory specializing in this type of analysis. As expected, trace amounts of a few compounds were found in the Potomac River and Occoquan Reservoir sources. Trace amounts of three compounds were also found in the treated water at a very low frequency. To date, research shows no indication of human health concern at the levels found in Fairfax Water's source or treated waters. To view the results from Fairfax Water's monitoring of these compounds and learn more about emerging water-quality issues, visit the Fairfax Water website at http://www.fairfaxwater.org/current/monitoring_program.htm or call 703-698-5600, TTY 711.

The analytical methods used in this study have very low detection levels—typically 100 to 1,000 times lower than state and federal standards and guidelines for protecting water quality. Detections, therefore, do not necessarily indicate a

concern to human health but rather help to identify the environmental presence of a wide variety of chemicals not commonly monitored in water resources. These findings complement ongoing drinking water monitoring required by federal and state regulations.

Fairfax Water provides highly advanced treatment for the water served to its customers. A study conducted by the Water Research Foundation concluded that using a combination of ozone and granular activated carbon is very effective in removing broad categories of endocrine disrupting chemicals, personal care products and pharmaceuticals. Fairfax Water uses both ozone and granular activated carbon at both of its treatment plants as part of its multi-barrier water-treatment approach that also includes coagulation, sedimentation, filtration and disinfection. Additional information about Fairfax Water's treatment process and water quality is available at www.fairfaxwater.org/water/index.htm.

e. Special Perchlorate Monitoring Study

Perchlorate is a naturally-occurring as well as a man-made compound. Its presence in drinking water is currently unregulated and utilities are not required to monitor for it. In mid-2007, Fairfax Water began voluntarily participating in an EPA-funded, 12-month non-regulatory perchlorate sampling project for the Potomac River. EPA initially established a reference dose of 24.5 parts per billion for perchlorate and, beginning in 2009 has proposed an interim health advisory of 15 ppb. A reference dose is a scientific estimate of a daily exposure level that is not expected to cause adverse health effects in humans. The reference dose concentration was used in EPA's efforts to address perchlorate in drinking water and to establish the interim health advisory.

The source and treated water samples collected in 2007 and 2008 from Fairfax Water's Potomac River treatment plant showed only trace amounts of perchlorate at levels less than 1.1 parts per billion, far below the EPA reference dose level of 24.5 ppb or the interim health advisory of 15 ppb. Based on EPA's research, the levels of perchlorate observed in the Potomac plant waters are not considered to be a health concern. If you have special health concerns, you may want to get additional information from the EPA at www.epa.gov/safewater/contaminants/unregulated/perchlorate.html or contact the EPA's Safe Drinking Water Hotline at 800-426-4791, TTY 711.

f. Special Hexavalent Chromium Monitoring Study

A report released by the Environmental Working Group in 2010 spurred interest in chromium in drinking water, specifically hexavalent chromium. Chromium is a naturally occurring metal found in soils, plants, rocks, water and animals.

There are two common forms of chromium: chromium III and chromium VI. Chromium III is an essential human dietary element found in vegetables, meats,

fruits, grains and yeast. Chromium VI, also known as hexavalent chromium, is generally produced by industrial processes such as steel manufacturing and pulp mills. It can also be generated by converting natural deposits of chromium III to chromium VI.

Total chromium, which is a measure of the sum of both chromium III and chromium VI, is a regulated compound in drinking water. The current maximum level of total chromium allowed in drinking water is 100 parts per billion. Fairfax Water routinely monitors for total chromium. The tests to date show that our water is consistently below the detection limit of five parts per billion.

In January 2011, Fairfax Water began conducting a special monitoring study by performing quarterly testing for hexavalent chromium in our raw (untreated), finished (treated) and distribution waters. To learn more about the 2011 data results for hexavalent chromium, visit Fairfax Water's website at www.fairfaxwater.org/water/chromium.htm.

g. Tap Water Monitoring

In 2013, Fairfax Water monitored 3,300 taps for coliform bacteria. The monthly monitoring results were within EPA required limits. Fairfax Water also monitored surface source water and finished drinking water for 42 volatile organic compounds and 40 synthetic organic compounds. Low levels of atrazine and metolachlor were detected in the source waters and none was detected in finished waters. Total trihalomethanes, a subset of volatile organic compounds, as discussed above, were detected at low levels in the finished water as expected in a chlorinated system.

Fairfax Water has been testing for lead and copper in customer tap samples, in accordance with EPA's lead and copper rule, since 1992 and has consistently tested below the action level established in the rule. In 2011, the 90^{th} percentile value for lead was 0.80 parts per billion, compared to the EPA action level of 15 ppb. For copper, the 90^{th} percentile value in 2011 was 0.116 part per million, compared to the EPA action level of 1.3 ppm. The next required collection for the EPA lead and copper regulation was to have occurred in June – September 2014. Additional information on these programs and more can be found at: www.fairfaxwater.org.

h. New Regulatory Monitoring - EPA Unregulated Contaminant Monitoring Rule 3

The 1996 SDWA amendments require the EPA once every five years to issue a new Unregulated Contaminant Monitoring Rule list of no more than 30 unregulated contaminants to be monitored by public water systems. This is the first step in the EPA's process to determine what new contaminants may need to be regulated.

Through the UCMR, public water systems provide the EPA with scientifically valid data about the presence of these contaminants in drinking water. These data allow

the EPA to determine if the population is being exposed, quantify the level of exposure and assess the impact of these unregulated contaminants on the environment and public health. These data provide one of several primary sources of occurrence and exposure information used by EPA to develop regulatory decisions for emerging contaminants. The first UCMR was published on Sept. 17, 1999, the second on Jan. 4, 2007 and the third on May 2, 2012. Each UCMR provides a basis for future regulatory actions to protect public health.

The UCMR3 requires public water systems like Fairfax Water to monitor for 28 chemical contaminants for at least a 12-month period between January 2013 and December 2015. Two types of monitoring are being conducted:

- Assessment Monitoring uses common analytical method technologies used by drinking water laboratories. For UCMR3, Fairfax Water is monitoring for 21 contaminants using this method.

- Screening Survey Monitoring uses specialized analytical method technologies not as commonly used by drinking water laboratories. Fairfax Water is required to monitor for seven contaminants using this method.

The UCMR Program was developed in coordination with the Contaminant Candidate List. The CCL is a list of contaminants that are not regulated by the National Primary Drinking Water Regulations, are known or anticipated to occur at public water systems and may warrant regulation under the SDWA. Data collected through the UCMR are stored in the National Contaminant Occurrence Database to support analysis and review of contaminant occurrence, to guide the CCL selection process and to help determine whether to regulate a contaminant in the interest of protecting public health.

