2006 Fairfax County
Stormwater Status Report

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2006

Fairfax County

Stormwater Status Report

Report prepared and compiled by:
Stormwater Planning Division,
Department of Public Works and Environmental Services
Fairfax County, Virginia
May 31, 2007

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Introduction

This report highlights the accomplishments of Fairfax County's stormwater management program in 2006 and describes the county's ongoing stormwater management programs, the challenges it faces, and the partnerships forged to meet those challenges. The stormwater management program supports the water quality (and quantity) theme of the Board of Supervisor's' 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 of 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 streambanks 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:

- Developing 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 reduce volume of water 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 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 county agencies, and many divisions in DPWES. These include:

Private organizations

- Audubon Naturalist Society
- Earth Sangha
- Fairfax ReLeaf
- Northern Virginia Regional Commission
- Northern Virginia Soil and Water Conservation District

- 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

Department of Public Works and Environmental Services divisions
- Code Services Staff
- Environmental and Facilities Inspections Division
- Environmental and Site Review Division
- Maintenance and Stormwater Management Division
- Planning and Design 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

The subsequent pages provide an in-depth look into stormwater management in Fairfax County under the following categories:

1. Watershed Management Planning. The county has completed and is implementing two watershed management plans; two more plans were completed in late 2006 and were approved for implementation by the Board of Supervisors on February 26, 2007. Two additional plans are in the final draft stage with completion slated for this year. Combined, these six plans will cover more than 50 percent of the land area in the county. Within the next few years, watershed management plans will be completed for the entire county and will provide an assessment of stormwater conditions, recommend protection strategies and improvement projects, and encourage public involvement.

2. Improvements to Stormwater Management Infrastructure. Fifty-six stormwater management projects were completed by the county in 2006. These projects were designed to mitigate or alleviate house and yard flooding, provide stormwater control through construction or retrofitting of stormwater facilities, and stabilize stream banks or restore streams. The county and its partners constructed demonstration projects to encourage the use of low impact development concepts and techniques.

3. Maintenance and Operation. The county maintains more than 1,200 stormwater management facilities and inspects one-fifth of the 2270 privately maintained facilities each year. Maintenance and operation also includes: other stormwater infrastructure; roadways; sanitary sewer systems; public rights of way, parks, and other municipal properties; and county landfills. The county is investigating reducing the use of pesticides, herbicides and fertilizers on public property. The county's Fire and Rescue Department responds to all reported incidents of hazardous material releases, spills, and discharges. This reduces the possibility of the material reaching the county's storm sewer infrastructure and streams.

4. Monitoring and Assessment. The county conducts watershed water quality monitoring, dry weather screening, wet weather industrial high risk monitoring, bacteria monitoring, and bioassessment of fish and aquatic invertebrates. The county also uses data collected by more than 400 volunteer monitors and 500 students to track stream conditions.

5. Public Outreach and Education. The county conducted presentations and staffed booths at community meetings and events to raise awareness of non-point source pollutants and the actions residents can take to help protect streams. The county partnered with numerous local agencies to promote environmental stewardship events such as the stream cleanups in 2006 that mobilized more than 1,000 volunteers. The county also partnered with various organizations to host a high school science program, a middle school teacher training program, stream buffer restoration projects, and a regional pollution prevention radio campaign.

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

1. Watershed Management Planning

Watershed management plans have been completed and are currently being implemented for Little Hunting Creek and Popes Head Creek. Two watersheds plans were largely completed in 2006 and were adopted by the Board of Supervisors in February 2007. One was for Difficult Run, the largest watershed in the county; the other encompassed two watersheds that are adjacent to each other, Bull Run and Cub Run. Two additional plans covering six more watersheds are in the final draft stage with completion slated for Summer 2007. Combined, these six plans will cover 11 of the county's 30 watersheds and 50 percent of the land area in the county. In 2007, work was initiated for the remaining 50 percent, and all of the watershed plans are anticipated to be completed before 2010. The current status of watershed planning is presented in more detail in Table 1.1.

Watershed management plans are being developed in support of Virginia's commitment under the Chesapeake Bay 2000 Agreement, and are part of the Fairfax County Board of Supervisors' Environmental Agenda. The development of comprehensive watershed management plans began in 2003 with the Little Hunting Creek Watershed. The plans begin with a review and synthesis of previous studies and compilation of available data. This information is used to evaluate current watershed conditions and to project stormwater runoff from ultimate development conditions, allowing a thorough characterization of each watershed. The characterization is used to identify candidate sites for development of structural and non-structural projects designed to address problem areas or to preserve high quality areas in each watershed. Preliminary cost estimates are then developed for proposed projects, and a cost/benefit analysis is used to help prioritize projects and develop an implementation plan. Public involvement is used throughout the process to obtain input, provide education on watershed issues, and build community support for the final watershed management plan.

Table 1.1: Status of Fairfax County watersheds in planning process

Watershed Planning Group	***Watershed Name***	***Total Area (sq. mi.)***	***Fairfax Co. Area (sq. mi.)***	***Plan Status***
Little Hunting Creek	Little Hunting Creek	11.2	11.2	Adopted 02/2005
Popes Head Creek	Popes Head Creek	18.9	18.2	Adopted 01/2006
Cub Run and Bull Run	Bull Run	6.0	6.0	Adopted 02/2007
	Cub Run	55.2	38.2	
Difficult Run	Difficult Run	58.1	55.3	Adopted 02/2007
Cameron Run	Cameron Run	44.8	32.6	Final Draft
Middle Potomac Watersheds	Bull Neck Run	2.3	2.3	Final Draft
	Dead Run	3.1	3.1	
	Pimmit Run	12.6	10.3	
	Scotts Run	6.0	6.0	
	Turkey Run	2.0	2.0	
Little Rocky Run and Johnny Moore Creek	Johnny Moore Creek	5.3	5.3	Initiated 2007
	Little Rocky Run	7.4	7.4	
Accotink Creek	Accotink Creek	51.1	37.8	Initiated 2007

Table 1.1: Status of Fairfax County watersheds in planning process

Watershed Planning Group	***Watershed Name***	***Total Area (sq. mi.)***	***Fairfax Co. Area (sq. mi.)***	***Plan Status***
Pohick Creek	Pohick Creek	36.5	34.3	Initiated 2007
Sugarland Run and Horsepen Creek	Horsepen Creek	23.7	8.8	Initiated 2007
	Sugarland Run	22.7	10.5	
Dogue Creek	Dogue Creek	19.4	13.4	Initiated 2007
Lower Occoquan Watersheds	High Point	6.3	6.3	Initiated 2007
	Kane Creek	4.8	4.8	
	Mill Branch	8.8	8.8	
	Occoquan	3.4	3.4	
	Old Mill Branch	4.4	4.4	
	Ryans Dam	3.6	3.6	
	Sandy Run	8.2	8.2	
	Wolf Run	5.9	5.9	
Nichol Run and Pond Branch	Nichol Run	7.7	7.7	Initiated 2007
	Pond Branch	8.4	8.4	
Special Studies	Belle Haven	2.8	2.8	Initiated 2007
	Four Mile Run	30.9	2.0	

The status of current watershed planning projects at the end of 2006 is presented below.

