
ANNUAL REPORT ON THE ENVIRONMENT

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. Water quality 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.

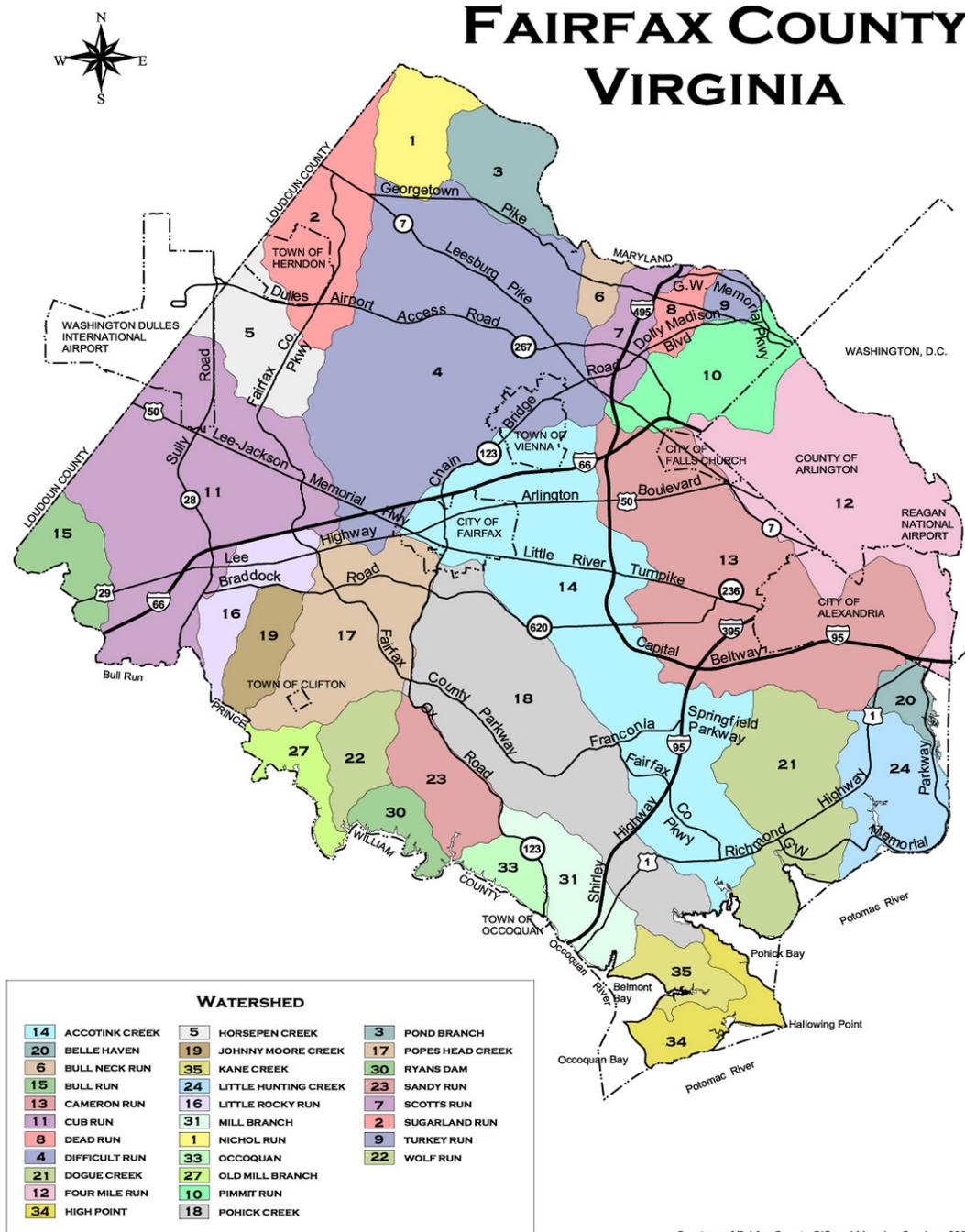
1. Watersheds

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



Courtesy of Fairfax County GIS and Mapping Services 2002

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 overwidening 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. 2008 Annual Report on Fairfax County's Streams

This report provides data from sampling efforts conducted in 2008 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.

A probability-based site selection sampling methodology was used to identify randomly-selected stream bioassessment locations throughout Fairfax County. These sites were stratified and proportionally distributed throughout the county based on Strahler stream order applied to all perennially flowing streams in Fairfax County. This methodology eliminates any site selection bias and is commonly used as a cost-effective way of obtaining a statistically defensible determination of stream conditions at a countywide scale. A total of 69 sites were sampled in 2008: 40 sites randomly selected within Fairfax County as part of the annual probabilistic monitoring program; 14 trend-monitoring sites in the County; 11 piedmont reference locations in Prince William National Forest Park; two coastal plain reference sites in the Kane Creek watershed of Fairfax County; and two sites monitoring the Kingstowne restoration project. Results from the 40 randomly selected sites suggest that approximately 77 percent of the county's waterways are in "Fair" to "Very Poor" condition based on a decrease in biological diversity. The monitoring program is part of the framework to establish a baseline to evaluate future changes in watershed conditions. Results may be viewed at www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm.

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 contacting the Fairfax County Stormwater Planning Division at 703-324-5500.

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.

2. Volunteer Water Quality Monitoring Programs

The Northern Virginia Soil and Water Conservation District manages volunteer stream monitoring programs in Fairfax County.

NVSWCD volunteers conduct biological and chemical monitoring and a habitat assessment, using the Save Our Streams protocol four times a year. The District added bacterial and temperature monitoring programs in 2005. Approximately 150 monitors collected data at 20 active monitoring sites in 2008. Information about the NVSWCD volunteer monitoring program can be found at <http://www.fairfaxcounty.gov/nvswcd/monitoring.htm>.

The Audubon Naturalist Society program uses a modified version of the EPA's Rapid Bioassessment II protocol, which includes assessment of in-stream and

streamside habitat parameters and a survey of benthic macroinvertebrate populations. There were five monitoring stations in Fairfax County. In 2008, ANS monitoring stations were incorporated into the NVSWCD volunteer monitoring program.