EPA reviewed contaminants that had been targeted through existing prioritization processes, including previous UCMR contaminants and the CCL. Additional contaminants were identified based on current research on occurrence and health-effect risk factors. Pesticides that were not registered for use in the United States, contaminants that did not have an analytical reference standard and contaminants for which analytical methods were not ready for use were removed from the list. EPA further prioritized the remaining contaminants based on more extensive health-effects evaluations by the Office of Science and Technology in EPA's Office of Water. These procedures for evaluating health effects support the ranking of contaminants for future CCLs.

Fairfax Water commenced its UCMR3 collection during the third quarter of 2013 and completed four consecutive quarters. Very few of the 28 tested contaminants were detected in Fairfax Water samples, and those that were were detected at low levels. For a complete list of the UCMR3 contaminants and those that were detected please visit www.fairfaxwater.org/current/ucmr3.htm.

For more information, visit EPA's website at http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/index.cfm or call 202-564-3750, TTY 711.

5. Regional Cooperative Water Supply Agreements

In order to protect the Potomac River ecosystem during low flow periods, the three major water utilities in the Metropolitan Washington Area (Fairfax Water, Washington Aqueduct and Washington Suburban Sanitary Commission) became signatories to agreements that lay out the rules for water allocations. Two upstream dams, Jennings-Randolph on the Potomac River and the Savage River Dam, along with Seneca Lake in Montgomery County, Maryland have been constructed; releases from these reservoirs can be used to augment natural river flows during times of drought. The suppliers provide funding for operations and maintenance for a third reservoir, Savage Reservoir, which is used to match a portion of water supply releases from Jennings Randolph.

While the Potomac River has flows that average above 7,000 million gallons per day, flows well below that have also been observed, usually in late summer and early fall. The lowest recorded flow in this region was 388 mgd at Little Falls in September during the drought of 1966. This is an adjusted figure that does not include the withdrawal allocation of 290 mgd (e.g., with that adjustment, the flow was actually 98 mgd).

In 1978, the three major metropolitan water utilities, including Fairfax Water, signed the Low Flow Allocation Agreement, which creates a protocol for allocation of water from the Potomac during periods of low water when the possibility of demand exceeding supply exists.

In 1982, the Metropolitan Washington Area water suppliers and the Interstate Commission on the Potomac River Basin signed the Water Supply Coordination Agreement. The main goal of the agreement is to maintain adequate flow in the river so that water supply and flow-by needs are met and to reduce the risk of requiring allocations as defined in the LFAA. The WSCA promotes a sharing of benefits, risks, and resource costs. All parties agree to optimally utilize the off-Potomac Occoquan and Patuxent Reservoirs to meet water supply demands. The Cooperative Water Supply Operations Section of the ICPRB was established by the WSCA to perform necessary modeling, forecasting and coordination of drought activity.

The current environmental flow recommendations are 300 mgd downstream of Great Falls and 100 mgd downstream of Little Falls. In 2002, the Maryland Department of Natural Resources revisited this issue of the flow level necessary to support aquatic habitat in the Potomac River and was unable to replicate the methodology used to create the present low flow requirements in the agreement. Droughts that occurred in 1999 and 2002 called attention to the concern that these flow regimes, derived by the 1981 study (which was conducted during a period without extreme low flows), needed to be revisited in light of new scientific methods and low-flow information. During the

drought of 2002, the Maryland Department of Natural Resource's Power Plant Siting Program assembled teams of biologists from its staff and Versar, Inc., with assistance from Montgomery County, Maryland and the Interstate Commission on the Potomac River Basin, which performed habitat assessments during that year's low flow conditions.

On April 8, 2003, the Maryland Power Plant Research Program and the Interstate Commission on the Potomac River Basin sponsored a one-day workshop with a panel of nationally recognized experts on habitat assessment to investigate and develop methods to evaluate the environmental flow-by requirements. Their conclusion of the present low-flow agreement is that: "Existing biological data and understanding are inadequate to support a specific, quantitative environmental flow-by." At this workshop, members of the special panel collectively considered and debated the various methodologies applicable to the Potomac River to address the flow-by issue. The final product of the workshop is a set of recommendations for 1) the best method or approach, given current financial resource limitations, to address the Potomac Flow-by Study objectives and the level of confidence associated with their recommendations and 2) an alternative long-term method or approach which could better accomplish those objectives, yet might exceed current resources or available data, and recommended guidelines for achieving the objectives in a longer time-frame.

In September 2003, the Maryland Department of Natural Resource's Power Plant Siting Program issued a report entitled Habitat Assessment of the Potomac River From Little Falls to Seneca Pool (Final Document #PPAD-03-1), which provided substantial background information describing the history of current low-flow requirements, a review of the studies conducted to support those requirements and a report on habitat assessment conducted during low-flow conditions in 2002. The assessment included development of a habitat map, a field survey of habitat types and measurements of hydraulic and water quality conditions, spanning the period of July through October 2002 when flows were as low as 151 million gallons per day at the gage at Little Falls Dam.
In November 2004, ICPRB convened an update meeting to discuss recent developments in USGS mussel studies and further defining desired hydrological regimes.

Full reports on these activities can be viewed at:
www.esm.versar.com/pprp/potomac/default.htm.

A symposium hosted by the Nature Conservancy at the National Conservation Training Center in Shepherdstown, West Virginia on September 24-25, 2010 drew together 70 scientists and interested individuals representing a broad spectrum of interests to continue work on the low-flow issue. The final large river flow needs report is now available at: Potomac Basin Large River Environmental Flow Needs.

The State Water Control Board's Water Supply Planning Regulation (9 VAC 25-780) requires all cities and counties in the commonwealth to submit water supply plans to

the Virginia Department of Environmental Quality. Each water supply plan must include a description of existing water resources and water use, projected demands, a description of water management actions/conservation measures, segment of need for future supplies and alternative analysis and local government resolution approving the plan. Fairfax County is participating in a Regional Water Supply Plan, which was required to be submitted to VDEQ by November 2011.

a. Interstate Commission on the Potomac River Basin Cooperative Water Supply Operations

ICPRB plays several important roles in providing for the region's current and future water supply needs. The Cooperative Water Supply Operations Section facilitates the coordination of resources among the three major water utilities (including Fairfax Water) during times of low flows in the Potomac River. The Water Resources Section also provides technical water resources management assistance to the jurisdictions throughout the basin. Since the creation of the region's cooperative water supply system in 1982, low flow conditions necessitating the release of water from upstream reservoirs to augment Potomac River flow have occurred in only three years: 1999; 2002; and 2010. Since 2010, flow in the Potomac River has been more than adequate to meet drinking water withdrawal needs by the region's major utilities and no additional releases from upstream reservoirs to augment water supplies have been needed. Given the rainfall this year throughout the Potomac watershed, it is unlikely that releases will be needed for the remainder of 2014.