Little Hunting Creek

The Little Hunting Creek watershed drains 11 square miles in the southeast portion of Fairfax County. The majority of the land use in the watershed is residential with commercial areas located along Route 1 (Richmond Highway). The watershed is approximately 92 percent developed. In 2006, the Virginia Department of Environmental Quality identified the tidal portion of Little Hunting Creek as impaired due to high levels of bacteria and impacts to aquatic plants. The tidal portion of Little Hunting Creek had previously been identified as impaired due to high levels of polychlorinated biphenyls (PCBs) in fish tissue in 2002.

The Little Hunting Creek watershed management planning process was initiated in March 2003, and the final watershed management plan was adopted by the Board of Supervisors in February 2005. The plan was developed in cooperation with an advisory committee comprised of approximately 15 members representing stakeholder groups in the watershed, and a series of public meetings was held for watershed residents to collect information about problem areas and obtain feedback regarding proposed solutions. The final plan includes more than 75 structural projects such as new stormwater management facilities, water quality improvements to existing stormwater management facilities, and stream restoration projects, as well as recommendations for modifications of county policies and procedures. Approximately 34 structural projects have been initiated in the Little Hunting Creek, and five are now complete. Additional projects and other recommendations of the plan will be initiated and funded through the annual budget process.

Popes Head Creek

The Popes Head Creek watershed drains 19 square miles in the southwest portion of Fairfax County. Portions of the watershed were re-zoned as part of the Residential-Conservation District to protect water quality in the Occoquan Reservoir. This zoning protects those portions of the watershed from high density development by limiting density to one house per five acres. Most of the watershed remains forested with low density residential development being the predominant developed land cover. In 2006, the Virginia Department of Environmental Quality identified Popes Head Creek as impaired due to high levels of bacteria. Popes Head Creek had previously been identified as impaired due to impacts to benthic macroinvertebrates in 1998.

The Popes Head Creek watershed management planning process was initiated in September 2003, and the final watershed management plan was adopted by the Board of Supervisors in January 2006. The plan was developed in cooperation with an advisory committee comprised of approximately 17 members representing stakeholder groups in the watershed, and a series of public meetings was held for watershed residents to collect information about problem areas and obtain feedback regarding proposed solutions. The resulting plan includes more than 70 structural projects such as new bioretention facilities, water quality improvements to existing stormwater management facilities, and stream restoration projects, as well as recommendations for modifications to county policies and procedures.

Cub Run and Bull Run

The Cub Run and Bull Run watersheds drain a 61 square mile area of Northern Virginia, with 44 square miles of this area located in the western portion of Fairfax County. The remaining area lies within Loudoun County. This area has undergone rapid growth over the past 20 years. Portions of the watershed were re-zoned as part of the Residential-Conservation District to protect water quality in the Occoquan Reservoir. This zoning protects those portions of the watershed from high density development by limiting density to one house per five acres. In 2006, the Virginia Department of Environmental Quality identified Cub Run as impaired due to high levels of bacteria. Bull Run had previously been identified as impaired due to impacts to benthic macroinvertebrates in 1996, and due to high levels of bacteria and PCBs in fish tissue in 2004.

The Cub Run/Bull Run watershed management planning process was initiated in September 2003, and the final watershed management plan was adopted by the Board of Supervisors in February 2007. The plan was developed in cooperation with an advisory committee comprised of approximately 28 members representing diverse watershed stakeholder groups. The fourth and final public meeting was held as an open house in June 2006 to collect information from watershed residents about problem areas, raise awareness of specific issues facing Bull Run and Cub Run, and obtain feedback regarding proposed solutions. Presentations were also made to three homeowners associations in March 2006 and two special interest groups in January and February 2006. The planning process also involved significant coordination with the Fairfax County Park Authority's Sully Woodlands Regional Master Plan, the Metropolitan Washington Airport Authority's plans to expand Dulles Airport, and the Virginia Department of Transportation's Tri-County Parkway Location Study. The resulting plan includes 90 structural projects such as water quality improvements to existing stormwater facilities, riparian buffer

restoration projects, and stream restoration projects, as well as recommendations for modifications to county policies and procedures.

Difficult Run

The Difficult Run watershed drains 58 square miles in the north-central portion of Fairfax County and is the largest watershed in the county. The watershed is substantially developed, primarily in residential uses. As late as 1976, approximately half of the watershed remained in forest or agriculture, although further residential subdivisions followed. By the 1990s most of the watershed was built out, including a major commercial corridor established after the Dulles Toll Road opened in 1984. The remaining open space is primarily in park land. In 2006, the Virginia Department of Environmental Quality identified Difficult Run as impaired due to heptachlor epoxide and PCBs in fish tissue. Difficult Run had previously been identified as impaired due to impacts to benthic macroinvertebrates in 1996, and due to high levels of bacteria in 2004.

The Difficult Run watershed management planning process was initiated in February 2004, and the final watershed management plan was adopted by the Board of Supervisors in February 2007. The plan was developed in cooperation with an advisory committee comprised of approximately 20 members representing diverse watershed stakeholder groups. The fourth and final public meeting was held in October 2006 to collect information from watershed residents about problem areas, raise awareness of specific issues facing Difficult Run, and obtain feedback regarding proposed solutions. The resulting plan includes more than 250 structural projects such as water quality improvements to existing stormwater facilities, drainage retrofit projects, and stream restoration projects, as well as recommendations for modifications to county policies and procedures.

Cameron Run

The Cameron Run watershed drains a 45 square mile area of Northern Virginia, with 33 square miles of this area located in the east-central portion of Fairfax County. The remaining area lies within the cities of Falls Church and Alexandria. The watershed has a long history of urbanization and the majority of land in the watershed was developed by the early 1970s. The high degree of impervious surface in the watershed has resulted in substantial impacts to streams. In 2006, the Virginia Department of Environmental Quality identified Cameron Run as impaired due to high levels of bacteria. Three tributaries to Cameron Run – Backlick Run, Holmes Run and Tripps Run – had previously been identified as impaired due to high levels of bacteria and impacts to benthic macroinvertebrates in 2002 and 2004.

The Cameron Run watershed management planning process was initiated in 2003. The plan was developed in cooperation with an advisory committee comprised of approximately 15 members representing diverse watershed stakeholder groups. The fourth and final public meeting was held in December 2006 to collect information from watershed residents about problem areas, raise awareness of specific issues facing Cameron Run, and obtain feedback regarding proposed solutions. Comments received on the final draft plan are currently being incorporated into the plan. The final management plan for Cameron Run is slated for adoption by the Board of Supervisors in 2007.

Middle Potomac Watersheds

The Middle Potomac Watersheds drain a 26 square mile area of Northern Virginia, with 24 square miles of this area located in the northeast portion of Fairfax County. The remaining area lies within Arlington County. The planning area encompasses five separate watersheds: Pimmit Run, Bull Neck Run, Scotts Run, Dead Run, and Turkey Run. The majority of the land use is medium- and low-intensity residential, with sizable commercial areas located in Tysons Corner and McLean. A significant portion of the watersheds is occupied by major road rights-of-way, including Interstate 495 (Capital Beltway) and Route 267 (Dulles Access and Toll Road). Over the last 10 years, significant infill development has occurred in the watersheds and poses special challenges for stormwater management. In 2006, the Virginia Department of Environmental Quality identified Pimmit Run as impaired due to chlordane, heptachlor epoxide and PCBs in fish tissue. Pimmit Run had previously been identified as impaired due to high levels of bacteria in 2002.

