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.

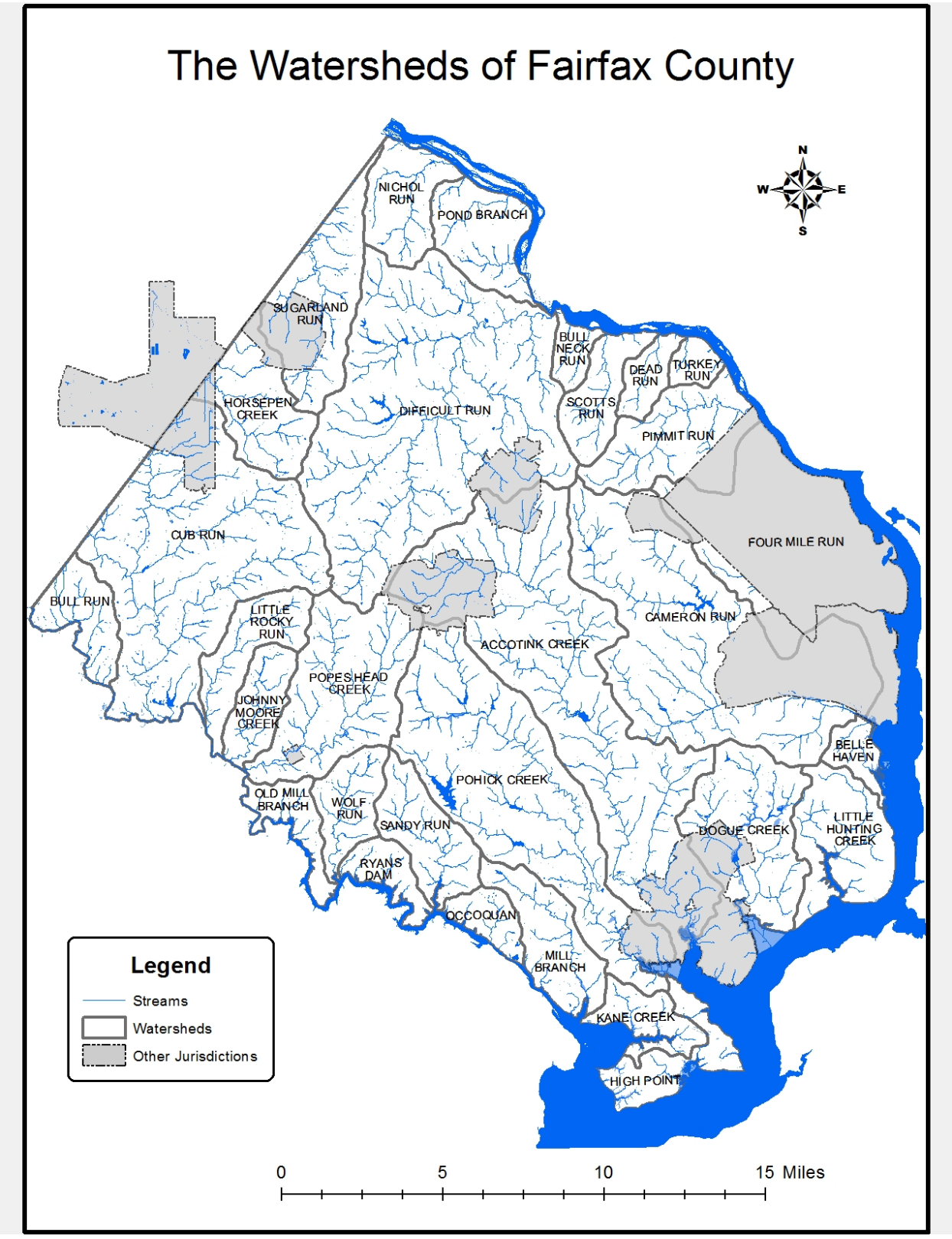
1. Watersheds

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.

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 area. 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 stimulates algal growth. Other nonpoint source pollutants are sediment (from erosion, construction sites, eroded stream banks, 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 that discharge pollutants such as a discharge pipe. 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 leads to habitat loss, water quality problems and damage to utilities and infrastructure.

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. 2012 Annual Report on Fairfax County's Streams (now the Stormwater Status Report)

i. Overview of Biological Monitoring

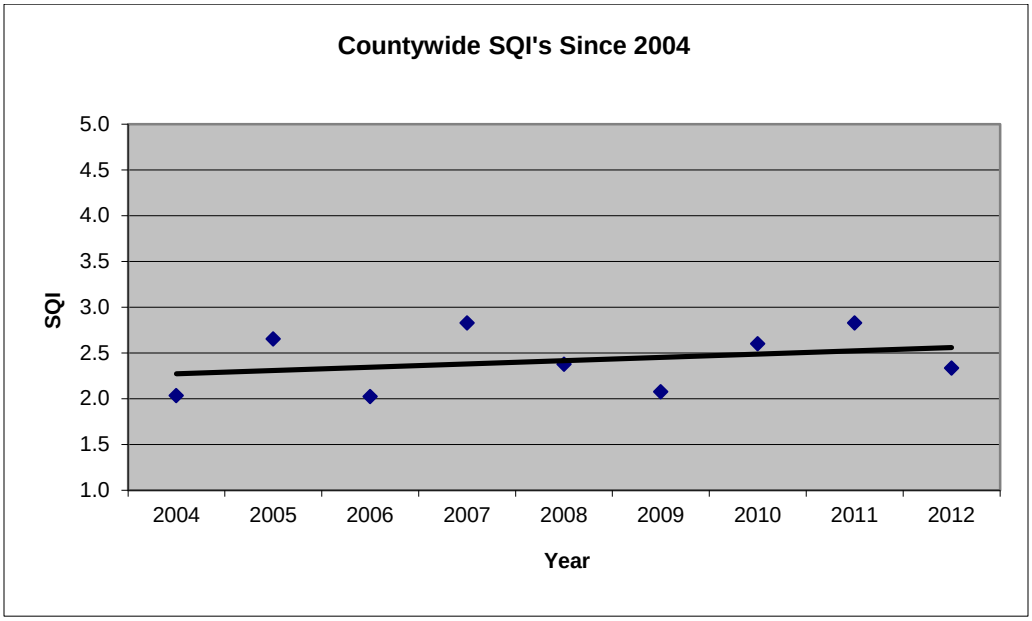
This report provides data from sampling efforts conducted in 2012 and documents overall stream conditions based on the health of fish and benthic macroinvertebrate communities. In addition, the potential human health risk associated with wading or swimming in streams is assessed based on analyses of *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 (once annually) and for *E. coli* bacteria concentration quarterly. 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-2 presents a summary of trends in a countywide Stream Quality Index.

A total of 52 sites were sampled in 2012: the 39 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 39 sites selected, 19 were randomly sampled for fish. Results from the 39 randomly selected sites suggest that approximately 62 percent of the county's waterways are in "Poor" to "Very Poor" condition based on a decrease in biological integrity of streams and 58 percent are in "Poor " to "Very Poor" based on fish sampling in 15 streams. This is a decrease 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 nine 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.

Figure IV-2: Trends in the Countywide Stream Quality Index



Source: 2012 Fairfax County Stormwater Status Report

The 2011 Stream Quality Index showed an increase in overall stream quality from 2010. This year's data reflect a downward trend. This index will be 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 2012 Stormwater Status Report states the following [note—some of this discussion is paraphrased]:

> *Over the past nine years, a small increase in the benthic IBI scores has emerged. As future sampling results are added, a trend in biological integrity should begin to emerge.*
>
> *Benthic IBI has been calculated in the past by comparing data collected in the county against the reference data collected that same year. Now that there are enough years' worth of reference data available, the Benthic IBI is calculated using the cumulative reference data collected over the past five years. This process will reduce the variability in the*

> *IBI created by yearly disturbances to the reference sites (i.e. drought). This change is the reason previous years' reports show different SQIs than the ones shown in* [figure IV-2].

The monitoring program is part of the framework to establish a baseline to evaluate future changes in watershed conditions. Monitoring results from 2008 through 2012 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.

In 2012, the Stormwater Planning Division completed its ninth year collecting data for the bacteria monitoring program since acquiring the program from the Fairfax County Health Department. However, the collection of bacteria data was temporarily suspended in 2011 during which time the program was re-evaluated in light of pending regulatory requirements. In January 2012, sampling efforts resumed.

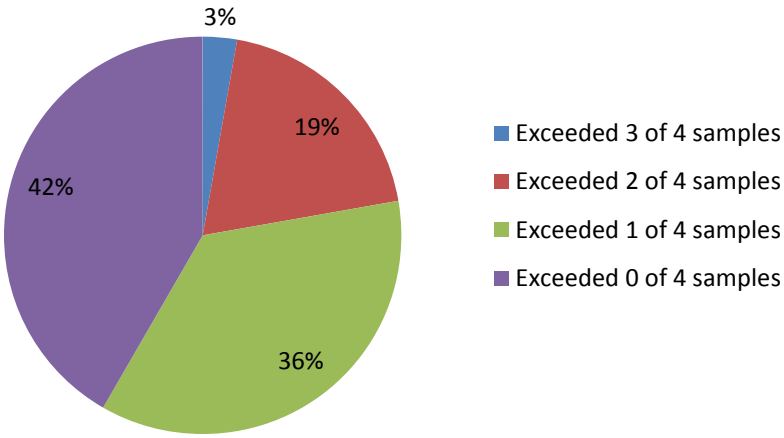
To determine levels of *E. coli* in county streams, grab samples of stream water were taken at 36 sites in 15 watersheds throughout the county. Staff collected samples four times during the year. Sites are normally sampled four times during the year for the bacteria, *E. coli*. Samples are processed 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 2012, 42 percent of Fairfax County's bacteria monitoring locations were consistently below VDEQ's standard of 235 units per 100 ml of water (Figure IV-3). 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.

Figure IV-3: 2012 Sampling Sites: Percentage of Samples Exceeding State Standards for *E. coli*



Source: 2012 Fairfax County Stormwater Status Report

ii. Dry and Wet Weather Screening

In 2012, the county selected 106 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 44 of the outfalls and was tested for a range of pollutants (ammonia, conductivity, surfactants, fluoride, pH, potassium, phenol, copper, and chlorine) using field test kits. . Of the outfalls tested, 23 required follow-up investigations because they exceeded the allowable limit for at least one pollutant. Of the 23 sites that required a retest, 21 have been completed. Upon retesting these sites, 12 continued to exceed the screening criteria, and further testing was conducted in an attempt to track down the source. This track down procedure consisted of using the county's GIS mapping system. A map of the county's storm drainage system was printed from the GIS and used to track the storm network upstream of each site. Staff recorded observations of flowing water and land use, and tested the water where flow was found. This procedure was followed up the network of storm sewer pipes until the source was found or there was no flowing water.