In October 2007, ICPRB worked with the region's utilities and the U.S. Army Corps of Engineers to conduct several test releases from upstream reservoirs. These test releases provided useful data on how the river behaves during droughts and will help to make drought management activities more efficient in the future.

ICPRB annually coordinates a weeklong drought management exercise that simulates water management operations and decision making under drought conditions for the Metropolitan Washington area. Annual simulation allows for renewal of coordination procedures with the water suppliers and other agencies, opportunities for public education and outreach and review and improvement of operational tools and procedures.

Information on water supply status, recent streamflow, reservoir storage, water supply outlooks and precipitation maps can be found in the publications section of the ICPRB website, www.potomacriver.org.

Summary of Water Supply Data and Trends

Every five years since 1990, the Section for Cooperative Water Supply Operations on the Potomac of ICPRB has conducted a 20-year forecast of demand and resource availability on behalf of the three major water utilities in the Washington D.C.

Metropolitan Area (including Fairfax Water). The 2010 study had two parts to it. Part one of the study, "Demand and Resource Availability Forecast for Year 2040," contains the most recent demand forecast of future water use, analysis of current resources and evaluation of resource alternatives. The main focus of part one is to assess the ability of the region's water resources to meet the water supply needs of the Washington metropolitan area population as it continues to increase. Part two of this study addresses the potential impacts of climate change. Different possible climate change scenarios for the region were evaluated using climate change models and the results were incorporated into the water utility planning model to better help forecast future demands and the constraints that need to be overcome to meet the demands. Both parts one and two are available as follows:

Part One: http://www.mwcog.org/uploads/committee-documents/ZV5YWVxX20100907131139.pdf.
Part Two: http://www.potomacriver.org/publicationspdf/ICPRB13-07.pdf

ICPRB has initiated work on the 2015 study, "Demand and Resource Availability Forecast for Year 2040," which will include a range of updates such as the Metropolitan Washington Council of Governments' Round 8.2 demographic forecasts and a sensitivity analysis based on the information learned from the climate change results in part two of the 2010 study.

b. Potomac River Drinking Source Water Protection Partnership

The Potomac River DSWPP is a voluntary association of water utilities and government agencies focused on protecting drinking water sources in the Potomac River basin. Fairfax Water, a founding member since its formation in 2004, has been actively involved in the leadership of the partnership. The partnership aims to identify priorities for source water protection, to establish coordinated dialogue between water suppliers and government partners, to promote information sharing and to encourage coordinated approaches to water supply protection measures in the basin. It has been effective in providing the utilities and the government partners with a stronger voice and more effective position on numerous watershed protection efforts and has been instrumental in advocating for stronger source water protection efforts. The partnership works through various workgroups involved in issues that are important and relevant to source water protection. Pathogens, emerging contaminants, early warning/emergency response, urban issues, agricultural issues and water quality data are some of the issues being addressed by existing workgroups in the partnership. The partnership was also recognized in the National Water Program by the Environment Protection Agency in 2008 as a best practice. More information on the partnership can be found at:

http://www.potomacdwspp.org/index.php?option=com_content&view=article&id=1:about-dwspp&catid=37:about-dwspp&Itemid=28

c. Metropolitan Washington Council of Governments

In response to the droughts of 1998 and 1999, MWCOG brought together a task force in May 2000 to coordinate regional responses during droughts to reduced availability of drinking water supplies. The plan consists of two components: (1) a year-round plan emphasizing wise water use and conservation; and (2) a water supply and drought awareness and response plan. The Section for Cooperative Operations for Water Supply on the Potomac of the Interstate Commission on the Potomac River Basin handles the administration of the coordinated drought response for water withdrawals from the Potomac River and during low flows. Additionally, the CO-OP Section works with MWCOG and the Drought Coordination Committee to assist in providing accurate and timely information to residents during low-flow conditions.
http://www.mwcog.org/environment/water/watersupply/current_conditions.a

In coordination with the water utilities in the Washington area, including Fairfax Water, a Water Emergency Response Plan was developed and completed in 2005; the plan was updated in 2009. The plan provides communication and coordination guidance to area water utilities, local governments and agencies in the event of a drinking water related emergency. The plan replaced the 1994 Water Supply Emergency Plan.

The plan includes four conditions of water supply: 1) Normal, focusing on a year-round program emphasizing "Wise Water Use;" 2) Watch, where the Potomac River basin is in a drought of level D1 as defined by the National Oceanographic and Atmospheric Administration; 3) Warning, when combined storage in Jennings Randolph and Little Seneca reservoirs is at less than 60 percent of capacity, triggering voluntary water use restrictions; and 4) Emergency, when the probability of meeting water supply demands during the following 30 days is 50 percent or less, triggering mandatory water use restrictions. These drought levels were adopted by the COG Board of Directors in June 2000 and represent a concerted effort to coordinate interjurisdictional drought response.

COG held a regional Drought Coordination and Response Plan workshop on April 4, 2013. Participants included COG staff, the Interstate Commission on the Potomac River Basin, the Maryland Department of the Environment, VDEQ, the National Oceanographic and Atmospheric Administration, the U.S. Geological Survey, the Middle Atlantic River Forecast Center, local governments and regional utilities. The main purpose of the workshop was to review the “Drought Watch” trigger and consider modifications to it. Additional information is available on the COG website: http://www.mwcog.org/environment/water/water_workshops.asp

A revised regional Drought Coordination and Response Plan and also a revised Water Supply Emergency Plan should be completed by June 30, 2015.
MWCOG put forward a report on the effects of climate change in the National Capital Region in November 2008. The report identified potential impacts of climate change on the water resources of the region and contains recommendations

to help reduce and control emissions that contribute towards climate change. It also identified goals for climate change adaptations and mitigation. The report is available at: http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf

In 2009, the Climate, Energy and Environment Committee was established to help meet the goals outlined in the Climate Change Report. The CEEPC Action Plan identifies short term mitigation and adaptation related targets and strategies to facilitate achieving the long-term goals. In May 2013, CEEPC adopted a revised Climate and Energy Action Plan for the years 2013-2016 (https://www.mwcog.org/environment/climate/Documents/2013-5-22%20Final%202013-2016%20CEEPC%20Action%20Plan.pdf). In addition, a COG report was finalized in June 2013 that provides an overview of climate change vulnerabilities and adaptation options. The report is available at: http://www.mwcog.org/uploads/pub-documents/pl5cXls20130701111432.pdf.