Volunteers and Reston Association staff monitor Reston's streams four times a year using the Virginia Save Our Streams protocol. 24 volunteers collect data at eleven monitoring sites in Reston. The Reston Association works closely with the Northern Virginia Soil and Water Conservation District program and plans to conduct three Stream Monitoring Workshops in July, August and October, 2008.

Data are forwarded to Fairfax County, the Virginia Department of Environmental Quality, Virginia Save Our Streams and other interested organizations or individuals. This program helps supplement the county's monitoring programs, including the Annual Report on Fairfax County's Streams.

3. Fairfax County Park Authority Stream Monitoring

The Park Authority continues to support volunteer stream monitoring programs through partnerships with NVSWCD and ANS. Stream monitoring is conducted by staff and volunteers at Ellanor C. Lawrence, Riverbend and Lake Accotink Parks.

4. Virginia Department of Environmental Quality

DEQ performs long-term trend monitoring at 14 streams that are either in Fairfax County or border the county. DEQ has eight monitoring stations in the county. Monitoring was conducted from 2004 through 2006. DEQ staff conducts biological monitoring at four stations in the county. Failure to meet designated water quality standards may result in a stream being placed on the 303(d) list for impaired state waters.

5. Metropolitan Washington Council of Governments

a. 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

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 large mouth bass and submerged aquatic vegetation.

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. The results of this work can be obtained on the Web site <http://md.water.usgs.gov/gis/trends/>.

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 Program is administered by the OWML and has been in operation since 1972. It is funded by Fairfax Water and the six jurisdictions within the watershed: Fairfax, Prince William, Loudoun and Fauquier Counties; and the cities of Manassas and Manassas Park. The program consists of nine stream monitoring stations (automated flow monitoring at all and storm sampling at most) and four Occoquan Reservoir stations. Base flow sampling in the streams and all sampling in the reservoir is done manually. In addition to surface and bottom water samples, profiles of dissolved oxygen, temperature and pH are also obtained at the reservoir stations. Sampling is done weekly during the growing seasons and biweekly or monthly (if ice is present) in winter. Past water quality data indicate little change in water quality in the watershed. The Lake Manassas program is used for monitoring water and sediment at seven stream stations and eight lake stations. The eutrophication status of the Occoquan Reservoir and Lake Manassas is moderately eutrophic.

The OWML monitors quarterly for synthetic organic compounds in the watershed in a program established under the recommendation of EQAC in 1982 for water samples. In 1988, the OWML began monitoring for SOC in sediment and fish samples within the reservoir. The Lake Manassas program also funds SOC monitoring. The most frequently detected SOC is atrazine, usually detected in springtime and early summer when it is being land applied. Concentrations “are usually lower” than the maximum contaminant level of three micrograms/liter for drinking water. The pesticide dual (metolachor) and phthalates are regularly found in concentrations one or more order of magnitude below the maximum contaminant level.

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. Monitoring and testing have substantiated that the stream segment is stable, erosion has been brought under control and water quality and habitat in the stream are improved.

During the July 2004-2005 monitoring period, storm events and base flow samples were collected and analyzed to determine pollutant loads in Dogue Creek. Based on the monitoring data, sediment removal efficiencies for the 1,148 acre watershed were achieved for all storm events. The phosphorus removal rate did not meet the 50 percent removal requirement of the South Van Dorn III permit.

9. Gunston Cove Aquatic Monitoring Program

Gunston Cove is the site of the outfall of Fairfax County's Noman M. Cole, Jr. Pollution Control Plant. 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. Twenty years of data from Gunston Cove and the nearby Potomac River provide valuable long-term trends that will aid in the continued management of the watershed and point source inputs.

For a copy of the "Ongoing Aquatic Monitoring Program for the Gunston Cove Area of the Tidal Freshwater Potomac River 2004 & 2005" Final Report (Draft October 17, 2006), contact R. Christian Jones, Professor and Project Director at George Mason University.

10. Total Maximum Daily Loads

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.

A total of 19 water bodies in Fairfax County are included in Virginia's listing of impaired waters. Ten of the water bodies are multi-jurisdictional. Of the listed water bodies, 12 are riverine systems totaling 58.45 miles, six are estuarine with a total area of 23.23 square miles and one is a drinking water reservoir (Occoquan) with an area of 1,700 acres. The cause of the impairment for the majority of riverine systems is either fecal coliform bacteria or impacts to benthic macroinvertebrates. For the estuarine water bodies, the cause of impairment is bacteria and/or polychlorinated biphenyls in fish tissue. According to the schedule, seven water bodies require TMDL studies to be completed by 2010, nine by 2014 and three by 2016.

Bacteria TMDLs have been established for three stream segments in the county, including one section of Four Mile Run and two sections of Accotink Creek.

Bacteria and benthic TMDL plans have been or are being developed for seven tributaries to the Occoquan River. EPA approved TMDLs for Popes Head Creek, Bull Run and the Occoquan River in 2006. TMDLs for the lower section of Accotink Creek and for Difficult Run are to be developed by 2008.

The county is participating in a cooperative effort between Maryland, the District of Columbia and Virginia to develop a TMDL for PCBs for the Tidal Potomac River. There are now 14 county waterways in or draining to the tidal Potomac River that have a TMDL for PCBs. County staff tracks developments of new TMDLs and addresses impairments on streams segments located within the county. Watershed management plans advocate best management practices to address uncontrolled stormwater runoff and associated pollutant loading to streams.

a. Accotink Creek TMDL

Due to high levels of fecal coliform bacteria, a 4.5 mile segment of Accotink Creek in Fairfax County, beginning at the confluence of Crook Branch and Accotink Creek to the start of Lake Accotink, was placed on the 1998 Virginia 303(d) TMDL list. A United States Geological Survey study was initiated in August 2001 to identify and isolate specific sources of human fecal coliform bacteria found in Accotink Creek. The study focuses on storm drains that flow during dry periods and sampling of locations with elevated fecal coliform bacteria levels. The results of these studies will be used to identify “hot-spots” for remedial work and inclusion in the TMDL implementation plan. The USGS paper on sampling Accotink Creek can be viewed on-line at: <http://water.usgs.gov/pubs/wri/wri034160/wrir03-4160.htm>.