As reported in the 2012 Stormwater Status Report:

> *One of the track downs had very minimal flow and the source could not be determined. One of the sites resulted in finding that a building's cooling tower had sprung a leak and was draining down through the roof drains. The cooling tower has since been fixed and the discharge eliminated. Another trackdown resulted in finding that a cooling tower on a second building had its drain pipe left open. The drain has since been closed which has eliminated the discharge. Another trackdown found that an interior water feature of a building had its drain valve accidentally left open. The building engineer*

closed the valve which resulted in elimination of the discharge. One retest resulted in finding that a T-shirt company located in the City of Fairfax had one of its drains connected to stormwater instead of sanitary. The dye from the company that should have been going to sanitary instead was turning the stream blue. The county and city staff are working with the company to correct the problem. The remaining two trackdowns are from fluoride exceedances and have been followed up to buildings and are assumed to be cooling tower discharges. The remaining 12 trackdowns are currently being investigated and consist of exceedances in pH, copper and fluoride limits.

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.

c. Physical Stream 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. The 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. 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. 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.

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-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.

The monitoring network designed to fulfill the objectives of the study originally consisted of four automated continuous water-resources monitoring stations and 10 less-intensely monitored sites. This base network was expanded in 2012 and is now comprised of five automated stations and 15 less-intensely monitored sites. Four automated stations were constructed in 2007 and achieved full operational capability in 2008 and a fifth station was constructed in 2012 and became fully operational in June 2013. . 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 2012 ran from October 1, 2011 through September 30, 2012. Samples from the expanded network began on October 9, 2012, so they are excluded from the data below.

As reported in the 2012 Stormwater Status Report:

Continuous Data Collection

- *Continuous water-quality and streamflow data were collected at the four base network intensive monitoring stations throughout the water year with no significant interruptions in data collection.*

- *Streamflow 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, p, 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 14 base network monitoring stations, resulting in 186 samples collected and analyzed (including QA samples). Streamflow and water quality data were measured at the time of sampling and samples were analyzed for nutrients and suspended sediment concentration.*

- *Storm event samples were collected using automated samplers at the four base network monitoring stations. These samples were collected in response to elevated turbidity and streamflow conditions during storms, resulting in the collection of 105 samples that were analyzed for the same suite of nutrients and suspended sediment concentration as the monthly grab samples.*

- *A total of 52manual streamflow measurements were made across the 14 sites to support the maintenance of the streamflow rating curve for each site.*

Preliminary evaluations of general patterns in water-quality conditions have been conducted. Results of these evaluations demonstrate that the nutrient and sediment yields from streams in Fairfax County are comparable with yields measured in other urban/suburban areas of the eastern United States. These evaluations will be furthered to explore relations between environmental setting, land use and water-quality conditions in an upcoming publication.

The monitoring network was expanded in fall 2012 (beginning of 2013 water year) to include one additional intensive monitoring station and five additional less-intense monitoring stations. These stations were added to improve the spatial

distribution of monitoring stations in the county and to incorporate smaller drainages with greater amounts of planned BMP implementation.

Data collected under this study is publicly available online at: http://va.water.usgs.gov/projects/ffx_co_monitoring.htm and http://www.fairfaxcounty.gov/dpwes/stormwater/usgs.htm

2. Volunteer Water Quality Monitoring Programs

The Northern Virginia Soil and Water Conservation District continued its successful volunteer stream monitoring program in 2012. 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; there are currently more than 100 certified monitors. 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 2012. In addition, 34 public stream monitoring workshops and field trips were held throughout the county and 532 county residents attended. 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 by 24 volunteers.

A monthly *Watershed Calendar*, listing training and other events of interest, is emailed to 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 2012-2013, the Park Authority supported ongoing stream monitoring programs at the following parks, with sampling conducted primarily by volunteers:

- Horsepen Run at Frying Pan Farm Park.
- Wolftrap Creek at Foxstone Park, Vienna.
- Old Courthouse Spring in Old Courthouse Stream Valley Park, Tysons.
- Holmes Run Stream Valley Park below Lake Barcroft.
- Holmes Run Stream Valley Park near Roundtree Park.
- Pohick Creek, near the southern end of the Cross-County Trail.
- Accotink Creek at Eakin Park.
- Accotink Creek at Accotink Creek Stream Valley Park.
- Accotink Creek at Lake Accotink.
- Rocky Run at Greenbriar Park.
- Rocky Run at EC Lawrence Park.
- Walney Creek at EC Lawrence Park.
- Piney Branch Stream Valley.
- Colvin Run in Lake Fairfax Park.
- Scotts Run at the Nature Preserve.
- Difficult Run at Tamarack.
- Difficult Run near Great Falls.
- Huntley Meadows.

b. Update on water quality monitoring project in Huntley Meadows Park

Huntley Meadows Park staff conducted water quality monitoring at three sample sites in 2012. All three sites were sampled in both the spring and summer. During years prior to 2011, six sites were sampled--three on Dogue Creek and three on Barnyard Run. However, in 2011 the Watershed Planning & Assessment Branch of the Department of Public Works and Environmental Services took over the analysis of Dogue Creek. Huntley Meadows Park staff will continue sampling the three sample sites along East Barnyard Run. The analysis conducted by the WP&AB of DPWES is a much more complex and detailed assessment than done by site staff at Huntley Meadows Park. The Dogue Creek data are included in the DWPES stream monitoring annual report. The Rapid Bio-assessment II monitoring protocol was used at all three remaining sites sampled by Huntley Meadows Park staff.

With respect to results from the monitoring (see Figure IV-4), Water Quality scores are based on the numbers and tolerance levels of the macroinvertebrate families collected during sampling: scores of zero to eight are unacceptable; nine to 13 are partially acceptable; and 14 to 24 are acceptable. The Barnyard Run watershed includes the Central Wetland, and samples were collected at three different locations: the Central Wetland Inflow, the Central Wetland Reservoir and the Lower Wetland Reservoir. All three sites were sampled in spring 2012; two methods of sampling were pursued in order to ensure that the full extent of fauna at each of the sampling sites was identified accurately. The "live pick" method was a field evaluation of macroinvertebrates, while the "full square" method was a more comprehensive analysis of fauna within randomly-selected "squares" in a grid. For the latter method, the entire square was collected and stored in alcohol for laboratory analysis. Scores for all sites are as follows: For live pick and full square, CWI scored six and nine, CWR scored nine and 12, and LWR scored 12 with no full square sample, respectively.

The sites were once again sampled in the summer with the exception of the LWR location. The LWR site was completely dry during the summer months so a summer sample was impossible to collect. The summer scores for the sites were as follows: for live pick and full square, CWI scored six and six, and CWR scored six with no full square sample, respectively.

4. Virginia Department of Environmental Quality

a. Overview

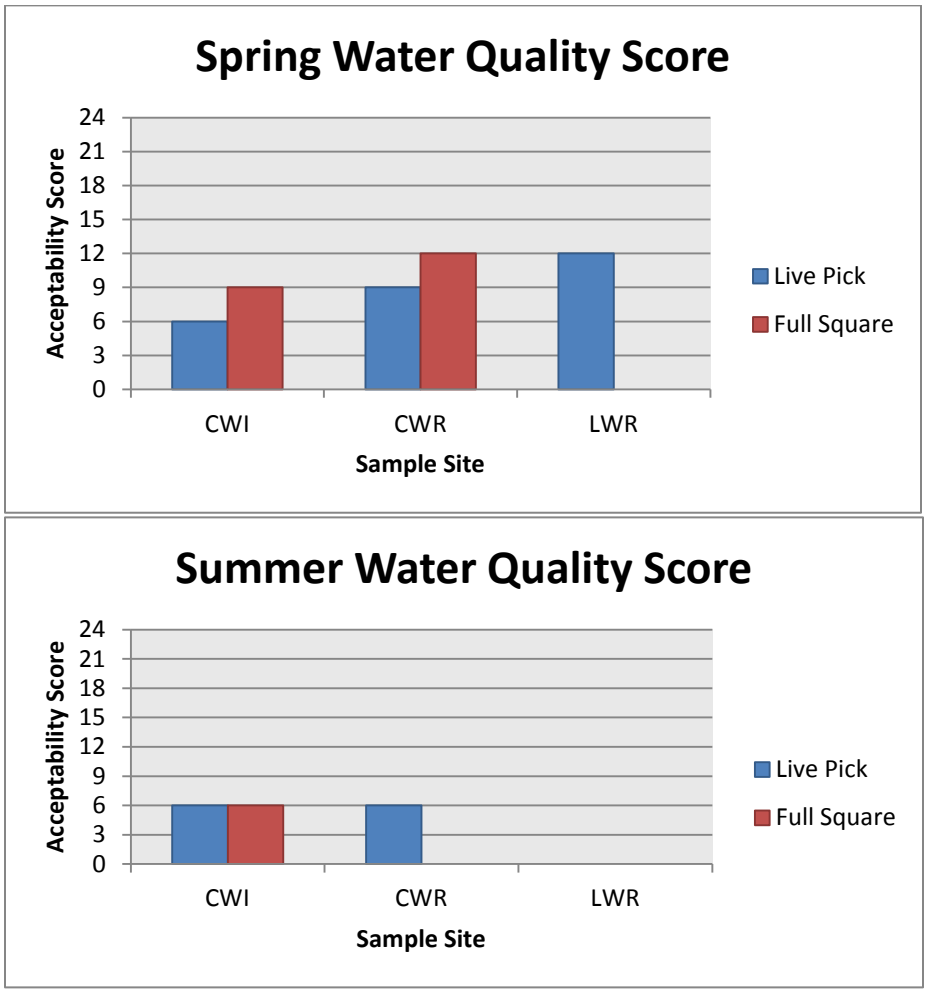
VDEQ performs long-term trend monitoring at 31 stations in 22 water bodies that are either in Fairfax County or border the county:

- 13 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.

b. Probabilistic Biomonitoring and Chemical Monitoring Program in Virginia Non-Tidal Streams

VDEQ's probabilistic monitoring program began in spring 2000. This program consists of three sampling components: a thorough examination of the benthic macroinvertebrate community utilizing the EPA's Rapid Bioassessment Protocols; sampling a full suite of chemical parameters in water and sediment; and a physical habitat evaluation at each station. The stations are biologically sampled twice a year. Chemical sampling is performed each spring and fall in conjunction with biological monitoring. The physical habitat evaluation is conducted each fall when the biological monitoring is performed. There were no probabilistic monitoring

Figure IV-4: Water Quality Scores for Huntley Meadows Park Water Quality Monitoring: Spring and Summer 2012



CWI: Central Wetland Inflow; CWR: Central Wetland Reservoir; LWR: Lower Wetland Reservoir

sites in Fairfax County in 2012. Since 2004, as part of the probabilistic program, VDEQ has participated in a grant study with the National Academy of Sciences to collect data on periphyton/algae in freshwater systems. Samples for that study are collected at every probabilistic monitoring station each fall.