COG issues monthly reports during the drought monitoring season (typically from May—October) unless conditions deteriorate and additional reporting is needed. The report is a snapshot of current water supply and drought monitoring conditions in the Potomac River Basin along with an outlook for the next several months, including: (1) The current U.S. Drought Monitor issued by NOAA; (2) Precipitation data for the Potomac River Basin; (3) Groundwater Levels; (4) Seasonal Drought Outlooks—prediction tools issued by NOAA; and (5) Streamflow data for Little Falls and Point of Rocks. The latest copy and other drought response information can be found on COG's water supply web site http://www.mwcog.org/environment/water/watersupply.asp.

d. Northern Virginia Regional Commission Water Supply Plan

Northern Virginia Regional Commission Water Supply Plan

In April 2014, the Department of Environmental Quality undertook a review of 9VAC25-780, Local and Regional Water Supply Planning Regulation. The purpose of this review was to determine whether this regulation should be repealed, amended, or retained in its current form. Public comment was sought on the review of any issue relating to this regulation, including whether the regulation (i) is necessary for the protection of public health, safety and welfare or for the economical performance of important governmental functions; (ii) minimizes the economic impact on small businesses in a manner consistent with the stated objectives of applicable law; and (iii) is clearly written and easily understandable.

Statute directs the State Water Control Board to establish a comprehensive water supply planning process for the development of local, regional and state water supply plans. Statute also allows for localities to choose whether to plan individually or as part of a regional group. One alternative would be for the State Water Control Board to establish which localities would collectively submit a regional water supply plan, based on specified criteria such as planning district area,

metropolitan area or watershed boundary. This alternative was rejected since localities have already complied with developing water supply plans, thus making changes to who is required to plan together regionally would not be beneficial to the comprehensive water supply planning process. Dictating the membership of localities to be included in a specific water supply plan would be more burdensome on localities and the board.

Based on current statute, there were no alternatives to this regulation that were determined to be less burdensome and as such, the agency recommended that the regulation be retained. Based on the current regulation the next revision of the Northern Virginia Water Supply Plan will be due in 2018. The plan may be viewed on line at http://www.novaregion.org/index.aspx?NID=1214.

6. Occoquan Watershed Initiatives

a. The Occoquan Policy

The Occoquan Reservoir is one of the two sources of drinking water for Fairfax Water. Fairfax Water relies on the reservoir to provide about 40 percent of its water supply. Therefore, maintaining the water quality in the reservoir is of utmost importance. Several initiatives are in place to protect the water quality in the reservoir.

During the latter part of the 1960s, the Occoquan Reservoir exhibited signs of advanced eutrophication, such as frequent and intense algal blooms (including cyanobacteria), periodic fish kills and taste and odor problems. All these issues threatened the health of the reservoir as a water supply source. In an attempt to find a solution to these problems and to ensure long term health and usability of the reservoir, the Virginia State Water Control Board commissioned the firm Metcalf & Eddy to study the reservoir water quality issues and to suggest a plan of action. Based on the report, in an effort to improve the water quality in the reservoir, the SWCB adopted the Occoquan Policy in 1971. The main goal of the program was to regulate point source pollution in the reservoir by regulating jurisdictional domestic sewage and by setting forth requirements for high performance regional treatment plants. Realizing that the establishment of advanced waste water treatment plants in a rapidly urbanizing watershed might not be sufficient to fully protect the reservoir, the Occoquan Watershed Monitoring Program was established in 1972. It serves as an independent program for monitoring the water quality in the Reservoir. The program is overseen by the Occoquan Watershed Monitoring Subcommittee and the monitoring and evaluations are done by the Occoquan Watershed Monitoring Lab. As outlined in the Policy, an advanced waste water treatment facility operated by the Upper Occoquan Service Authority came into operation in 1978. It replaced 11 major point sources of pollution in the watershed. This system is also one of the early pioneers of indirect potable reuse.

b. Occoquan Basin Nonpoint Source Pollution Management Program

The point source pollution in the Occoquan watershed was addressed by the Occoquan Policy. Planning studies conducted by NVRC between 1976 and 1978 indicated that nonpoint source pollution loadings from the watershed were a significant contributor to the water quality problems observed in the reservoir. In an attempt to combat the sources of nonpoint source pollution in the basin, the Occoquan Basin Nonpoint Source Pollution Management Program was established in accordance with Section 208 of the Metropolitan Washington Region's Area Wide Water Quality Management Plan, which was developed pursuant to the 1972 Federal Water Pollution Control Act Amendments. NVRC coordinated this multijurisdictional effort to supplement the water quality benefits of the advanced wastewater treatment plant in the basin.

c. Fairfax County New Millennium Occoquan Watershed Task Force Report

To further combat the effects of nonpoint source pollution in the watershed, in 1980 the Fairfax County Board of Supervisors authorized the Occoquan Basin Study and appointed the Citizens Task Force on the Occoquan Basin to carry out the study. The report from the study was published in 1982. It recommended downzoning the land use in about two-thirds of the Fairfax County portion of the Occoquan Watershed to allow no more than one residence per five acres of land and to implement stringent stormwater BMPs in the remaining urbanized areas to protect the Occoquan Reservoir from the impacts of stormwater runoff. As recommended by the report, in the same year Fairfax County downzoned about 41,000 acres of the Occoquan Watershed. Concurrent with the 1982 rezoning, the county established the Water Supply Protection Overlay District in its zoning ordinance, consisting entirely of its portion of the Occoquan Watershed. Stormwater BMPs are required for all new developments exceeding a density of one dwelling per five acres; a 50% phosphorus reduction requirement was also established.

On the twentieth anniversary of the downzoning, the Fairfax County Board of Supervisors established a New Millennium Occoquan Watershed Task Force to provide an assessment of issues facing the Fairfax County portion of the Occoquan Watershed. The report was published in 2003 and put forward management options for consideration both at the county and regional levels to further protect the Occoquan Reservoir. The Fairfax County New Millennium Occoquan Watershed Task Force report is available at:
http://www.fairfaxcounty.gov/dpwes/watersheds/part_1_otf.pdf

7. Lifting the Ban on Uranium Mining

There has been in place in Virginia a ban on uranium mining statewide since 1982. However there have been recent legislative and/or gubernatorial efforts under way to lift the moratorium.

