



---

2011 FAIRFAX COUNTY  
STORMWATER STATUS REPORT

---



*Photos on cover (clockwise from top): Rain barrel—citizens making rain barrels; Fish—pumpkinseed sunfish (*Lepomis gibbosus*) from fish monitoring; Pond retrofit— Sequoia Section 2, Cub Run watershed; Dredging—Lake Barton; Stream Restoration—Kingstowne stream restoration project (photo credit Stephanie Bianco).*

Report prepared and compiled by:  
Stormwater Planning Division,  
Department of Public Works and Environmental Services  
Fairfax County, Va., 22035  
703-324-5500, TTY 711  
[www.fairfaxcounty.gov/dpwes](http://www.fairfaxcounty.gov/dpwes)  
March 2012



A Fairfax County, Va.,  
publication

To request this information in an alternate format, call the Stormwater Planning Division at 703-324-5500, TTY 711.



This page was intentionally left blank.

**Table of Contents**

Table of Contents ..... v

List of Figures ..... vii

List of Tables ..... vii

Acknowledgments ..... ix

Introduction ..... 1

**1. Watershed Management Planning ..... 4**

**2. Stormwater Capital Projects ..... 6**

    Flood Mitigation ..... 6

    New Construction of Stormwater Management Ponds ..... 6

    Retrofit of Existing Stormwater Management Facilities ..... 7

    Low Impact Development ..... 9

    Summary of 2011 Low Impact Development Projects ..... 10

    LID Monitoring Efforts ..... 11

    Stream Restoration and Stabilization ..... 12

    Reston Association Stream Restoration ..... 13

**3. Operations ..... 14**

    Inspection and Maintenance of Stormwater Management Facilities ..... 14

    Storm Drainage Infrastructure Management ..... 16

    Roadways ..... 18

    Pesticide, Herbicide and Fertilizer Application Program ..... 19

    Industrial and High Risk Runoff Facilities ..... 20

    Hazardous Materials Spill Prevention and Response ..... 21

    MS4 Permit Tactical Planning Process ..... 21

    Sanitary Sewer Inspection and Maintenance ..... 22

    Construction Site Erosion and Sediment Control ..... 22

    Land Conservation Awards Program ..... 23

    Trail Improvements to Address Erosion Issues ..... 24

    Agricultural Land ..... 24

**4. Monitoring and Assessment ..... 26**

    Water Quality Monitoring ..... 26

    Biological Monitoring ..... 28

    Virginia Department of Environmental Quality List of Impaired Waters in Fairfax County  
..... 35

    Volunteer monitoring ..... 36

    USGS Monitoring Network ..... 37

**5. Public Outreach and Education ..... 39**

    Educational Booths and Presentations ..... 39

    Communication Initiatives ..... 43

    Printed Materials/Mailings ..... 43

    Television ..... 44

    Radio ..... 44

    Digital Media ..... 45

    Storm Drain Marking Program ..... 46

    Rain Barrel Program ..... 46

    Watershed Cleanups ..... 47

Potomac Watershed Trash Summit..... 51  
Household Hazardous Waste Management ..... 51  
Stream Buffer Restoration and Seedling Sale..... 51  
Public School Environmental Education Partnerships ..... 55  
Technical Support and Training..... 57  
**6. Strategic Initiatives ..... 59**  
    Stormwater Water Quality ..... 59  
    Flood Response and Dam Safety ..... 59  
    Watershed Management Plans Non-Structural Projects and Policy Recommendations ..... 60  
    Infrastructure Reinvestment..... 60  
Literature Cited ..... 62

**List of Figures**

Figure 2-1 Aldebaran Drive flood mitigation project. Photo by Fairfax County. .... 7

Figure 2-2 Langley Oaks pond retrofit immediately after construction. Photo by Fairfax County.  
..... 9

Figure 2-3 Installing pervious asphalt paving at Shreveewood Elementary School. Photo by  
Fairfax County. .... 11

Figure 2-4 Schneider Branch stream restoration. Photo by Fairfax County..... 13

Figure 3-1 Lake Barton dam spillway renovation. Photo by Fairfax County..... 16

Figure 3-2 Sycamores at Van Dorn triple elliptical reinforced concrete pipe culvert. Photo by  
Fairfax County. .... 18

Figure 4-1 Sampling a flowing outfall during dry weather screening. Photo by Fairfax County.  
..... 28

Figure 4-2 Location of 2011 biological monitoring sites. .... 29

Figure 4-3 Countywide distribution of benthic macroinvertebrate and fish IBI ratings..... 30

Figure 4-4 Trends in the countywide stream quality index. .... 33

Figure 5-1 Educational booth on display at the Earth Day festival at the Government Center.  
Photo by Fairfax County. .... 40

Figure 5-2 The annual Wetlands Awareness Day at Huntley Meadows Park. Photo by FCPA.. 42

Figure 5-3 NVSWCD employees and volunteers field testing the TAFIE guidance at the Jana  
Lee snag. Photo by NVSWCD..... 48

Figure 5-4 DPWES staff preparing to pick up cigarette butt litter around the Government Center.  
Photo by Fairfax County..... 48

Figure 5-5 Volunteers participating in a watershed clean-up event in Holmes Run. Photo by  
NVSWCD. .... 49

Figure 5-6 Volunteerfest® invasives removal event in Pohick Stream Valley Park. Photo by  
FCPA..... 54

Figure 5-7 Langston Hughes Intermediate School students participating in a watershed education  
program sponsored by Reston Association and the USGS. Photo by Reston Association..... 56

Figure 6-1 Emergency responders reviewing inundation flood maps during Hurricane Irene.  
Photo by Fairfax County..... 60

**List of Tables**

Table 2-1 Flood mitigation projects completed in 2011..... 6

Table 2-2 Retrofit projects completed in 2011. .... 7

Table 2-3 LID projects constructed in 2011. .... 10

Table 2-4 2011 stream restoration and stream stabilization projects..... 12

Table 3-1 2011 Dam rehabilitation and safety projects. .... 15

Table 3-2 2011 infrastructure repairs and channel clearing projects..... 17

Table 4-1 Results of statistical analysis to determine if there is a significant difference between  
observed constituent concentrations at Stations VNA and OQN for 2005 to 2011..... 26

Table 4-2 Computed seasonal and annual unit area constituent loadings at monitored locations  
for 2011..... 27

Table 4-3 2011 benthic macroinvertebrate sampling results by stream order..... 30

Table 4-4 2011 biological sampling results for individual monitoring sites. .... 31

Table 4-5 Countywide SQI for sampling years 2004-2011 showing percentage of sites in each rating category. .... 32

Table 4-6 Overall watershed conditions for sampling years 2004-2011 combined. .... 34

Table 5-1 2011 Earth Sangha buffer restoration activities. .... 52

Table 5-2 Fairfax ReLeaf projects planted in 2011. .... 52

## **Acknowledgments**

The staff of the Stormwater Planning Division appreciates the following organizations for their contributions to this report and ongoing commitment to protecting water resources in Fairfax County.

### *Private organizations*

Clean Fairfax Council  
Earth Sangha  
Fairfax ReLeaf  
Reston Association

### *State agencies*

Virginia Cooperative Extension, Environmental Horticultural Division of Fairfax County  
Virginia Department of Conservation and Recreation  
Virginia Department of Environmental Quality  
Virginia Department of Forestry

### *County agencies*

Fire and Rescue Department, Hazardous Materials Investigative Services Section  
Health Department  
Park Authority  
Planning and Zoning Department  
Public Schools

### *Other government agencies*

Northern Virginia Regional Commission  
Northern Virginia Soil and Water Conservation District

### *Department of Public Works and Environmental Services divisions*

Code Services Division  
Construction Management Division  
Environmental and Facilities Inspections Division  
Environmental and Site Review Division  
Land Acquisition Division  
Maintenance and Stormwater Management Division  
Building Design and Construction Division  
Solid Waste Collection and Recycling Division  
Solid Waste Disposal and Resource Recovery Division  
Wastewater Collection Division  
Wastewater Planning and Monitoring Division  
Wastewater Treatment Division

## Introduction

This report highlights the accomplishments of Fairfax County's stormwater management program in 2011 and describes the challenges it faces as well as the partnerships forged to meet those challenges. The stormwater management program supports the water quality theme of the Board of Supervisors' Environmental Agenda, which is organized into six major themes: growth and land use; air quality and transportation; water quality; solid waste; parks, trails and open space; and environmental stewardship. The agenda centers on two principles: conservation of limited natural resources must be interwoven into all government decisions; and the county must be committed to providing the necessary resources to protect the environment.

Stormwater discharges are generated by rainfall and/or snowmelt running off the land and impervious areas such as paved streets, parking lots and building rooftops. Stormwater picks up and carries away sediments, nutrients, toxic substances, pathogens and other pollutants, depositing them into lakes, streams, rivers, wetlands and coastal waters. These pollutants have potentially harmful effects on drinking water supplies, recreation and aquatic life. In addition, pavement and other hard surfaces prevent water from infiltrating into the ground, causing high volumes of stormwater to accumulate and surge into storm drains at high speeds. When quickly flowing runoff empties into receiving waters, it can severely erode stream banks and damage sensitive stream valley ecosystems. The county is proactive in the mission of environmentally friendly stormwater management and control through the following ongoing activities:

- Implementing projects from the watershed management plans
- Implementing improvements to stormwater management infrastructure
- Conducting inspection and maintenance programs for stormwater control systems and structures to ensure their effectiveness
- Conducting stream monitoring and evaluation programs
- Sharing resources and information for the purposes of educating residents and developing strategies to promote good water quality practices
- Developing strategic initiatives to further reduce stormwater runoff volume and the negative environmental effects of the continual increase in impervious area

Although the Fairfax County Department of Public Works and Environmental Services (DPWES) Stormwater Planning Division (SWPD) compiled the data for this report, implementation of the county's stormwater program is accomplished through the collective efforts of its partners, including private organizations, state agencies, other government and county agencies and many divisions in the DPWES. The report highlights specific contributions of these organizations to stormwater management.

The subsequent pages summarize stormwater management in Fairfax County under the following categories:

### 1. *Watershed Management Planning.*

A total of 13 watershed management plans covering the county's 30 watersheds have been developed and adopted by the Board of Supervisors. These plans provide an assessment of stormwater conditions, recommend protection strategies and improvement projects and encourage public involvement. The number of projects selected for implementation annually

will be determined as part of the annual budgetary process. Efforts to include implementation of non-structural projects and policy recommendations from the watershed plans are ongoing.

2. *Stormwater Capital Projects.* In 2011, the county and its partners continued to implement stormwater management-related capital projects, including seven flood mitigation projects, more than 15 stormwater management facility retrofits, seven low impact development (LID) projects, and five stream restoration and stream stabilization projects. Staff continued to monitor the quantity and quality of runoff from three innovative stormwater management systems throughout the county.

3. *Operations.* The county operates its facilities in a manner consistent with the requirements of its Municipal Separate Storm Sewer System (MS4) permit, which regulates discharges of stormwater from the county's municipal separate storm sewer system. As required by the permit, the county continues to inspect and maintain (as needed) more than 1,460 county maintained stormwater management and BMP facilities and more than 3,600 privately-maintained facilities in the county. The county continues to implement a storm sewer infrastructure management program to track Fairfax County's stormwater management facilities, stormwater infrastructure and associated easements using the county's geographic information system (GIS) databases. Nine dam rehabilitation and safety projects were completed in 2011. The county addresses the permit requirements for the operation of county roadways; use of pesticides, herbicides and fertilizers on county and Park Authority property; and operation of facilities characterized by regulation as high risk sources of stormwater pollutants, including county landfills. In order to reduce the possibility of pollutants reaching the county's stormwater infrastructure and streams, the county implements programs to detect and eliminate sources of illegal discharges such as cross-connections with sanitary sewer systems and responds to incidents of hazardous material releases, spills and illegal dumping.

4. *Monitoring and Assessment.* The county conducts watershed water quality monitoring, dry weather screening, wet weather industrial high risk monitoring, physical habitat evaluations and biological assessment of fish and aquatic macroinvertebrates. County partners help to train and mobilize residents to track stream conditions at approximately 30 sites located around the county through a volunteer monitoring program. In addition, through a joint funding agreement between SWPD and the United States Geological Survey (USGS), long-term monitoring to assess countywide conditions and trends in water quality and water quantity is ongoing.

5. *Public Outreach and Education.* The county conducted presentations and staffed booths at community meetings and events to raise awareness of non-point source pollution and the actions residents can take to help protect streams. In 2011, the county partnered with numerous local agencies to promote environmental stewardship events (such as stream cleanups, storm drain marking events, rain barrel building workshops and invasive species removals) that mobilized thousands of volunteers. The county partnered with various organizations to host a high school science program, stream buffer restoration projects and a regional pollution prevention radio campaign.

6. *Strategic Initiatives.* The county and its partners are actively involved in improving the quality of stormwater that enters the streams and protecting watersheds through initiatives to control

runoff and reduce the negative effects of impervious area. In 2011, DPWES and its partners collaborated on numerous efforts to improve the county's stormwater management program while meeting state and federal requirements, including a stormwater infrastructure reinvestment program and the development of a plan to prioritize and implement non-structural projects and policy recommendations from the watershed management plans.

## 1. Watershed Management Planning

Starting with the Little Hunting Creek Watershed Management Plan in 2003, the county embarked on a watershed planning initiative that assessed the needs and resulted in proposed improvements for the county's 30 watersheds over the next 25 years. The watershed management planning process is one component of the county's MS4 Program and is part of the Fairfax County Board of Supervisors' Environmental Agenda. The overarching goals for the watershed plans are:

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

A total of 13 plans, which cover all 30 watersheds, were developed during this watershed planning initiative. The plans were developed with the assistance of the community through public meetings and individual plan stakeholder groups. This public involvement process helped to ensure that the plans meet the needs in the watershed, and have the support, of county residents. The county completed and adopted six watershed plans between 2005 and 2008 as part of the first round of planning. By early February 2011, the last of seven remaining watershed management plans were completed and adopted by the Fairfax County Board of Supervisors. In November 2011, the county provided a status update of the watershed planning and the broader stormwater management programs to watershed advisory groups and other public interests. The following is a list of Fairfax County's thirteen watershed management plans, the associated watersheds and the date the plans were adopted by the Board of Supervisors.

1. Little Hunting Creek Watershed Management Plan (adopted February 2005)
  - Included watershed: Little Hunting Creek
2. Popes Head Creek Watershed Management Plan (adopted January 2006)
  - Included watershed: Popes Head Creek
3. Cub Run and Bull Run Watershed Management Plan (adopted February 2007)
  - Included watersheds: Cub Run and Bull Run
4. Difficult Run Watershed Management Plan (adopted February 2007)
  - Included watershed: Difficult Run
5. Cameron Run Watershed Management Plan (adopted August 2007)
  - Included watershed: Cameron Run
6. Middle Potomac Watersheds Management Plan (adopted May 2008)
  - Included watersheds: Bull Neck Run, Dead Run, Pimmit Run, Scotts Run, and Turkey Run
7. Pohick Creek Watershed Management Plan (adopted December 2010)
  - Included watershed: Pohick Creek
8. Sugarland Run and Horsepen Creek Watershed Management Plan (adopted December 2010)
  - Included watersheds: Sugarland Run and Horsepen Creek

9. Belle Haven, Dogue Creek and Four Mile Run Watershed Management Plan (adopted January 2011)
  - Included watersheds: Belle Haven, Dogue Creek, and Four Mile Run
10. Lower Occoquan Watershed Management Plan (adopted January 2011)
  - Included watersheds: High Point, Kane Creek, Mill Branch, Occoquan, Old Mill Branch, Ryans Dam, Sandy Run, and Wolf Run
11. Nichol Run and Pond Branch Watershed Plan (adopted January 2011)
  - Included watersheds: Nichol Run and Pond Branch
12. Accotink Creek Watershed Management Plan (adopted February 2011)
  - Included watershed: Accotink Creek
13. Little Rocky Run and Johnny Moore Creek Watershed Plan (adopted February 2011)
  - Included watersheds: Little Rocky Run and Johnny Moore Creek

The number of projects selected for implementation annually will be determined as part of the annual budget process. Efforts to include implementation of non-structural projects and policy recommendations from the watershed plans are ongoing.

## 2. Stormwater Capital Projects

Fairfax County continues to manage an extensive inventory of stormwater structures which receive and transport stormwater runoff and facilities designed to affect the quantity and quality of stormwater discharged to streams. The Department of Public Works and Environmental Services (DPWES) Stormwater Management business area operates and maintains Fairfax County’s storm drainage system, often referred to as the municipal separate storm sewer system (MS4). Public stormwater management facilities are constructed and retrofitted by multiple county organizations and through partnerships with local and regional organizations. Among the entities that helped to build or make improvements to stormwater management facilities in 2011 were DPWES and the Fairfax County Park Authority (FCPA). The Maintenance and Stormwater Management Division (MSMD) of DPWES inspects and maintains public stormwater management facilities and inspects other stormwater management facilities maintained by private entities according to private maintenance agreements.