5. Potomac River Monitoring

a. 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 Chain Bridge monitoring station consists of an automated sampler that simultaneously monitors the river stage at Little Falls while directly sampling at Chain Bridge, about 1.5 miles downstream, in response to changes in river flow volume. Base and storm event samples are taken throughout the year.

b. Potomac River Water Quality Monitoring

COG 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

c. Virginia Department of Environmental Quality Monitoring in the Tidal Potomac

VDEQ's Northern Regional Office initiated a long-term water quality monitoring project in the Occoquan River tidal embayment in spring 2005. To better characterize the water quality in the Occoquan River tidal embayment, water quality measurements were made using fixed continuous monitors and grab samples. The water quality monitoring for this study was conducted from April to October 2005. The primary objective of this study was to collect monitoring data throughout the warm season to better characterize the water quality and provide detailed monitoring data to support the development of a Total Maximum Daily Load for pH. A secondary objective of this study was to provide continuous monitoring data to enable a more accurate assessment of the Chesapeake Bay water quality criteria for dissolved oxygen, water clarity and chlorophyll.

In 2007, VDEQ initiated monitoring in the tidal embayment of Pohick Creek. The monitoring period for these areas was conducted from April to October 2007. Data for all of the long-term water quality monitoring deployments were collected using YSI Model 6600 EDS multi-meters. These instruments were configured to measure and store water temperature, pH, dissolved oxygen, turbidity and chlorophyll measurements in fifteen-minute increments. In addition to the continuous monitoring with these meters, water column grab sampling, light attenuation and Secchi depth measurements were performed at each of the stations where the

continuous monitors were deployed. Continuous monitoring was continued at the Pohick Bay station in 2008 and 2009.

6. Update on 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 (http://water.usgs.gov/nrp/highlights/potomac_update.html) an 18-year study of submerged aquatic vegetation in the tidal Potomac River 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 Government's 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 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, and 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 the recommendation of EQAC. Initially, the program monitored water samples, but added quarterly sediment and semi-annual fish samples at stations within the Occoquan Reservoir. The Lake Manassas program, likewise, funds the monitoring of SOCs in the Lake Manassas watershed.

Dr. Adil Godrej, Assistant Director of OWML states

The year 2012 was, in many ways, a very good year for the SOC monitoring program, as practically no 'detects' were found for any compound of concern. Even atrazine, which is almost always detected in water samples, was not found in the streams of the Occoquan watershed and the waters of the Occoquan reservoir. It is too soon to tell if this is a long-term good development or not, as so much depends on when a sample is taken. With a quarterly sampling schedule for SOCs, it can be easy to miss sampling at the time when atrazine, for example, would be present, although attempts are made to get to the sampling locations at the right time, especially in spring when atrazine applications are made. If this trend continues for another few years, then we

can safely conclude that those SOCs that have stopped being detected in samples are not of concern in the Occoquan watershed any more.

Sediment and fish samples taken in 2012 likewise showed no SOCs of concern in them. The most-frequently found family of compounds was the phthalates, but these are ubiquitous in human-occupied areas and none of them was found even close of any level of concern.

As a result, there isn't much to be discussed about the SOC monitoring done in 2012, except that the results were all good: nothing of concern found! It is good to have years like this where there are no dramatic results to discuss.

Water quality in the Occoquan Reservoir has remained stable over the years, and this trend has continued in 2012. The reservoir is, of course, still enriched with nutrients (eutrophic), but 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.

It should be noted that due to budget constraints, the water quality monitoring programs at OWML that are funded either wholly or partially by Fairfax County have been flat-funded for the last five years. OWML managed to preserve the full monitoring program in the first four of these years mainly because staff salaries were frozen for three years, and the purchase of badly-needed replacement laboratory equipment was postponed. In the latter part of 2012, the basic Occoquan Reservoir program and OWML instituted a reduction of some stream and reservoir data collection activities by up to 25%. Currently, the SOC program has been preserved at its full scope, and will continue to be so for fiscal year 2014 (ending June 2014). However, unless some additional funding becomes available, even the SOC program will have to be modified to stay within budget. It is a modest program, overall, that is a very useful indicator of long-term trends with respect to SOCs in the watershed. Reducing sampling from once per quarter, or dropping some stations altogether, will definitely have an impact on this. We continue to hope that some modest additional funding will become available to allow the program to keep up with increasing operational costs.

OWML works on many other projects within the region that have a water focus. The Potomac regional monitoring program, where OWML operates an automated station at Chain Bridge, is performed for the Metropolitan Washington Council of Governments, and has been in continuous operation since 1982.

Over the last decade, OWML staff has developed a complexly linked watershed and reservoir water quality model for the Occoquan Watershed (including Lake Manassas and the Occoquan Reservoir). The model replaced a mainframe model that was developed in the early 1980s, and the simulation period currently extends

from 1988 to 2007. The model is updated to reflect changing land use as the data become available, and improvements to the model are incorporated as new data or research come available. It is anticipated that the next update, incorporating land use data from 2008-2012, will be completed in the first half of 2013. Both the watershed and reservoir components of the model have been used to provide simulations to support reservoir and/or water quality management decisions.

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. This website is currently being updated, with a new version expected to be on-line in buy October 2013.

8. Kingstowne Monitoring and Stream Restoration

In 1999, the Department of Public Works and Environmental Services, the Northern Virginia Soil and Water Conservation District, the USDA Natural Resources Conservation Service, the Friends of Huntley Meadows and the Citizens Alliance to Save Huntley formed a partnership to restore a stream in the Kingstowne area, with the help of a grant from the Virginia Department of Conservation and Recreation. The Kingstowne stream is a tributary of Dogue Creek, receives runoff from a 70 acre watershed and is upstream of Huntley Meadows Park.

The Kingstowne Environmental Monitoring Program established two stations along Dogue Creek (referred to as the "Kingstowne" and "South Van Dorn Street" monitoring stations) to assess the effectiveness of controls at trapping sediment and phosphorus in stormwater runoff from the Kingstowne development and to inform the partners of detrimental effects of upstream development on Huntley Meadows Park. Though estimates of annual sediment and phosphorus loads fluctuated from year to year, the monitoring data showed reductions in both constituents over the long term. As of 2010, the estimated long-term average sediment removal efficiency of controls was 82.9 percent. The mean annual phosphorus removal efficiency in 2010 was 34.2 percent.

Calendar year 2010 concluded water quality sampling at Kingstowne and South Van Dorn station to fulfill USACE permit requirements and monitoring and maintenance plan goals.

9. Gunston Cove Aquatic Monitoring Program

Gunston Cove is an embayment of the tidal freshwater Potomac River located in Fairfax County about 12 mi (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 2010 report (November 2011) 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 (although chlorophyll values increased somewhat in 2008).

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 that were initiated in the late 1970s at the Noman M. Cole, Jr. wastewater treatment plant. This 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.

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 2010" Final Report, use http://digilib.gmu.edu:8080/dspace/bitstream/1920/7401/1/GCExecSummary2010.pdf, or contact R. Christian Jones, Professor and Project Director at George Mason University.

10. 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 Total Maximum Daily Load is a watershed-specific plan for bringing an impaired water body into compliance with the Clean Water Act goals. A 1999 Consent Decree required the state to develop TMDL plans for all impaired streams listed on the 1998 303(d) Impaired Waters List by 2010.

In 2012, VDEQ added E. *coli* TMDLs for the Sugarland, Mine and Pimmit Run watersheds and benthic impairments TMDLs for Holmes and Tripps Run. The TMDLs were scheduled to have been finalized in early 2012, but are still in draft form.

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).
- Pope's Head Creek.
- Difficult Run.
- Hunting Creek (includes Cameron Run and Holmes Run).

Sediment (Benthic Impairment):
- Bull Run (includes Cub, Johnny Moore and Little Rocky Runs).
- Pope's 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 1996 303(d) List of Impaired Waters for not meeting the aquatic life use due to poor health in the benthic biological community. This impaired segment of Accotink Creek stretches from the confluence of Calamo Branch with Accotink Creek and extends downstream to the start of the tidal waters of Accotink Bay (7.35 miles). This segment was listed in Attachment A, Category 1 (Waters Listed on Part 1 of Virginia's 1998 303(d) Report) of the 1999 Consent Decree. An additional segment of Accotink Creek was listed as impaired on the 2008 303(d) List of Impaired Waters for not meeting the aquatic life use. This impairment extends from the confluence with an unnamed tributary to Accotink Creek, located in the upstream corridor of Ranger Park, and continues downstream until the confluence with Daniels Run (0.85 miles).

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 not yet been established.

ii. Four Mile Run TMDL

Due to high levels of fecal coliform bacteria, Four Mile Run was listed in 1996 and 1998 on the 303(d) Impaired Waters List. Although only the very upper reaches of Four Mile Run are located in Fairfax County, it is important to note the existence of a TMDL study for Four Mile Run and the participation of Fairfax County in the Four Mile Run TMDL study and implementation plan.

The Four Mile Run Fecal Coliform Study, which identified the sources of fecal coliform bacteria in the watershed using DNA testing, was completed in 2000. The study found that waterfowl contribute almost one-third (31 percent) of those bacteria that could be matched. Eighteen percent of the bacteria originated from humans, 13 percent from dogs, six percent from deer, 19 percent from raccoons and 13 percent from other sources. Bacteria from humans appear to be highly localized. There were indications that, without regard to specific host animals, *E. coli* bacteria seem to regenerate, through cloning, within the storm drains and stream sediments, which in turn perpetuates bacteria levels.

In 2002, the bacteria TMDL study for Four Mile Run developed by the Northern Virginia Regional Commission and the Virginia Department of Environmental Quality was approved by the EPA. NVRC, under a grant from VDEQ, worked with four jurisdictions (Fairfax and Arlington counties and the cities of Falls Church and Alexandria) to develop an implementation plan for the TMDL study. Completed in 2004, the plan focuses on reducing bacteria contamination from human and pet sources in the watershed and includes several initiatives from community outreach efforts to large capital projects. The plan can be viewed on-line at: http://www.novaregion.org/index.asp?nid=394.

NVRC continued to provide jurisdictions participating in the Four Mile Run Management Program with annual projections of the effectiveness of local programs for controlling stormwater runoff in the channel, both to prevent flooding and limit pollution. The Four Mile Run Watershed Management Program is NVRC's oldest continuously active program, and has a long and interesting history. This NVRC Program has been at the cutting edge in urban watershed management for nearly two decades and continues to remain at the forefront. Recently, NVRC has begun the process to revise the watershed modeling and develop new understanding of this urban watershed. Discussions with the Federal Emergency Management Agency regarding the flood mapping update continue to be a priority for the jurisdictions. NVRC will be a resource for the jurisdictions as the new mapping challenges emerge.