EQAC received presentations on this issue from Dan Holmes, Director of State Policy with the Piedmont Environmental Council, and Stephen Walz, the then-Director of Energy Programs at the Northern Virginia Regional Commission and formerly the Director of the Virginia Department of Mines, Minerals and Energy. An area of focus of these presentations was reports on uranium mining in Virginia that had been prepared by the National Academy of Sciences, Fairfax Water, Chmura Analytics, Virginia Beach and RTI Socioeconomic. EQAC has had the opportunity to review these reports.

The Chmura study indicates that the adverse economic impact under the worst case scenario is significantly greater than corresponding positive impact in the best case scenario. It appears from these studies that future substantive failure of a uranium mining site would require significant economic support from all the residents of Virginia for remediation and would potentially result in contaminated water resources for very significant periods of time.

At this time, the only uranium deposits that appear to be potentially economically viable for mining are in Pittsylvania County, where mining would have no impact on Fairfax County. The concern exists, though, that there are other uranium occurrences in Virginia and that past uranium mining lease agreements were established in Fauquier County, within the Occoquan watershed.

The Occoquan Reservoir is one of the county's primary sources of drinking water, and the quality of this drinking water source can be adversely affected by activities occurring within its watershed. There are serious concerns about the lifting of the moratorium in light of numerous and substantial questions and concerns regarding the potential for adverse environmental impacts to Virginia and the Occoquan Reservoir if uranium was to be mined or milled within the Occoquan watershed.

It is EQAC's view that it would be premature to lift the moratorium on uranium mining in Virginia or draft regulations pertaining to uranium mining without first addressing concerns identified by the National Academy of Sciences in its report.
See EQAC's resolution on retaining the ban at
http://www.fairfaxcounty.gov/dpz/eqac/resolutions/2012_january--uranium_mining.pdf.

8. Environmental Stewardship

a. Occoquan Shoreline Easement Policy

In December 2005, Fairfax Water adopted a revision to the Occoquan Reservoir Shoreline Easement Policy, which places limits on what may be done within the utility's easement surrounding the reservoir. The policy prohibits construction of any structures other than piers and floats. Removal of any vegetation, storage of fuels or chemicals, application of pesticides and placement of debris are also prohibited in this area. Shoreline stabilization projects are allowed with prior

permission from Fairfax Water and pertinent federal, state and local agencies. Vegetative practices are required unless technical considerations justify hardened practices. The policy is intended to protect the reservoir's riparian buffer. A copy of the policy is available at: http://www.fairfaxwater.org/water/shoreline_easement_policy.htm.

b. Water Supply Stakeholder Outreach Grant Program

Fairfax Water offers grants to qualified organizations that undertake water supply education or watershed protection projects. Projects eligible for grants include educational efforts, source-water protection efforts, water quality monitoring projects and Occoquan Reservoir stabilization projects. The project must address issues within areas served by Fairfax Water or watershed lying in Fairfax, Loudoun, Prince William or Fauquier Counties. Eligible education projects may include seminars, programs or displays on hydrology, water treatment processes, distribution, nonpoint source pollution, erosion and sediment control, water quality monitoring or any related topic. Eligible watershed protection projects may include stream restoration projects, nonpoint source pollution management projects or other activities aimed at improving water quality within Fairfax Water's watershed. Since beginning the program in 2000, Fairfax Water has awarded 80 water supply stakeholder outreach grants totaling $384,653.

More information about the grant program is available at: www.fairfaxwater.org/outreach/grants.htm

I. REGULATIONS, LAWS AND POLICIES

1. 2014 Virginia General Assembly Legislation

SB 209 (McWaters) Sand Replenishment
Provides that when sand or other material is placed on state-owned bottomlands seaward of the mean low-water mark in order to provide beach nourishment or storm protection or as a result of a dredging project, the deposited material shall be deemed accretion. The public has a right of use and maintenance of the new area as exists on the adjacent land above the mean low-water mark. Affects sand placement projects of the specified type beginning January 1, 2009.

HB 445 (Bulova) Administrative Process Act; standard procedures for adoption of waste load allocations
Identifies standard procedures for adoption of waste load allocations by the State Water Control Board. Establishes minimum procedural requirements for the adoption of all waste load allocations, including public notice, public comment opportunity, a stakeholders advisory group process, agency response to comments and a public meeting. Historically, waste load allocations were established under various procedures on a case-by-case basis. The bill requires that a comprehensive listing of all

total maximum daily load waste load allocations adopted or approved by the State Water Control Board prior to July 1, 2014, be set forth in the Water Quality Management Planning Regulation (9VAC25-720).

HB 572 (Stolle) Wetlands; credit for in-lieu fee payments
Requires a local wetlands board to give a permit applicant credit toward local in-lieu fees in the amount of the fee he has paid, as an agreed-upon permit condition, to the Virginia Aquatic Resources Trust Fund or another dedicated wetlands restoration fund; includes other technical changes.

HB 654 (Scott) Wetland and Stream Mitigation Banks; hydrologic unit boundaries
Allows the use of a hydrologic unit system or dataset other than the National Watershed Boundary Dataset; allows the adjustment of the hydrologic unit boundaries of such dataset based on the availability of more accurate information.

HB 674 (Poindexter) Water supplies and waterworks
Defines "human consumption" as used in the context of water supplies and waterworks.

HB 911 (Knight) Living shorelines projects; issuance of general permits.
Requires regulations for the issuance of general permits for living shoreline projects to include an expedited review process. Allows construction of such projects under the local wetlands and coastal primary sand dunes ordinances.

HB 1173 (Landes) Stormwater Management Programs
Alters the permitting appeals process and allows for an agreement in lieu of a stormwater management plan, and it directs the State Water Control Board to adopt regulations relating to the issuance of permits for parcels in subdivisions, the registration of single-family residences and the reciprocity given by Virginia for proprietary Best Management Practices established elsewhere. The bill exempts single-family residences from payment of DEQ's portion of the fee for the state general permit. Finally, the bill provides that the consolidation of state post-construction requirements into Virginia's General Permit shall not modify the scope of enforcement of the federal Clean Water Act and exempts from most requirements of the Administrative Process Act those regulations of the State Water Control Board that will be necessary to implement the act.

HB 1217 (Morris) Chesapeake Bay Preservation Areas; septic tank pump-outs
Allows documentation in lieu of proof of septic tank pump-out provided the documentation is certified by a licensed or certified on-site sewage system operator or soil evaluator.