This section summarizes the capital projects, by type, completed during calendar year 2011.

### Flood Mitigation

Preventing and reducing the impacts of flooding remain high priorities for Fairfax County. Part of the county’s approach to flood mitigation consists of constructing site-specific solutions to residential drainage problems. In 2011, DPWES finished seven projects under the county’s ongoing flood mitigation program (Table 2-1).

### New Construction of Stormwater Management Ponds

There were no new regional stormwater management facilities substantially completed in 2011.

**Table 2-1 Flood mitigation projects completed in 2011.**

<i>Project Name</i>	<i>Description</i>
Aldebaran Drive	Provided adequate overland relief to mitigate structural flooding from an adjacent county storm drain.
Buffie Court	Provided flood mitigation measures including the installation of a retaining wall, removal and reinstallation of playground equipment, and yard grading to establish positive drainage.
Columbia Pike	Provided flood mitigation measures for a residential lot that was being impacted by flood waters.
Hayfield Road	Provided flood protection for two residential properties that existed immediately adjacent to a county storm drainage system.
Prince William Drive	Provided flood mitigation for a residential property that existed immediately adjacent to a county storm drainage system.
Shari Drive	Provided flood mitigation for a residential property that existed immediately adjacent to a county storm drainage system.
Venice Street	Provided flood mitigation measures for a residential property that existed immediately adjacent to a county storm drainage system.



**Figure 2-1 Aldebaran Drive flood mitigation project. Photo by Fairfax County.**

**Retrofit of Existing Stormwater Management Facilities**

Stormwater management facility retrofits are intended to improve water quality and/or quantity control beyond their original designs. Water quality retrofits enhance nutrient uptake and increase the infiltration, uptake and transpiration of stormwater while water quantity retrofits help to reduce downstream flooding and erosion. Table 2-2 describes selected retrofit projects completed by the DPWES in 2011.

**Table 2-2 Retrofit projects completed in 2011.**

<i>Project Name</i>	<i>Description</i>
Barton Place	Improved water quality by providing extended detention for 65 acres, increasing pool capacity and creating micropools in the incoming stream bottom, replacing the existing riser trash rack with a larger one and installing a permanent access road to enhance maintenance.
Bryant Towne Court	Retrofitted detention basin through the addition of micropools and water tolerant vegetation to decrease stormwater detention time. Removed vegetation and invasive species from the top of the dam embankment and replaced outlet structure to improve water quality.
Cabell’s Mill Pond 3	Removed ~1,000 cubic yards of sediment and reseeded with a wetland seed mixture to improve water quality.
Crosspointe Pond 12B	Removed ~1,100 cubic yards of sediment and reseeded the pond floor with a wetland seed mixture for improved water quality.
Hunter’s Mill Estates Regional Pond	Removed 200 cubic yards of sediment and improved water quality control through the installation of a wetland retrofit.

**Table 2-2 Retrofit projects completed in 2011.**

<b><i>Project Name</i></b>	<b><i>Description</i></b>
The Knolls Section 2	Retrofitted the detention basin by removing and replacing the failing riser, relining the deteriorated spillway pipe and adding a trash rack and riprap at the outfall channel to improve water quality.
Langley Oaks Pond 1	Retrofitted the detention basin to provide water quality benefits, including sediment removal, emergency spillway stabilization and installation of forebay, wetland plants and access road.
Newington Forest Section 6	Removed 120 cubic yards of sediment and seeded pond floor with a wetland seed mixture allowing for improved water quality. Constructed paved access to improve maintenance.
Newington Forest Section 25	Retrofitted the detention basin by installing rip rap and a wetland retrofit to improve water quality and correct erosion of the dam.
Popes Head View	Retrofitted the detention basin by removing and replacing the failing riser, relining the deteriorated spillway pipe and adding a trash rack and riprap at the outfall channel to improve water quality.
Reston Section 59	Removed 605 cubic yards of sediment and seeded pond floor with a wetland seed mixture allowing for improved water quality.
Rolling Valley Sec 8D	Retrofitted the detention basin by removing and replacing the existing headwall and failing riser, relining the deteriorated spillway pipe and adding riprap at the outfall channel to improve water quality.
Sequoia Park	Removed 800 cubic yards of sediment and seeded pond floor with a wetland seed mixture allowing for improved water quality.
Sequoia Section 2 Pond 1	Retrofitted the detention basin and riser structure by installing a sediment forebay and meandering low-flow channel with micropools to enhance water quality.
Spring Hill Pond	Retrofitted the detention basin by constructing micropools, extending flow paths and planting native aquatic vegetation to enhance water quality.

In addition to the retrofit projects stated in Table 2-2, DPWES provided technical assistance on two detention basin retrofits in 2011. The Laurel Hill and Great Falls Library detention basins were naturalized with native aquatic vegetation to provide improved water quality. The Laurel Hill basin retrofit was funded by the Laurel Hill HOA and the Great Falls basin retrofit was funded by the Great Falls Garden Club and Library.



**Figure 2-2 Langley Oaks pond retrofit immediately after construction. Photo by Fairfax County.**

### **Low Impact Development**

Fairfax County promotes the use of environmentally sensitive site design and low impact development (LID) practices that minimize impervious cover and replicate natural hydrologic conditions as a means of protecting streams and other natural resources. LID projects are used to help the county meet multiple stormwater management goals and provide the following benefits:

- A variety of LID concepts and techniques can be used to meet stormwater requirements of new developments and to retrofit existing developed areas.
- LID projects are often a viable solution to address stormwater needs if space is limited.
- The visibility and accessibility of certain projects provide opportunities to educate the public on the benefits of LID and can increase awareness of stormwater management issues.
- These innovative projects provide opportunities for scientific research.
- With adequate training, residents can implement and maintain some LID practices on their properties.
- Certain LID practices provide aesthetically pleasing alternatives for stormwater management.

In 2011, Northern Virginia Soil and Water Conservation District (NVSWCD) coordinated a regional rain barrel initiative for Northern Virginia with neighboring jurisdictions. Eleven “build-your-own” rain barrel workshops and three pre-made rain barrel sales were held in Northern Virginia (see Chapter 5, Rain Barrel Program).

The manual *Rain Garden Design and Construction: A Northern Virginia Homeowner’s Guide*, which includes instructions and calculations needed for a homeowner to build a rain garden on his or her property, continued to be distributed in 2011. NVSWCD presented three rain garden

workshops during 2011. The workshops covered rain garden function, design, location, costs, construction, maintenance, planting, and materials. The workshops were attended by 78 county residents and industry professionals. Reston Association also installed a rain garden at the Millennium cluster, a group of single-family, townhouse or multifamily dwellings in a community.

In addition, NVSWCD organized the Watershed Friendly Garden Tour in June 2011, showcasing low impact development practices including green roofs, porous pavers, rain gardens, composting, rain barrels, native species, wildlife habitat, and more, inspiring visitors to adopt these practices in their own yards and schools.

**Summary of 2011 Low Impact Development Projects**

DPWES, FCPA, various non-profit organizations and individual volunteers contributed to the design and implementation of seven projects within the county that incorporated one or more LID practices (Table 2-3).

**Table 2-3 LID projects constructed in 2011.**

<i>Project</i>	<i>Description</i>	<i>Partners</i>
Cedars of Tyson	Replaced 1,000 cubic foot underground stormwater trench and modified structures to reestablish detention.	DPWES
Dolley Madison Library	Installed green roof, bioretention cells and porous concrete.	DPWES
Jefferson Park	Replaced 1,600 cubic foot trench and modified structures to reestablish detention.	DPWES
Shreveewood Elementary School	Installed pervious asphalt paving in the parking lot.	DPWES
Spring Hill Athletic Field Renovation	Renovated existing adult-sized natural turf fields into synthetic* turf fields with a supporting open-graded aggregate base providing storage capacity to reduce peak flows during large storm events and eliminate need for fertilizer and pesticides.	FCPA
Spring Hill RECenter Parking Lot Expansion	Redeveloped an existing stormwater detention pond to meet current standards to support the addition of 150 parking spaces in addition to installing pervious pavers, a bioretention basin and vegetated swale in 2010.	FCPA, DPWES
Turner Farm Park	Installed two infiltration trenches to collect surface and subsurface runoff from an equestrian center.	FCPA

\*The phosphorus removal efficiency rate for synthetic turf systems is a conservative 15 percent.



**Figure 2-3 Installing pervious asphalt paving at Shreveewood Elementary School. Photo by Fairfax County.**

The Department of Planning and Zoning (DPZ) provides a full range of environmental review, but does not track stormwater efforts independently from other environmental efforts. In coordination with other DPZ staff and staff from other county agencies, DPZ accepted and reviewed 45 rezonings and related applications (e.g., amendments), 19 special exceptions and amendments, and 47 special permits and amendments in fiscal year 2012 for environmental considerations. In 2011, NVSWCD provided recommendations to DPZ on 112 rezoning and special exception applications. Recommendations addressed better site design techniques, LID practices and stormwater management measures that would lessen post-development impacts on streams and natural resources.

### **LID Monitoring Efforts**

DPWES staff is monitoring the quantity and quality of runoff from three innovative stormwater management systems installed at Fairfax County government facilities. Rain generally flows directly from impervious surfaces such as parking lots, roads and roofs into receiving streams unless it is intercepted by a stormwater management facility. The three stormwater systems being monitored are designed to retain and absorb much of the stormwater onsite through infiltration and evapotranspiration before it enters into streams and waterways. These systems help replicate what naturally occurs when stormwater is retained by forests and meadows long enough to infiltrate into the soil and recharge groundwater.

The three stormwater systems are located at Providence District Supervisor's Office/Fire Station 30 in Merrifield, Cub Run RECenter and the Herrity Government Center building. A bioretention filter and basin, a rain garden and permeable pavement blocks with underground gravel storage were installed at Providence District Supervisor's Office/Fire Station 30. A bioretention filter and basin with a vegetated swale were installed at Cub Run RECenter. The Herrity building site is located on the roof of the garage structure and demonstrates three types of vegetated roof on a 5,633 square foot area.

The reports for monitoring in 2008, 2009 and 2010 were finalized in 2011. The conclusions are as follows:

Providence rain garden – An average of 80.5 percent of the rainfall that fell within the 0.83 acres that drains to the bio-retention facility was captured. This water eventually infiltrated into the ground or evapotranspired into the atmosphere. The average storm was 2.31 inches of rain and an average of 1.86 inches of rain was retained. Phosphorus, nitrate and total suspended sediment (TSS) normalized loadings (grams per inch of rain) were reduced by 32 percent, 77 percent and 90 percent respectively.

Cub Run RECenter rain garden – Rain events less than 0.44 inches of rain did not result in any bio-retention outfall runoff. In larger events, runoff was dependent on rainfall rate, rainfall duration and antecedent dry time, and in some cases up to 1 inch of rain was retained. The temperature of effluent when compared to that from the parking lot was lowered by an average of 2.76° F. Pollutant load (grams) reduction of phosphorus, nitrate and TSS was 51 percent, 81 percent and 95 percent respectively.

Herrity Garage green roof –The green roof typically retained at least the first one-half inch of rain and in some cases retained over an inch of rain. The green roof only received water directly from the rain; no runoff entered the green roof system. Pollutant load reduction is dependent on volume reduction. A control section of the parking structure, equal in area to that of the green roof, was also monitored to compare the runoff load from the green roof to that from the parking area. The pollutant load (grams) reduction of phosphorus, nitrate and TSS was 17 percent, 27 percent and 86 percent respectively. The majority of the TSS runoff from the control section of the parking lot was from atmospheric deposition of “dirt” on the surface that washed off when it rained. Green roofs can be an exporter of phosphorus, nitrate and TSS when they are new, however when they have gone through one or two growth seasons this no longer occurs or is minimized. The pollutant load reduction percentages apply to the difference between what is in the runoff from the green roof and the runoff from the control side of the parking structure. Green roofs do not filter water that passes through them, they act as a sponge and retain rain that falls on them, later releasing the water to the atmosphere through evapotranspiration. In addition green roofs reduce the heat island effects seen in typical roofs, provide cooling to the building and have a longer life thus reducing roof maintenance costs.

**Stream Restoration and Stabilization**

In 2011, the county completed five stream restoration projects with the assistance of a number of non-profit organizations and volunteers. These projects are summarized in Table 2-4.

**Table 2-4 2011 stream restoration and stream stabilization projects.**

<i><b>Project Name</b></i>	<i><b>Description</b></i>	<i><b>Partners</b></i>
Cub Run-Flatlick Branch Confluence	Restoration of ~1400 linear feet of stream channel achieved through the use of natural channel design principles including rock vanes, J-vanes, riffle habitats, and soil bio-engineering.	DPWES

**Table 2-4 2011 stream restoration and stream stabilization projects.**

<i>Project Name</i>	<i>Description</i>	<i>Partners</i>
Hunters Branch	Improved water quality by providing a series of step pool sequences intended to increase the residence time of water to allow sediment and pollutants in the runoff to settle out in the pools.	DPWES
Kingstowne II	Restored 2,500 linear feet of stream channel using natural channel design with stilling basins (plunge pools) at culvert outfall locations, step-pools, step-runs and rock cross vanes. Raised stream bed was reconnected to the floodplain and a re-vegetated buffer was installed, all of which resulted in protection for aquatic life, an exposed gas line, and the surrounding community.	NVSWCD, DPWES, USACE, Nature Conservancy, Kingstowne HOA
Little Pimmit Run	Stabilized 100 linear feet of stream bank and 70 linear feet of drainage channel using J-hook rock vanes, floodplain benching, step pools and re-vegetation.	DPWES, NVSWCD
Schneider Branch	Restoration of ~900 linear feet of stream channel achieved through the use of natural channel design principles including rock toes, J-hooks, cross vanes, and rock sills.	DPWES



**Figure 2-4 Schneider Branch stream restoration. Photo by Fairfax County.**

**Reston Association Stream Restoration**

Since 2008, over eight miles of stream restoration have been completed in Snakeden Branch, The Glade, and Colvin Run watersheds as part of the Northern Virginia Stream Restoration Bank. Additional streams in Reston’s Colvin Run watershed located north of the Dulles Toll Road and east of Reston Parkway, are under design with focus on improving streams that drain into Buttermilk Creek, Lake Anne and Lake Newport.

### 3. Operations

Fairfax County's stormwater management program is designed to prevent harmful pollutants from being dumped or washed by runoff into its municipal separate storm sewer system (MS4) and discharged into local water bodies. Controlling and managing sources of stormwater pollutants are vital components of the plan. The plan addresses how the county manages materials used to treat county roadways and parking lots; applies pesticides, herbicides and fertilizers; takes measures to prevent sanitary sewer system leaks; controls discharges from high priority and industrial facilities like county landfills; and responds to spills of hazardous materials. These actions reduce the possibility of materials reaching the county's stormwater infrastructure and streams.

#### **Inspection and Maintenance of Stormwater Management Facilities**

The Maintenance and Stormwater Management Division (MSMD) of DPWES inspects and maintains all county-owned and operated stormwater management (SWM) facilities and Best Management Practice (BMP) facilities and infrastructure, including stormwater dry ponds located in residential subdivisions. MSMD inspects and oversees private maintenance agreements for privately owned stormwater management facilities. In 2011, MSMD inspected 1,156 of the 1,465 county-maintained stormwater management and BMP facilities at least once. MSMD inspected 616 of the 3,611 privately-maintained facilities in 2011.

In 2011, MSMD continued its maintenance program for county stormwater management facilities. Maintenance can include repairs to stormwater management facility structures and removal of sediment. During 2011, the county cleaned and/or mowed 1,259 dam embankments, including 52 regional ponds which were maintained four times each during the calendar year. Cleaning involves removing trash, sediment and debris from the trash rack, control structure and all inflow channels leading to the control structure. At each stormwater management facility, deposited sediment is removed from the trickle ditch upstream from the control structure and deposited offsite. The cleaning helps keep the facility functioning properly by conveying water and performing the BMP function as designed. The county completed 256 maintenance work orders to correct deficiencies in publicly maintained SWM/BMP facilities.

In addition to routine maintenance inspections, county staff with expertise in dam design and construction continues to perform annual inspections of 19 state-regulated dams in the county which are owned by DPWES to identify any safety or operational items in need of corrective action and to ensure that the dams satisfy state safety requirements. A work program was established and implemented to correct deficiencies and address maintenance items discovered during inspections (Table 3-1). Critical items such as the stability of the dam embankment and the function of the water control structures are addressed on a priority basis. Routine items such as mowing are scheduled five times per year.