As part of the Four Mile Run Program, NVRC continued to serve as secretariat for the Runoff Board and its committees, performed research tasks and provided liaison with state, federal and local agencies. NVRC conducted analysis and modeling studies for the program and worked with FMR TAC members to identify modeling needs for the watershed and innovative corporation to facilitate new modeling of FMR. NVRC performed technical modeling analyses for Four Mile Run member governments upon request, to determine adequate levels of stormwater management, associated with land use changes, needed to prevent flooding in a regional flood control channel.

NVRC continued to work with local governments to execute the U.S. EPA approved Total Maximum Daily Load Implementation Plan for bacteria in Four

Mile Run. The TMDL Implementation Plan developed strategies to address the issues and concerns uncovered during the TMDL study. The Implementation Plan requires extensive coordination with watershed local governments and other stakeholders.

iii. Hunting Creek, Cameron Run, Holmes Run – Bacteria TMDLs completed in 2010

Hunting Creek was listed as impaired for bacteria in Virginia's 2008 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ, 2008) due to exceedances of the state's water quality criteria for *E. coli* bacteria. The segment was first listed as impaired for fecal coliform bacteria on Virginia's 1998 303(d) List, and was included in Attachment A of the 1999 Consent Decree. Cameron Run was listed as impaired for bacteria in Virginia's 2008 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ, 2008) due to exceedances of the state's water quality criteria for *E. coli* bacteria. The segment was first listed as impaired for *E. coli* bacteria on Virginia's 2006 Integrated List. Holmes Run was listed as impaired for bacteria in Virginia's 2008 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ, 2008) due to exceedances of the state's water quality criteria for *E. coli* bacteria. The segment was first listed as impaired for fecal coliform bacteria on Virginia's 2004 Integrated List.

All three impaired segments are located within the Potomac River basin (USGS Cataloging Unit 02070010) in the City of Alexandria and Fairfax County, Virginia. The impaired segment of Holmes Run extends from the confluence of Holmes Run and Backlick Run upstream to the mouth of Lake Barcroft, covering approximately 3.58 miles. The impaired segment of Cameron Run extends from the head of tide at approximately the Route 611/241 (Telegraph Road) bridge crossing, upstream to the confluence of Holmes Run and Backlick Run, covering approximately 2.08 miles. The impaired segment of Hunting Creek extends from the confluence with the Potomac River at the state boundary, to the upstream limit of tidal waters at the Route 611/241 (Telegraph Road) bridge crossing, covering approximately 0.526 mi^2.

In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml, the following bacteria reductions are required for Holmes Run and Cameron Run:

- 100 percent reduction of the human sources (failed septic systems and sanitary sewer overflows).
- 83 percent reduction of the edge-of-stream loadings from runoff, interflow and groundwater discharge.
- 50 percent reduction of the direct instream loading from wildlife.

In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml in Hunting Creek, the following bacteria reduction are required:

- 100 percent reduction of the human sources (failed septic systems and sanitary sewer overflows).
- 83 percent reduction of the edge-of-stream loadings from runoff, interflow and groundwater discharge in non-tidal Cameron Run.
- 98 percent reduction of the edge-of-stream loadings from runoff, interflow and groundwater discharge in Hooff Run.
- 50 percent reduction of the direct instream loading from wildlife.
- 80 percent reduction of the load from City of Alexandria's combined sewer overflow Outfall 002.
- 80 percent reduction of the load from City of Alexandria's CSO Outfalls 003 and Outfall 004.

This TMDL was approved by EPA on November 10, 2010.

iv. Potomac River Tributaries – Bacteria TMDL

A PCB TMDL has been established for the Tidal Potomac River. Information on TMDL development in Virginia is available on VDEQ's website: http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment.aspx

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 from the confluence with Folly Lick Branch downstream to the confluence with the Potomac River. The impaired reach of Mine Run extends from the confluence with an unnamed tributary to Mine Run downstream to the confluence with the Potomac River. The impaired portion of Pimmit Run extends from the headwaters of Pimmit Run downstream to the confluence with the Potomac River.

A draft TMDL was presented at the final public meeting in December 2011. In order to meet the *E. coli* geometric mean water quality criterion of 126 cfu/100 ml, the draft TMDL identified the following bacteria reductions:

Sugarland Run:

- 100 percent reduction of failed septic systems.
- 100 percent reduction of direct deposition of livestock waste into the stream.
- 96.6 percent reduction of nonpoint source agricultural loads.
- 96.6 percent reduction of nonpoint source urban loads.

Mine Run:

- 100 percent reduction of failed septic systems.
- 100 percent reduction of direct deposition of livestock waste into the stream.
- 78.5 percent reduction of nonpoint source agricultural loads.
- 78.5 percent reduction of nonpoint source urban loads.

Pimmit Run:

- 100 percent reduction of failed septic systems.
- 100 percent reduction of direct deposition of livestock waste into the stream.
- 99.2 percent reduction of nonpoint source agricultural loads.
- 99.2 percent reduction of nonpoint source urban loads.

The draft TMDL has not yet been finalized.

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.

At the request of local governments and the Virginia Department of Conservation, NVRC continued to host a series public of meetings between the Department and local stakeholders to discuss the Phase I and Phase II Watershed Implementation Plan and the Virginia Assessment and Scenario Tool which allows users to rapidly develop scenarios with varying best management practices.

NVRC also coordinated regional review and comments on the Commonwealth of Virginia's Chesapeake Bay Phase II Watershed Implementation Plan. NVRC participated in a planning district commission-coordinated grant proposal funded by the Department of Conservation and Recreation entitled "Coordinated PDC Approach to the Virginia WIP for Cleanup of the Chesapeake Bay." The grant was a result of a joint application that provided a very critical and important service of facilitation and coordination between the Department of Conservation and Recreation staff and member local governments. Through the DCR grant, the participating PDCs provided a venue for dialog where the local governments became better informed to make critical and important decisions related to the five

WIP deliverable outcomes DCR has requested of local governments. The partnering PDCs' joint grant intended to allow for a coordinated Chesapeake Bay Watershed-wide approach, but allowed for flexibility for localities to use local information and existing program capacity to inform the development of Virginia's Phase II Watershed Implementation Plan.

NVRC participated as a member to the Department of Conservation and Recreation's Stakeholder Advisory Group on the development of Virginia's Chesapeake Bay Phase II Watershed Implementation Plan. The charge of the SAG was to provide guidance and recommendations to the Secretary of Natural Resources during the development of the Chesapeake Bay TMDL Phase II Watershed Implementation Plan. NVRC also participated on a regulatory advisory panel, at the request of the Department of Environmental Quality, to consider amending the Water Quality Management Planning Regulation (9 VAC 25-720-10) to include the concept of regulating flow as part of the TMDL process. NVRC continues to participate on a regulatory advisory panel at the request of the Department of Environmental Quality to consider amending the Water Quality Management Planning Regulation to identify unused nutrient waste load allocations assigned to dischargers within the Shenandoah-Potomac River Basin. These WLAs may then be transferred to offset additional allocations assigned to certain other dischargers who the State Water Control Board determines did not receive an equitable share of the total basin allocation, thereby maintaining the basin point source nutrient load cap and protecting water quality within the river basin and the Chesapeake Bay. NVRC developed a "fact sheet" and website to update localities on the requirements of the new Stormwater Regulations.

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.

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

11. 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 2012, RA staff continued the massive removal of purple loosestrife from the shoreline at all four lakes. RA also removed the large 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.

RA's management strategy included treating 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. AEC applied three different herbicides to target the different plants over the course of one day.

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. Lake Anne's concrete riser structure was repaired in winter 2011.

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 2013. 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 and hindering water quality and limiting sunlight penetration depths.

In 2012, monitoring of recently-dredged Lake Barton commenced. The water quality data collected at Lake Barton will be evaluated in concert with the data from nearby Lake Huntsman. Analysis of these data will focus on the benefits of selected management 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 was removed by project completion in September 2008.

e. Twin Lakes

North Twin Lake Dam

The Fairfax County Park Authority completed a Capital Improvement Project to repair the North Twin Lake dam at Twin Lakes Golf Course. The scope of repair

work included demolishing the existing bridges, spillway structure and outfall channel, raising the dam embankment elevation approximately five feet, and constructing a new concrete spillway structure, armor earthen emergency spillway, outfall channel and cart bridge. The repair work was required by the Virginia Department of Conservation and Recreation in order for VDCR to issue the Park Authority a regular operations and maintenance permit for the dam. The repair work was satisfactorily completed in January 2012, and the design engineer is now preparing the application and as-built drawings required by VDCR to obtain a regular O&M permit.

12. Groundwater Monitoring

The United States Geological Survey maintains a series of wells throughout the nation to monitor groundwater levels and drought. Two wells are located in Virginia; one such well (Site 385638077220101) in Fairfax County has been maintained since 1976. This well provides continuous real-time data that is used to assess ground water levels. Information on this well is available on-line at: http://groundwaterwatch.usgs.gov.

On June 17, 2013, the State Water Control Board adopted final regulations developed by the Department of Quality adding portions of Fairfax County east of Interstate 95 to the Eastern Virginia Groundwater Management Area. The effect if this action is that users who withdraw 300,000 gallons of groundwater in any one month will need a permit. By placing the entire coastal aquifer system under the permit program, the groundwater resource will be managed comprehensively for the first time. The goal of this management is to ensure the commonwealth and its residents get the greatest economic benefit from this resource while maintaining its long term availability and productivity.

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 27 open cases and 1,084 closed cases. In 2012, 10 new cases were opened and 10 were closed. In terms of unregulated tanks (i.e. residential heating oil), there are 36 open cases and 1,874 closed cases. In 2012, 67 new cases were opened and 89 were closed.

13. Stream Restoration and Ecosystem Function

The Hydroecology of Flowing Waters group in the National Research Program of the United States Geological Survey is currently conducting a study on two streams in Fairfax County to evaluate the effects of stream restoration on stream ecosystem functioning at low levels of the food chain. By changing the morphology of the stream, restoration activities change the distribution of habitats for primary producers and consumers and the amount of time it takes water to move through those habitats. Restoration activities also change the quantity of light reaching the stream, altering the amount of primary production by algae. Both factors influence the balance between the

production and respiration of organic matter, which in turn strongly influences food web structure and water chemistry. The USGS study focuses on obtaining a fundamental understanding of the linkage between flow, the transport of sediment and organic matter, the physical structure of the stream and the resulting production and respiration of organic matter in a restored section of Accotink Creek, compared to an unrestored section of Upper Difficult Run. Initial efforts are under way to understand how spatial differences in the physical characteristics of these streams control spatial differences in primary production and respiration. Future efforts will involve laboratory and numerical modeling studies to determine how storm flows influence these processes. The study is not yet completed.