2. Buffer Protection for Headwater and Intermittent Streams

On February 25, 2008, the Board of Supervisors adopted an amendment to the Policy Plan to strengthen Comprehensive Plan guidance regarding the protection and restoration of streams and associated buffer areas along stream channels upstream of

Resource Protection Areas and Environmental Quality Corridors. This new guidance augments the Environmental Quality Corridor policy by explicitly encouraging stream and buffer area protection and restoration in these headwaters areas. On July 27, 2010, the EQC policy was further amended to clarify circumstances under which proposals for disturbances to EQCs should be considered favorably.

3. The Virginia Chesapeake Bay Preservation Act and Regulations

The Virginia Chesapeake Bay Preservation Act was passed as part of Virginia's commitment to the second Chesapeake Bay Agreement's goals to reduce nonpoint source phosphorus and nitrogen entering the bay. In November 2004, the Board of Supervisors adopted an amendment to the Comprehensive Plan to ensure it was consistent with the act and satisfied all requirements. The amendment included revisions to text in the environment section of the Policy Plan as well as the incorporation of a Chesapeake Bay Supplement. In March 2005, the Chesapeake Bay Local Assistance Board determined that the Comprehensive Plan, as amended, is fully consistent with the Chesapeake Bay Preservation Act and Regulations.

The Chesapeake Bay Exception Review Committee was formed to hear requests for exceptions to the Chesapeake Bay Preservation Ordinance. The committee is comprised of 11 county residents appointed by the Board of Supervisors--one member from each magisterial district and two at-large members. As part of the exception review and approval process, public notice and a public hearing are required. In 2013, the Exception Review Committee approved the three exception requests presented.

The Chesapeake Bay Program is a cooperative arrangement among three states (Virginia, Pennsylvania and Maryland), the District of Columbia and the federal government (represented by the Environmental Protection Agency) for addressing the protection and restoration of the water quality, habitats and living resources of the Chesapeake Bay and its tributaries. Each state determines how it will meet the various commitments, and the approaches to implementation often vary greatly among states. All streams in Fairfax County are tributaries of the Potomac River, which flows into the Chesapeake Bay.

4. Virginia Stormwater Management Program—Stormwater Management Regulations (4VAC50-60)

As required by of the Code of Virginia, beginning July 1, 2014, local governments became the Virginia Stormwater Management Program authorities. Prior to this date, this responsibility belonged to the Virginia Department of Conservation and Recreation. The commonwealth will maintain oversight of local programs to ensure that all applicable state regulations are applied and enforced. In 2013, the responsibility for this oversight changed from the Department of Conservation and Recreation to the Virginia Department of Environmental Quality.

The Stormwater Management Ordinance of Fairfax County applies to all unincorporated areas of the county and the town of Clifton. Any cities or towns that have their own MS4 permit will also have their own ordinance and stormwater management program. The VPDES (formerly known as the VSMP) General Permit for Discharges of Stormwater from Construction Activities will continue to be the vehicle by which land disturbing activities are monitored for compliance with the provisions of the Virginia Stormwater Management Act and associated regulations. Beginning July 1, 2014, the county now administers the state permit program on behalf of the Department of Environmental Quality. Also, the Virginia Soil and Water Conservation Board approved new stormwater management regulations. Compliance with these new rules is required by the 2014 VPDES permit and the localities' Stormwater Management Ordinances, both of which were to have taken effect on July 1, 2014. The Board of Supervisors approved a new Chapter 124, Stormwater Management Ordinance, as well as related Code and Public Facilities Amendments on January 28, 2014. The main regulatory changes are summarized in Table IV-5.

The *Virginia Stormwater Management Handbook* is being updated to reflect the new regulations and design criteria. The handbook will be available online, by chapter. Until the final version is published, practitioners can access approved Best Management Practice specifications at the Virginia Stormwater BMP Clearinghouse: http://vwrrc.vt.edu/SWC/PostConstructionBMPs.html. Under the old stormwater regulations, specific BMP utilization within a jurisdiction was primarily at the discretion of the locality. Under the new regulations, the BMP must be listed on the clearinghouse. Also, the VPDES permit will require fully enforceable maintenance agreements for stormwater controls (structural and non-structural best management practices). The agreements will be deeded to run with the land and will allow for inspections and maintenance to occur that will ensure the long-term function of stormwater controls. The Stormwater Management Regulations contain the following noteworthy provisions regarding both grandfathering and time limits. Projects may proceed through construction under the old technical criteria for stormwater management, if one of several circumstances applies. These are:

- Projects for which there is plan approval status dated July 1, 2012 or before, but for which no state permit is obtained before July 1, 2014.
  - Documentation may take the form of a locality approved plan, plat, zoning approval or other approved document determined permissible under the locality's ordinance.
  - Any modification to said locality-approved document may call into question the eligibility of the project to be grandfathered.
  - Portions of a project not under construction June 30, 2019, must comply with any new criteria adopted by the state.

- Projects with government bonds or public debt financing before July1, 2012.

- Projects that obtained 2009 state permit coverage before July 1, 2014 have two five-year permit cycles (until June 30, 2024) to commence construction.

Table IV-5 New Stormwater Management Regulations: Changes to Stormwater Technical Criteria		
Criteria	**Old Regulations**	**New Regulations**
Land Use	Impervious cover only	Impervious cover + Forest/Open Space + Managed Turf
Event	0.5 inches of runoff from the impervious cover only	1.0 inches of rainfall from the whole site
New Design Criteria	Average land cover condition/technology based	0.41 pounds per acre per year Total Phosphorus
Redevelopment Criteria with land disturbance of less than one acre	10 percent reduction in Total Phosphorus	Land disturbance of less than one acre: 10 percent reduction in Total Phosphorus or up to 0.41 pounds per acre per year
Redevelopment Criteria with land disturbance of one acre or more		Land disturbance of one acre or more: 20 percent reduction in Total Phosphorus or up to 0.41 pounds per acre per year
Compliance	Occoquan Method	Runoff Reduction Method
Water Quantity	Criteria for natural and man-made conveyance systems	Criteria for natural, man-made and restored conveyance systems

5. Dam Safety Regulations

In December 2010, the Virginia Department of Conservation and Recreation amended its Impounding Structure Regulations to conform with legislative changes made by the General Assembly. This amendment further defined the dam classification system, streamlined and improved the hydrologic and hydrologic design requirements for dams and instituted provisions to improve emergency action plans to facilitate responses to dam breaks.

Fairfax County DPWES is responsible for the operation and maintenance of 19 state regulated dams. DPWES continues to work through the Virginia Municipal Stormwater Association to promote improvements to these guidance documents. For further information on the Virginia Impoundment Structures Regulations, visit: http://www.dcr.virginia.gov/dam_safety_and_floodplains/index.shtml

J. STEWARDSHIP OPPORTUNITIES

There are numerous actions that county residents can and should take to support water quality protection.