**Table 3-1 2011 Dam rehabilitation and safety projects.**

<i>Project Name</i>	<i>Description</i>
Countywide BMP and Trash Rack Replacement	Installed improved trash racks and BMP plates at 13 stormwater management facilities to improve water quality control.
Flood Response Signalization System Phase III	Installation of the Phase III flood response, monitoring, and signalization system resulted in real-time water level and rainfall monitoring capabilities for state regulated dams, major flood prone communities, and a pilot road closure alert system.
Kingstowne Park Lake	Installed outfall channel, including rip rap and stabilization of the slopes, to prevent failure of a second adjacent dam.
Lake Barton Dredging	Dredged lake to restore sediment storage capacity, enhance water quality, stabilize shoreline and provide fish habitat.
Lake Barton Dam Pohick Creek No. 2	Constructed major structural improvements to the spillway which included the installation of a downstream concrete secant pile wall, an upstream concrete curtain wall, turf reinforcement mat in spillway and modifications to the training dike.
Lake Braddock 3T	Installed improved trash rack, constructed 50 square yards of rip rap spillway, removed 300 cubic yards of sediment and retrofitted a wetland.
Sully Station	Rehabilitated the dam embankment, replaced existing riser structure and improved spillway.
Terra Grande Section 4	Constructed 250 feet of paved access road and removed 131 cubic yards of sediment and constructed 765 square yards of wetlands to improve water quality.



**Figure 3-1 Lake Barton dam spillway renovation. Photo by Fairfax County.**

In addition, the FCPA renovated the North Twin Lake dam and outlet structure in 2011. These renovations reduced the peak flow and brought the dam into conformance with state and local standards.

The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), Northern Virginia Soil and Water Conservation District (NVSWCD) and Fairfax County have been working together to rehabilitate four flood control dams that were constructed in the Pohick Creek watershed during the 1970s and 1980s. New federal and Virginia dam safety regulations necessitated the rehabilitation projects. The improvements are being funded by NRCS and Fairfax County, with NRCS providing up to 65 percent of the total project costs. Construction for the rehabilitation of the first of the four dams (Royal Lake) was completed in April, 2009. Construction on the second dam (Woodglen Lake) was completed in September, 2010, and construction on the third dam (Lake Barton) was completed in November, 2011. The total cost of the Woodglen Lake dam rehabilitation project was \$1.6 million, while the total cost of the Lake Barton dam rehabilitation was \$3.8 million. A total of \$3.5 million in federal cost-share funds for both dams was provided by NRCS through the American Recovery and Reinvestment Act. The final design for the fourth dam (Huntsman Lake) was initiated in September 2011, and is expected to be completed by August 2012, with construction estimated to start by early 2013.

### **Storm Drainage Infrastructure Management**

As required by its MS4 permit, Fairfax County must maintain an accurate inventory of its infrastructure. MSMD implements an infrastructure management plan to track Fairfax County's stormwater management facilities, stormwater infrastructure and associated easements using the county's geographic information system (GIS) databases. The infrastructure management plan encompasses Fairfax County's 399 square miles as identified on 436 tax map grids. Over a five-year cycle completed in 2005, MSMD field-verified the storm drainage conveyance system on

each tax map grid, identified storm drainage pipes, outfalls and associated appurtenances and created a GIS-based data layer. During 2011, the GIS inventory was continuously updated with new as-built plans and field verification of system location and components within the identified easements. More than 265 as-built construction plans were digitized and 268 tax map grids were reviewed for completeness, proper maintenance responsibility identification and spatial accuracy. Routine maintenance began during the spring of 2010 on the GIS-based stormwater easement database.

During 2011, MSMD continued implementation of its infrastructure inspection and rehabilitation program. Staff inspected 850 pipe segments and 15,000 storm structures with video and photo documentation. Under the rehabilitation program more than 17 miles of pipe were videoed, documenting the existing structural and service conditions of the interior of the storm system. These efforts represent 319 miles, or 21.2 percent of the storm drainage network, being screened through walking and/or video documentation for obvious deficiencies. The inventory continues to be assessed for ongoing repair of identified deficiencies. In addition, more than 4,700 feet of more than 1,500 miles of storm pipe in the county’s inventory were rehabilitated or repaired through replacement or by lining entire pipe segments using cured-in place pipe lining methods (Table 3-2).

**Table 3-2 2011 infrastructure repairs and channel clearing projects.**

<i><b>Project</b></i>	<i><b>Description</b></i>
Briar Ridge Court	Stabilized an undermined and failed storm outlet in a tributary to Little Pimmit Run.
Countywide Outlet Stabilization and Repair	Repaired and replaced seven storm outlet structures by resetting pipes, sealing joints, reconstructing end of pipe structures and stabilizing outlets from undermining.
Sycamores at Van Dorn	Constructed a 25 foot triple elliptical reinforced concrete pipe culvert and 10 feet of rip rap channel to correct an erosion problem and failed access.



**Figure 3-2 Sycamores at Van Dorn triple elliptical reinforced concrete pipe culvert. Photo by Fairfax County.**

### **Roadways**

The Virginia Department of Transportation (VDOT) is responsible for maintenance and operation of public roads (interstate, primary, secondary, residential) in Fairfax County. The county is responsible for maintaining several miles of discontinuous road segments, many of which are unpaved. A significant component of Fairfax County’s roadways program is sweeping parking lots associated with county facilities such as government centers, libraries, public schools, fire stations, police stations, health centers, bus transit facilities, park and ride lots, commuter rail stations, public housing facilities and staffed park locations.

In an effort to limit the discharge of pollutants from parking lots into the county’s streams, the county provides sand and chemical treatment only when dictated by safety concerns. The county sweeps material from each treated parking area once annually during the spring.

The county’s parking lot sweeping program is currently carried out by three organizations: Department of Public Works and Environmental Services, Department of Housing and Community Development (DHCD), and the Park Authority. DPWES sweeps parking lots at county government and public schools sites as well as paved county road segments, where feasible. DHCD sweeps parking lots on residential developments such as apartment complexes, townhouse developments, group homes and senior facilities that are owned and operated by DHCD. FCPA maintains essential use parking areas at staffed park locations and commuter parking lots. In 2011, more than 1,842 cubic yards of material was removed from 316 county government and public schools sites, 41 residential sites, essential use areas at parks and county-maintained road segments through sweeper trucks and hand sweeping.

### **Pesticide, Herbicide and Fertilizer Application Program**

County agencies involved in the administration of public rights-of-way, parks and other municipal properties currently have some form of nutrient and pest management plans and either implement the plans themselves or have contractors implement them. County personnel and private contractors follow the Virginia Department of Conservation and Recreation's nutrient management guidelines, the Virginia Department of Agriculture's guidelines, and the Virginia Pesticide Control Act, 2006. In addition, many agencies are also collecting information on the application rates and total annual usage of pesticides, herbicides and fertilizers (PHF).

Park Authority staff worked to reduce the amount of mowed turf areas at several park sites around the county to promote water and air quality improvements and provide additional wildlife habitat. Staff at Lake Fairfax Park increased the stream buffer along 600' of Colvin Run. No-mow areas were expanded to 3.5 acres around the Turkeycock Run Resource Protection Area at Pinecrest Golf Course. Jefferson Golf Course staff expanded unmowed buffers around six ponds.

The Park Authority currently has nutrient management plans for 515 acres on golf courses and 252 acres on natural turf athletic fields. The vast majority of the remaining mowed turf areas do not receive any regular treatments of either fertilizers or pesticides.

In 2011, a Virginia state-certified nutrient management planner in the Northern Virginia Soil and Water Conservation District (NVSWCD) prepared nutrient management plans covering 188.4 acres in the county. These included 152 "new acres" which were not previously part of any current or expired plan and 36.4 "revised acres" which were already under plans that had been recently rewritten because the previous ones had expired or were about to expire. All of the plans were for horse operations or mini-farms (such as Frying Pan Park).

The federal and state pesticide laws and regulations require pesticide applicators to be certified to use restricted-use pesticides. In addition, Virginia law requires all commercial applicators to be certified to use any pesticide. Applicators must renew their pesticide licenses through continuing education every two years. In 2011, Agriculture and Natural Resource Extension agents for the Virginia Cooperative Extension (VCE) conducted programs in pesticide safety and integrated pest management (IPM) throughout Northern Virginia. The program assisted agricultural producers and licensed pesticide applicators to comply with the law and protect the environment and human health through the safe and efficient use of pesticides and alternative pest control tactics.

In 2011, VCE trained 550 commercial pesticide applicators for re-certification in Northern Virginia. The trainees provided the following feedback about the experience:

- 97 percent of surveyed respondents stated that they "know what (they) need to do to comply with state and federal laws and regulations".
- 100 percent agreed that they "learned more about proper use of application equipment (calibration, drift minimization)."
- 93 percent will check (my) pesticide storage area over to make sure it is compliant
- 75 percent have gained new knowledge for identifying and controlling aquatic pests
- 89 percent understand how to properly launder contaminated clothing

- 91 percent have gained new knowledge to make safe and informed decisions about pesticide use
- 82 percent have gained new knowledge for identifying and controlling right of way pests
- 89 percent will choose the proper PPE when applying pesticides
- 80 percent understand the importance of identifying insects before choosing a control method
- 91 percent have a better understanding of invasive plants and how to manage them

In addition, the federal and state pesticide laws and regulations require pesticide applicators to dispose of pesticides properly. The disposal of canceled, banned or unwanted agricultural and commercial pesticides poses a significant challenge to agricultural producers and other pesticide users due to its high cost. The proper disposal of waste pesticides eliminates a potential threat to human health and the environment.

Virginia's Pesticide Disposal Program is a cooperative effort between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Pesticide Control Board, with participation from VCE and the Division of Consolidated Laboratory Services. The program assists agricultural producers, licensed pesticide dealers and pest control firms, golf courses and homeowners with the proper disposal of unwanted pesticides. The program is available at no cost to eligible participants. The Pesticide Disposal Program requires participants to transport their unwanted agricultural and commercial pesticides to a central collection site where the hazardous waste disposal contractor will package the pesticides for eventual disposal. If a participant cannot safely package the unwanted pesticides for transport, the disposal contractor will make arrangements to containerize the pesticides for transport.

### **Industrial and High Risk Runoff Facilities**

There are currently 35 facilities that are covered under a Virginia Pollutant Discharge Elimination System (VPDES) general permit and nine facilities that are covered under a VPDES individual permit that drain to Fairfax County's MS4. In addition, there is currently one additional facility with a no-exposure certification. Of the 45 permitted facilities, seven are county facilities. As required by the permits, each facility has developed and is implementing a stormwater pollution prevention plan (SWPPP), which includes spill prevention and response procedures. The SWPPP's for Fairfax County Department of Vehicle Services (DVS) maintenance facilities are currently being updated, and new stormwater pollution training classes will be held for the staff of each facility in 2012.

Fairfax County is currently developing a database application to better manage the list of VPDES facilities that discharge to the county's MS4. The new database will also maintain a list of any other industrial and/or commercial facilities within the county's MS4 deemed to be high risk and facilitate in scheduling and tracking inspections. Fairfax County has requested copies of discharge monitoring reports (DMR's) from DEQ for appropriate VPDES permitted sites within the county's MS4 service area.

### **Hazardous Materials Spill Prevention and Response**

The Fire and Rescue Department responds to all reported incidents of hazardous material releases, spills, and discharges in the county (regardless of whether the material has potential to enter the county-operated MS4 or another system, such as VDOT's). The department maintains and tracks firefighter training/certification under OSHA 29 CFR 1910.120 (q) and NFPA 472. The department's Fire and Hazardous Materials Investigative Services (HMIS) personnel receive regular training in pollution prevention and are equipped to initiate spill control measures to reduce the possibility of hazardous materials reaching the storm drainage system. Resources available to personnel include personal protective equipment, technical tools and equipment for spill control, and absorbent products such as pads and booms for spill containment. HMIS also maintains a contract with a major commercial hazardous materials response company to provide additional containment and clean-up support for large-scale incidents.

In 2011, HMIS received 585 complaints. Approximately 326 of the complaints involved the actual release of various petroleum or chemical substances. Of the 326 releases, 232 involved the release of either diesel fuel (27), home heating fuel oil (80), gasoline (33), motor oil (37), or hydraulic oil (55). Other releases investigated involved antifreeze, paint, sewage, wastewater discharges, water treatment chemicals and mercury. Storm drains were involved in 58 of the releases.

In both emergency and non-emergency spills that reach the storm drainage system, HMIS enforces appropriate codes and ordinances to ensure that responsible parties take appropriate spill control and cleanup actions to protect and restore the environment.

FHIS monitors, on a long-term basis, contaminated sites that have a potential for the contaminant coming in contact with surface waters or stormwater management facilities. As a part of the Oversight Program, FHIS, as an agent of the Director of DPWES, accepts, reviews, and processes requests to discharge treated groundwater from remedial activities at contaminated sites into county storm drains. FHIS then monitors the discharge for the duration of the agreement. In 2011, the Hazardous Materials Technical Support Branch of FHIS started the year with 56 oversight files. During the year, 101 new oversight files were opened and 93 were closed. Most of these oversight files involved contaminated underground storage tank sites.

Fire and Rescue continued to maintain membership in the Fairfax Joint Local Emergency Planning Committee (FJLEPC), which includes representatives of Fairfax County, the City of Fairfax, and the towns of Vienna and Herndon. Fire and Rescue periodically updates its Hazardous Material Emergency Response Plan.

### **MS4 Permit Tactical Planning Process**

The county was issued its first MS4 permit in 1997 and each permit typically has a term of five years. However, the current permit issued in 2002 has been administratively continued since 2007. It is expected that the Virginia Department of Conservation and Recreation (DCR) will issue a new permit in 2012 which will require significant stormwater program modifications. In preparation of the issuance of the new MS4 permit, the county has developed a tactical plan initiative to identify and address program gaps and program improvements for each of the 18 permit elements. This process involves multiple county agencies since the permit covers all county operations that have the potential to impact stormwater quality.

In 2011, the county initiated the tactical plan development for the following six permit elements:

- Industrial and High Risk Runoff
- Illicit Discharge
- Spill Prevention and Response
- Roadways
- Water Quality Screening
- Monitoring

Many of the permit areas overlap in terms of actions and responsibilities. For those areas which have shared responsibilities, a lead coordinating team was identified that is responsible for developing each tactical plan. Through a series of meetings, team members discussed the MS4 program and permit requirements, current permit-related services, program gaps and approaches for meeting the draft permit requirements. The result was a series of recommended tactics for meeting the draft permit requirements. The next step in the process will be to implement each of the planning actions as outlined in each tactical plan. In 2012 the tactical plans for the remaining 12 permit elements will be initiated and developed.

### **Sanitary Sewer Inspection and Maintenance**

Inspection and maintenance of the county's sanitary sewers help eliminate sewage leaks to the MS4 and waterways. Rehabilitation and repairs include dig-up repairs, manhole rehabilitation and trenchless pipe repair using technologies such as robotic, cured-in-place and fold-and-reformed pipe rehabilitation processes. Programs that help prevent, detect and eliminate illicit entry of sanitary wastes into the MS4 are implemented and documented in the Wastewater Management and Capital Facilities business areas of DPWES.

The Sanitary Sewer Infiltration Abatement Program conducts wastewater flow measurements and analysis to identify areas of the wastewater collection system with excessive inflow/infiltration problems, and uses closed circuit television (CCTV) to inspect trunk sewer mains in an effort to specifically identify defective sewer lines for repair and rehabilitation. In 2011, 198 miles of old sewer lines and approximately eight miles of new sewer lines were inspected, resulting in the identification of sanitary sewer lines and manholes needing repair and rehabilitation. In 2011, 30.8 miles of sanitary sewer lines were rehabilitated, bringing the total length of sewer lines repaired over the past ten years to 211.15 miles.

The Sanitary Sewer Extension and Improvement Program addresses pollution abatement and public health considerations and provides sanitary sewer services to areas identified by the Department of Health as having non-repairable or malfunctioning septic systems. In 2011, one Extension and Improvement project was completed consisting of 703 feet of eight-inch sanitary sewer and sanitary sewer connections to seven existing homes.

### **Construction Site Erosion and Sediment Control**

Through its plan review process, DPWES staff enforces the Public Facilities Manual and Subdivision Ordinance criteria related to stormwater for new development and redevelopment. DPWES Land Development Services staff review erosion and sediment control (E&S) plans for compliance with county and state requirements.

In 2011 a total of 758 E&S plans for projects that would disturb a land area of 2,500 square feet or more were submitted and approved for construction. Written reports listing these individual sites were provided on a monthly basis to Virginia Department of Conservation and Recreation (DCR).

Fairfax County's E&S control program is fully approved by DCR and is implemented by Land Development Services (LDS). In 2011, 27,849 E&S inspections were performed through the county's Alternative Inspection Program on all sites under construction. Those E&S inspections represent 57.4 percent of the 48,496 total site inspections that were performed by Site Development and Inspection Division (SDID) personnel. The site inspections total also includes 2,198 projects that were inspected for purposes other than strictly E&S control (e.g., pre-construction, streets, sanitary sewer, storm sewer, and project release).