D. WATERSHED MANAGEMENT

1. Watershed Master Plans

Between 2003 and 2011, 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 with the assistance of the community through public meetings and individual plan 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.

In November 2012, the county staff provided a status update of the watershed planning and the broader stormwater management programs to the public. The number of projects selected each year for implementation will be determined as part of the annual budget process. Efforts to include implementation of non-structural projects and policy recommendations from the watershed plans are ongoing.

2. Restoration Efforts

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

In 2012, the county and its partners continued to implement stormwater management-related capital projects, including 10 flood mitigation projects, 16

stormwater management facility retrofits, seven low impact development projects and three stream restoration projects. Some examples are listed below:

i. Stream restorations

In 2012, the county completed three stream restoration or stabilization projects including one with nonprofit organization and volunteer assistance:

- Sheffield Hunt Outfall and Basin Retrofit. This project restored 940 linear feet of a tributary to Pohick Creek to mitigate stream bank erosion, improve water quality and address safety concerns related to a deeply incised channel and a dam embankment. The existing stormwater management facility downstream of the tributary was also retrofitted for water quality enhancements.

- Government Center Stormwater Retrofit Project: The county formed a unique private-public partnership to restore 1,000 linear feet of the headwaters of Difficult Run and to maintain and enhance three stormwater facilities on the campus of the Government Center. The novel approach employed on this comprehensive project involved hydraulic dredging of a pond and utilizing the dredged pond sediment to fill the degraded channel from which the sediment had eroded. Wetland Studies and Solutions, Inc. donated dredging equipment and staff. The dredged sediments, an otherwise costly material to dispose of, were pumped into custom fabricated geotextile tubes placed in the upstream channel. The restored channel was then built upon the sediment filled geotextile tubes to reconnect the channel to the floodplain. Elements of the design included installation of cascades, cross vanes, J-hooks, step pools, large woody debris, native vegetation and use of a progressive tree protection plan. The project also included retrofits of two detention basins, an outfall stabilization and replacement of the existing recreational trail with a combined use recreation/maintenance access trail to serve six stormwater facilities. Implementation of the project also involved collaboration among eight county agencies. The project improved water quality and habitat through restoration of ecological form and function of the stream corridor. County staff and the Virginia Native Plant Society participated in three volunteer events to salvage trees from within the limits of construction and transplant the trees to other areas of the campus in an effort to increase overall tree canopy cover.

- West Barnyard Run-Huntley Meadows Park Project: This project involved the installation of stormwater blockages made from fallen trees in order to slow down stormwater flows and reduce stream bank erosion and deposition of silt into wetlands. Over 200 native trees and shrubs were planted along the borders of the park's central wetlands to repair damage done by a recent boardwalk construction project.

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 2012, 16 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.

iv. Low Impact Development Projects

Seven 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.

v. Education and outreach

As part of the Government Center Stormwater Retrofits project, tours were conducted in 2012 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.
- Potomac Watershed Roundtable.
- Northern Virginia Soil and Water Conservation District Green Breakfast.
- 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 Employees for Environmental Excellence.
- Stormwater Retrofitting Workshop for Stormwater Practitioners, by the Chesapeake Stormwater Network and the Center for Watershed Protection.
- Fairfax County Engineers in Training Program.
- Truro Home Owners Association.

b. 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 2012 seedling sale helped promote urban reforestation, habitat enhancement and water quality protection, selling 7,600 native tree and shrub seedlings. 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 899 native woody plant seedlings, 459 native grass and wildflower plants and 26 pounds of meadow seed mix in 2012. Earth Sangha sold at a discount 302 native woody plants and 233 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 25 local schools and 30 other parklands, ecological organizations and homeowner associations.

FCPA, Fairfax ReLeaf and the Virginia Department of Forestry hosted independent stream buffer restorations in the county in 2012. The Park Authority continues to maintain and monitor the previous riparian buffer enhancement projects installed in the last five years. To date, 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 2012 include the planting of 165 native shrubs, grasses and forbs at Riverbend Park and the planting of 161 native trees plus 12 pounds of native seed mix at Huntley Meadows Park, with support from Earth Sangha.

In 2012, Fairfax ReLeaf planted 4,206 trees in Fairfax County through more than 60 projects. Fairfax ReLeaf also distributed 2,514 trees in the county.

VDOF continues to plant riparian buffers in watersheds throughout Fairfax County in support of the county's riparian buffer initiative. In 2012, VDOF worked with volunteers from organizations such as Fairfax ReLeaf, Eagle Scouts, homeowner associations and school groups and planted approximately 5,300 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 10 Tree Stewards were trained in 2012.

c. 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, oversee the progress of the bank.

The groundbreaking for Phase I, which covers 14 miles of stream, occurred on February 12, 2008. As of June 2012, 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. Construction of the approved plans will depend on the economy and mitigation credit sales with a goal of beginning in late 2014. For more information on the stream restoration project in Reston visit: http://reston.wetlandstudies.com or www.reston.org.

3. 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 2012, the Department of Public Works and Environmental Services, the Fairfax County Park Authority, Fairfax County Public School, various nonprofit organizations, individual volunteers and other partners contributed to the design and implementation of seven 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, are being integrated into the local code and PFM requirements.

b. LID monitoring efforts

DPWES staff continues to monitor and evaluate the quantity and quality of runoff from innovative stormwater management systems installed at Fairfax County government facilities. Rain generally flows directly from impervious surfaces such as parking lots, roads and roofs into receiving streams unless it is intercepted by a

stormwater management facility. The stormwater systems being 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 help replicate what naturally occurs when stormwater is retained by forests, meadows and wetlands long enough to infiltrate into the soil and recharge groundwater.

The stormwater systems being monitored include Providence District Supervisor's Office/Fire Station 30 in Merrifield, Cub Run RECenter, Herrity Building in the Government Center complex and 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. Wetland cells and benches, a sand seepage storm outfall and organic soil amendment with native landscaping were installed at Cinnamon Oaks pond.

The reports for monitoring in 2008, 2009 and 2010 were finalized in 2011. The data are being further evaluated to determine performance and make design related recommendations. Meanwhile, the monitoring data from 2011 indicates:

- Providence LID system – An average of 80.5 percent of the rainfall that fell within the 0.83 acres that drains to the system. eventually infiltrated into the ground or evapotranspired into the atmosphere. Test results showed that phosphorus, nitrate and total suspended sediment normalized loadings (grams per inch of rain) were reduced by 32 percent, 77 percent and 90 percent respectively.

- Cub Run RECenter LID system – Rain events less than 0.44 inches of rain did not result in any outfall runoff. In larger events, runoff was dependent on rainfall rate, rainfall duration and antecedent dry time, and in some cases up to one inch of rain was retained. The temperature of effluent when compared to that from the parking lot was lowered by an average of 2.76^{o}F. Pollutant load (grams) reduction of phosphorus, nitrate and total suspended sediment was 51 percent, 81 percent and 95 percent respectively.

- Herrity Garage green roof –The green roof typically retained at least the first one-half inch of rain and in some cases retained over an inch of rain. The green roof only received water directly from the rain; no runoff entered the green roof system. Pollutant load reduction is dependent on volume reduction. A control section of the parking structure, equal in area to that of the green roof, was also monitored to compare the runoff load from the green roof to that from the parking area. The pollutant load (grams) reductions of phosphorus, nitrate and total suspended sediment were 17 percent, 27 percent and 86 percent respectively. The majority of the TSS runoff from the control section of the parking lot was from atmospheric deposition of "dirt" on the surface that

washed off when it rained. Green roofs can be an exporter of phosphorus, nitrate and TSS when they are new; however, when they have gone through several growth seasons this no longer occurs or is minimized. The pollutant load reduction percentages apply to the difference between what is in the runoff from the green roof and the runoff from the control side of the parking structure. Green roofs do not filter water that passes through them; they act as a sponge and retain rain that falls on them, later releasing the water to the atmosphere through evapotranspiration. In addition, green roofs reduce the heat island effects seen in typical roofs, provide cooling to the building and have a longer life, thus reducing roof maintenance costs.

- Cinnamon Oaks pond retrofit- Monitoring of the Cinnamon Oaks Pond, in the Horsepen Watershed, began in 2012 to measure the performance of wetland cells and benches, a sand seepage storm outfall and organic soil amendment with native landscaping.

c. 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, booklets.
- Slideshare (online PowerPoint presentations).
- Flickr (photo stream).
- Web pages.
- Events (SpringFest, Celebrate Fairfax, homeowner association and project meetings).
- Reports (Stormwater Status Report).
- Personal contact by telephone, email, letter, visit.
- Volunteer opportunities (stream and litter cleanups).
- School programs (Sewer Science).
- Stormy the Raindrop (activity books, puppet shows at events).
- Tours of completed projects (Government Center stream restoration, Herrity green roof).

Popular public education topics included: stream restorations; cigarette butts in the environment; proper disposal of pet waste; natural gardening techniques; completed projects; backyard composting and stream friendly yard care; detention basins and micropools; the Herrity green roof; native plants; permeable pavers; promoting

pollinators; rain barrels; reforestation; how to properly discharge swimming pool water; tree box filters; water quality swales; and tree care tips, 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 Internet advertising in an effort to reduce pollution-causing behaviors among Northern Virginia residents.

For the 2012 campaign, the Clean Water Partners expanded the partnership and the campaign reach into D.C. and Maryland by aligning with the Community Engagement Campaign managed by the Metropolitan Washington Council of Governments, and:

- Supported two Metro DC-wide blogs that target dog owners and residential gardeners.
- Transferred the blogs to a blogger platform managed by Google.
- Ran four online quizzes and contests to encourage new blog readers and to further promote campaign messages.
- Conducted an online poll survey of 500 Northern Virginia residents to determine the effectiveness of the blog and the ads, to reveal any changes in behavior and to aid in directing the future efforts of the campaign.

In April 2012, two radio ads featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on three popular radio stations, including one Spanish language station a total of 236 times. These ads reached over 54,000 residents and resulted in more than 200 visits to the www.onlyrain.org website.

The Clean Water Partners conducted a mini campaign featuring banner ads that promote alternatives to chemical fertilizer use.

Between September 14, 2011 and August 31, 2012, there were more than: 16 million online advertising impressions; 88,000 blog and Facebook page views; 16,000 online interactions; and 4,000 email/RSS subscribers, Facebook fans and Twitter followers.

Survey highlights include: one-fourth of respondents recalled hearing or seeing advertisements on the Internet or on the radio. Of those who recalled the ads, six percent state they now pick up after their pets more often; 15 percent said that they are more careful with fertilizer; seven percent fertilize fewer times per year; and nearly 77 percent of people surveyed reported that they always pick up after their pet.