1. Disposal of Household Hazardous Wastes

Medicines, paints and other toxics should NOT be flushed down toilets and should NOT be dumped down storm drains. Instead, they should be taken to one of the county's household hazardous materials collection sites.

Putting hazardous household wastes in the trash or down the drain contributes to the pollution of surface waters. The Fairfax County Solid Waste Management Program is responsible for the county's Household Hazardous Waste Management Program, through which county residents are given the opportunity to properly dispose of hazardous waste (such as used motor oil, antifreeze and other automotive fluids) at no charge. The SWMP has two permanent HHW facilities that are open every day.

For a list of common household hazardous materials and how to dispose of them, go to http://www.fairfaxcounty.gov/dpwes/trash/disphhw.htm.

2. Septic System Pumpouts

Septic systems must be pumped out every five years—it's the law! Residents with questions or with problems with their septic systems should call the Fairfax County Health Department at 703-246-2201, TTY 711.

3. Yard Management

Residents are encouraged to get soil tests for their yards before fertilizing and then to apply fertilizers and pesticides responsibly. Grass should not be cut to the edge of a stream or pond; instead, a buffer should be left to filter pollutants and provide wildlife habitat.

The Northern Virginia Soil and Water Conservation District can advise homeowners on problems with ponds, eroding streams, drainage, problem soils and other natural resource concerns. More information about managing land for a healthier watershed is available from the NVSWCD publications "You and Your Land, a Homeowner's Guide for the Potomac River Watershed" (http://www.fairfaxcounty.gov/nvswcd/youyourland/) and the "Water Quality Stewardship Guide" (http://www.fairfaxcounty.gov/nvswcd/waterqualitybk.htm).

Advice regarding drainage and erosion problems in yards can be provided by the technical staff of the Northern Virginia Soil and Water Conservation District. NVSWCD can assess the problems and advise on possible solutions. Interested parties

can send an e-mail to NVSWCD at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=9990 or call 703-324-1460.

4. Volunteer Opportunities

There are numerous opportunities throughout the year to participate in stream cleanups, storm drain labeling, volunteer water quality monitoring and tree planting projects. Interested parties can send an e-mail to NVSWCD at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=9990 or call 703-324-1460. Additionally, DPWES-Stormwater Management provides links to information about these popular volunteer programs on its website at http://www.fairfaxcounty.gov/dpwes/stormwater/. EQAC also commends the efforts of the Alice Ferguson Foundation and encourages residents, employers and employees in Fairfax County to participate in these initiatives. Visit the foundation's website at www.Fergusonfoundation.org for further information.

Environmental stewardship opportunities for volunteers are available at Meadowlark Botanical Gardens, Potomac Overlook Regional Park, Upton Hill Regional Park, Pohick Bay Regional Park and various other parks on occasion. NOVA Parks implemented a program that allows youth to access its fee-based park facilities through volunteer service. It has a wide variety of community partnerships in place that encourage groups to take advantage of the regional parks for environmental and historic education and service projects. More information can be found at http://www.nvrpa.org/park/main_site/content/volunteer. For current information about the Northern Virginia Regional Park Authority, visit its website, http://www.NVRPA.org/.

5. Reporting Violations

Vigilance in reporting activities that threaten water quality is important to the protection of water resources.

Sediment runoff from construction sites can be reported to Fairfax County's Code Enforcement Division at 703-324-1937, TTY 711; e-mail reports can also be filed at https://www.fairfaxcounty.gov/contact/mailform.aspx?ref=70003.

Improper disposal of motor oil, paint or other materials into streams or down storm drains should be reported through a phone call to 911. This is particularly important if the substance being dumped can be identified as motor oil or another toxic substance but also applies to any other substance; assumptions regarding the contents of the materials should not be made. Callers to 911 should be prepared to provide specific information regarding the location and nature of the incident. If the person dumping materials into the stream or storm drain has a vehicle, the tag number should be recorded.

Storm drains are for stormwater only, NOT motor oil, paint, or even grass clippings.

If dumping is not witnessed but is instead suspected, and if no lives or property are in immediate danger, the suspected incident can be reported to the Hazardous Materials and Investigative Services Section of the Fire and Rescue Department at 703-246-4386, TTY 711. If it is unclear as to whether or not there may be a danger to life or property, 911 should be called.

A more comprehensive table addressing how to report environmental crimes is provided immediately following the Scorecard section of this report.

6. Pet Wastes

The Northern Virginia Clean Water Partners continued its support efforts tailored to stormwater specific messages in 2013. Clean Water Partners used television, print, internet advertising and the Only Rain Down the Storm Drain website (www.onlyrain.org) to distribute messages linked to specific stormwater problems, such as proper pet waste disposal, over-fertilization of lawns and gardens and proper disposal of motor oil.

From April 2013 through August 2013, four commercials featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on twelve cable TV channels, including three Spanish-speaking channels 1530 times. These TV ads reached four million Northern Virginia residents and resulted in more than 400 visits to the www.onlyrain.org website.

K. NOTABLE AND ONGOING ISSUES

1. EQAC commends the county for developing and adopting amendments to the Public Facilities Manual's provision for adequate drainage that require analysis of adequacy of outfalls during the construction phase. This is another enforcement tool that will protect streams during the construction phase. However, EQAC cannot over-emphasize the importance and need for increased monitoring of stormwater management controls during the construction phase and for enforcement action to ensure inadequate controls are corrected during construction.

2. EQAC continues to support the full funding and implementation of the comprehensive countywide watershed management program. EQAC strongly endorses the ongoing work of county staff on the watershed planning and public outreach efforts and the comprehensive stream monitoring program. EQAC continues to support continued assessments of watersheds and development of a stream protection and restoration program that has adequate sustainable funding. EQAC continues to stress that equal importance should be devoted to environmental protection, restoration and monitoring as compared to infrastructure improvement and maintenance.

3. EQAC commends the county for its existing stream protection requirements for perennial streams. EQAC thanks the Board of Supervisors for its efforts to protect intermittent and headwater streams by the establishment of protective buffers. While the end result of the inquiry was NOT to move forward, the process did heighten awareness of the importance of intermittent streams.

4. EQAC is pleased to note the MS4 requirement to develop a long-term watershed monitoring program to verify the effectiveness and adequacy of stormwater management goals and identify areas of water quality improvement or degradation is being implemented. While EQAC is pleased to note the long term monitoring of several sites, we also understand that a comprehensive countywide program to monitor effectiveness could be cost-prohibitive.