The Middle Potomac watershed management planning process was initiated in September 2004. The plan is being developed with guidance from an advisory committee comprised of approximately 20 stakeholders representing diverse stakeholder groups in these five watersheds. The planning process also involves significant coordination with the Tysons Land Use Task Force to ensure that opportunities for additional stormwater controls are incorporated into the Tysons Comprehensive Plan. The Tysons Corner area is located in the Scotts Run watershed and has the potential for major redevelopment; four Metrorail stations are planned for the area. The final management plan for the Middle Potomac Watersheds is slated for adoption by the Board of Supervisors in 2007.

Remaining Watersheds

Watershed management plans for the remainder of the county includes the following watershed groups: Accotink Creek, Pohick Creek, Little Rocky Run/Johnny Moore Creek, Lower Occoquan, Nichol Run/Pond Branch, Sugarland Run/Horsepen Creek, and Dogue Creek/Belle Haven. These remaining watershed plans were initiated in early 2007.

2. Improvements to Stormwater Management Infrastructure

In 2006, Fairfax County completed 56 projects designed to mitigate or alleviate house and yard flooding, provide stormwater control through construction or retrofitting of stormwater facilities, and stabilize stream banks or restore streams. Ten additional projects demonstrating low impact development (LID) techniques and best management practices (BMP) were also launched.

Among the agencies and organizations that contributed to stormwater infrastructure improvement efforts in 2006 were the Department of Public Works and Environmental Services, the Fairfax County Park Authority, the Northern Virginia Soil and Water Conservation District, and the Northern Virginia Regional Commission. These agencies occasionally partnered to complete projects. For example, three agencies were involved in the implementation of the Cub Run Recreation Center and Mount Vernon Recreation Center LID demonstration projects (described below).

This section summarizes county improvement projects undertaken in 2006.

Flood Mitigation and Alleviation

In June 2006, the County experienced intense rainfall that produced stream flows in the 50-100 year reoccurrence range. Stormwater divisions of the Department of Public Works and Environmental Services (DPWES) responded to 1,373 calls for assistance. While many responses required a relatively simple action such as clearing an inlet or pipe of debris, design projects were initiated at 87 locations to prevent future house flooding. Construction was completed at eight locations, as indicated in the table below, with 79 currently under development. The largest single area impacted was Huntington, where 160 homes were flooded by Cameron Run. The County engaged the US Army Corps of Engineers to determine contributing factors to the flood, and to design and evaluate alternative solutions. This effort was coordinated with the City of Alexandria and the Virginia Department of Transportation. A report on contributing factors was issued in January 2007, and a community workshop presenting alternative solutions was conducted in spring 2007. As a result, new flood plain elevations have been adopted in the Huntington area.

In addition to the eight projects referenced above, DPWES also designed and constructed an additional eight projects to address specific residential flooding problems. Table 2.1 contains a list of all 16 projects, summarizing the problem or the immediate conditions that contributed to individual drainage concerns along with the solutions applied in each case. Measures taken to reduce the potential for flooding include installation of storm sewers, renovation of storm sewer inlets, and construction of overland relief swales.

Table 2.1 DPWES flood protection projects completed in 2006

Project Name	***Problem***	***Solution***
1221 Aldebaran Drive	Potential flooding at dwelling	Constructed a new storm sewer headwall, and entrance; lowered the trail embankment to ensure overland relief; and constructed a retaining wall.
6619 Brawner Street	**June 2006 House Flooding**	Replaced grate inlet - more efficient with less potential for being blocked by debris.
5905 Brookview Drive	Inadequate storm drainage	Constructed a concrete retaining wall and a 10 foot wide overflow swale.
2818 Derek Road	Yard flooding	Installed three yard inlet structures, 210 feet of storm pipe and graded the site.
6914 Edgebrook Drive	**June 2006 House Flooding**	Constructed areaway steps and a landing for additional 24 inches of flood protection.
7297 Hillary Street	**June 2006 House Flooding**	Lowered the storm sewer inlet, provided additional throat, and constructed an overland relief swale.
Indian Run Phase IVB, 6833 Little River Turnpike	Potential flooding at site	Constructed concrete abutments, installed a bridge and graded site.
Indian Springs Phase II Storm Drainage Improvement	Community lacked underground drainage system.	Installed underground drainage system.
5374 Laura Bell Lane	**June 2006 House Flooding**	Relocated the fence, and graded an overland relief swale. Added areaway steps and a landing for additional 12 inches of flood protection.
Magnolia Lane	**June 2006 House Flooding**	Installed 240 feet of storm sewer.
North River Street	Several house floodings due to undersized drainage system	Installed 205 feet of underground drainage system to alleviate house flooding.
Portside	Potential flooding at dwelling	Replace grated inlet with a more efficient yard inlet, and re-graded site to provide an overland relief swale.
6711 Tennyson Dr.	**June 2006 House Flooding**	Constructed a floodwall and installed a sump pump.
Weaver Avenue	**June 2006 House Flooding**	Constructed 3 foot high courtyard wall and installed a sump pump.
8303 West Blvd	Potential flooding at dwelling	Retrofitted storm inlet to reduce flood potential
Westmoreland Road Flood Proofing Phase I	**June 2006 House Flooding**	Constructed a flood wall surrounding two entry doors.

Figure 2.1 depicts improvements that were made at 6619 Brawner Street. At issue was a blocked storm sewer inlet that caused a nearby home to flood. DPWES solved this problem by replacing the original grate inlet with a more efficient entrance that is less likely to be blocked by debris. Figure 2.2 provides two other examples of the design and construction work DPWES performed in 2006 to alleviate flooding at individual dwellings.

Original grate inlet at 6619 Brawner Street *Improved inlet at 6619 Brawner Street*

Figure 2.1 A storm sewer inlet before and after DPWES flood alleviation efforts

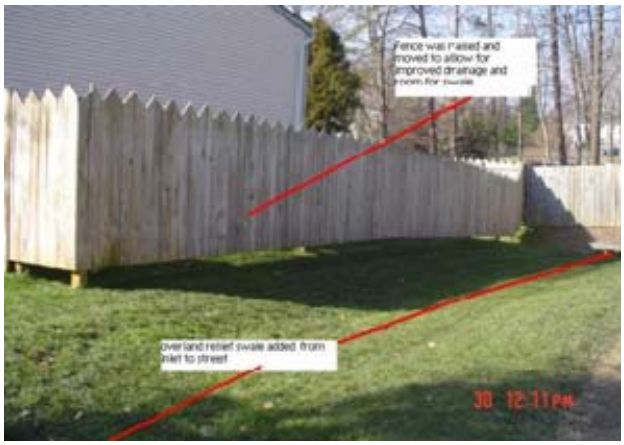

Figure 2.2 Other examples of completed flood alleviation projects
Left: Moving the fence and grading an overland relief swale were among the actions taken to protect this Laura Bell Lane residence from flooding. Right: New areaway steps (with brick encasement) and a landing provide additional 24" flood protection at this Edgebrook Drive home.