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

d. Green Golf Course at Pohick Bay

The Pohick Bay Regional Park 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, 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.

4. 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 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, which damaged more than 200 structures. 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 such structural options as levees and flood walls and such flood proofing alternatives as 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 October 2012, the most expensive alternative being approximately $35 million.

b. Huntington Flood Remediation Project

In June 2006, the Huntington community experienced flooding from Cameron Run which affected more than 160 homes. 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, the 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.

5. 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 2012. 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. Eight "build-your-own" rain barrel workshops, four pre-made rain barrel sales and one "train the trainer" event attracted a total of 324 county residents and resulted in the distribution of 405 barrels. NVSWCD continued to partner in an Artistic Rain Barrel program to renew interest in rain barrels and other best management practices. Twenty 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 2012, 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 2011, the Virginia Department of Forestry partnered with volunteers from organizations such as Fairfax ReLeaf, the Boy Scouts of America,, homeowner associations and school groups and completed 24 community tree plantings in the county. Volunteers donated 1,587 hours and planted 2,333 trees in these 24 events. Eleven of the tree plantings were along streams and added 925 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.

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. 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 that focuses on the monitoring and improvement of water quality. RA manages and monitors four lakes (Audubon, Anne, Thoreau, and Newport) and two ponds (Bright and Butler).

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.

- RA hosted a **Stream Monitoring Workshop** on March 30, 2013 with 20 people getting certified as stream monitors. Leah Miller, Clean Water Program Director at the Izaak Walton League of America, Inc., led the program with monitoring of Snakeden Branch at the Walker Nature Education Center.
- At RA's **Spring Festival** in May, residents rented boats at Lake Audubon, learned about stream monitoring, and tried their hands at fishing at the lake.
- RA hosted two **Make Your Own Rain Barrel Workshops** in 2011, two in 2012 and one in 2013 where over 120 barrels were made and distributed.
- In June, 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 2012, RA hosted the **Fall Stream Watershed Cleanup** where 20 volunteers collected a total of 41 bags of trash.
- In March, RA hosted the third annual **Reston Kid's Trout Fishing Day** where 222 kids ages 2-12 enjoyed catching rainbow trout from the restored Snakeden Branch stream between Soapstone and Lake Audubon.
- In September 2012, RA, in partnership with U.S. Geological Survey, conducted a stream monitoring program in Snakeden Branch for South Lakes High School 11^{th} graders.
- RA participated in the **Beaver Pond Watershed Experience Field Trip** for Langston Hughes Middle School 7^{th} graders at The Glade stream valley; this program taught students about stream restoration and the benefits of the riparian area. RA also worked with LHMS **Earth Force Club** on stream monitoring.

6. Reston Storm Water 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 Storm Water 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 Storm Water Trail is complete and established.

The Storm Water 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 Storm Water 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.

7. Organized Countywide 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.

Clean Fairfax reports that, last year, the organization worked with over 1,200 volunteers at 85 assisted cleanups, picking up over 67,000 pounds of trash, on and around Fairfax County's roads, parks and side streets.

As reported by the Alice Ferguson Foundation, in spring 2013, approximately 86 sites were established throughout the county for the foundation's annual Potomac River Watershed Cleanup. These cleanups were advertised in the Solid Waste Management Program's e-mail subscription for public school teachers and FCPA's Parktakes Magazine, as well as on the Internet. Cleanups were conducted at numerous state, county and local parks, schools, the county wastewater treatment plant and other locations. The Alice Ferguson Foundation reports that, in Fairfax County, more than 2,200 volunteers removed an estimated 89,500 pounds of trash. An estimated 12,000 plastic shopping bags were counted, as were 217 tires. Region-wide, a total of 14,586 volunteers removed 312 tons of trash and debris from 633 cleanup sites throughout Washington, D.C., Maryland, Virginia, West Virginia and Pennsylvania. The 312 tons of trash collected during the cleanup included 1,314 tires, 193,800 beverage containers, 27,200 plastic bags and 27,400 cigarette butts.

Clean Fairfax made 50,000 impressions (i.e., Web hits, tweets, Facebook) with its online content about litter and the environment.

The Alice Ferguson Foundation's "Bridging the Watershed" program is an outreach program that is implemented in partnership with the National Park Service; it has served 14 schools and around 475 students in Fairfax County. BTW is designed to promote student academic achievement, personal connections with the natural world, lifelong civic engagement and environmental stewardship through hands-on curriculum-based outdoor studies in national parks and other public lands. The curriculum includes the following topics: litter; water quality; invasive species; runoff and sedimentation; and how park history affects current environmental issues. Fairfax County schools have visited the following parks as part of this program:

- George Washington Memorial Parkway—Dyke Marsh (three schools) and Great Falls (three schools).
- National Mall and memorial parks (two schools).
- Prince William Forest Park (six schools).

Twenty-three teachers in Fairfax County have been active in BTW between 2010 and 2012 with 11 going through BTW training during the same period. More information is available at www.BridgingTheWatershed.org.

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

According to Clean Virginia Waterways, a total of 801 volunteers participated in the International Coastal Cleanup in Fairfax County during September and October 2012. At 36 sites, 17,421 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.

FCPA organized and/or assisted with a number of stream cleanups in 2012:

- Riverbend Park: three watershed cleanups with a total of 140 people.
- Fairfax Trails and Streams cleaned Pimmit Run stream valley on a regular basis along with two big cleanups spring/fall.
- Burke **Lake** Park: High school cross country teams organized a lake shore cleanup day and collected approximately 50 bags of lake shore trash. Several patrons also collected lakeside trash.
- Lake Accotink Park: Staff organized two Watershed Clean-up Days on April 14 and October 13, 2012, attracting more than 130 volunteers. The Mobile Crew removed 17.9 tons of debris from the lake at the marina in April and 40.5 tons in November.
- Throughout the year, Lake Accotink Park supported numerous individual and small-group volunteers who collected trash in the park. Friends of Accotink

Creek organized bi-annual cleanups at twelve points along Accotink Creek, in Fairfax County and Fairfax City parks. Northern Virginia Kayak Club conducted an Earth Day clean-up of the lake.

- Huntley Meadows Park: Over 100 bags of trash were removed from the park during five separate stream cleanups in 2012 that included Dogue Creek, Barnyard Run and Little Hunting Creek watersheds.

NVSWCD and the county's Solid Waste Management Program assisted in a cleanup of Little Hunting Creek in April 2012 where 139 volunteers picked up 245 bags of trash, 27 tires and 49 shopping carts.

Reston Association coordinated two major stream cleanups during 2012 with 141 volunteers collecting approximately 175 bags of trash. RA also sponsored two lake cleanups on May 23 and June 2, 2012, during which 46 volunteers removed trash and debris from six miles of shoreline along Lakes Anne, Thoreau and Audubon.

The Lake Barcroft Water Improvement District collected litter from the lake; the litter was subsequently moved offsite by the Solid Waste Management Program. These actions keep trash and other debris from moving downstream and into the Potomac River.

In 2012 the multi-agency trash workgroup (consisting of representatives from the Stormwater Planning Division, Solid Waste Management Program, NVSWCD and Clean Fairfax) continued to test and refine the Trash Assessment For Improved Environments stream condition assessment protocols and data forms. As part of a cooperative effort to evaluate litter problems prior to a stream restoration project in Flatlick Branch, NVSWCD completed a TAFIE survey in a 100-foot reach within the project site. Surveyors counted 193 pieces of trash, mostly plastics. Six bags of trash were removed. Valuable information about the types and probable sources of trash was also recorded. Phase I of this stream restoration project will occur in 2013. The workgroup plans to reach out to retailers/vendors located near the site to raise awareness of the litter issue and encourage support for the upcoming restoration project.

Other TAFIE assessments conducted in 2012 included sites at Accotink/Royal Thomas Way (spring and fall), Providence REC Center (spring and fall), Huntley Meadows (spring) and Shaw Park Court (fall).

During 2012, the workgroup outlined a public education plan for TAFIE for 2013. TAFIE forms and guidance were provided to elementary schools by request 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 Virginia Department of Conservation and Recreation took over administration of the MS4 permit program as part of the Virginia Stormwater Management Program in 2005. In July 2006, the county submitted its MS4 permit reapplication to DCR. The county's current MS4 permit expired in January 2007; however, the county is operating under an administrative continuance of the existing permit while the state and EPA work on reissuing the permit. County staff has been working with DCR and other municipalities on clarification of the new permit requirements. In April 2011, the county responded to DCR's fifth preliminary draft permit. The latest preliminary draft includes incorporation of Fairfax County Public Schools into the countywide permit, as well as new requirements related to MS4 program plan updates, watershed management plans, inventory control, nutrient management plans, industrial and high risk runoff stormwater management at county facilities, monitoring, public outreach, employee training and development of TMDL action plans.

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 steps related to include the Industrial and High Risk Runoff inspection program include:

- Development 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 will be used to prioritize inspections associated with the IHRR program.
- Development of a spreadsheet to track facilities holding Virginia Pollutant Discharge Elimination System permits for discharges of stormwater associated with industrial activity.
- Development of new educational materials to assist other county agencies with recognizing and reporting IHRR during their inspections.
- Two new positions for the purpose of conducting IHRR inspections.

The steps related to the Construction Site Runoff inspection programs 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.

The county is working 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.

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 2012, Fairfax County inspected 374 of the 1,541 county-owned stormwater management facilities and 664 of the 3,720 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 2012, MSMD continued its maintenance program for county stormwater management facilities. Maintenance can include repairs to stormwater management facility structures and removal of sediment. During 2012, the county cleaned and/or mowed 1,289 dam embankments, including 50 regional ponds which 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 3,856 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; trail maintenance; graffiti removal; snow 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 203 facilities, including: bioretention gardens; green roofs; permeable pavers; vegetated swales; tree box filters; and infiltration trenches.

In 2012, MSMD met with the Fairfax County Sheriff's department about using the Community Labor Force crews to help maintain Fairfax County's public low impact development stormwater facilities. A partnership was created between the two agencies, and the CLF work crews were tasked with maintaining roughly 39 publically maintained LID facilities.

In 2012, MSMD continued implementation of its infrastructure inspection and rehabilitation program. Staff inspected 2,200 pipe segments and 4,000 storm structures with video and photo documentation. Under the rehabilitation program, more than 50 miles of pipe were videoed, documenting the existing structural and service conditions of the interior of the storm system. These efforts represent 292 miles, or 23 percent of the storm drainage network, being screened through walking and/or video documentation for obvious deficiencies. In addition, more than 5,100 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. DPWES also developed a prioritized inspection program, in accordance with guidelines established by the Virginia Department of Conservation and Recreation, that will consider slope, soil type, proximity to streams and extents of buffer areas to determine an overall rating for any given site. In March 2008, the Virginia Department of Conservation and Recreation approved the county's program, finding it to be "fully consistent with the requirements of the Virginia Erosion and Sediment Control Law and Regulations."