In 2011 SDID wrote 905 "2030" E&S control reports, which identify the E&S control deficiencies developers must correct within five days. Failure to comply within the specified time frame can result in issuance of a violation to the developer. SDID issued 86 violations in 2011 and 76 of those were later cleared. The remaining ten violations are extended until the required corrections are made or court action is initiated. SDID held 198 escrows for either landscaping or stabilization issues.

The Land Disturbance and Post Occupancy Branch of LDS investigated 184 complaints alleging violations of Fairfax County's Erosion and Sediment Control Ordinance (Chapter 104). The branch also investigated 46 complaints alleging violations of the county's Chesapeake Bay Preservation Ordinance (Chapter 118). Of the total complaints, 180 were instances where there was either no violation or there was timely compliance if a violation was cited. The other 50 complaint investigations led to the branch undertaking criminal proceedings to ensure compliance, with some proceedings resulting in fines issued by the court.

Residents may report complaints about erosion and sedimentation to the county by phone or through email. Residents can visit the following web page to find contacts for specific land development issues: <http://www.fairfaxcounty.gov/dpwes/publications/urbanfor.htm>.

The Department of Planning and Zoning coordinates with staff from other county agencies to review rezoning, special exceptions, and special permit applications for environmental considerations including stormwater management. They also investigate complaints of possible Zoning Ordinance violation issues that may have potential stormwater impacts.

### **Land Conservation Awards Program**

The county sponsors an annual Land Conservation Awards program to recognize the developers, contractors, site superintendents, and site inspectors who demonstrated an exemplary effort during the past year in the installation and maintenance of erosion and sediment control measures on construction projects and preservation of natural resources (such as trees, wetlands and Resource Protection Areas). In 2011, 12 sites were nominated for awards in five different categories including Large Commercial, Small Commercial, Large Single Family Residential, Infill Lot, and Special Project. Three award winners were selected, one for each of the following categories: Large Commercial, Large Single Family Residential, and Special Project. In addition,

one site was recognized as the Best Protected Environmentally Sensitive Site of the year. At the 2011 Land Conservation Awards program held on January 20, 2012, an Outstanding Superintendent, an Outstanding Engineering Firm, and an Outstanding Contractor were also recognized. These awards are valued by recipients in the construction industry and provide incentives to do excellent work. County employees were also recognized with awards for Outstanding E&S County Inspector and Outstanding E&S County Reviewer.

### **Trail Improvements to Address Erosion Issues**

Park Authority staff worked with many partners to implement special projects to minimize water quality impacts from trails in the Resource Protection Areas. Park staff at Lake Fairfax Park used sustainable trail maintenance techniques including planting native warm season grasses to improve 2,500 feet of trail along the lake to prevent erosion. They also improved the stormwater outfall from the Water Mine pool complex into the lake by installing an 8 X 10 foot rip-rap apron. Riverbend Park staff rerouted two sections of trail away from the riverbank and removed woody debris that threatened to degrade unstable bank areas. Park Authority staff partnered with the Potomac Appalachian Trail Club to stabilize steep trail sections to prevent erosion into the Potomac River floodplain at Scotts Run Nature Preserve. They also monitored streams at Scotts Run Nature Preserve to prevent illegal gold panning which destroys stream banks causing large-scale erosion. An Eagle Scout worked with staff at Hidden Pond Nature Center to repair trails in a power line easement in Pohick Creek Stream Valley Park to prevent erosion and improve the trail surface. The Park Authority replaced two culvert pipes under the small gage railroad tracks at Burke Lake Park to reduce erosion and improve stream function entering Burke Lake.

### ***Lake Fairfax Park Natural Surface Trails***

Phase 2 of the Lake Fairfax Natural Surface Trails project was partially funded with money that was left over from Phase 1 of the project. In Phase 2, approximately 800 feet of severely eroded natural surface trail was closed and a new sustainable trail was designed and built to replace it. Another 100 feet of existing trail was improved in place to prevent further erosion. Erosion and sedimentation in the Colvin Run Stream Valley from the degrading trail during rain events has now been eliminated. All new and improved trails are designed to maintain sheet flow on the landscape and minimize erosion that is caused by concentrated flows. The work was accomplished with a combination of professional and volunteer labor.

### ***Pickett Road Bridge Replacement and Stream Restoration***

This project included the removal and replacement of an existing pedestrian bridge over Long Branch Stream with a new fiberglass bridge, new concrete abutments and piers and stream restoration work.

### **Agricultural Land**

Horse-keeping operations are the predominant agricultural land use in the county. These are located in the northern, western and southern areas of the county, and range from five to more than 100 acres. Fairfax County's Chesapeake Bay Preservation Ordinance and Agricultural and Forestal District Ordinance require land in agricultural use to have a soil and water quality conservation plan. Plans include best management practices to reduce erosion and sediment pollution from pastures and stables, manage excess nutrients from animal waste and fertilizers and address the misuse of pesticides and herbicides. The plans prescribe vegetated riparian

buffers for streams known as Resource Protection Areas (RPAs). In 2011, NVSWCD developed soil and water quality conservation plans for 26 parcels on 443 acres, which included 10,655 linear feet of RPAs. The RPA's included 2,250 linear feet of new vegetated buffers and 8,405 linear feet of re-planned buffers. Three of the plans were prepared for landowners to help meet the requirements for renewing the Agricultural and Forestal District status of their properties, under the Department of Planning and Zoning's open land preservation program.

At the request of Fairfax County's Code Enforcement Division, NVSWCD provided technical assistance to four landowners cited for violation of county code. Technical assistance included three stabilization plans for restoring sites that had imported "fill material" (soil) without an approved rough-grading plan. Such stabilization plans included the use of appropriate vegetation, and the use of riprap and erosion control blankets; the third plan was designed to correct illegal activities and remediate improper use of an RPA.

In 2011, 70 participants attended two horse management seminars that were sponsored by NVSWCD. The seminars covered pasture planning and horse waste management. NVSWCD also created and published *Earth Friendly Suburban Horse Farming*, which contains detailed information about site planning, pasture management, non-vegetated heavy use areas, and animal waste management. This guide is distributed to the horse-keeping community directly, at events and on-line.

The Virginia Department of Forestry (VDOF) assists Fairfax County with the Agricultural and Forestal District Program, which provides tax incentives for landowners with 20 acres or more of land in agricultural and forest management. In 2011, VDOF completed three Agricultural and Forestal management plans. Stream management zones were particularly noted on these plans, and efforts were made to include buffers from the agricultural uses. The protection of forest cover and water quality were both promoted in the plans.

VDOF also writes Stewardship Plans for forestland owners and Neighborhood Forest Management Plans for Homeowners and Civic Associations. As a matter of course, these plans include an assessment of water quality issues such as erosion, pet waste, and fertilizer use. The Department of Forestry wrote one Neighborhood Forest Management Plan covering a 90 acre condominium complex built entirely within an RPA.

## 4. Monitoring and Assessment

Fairfax County oversees a comprehensive monitoring program that includes activities designed to characterize water bodies, identify problems and assess the effectiveness of stormwater controls. This section discusses ongoing monitoring and watershed assessment programs in water quality and stream health administered by the Fairfax County Department of Public Works and Environmental Services (DPWES) and other regional partners.

### Water Quality Monitoring

#### *Watershed Monitoring*

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

In 2011, three rainfall events were monitored at each of the two water quality monitoring sites, Henderson Road in Occoquan (OQN) and Kingsley Avenue in Vienna (VNA) in accordance with Fairfax County’s Watershed Water Quality Monitoring Program. Samples were tested for concentrations of nine constituents of concern. Table 4-1 below contains the median, high and low concentration of each of the nine constituents over the seven years from 2005 to 2011. In addition, statistical analyses using the Mann-Whitney 2-sample test were performed to determine if there were significant differences between median constituent concentrations at the two stations. In 2011, as in 2010, the analysis found significant statistical differences for concentrations of all of the nine constituents measured at the two sites. Seasonal and annual unit-area constituent loadings for 2011 were also calculated and are presented in Table 4-2.

**Table 4-1 Results of statistical analysis to determine if there is a significant difference between observed constituent concentrations at Stations VNA and OQN for 2005 to 2011.**

Constituent*	VNA Median	VNA High	VNA Low	OQN Median	OQN High	OQN Low	Differences Statically Significant? **
NH <sub>3</sub> -N	0.18	0.73	0.00	0.01	0.27	0.00	YES
COD	53	292	22	26	122	0	YES
<i>E. coli</i>	901	200000	0	583	38000	27	YES
Fecal Strep	4200	129000	100	925	51000	18	YES
NO <sub>3</sub> +NO <sub>2</sub> -N	0.78	1.64	0.16	0.43	0.73	0.10	YES
TDS	128	836	51	100	160	71	YES
TKN	1.65	11.30	0.48	0.58	2.41	0.00	YES
TP	0.30	1.61	0.06	0.06	0.80	0.00	YES
TSS	52.57	1207.00	4.90	15.75	485.00	1.40	YES

\*All constituent units are mg/l, other than *E. coli* and Fecal Strep which are in colonies per 100 ml.

\*\*Based on a Mann-Whitney 2-sample test at a 0.1 significance level.

**Table 4-2 Computed seasonal and annual unit area constituent loadings at monitored locations for 2011.**

Constituent	VNA Winter	OQN Winter	VNA Spring	OQN Spring	VNA Summer	OQN Summer	VNA Fall	OQN Fall	VNA Annual	OQN Annual
NH <sub>3</sub> -N	0.194	0.003	0.105	0.027	0.226	0.024	0.084	0.003	0.608	0.057
COD	51.208	6.185	36.269	15.348	64.339	10.199	77.177	8.587	228.993	40.318
<i>E. coli</i>	0.704	0.391	6.299	23.078	105.132	13.304	26.633	7.367	268.541	34.326
Fecal Strep	0.945	1.671	22.072	19.974	78.881	38.664	76.379	7.140	275.330	62.148
NO <sub>3</sub> +NO <sub>2</sub> -N	0.558	0.122	0.413	0.117	1.018	0.263	0.403	0.110	2.393	0.612
TDS	141.438	31.649	75.620	26.061	114.808	67.123	94.909	33.126	426.776	157.959
TKN	1.237	0.124	1.792	0.356	2.012	0.434	0.954	0.194	5.995	1.107
TP	0.182	0.010	0.126	0.094	0.393	0.048	0.286	0.015	0.986	0.168
TSS	73.440	3.291	47.314	57.792	117.683	28.590	27.398	4.927	265.834	94.600

\*All units are lb/ac, except for *E. coli* and Fecal Strep which are in billion colonies/ac. To compute total loads in lbs or billion colonies, multiply unit-area loading by drainage area of monitoring station in acres

### ***Dry Weather Monitoring***

In 2011, the county selected 101 MS4 outfalls for dry weather screening in accordance with the general protocol outlined in the Fairfax County Dry Weather Screening Program: Site Selection and Screening Plan (July 2007). Physical parameters were recorded at each outfall. Water was found to be flowing at 48 of the outfalls, and was tested for a range of pollutants (conductivity, surfactants, fluoride, pH, phenol, copper, and temperature) using field test kits. Of the outfalls tested, 15 required follow-up investigations because they exceeded the allowable limit for at least one pollutant. Upon retesting these sites, 12 continued to exceed the screening criteria, and further testing was conducted in an attempt to track down the source. This track down procedure consisted of using the county's GIS mapping system. A map of the county's storm drainage system was printed from GIS and used to track the storm network upstream of each site. Staff recorded observations of flowing water and land use, and tested the water where flow was found. This procedure was followed up the network of storm drain pipes until the source was found or there was no flowing water.

Two of the track downs had very minimal flow that did not allow track downs to be conducted. Two of the track downs resulted in finding that restrooms were connected to the stormwater system instead of the sanitary system. One of these sites in Reston had a business office's restrooms linked to the stormwater network. Another site in Vienna had two separate office buildings with illicit connections to the same MS4 outfall. The first of these two buildings had an entire restaurant connected to the stormwater network and a washing machine from a drycleaners while the second building had a hair salon. SWPD is working closely with Fairfax County's Wastewater Division, Health Department and Code Compliance Division to resolve these connections. The sources of flow for the remaining eight sites are still under investigation. These sites mostly consist of outfalls with high levels of conductivity and/or fluoride levels and low flow levels with no solids. Plans to resolve these locations include using video cameras in the stormwater pipes and follow up visits in an attempt to locate the sources of the discharge.



Figure 4-1 Sampling a flowing outfall during dry weather screening. Photo by Fairfax County.

## Biological Monitoring

### Approach

The Fairfax County biological stream monitoring program includes an annual sampling of fish and macroinvertebrate communities in wadeable, non-tidal freshwater streams. Benthic macroinvertebrates are organisms lacking a backbone, which inhabit the stream bottom and are large enough to be seen with the naked eye. These organisms include aquatic snails, water mites, worms, leeches, crustaceans and many types of insects (both larval and adult forms). These creatures are an integral and critical part of a healthy stream ecosystem and serve many important functions, including forming the core diet of most fishes.

Countywide biological monitoring is conducted annually using a probabilistic design approach. Using this approach, statistically valid inferences may be made about the condition of the county's streams. Each year, all potential sampling sites are stratified by stream order (first through fifth order) and 40 sites are selected randomly for monitoring. At these sites, samples are collected for both benthic macroinvertebrates and fish (once annually). Water quality and stream habitat characteristics are evaluated. As more data are collected and compiled, meaningful trends can be inferred with greater confidence. The previous year's annual stream reports are available online at <http://www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports>. Figure 4-2 shows the locations of the 2011 monitoring sites and their respective stream orders.

The biological health of the benthic macroinvertebrate and fish communities is quantified using a multi-metric Index of Biological Integrity (IBI), which numerically rates various functions of the biological assemblage such as pollution tolerance, community diversity, active ecological functions and other characteristics versus reference conditions. An IBI has been developed for macroinvertebrate and fish communities. The macroinvertebrate IBI is applied to all 40 sites, while the fish IBI is applied to sites with drainage areas greater than 300 acres (approximately half of the sites). Headwater streams with small drainage areas typically harbor very few fish.