In addition to the flood protection projects summarized above, the Northern Virginia Soil and Water Conservation District (NVSWCD) and the county have been assisting homeowners in the Falls Hill and Poplar Heights subdivisions to find solutions to severe flooding as well as erosion and drainage problems within these communities. A retrofit plan has been developed to manage the stormwater runoff and protect those properties in immediate danger of flooding, including measures to deal with existing stream bank erosion.

New Construction of Stormwater Management Ponds

As part of Fairfax County's Regional Pond Program, developers substantially completed two regional stormwater management ponds in 2006. Combined, these ponds control runoff from 355 acres of land. In addition, the Fairfax County Park Authority (FCPA) completed construction of a stormwater management pond at Clemyjontri Park. Details about these projects are presented in Table 2.2. Two more regional ponds were under construction and five regional facilities were in the design planning stage in 2006.

Table 2.2 Regional pond construction

Project Name	***Description***	***Partners***
Regional Pond R-16	A dry pond with extended drawdown of the one-year storm for improved stream bank protection. Water quantity and quality control for a 120-acre drainage area.	Developer of Sully Manor and Fairfax County
Regional Pond R-161	An extended dry pond with wetland plantings as part of a shallow wetland system. Water quantity and quality control for a 235-acre drainage area.	Developer of Faircrest and Fairfax County
Clemyjontri Park	The pond features a wetland forebay with native plantings.	FCPA

Retrofits to Existing Stormwater Management Infrastructure

In 2006, DPWES and FCPA retrofitted 27 stormwater management facilities to improve water quality. These water quality retrofits enhanced nutrient uptake, provided an increase in water infiltration, uptake and transpiration, and created habitat for wildlife. Table 2.3 summarizes these retrofit projects. Photographs from two of the projects appear in Figure 2.3.

At London Towne West Section 1A, a failed principal spillway pipe was replaced to prevent further dam breaches and enhance water quality.

Burgoyne Forest Mount Pond was repaired and retrofitted to provide detention and improve water quality.

Figure 2.3 Examples of completed retrofits to existing stormwater management facilities

Table 2.3 Infrastructure retrofit projects completed in 2006

Project Name	***Problem/Need***	***Solution***	***Partners***
Americana Drive Storm Drainage Improvement	Collapsed end wall, pipe and structure	Replaced collapsed pipe and structure, completed 50 linear feet of stream bank stabilization/restoration.	DPWES
Autumnwoods Stormwater Management Facility	Flooding of nearby soccer field	Excavated silt and replaced grate inlet with headwall and BMP plate.	DPWES
Barton Place	Excavation	Removed silt.	DPWES
Braddock Forest	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Burgoyne Forest Mount Pond Repair/Retrofit	Failed detention pond; clogged outfall pipe and washed-out emergency spillway	Pond was repaired and retrofitted to provide detention and improve water quality.	DPWES
Centreville Green Pond 4A	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Confederate Ridge	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Crestleigh Pond 1	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Crestleigh Pond 2	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Crosspointe Sec., Third Addition	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Fair Ridge Pond C	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Fairfax County Boys Probation	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Fairview Woods Regional Pond	Pond didn't drain properly, always held water	Excavated silt.	DPWES
Fire Station 16	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Glenbrook Wood Drive Pond Retrofit	Failed principal spillway pipe caused breached dam	Replaced principal spillway and provided enhanced water quality.	DPWES
Island Creek Section 4 Pond 4	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Lake Accotink Dredging, Lake Accotink Park	Needed to increase volume and reduce peak flows	Dredging began in 2006. Dredging goal is 200,000 CY of material. To date 55,000 CY has been removed.	DPWES, FCPA
Little Hunting Creek – Noral Place Pond Retrofit	Site lacked water quality treatment	Excavated and graded pond, replaced existing riser structure, included some stream restoration.	DPWES
London Towne West Section 1A	Failed principal spillway pipe caused breached dam	Replaced principal spillway and provided enhanced water quality.	DPWES
Monroe Manor Sec 4	Dry pond repair	Replaced BMP plates and trash racks.	DPWES

Table 2.3 Infrastructure retrofit projects completed in 2006

Project Name	***Problem/Need***	***Solution***	***Partners***
New Alexandria Tide Gate Retrofit	Sub-surface piping	Constructed a subsurface grout wall between the tide gate and "I" Street to increase effectiveness of closed gate system during high water conditions.	DPWES
Oakton Grove	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Ridge Top Terrace Pond 2	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
The Sycamores at Van Dorn	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Valley View Manor	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Walden of McLean	Dry pond repair	Replaced BMP plates and trash racks.	DPWES
Westport Pond B	Dry pond repair	Replaced BMP plates and trash racks.	DPWES

Stream Restoration and Stabilization

In 2006, the county completed 10 stream restoration projects with the assistance of a number of non-profit organizations and volunteers. Photographs of two of the stream restoration projects are shown in Figures 2.4 and 2.5. A summary of the projects is provided in Table 2.4.

Figure 2.4 Barnyard Run after stream stabilization.
Grade controls and bioengineering practices were used to stabilize the banks in Huntley Meadows Park.

Figure 2.5 Scotts Run after stream stabilization
A streambank stabilization project was completed to alleviate severe erosion near The Colonies at Scotts Run.

Table 2.4 Stream restoration and stabilization projects completed in 2006

Project Name	***Problem***	***Solution***	***Partners***
Difficult Run Stream Valley Park – Area #3 Stream Stabilization, Upstream	Erosion in area adjacent to Georgetown Pike on Difficult Run near the confluence with the Potomac River	Installed root wads, large boulder revetments, a rock vane, and vegetated geo-grids in the upstream portion of Difficult Run in order to recreate the natural meander of the channel while stabilizing the toe and banks.	FCPA
Difficult Run Stream Valley Park – Area #3 Stream Stabilization, Downstream	Erosion in area adjacent to Georgetown Pike on Difficult Run near the confluence with the Potomac River	Redirected flow with large boulder revetments and two rock vane structures. Shaped and graded the bank, placed a vegetated geo-grid on the banks, and filled existing scour areas to stabilize the eroding embankment toe adjacent to the parking area.	FCPA
English Hill Subdivision Streambank Stabilization	Severe erosion on the streambank of unnamed tributary of Sandy Run	Installed 175 linear feet of streambank stabilization.	DPWES
Haycock Longfellow Park Stream Restoration (tributary to Spring Branch and Pimmit Run)	Desired alternative to a rip-rap channel that would meet the developer's adequate outfall requirement	Bioengineered solution was designed on approximately 270 feet of stream that featured large boulder cross-veins with step pools, a reestablished floodplain and native plantings while only requiring the removal of one tree.	FCPA, DPWES
Huntley Meadows Park Barnyard Run Stream Restoration	Erosion on Barnyard Run along the northern border of Huntley Meadows Park on the southern side of Lockheed Boulevard near the Groveton Gardens apartment complex	Removed silt from within the stilling basin, reconstructed and stabilized the stilling basin, constructed flow control measures, graded and stabilized the banks of about 700 lineal feet of channel using bioengineering techniques, and vegetated disturbed areas.	FCPA, DPWES