5. Given the anticipated increase in the number of small individual low impact development facilities that will be installed throughout the county, EQAC recognizes that the county will have an additional challenge of developing a program to track, inspect and ensure adequate maintenance of these LID facilities.

6. There has been in place in Virginia a ban on uranium mining statewide since 1982. However there are now legislative or/and gubernatorial efforts under way to lift the moratorium. At this time, the only uranium deposits that appear to be potentially economically viable for mining are in Pittsylvania County, where mining would have no impact on Fairfax County. The concern exists, though, that there are other uranium occurrences in Virginia and that past uranium mining lease agreements were established in Fauquier County, within the Occoquan watershed.

   Because the Occoquan Reservoir is one of the county's primary sources of drinking water, EQAC does have concerns about the lifting of the moratorium in light of numerous and substantial questions and concerns regarding the potential for adverse environmental impacts to Virginia and the Occoquan Reservoir if uranium was to be mined or milled within the Occoquan watershed. It is EQAC's view that it would be premature to lift the moratorium on uranium mining in Virginia or to draft regulations pertaining to uranium mining without first addressing concerns identified by the National Academy of Sciences in its report.

7. EQAC is pleased to note the number of innovative and significant stream restoration projects and LID installations the county has undertaken in recent years.

L. COMMENTS

EQAC commends the Board of Supervisors for its actions of the past few years, initially authorizing one penny of the real estate tax to be dedicated to the stormwater management program in FY 2006 and establishing a Stormwater Service District in FY 2010 that is currently funded at two and one quarter pennies of the real estate tax. Stormwater funding has increased from the original amount of $17.9 million for FY 2006 to $40.2 million for FY 2014. In FY 2010, however, this amount decreased to about $10.3 million due to the creation and structuring of the Service District as a funding mechanism halfway through the fiscal year.

The Board of Supervisors' adoption of the FY 2015 Stormwater Service District tax rate of 2.25 cents (and adoption of the five-year plan with a quarter cent increase each year to ramp up to meet the ramping up bay TMDL mandates) has allowed Stormwater Management to increase stormwater infrastructure replacement, create a more comprehensive low impact development maintenance program and rehabilitate a number of older stormwater management dams as well as other critical components. Much of the stormwater infrastructure in Fairfax County is reaching the end of its life cycle, and as the system ages it will be critical to maintain adequate inspection and rehabilitation programs to avoid infrastructure failures and ensure the functionality of stormwater treatment systems. It is also critical for Stormwater Management to implement cost effective solutions such as trenchless pipe rehabilitation technologies, naturalized stormwater management facilities and partnerships with other county agencies such as Fairfax County Public Schools and the Fairfax County Park Authority to help protect and improve local streams.

The county's existing stormwater conveyance infrastructure includes over 1,600 miles of pipes, man-made ditches, channels and swales. This infrastructure conveys stormwater to over 850 miles of perennial streams and about 400 miles of non-perennial streams in the county. The majority of the stormwater control facilities and pipes were constructed 35 or more years ago. Prior to the board providing a dedicated penny to stormwater in FY 2006, there had never been consistent funding to proactively inspect or reinvest in these stormwater systems. When the video inspections of the inside of pipes were first undertaken in FY 2007, over five percent of the system was identified as being in a state of failure and another 10 percent in need of rehabilitation. With the recently adopted Stormwater Service District tax rate, it is estimated that the reinvestment cycle for stormwater infrastructure has been reduced from well over 1,000 years to less than 200 years. With the implementation of the next five-year funding plan, this should reduce this reinvestment cycle eventually to a 100 year plan.

In addition to the conveyance system, the county owns and maintains roughly 1,500 stormwater management facilities, ranging from large flood control lakes to LID techniques such as small infiltration swales, tree box filters and rain gardens. Again, prior to providing a dedicated funding source, there was not funding for reinvestment in these LID facilities.

Nineteen of the county's stormwater management facilities have dam structures that are regulated by the state. The county must provide rigorous inspection and maintenance of these 19 facilities in order to comply with state requirements. Significant upgrades to the emergency spillways have been required in some cases.

In addition to supporting infrastructure reinvestment, the capital program funds critical capital projects from the watershed management plans including: flood mitigation projects; stormwater management pond retrofits; implementation of low impact development techniques; and stream restoration projects. It is important to note that these projects are necessary to address current community needs, mitigate the environmental impacts of erosion and comply with the county's Municipal Separate Storm Sewer System MS4 permit. The benefits of these projects include: reducing property damage due to flooding and erosion; reducing excessive sediment loading caused by erosion; improving the condition of streams; and reducing nutrient and sediment loads to local streams, the Potomac River and the Chesapeake Bay.

The county must meet the federally mandated requirements of its MS4 permit. Fairfax County and Fairfax County Public Schools are combining their MS4 responsibilities into a single permit that will be administered by the county. Following development by the state, the new permit will be forwarded to the U.S. Environmental Protection Agency for approval. Recent permits that have been approved or issued for public hearing by the EPA have included aggressive requirements to retrofit significant amounts of impervious area, such as school and county buildings and parking lots, with more effective stormwater controls. We are anticipating that these extensive additional requirements also will be included in the new MS4 permit that will be issued to Fairfax County.

It has been estimated that the annual cost to comply with current and anticipated stormwater regulatory requirements and to implement a sustainable infrastructure reinvestment program would likely be between $80 and $100 million per year. EQAC supports meeting these challenging requirements through a phased approach (as demonstrated in the five-year adopted plan) that builds capacity over a period of time that can be based on success and experience and should result in a more cost effective and efficient program.

M. RECOMMENDATION

1. EQAC recommends that Fairfax County continue to adequately fund and implement its ongoing stormwater program, which includes dam maintenance, infrastructure replacement, water resource monitoring and management, watershed restoration and educational stewardship programs. EQAC realizes the funding for the stormwater program will come entirely from funds generated through the Service District rates. EQAC also realizes that there is a need for increasing capacity within the Department of Public Works and Environmental Services to provide these services.

   EQAC recommends that the Stormwater Service District rate be increased in FY 2016 by at least one-quarter penny, from a rate of 2.25 cents per $100 assessed real estate value to 2.50 cents per $100. EQAC understands that this increase would not fully meet stormwater management needs and therefore suggests that additional increases be continued each fiscal year until adequate funding to support the program is achieved. This would, once again, result in more funding for modest watershed improvement programs and a somewhat more realistic infrastructure replacement timeline. We realize that there will be a need for additional increases in funding for water quality projects to meet future permit conditions, and for infrastructure reinvestment, as the system is continually growing and aging.

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