In 2012 a total of 710 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 Conservation and Recreation.

In 2012, 26,617 E&S inspections were performed through the county's Alternative Inspection Program on all sites under construction. Those E&S inspections represented 54.7 percent of the 48,622 total site inspections that were performed by Site Development and Inspection Division personnel. The site inspections total also included 2,160 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 2012 SDID wrote 605 "2030" 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

69 violations in 2012 and 54 of those were later cleared. The remaining 15 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 2012, the branch received 247 total complaints. In most instances there was either no violation or there was timely compliance if a violation was cited. The branch issued 24 Resource Protection Area violation notices and 38 land disturbance violation notices. The branch undertook 20 criminal proceedings to ensure compliance, with two proceedings resulting in fines issued by the court.

5. Illicit Discharges

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 2012 the section received 552 complaints involving hazardous materials. The actual spill, leak or release of hazardous materials into the environment occurred in 231 of these cases. Of these 231 releases, 168 involved petroleum based products. There were 31 hydraulic oil spills/releases (mostly from trash trucks), 12 gasoline releases, 51 fuel oil or home heating oil releases and 33 diesel fuel releases. The remainder consisted of a variety of materials including, paint, antifreeze, cleaners, various gases, various chemicals and mercury. There were 28 incidents where the release of hazardous materials impacted storm drains or surface waters. The section tracked 35 sites for both short and long term remediation. The vast majority of these releases were small scale with the exception of an overturned gasoline tanker truck that caught fire and released approximately 8,500 gallons of gasoline into a storm drain system.

The Sanitary Sewer Infiltration Abatement Program conducts wastewater flow measurements and analysis to identify areas of the wastewater collection system with

excessive inflow/ infiltration problems, and uses closed circuit television to inspect trunk sewer mains in an effort to specifically identify defective sewer lines for repair and rehabilitation. In 2012, 208 miles of old sewer lines and approximately 12 miles of new sewer lines were inspected, resulting in the identification of sanitary sewer lines and manholes needing repair and rehabilitation. In 2012, approximately 31 miles of sanitary sewer lines were rehabilitated, bringing the total length of sewer lines repaired over the past ten years to approximately 214 miles.

The Sanitary Sewer Extension and Improvement Program addresses pollution abatement and public health considerations and provides sanitary sewer services to areas identified by the Department of Health as having non-repairable or malfunctioning septic systems. In 2012, four Extension and Improvement projects were completed, consisting of approximately 5,360 feet of eight-inch gravity sanitary sewer, approximately 3,863 feet of 1.5-inch to 2.5-inch diameter low-pressure sanitary sewer (including six individual grinder pumps) and sanitary sewer connections for 68 existing homes and three vacant properties.

6. Wetlands Impacts

In 2012 the Northern Regional Office of the Virginia Department of Environmental Quality received 28 applications to impact surface waters in Fairfax County. A total of 26 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.

F. 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 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 2012 plant performance are listed in Table IV-1.

Table IV-1. UOSA Permit Requirements and 2012 Performance

Parameter	Limit	Performance
Flow	54 mgd	30.1 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

The influent highest rolling 30-day flow was observed during the 30-day rolling period ending on June 12, 2012 at 36.1 mgd. The UOSA Plant continues to produce high quality reclaimed water.

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 the 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-2 presents the facility's performance and current effluent monthly limitations.

In 2012, 55,942 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.

Table IV-2
NMCPCP Permit Requirements and 2012 Performance Averages

Parameter	Limit	Performance
Flow	67 mgd	37.57 mgd
$CBOD_5$	5 mg/l	< 2 mg/l
Suspended Solids	6 mg/l	1.4mg/l
Total Phosphorus	0.18 mg/l	0.08 mg/l
Chlorine Residual	0.008 mg/l	< 0.008 mg/l
Dissolved Oxygen	6.0 mg/l (minimum)	8.4 mg/l
pH	6.0-9.0 (range)	7.0
E. coli Bacteria	126/100 N/MCL*	1 N/MCL*
Ammonia Nitrogen	1.0 – 2.2 mg/l (seasonal)	< 0.12 mg/l
Total Nitrogen (Annual)	7 mg/l	4.22mg/L

*Geometric mean
Source: Fairfax County Department of Public Works and Environmental Services

Water Reuse Project

The purpose of the project 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. The notice to proceed on the reuse project was issued on December 23, 2009. The project went online April 5, 2012

2. Septic System Permitting and Repairs

a. Overview

An estimated 21,371 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 2012, 107 New Sewage Disposal Permits were issued for single family residences. There were 86 new sewage disposal systems installed—41 (47.7 percent) were alternative type systems and 45 (52.3 percent) were conventional systems. There were 792 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 5,466 septic tank pumps outs.

The Health Department mailed 14,957 flow diversion valve reminder notices in 2011. The notices are sent to homeowners on the anniversary of the installation of their septic system to remind them to turn their flow diversion valve once a year. It reminds them to pump out their septic tank every three to five years.

In 2011, 1,467 non-compliance letters were mailed to owners of homes that have not pumped out their septic tank during the five year period required by County Code. If homeowners fail to comply, a follow-up letter is mailed to them informing them that action will be taken under the regulations to insure their septic tank is pumped out as required.

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 are 33 properties permitted for pump & haul as a result of a failing onsite sewage disposal system with no area 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 are really not aware of their responsibilities for maintaining these systems. Education from the private sector and government sector is essential.

To address concerns about the management of onsite sewage disposal systems, Health Department staff and representatives from American Water/Applied Water Management conducted a study to examine the feasibility of establishing an onsite sewage disposal management entity in Fairfax County. If deemed feasible, the entity would be responsible for ensuring that proper and timely system maintenance is performed on all onsite sewage disposal systems. This project was completed in a four phased approach. Phase four of final technical report was provided to Health Department at the beginning of FY 2010. The Health Department has been reviewing the report as to its applicability to legislation approved by the Virginia General Assembly in 2009 and 2010. The legislation specifically required the State Health Department to adopt *Emergency Regulations for Alternative Onsite Sewage Systems* that establish performance requirements, maintenance requirements and reduced vertical soil setbacks distances to restrictions for all Alternative Onsite Sewage Systems. Emergency regulations were adopted on April 7, 2010.

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

No changes have been made to Chapter 68.1 of the Fairfax County Code. The new Regulations for Alternative Onsite Sewage Systems have gone into effect; these regulations establish permanent operation and monitoring requirements for alternative onsite sewage systems. Chapter 68.1 will be reviewed for possible future amendments to address changes that may be necessary to comply with statutory codes related to alternative onsite sewage systems.

Due to concerns expressed from the General Assembly and the small business caucus, the Virginia Department of Health is examining the extent to which direct service delivery in the onsite sewage program may be privatized. VDH has engaged the University of Virginia Institute for Environmental Negotiation to undertake a stakeholder process to examine privatization and offer consensus-based recommendations on how the agency should proceed. The stakeholder group will include both VDH and private sector onsite sewage practitioners, local government representatives, homeowners and other interested parties who can provide different perspectives. 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.

a. Closed Circuit Television Inspection

Closed circuit television inspection is used to inspect trunk sewer mains to identify defective lines in need of repair and/or rehabilitation. In 2012, 208 miles of old sewer lines and 12.4 miles of new sewer lines were inspected using CCTV. All new inspections are recorded in the Enterprise Asset Management system and are used in work order planning and management.

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b. Sewer Rehabilitation

The use of trenchless technologies for sewer rehabilitation continues to be a major initiative for both gravity and pressure lines. These technologies provide significant cost savings over traditional open cut repairs, with the additional benefits of reduced disruption to citizens, the surrounding environment and traffic. In 2012, 165,950 linear feet of 8" through 15" diameter sewers were rehabilitated using cured-in-place pipe repair, and 14 dig-ups and 36 trenchless point repairs (top-hats) were completed. Additionally, 47 manholes were rehabilitated. Over the past 10 years, 213.8 miles of sewer lines have been rehabilitated.

c. Sewer Maintenance

The Sewer Maintenance group continues to integrate and optimize 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 2011, 388 miles of sewer were pressure cleaned, 73 miles were mechanically cleaned using rodders, and 290 miles were visually inspected. The work orders are planned and managed using a Web-based asset management system.

G. 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. The City of Fairfax receives its water from the Goose Creek Reservoir in Loudoun County, and the City of Falls Church buys its drinking water from the Washington Aqueduct's Dalecarlia Plant on the Potomac River.

By early 2014 it is expected that both the City of Fairfax and Falls Church systems will be a part of Fairfax Water. Fairfax Water provided 54,986 million gallons of drinking water in 2012.

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

Fairfax Water provided 54.986 billion gallons of drinking water in 2012.

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.

Table IV-3
Fairfax Water -Water Supply Sources, 2012

Sources	Gallons (in billions)
Occoquan Reservoir (Lorton/Occoquan)	23.333
Potomac (Corbalis)	31.513
Wells	0.000
Purchased	0.040
Untreated	.1
TOTAL	54.986

Source: Fairfax Water

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 2012 there were 149 new well permits, 44 well repairs and 137 Water Well Abandonments issued. There were 44 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 13,930 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.

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.

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 2012 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 2012 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 LT2ESWTR was complete, Fairfax Water continued to monitor for *Cryptosporidium* at water treatment plant sources.

Under the LT2ESWTR, the average *Cryptosporidium* concentration determines whether additional treatment measures are needed. A *Cryptosporidium* concentration of 0.075 oocysts/Liter will trigger additional water treatment measures. Fairfax Water's raw water *Cryptosporidium* concentrations consistently remain below this 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. In establishing a protocol for monitoring these compounds, Fairfax Water carefully considered the most prudent use of its resources when developing the list of compounds to test for in raw and treated water. Fairfax Water looked at influences in the Potomac and Occoquan River watersheds (industrial, agricultural uses, etc.) to determine which compounds are most likely to be present in the raw water. Fairfax Water then looked at the 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 2012, Fairfax Water monitored 3,307 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 90th percentile value for lead was 0.80 parts per billion, compared to the EPA action level of 15 ppb. For copper, the 90th 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 will occur June – September 2014. Additional information on these programs and more can be found at: www.fairfaxwater.org.

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 interest 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. Low flow conditions in the Potomac River in 2010, due to a combination of low summer rainfall, high temperatures and low ground water levels, necessitated release of water from the upstream reservoirs to augment flow in the Potomac River. It is unlikely that releases will be needed for the remainder of 2013.

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.