Table 2.4 Stream restoration and stabilization projects completed in 2006

Project Name	***Problem***	***Solution***	***Partners***
Little Pimmit Run	Streambed erosion leading to sanitary sewer main breakage	Performed emergency repairs to sewer, including temporary pump around sanitary flow, construction of 125 linear feet of new 24" sanitary sewer main; stream bank stabilization by gabion walls and riprap and restoration.	DPWES
Pleasant Ridge	Stream was eroding and the stormwater outfall was damaged potentially affecting a house	Restored and stabilized stream bank and repaired stormwater outfall.	DPWES
Runnymeade Subdivision	Erosion on unnamed tributary of Cameron Run	Installed grade controls and restored stream with bioengineering practices.	DPWES
Swinks Mill Road	Severe erosion on the streambank of Scotts Run and one house flooding	Installed flood wall to protect flooding house and installed 180 linear feet of streambank stabilization.	DPWES
The Colonies at Scotts Run	Severe erosion on the streambank of Scotts Run	Installed 180 linear feet of streambank stabilization to protect the structure and to alleviate severe erosion.	DPWES

In addition to the completed projects summarized above, planning commenced on two major restoration projects: stream restoration on about 500 feet of Turkeycock Run at Green Spring Gardens; and restoration of the central wetland at Huntley Meadows Park. Also in 2006, the Reston Association worked with several clusters and individual homeowners on various shoreline stabilization and stream restoration projects using bio-logs, erosion cloth, and native plantings. This was part of the Reston Association's active watershed and lakes management program. A stream restoration bank in Reston was also approved in March 2006. Aerial photography of Reston's watersheds and surveying and tagging over 10,000 trees in the stream valleys was conducted as part of establishing the groundwork for future restorations.

Low Impact Development

Environmentally sensitive site design and low impact development (LID) practices serve to minimize impervious cover and replicate natural hydrologic conditions. Fairfax County recommends and encourages "Better Site Design" development techniques that are protective of streams and other natural resources. It also encourages the use of LID concepts and techniques, especially in development of new residential and commercial areas and in retrofitting established areas.

DPWES, NVSWCD, FCPA, nonprofit organizations, and individual volunteers contributed to the design and implementation of 10 LID projects in 2006. These innovative projects are helping the county to meet multiple stormwater management goals. The visibility and accessibility of certain projects provide opportunities to educate county agencies and the public on the benefits of LID. LID projects can also be selected to meet space constraints and aesthetics.

Under the Board of Supervisor's Environmental Improvement Program, DPWES partnered with NVSWCD and FCPA on LID demonstration projects at the Mount Vernon Recreation Center (Figure 2.6) and the Cub Run Recreation Center. These and other LID projects are summarized in Table 2.5.

Figure 2.6 Mount Vernon Recreation Center LID Demonstration

Table 2.5 LID projects in construction and planning phases or completed in 2006

Project	***Description***	***Partners***
Cub Run Recreation Center LID Demonstration	Construction began in Fall 2006 on vegetated swales, soil amendments and bioretention basins with underground storage to decrease the volume, peak discharge and phosphorus concentration of stormwater runoff from the 1.91-acre site. Construction will be completed in 2007 with planting of trees and shrubs and placement of an interpretive sign.	DPWES, NVSWCD, FCPA
Mount Vernon Recreation Center LID Demonstration	Construction began in Fall 2006 on vegetated swales, soil amendments and bioretention basins with underground storage to decrease the volume, peak discharge and phosphorus concentration of stormwater runoff from this 1.61-acre site. Construction will be completed in 2007 with planting of trees and shrubs and placement of an interpretive sign.	DPWES, NVSWCD, FCPA
Fairfax Center Fire Station	Completed rain garden draining 3 acres under Leadership in Energy and Environmental Design (LEED) Green Building Program.	DPWES
Herrity Building Parking Garage Vegetated Roof Demonstration Garden	Completed vegetated roof design in 2006 for 2007 construction. It will be monitored for performance.	DPWES
Hutchinson Park School Athletic Fields	Developed a pilot plan to use LID-based practices for the school's athletic fields, including a series of infiltration facilities for BMP and stormwater detention capacities, as an alternative to conventional systems (e.g., dry pond).	NVSWCD, FCPA
Lorton Arts Foundation Rain Garden	NVSWCD performed minor maintenance on the rain garden and provided maintenance instructions to the foundation's staff.	NVSWCD
Marie Butler Levin Park Demonstration Rain Garden and Arboretum	Design and installation commenced in 2006. The project will be completed in 2007. Earth Sangha is planting the preserve as a native plant arboretum.	NVSWCD, Earth Sangha, FCPA
Mason District Park Soccer Field Renovation	An existing full-sized adult soccer field was renovated from natural to synthetic turf with supporting open-graded aggregate base to provide storage capacity which reduces peak flows during large storm events and eliminate the need for fertilizers and pesticides.	FCPA

Table 2.5 LID projects in construction and planning phases or completed in 2006

Project	***Description***	***Partners***
Wakefield Park Soccer Field Renovation	An existing full-sized adult soccer field was renovated from natural to synthetic turf with supporting open-graded aggregate base to provide storage capacity which reduces peak flows during large storm events and eliminate the need for fertilizers and pesticides.	FCPA
Wakefield Park/Audrey Moore Recreational Center Rain Garden	Rain garden design was completed in 2006 for installation in 2007. It will control runoff from 2.43 acres, including a 0.22 acre parking area.	NVSWCD

In addition to the projects summarized above, NVRC, NVSWCD and FCPA were involved in other LID-related projects in 2006:

- NVRC continued to work on a manual of LID practices which will be offered to multiple jurisdictions within northern Virginia.
- NVSWCD provided recommendations to the Department of Planning and Zoning on 186 rezoning and special exception applications. Recommendations addressed better site design techniques, low impact development practices, and stormwater management measures that would lessen the impact to streams. NVSWCD also worked directly with developers to advise them on ways to develop sites with less adverse impact on streams and other natural resources.
- FCPA seeks opportunities during conceptual site planning to recommend low impact stormwater management techniques. In 2006, site plans were developed for Patriot Park, Hidden Oaks Nature Center parking lot expansion, Ossian Hall Park parking lot, and the Lake Fairfax Phase II park improvements. All of these projects will incorporate LID features to provide stormwater management.

3. Maintenance and Operation

Fairfax County's stormwater management plan is designed to prevent harmful pollutants from being dumped or washed by runoff into the stormwater system, then discharged into local water bodies. Maintenance and operation of installations that control and manage, or are impacted by, stormwater runoff is a vital component of the plan. These installations include: stormwater facilities and other infrastructure; roadways; sanitary sewer systems; public rights of way, parks, and other municipal properties; and county landfills. The county is investigating reducing the use of pesticides, herbicides and fertilizers on public property. The county's Fire and Rescue Department responds to all reported incidents of hazardous material releases, spills, and discharges. This reduces the possibility of the material reaching the county's storm sewer infrastructure and streams.

Stormwater Management Facilities and Infrastructure

The Department of Public Works and Environmental Services (DPWES) inspects and maintains all county owned and operated stormwater management facilities and infrastructure, including stormwater dry ponds located within residential subdivisions, and inspection and maintenance of State regulated dams. In addition, DPWES inspects and enforces maintenance for privately maintained stormwater management facilities. The county's inventory of stormwater management facilities and infrastructure is being tracked through the use of the county's geographic information system databases. Associated easements corresponding to the infrastructure system are currently being inventoried. Table 3.1 contains a summary of the stormwater maintenance and inspection program.