An extensive Dry Weather Screening program has been undertaken in the Accotink Creek Watershed as part of the ongoing efforts to detect illicit connections and improper discharges.

b. 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 over 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 in 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 VA DEQ was approved by the EPA. NVRC, under a grant from VA DEQ, 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 2003, 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>.

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 2007 Reston Lakes Annual Monitoring Report. This report and other information about Reston's lakes

can be obtained by contacting the association's watershed manager at 703-435-6560 or visiting the Web site: www.reston.org.

In 2007, Lake Anne was randomly chosen to be surveyed as part of EPA's National Lake Survey. In June 2008, USGS sampled the bottom sediments at Lake Anne as part of a national study of water quality trends. The scientists learn about trends by studying bottom sediment cores from lakes, in a similar way to using tree rings to look at historical climate. The scientists took sediment cores from Lake Anne in 1996 and analyzed them for metals and organic compounds and will update the trends they saw a decade ago by comparing them to the 2008 samples. Some of the most common compounds used to date the sediment cores include DDT and lead. In addition, the amounts of Polycyclic Aromatic Hydrocarbons, which most commonly are found in coal tar asphalt sealers, are analyzed. For more information on the national study of water quality trends visit: <http://tx.usgs.gov/coring/index.html>.

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 monitored for biological or chemical parameters.

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 Web site: 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.

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>.

a. Leaking Underground Storage Tanks

In 2007, there were 40 new release cases investigated by the Virginia Department of Environmental Quality. As of July 2008, there were a total number of 2,456 cases, of which 84 remain open.

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.

D. WATERSHED MANAGEMENT

1. Watershed Master Plans

In 2003, the Stormwater Planning Division of the Fairfax County Department of Public Works and Environmental Services commenced a watershed planning program to develop management plans for all 30 county watersheds. Data from the Physical Stream Assessment, Stream Protection Strategy Baseline Study and other monitoring information are being used in the development of the watershed plans. The plans encourage public involvement; provide an assessment of stormwater conditions; recommend protection strategies and improvement projects including stream restoration, riparian buffer restoration, installation of low impact development practices, and retrofitting and improving existing stormwater management facilities and infrastructure; and recommend modifications to the County Code and Public Facilities Manual.

Six watershed management plans (Little Hunting Creek, Popes Head Creek, Cub Run/Bull Run, Difficult Run, Cameron Run, and Middle Potomac) have been completed and approved by the Board of Supervisors. Combined these six plans cover 11 watersheds and 50 percent of the land area in the county. Plans for the remaining watersheds in the county (Accotink Creek, Dogue Creek, Little Rocky Run/Johnny Moore Creek, Pohick Creek, Sugarland Run/Horsepen Creek, Lower Occoquan Watersheds and Nichol Run/Pond Branch) are anticipated to be completed by 2010.

2. Restoration Efforts

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

The Department of Public Works and Environmental Services reports that, between July 2007 and July 2008, 12 stream restoration and/or stabilization projects were in progress or had been completed. Nine of the 12 projects addressed stream bank erosion; for two of these projects, erosion was considered to be severe, with exposed and threatened sewer lines in one case (see the discussion of the Little Pimmit Run project below) and with erosion around culvert pipes in the other. Of the other three projects, two addressed stream channel blockages and one addressed severe sedimentation.

Between July 2008 and July 2009, DPWES reports that there were eight projects in progress or that had been completed. These are identified in Table VII-1 in the Ecological Resources chapter of this report. All eight projects addressed stream bank erosion.

b. Riparian Buffer Restoration

In 2008, Fairfax County continued its countywide riparian buffer restoration project in collaboration with volunteers and various other partners to help lessen the impacts of stormwater runoff on local streams. An evaluation of the inventory of buffer deficiencies from the countywide stream physical assessment was conducted to develop a planting priority list and schedule.

c. Huntley Meadows Park

In June 2006, the Fairfax County Park Authority and DPWES completed a stream stabilization and stormwater control improvement project on Barnyard Run above Huntley Meadows Park. The project involved creating a number of step pools in the stream to reduce energy and erosive force and stabilization of several hundred feet of stream bank using bioengineering techniques and native plant seedlings. In 2007, additional live stakes, tublings, and biologs were installed to further stabilize banks. Maintenance of construction access points continued in 2007.

In 2007, the county began working on the plan for Huntley Meadows Wetland Restoration project. The goal of the project is to restore the wetland to its previous, more water-filled condition with the aid of an earthen berm, water control structure, and several wetland pools. The project is ongoing. Information about the project can be found on-line at:
<http://www.fairfaxcounty.gov/parks/huntley/restorationproject.htm>.

d. Reston

In 2006, Reston Association worked with Northern Virginia Stream Restoration, L.C., to establish the Reston stream mitigation bank. The restoration bank was approved in March 2006. Aerial photography of watersheds and surveying/tagging of thousands of trees in the stream valleys was conducted as part of establishing the groundwork for future restoration projects. The project will implement 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, the U.S. Environmental Protection Agency, the U.S. Fish & Wildlife Service and the Virginia Department of Environmental Quality, will oversee the progress of the bank.

In 2007, Reston Association continued 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.

The groundbreaking for Phase I, which covers 14 miles of stream, occurred on February 12, 2008. As of July 2008, approximately one mile of stream in the Snakeden Branch watershed has been restored, fully funded by the Northern Virginia Stream Restoration, L.C. Designs for the entire Snakeden Branch watershed are finished and are being processed. Construction should be finished on Snakeden Branch by late Spring 2009. Survey and data collection is nearly finished in the Glade Stream Valley, which is slated to be restored beginning late Spring/Summer 2009. For more information on the stream restoration project in Reston visit: <http://reston.wetlandstudies.com> or www.reston.org/water.

e. Little Pimmit Run

In June 2007, the Northern Virginia Soil and Water Conservation District completed the Little Pimmit Run Stream Restoration project. The project involved a public-private partnership that used natural stream channel design and innovative techniques to restore 675 feet of a severely degraded stream segment. It also protected three threatened sanitary sewer lines that are parallel to and crossing the stream. Nearby homeowners assumed two-thirds of the cost for design and construction of the project, which is located primarily within parkland. NVSWCD partnered with an engineering firm to design and oversee the project. Other partners, in addition to the homeowners, included the Park Authority, DPWES-Wastewater Collection Division, the Dranesville District Supervisor and Angler Environmental Construction. The design included two stacked stone walls to bankfull height, five j-hooks to control and direct flow, bankfull benches, riffles and

pools throughout the segment, an integrated trail crossing, floodplain and upland grading and planting with native grasses, shrubs and trees.