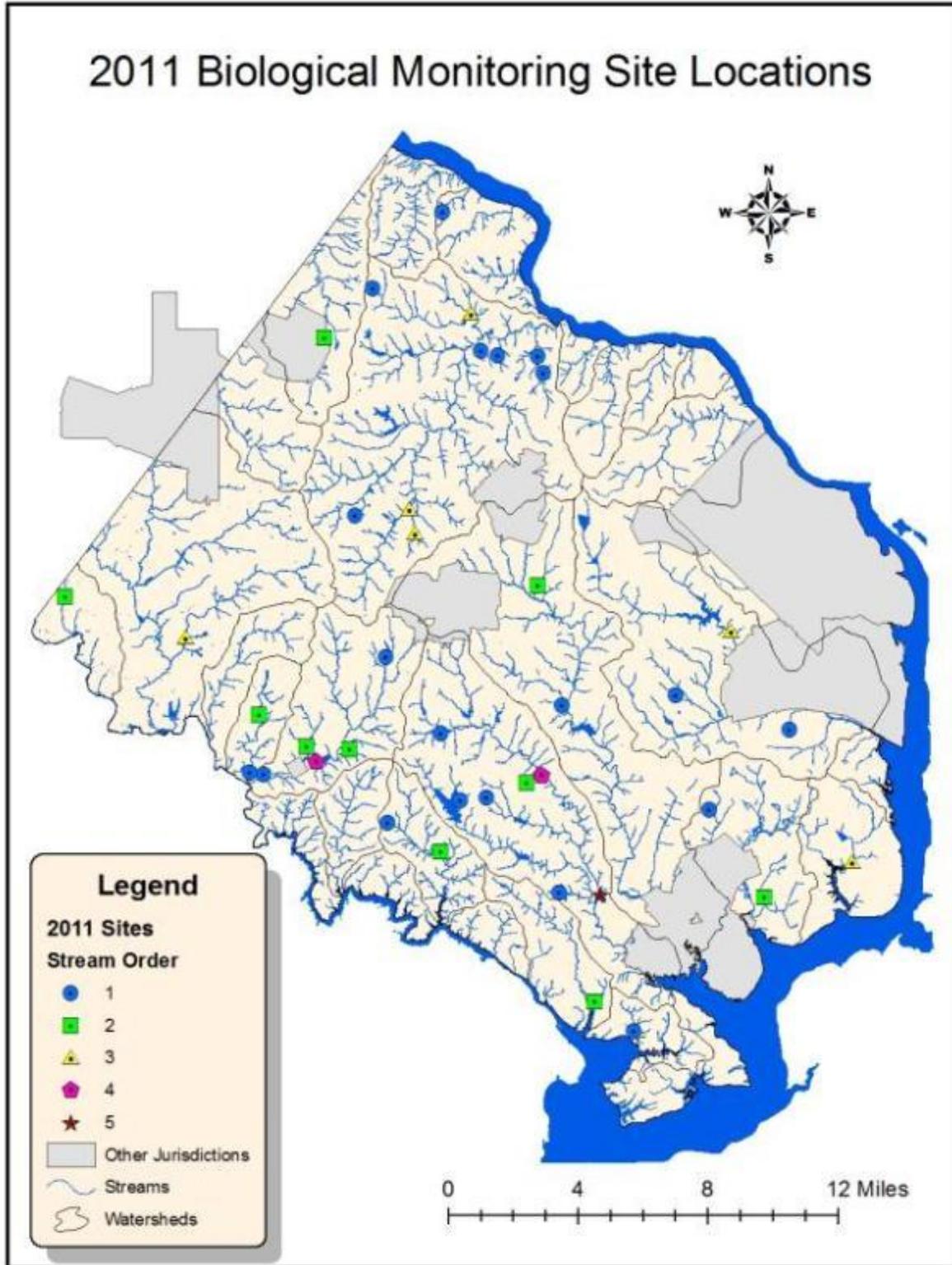
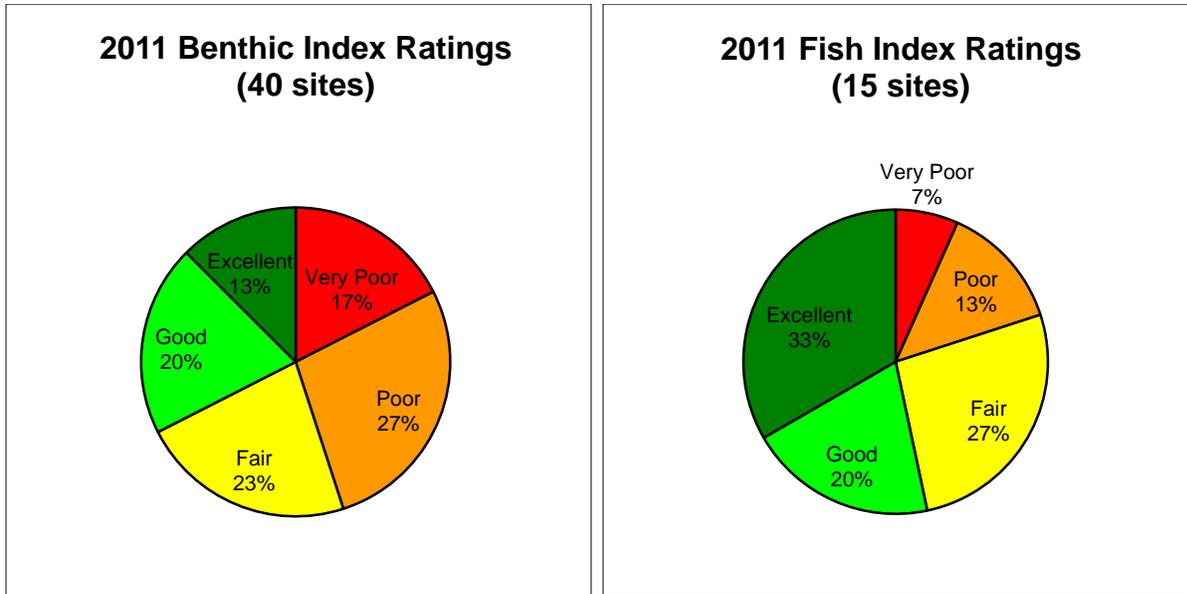


Figure 4-2 Location of 2011 biological monitoring sites.

**Results**

Figure 4-3 shows the results of the countywide distribution of macroinvertebrate and fish IBI scores, respectively.



**Figure 4-3** Countywide distribution of benthic macroinvertebrate and fish IBI ratings.

The benthic IBI scores show that 44 percent of the sites evaluated exhibited “poor” to “very poor” biological conditions while the fish IBI showed that 20 percent were scored “poor” to “very poor.” This is an increase in the biological ratings compared to previous years. This may be a result of the random site selection (it is possible for a group of lower quality sites to be chosen in some years). Over the past seven years, a small increase in the benthic IBI scores has emerged. As future sampling results are added, a trend in biological integrity should begin to emerge. The countywide stream quality index, described in the following sub-section, is a way of tracking and evaluating these conditions over time.

Table 4-3 shows a breakdown (stratified by stream order) of the 2011 biological monitoring results for benthic macroinvertebrates and the scoring ranges for the rating categories. Table 4-4 shows the monitoring results at individual sites.

**Table 4-3 2011 benthic macroinvertebrate sampling results by stream order.**

Stream Order	Number of Samples	Minimum Score	Maximum Score	Mean IBI Score	Rating
1	20	15.7	80.0	46.1	Fair
2	10	11.8	100.0	63.2	Good
3	7	13.0	76.0	36.9	Poor
4 & 5	3	27.5	63.9	42.5	Fair
ALL	40	11.8	100.0	48.3	Fair

Rating Category	Score Range
Excellent	80 - 100
Good	60 - 79.9
Fair	40 - 59.9
Poor	20 - 39.9
Very Poor	0 - 19.9

**Table 4-4 2011 biological sampling results for individual monitoring sites.**

Site ID	Watershed	Stream Order	Drainage Area in Acres	Benthic IBI*	Benthic Rating	Fish IBI*	Fish Rating
AC1101	Accotink Creek	1	265.0	15.7	Very Poor	28.6	Poor
AC1102	Accotink Creek	2	1420.0	39.4	Poor	N/A	N/A
BL1101	Bull Run	2	833.0	78.1	Good	N/A	N/A
CA1101	Cameron Run	1	147.0	53.2	Fair	N/A	N/A
CA1102	Cameron Run	1	270.0	28.5	Poor	N/A	N/A
CA1103	Cameron Run	3	9767.0	13.0	Very Poor	35.7	Poor
CU1101	Cub Run	3	4845.0	23.6	Poor	78.6	Excellent
DC1101	Dogue Creek	1	84.0	37.7	Poor	N/A	N/A
DC1102	Dogue Creek	2	1318.0	19.9	Very Poor	42.9	Fair
DF1101	Difficult Run	1	10.0	29.3	Poor	N/A	N/A
DF1102	Difficult Run	3	3565.0	76.0	Good	78.6	Excellent
DF1103	Difficult Run	1	117.0	72.4	Good	N/A	N/A
DF1104	Difficult Run	1	69.0	47.3	Fair	N/A	N/A
DF1105	Difficult Run	1	37.0	35.0	Poor	N/A	N/A
DF1106	Difficult Run	1	120.0	36.9	Poor	N/A	N/A
DF1107	Difficult Run	1	95.0	72.1	Good	N/A	N/A
DF1108	Difficult Run	3	511.0	24.9	Poor	71.4	Good
DF1109	Difficult Run	3	4156.0	40.3	Fair	78.6	Excellent
JM1101	Johnny Moore Creek	2	1348.0	51.4	Fair	14.3	Very Poor
JM1102	Johnny Moore Creek	1	19.0	62	Good	N/A	N/A
KC1101	Kane Creek	3	664.7	66.6	Good	42.9	Fair
KC1102	Kane Creek	1	101.1	80.0	Excellent	N/A	N/A
LH1101	Little Hunting Creek	3	2630.0	14.3	Very Poor	42.9	Fair
MB1101	Mill Branch	2	279.0	100.0	Excellent	N/A	N/A
PC1101	Pohick Creek	4	8685.0	27.5	Poor	78.6	Excellent
PC1102	Pohick Creek	2	110.0	11.8	Very Poor	N/A	N/A
PC1103	Pohick Creek	1	60.0	46	Fair	N/A	N/A
PC1104	Pohick Creek	1	48.0	19.0	Very Poor	N/A	N/A
PC1105	Pohick Creek	1	141.0	19.8	Very Poor	N/A	N/A
PC1106	Pohick Creek	1	149.0	59.2	Fair	N/A	N/A
PC1107	Pohick Creek	5	13382.0	36.1	Poor	85.7	Excellent
PH1101	Popes Head Creek	2	359.0	95.3	Excellent	64.3	Good
PH1102	Popes Head Creek	4	9130.0	63.9	Good	64.3	Good
PH1103	Popes Head Creek	1	32.0	70.0	Good	N/A	N/A
PH1104	Popes Head Creek	2	146.0	92.2	Excellent	N/A	N/A
PH1105	Popes Head Creek	1	54.0	31	Poor	N/A	N/A
PN1101	Pond Branch	1	171.0	52.5	Fair	N/A	N/A
SA1101	Sandy Run	2	94.0	97.6	Excellent	N/A	N/A
SA1102	Sandy Run	1	81.0	55.1	Fair	N/A	N/A
SU1101	Sugarland Run	2	2362.0	46.1	Fair	42.9	Fair

**Stream Quality Index**

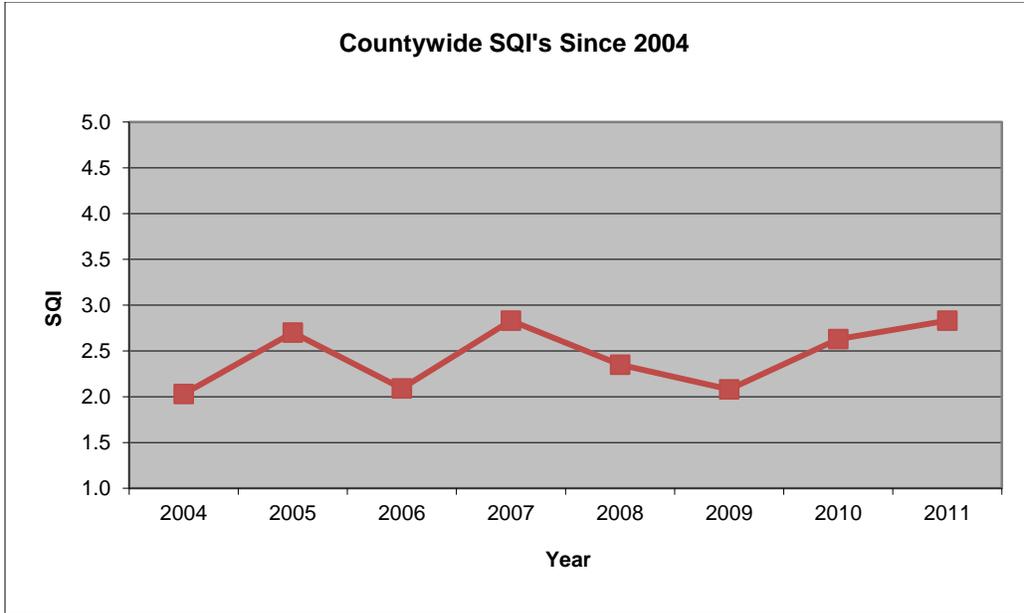
A number of key indicators have been developed to support the Fairfax County Board of Supervisors’ Environmental Agenda. One is used to measure watershed and stream quality. This is known as the Stream Quality Index (SQI). Benthic macroinvertebrate IBI data from the biological monitoring program (based on the probabilistic design approach which began in 2004) were used to develop this indicator.

The number of sites placed in each of five rating categories (“excellent,” “good,” “fair,” “poor,” or “very poor” based on the benthic macroinvertebrate monitoring data) was used to develop a stream quality index value of overall stream conditions countywide. This index value is computed by multiplying the number of sites rated “excellent” by five, those rated “good” by four, those rated “fair” by three, those rated “poor” by two and those rated “very poor” by one and then taking each of those numbers and dividing it by the total number of sites. The values are then summed, resulting in a single numeric index ranging from one to five with a higher value indicating better stream biological conditions. Thus, an SQI value of five would correspond to all streams countywide as being rated “excellent.” An index of 2.5 would indicate that conditions are intermediate between “poor” and “fair” and an index score of one corresponds to “very poor.”

Table 4-5 and Figure 4-4 shows the SQI for all years probabilistic monitoring has been employed. The 2011 SQI shows an increase in overall stream quality from 2010. This index will be reported annually to evaluate long-term trends in the overall health of streams. Over the past eight years of sampling, a very small increase in the SQI has emerged. As more data are reported annually, emerging trends can be identified with greater certainty.

**Table 4-5 Countywide SQI for sampling years 2004-2011 showing percentage of sites in each rating category.**

Sampling Year	Very Poor	Poor	Fair	Good	Excellent	Index Value
2004	40	30	17	13	0	<b>2.03</b>
2005	15	32.5	32.5	7.5	12.5	<b>2.70</b>
2006	36.4	34	15.9	11.4	2.3	<b>2.09</b>
2007	17.5	32.5	15	20	15	<b>2.83</b>
2008	35	25	17.5	15	7.5	<b>2.35</b>
2009	38	35	15	8	5	<b>2.08</b>
2010	15	40	22	15	8	<b>2.63</b>
2011	17.5	27.5	22.5	20	12.5	<b>2.83</b>



**Figure 4-4 Trends in the countywide stream quality index.**

The benthic IBI was calculated from 2004 to 2008 by comparing data collected in the county against the reference data collected that same year. Now that there is five years' worth of reference data available, the Benthic IBI is calculated using the cumulative reference data collected over the past five years. This process will reduce the variability in the IBI created by yearly disturbances to the reference sites (i.e. drought). This change is the reason previous years' reports show different SQIs than the ones shown in Table 4-5.

Table 4-6 presents a summary of biological monitoring data collected countywide since 2004. Results are presented by watershed to give a general indication of stream conditions within each watershed. Due to the random site selection methodology employed, some watersheds have not been sampled for benthic macroinvertebrates and/or fish. For general conditions of these particular watersheds, see the 2001 Stream Protection Strategy (SPS) Baseline Study at [http://www.fairfaxcounty.gov/dpwes/environmental/sps\\_main.htm](http://www.fairfaxcounty.gov/dpwes/environmental/sps_main.htm). The data reported in the SPS study were collected in 1999 and watershed conditions may have changed significantly since that time. Additionally, section four of the 2006 annual stream report has detailed watershed condition maps showing the results of county and resident volunteer monitoring data from 1999 through 2005 and can be found at <http://www.fairfaxcounty.gov/dpwes/stormwater/reports.htm>.

Table 4-6 Overall watershed conditions for sampling years 2004-2011 combined.

Watershed	Number of Benthic Sites	Average IBI	Rating	Number of Fish Sites	Average IBI	Rating
Accotink Creek	24	27.2	Poor	16	35.3	Poor
Belle Haven	4	23.4	Poor	1	21.4	Poor
Bull Run	3	51.9	Fair	N/A	N/A	N/A
Cameron Run	22	27.3	Poor	11	17.3	Very Poor
Cub Run	17	32.4	Poor	15	44.3	Fair
Dead Run	4	22.2	Poor	1	14.3	Very Poor
Difficult Run	71	40.2	Fair	35	51.4	Fair
Dogue Creek	6	31.3	Poor	4	42.9	Fair
Horsepen Creek	5	24.6	Poor	1	14.3	Very Poor
Johnny Moore Creek	5	47.7	Fair	2	39.3	Fair
Kane Creek	4	66.1	Good	1	42.9	Fair
Little Hunting Creek	7	21.5	Poor	6	22.6	Poor
Little Rocky Run	8	19.8	Very Poor	4	60.7	Good
Mill Branch	7	49.5	Fair	2	17.9	Very Poor
Nichol Run	9	60.6	Good	1	57.1	Good
Occoquan	4	87.9	Excellent	N/A	N/A	N/A
Old Mill Branch	1	75.5	Good	N/A	N/A	N/A
Pimmit Run	8	16.8	Very Poor	4	5.4	Very Poor
Pohick Creek	44	31.4	Poor	19	56.4	Fair
Pond Branch	6	57.2	Fair	2	50	Fair
Popes Head Creek	20	59.1	Fair	11	64.9	Good
Ryans Dam	1	90.6	Excellent	N/A	N/A	N/A
Sandy Run	11	65	Good	1	64.3	Good
Scotts Run	2	19.3	Very Poor	1	7.1	Very Poor
Sugarland Run	7	44	Fair	4	46.4	Fair
Turkey Run	1	17.1	Very Poor	N/A	N/A	N/A
Wolf Run	7	78.1	Good	2	42.9	Fair
<b>Fairfax County</b>	308	38	Poor	143	42.1	Fair

**Virginia Department of Environmental Quality List of Impaired Waters in Fairfax County**

In early 2011 the Virginia Department of Environmental Quality (VDEQ) released its summary of water quality conditions in Virginia from January 1, 2003, to December 31, 2008. This report is released on a bi-annual basis. The goals of Virginia’s water quality assessment program are to determine whether water bodies meet water quality standards and then develop and implement a plan to restore waters identified as impaired. Water quality standards designate uses for waters and define the water quality needed to support each use. There are six designated uses for surface waters in Virginia: aquatic life; fish consumption; public water supplies (where applicable); shellfish consumption; swimming; and wildlife. Several subcategories of the aquatic life use have been adopted for the Chesapeake Bay and its tidal tributaries. If a water body contains more pollutants than allowed by water quality standards, it will not support one or more of its designated uses. Such waters have “impaired” water quality and are listed on Virginia’s 303(d) list as required under the Clean Water Act.