Table 3.1 – 2006 Stormwater management maintenance and inspection summary

Activity or Facility	***Number of Facilities***	***Number Inspected***	***Dam embank-ments mowed***	***Inspection Reports Written***	***Maintenance work orders written/ completed***
County maintained facilities	1209	1209	659	1209	196 / 196
Privately maintained facilities	2270	457	N/A	457	N/A
Storm drainage network inspections	N/A	176 miles	N/A	N/A	263 / 263
Storm sewer inspections by Closed Circuit TV	N/A	43 miles	N/A	N/A	Included in above
State Regulated Dams	16	16 / 2*	16	16	16

* 16 Annual maintenance inspection / 2 Bi-annual Engineering Inspection

Roadways

In an effort to limit the discharge of sand and deicing materials into the county's streams, sand and chemical treatment are provided only when dictated by safety concerns. Magnesium chloride is used on sidewalk applications as necessary because it is more environmentally acceptable than sodium chloride. The county performed sweeping operations at a total of 92 sites including parking lots and roadways.

Sanitary Sewer

Inspection and maintenance of the county's sanitary sewers help eliminate sewage leaks to the county's stormwater system 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. A 2006 summary of the sanitary sewer maintenance and inspection program is shown in Table 3.2.

Table 3.2 – 2006 Sanitary sewer maintenance and inspection summary

Activity	***Old sanitary sewer lines***	***New sanitary sewer lines***	***Total after 9 years***	***Dig ups***	***Manholes***	***Trenchless pipe repair***
Sanitary sewer inspections by Closed Circuit TV	246 miles	22 miles	N/A	N/A	N/A	N/A
Rehabilitation and Repairs	75,058 feet	N/A	233 miles	30	750	123
Constructed to replace failing septic system	N/A	1,800 feet (14 homes)	N/A	N/A	N/A	N/A

Pesticide, Herbicide and Fertilizer Application Program

In 2006, county agencies responsible for public rights of way, parks, and other municipal properties were surveyed on their use of pesticides, herbicides, and fertilizers to document current usage on county property. It should be noted that all pesticide, herbicide, and fertilizer treatments were applied by certified applicators. Data from the 2006 survey, in conjunction with data collected in 2003 and 2004, were used to develop a preliminary county-wide nutrient management plan and an integrated pest management plan. The county is currently developing strategies for implementation of the plans.

Some available publications and other resources on the proper use of pesticides, herbicide, and fertilizers include:

- *You and Your Land - A Homeowner's Guide for the Potomac Watershed* – Northern Virginia Soil and Water Conservation District (NVSWCD). It is posted on the following Web site:

www.fairfaxcounty.gov/nvswcd/yyl-intro.htm

- *Agricultural Best Management Practices for Horse Operations in Suburban Communities* –NVSWCD. It is posted on the following Web site:

www.fairfaxcounty.gov/nvswcd/horse.htm

Under the county's Chesapeake Bay Preservation Ordinance, NVSWCD develops soil and water quality conservation plans for land in agricultural use. The plans recommend best management practices so that sediment, fertilizers, pesticides, herbicides, and animal wastes do not harm water quality.

In addition, NVSWCD reviews nutrient management plans and integrated pest management plans for private golf courses and plant nurseries, and provides comments and recommendations to the Department of Planning and Zoning. NVSWCD reviews and comments on the implementation and monitoring reports received from golf courses.

County Landfills

County staff perform quarterly visual inspections of the stormwater outfalls located at the I-95 Landfill on Furnace Road and the I-66 Transfer Station/Closed Landfill. Inspections are performed in each quarter of the calendar year (January through March, April through June, etc.). Annual benchmark sampling is performed between July 1 and June 30 of the monitoring year for the I-95 Landfill.

In 2006, the county completed capping approximately 100 acres of the 130 acres of the Municipal Solid Waste section of the I-95 landfill as approved by the Virginia Department of Environmental Quality. Approximately 30 acres are still under construction and scheduled to be completed in Summer 2007. The final cover system consists of 18 inches of low-permeability soil and a 15-inch protective cover/vegetated support layer. As a result of this work, stormwater is managed more efficiently and infiltration is reduced significantly, in turn providing for less generation of leachate. The final cover system also minimizes the need for post-closure maintenance.

The Area Three I-95 Complex receives ash from the I-95 Energy/Resource Recovery Facility and a similar facility in Alexandria. Ash is placed in a 7.5-acre cell consisting of a bottom lining system that includes two feet of low-permeability soil, a double synthetic liner system, and a leachate collection and detection system. Recent stormwater management efforts associated with the lined landfill include a new stormwater detention pond north of the ash site, and closure of select side slopes.

Hazardous Materials Spill Prevention and Response

In 2006, the Fire and Rescue Department's Hazardous Materials and Investigative Services section received 395 complaints involving hazardous material, of which 347 were reported spills, leaks or releases. Staff are trained and equipped to initiate spill control measures to reduce the possibility of hazardous materials reaching storm sewers. Resources available to Fire and Rescue Department personnel include personal protective equipment, technical tools and equipment for control, and absorbent products such as pads and booms for containment. The

Fire and Rescue Department also contracts with a major commercial hazardous materials response company to provide additional containment and clean-up support for large-scale incidents. Staff ensure that the responsible party takes appropriate spill control and cleanup action through vigorous enforcement of appropriate codes and ordinances, and that proper activities are undertaken to protect and restore the environment. In addition, long-term monitoring is conducted at contaminated sites that have a potential for the contaminant reaching surface structures such as stormwater management facilities.

The Fairfax County Hazardous Materials Task Force provides oversight of remedial activities required as a result of Corrective Action Plans. Corrective Action Plans may involve remedial activity at a site because of groundwater contamination or the discharge of treated groundwater to the storm sewer system. The Fire and Rescue Department's Hazardous Materials Services Section acts as an agent of the Director of DPWES to permit and enforce actions on these activities. In 2006, the Hazardous Materials Technical Support Branch performed oversight management to 61 sites with ongoing remediation activities. This includes 39 actively opened sites as well as 22 sites that were closed.

4. Monitoring and Assessment

Fairfax County oversees a vigorous monitoring program consisting of a number of activities designed to characterize waterbodies, 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.

Watershed Water Quality Monitoring

Two long-term monitoring stations were established in 2005: one located in a medium/high density residential area in the Accotink Creek watershed; and a second in a low density residential area in the Sandy Run watershed. Automated sampling equipment (Figure 4.1) was used to collect stormwater. Collection was triggered by preset rainfall amount and stream stage level. Sampling devices also recorded rainfall amount, flow levels, pH, and temperature at timed intervals. Four storms were monitored in 2006, and the data were combined with 2005 storm data. Pollutant concentrations at the two stations were compared statistically. Nutrient loadings (nitrogen compounds and phosphorus) were significantly higher at the medium/high density residential land use site than at the low density site. Results were submitted to the Virginia Department of Conservation and Recreation in the 2006 Virginia Pollutant Discharge Elimination System Permit Annual Report.

Figure 4.1 Watershed monitoring equipment: automatic sampler with bubble flow modules; pH and temperature monitors; tipping bucket rain gauge.