Since completion, the restored channel functions as designed and successfully conveys stormwater flows. The neighbors are exploring how they can help with stewardship of the project, including the riparian buffer. Both the stream and riparian habitats are improving, and the trail users enjoy the new stream crossing.

3. 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 LID projects.

b. Virginia Department of Forestry

The Virginia Department of Forestry helps protect water quality and forest resources in Fairfax County. In 2008, VDOF partnered with a number of organizations and volunteers including the Potomac Conservancy, the Fairfax County Park Authority, Earth Sangha, Fairfax ReLeaf, Eagle Scouts and the Chesapeake Bay Foundation to plant approximately 5,000 seedlings throughout Fairfax County.

Included in the above statistic is that in fall 2008, about 260 volunteers working with Earth Sangha planted over 1,200 trees and shrubs on six sites totaling just over 2.6 acres and buffering about 2,000 feet of stream channel. Four of these plantings were enrichments of sites already enrolled in the buffer program; two were new.

VDOF, the Fairfax County Park Authority and the Department of Public Works and Environmental Services are partnering on a stream buffer restoration project that will replenish areas along streams with deficient riparian vegetation. Areas will be determined based on data from the Stream Physical Assessment Study, which identified deficient buffers along over 800 miles of streams.

4. Reston Storm Water Trail

The Reston Association received a grant for \$8,500 from the Chesapeake Bay License Plant fund, \$4,000 from Fairfax Water and a donation from Deloitte LP to implement a self-guided Storm Water Trail in Reston that will serve as a guide to help community associations, residents and youth to better understand stormwater management. It will also encourage 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 includes best management practices or 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 native species that grow well in the Northern Virginia area which require little maintenance and a rain barrel that will be used to collect and conserve rainwater to be used to water the gardens in between rainstorms.

At Brown's Chapel Park on Friday, June 6, 2008, during the ninth annual Deloitte IMPACT Day, over 60 volunteers from Deloitte LP worked alongside Reston Association staff and the association's Environmental Advisory Committee to install the Storm Water Trail's rain garden and native plant garden, to assemble 36 rain barrels, to plant a groundcover demonstration on a shaded slope and to improve the natural areas by removing a vast amount of invasive exotic plants.

At Lake Newport, Deloitte volunteers and Reston Association staff kicked-off a massive removal of purple loosestrife from the shoreline. Purple loosestrife, a noxious weed in Virginia, was well established at Lake Newport. A remarkable 47 bags of purple loosestrife were removed during Deloitte Impact Day and another 50 or so bags were removed the following week.

The Storm Water Trail helps satisfy the goal outlined in Reston's watershed plan of expanding environmental education opportunities in the watersheds of Reston by implementing on-site controls that include low impact development technologies to reduce storm water runoff volume and peak flows and to

implement best management practices and retrofits to take advantage of natural storm water infiltration that is provided in natural stream valleys.

Reston's watershed management plan is available online at:
www.reston.org/Nature/n_natural_resources.html#watershedmasterplan.

5. Alice Ferguson Foundation

On April 4, 2009, the Alice Ferguson Foundation held its 21st annual Potomac River Watershed Cleanup. This was truly a comprehensive, watershed-wide effort, in that there were over 500 cleanup sites in four states and the District of Columbia. A total of over 291 tons of trash were removed by over 13,500 volunteers. Items removed included over 41,000 plastic bags and over 2,000 tires. Among the more interesting items removed were a bowling ball, a safe filled with concrete, a soccer goalpost, a machete and three tiki torches. In Fairfax County and the City of Fairfax, nearly 1,900 volunteers working at over 100 sites collected over 77,000 pounds of trash, including 248 tires, over 30,000 bottles and over 4,600 cigarette butts.

More information about the foundation can be found in the Solid Waste chapter of this report.

E. STORMWATER MANAGEMENT, ENFORCEMENT AND INSPECTIONS

1. NPDES Municipal Separate Storm Sewer System Permit

Fairfax County's National 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 Stormwater Planning Division and the Maintenance and Stormwater Management Division manage a comprehensive stormwater management program, which includes 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 storm sewer 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 administers the MS4 permit as part of the Virginia Stormwater Management Program Permit. DCR is currently in the process of updating VPDES permits. 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 county and state work on the next permit. In July 2006, the county submitted its proposed NDPES permit for 2007-2012 to DCR. County staff members have been working with DCR and other municipalities on the development of the new permit requirements. In April 2008, the county responded to DCR's second preliminary draft. A permit for Fairfax County Public Schools is being coordinated with the county 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 developed.

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. In 2008, one new regional stormwater management facility was substantially completed, which provides water quality control for 344 acres.

3. Stormwater Management Facilities and Infrastructure

Fairfax County maintains more than 1,237 stormwater management facilities (as of 2008), 1,400 miles of pipe and 45,000 drainage structures designed to protect the county's streams. In 2008, the county retrofitted 14 stormwater management facilities to provide enhanced water quality benefits. There are approximately 3,164 private stormwater facilities in the county. The county inspected 1,193 county facilities and 585 of the 3,164 privately maintained facilities in 2008. In 2008, the county cleaned and mowed 1,027 dam embankments and completed 314 maintenance work orders to correct deficiencies in publicly maintained SWM/ BMP facilities. Additionally, the county inspected 338 miles of county maintained storm drainage conveyances. The county's inventory of stormwater management facilities and infrastructure is being tracked through the use of the county's GIS databases. The county is working on Infrastructure Reinvestment Infrastructure Program that includes digitizing the storm sewer inventory.

The 2008 Fairfax County Stormwater Status Report provides updated information on the number and types of public and private stormwater management facilities in the county as well as detailed information about the types of projects being undertaken to improve and protect water quality.