The VDEQ’s 2010 Water Quality Assessment Integrated Report can be found at <http://www.deq.state.va.us/wqa/ir2010.html>. Please refer to this website for the most up to date listing of impaired waters in Virginia. Water bodies are often listed for multiple impairments based on elevated levels of pollutants, high levels of contaminants in fish or reduced numbers of aquatic organisms (macroinvertebrates and/or fish). Waters listed as impaired for aquatic life uses typically exhibit substantially suppressed ecosystems. Scores for biological integrity indices of these waters rank at or below 50 percent of the scores for natural (unimpaired) reference waters. This impaired condition is analogous to “very poor,” “poor” and many of the “fair” streams as rated by the county’s benthic macroinvertebrate IBI described above.

Once a water body has been listed as impaired, a Total Maximum Daily Load (TMDL) report identifying the sources causing the water quality problem and the reductions needed to resolve it must be developed by the VDEQ and submitted to the U. S. Environmental Protection Agency for approval. The TMDL consists of a waste load allocation, or point source contribution, a load allocation, or non-point source contribution, and a margin of safety. Upon approval, state law requires the development of a TMDL implementation plan (IP). The IP should describe actions (best management practices) to implement the allocations contained in the TMDL. In most cases, the point source allocations would be addressed through the Virginia Pollutant Discharge Elimination System (VPDES) program. These permits are issued by the commonwealth and are used to regulate the inputs of pollutants into receiving waters.

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

- Bacteria (Fecal Coliform and/or E. coli):
  - Accotink Creek
  - Four Mile Run
  - Bull Run (includes Cub, Johnny Moore and Little Rocky Runs)
  - Pope’s Head Creek
  - Difficult Run
  - Hunting Creek (includes Cameron Run and Holmes Run)
- Sediment (Benthic Impairment):
  - Bull Run (includes Cub, Johnny Moore and Little Rocky Runs)

- Pope's Head Creek
- Difficult Run
- PCBs: Tidal Potomac (includes Accotink Creek, Belmont Bay, Dogue Creek, Four Mile Run, Gunston Cove, Hunting Creek, Little Hunting Creek, Occoquan River and Pohick Creek)

EPA established a stormwater TMDL for Accotink Creek in April 2011. The TMDL uses in-stream flow as a surrogate for sediment, which was identified as the stressor causing the benthic impairment in the creek. It calls for a 50 percent reduction in the one-year 24-hour in-stream flow. The county is currently assessing what would be needed in runoff from new development, redevelopment and existing development to achieve the requirements of the TMDL.

In December 2010, the EPA published the final TMDL for the Chesapeake Bay watershed, in which Fairfax County is the most populous local jurisdiction. This multi-state initiative set restrictions on nitrogen, phosphorus and sediment pollution throughout the 64,000-square-mile watershed. Virginia has been developing their Phase II Watershed Implementation Plan (WIP) that will bring the basin-level reductions identified in the TMDL and in Virginia's Phase I WIP down to the local level. This will help guide local implementation efforts. The final Phase II WIP is scheduled to be submitted to EPA in March 2012.

The VDEQ is currently developing bacteria TMDLs for the Sugarland, Mine and Pimmit Run watersheds. The TMDLs are scheduled to be finalized in early 2012.

The county holds a Municipal Separate Storm Sewer System (MS4) permit, which regulates the discharge of stormwater to receiving water bodies through the county's storm drainage (stormwater conveyance) system. Specific TMDL requirements become mandatory if they are incorporated into a permit.

Additional information on the VDEQ water quality program and the draft 2010 Integrated Report is available at <http://www.deq.virginia.gov/water/homepage.html>.

### **Volunteer monitoring**

Northern Virginia Soil and Water Conservation District (NVSWCD) continued its successful volunteer stream monitoring program in 2011. This program supplements the county's stream bio-assessment program. The data collected support the findings of the county's program and help to provide trend data. The data can also alert staff to emerging problems. Trained volunteers assess the ecological health of streams using the enhanced Virginia Save Our Streams (SOS) protocol. Monitoring includes biological and chemical aspects and a physical habitat assessment. NVSWCD provides training, equipment, support, data processing, and quality control; there are currently more than 100 certified monitors. Data collected by volunteers are shared with Fairfax County, the VDEQ, Virginia Save Our Streams, and other interested organizations or individuals. The data help to confirm findings of biological monitoring performed by county staff, provide information on trends, and can serve as a first alert in areas where the county may monitor only once in five years. The program also builds awareness of watershed issues among participants. Approximately 45 volunteers collected data at 21 sites four times during 2011. In addition, 34 public stream monitoring workshops and field trips were held throughout the county

and 619 county residents attended. At each workshop or field trip biological monitoring was performed and information was presented on stream ecology, stormwater runoff, urban hydrology and watersheds. The program builds awareness of watershed issues among the participants. A monthly *Watershed Calendar*, listing training and other events of interest, is emailed to 973 recipients.

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

Reston Association is among the organizations that participate in the monitoring program using the SOS protocol, and they submit data on Reston streams to NVSWCD. Currently, 11 sites are monitored by 18 volunteers.

Several FCPA Resource Management sites participate in the county stream quality monitoring program directly, as well as through training and sponsoring citizen volunteer monitors to include Riverbend Park and Ellanor C. Lawrence Park. Vernal pools and seeps were mapped and monitored at Riverbend Park on the Potomac River and Old Colchester Park and Preserve on the Occoquan River. Five nature centers and an imbedded naturalist at Cub Run RECenter provide water quality and environmental education to hundreds of thousands of park visitors each year.

### **USGS Monitoring Network**

In June 2007, a joint funding agreement between the SWPD and the United States Geological Survey (USGS) was signed by the Board of Supervisors. This agreement established a study designed to be an ongoing, long-term (five-ten year) monitoring effort to describe countywide conditions and trends in water-quality (e.g. nutrients and sediment) and water-quantity. Ultimately, the information gathered will be used to evaluate the benefits of projects implemented under the watershed planning and stormwater management programs.

The monitoring network designed to fulfill the objectives of the study consists of four automated continuous water-resources monitoring stations and ten less-intensely monitored sites. The four automated stations were constructed in 2007 and achieved full operational capability in 2008. Instruments at these stations collect streamflow data every five minutes and water-quality (water temperature, pH, specific conductance, and turbidity) data every 15 minutes; data are then transmitted via satellite and posted to a USGS web page hourly. These automated stations also capture storm event samples to be analyzed for sediment and nutrient concentrations. Additionally, samples are collected monthly at all fourteen sites under various hydrologic conditions and analyzed for the same suite of constituents. Nutrient analyses are conducted by the Fairfax County Environmental Services Laboratory and the suspended sediment analyses are conducted by the USGS Eastern Region Sediment Laboratory.

Data for this study is compiled based on the USGS 'Water Year', which for 2011 runs from October 1, 2010 through September 30, 2011.

### **Continuous Data Collection**

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

### **Discrete Data Collection**

- Grab samples were collected monthly at all 14 monitoring stations, resulting in 204 samples collected and analyzed (including QA samples). Water level and water-quality parameters were measured at the time of sampling and samples were analyzed for nutrients and suspended sediment concentration.
- Storm event samples were collected using automated samplers at the four intensive monitoring stations. These samples were collected in response to elevated turbidity and streamflow conditions during storms, resulting in the collection of 144 samples that were analyzed for the same suite of nutrients and suspended sediment concentration as the monthly grab samples.
- A total of 116 manual streamflow measurements were made across the 14 sites to support the maintenance of the streamflow rating curve for each site.
- High water marks were located and surveyed to determine maximum water surface elevations during Tropical Storm Lee at the 14 monitoring stations. These water-surface elevations will be used to compute peak discharge values from this tropical storm.

Interpretation of water-quality conditions and trends requires multiple years of data for statistically rigorous evaluation; thus, these analyses are not yet available for this study. This cooperative study is a progressive and unique effort to characterize conditions in urban and suburban streams that is expected to facilitate an understanding of watershed-scale responses to management practices which has yet to be accomplished by other studies.

## 5. Public Outreach and Education

The Department of Public Works and Environmental Services (DPWES) continues to work with partners from several organizations to enhance public outreach and education campaigns. Partnerships with these groups result in an organized effort to educate county residents on key elements to improve and protect the environment. In 2011, these organizations partnered with DPWES for outreach efforts:

- Alice Ferguson Foundation: organizes the Potomac River Watershed Cleanup
  - [http://www.potomaccleanup.org/trash\\_initiative/trash\\_cleanup.shtml](http://www.potomaccleanup.org/trash_initiative/trash_cleanup.shtml)
  - <http://www.fergusonfoundation.org/>
- Clean Fairfax Council: assists with watershed cleanups
  - <http://www.cleanfairfax.org/>
- Earth Sangha: assists and provides volunteers for tree plantings
  - <http://www.earthsangha.org/>
- Fairfax ReLeaf: assists with tree planting
  - <http://www.fairfaxreleaf.org/FFR/Index.html>
- Ocean Conservancy: organizes the International Coastal Cleanup
  - <http://www.oceanconservancy.org/>
- Northern Virginia Soil and Water Conservation District (NVSWCD): provides support for outreach activities
  - <http://www.fairfaxcounty.gov/nvswcd/>
- Northern Virginia Regional Commission (NVRC): through the efforts of the Clean Water Partners which includes Fairfax County and neighboring jurisdictions, the commission coordinates regional pollution prevention outreach through radio public service announcements (PSAs) and an improved web presence
  - <http://www.onlyrain.org/>
- Reston Association: provides support for outreach activities
  - <http://www.reston.org/>
- Virginia Department of Forestry: assists with tree plantings
  - <http://www.dof.virginia.gov/>

### Educational Booths and Presentations

#### *Fairfax County Stormwater Planning and Management*

Fairfax County's public education program raises awareness about stormwater challenges throughout the county, educates residents about watersheds and the need for stormwater management, and offers opportunities for residents to become involved in efforts to restore and protect Fairfax County's waterways. Educational presentations help residents to recognize connections between water quality problems in local streams and impacts on the Occoquan Reservoir, the Potomac River and the Chesapeake Bay. In 2011, the county gave presentations to homeowner's associations, school groups (teachers and students), civic associations, Fairfax Master Naturalist trainees, Board of Supervisor's town hall meetings, resource fairs and various environmental events.

Fairfax County hosts educational booths at several annual public events to raise awareness among residents about stormwater issues and to encourage watershed-friendly behaviors. In 2011, Fairfax County participated as an exhibitor or environmental educator at approximately 20 events, including: Fall for Fairfax, Earth Day/Arbor Day, resource fairs and environmental fairs. The public was invited to a watershed update meeting on November 30 that attracted more than 70 participants. The status of the county watershed management plans and the stormwater management program were discussed and examples of completed projects were presented. A puppet show was developed in 2011 based on the activity book “Stormy the Raindrop’s Watershed Journey”. The show debuted at the Fall for Fairfax festival and plans are underway to record the puppet show for use at schools and libraries.



Figure 5-1 Educational booth on display at the Earth Day festival at the Government Center. Photo by Fairfax County.

*Northern Virginia Soil and Water Conservation District*

In 2011, NVSWCD made presentations, provided displays, and sponsored events that included:

- Demonstrated the Enviroscope watershed model 44 times at 12 locations to 858 students in schools and scout programs.
- Gave 89 presentations to audiences in industry, government, youth and the general public, in which 5,450 people learned about rain gardens and other low impact development techniques, water conservation, best management practices for horse-keeping operations, soil concepts, art with soils, stream cleanups, water quality monitoring, award-winning erosion and sediment controls on construction sites, ecological concepts and nonpoint source pollution. Three of the workshops focused on the design and installation of rain gardens. The rain garden workshops were attended by 78 county residents and industry professionals.
- Coordinated two “build-your-own” composter workshops using surplus barrels from the rain barrel program. Thirty participants constructed thirty tumbler-style composters.

- Coordinated 11 “build-your-own” rain barrel workshops and three pre-made rain barrel sales for communities in Northern Virginia, which included at least 320 Fairfax County residents.
- Sponsored six Saturday morning *Green Breakfasts* featuring presentations on: Urban Stormwater Management in Fairfax County; Upcoming Environmental Legislative Issues; Off-Shore Wind Power; Electricity from Nuclear Energy; Demystifying Recycling; Why Green Energy Conservation Makes Economic Sense.
- Provided displays and publications about environmental landscaping, stream restoration, volunteer monitoring, soils, storm drain marking, rain barrels and other environmental topics at 8 events; 1,890 publications were distributed.

Furthermore, all low impact development (LID) projects NVSWCD completed in 2011, such as the “build-your-own” rain garden workshops and the Watershed Friendly Garden Tour described in Chapter 2, were demonstration projects that have a strong educational component.

#### ***Fairfax County Solid Waste Management***

The Fairfax County Solid Waste Management Program (SWMP) plays an important role in protecting surface water resources through its outreach efforts to promote responsible waste management practices. The SWMP supports education of residents and business owners about how they can reduce the volume of waste they generate, and how to dispose of and recycle it properly. Education is conducted in a variety of forums with community groups and school students. In 2011, SWMP:

- Presented the Sewer Science program to 68 classes at 16 high schools in the county.
- Provided financial and operational support for the annual Earth Day/Arbor Day event held at the Fairfax County Government Center, the “Greenology” exhibit at Celebrate Fairfax, Fall for Fairfax, 4-H fair held at Frying Pan Park and the Alice Ferguson Foundation’s Trash-Free Potomac River Watershed Initiative.
- Gave 45 presentations about solid waste and recycling practices to community groups and business leaders and presented to students in 52 schools throughout the county. In addition participated in Science Teacher In-service Day and high school science fairs.
- Hosted 35 group tours at its solid waste management facilities.

#### ***Fairfax County Park Authority***

Five nature centers and an imbedded naturalist at Cub Run RECenter provide water quality and environmental education to hundreds of thousands of park visitors each year. For example, Huntley Meadows Park staff held the annual Wetlands Awareness Day on May 1, 2011 to educate citizens on the importance of maintaining healthy wetlands.



**Figure 5-2 The annual Wetlands Awareness Day at Huntley Meadows Park. Photo by FCPA.**

***Reston Association***

Reston Association (RA) provides watershed education opportunities for the public at its Walker Nature Education Center. The nature center conducts programs for all ages that promote watershed appreciation and conservation, including stream and lake explorations, rain barrel workshops and fishing programs. RA staff conducted five stream walks plus two in conjunction with the Reston Museum in addition to meeting with clusters (group of single-family, townhouse or multifamily dwellings in a community) at least five times over the course of the year for the stream restoration project. Two rain barrel workshops were held by Reston Association in May and October, where 40 barrels were made. RA presented one stream monitoring workshop in 2011.

Reston Association also includes watershed education, stream and lake exploration and fishing and boating activities at eight of its summer camp programs for children ages three to 16. These programs served 1,259 campers between June 27 and August 19.

Every Reston lake has a permanent wayside exhibit with information about the lake's watershed and the flora and fauna that is supported by the lake. There is also a permanent wayside exhibit at the nature center at Snakeden Branch that includes watershed and stream restoration information. At Brown's Chapel, new stormwater trail signs were installed in 2011 explaining rain gardens, native plant gardens, rain barrels and permeable pavement sidewalks as part of the demonstration project. These interpretive signs are for all ages. The Northern Virginia Stream Restoration Exhibit was at the Reston Museum through July describing why streams in Reston need restoration, how the streams are being restored, benefits of stream restoration and project progress. In addition, the exhibit featured two scale models representing an impaired urban stream and a restored urban stream.

Reston Association coordinated the first Reston Kids Trout Fishing Day with over 200 participants and 400 people attending on April 23, 2011.

### ***Virginia Department of Forestry***

Virginia Department of Forestry (VDOP) works regularly with Fairfax County to conduct watershed and water quality presentations to students, homeowners, professionals and organizations. Volunteers are educated and enlisted to plant riparian buffers. Rain garden presentations and workshops are given for garden clubs, homeowner associations and professionals. Brochures and exhibits have been developed for public outreach at festivals, Arbor Day and other environmental celebrations. There were 60 such activities presented by VDOP in 2011.

## **Communication Initiatives**

### **Printed Materials/Mailings**

#### ***Fairfax County Stormwater Management***

In 2011, the county distributed educational fact sheets on such topics as rain gardens and rain barrels, reforestation plots, car washing, detention basins, pervious pavement and pavers, water quality swales and cigarette butt litter. A FEMA-required newsletter that included information about the natural and beneficial functions of floodplains specific to Fairfax County was mailed to more than 19,000 county residents who live in or adjacent to county floodplains.

The county distributed more than 3,100 copies of the Stormy the Raindrop activity books at various libraries, district offices and events. The activity books are available on Stormy the Raindrop's website at: <http://www.fairfaxcounty.gov/dpwes/stormwater/stormy/>.

In addition, the county provided 1000 reusable bags with the Stormy the Raindrop image and "Preventing litter in streams one bag at a time" printed at the top of the bag to attendees of Fall for Fairfax.