The Northern Virginia Soil and Water Conservation District (NVSWCD), in partnership with DPWES, the Fairfax County Park Authority (FCPA), and the United States Geological Survey, continued its temperature monitoring program in riparian restoration areas. Tiny devices called "iButtons" placed in streams record water temperature every half-hour. Once a month, trained volunteers download the logged temperature data using handheld computers. An article about the program was published in the Winter 2006/2007 issue of *Conservation Currents*:

http://www.fairfaxcounty.gov/nvswcd/newsletter/winter2007.pdf

The Kingstowne Environmental Monitoring Program provides information to protect Huntley Meadows Park from the detrimental effects of upstream development (particularly excessive sediments and phosphorus) in the Dogue Creek watershed. Two stations (Kingstowne and South Van Dorn) are monitored to comply with a U.S. Army Corps of Engineers permit. Data are also used to evaluate the effectiveness of the Dogue Creek Watershed Stormwater Control Plan in removing phosphorus from stormwater discharges. The reduction requirement for total

phosphorus is 50 percent. From July 2005 through June 2006, 42 stormwater samples were collected at the two stations using automated samplers. Erosion and sedimentation controls, including stormwater best management practices (BMP), are minimizing sediment loads to Dogue Creek. However, phosphorous loads did not meet the permitted requirements during the monitoring period. The total phosphorus concentration at South Van Dorn was 0.274 mg/L, which is equal to an 8.7 percent removal rate. Although the June 2006 storm may have impacted removal efficiency, this was the fourth consecutive monitoring year that the 50 percent reduction requirement was not met. The county and the Corps are conducting further evaluations to determine why the 50% requirement has not been attained.

Water quality in Reston's four lakes (Anne, Newport, Thoreau, and Audubon) and two ponds (Bright and Butler) was monitored from April through September 2006 by the Reston Association, the homeowners association for the large, planned community of Reston. The annual lakes report provided data analysis and recommendations.

Biological Monitoring

Long-term bacteria monitoring and bioassessment enable comprehensive evaluations of stream health throughout Fairfax County. Stream monitoring sites are randomly sampled to reflect all waters that have similar ecological characteristics. This approach eliminates site selection bias and provides a cost-effective way of obtaining scientifically valid determinations of stream conditions at a countywide scale. Over time, the expanding dataset will provide essential information to determine the overall rate of change or trends in stream conditions, and provide a basis for prioritizing implementation measures to restore Fairfax County's watersheds.

Bacteria monitoring

In 2006, the DPWES Stormwater Planning Division completed its third year collecting data for the Bacteria Monitoring Program since acquiring the program from the Fairfax County Health Department. To determine the baseline levels of *E. coli* in county streams, sampling was conducted at 45 randomly selected locations. Samples were collected twice per season for a total of eight rounds in 2006. Water quality parameters including pH, temperature, dissolved oxygen, and specific conductance were measured at the time of sampling. Samples were tested by the Fairfax County Health Department Laboratory for *E. coli*, nitrates, and phosphorous. Results of bacteria monitoring in 2006 will be presented in Stormwater Planning's 2007 Annual Report on Fairfax County Streams.

Total Maximum Daily Loads (TMDLs) are plans to restore and maintain water quality in impaired waters. NVSWCD, in partnership with the Virginia Department of Environmental Quality and Arlington County, continues to support volunteer bacteria monitoring in Four Mile Run to assess changes resulting from TMDL implementations. Data are collected monthly from ten sites by more than 25 volunteers. An overview of the program is available at:

www.fairfaxcounty.gov/nvswcd/newsletter/ecoli.htm

Bioassessments

Biological assessments (bioassessments) are evaluations of the condition of waterbodies using surveys of resident organisms such as fish, bottom-dwelling stream insects (benthic macroinvertebrates), and other aquatic life. Habitat quality is also assessed.

Figure 4.2 Fish population sampling is performed with backpack electroshockers

Figure 4.3 The 20-jab method is used to sample macroinvertebrates

Biological monitoring of fish and macroinvertebrates (Figures 4.2 and 4.3) as well as habitat assessments were conducted in 2006 at 40 randomly selected stream sites throughout the county. In addition, 10 Piedmont reference locations in Prince William Forest Park and two Coastal Plain reference locations in Fairfax County were sampled. A reference site is a minimally impaired stream reach that represents the best possible conditions for a region and therefore provides a "benchmark" for comparisons.

Results of 2006 biological assessments will be presented in the Stormwater Planning Division's 2007 Annual Report on Fairfax County Streams. It should be noted that in 2005, 82 percent of county streams were found to be impaired due to poor biological diversity. More information about the bioassessment program can be found at:

www.fairfaxcounty.gov/dpwes/stormwater/streams.htm

NVSWCD continues its successful Volunteer Stream Monitoring Program. In 2006, there were 25 active monitoring sites in Fairfax County. Approximately 150 volunteer monitors logged over 3,000 Earth Team hours. The Earth Team is a program of the Natural Resources Conservation Service and tracks volunteer time. This program supplements the county's stream bioassessment program as well as provides other services to the environmental community. Trained volunteers assess the ecological health of streams using the Virginia Save Our Streams protocols. Monitoring includes biological and chemical aspects and a physical habitat assessment. NVSWCD provides training, equipment, support, data processing, and quality control. Data collected by volunteers are shared with Fairfax County, the Virginia Department of Environmental Quality, Virginia Save Our Streams, and other interested organizations or individuals.

In 2006, NVSWCD led 48 stream monitoring training sessions or watershed programs, with over 1,160 participants. Watershed programs include indoor stream ecology programs at schools, presentations to civic groups, table displays at environmental programs, tours of water and sewage treatment plants, watershed walks, and stream clean-ups. Approximately 300 students were introduced to stream monitoring through indoor workshops at schools, outdoor special programs, and science fair projects. More information about NVSWCD's technical assistance and education/outreach programs is available at:

www.fairfaxcounty.gov/nvswcd/monitoring.htm

The Reston Association continued its volunteer stream monitoring program in conjunction with the NVSWCD's Virginia Save Our Streams program. There are currently 12 sites monitored in Reston with 15 volunteers participating.

The Audubon Naturalist Society's Water Quality Monitoring Program recruits, trains, equips, and organizes volunteers to evaluate stream health throughout the region. Volunteers assess macroinvertebrate community composition and habitat conditions at specific points throughout the year (May, July, and September, with an optional winter sample). Readings of pH and water temperature are taken concurrently. There are currently five Audubon Naturalist Society sites within Fairfax County. The data collected by the Audubon Naturalist Society are shared with the Fairfax County DPWES as well as with the Virginia Department of Environmental Quality, the Virginia Department of Game and Inland Fisheries, and the National Park Service.

Dry and Wet Weather Monitoring

Identifying and removing illegal and/or improper connections to storm drainage systems and receiving waters is a measure for reducing stormwater pollution. In 2006, the county selected 106 storm sewer outfalls for dry weather monitoring and recorded physical parameters at each outfall. Water was flowing at 21 of the outfalls, and was tested for a range of pollutants (ammonia, conductivity, surfactants, fluoride, pH, potassium, phenol, copper and chlorine) using field testing kits. Of the outfalls tested, four required follow-up investigations because pollutants were detected. Upon retest of these four sites, only one continued to exceed the water quality criteria for chlorine. Because chlorine was involved, the Fairfax County Water Authority was also contacted and notified of a potential water line leak. A retest of this site a few weeks later showed that water was no longer flowing.