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 most recent study has two parts to it. The first part evaluates demand forecast, analysis of current resources and evaluation of alternative resources. The second part factors in the effects and impacts of climate change to this equation. 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. The first part of the 2010 study is available at: http://www.potomacriver.org/publicationspdf/ICPRB10-01.pdf

The second part of the 2010 study pertaining to climate change is available at: http://www.potomacriver.org/publicationspdf/ICPRB13-07.pdf

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 CO-OP section 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 Cooperative Water Supply Operations

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.asp

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, 2014.

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. CEEPC is currently working on reassessing the action plan with a climate assessment study. This report provides

more case studies and outlines more policy solutions than the previous climate change report in 2008. The draft report is available at: http://www.mwcog.org/uploads/committee-documents/bV1bWFxe20130516135550.pdf

d. Northern Virginia Regional Commission Water Supply Plan

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. The Northern Virginia Water Supply Plan, a regional plan as allowed under the regulation, includes more than 20 local governments including Fairfax County. NVRC completed development of a regional water supply planning effort. This is in response to the commonwealth's enactment, in 2005, of the Local and Regional Water Supply Planning Regulation (9 VAC 25-780-10) and was a result of a multi-year project that involved most (at least 21 of 23) of the localities and the water utilities in Northern Virginia. The draft Final Plan was delivered to the Department of Environmental Quality in March 2012 for the commonwealth's review prior to submission to the State Water Control Board.

NVRC has received an official notification from VDEQ. The plan has been deemed to be compliant with the water supply planning regulation, pending completion of several items.

The Northern Virginia Regional Water Supply Plan is available at: http://www.novaregion.org/index.aspx?NID=1214

6. Lifting the Ban on Uranium Mining

There has been in place in Virginia a ban on uranium mining statewide since 1982. However there are now legislative or/and gubernatorial efforts underway 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 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

7. 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 79 water supply stakeholder outreach grants totaling $355,377.

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

H. REGULATIONS, LAWS AND POLICIES

1. 2013 Virginia General Assembly Legislation

HB 2190 (Cosgrove) Stringency of stormwater management ordinances

Establishes a procedure for state review of the stringency of local stormwater ordinances. The bill requires localities within 30 days of the adoption of a more stringent stormwater ordinance or requirement to submit a letter report to the Department of Conservation and Recreation. The letter report is to include an explanation as to why the more stringent ordinance or requirement is necessary. In addition, within 90 days of the ordinance's adoption, a landowner or his agent can request the Department of Conservation and Recreation to determine whether the ordinance or requirement meets the standards of the state law. The department has 90 days to make such a determination.

SB 1279 (Hanger) Consolidation of water quality programs

Moves several water quality programs currently administered by the Department of Conservation and Recreation to the Department of Environmental Quality. The Department of Environmental Quality and the State Water Control Board will have oversight of water quality planning and laws dealing with stormwater management, erosion and sediment control and the Chesapeake Bay Preservation Areas. The Virginia Soil and Water Conservation Board will have continuing responsibility for oversight of the soil and water conservation districts and of resource management planning. The Virginia Soil and Water Conservation Board will continue to be responsible for administration of the flood prevention and dam safety laws. The board will continue to be staffed by the Department of Conservation and Recreation.

HB 1448 (Hodges) Financing for repairs to failed septic systems

Authorizes a locality, by ordinance, to create a loan program to enable the repair of property owners' failed septic systems. Any such ordinance is required to describe the arrangement of the loan program, including any partnership with a planning district commission, and is permitted to provide for the repayment of the loan through water or sewer billings, real property tax assessments or other billings. The bill authorizes other features of a loan program and permits a locality to set a minimum ownership interest or minimum level of proof of ownership of the property for situations in which it is

extremely difficult or impossible to identify all of the people who have an ownership interest in the property.

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

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 will become 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. This oversight responsibility will now lie with the Virginia Department of Environmental Quality. Any town that does not adopt its own stormwater program will be subject to the program of the county within which that town is located.

Each county and city in northern Virginia is preparing a stormwater management ordinance consistent with the requirements of Virginia's stormwater regulations. 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. While the local jurisdiction will administer the VSMP, developers/contractors will continue to obtain VSMP permit coverage *from the state* following the process outlined on the fact sheet.

Also, the Virginia Soil and Water Conservation Board approved new stormwater management regulations. Compliance with these new rules will be required by the 2014 VSMP permit and the localities' Stormwater Management Ordinances, both of which take effect July 1, 2014. The main regulatory changes are summarized in Table IV-4.

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 VSMP 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 grandfathering:

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 VSMP 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.
  Construction must be complete by June 30, 2019.
- Projects with government bonds or public debt financing before July 1, 2012.
- Projects that obtain 2009 VSMP permit coverage before July 1, 2014 have two five-year permit cycles (until June 30, 2024) to be completed, if permit coverage is maintained.

Table IV-4
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	10 percent reduction in Total Phosphorus	Land disturbance of less than one acre: 10 percent reduction in Total Phosphorus
		Land disturbance of one acre or more: 20 percent reduction in Total Phosphorus
Compliance	Simple Method	Runoff Reduction Method
Water Quantity	Varied	Criteria for: manmade conveyance systems; restored conveyance systems; and natural 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 which 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.

In 2010, DCR also issued a number of guidance documents to assist dam owners and industry professionals to gain a better understanding of the regulations. The guidance documents include information on agricultural exemptions, crediting of certificate fees, dam ownership and roadways on or below dams. DCR continues to develop several other related guidance documents that outline policies on low hazard structures, dam break inundation zone mapping, incremental damage analysis and hazard potential classification.

In November 2012, DCR again amended its Impounding Structure Regulations in response to Virginia Senate Bill 1060, which became effective on July 1, 2011, and allows DCR to provide financial assistance for hazard class determination and other engineering requirements to certify a dam. It also provides for some flexibility in hazard class determination and permits DCR, through the Virginia Soil and Water Conservation Board, to develop a general permit for the regulation of low hazard dams. The regulations also include simplified dam break procedures for low hazard facilities and make it unnecessary to develop dam breach inundation maps for low hazard dams that do not impact offsite properties.

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

6. Summary/Status of Amendments to Chapter 68.1 of the Fairfax County Code on Alternative Septic Systems

In 2008, legislation was passed requiring the Virginia Department of Health to accept designs from professional engineers that are outside the prescribed site, soil and design requirements of the Sewage Handling and Disposal Regulations. Designs must be compliant with standard engineering practice, performance requirements established by the Board of Health, and horizontal setback requirements necessary to protect public health and the environment.

In 2009, legislation was passed directing VDH to adopt Emergency Regulations for Alternative Onsite Sewage Systems to specifically address three issues relative to alternative onsite sewage systems that are silent in the SH&DR: Performance standards for the design of new alternative systems; minimum setback requirements from these systems to environmentally sensitive receptors; and operation and maintenance requirements. The emergency regulations were in effect from April 7, 2010 until October 7, 2011. Legislation was also passed clarifying a locality's power to regulate alternative onsite sewage systems by prohibiting their use. Pre-emption clauses in

legislation state that the locality shall not prohibit the use of alternative onsite sewage systems and shall not exceed maintenance standards that exceed state requirements.

On December 7, 2011, the Regulations for Alternative Onsite Sewage Systems were adopted. These "permanent" regulations are similar to the Emergency Regulations with a few major changes based on feedback from engineers, soil consultants, operators, system owners and regulators.

No changes have been made to Chapter 68.1 of the Fairfax County Code while implementing the new policies and procedures resulting from all the recent legislation and the changes to regulation.

7. Overview of Proposed Exceptional State Waters Designation for a Segment of Bull Run and the Possible Pursuit of a Virginia Scenic Rivers Designation

In 2011, the National Park Service submitted a petition to the State Water Control Board requesting designation of a segment of Bull Run as an Exceptional State Water. The nominated segment was from the northern end of Manassas National Battlefield Park boundary downstream to the Interstate 66 bridge over the stream. The designation would have prohibited new or increased discharges into this segment of the stream, including storm sewer discharges associated with Municipal Separate Storm Sewer System permits. The Virginia Department of Environmental Quality convened an advisory panel to bring together interested parties to discuss this proposal and its potential implications. At an advisory panel meeting, interested parties discussed the Exceptional State Waters program as well as the Virginia Scenic Rivers program, which is a nonregulatory recognition program that is administered by the Virginia Department of Conservation and Recreation.

Subsequent to the advisory panel meeting, the National Park Service requested a withdrawal of its petition. In June 2012, the State Water Control Board accepted this request and withdrew its Notice of Intended Regulatory Action for the Exceptional State Water designation. Since that time, focus has shifted to the possible designation of Bull Run as a Virginia Scenic River. In August 2012, the National Park Service hosted a meeting at the Manassas National Battlefield Park at which there was an informal discussion regarding the Scenic Rivers program and its potential applicability to Bull Run; Fairfax County staff attended this meeting, as did a member of the Virginia Board of Conservation and Recreation and members of staff from Prince William and Loudoun Counties, the Northern Virginia Regional Park Authority, the Northern Virginia Regional Commission, Fairfax Water and the Virginia Department of Conservation and Recreation. As any Scenic River proposal would ultimately require support from the boards of supervisors of all affected localities, Fairfax County staff is coordinating with Prince William County staff on this idea, and other parties involved in the August 2012 meeting will likely be consulted if and when this idea moves forward.

I. 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, where 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 weekend and holds community household hazardous waste collection events on occasion at other locations around the county.

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.

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 Dog Blog and Facebook pages for dog owners. During 2012, the blog and Facebook pages had more than 88,000 views, up from about 24,000 views in 2011. Based on the success of the 2010 and 2011 contests, the organization held the Third Annual Dog Blog Essay Contest. Eleven non-profit organizations submitted an entry into the "Bark Your Piece" contest, which resulted in 10,360 votes. The three winning organizations received $5,000 in grants to use toward veterinary care, spaying and neutering, dog food and pet owner education.

In April 2012, two radio ads featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on three popular radio stations a total of 236 times; included among the stations was one Spanish language station. These ads reached an estimated 54,563 Northern Virginia residents and resulted in over 200 visits to the website, http://www.onlyrain.org.

J. 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 predevelopment stormwater management controls and for enforcement action to ensure inadequate controls are corrected prior to construction and, if necessary, 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 can 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 underway 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.

K. 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 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 2014 Stormwater Service District tax rate of 2.0 cents 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 about 200 years.

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 or 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 and 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 is 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 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.

L. RECOMMENDATIONS

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 2015 by at least one-quarter penny, from a rate of 2.0 cents per $100 assessed real estate value to 2.25 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.

2. Fairfax County is preparing a Stormwater Management Ordinance in response to state regulations requiring localities to adopt ordinances and take over reviews and inspections for Virginia Stormwater Management Program general permits relating to stormwater runoff from construction sites effective July 1, 2014. **EQAC has recommended that this new Stormwater Management Ordinance maximize stream protection and lessen no current protection, in order not to have an adverse impact on the environment**.

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