4. Low Impact Development Techniques

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

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 county is continuing its work with the Engineering Surveyors Institute, Northern Virginia Regional Commission and other local jurisdictions on developing a design and construction standards manual for LID applications. The manual will be recommended for adoption into the county's PFM. The county will soon be implementing a number of LID demonstration projects including several vegetated roofs.

With the addition of these important techniques comes the challenge of what will be a significant increase of small stormwater management facilities that will need to be tracked, inspected, and maintained. Enforcing maintenance requirements will also be a challenge given limited staff.

In 2007, with the help of a grant from the Virginia Department of Conservation and Recreation, the Northern Virginia Soil and Water Conservation District conducted a study of 20 existing rain gardens in the county, three to five years old, both publicly and privately maintained. The evaluation focused on their physical characteristics, in relation to how well they were functioning. The analysis included infiltration tests and lab analyses of soil texture, organic matter content and bulk density. The filter media were examined to determine the type and level of pollutants retained and their relationship to the area drained. The actual installation of each rain garden was compared to the approved design. In general, publicly maintained rain gardens fared better than private ones, as did those built according to their approved designs. The study suggests several design recommendations. Perhaps the most important recommendations for overcoming the problems that were observed are for training and education that would ensure rain gardens are properly installed and well-maintained.

5. 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."

During FY 09, there were nine complaints received by DCR from residents in Fairfax County; all but two were addressed by county and DCR staff and closed. The remaining two complaints are being addressed but the cases have not been closed.

In 2006, DPWES and the Engineers and Surveyors Institute conducted a class and workshop on constructability issues. In addition, in February 2006, a Letter to Industry was issued to announce the addition of two amendments to the PFM. The first clarified the requirements for drainage divides; the second clarified the adequate outfall requirements.

In 2008, a total of 670 erosion and sediment control plans were submitted and approved for projects that would disturb a land area of 2,500 square feet or more. Fairfax County's Alternative Inspection Program, established in cooperation with DCR, resulted in 32,168 Erosion and Sediment control

inspections. In 2008, the county issued 188 notices of violation. Criminal proceedings were started in 16 cases.

6. Illicit Discharges

In 2008, the Hazardous Materials and Investigative Services Section of the Fairfax County Fire and Rescue Department received 418 complaints. Approximately 330 of the complaints involved the actual release of various petroleum or chemical substances. Of the 340 releases, 267 involved the release of either diesel fuel (45), home heating fuel oil (63), gasoline (48) or hydraulic oil (45). Other releases investigated involved antifreeze, paint, sewage, mineral oil, and mercury. Storm drains or surface waters were involved in 43 of the releases.

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 Sewage 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 2007 plant performance are listed in Table IV-1.

Table IV-1. UOSA Permit Requirements and 2008 Performance		
Parameter	Limit	Performance
Flow	54 mgd	28.5 mgd
Fecal Coliform	<2/100 mg/l	<1.1/100 mg/l
Chemical oxygen demand	10.0 mg/l	<5.0 mg/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	0.034 mg/l
Total Kjeldahl Nitrogen	1.0 mg/l	0.3 mg/l
Dissolved Oxygen	>5.0 mg/l	8.2 mg/l
Dechlorination Chlorine Residual (mg/l)	Non detect	Non detect

Source: Upper Occoquan Sewage Authority

The influent highest rolling 30-day flow was observed during the 30-day rolling period ending on March 22, 2007 at 43.3 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. These biosolids have commercial potential in the horticultural and agricultural markets. As a back up to the exceptional quality biosolids process, UOSA produces Class B biosolids through a combination of digestion and dewatering or digestion and dewatering followed by lime stabilization. Thickened lime residuals are gravity thickened and dewatered on recessed chamber filter presses. All lime solids are disposed of on site in a permitted industrial landfill.

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.

Table IV-2 NMCCPCP Permit Requirements and 2008 Performance Averages		
Parameter	Limit	Performance
Flow	67 mgd	41.1 mgd
CBOD ₅	5 mg/l	< 2 mg/l
Suspended Solids	6 mg/l	2.4 mg/l
Total Phosphorus	0.18 mg/l	< 0.10 mg/l
Chlorine Residual	0.008 mg/l	< 0.008 mg/l
Dissolved Oxygen	6.0 mg/l (minimum)	8.8 mg/l
pH	6.0-9.0 (range)	7.0
E. coli Bacteria	126/100mls*	< 1/100mls*
Ammonia Nitrogen	1.0 – 2.2 mg/l (seasonal)	< 0.14 mg/l
Total Nitrogen	No Limit	<5.53 mg/l
Total Nitrogen (Annual)	7 mg/l	N/A

*Geometric mean

Source: Fairfax County Department of Public Works and Environmental Services

In 2008, 57,031 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.

Virginia Department of Environmental Quality issued a new general permit for nutrient discharge limits for sewage treatment facilities in Virginia's portion of the Chesapeake Bay watershed. These proposed changes will further limit nutrient discharges from the NMCCPCP and require substantial modifications by 2010. Design and construction of the new modifications have begun. The NMCCPCP has volunteered to comply with the phosphorus requirement five years early.

2. Septic System Permitting and Repairs

An estimated 23,905 homes and business are served by on-site sewage disposal systems in Fairfax County. The county's Health Department reported that, in fiscal year 2009, 88 new sewage disposal permits were issued for single family residences. There were 138 new sewage disposal systems installed, 57.9 percent were alternative type systems and 42.1 percent were conventional systems. Approximately 668 sewage disposal system repair permits were issued (repairs ranged from total replacement of the system to minor repairs such as broken piping or pump replacement). There were 3,860 septic tank pumps outs.

In fiscal year 2008, notices were sent to 13,421 homeowners to remind them to turn their system's flow diversion valve and pump out the septic tank every three to five years.

Sustainability of existing onsite sewage disposal systems and areas of marginal or highly variable soil remain concerns for future failing septic systems. Areas

of the county with marginal or highly variable soils that were once deemed unbuildable in the past are now being considered for development utilizing alternative onsite sewage disposal technology. Alternative systems are also becoming the norm for developers who desire to maximize lot yield from properties. Alternative 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 not typically aware of their responsibilities for maintaining these systems. Education is essential for ensuring that maintenance is conducted to prevent system failure. To address concerns about the management of onsite sewage disposal systems, Health Department staff and representatives from American Water/Applied Water Management are currently working together to complete a study to examine the feasibility of establishing an onsite sewage disposal management entity. If deemed feasible, the entity would be responsible for ensuring that proper and timely system maintenance is performed. This project will be completed in a phased approach of which three phases are completed. The fourth phase and release of the technical report and recommendations concerning the creation of management for these facilities is expected by 2010.