Stormwater management staff provided numerous media interviews for print, television and radio news. Topics included: flood protection and prevention, the restoration of county owned walkways, foot bridges and trails and how residents may safely clear storm drain openings to prevent flooding.

#### ***Health Department***

The Health Department mailed 14,921 flow diversion valve reminder notices in 2011. The notices are sent to homeowners on the anniversary of the installation of their septic system to remind them to turn their flow diversion valve once a year. It reminds them to pump out their septic tank every three to five years.

In 2011, 1,831 non-compliance letters were mailed to owners of homes that have not pumped out their septic tank during the five year period required by County Code. If homeowners fail to comply, a follow-up letter is mailed to them informing them that action will be taken under the regulations to insure their septic tank is pumped out as required.

#### ***Northern Virginia Soil and Water Conservation District***

In 2011, NVSWCD published three editions of *Conservation Currents* which featured articles on stream health, stream monitoring and stream restoration, as well as lawn care, low-impact

development practices, tree and native plant benefits, and other actions that residents can take to improve stream water quality. NVSWCD sent 2,500 print copies per issue, mainly to homeowner associations who are encouraged to reprint articles in their newsletters. Many articles are also posted on the NVSWCD website and there is a growing list of e-subscribers.

NVSWCD, partnering with the Park Authority, continued to distribute copies of their manual *Rain Garden Design and Construction: A Northern Virginia Homeowner's Guide*. It has all the instructions and calculations needed for a homeowner to build a rain garden on his or her own property. The manual is available in hard copy and electronic formats at <http://www.fairfaxcounty.gov/nvswcd/raingardenbk.pdf>. NVSWCD also published a *Residential LID Landscaping Guide* for homeowners, which provides design and installation information for several low impact development practices appropriate for solving common drainage problems. It includes sources of supplies and plant materials and is available in hard copy and electronic formats. In addition, *Earth Friendly Suburban Horse Farming* continued to be a popular publication, as mentioned in Chapter 3. In 2011, NVSWCD distributed a total of 2,885 brochures, publications and other information to colleagues and the public.

#### ***Reston Association***

The Walker Nature Education Center, operated by Reston Association, continued to distribute printed watershed education materials at the center and at community events, including “*Helping Our Watersheds: Living in the Potomac and Chesapeake Bay Watershed*,” “*Understanding, Preserving and Enjoying Reston's Lakes and Streams*” and “*Rain Barrels*.”

#### ***Fairfax County Solid Waste Management***

SWMP staff continued to distribute an updated educational brochure describing the energy-saving benefits of fluorescent lamps and how to dispose of them properly at the end of their useful life. The information is also made available on the county's recycling website at <http://www.fairfaxcounty.gov/dpwes/recycling/mat-light.htm>.

SWMP collaborated with the non-profit Alice Ferguson Foundation on the Trash-Free Potomac River Watershed Initiative with the goal of preventing trash and litter from entering the Potomac River. SWMP placed five full-page ads regarding the litter clean-up program in the *Living* section of the *Washington Post*.

### **Television**

#### ***Fairfax County Stormwater Management***

The county created educational public service announcements (PSA) in 2011 on topics such as stormwater, wastewater, recycling and urban forestry. These programs air on Fairfax County channel 16 and are posted to You Tube. Stormwater management staff also provided several media interviews for print, television and radio news and feature stories, as mentioned above.

### **Radio**

#### ***Regional Stormwater Education Campaign***

As a member of the Northern Virginia Clean Water Partners, Fairfax County continued to support the regional stormwater education campaign in 2011. The campaign used radio and

internet advertising to reduce pollution-causing behaviors. Three ads aired on five radio stations approximately 174 times, reaching about 967,000 listeners.

### ***Fairfax County Solid Waste Management***

SWMP partnered with the Metropolitan Washington Council of Governments (MWCOG) on its annual Go Recycle radio campaign. This campaign provides two weeks of intensive announcements on five major Washington DC radio stations to address recycling issues.

## **Digital Media**

### ***Regional Stormwater Education Campaign***

During the 2011 campaign, Google, Facebook and You Tube advertisements appeared more than 26 million times on individual computers, with more than 85 percent of these ads including action-oriented messages. As part of the Northern Virginia Dog Blog, the Partners sponsored the “Wag your Words” essay contest for readers. The Northern Virginia Dog Blog gained more than 1,000 subscribers during the 2011 campaign season.

In the spring of 2011, the Only Rain website, <http://www.onlyrain.org/>, was updated. It is reported that more than 500 visitors spent an average of two minutes on the site.

### ***Stormwater Management***

The main Stormwater website was updated in an effort to provide improved accessibility for residents. The Flooding and Flood Insurance information and Stream Litter websites were also updated. A new website entitled “What’s that Stuff in the Stream?” was created to help residents understand the difference between natural occurrences or man-made visual cues in the streams.

Staff from SWPD and SWMP worked together to develop a litter website with links to other county pages (such as the updated Floatables page, renamed the Stream Litter page) as well as the websites of partner organizations and programs (such as NVSWCD, Clean Fairfax Council, DCR’s Adopt-a-Stream and Adopt-a-Highway) providing information about litter-related topics, associated organizations and volunteer programs.

SWPD posted numerous messages on the county’s environmental Facebook page on such topics as stream cleanups and restorations, invasive plants, rain barrels, Lake Barton fish restocking, how to enjoy “green” holidays, cigarette butt litter, and watershed management plan updates.

### ***Northern Virginia Soil and Water Conservation District***

The NVSWCD website is a source of information for residents to help them manage their land and protect water quality by controlling stormwater, preventing erosion and encouraging native vegetation. The website can be found at <http://www.fairfaxcounty.gov/nvswcd/>. One of the resources, *You and Your Land-a Homeowner’s Guide for the Potomac Watershed*, provides comprehensive information to aid homeowners in the economical care and maintenance of their property. In 2011, NVSWCD disseminated information on county environmental programs and events monthly via two email lists, the *Green Breakfast* groups (548 recipients) and the *Watershed Calendar* group (an average of 973 recipients).

### ***Fairfax County Solid Waste Management***

- Continued to maintain the Know Toxics Web site, <http://www.knowtoxics.com>, in partnership with NVRC and the Northern Virginia Waste Management Board as part of a regional public information program to educate business owners about federal and state regulations that require proper disposal or recycling of spent fluorescent lamps, rechargeable batteries and computers and related electronics. The Know Toxics web site provides a resource where businesses can learn how to legally and appropriately dispose of these materials.
- Provided continued updates and revisions to the “Recycling and Trash” portion of the county web site to ensure the most up-to-date information for county residents. Dedicated a portion of its website specifically for students in the county to educate and familiarize them with the practice of recycling.
- Continued to maintain SCRAPmail, (Schools/County Recycling Action Partnership), an electronic resource for teachers. This e-mail subscription allows interested teachers, students and school administrators to receive periodic news items, event announcements, and updates and reviews on environmental education resources available to county schools.
- Continued to electronically distribute SCRAPBook, which is a compendium of resources dedicated to conducting environmental education in the schools from DPWES. This document is available on the website at: <http://www.fairfaxcounty.gov/dpwes/recycling/students.htm>.

### **Web Podcasts**

Podcast messages were aired through the county’s web site for a weekly audience of about 350 listeners on topics such as composting, native pollinators, the proper discharge of swimming pool water, how and when to fertilize lawns and the value of rain barrels.

### **Storm Drain Marking Program**

In 2011, the storm drain marking program continued to facilitate environmental stewardship and educate the public about non-point source pollution prevention. Staffed by NVSWCD and funded by Fairfax County, the program costs approximately \$12,000/year for plastic markers and glue. During each storm drain marking project, volunteers engage in outreach and placing a pre-printed label with a “no dumping” message on the storm drains in their neighborhoods. In 2011, the storm drain marking program coordinated 31 projects that placed markers on 2,554 storm drains and educated 14,195 households on ways they could take action to protect water quality. Each household received a flier about the causes and prevention of non-point source pollution and how to properly dispose of used motor oil, pet waste, paint, fertilizer, yard debris and other pollutants. In 2011, 607 volunteers contributed 1,710 hours to the program. Since the program began, 3,440 volunteers have helped to complete 210 projects which resulted in outreach to 287,135 households and labeling of 19,774 storm drains.

### **Rain Barrel Program**

In 2011, NVSWCD coordinated a regional rain barrel initiative for Northern Virginia with neighboring jurisdictions. Eleven “build-your-own” rain barrel workshops and three pre-made rain barrel sales were held in Northern Virginia. Four of the “build-your-own” rain barrel workshops were grant-funded, held for six communities affected by the Beltway Express Lanes

construction. These grant-funded workshops were organized in partnership with Fairfax County Stormwater Planning Division. In 2011, the program provided several free rain barrels to teachers for use in schools and held one “train the trainer” event. Four hundred twenty-two people participated in these programs, including at least 320 Fairfax County residents. A total of 601 rain barrels were distributed, including 25 free barrels at training events, 395 barrels made at “build-your-own” workshops, and 181 barrels sold at other distribution events.

An Artistic Rain Barrel program was a new educational initiative held by the rain barrel partnership in 2011. Twenty-five beautifully painted and decorated rain barrels were displayed at libraries, schools, businesses and community centers across the area for two months, generating renewed interest in rain barrels and other best management practices, and culminating in an artists’ reception and auction.

### **Watershed Cleanups**

In 2011 the multi-agency trash workgroup (consisting of representatives from the Stormwater Planning Division, Division of Solid Waste, Northern Virginia Soil and Water Conservation District and Clean Fairfax Council) began developing a Trash Assessment For Improved Environments (TAFIE) stream condition assessment form for Fairfax County. Similar to rapid assessment methods used to inventory the physical condition of stream habitats, the TAFIE approach can provide visual estimates of certain characteristics (such as amount of visible trash, threats to human health and wildlife, evidence of illegal dumping) and describe the overall condition of a particular location. The goal is to develop and make available a more rigorous method of evaluating the pre- and post-cleanup condition of a stream cleanup site that is easily understood by volunteers and to use the resulting information to guide future litter control and outreach efforts. The TAFIE worksheet and the accompanying guidance were field tested at several stream cleanup sites in 2011; feedback from these events was used to refine and clarify the worksheet and instructions for use. In 2012 the TAFIE form and guidance will be made available to schools, scout troops, and other stream cleanup groups.



**Figure 5-3 NVSWCD employees and volunteers field testing the TAFIE guidance at the Jana Lee snag. Photo by NVSWCD.**

In addition, the trash workgroup initiated an education and outreach campaign on improperly discarded cigarette butts and other smoking-related litter in 2011. The initial focus was on educating county employees about the impacts of cigarette litter on the environment and encouraging proper disposal of smoking waste. In November the trash workgroup hosted a cigarette butt pickup event on the grounds of the Fairfax County Government Center campus and later disseminated the results to county employees. The findings will be used to develop additional outreach materials for county employees and the general public.



**Figure 5-4 DPWES staff preparing to pick up cigarette butt litter around the Government Center. Photo by Fairfax County.**

The county continued to work with and support the following organizations that coordinate large and small-scale volunteer cleanups:

- The Alice Ferguson Foundation (Potomac River Watershed Cleanup)
- The International Coastal Cleanup/Clean Virginia Waterways
- Clean Fairfax Council

Clean Fairfax Council documented the following metrics regarding litter and clean-up activities:

- Report a Litterer reports (via anonymous fill-in form at Clean Fairfax website or the Report a Litterer hotline) – 102
- Total number of clean up events either planned or supported – 75
- Total number of volunteers at clean up events – 1,630
- Total number of volunteer hours – 8,050
- Cubic yards of garbage collected – 720

The county continued to provide support and staff for various stream and river cleanup events. In the spring of 2011 approximately 76 sites were established throughout the county for the Alice Ferguson Foundation’s annual Potomac River Watershed Cleanup. Cleanups were conducted at numerous state, county and local parks, schools, the county wastewater treatment plant and other locations. These cleanups were advertised in publications such as the Department of Solid Waste’s SCRAPBook and the Fairfax County Park Authority’s Parktakes Magazine, as well as on the internet. Staff from the Stormwater Planning Division, Division of Solid Waste, Wastewater Management Division, Fairfax County Park Authority and the Northern Virginia Soil and Water Conservation District participated in these cleanups. More than 1,734 volunteers removed approximately 1,713 bags of trash and litter, 200 tires, 1,883 cigarette butts, 8,559 plastic shopping bags and 31,750 plastic bottles from Fairfax County streams. All told, over 27.96 tons of trash were collected.



Figure 5-5 Volunteers participating in a watershed clean-up event in Holmes Run. Photo by NVSWCD.

According to Clean Virginia Waterways, a total of 1,022 volunteers participated in the International Coastal Cleanup in Fairfax County during September and October 2011. More than 57.5 stream and shoreline miles were cleaned, and 19,478 pounds of trash and marine debris were removed. Food wrappers and containers, litter from recreational activities and fast food consumption (i.e. cups, plates, forks, etc.), and plastic bags were the most commonly collected trash items in the county.

The county continued to promote the “Adopt a Stream” program. The Stormwater Planning Division distributed copies of its Floatables Monitoring Program Brochure to various public offices and during educational activities and outreach events throughout the county. The brochure was also made available on the county Stream Litter website:

<http://www.fairfaxcounty.gov/dpwes/stormwater/streamlitter.htm>.

Stream cleanup event organizers were encouraged to record their cleanup information on the Floatables Data Reporting Form (available in the brochure or on the county website) and return the completed form to the county. Cleanup data submitted to the county are entered in the Floatables database.

As in past years, Fairfax County Park Authority hosted and organized numerous cleanup events in many stream valley parks and two lake front parks. At least 60 stream cleanups were conducted on county parkland as part of the Alice Ferguson Foundation’s Potomac Watershed Cleanup event in the fall of 2011. These events provided an excellent learning opportunity for volunteers.

In addition, the Park Authority continues to organize separate clean up events in the spring. Clean up events in 2011 included: Colvin Run Historic Site (Colvin Run) with several bags of trash; seven clean up events in Accotink Stream Valley Park; two clean ups along Holmes Run Stream Valley Park gathering about 50 bags of trash and 20 tires; two clean ups in Pohick Creek near Hidden Pond Nature Center gathered about 9 cubic yards of trash; Riverbend Park had a Potomac River shore clean up event that attracted 20 volunteers and removed 7 bags of trash; and Lake Fairfax Park had quarterly cleanups that removed 17 bags of trash, 5 tires and construction debris. Riverbend Park staff also organized weekly Potomac River shoreline clean ups, maintains 12 large trash cans near the river in strategic locations and has fishing line recycling containers all to reduce the amount of floatables entering the Potomac River, mitigate impacts to wildlife and improve the visitor experience.

Fairfax Trails and Streams (FTS) is the Adopting Partner for Pimmit Run Stream Valley and the corresponding trail system. They coordinated large volunteer groups to remove trash and debris during the spring Potomac Watershed Clean Up and the fall Volunteerfest®. On a weekly basis, FTS core volunteers clean the stream bed and surrounding grounds, coordinating with Park Authority staff to truck the debris to the landfill and recycling sites. They also monitor the condition of the trail and stream crossings along the stream following storms and repair damage as it occurs.

Reston Association coordinated five stream cleanups during 2011 collecting over 200 bags of trash. They also sponsored a lake cleanup on June 4, 2011, during which 35 volunteers removed trash and debris from Lake Anne, Thoreau and Audubon.

### **Potomac Watershed Trash Summit**

Several staff members attended the annual Potomac Watershed Trash Summit sponsored by the Alice Ferguson Foundation in Arlington VA in October 2011. The Summit brought together key stakeholders from throughout the region to recognize progress, learn about initiatives, and work towards solutions for a Trash Free Potomac Watershed by 2013. There were several morning roundtable discussions on such topics as policy issues, containing trash and in-stream trash removal technologies. The afternoon roundtable sessions included an update on the Potomac Watershed Regional Anti-Litter Campaign and a dialogue among attendees on how to manage unusual trash items such as cigarette butts, medical sharps and shopping carts, all of which present unique challenges when discarded in streams.

### **Household Hazardous Waste Management**

Putting hazardous household wastes in the trash or down the drain contributes to the pollution of surface waters. The Fairfax County Solid Waste Management Program (SWMP) is responsible for the county's Household Hazardous Waste (HHW) Management Program where county residents are given the opportunity to properly dispose of hazardous waste (such as used motor oil, antifreeze, and other automotive fluids) at no charge. The program is supported by funding generated by the SWMP at a cost of about \$650,000 each year. The SWMP has two permanent HHW facilities that are open four days a week. The Fairfax County HHW program also accepts fluorescent lamps for disposal from county residents. SWMP staff continued to distribute an updated educational brochure describing the energy-saving benefits of using these lamps and how to dispose of them properly at the end of their useful life. The information is also made available on the county's recycling website at:

<http://www.fairfaxcounty.gov/dpwes/recycling/mat-light.htm>.