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 3,300 mile sanitary sewer system. Closed circuit television inspection is used to inspect trunk sewer mains to identify defective lines in need of repair and/or rehabilitation. In 2008, 251 miles of old sewer lines and 11 miles of new sewer lines were inspected using CCTV. Approximately 69,800 feet of sanitary sewer lines were rehabilitated and 30 dig-up and 142 trenchless point repairs were completed (46 robotic repairs and 96 tophats). Over the past 11 years, 252 miles of sewer lines have been rehabilitated.

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 at the James Corbalis Water Treatment Plant and from the Occoquan Reservoir at the Frederick 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.

With the exception of some wells, water must be treated prior to use. Fairfax Water provided 53,056 billion gallons of drinking water in 2008.

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 2008 Water Quality Report is available for review on the Fairfax Water Web site at www.fairfaxwater.org.

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 FY 2008 there were 116 new well approvals, 50 well repairs, and 130 Water Well Abandonments issued.

Table IV-3 Fairfax Water - Water Supply Sources, 2008	
<u>Sources</u>	<u>Gallons (in billions)</u>
Occoquan Reservoir (Lorton/Occoquan)	22.357
Potomac (Corbalis)	30.503
Wells	0.000
Purchased	0.102
Untreated	0.094
TOTAL	53.056

Source: Fairfax Water

The Virginia State Health Department Office of Drinking Water regulates 78 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 12,500 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 an ultimate 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.

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.

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 2009 Water Quality Report is available for review on the Fairfax Water Web site 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 2008 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 2008 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 (LT2ESWTR). 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 this year 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, Fairfax Water looked at which compounds could be measured in water and chose 19 compounds to test for in the source and treated waters. Samples were sent to an independent laboratory proficient in this type of analysis.

To date, none of these compounds have been detected in Fairfax Water's finished drinking water during this study. As expected, very, very small amounts of a few compounds were found in the source waters - the Potomac River and Occoquan Reservoir. Research shows that there is no indication of human health concern at the levels found in the source waters. In addition to research and testing, Fairfax Water continually employs advanced water treatment technologies, ozonation and granular activated carbon to treat all of the water in its system. Ozone breaks down organic matter in the water that is then captured in the granular activated carbon filtration process. Research has shown that the combination of ozone and filtration is highly effective in removing broad categories of the compounds of concern. To view the results from Fairfax Water's monitoring of these compounds and to learn more about emerging water quality issues, visit the Fairfax Water Web site at www.fairfaxwater.org/current/special_statement_120408.htm or call 703-698-5600, TTY 711.

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 a 12-month non-regulatory perchlorate sampling project for the Potomac River funded by the EPA. The 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. Tap Water Monitoring

In 2008, Fairfax Water monitored 3,302 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, simazine, and metolachlor were detected in the source waters, and a very low level of atrazine was detected in finished waters sourced by the Occoquan Reservoir. Total trihalomethanes, a subset of volatile organic compounds, as discussed above, were also 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 2008, the 90th percentile value for lead was 0.77 parts per billion, compared to the EPA action level of 15 ppb. For copper, the 90th percentile value in 2008 was 0.064 part per million, compared to the EPA action level of 1.3 ppm. 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 developed water allocation agreements for water use during low flow periods. Two upstream dams, Jennings- Randolph on the Potomac River and the Savage River Dam, along with Seneca Lake in Montgomery County, Maryland, are storage facilities for drinking water supplies during low flow periods. While the Potomac River has flows that average above 7,000 million gallons per day, the river has often reached flows well below that, 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 include the withdrawal allocation of 290 mgd (e.g., with that adjustment, the flow was actually 98 mgd).

In 1981, 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. 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.

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. The policy is intended to protect the reservoir's riparian buffer.

The U.S. Army Corps of Engineers, The Nature Conservancy and the Interstate Commission on the Potomac River Basin are collaborating on a multi-year watershed assessment of the Potomac River basin. The assessment will consider water supply, environmentally sustainable flows, ecosystem protection and restoration, drought preparedness and watershed resource management in the Middle Potomac River watershed in the District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia. The project will describe current and future conditions that are likely to have significant impacts on human and ecological needs within the basin. The assessment will include modeling activities, data gathering and ecological investigations. The goal is to identify key ecological needs, current and future human activities (especially withdrawals, dam operations and land use change), potential effects of climate change on the basin's hydrology and how these might be balanced and mitigated to prevent water use conflicts and ecological degradation of the Potomac River's native species and natural communities in a 50 to 100-year timeframe.

The watershed assessment will investigate the following:

- Surface and groundwater withdrawals.
- Dams and other impoundments.
- Effects of land use change and increase in impervious surfaces on flow.
- Cumulative hydrologic impacts of withdrawals and impoundments.
- Projected changes to water demand in the basin (including consumptive use).
- Condition and flow requirements for the basin's aquatic species and ecosystems.

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 is required to be submitted to DEQ by November 2011.

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

The 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 agreement among the three major water utilities (including Fairfax Water) that requires water suppliers to coordinate resources 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. Flow in the Potomac River was more than adequate to meet drinking water withdrawal needs by the region's major utilities in 2008. No releases from upstream reservoirs to augment water supplies were needed in that time, and it is unlikely that releases will be needed for the remainder of 2009. 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.

The 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 Web site, www.potomacriver.org.

Every five years since 1990, the section for Cooperative Water Supply Operations on the Potomac of ICPRB also conducts 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 ongoing 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 will be evaluated using climate change models and the results will be 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 2005 study is available on ICPRB's Web site:
<http://www.potomacriver.org/cms/>.

b. Metropolitan Washington Council of Governments

In response to the droughts of 1998 and 1999, COG 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 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 COG and the Drought Coordination Committee to assist in providing accurate and timely information to residents during low-flow conditions.