In 2011, the SWMP continued its monthly electronics recycling program for county residents known as *Electric Sunday*. The SWMP dedicates one Sunday per month where residents can drop off used computers and televisions in order to have them recycled. During its three years of operation, about 3,000,000 pounds of electronic waste, equating to about 70 tons of lead, were prevented from being introduced into the Fairfax County environment, significantly reducing the opportunity to negatively impact stormwater runoff. The county's HHW programs are open on Sunday to coincide with the *Electric Sunday* events.

The SWMP continued to collaborate with the industry-funded Rechargeable Battery Recycling Corporation Program to make collection of rechargeable batteries available at offices of all members of the Fairfax County Board of Supervisors and at major county buildings. Rechargeable batteries are also accepted at the county's HHW facilities.

### **Stream Buffer Restoration and Seedling Sale**

Fairfax County continues its countywide riparian buffer restoration project in collaboration with various partners to mitigate stormwater runoff into local streams and to support the Board of Supervisors' adopted Environmental Agenda.

As part of the County's buffer restoration program, Earth Sangha donated and installed more than 275 native trees, shrubs, and herbs and the necessary tree protectors, for the enrichment of five sites (Table 5-1).

**Table 5-1 2011 Earth Sangha buffer restoration activities.**

<i>Site</i>	<i>Number of Plants</i>	<i>Volunteer Hours</i>	<i>Staff Hours</i>
Awbrey Patent Park	55 woody plants	100	20
Roundtree Park	N.A.	99	15
Rutherford Park	170 perennials	111	19
Wakefield Park	N.A.	42	8
Wilburdale Park	30 woody plants, 20 perennials	184	37
<b>Totals</b>	85 woody plants, 190 perennials	<b>536</b>	<b>183</b>

The Fairfax County Park Authority, Fairfax ReLeaf and the Virginia Department of Forestry hosted independent stream buffer restorations in the county in 2011. The Park Authority continues to maintain and monitor the previous riparian buffer enhancement projects installed in the last five years. To date there are 35 projects on parkland throughout the county. These projects have focused on the conversion of mowed grass to areas of native trees and shrubs typical of riparian areas. In 2011, the county's partner organization, Earth Sangha, maintained and enhanced riparian plantings at Roundtree Park, Rutherford Park, and Rocky Run (Awbrey Patent). Earth Sangha also donated 100 trees that were planted by volunteers in Pohick Creek Stream Valley Park (Fig. 5-6). Park Authority staff completed additional planting projects in the RPA unrelated to the county's buffer planting program. Examples of such projects in 2011 include the planting of 130 native shrubs, grasses and forbs by an elementary school class with 55 students, parents and teachers at Annandale District Park; and the planting of 65 native trees along Turkeycock Run in Green Spring Gardens Park.

In 2011, Fairfax ReLeaf planted 3,880 trees in Fairfax County (Table 5-2). They also distributed 1,185 trees in the county.

**Table 5-2 Fairfax ReLeaf projects planted in 2011.**

<i>Location</i>	<i># of Trees</i>
Wolf Trap	77
Bull Run	50
Cardinal Forest ES #1	41
Cameron Elementary School	76
St. Mark's Episcopal Church - Eagle Scout Project	35
Pine Springs Elementary School	25
Greenbriar Elementary School	20
Mount Vernon High School	465
Crossfield Elementary School	20
Mount Vernon - LFI	45
Peace Lutheran Church Project Manager training	24
BLM	580
Kay Fowler	12
Ed Karch	100
Daly Chin - McNair Elementary School	10
Sean Duffy - Waples Mill ES	100

## 2011 Fairfax County Stormwater Status Report

<i>Location</i>	<i># of Trees</i>
Cardinal Forest Condominium Unit Owners Association	100
Bob Landsman	56
Laura Norcutt	46
Joel Newman	27
Jim Wright	14
Bob Pearson	65
Donna Murphy, Franklin Farm HOA Earth Day celebration	35
Linda Vasquez	8
Lily Whitesell	38
Chris Koerner	21
Joe McHugh	26
Laurel Hill planting	268
Government Center tree rescue	115
Bryant Towne Court (twice)	49
Awbrey Patent Park	40
Mt. Vernon RECenter	224
Bonnie Brae Elementary School	196
Belvedere Elementary School	14
Rachel Carson Middle School	27
Laurel Hill - area by I-95	237
South Run Dog Park	68
Ridge Road Estates Homeowners Association	47
Laurel Hill Project Manager training	10
Reston Association	180
Linda Brining	26
Marie Davis (Tysons corner Lions - Pimmit Hills School)	10
Roham Abtahi	23
Robert Landsman, Hayfield View development	4
John Hunnel (Eagle Scout Project)	41
Michael Biber	18
Valentina Raptis	15
Daine Blust	14
Dan Schwartz	1
Ruth Saunders	18
Vineet Kumar	48
David Penman (Lions Club - Manassas)	6
Wolf Trap	77
<b>TOTAL</b>	<b>3,880</b>

The Virginia Department of Forestry (VDOT) continues to plant riparian buffers in watersheds throughout Fairfax County in support of the county's riparian buffer initiative. In 2011, VDOT worked with volunteers from organizations such as Fairfax ReLeaf, Eagle Scouts, Homeowner Associations and school groups and planted approximately 3,400 seedlings in the county. In an attempt to expand outreach and education and planting efforts, the VDOT initiated a Tree

Stewards program. The Tree Stewards program is designed to create a cadre of trained volunteers to lead community tree plantings and provide information on the benefits and care of trees.



**Figure 5-6 Volunteerfest® invasives removal event in Pohick Stream Valley Park. Photo by FCPA.**

The Park Authority, with strong volunteer support, continued the aggressive management of invasive, non-native plants on over 50 acres of parkland as part of the Invasive Management Area (IMA) program. More than half of the management sites are within the Resource Protection Area, where the invasive species interfere with forest function of critical riparian buffer vegetation. Seven-hundred eighty native plants, trees, shrubs and ground covers were planted at eleven IMA sites in 2011. The Park Authority also contracts for herbicide removal of invasive species at selected sites. In 2011, approximately 658 acres were treated with selective herbicide for the support of invasive species eradication. At Riverbend Park, invasive plants were removed along the Potomac River shoreline for 2 ½ miles using park staff and volunteers requiring approximately 300 hours of work. Nearby, a large stand of Japanese knotweed was treated along Scott’s Run stream channel and invasive species were also pulled here using volunteers.

Reston Association managed an invasive species program at Lake Thoreau including the treatment of yellow floating heart, control of floating pondweed and removal of purple loosestrife.

NVSWCD’s 2011 seedling sale helped promote urban reforestation, habitat enhancement and water quality protection, selling 6,500 native tree and shrub seedlings. The sale offered a variety of eight seedlings, including many deer-resistant species.

## **Public School Environmental Education Partnerships**

### **Fairfax County Public Schools Curriculum**

A supplemental teacher's guide to the activity book, Stormy the Raindrop's Watershed Journey, was created by stormwater management staff in 2011. The activity book and guide are available to Fairfax County Public Schools via eCART. In addition, the Stormy the Raindrop educational campaign was awarded the bronze medal winner of the 2011 Governor's Environmental Excellence Award.

Staff continuously receives requests to speak to various schools and age groups throughout the year, including Science Honor Society meetings and high school Science Fairs.

### **Sewer Science**

The Sewer Science Program teaches county high school students about municipal wastewater treatment and stormwater management using specially designed tanks, analytical equipment, presentations and a custom student workbook. The program is a collaborative effort of three DPWES programs: Solid Waste Management, Stormwater Management, and Wastewater Management. The stormwater component of the program promotes an understanding of stormwater, its relationship with wastewater, how the water and the land are connected and how each individual can make a difference in the health of the environment. In 2011, Stormwater Management staff continued to partner with Wastewater Management and Solid Waste Management staff to bring the program to 68 classes, 1,477 students and 16 high schools.

### **Recycling Program**

Fairfax County's Solid Waste Management Program continues to provide support and education in the public school system regarding litter prevention and support for recycling. In 2011, the program:

- Continued to support the Schools County Recycling Action Program (SCRAP).
- Continued to give presentations containing a recycling message in support of the Sewer Science program for Fairfax County high school students.
- Gave recycling presentations to students in 52 schools.
- Hosted 35 tours of facilities for students of all ages.
- Sent information about recycling to approximately 150,000 Fairfax County Public School students.
- Awarded Johnnie Forte environmental grants to 13 schools to fund school environmental projects involving litter prevention, litter control or recycling.

### **Reston Association's Watershed Education Programs for Students**

Reston Association offers a watershed field trip program for students in grades three through seven. During the field trip, students learn about watersheds and explore an area of the Difficult Run watershed. Students conduct biological inventories and perform water quality tests at Lake Newport and Snakeden Branch. They also discuss ways that residents can protect the watershed. In 2011, Reston Association conducted the elementary watershed field trip for 153 students.

Reston Association also loans a traveling watershed education trunk to area schools which includes an interactive watershed model. In 2011 the trunk was loaned to Reston elementary schools for use with 473 students.

At the secondary level, Reston Association partnered with the United States Geological Survey to conduct watershed education field trips for all seventh grade students from Langston Hughes Intermediate School. Over 350 students conducted field studies in the Snakeden Branch Stream Valley and the Beaver Management Area of The Glade Stream Valley.



**Figure 5-7 Langston Hughes Intermediate School students participating in a watershed education program sponsored by Reston Association and the USGS. Photo by Reston Association.**

RA also worked with two Thomas Jefferson High School student interns to conduct water chemistry monitoring on restored streams in Reston.

RA continued the water quality monitoring program and Group 4 program with USGS and South Lakes High School students. Over 400 high school students experienced a stream study in the Snakeden Branch Stream Valley.

### **Envirothon**

Envirothon is a hands-on natural resources competition for high school teams. Training takes place throughout the year and competitions are held at the local, regional, state and national levels. NVSWCD sponsors the local program in Fairfax County. In 2011, NVSWCD provided training to teams from James Madison High School, George Marshall High School, Langley High School, Centreville High School, Hidden Pond Nature Center and Vienna Boy Scout Troop 152 in the local Envirothon competition held at Hidden Oaks Nature Center. The top two teams from the local competition- Hidden Pond and James Madison - represented Fairfax County in the regional competition in Warrenton, Fauquier County. Hidden Pond advanced on and represented the county at the state competition, where the team placed second overall.

## **Technical Support and Training**

### **Land Development Services**

- Conducted a training course on erosion and sediment controls for the Engineering and Surveyors Institute.
- Participated in a stormwater pond inspection training session.

### **Northern Virginia Soil and Water Conservation District**

- Provided technical advice directly to homeowners and homeowner associations during 117 site visits to advise on solving drainage and erosion problems.
- Provided soils information to 76 consultants, realtors and homeowners. In addition, the Web Soil Survey and the county's GIS department make soils information easily accessible to professionals and the public.
- Technical assistance was provided to county agencies 77 times to solve problems and assist with projects.
- Responded to 2,165 information inquiries by telephone, email and office visits.

### **Environmental Horticulture Division of Fairfax Cooperative Extension**

Home lawns in Virginia comprise nearly 62% of the 1.7 million acres of managed turfgrass in the state and account for \$1.7 billion in annual expenditures. Many homeowners apply chemical fertilizers and pesticides to keep their lawns healthy and green. Without proper training, it is easy to over apply or inappropriately apply chemical inputs leading to run-off into local streams and waterways. Excessive use and misapplication of chemical fertilizer can lead to excess nitrogen and phosphorous which can potentially reach storm drains or sewers and ultimately compromise ground or surface waters. This trend paired with high levels of residential development dramatically increases the potential overall impact on water quality. Ultimately the water quality of the Chesapeake Bay is compromised.

In 2008, VCE started a Master Gardener volunteer program to provide educational and technical services to homeowners with regard to home lawn management. Fairfax County created the Home Turf Nutrient Management program to bring awareness to local water quality as it is impacted by residential lawn care practices. Home lawns in Virginia comprise nearly 62% of the 1.7 million acres of managed turfgrass in the state and account for \$1.7 billion in annual expenditures. Many homeowners apply chemical fertilizers and pesticides to keep their lawns healthy and green. Without proper training, it is easy to over apply or inappropriately apply chemical inputs leading to run-off into local streams and waterways. Excessive use and misapplication of chemical fertilizer can lead to excess nitrogen and phosphorous which can potentially reach storm drains or sewers and ultimately compromise ground or surface waters. This trend, paired with high levels of residential development, dramatically increases the potential overall impact on water quality. Ultimately the water quality of the Chesapeake Bay is compromised.

In 2011, VCE Master Gardeners received 28 hours of training on turf best management practices. VCE Extension Specialist trainings were held to train volunteers on turf nutrient management practices. Forty six homeowners had their lawns measured, 52 soil tests were submitted, and 37 urban nutrient management plans were written and given to their respective homeowner. In

2009, a VCE Master Gardener volunteer took on leadership of this program and helped develop nutrient management plans which promote best practices. The volunteers continue to lead the way with this program. They have developed a survey of garden centers and the lawn care products they have for homeowner purchase.

## **6. Strategic Initiatives**

The Department of Public Works and Environmental Services (DPWES) and its partners continue to improve watershed protection and stormwater quality through initiatives to control runoff and reduce the negative environmental effects of impervious area. The following section discusses some of these initiatives as well as continuing efforts by DPWES and its partners to improve the county's stormwater management program and meet state and federal requirements to control stormwater runoff and improve the water quality in our streams and water bodies.

### **Stormwater Water Quality**

The use of multiple low impact design (LID) practices on a site is an effective method to improve the quality of stormwater flowing from the site into county streams. Fairfax County continues to recommend and encourage LID development techniques. LID practices are being incorporated as permitted by the Public Facilities Manual and the related Letters to Industry to improve the quality of stormwater leaving a site. Onsite infiltration, groundwater recharge, and filtration of pollutants are some of the benefits that can be achieved by these practices. The county also encourages developers and landowners to retrofit areas in the county that do not have adequate stormwater controls.

### **Flood Response and Dam Safety**

The county distributed a newsletter to more than 19,000 residents that live in or near a floodplain and updated its website to provide relevant information on floodplains, flood insurance, flood preparedness and flood safety. The county annually reviews and updates its flood response plan to incorporate operational changes, communications strategies and other actions and updates the emergency action plans for 19 state-regulated dams owned and maintained by the county. Stormwater proactively responds in the event of a flooding threat using the guidance provided by the flood response plan. Electronic devices installed at 18 dams and in the Huntington and Belle View communities are also used to closely monitor the potential for flooding. Training, monitoring information and instructions, inundation flood maps and safety equipment are provided to staff involved in field monitoring. All of these critical tools and resources are used by the county when responding to flooding events such as Hurricane Irene in August and Tropical Storm Lee in September.



**Figure 6-1 Emergency responders reviewing inundation flood maps during Hurricane Irene. Photo by Fairfax County.**

Fairfax County's Dam Safety Program is responsible for 19 state regulated dams approved by the Virginia Department of Conservation and Recreation. The program coordinates the safety operation and maintenance certificates and emergency action plans related to flooding for county-owned facilities. The county's Dam Safety Program includes various services such as inspection, certification, routine maintenance, dredging and capital construction to ensure compliance with dam safety requirements.

### **Watershed Management Plans Non-Structural Projects and Policy Recommendations**

Each watershed management plan includes a list of proposed non-structural projects, such as stream buffer restorations, rain barrel programs and community outreach and education. These projects, in concert with the structural projects, represent a holistic approach to watershed management. Since much of the land area in Fairfax County is privately owned, there is a need to work with local communities to promote environmental awareness and provide advice on improvements that can be implemented by residents and other groups.

The first six plans include a list of policy and action recommendations that, when implemented, will improve environmental stewardship in the county's communities and watersheds. County staff are working together with several partners and agencies to develop a plan to prioritize and implement these non-structural projects and policy recommendations. At this time, each of the 300+ recommendations have been reviewed, categorized by feasibility and consolidated by themes. Project feasibility, effectiveness and resource needs will be considered during the prioritization process.

### **Infrastructure Reinvestment**

Based on a pilot study, it is estimated that five percent of the county's storm drain conveyance system is failing and another ten percent exhibits the beginning signs of failure. The county's storm conveyance inventory, valued at over \$1 billion, has pipes and storm structures in excess of 80 years old and primarily consists of facilities with an expected life cycle of 75 years. The county's stormwater management inventory is valued at over \$0.5 billion and has an expected life cycle of 40 years. During 2011, DPWES began development of a comprehensive condition

assessment program that will eventually support a sustainable rehabilitation program for the \$1.5 billion stormwater infrastructure systems. At this time, approximately 21.2 percent of the conveyance inventory has been assessed through photo and video documentation and a condition assessment rating methodology is under development.

## **Literature Cited**

Fairfax County Department of Public Works and Environmental Services (DPWES). 2007. Fairfax County Dry Weather Screening Program: Site Selection and Screening Plan. Fairfax County Department of Public Works and Environmental Services, Stormwater Planning Division. Fairfax, Virginia. September.

This page was intentionally left blank