COG is also looking at issues such as effects of chemical environmental pollutants, specifically endocrine disruptors, in the Potomac River and their impacts on wildlife and humans. COG staff organized workshops over the past year that addressed subjects such as endocrine disruptors in the Chesapeake Bay watershed and contaminants of emerging concern in the Potomac and Anacostia Rivers.

COG put forward a report on the effects of climate change in the National Capital Region in November 2008. The issues addressed in the report have a direct impact on the direction of future growth and development in the region. The report also identified potential impacts of climate change on the water resources of the region. It sets forth relevant time lined goals for reduction of greenhouse gas emissions in the region. The report also

contains recommendations to help reduce the emissions, which will ultimately help conserve the natural and water resources in the region, in face of the adverse effects of climate change.

In coordination with the water utilities in the Washington area, including Fairfax Water, a Water Emergency Response Plan was developed and completed in 2005, and recently 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.

c. NVRC Water Supply Plan

Work is underway by more than 20 local governments and the Northern Virginia Regional Commission on the first Northern Virginia Regional Water Supply Plan project. This is the first time that so many local jurisdictions and water supply utilities are working together on a region-wide project and this is the first Water Supply Plan that encompasses all municipalities in Northern Virginia.

The Northern Virginia Regional Water Supply Plan will include information on water sources, water use, water resource conditions, projected water demand, water management actions and an analysis of alternatives, drought and contingency plans in the event of water deficits. The plan, expected to be completed in 2011, will include water supply projections for the next 30 years.

H. REGULATIONS, LAWS AND POLICIES

1. 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 EQC policy by explicitly encouraging stream and buffer area protection and restoration in these headwaters areas.

2. 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 regulations. The Committee is composed 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 is required. In 2006, the committee heard and denied one exception request.

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.

3. Stormwater Legislation HB 1177

This legislation, signed on April 8, 2004 by Governor Warner, encourages jurisdictions to adopt stormwater management ordinances that use the concept of Low Impact Development to the maximum extent practicable. The bill also transferred regulatory authority of the National Pollutant Discharge Elimination System programs associated with municipal separate storm sewer systems and construction activities from the State Water Control Board to the Soil and Water Conservation Board and transferred oversight of these programs from the Department of Environmental Quality to the Department of Conservation and Recreation. As a result, DCR is responsible for the issuance, denial, revocation, termination and enforcement of NPDES permits for the control of stormwater discharges from municipal separate storm sewer systems and land disturbing activities under the Virginia Stormwater Management Program. The legislation allows the state to transfer the administration of the Erosion and Sedimentation permitting for land disturbing activities to jurisdictions, allows these jurisdictions to charge permitting fees for review and establishes that jurisdictions must transmit 30 percent of these fees to the state.

4. Virginia Stormwater Management Program

New provisions of the VSMP permit program will transfer from the state to the county new responsibilities for the administration, monitoring and enforcement

of stormwater impacts in the Chesapeake Bay Watershed. Work was in progress in 2008 to create new Stormwater Regulations.

Information on legislation and proposed changes is available on-line at: <http://www.dcr.virginia.gov/lawregs.shtml>.

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. 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/intro.htm>) 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. They 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. 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 Web site 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 in the Hazardous Materials chapter of this report.

J. PROBLEMS

Fairfax County streams and watersheds continue to be impacted by several problems, including uncontrolled stormwater runoff, erosion, high levels of bacteria and sedimentation. Progress has been made with modifications to the Policy Plan section of the county's Comprehensive Plan; watershed and stream protection, however, need to be maximized in land use planning and site design decisions. The cumulative effects of land use decisions on Fairfax County's streams still need to be effectively considered. Only a few streams, such as Walney Creek in E. C. Lawrence Park, remain undisturbed and excellent examples of healthy streams in Fairfax County.

Stormwater runoff and erosion continue to have the greatest detrimental impacts on Fairfax County streams. A key requirement for controlling stormwater discharge is to require post development runoff not exceed pre-development runoff rates. Most Fairfax County streams have increased runoff flows that exceed the capacities of their original stream channels. This has created an ongoing erosion cycle that includes eroding stream banks, heavy sediment loads and sediment-smothered stream bottoms. Streams can become damaged by the changes brought about by changes in stream hydrology and increased flow during the pre-development clearing phase. The stream sees an overall increased flow due to the increased runoff caused by the clearing. This is not just the increase in peak flow, but the increase in the total volume of the water entering the stream. These increased flows start the cycle of damage, and once the stream is damaged it may take years or decades for the stream banks to revegetate and restabilize. This has resulted in erosion problems throughout the county that impact trail systems, homeowners' back yards, parks, utilities and infrastructure. Sediment on stream bottoms results in reduced habitat and diversity, which compromises the stream ecology and food chains.

Sediment also compromises the quality of, and increases the expense of, treating surface drinking water supplies. Poor land use planning, inadequate enforcement of erosion and sediment control laws and inadequate stormwater management have significantly contributed to erosion problems and impaired water quality in the past. Prevention of such damage would not only be good for the environment but would also be cost effective. Strict monitoring and enforcement of adequate stormwater management and erosion and sediment controls prior to construction can help prevent damage from erosion and sediment.

In addition to problems created in streams, runoff and erosion have resulted in numerous ponds and lakes having enormous sediment deposition. Stormwater management ponds are designed to protect downstream water quality. Ponds also provide additional amenities including recreation (boating, fishing), aesthetics and wildlife habitat. Depending on the size of the surrounding drainage area, the land uses in that area and the volume of runoff, a pond can fill up with sediment, trash and organic debris in a relatively short period of time. Although dredging is a

necessary management component to remove accumulated materials and help protect water quality downstream, private pond owners are experiencing increasing difficulty conducting dredging operations given the significant expense and lack of local, adequate disposal areas.

Much credit needs to be given to Fairfax County for its comprehensive watershed management efforts, including stream restoration and protection, adequate monitoring of water resources and adding new tools such as LID and other innovative practices to its stormwater management program. All of these efforts indicate a significant change in county policy and practice towards the protection and restoration of county streams. However, as long as the rate of stream degradation surpasses stream protection and restoration efforts in Fairfax County, the trend will continue to be a downward one.

K. ACCOMPLISHMENTS

Over the past several years, Fairfax County has demonstrated a clear commitment to improve, restore and protect the county's water resources.

- In February 2008, the Board of Supervisors adopted an amendment to the county's Policy Plan to strengthen comprehensive plan guidance regarding the protection and restoration of streams and buffer areas along stream channels upstream of Resource Protection Areas and Environmental Quality Corridors. This new guidance augments the EQC policy by explicitly encouraging stream and buffer area protection and restoration in headwater areas.
- The Environment Agenda (Environmental Excellence for Fairfax County: 20-Year Vision) adopted in 2004 continues to have significant impacts on water quality protection and environmental stewardship efforts in the county. In 2006, in response to the Board of Supervisors' directive for follow up action on the plan, the Environmental Coordinating Committee initiated its annual preparation of an Environmental Improvement Plan. The EIP addresses environmental and policy needs and assists county officials in making decisions regarding environmental funding and project planning. The EIP supports environmental initiatives and objectives identified in the Environmental Agenda. The ECC anticipates updating the EIP annually prior to the development of the county budget to provide sufficient time for funding decisions. Additionally, the plan will report on progress made and additional needs. Information on the EIP FY 2010 projects and plans may be found on-line at: <http://www.fairfaxcounty.gov/living/environment/eip/>.
- In February 2006, the Board of Supervisors adopted amendments to the Public Facilities Manual's provision for adequate drainage. The amendments provide greater protection to receiving streams and areas downstream from areas being developed. The county requires that plans proposing land-disturbing activity

must include an analysis of the adequacy of all outfalls from the site during the construction phase in addition to the requirements already in place for the developed site. This analysis helps decrease adverse impacts to outfalls and receiving streams during construction.

- In 2007, the Board of Supervisors adopted six low impact development practices (bioretention basins and filters, vegetated swales, tree box filters, vegetated roofs, permeable paving and reforestation) for inclusion in the Public Facilities Manual.
- The county continued developing and completing watershed management plans for each of the county's 30 watersheds. Six watershed management plans have been approved by the Board of Supervisors. It is anticipated that plans for the remaining watersheds will be completed in 2010. These plans will serve as guidance for all stream restoration and protection efforts in the county. Implementation of these plans is estimated to occur over the next twenty-five years.
- At times, high levels of fecal coliform bacteria, particularly E. coli bacteria, occur in various streams throughout the county. The county continues to expand its public outreach efforts to increase awareness about high fecal coliform bacteria counts in the county's waterways and potential health hazards from coming in contact with impaired surface waters.
- In 2006, the Fairfax County Park Authority revised its policy for evaluating all forms of stormwater related projects to include conservation easements, stream restoration, stream buffer enhancement, LID facilities and stormwater ponds.

L. COMMENTS AND ONGOING CONCERNS

1. EQAC commends the Board of Supervisors for its actions of the past few years authorizing one penny of the real estate tax to be dedicated to the stormwater management program. The amount increased from the original amount of \$17.9 million for FY 2006 to \$22.8 million for FY 2009. 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. There were also reallocations of financial responsibilities from the General Fund to the Stormwater Fund, which means that funding in FY 2010 does not support basic operations, including regulatory compliance, and that carry over funds originally intended for watershed projects or infrastructure replacements will be used for annual operations this year. Even in FY 2011, with full year's revenue, the current rate of one penny is expected to generate just over \$18 million. After all annual operating expenses and dam safety needs are met, there will be very little available for watershed projects or infrastructure reinvestment.

2. 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. It is also important that the county hire the appropriate number of staff to handle the estimated inspection workload.
3. 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.
4. EQAC commends the county for its existing stream protection requirements for perennial streams. EQAC thanks the Board of Supervisors for its recent efforts to protect intermittent and headwater streams by the establishment of protective buffers.
5. 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 understands that a comprehensive countywide program to monitor effectiveness can be cost-prohibitive, data are still needed, as it is still unclear as to which structures and requirements are effective and working well.
6. EQAC continues to encourage Fairfax County (the Board of Supervisors, the Planning Commission, the Board of Zoning Appeals, the Fairfax County Park Authority and various county agencies) to coordinate efforts and develop a protocol for assessing the impacts and cumulative effects of land use considerations and decisions on the county's water resources. EQAC urges these groups to use and disseminate information to protect the county's watersheds. EQAC commends the Board of Supervisors for adopting Residential Development Criteria that include supporting the provision of adequate outfall drainage and innovative water quality measures.
7. As sedimentation of stormwater management ponds from upstream bank erosion continues, the need to dredge facilities becomes more frequent. Facility owners are having difficulty conducting necessary dredging operations given rising expenses and lack of local, adequate disposal areas. EQAC commends the county for establishing an interagency work group to explore options, such as creating spoil

disposal/recycling areas in various parts of the county to assist private facility owners and help protect water quality. EQAC is pleased that staff will investigate the pros and cons of dredging, hauling, and disposal options and will present its findings and recommendations to the Board of Supervisors.

8. Given the anticipated increase in the number of small individual LID 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.

9. More than 12,000 single-family residences and businesses are served by individual well water supplies in Fairfax County, and approximately 30,000 homes and businesses have septic systems that ultimately infiltrate into groundwater. Areas of the county that have been unbuildable in the past now are now being developed and are using alternative onsite sewage disposal technology. These alternative systems are often more difficult to maintain and are therefore subject to failure. The Health Department staff and the American Water/Applied Water Management are developing a report that will establish a framework for ensuring that proper and timely septic system maintenance is preformed. EQAC continues to support this effort and recommends that this report include support for requirements that owners with alternative septic systems be required to file a maintenance plan for their systems and provide evidence of compliance.

M. RECOMMENDATION

1. EQAC recommends that Fairfax County 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 current budget constraints have removed monies available from the general fund and that the funding for the Stormwater Division will come from funds generated through the Service District rates.

EQAC recommends that the Stormwater Program continue to be funded by the Service District, and that the rate be increased to a penny and a half. This would result in the restoration of some funding for modest watershed improvement programs and a somewhat more realistic infrastructure replacement timeline. We realize that there will likely be a need for additional increases for water quality projects to meet future permit conditions, and for infrastructure reinvestment, as the system is continually growing and aging.

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