In 2006, the county reviewed other jurisdictions' wet weather screening and industrial high risk monitoring programs in Virginia and other states, and reviewed federal and state regulations and guidelines pertaining to these permit requirements. This information was used in conjunction with county geographic information system data layers to develop a new protocol for identifying industrial and commercial facilities with the greatest potential for discharging pollutants, and for selecting sites for monitoring. Four sites were selected, with monitoring scheduled to begin in early 2007.

5. Public Outreach and Education

The Department of Public Works and Environmental Services (DPWES) has created an effective public outreach and education campaign by forming partnerships with several organizations. Partnerships with these groups result in an organized effort to educate residents of the county on key elements to improve the state of our environment. In 2006, the following 12 organizations partnered with DPWES for various outreach efforts:

- Alice Ferguson Foundation: organizes the Potomac River Watershed Cleanup (www.potomaccleanup.org).
- Audubon Naturalist Society: stream monitoring program (www.audobonnaturalist.org).
- Earth Sangha: Assists and provides volunteers for tree plantings (www.earthsanga.org).
- Friends of the Occoquan: organizes two Occoquan river cleanup events per year (www.friendoftheoccoquan.org).
- Fairfax Watershed Network: promotes several events, such as the Potomac River Watershed Cleanup.
- Fairfax ReLeaf: assists with tree plantings (www.fairfaxreleaf.org).
- Ocean Conservancy: organizes the International Coastal Cleanup (www.oceanconservancy.org).
- Northern Virginia Soil and Water Conservation District: provides support for various activities (www.fairfaxcounty.gov/nvswcd/).
- Northern Virginia Regional Commission: coordinates Regional Pollution Prevention Outreach Strategy through use of a radio campaign (www.novaregion.org).
- Reston Association: provides support for various activities (www.reston.org).
- Virginia Department of Conservation and Recreation – Adopt-A-Stream Program: Provides information and assistance to individuals or groups to clean an adopted reach of stream twice a year (www.dcr.state.va.us).
- Virginia Department of Forestry: assists with tree plantings (www.dof.virginia.gov).

Please note that this does not include all of the organizations' missions or events, but only those that directly partnered with the department. See individual Web sites for additional efforts not addressed in this document.

Educational Booths and Presentations

In 2006, Fairfax County hosted educational booths and presentations at several annual public events to raise awareness among residents about stormwater issues facing the county and to encourage behaviors that positively impact watersheds.

Health Department

- Presented six public awareness programs to approximately 185 county residents about the Chesapeake Bay requirement to pump septic tanks every five years.

Northern Virginia Soil and Water Conservation District

- Used the watershed model *Enviroscape* during 16 presentations to 465 people.
- Gave 31 presentations to over 1,176 people in groups ranging from 10 to 125 or more, and on two local television shows. Exhibits were manned at 10 events.
- Provided technical advice to 575 homeowners and homeowner associations, including 88 on-site visits to advise on erosion, drainage, pond management, and other environmental problems. Site-specific soils information was provided to 172 consultants and homeowners.
- Sponsored three teams from James Madison High School and Hidden Pond Nature Center in the Virginia Envirothon, a natural resources competition for high school students.

Solid Waste

- Hosted information at Celebrate Fairfax (Figure 5.1), Fall for Fairfax, Earth Day/Arbor Day, and several events sponsored by individual members of the Fairfax County Board of Supervisors.
- Hosted annual "Clean Your Files Day" for county agencies.

Stormwater Management

- Participated as an exhibitor and/or environmental educator in more than 42 events.

Virginia Department of Forestry

- Gave 20 presentations on topics such as water quality and rain gardens.

Figure 5.1 The Stormwater Management tent at Celebrate Fairfax. The theme was "Stream Wars."

Communication Initiatives

Printed Materials/Mailings

<u>Environmental Horticulture Division of Fairfax County Extension</u>

- Circulated low-input lawn care advice to more than 25,000 residents through monthly articles in resident association newsletters.
- Distributed approximately 4,000 Virginia Tech publications on such topics as "Lawn Fertilization in Virginia," "Horse Pastures in Virginia," and "Selection of Plant Material Suitable for this Area."

<u>Health Department</u>

- Mailed 14,329 Flow Diversion Valve reminder notices. These 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 also reminds them to pump out their septic tank every three to five years.

Northern Virginia Soil and Water Conservation District

- Published and circulated four editions of the *Conservation Currents* newsletter. Three thousand copies are delivered to recipients via US mail and county courier. In addition to the printed newsletter, NVSWCD distributes the newsletter via e-mail upon request.
- Received 320 public information inquiries and distributed approximately 5,750 brochures and flyers related to the reduction of nonpoint source pollution.

Reston Association

- Continued to distribute and promote the "Help Our Watersheds – Living in the Potomac and Chesapeake Bay Watershed" brochure, which was funded through the Chesapeake Bay License Plate Grant. The brochure covers several topics: controlling runoff, preventing and managing erosion, improving water quality with "bayscaping," and helpful local resources.

Solid Waste

- Updated battery recycling program brochure.

Radio - Regional Pollution Prevention Outreach Campaign

This is the second year that Fairfax County, in partnership with the Northern Virginia Regional Commission (NVRC) and surrounding jurisdictions, implemented a region-wide radio outreach campaign. It was aimed at raising awareness among residents about harmful non-point source pollutants and actions residents can take to help protect the water quality of local streams and the Chesapeake Bay. In 2006, nine radio stations played the 60-second commercial a total of 895 times. The spot was also aired in Spanish. The result of the campaign was that the ad was heard by 70 percent of the target audience an average of 12 times.

Storm Drain Marking Program

In partnership with DPWES, NVSWCD continued the Storm Drain Marking program to provide small plastic markers or stencils to be placed over storm drain inlets. In 2006, 37 projects brought nonpoint source pollution prevention information directly to 57,415 households. More than 500 volunteers carried out the education program and then placed markers on 3,142 storm drain inlets (Figure 5.2).

Figure 5.2 A storm drain marker being applied.

Web Page Development

The following division Web pages were either updated or created in 2006 in order to provide better information to residents regarding volunteer opportunities, stormwater management projects in the county, and the state of local waterways.

Solid Waste

- Created a new Web page entitled KnowToxics, in partnership with NRVC (www.knowtoxics.com).
- Developed an intranet site with county employee recycling information.

Stormwater Management

Stormwater Management Web pages had more than 10,000 hits in 2006.

- Stormwater Management home page
  www.fairfaxcounty.gov/dpwes/stormwater
- Streams and flood plains
  www.fairfaxcounty.gov/dpwes/stormwater/# streams/
- Calendar of Events
  www.fairfaxcounty.gov/dpwes/stormwater/events.htm
- Reports
  www.fairfaxcounty.gov/dpwes/stormwater/resources.htm#reports
- Storm Drainage System
  www.fairfaxcounty.gov/dpwes/utilities/stormdrains.htm

"Explore Your Watershed" Walks

In 2006, Fairfax County continued to partner with the Audubon Naturalist Society, NVSWCD, and NVRC to host an ongoing series of watershed walks. These walks provided an opportunity for residents to learn more about the organisms living in Fairfax County's stream valleys, the pollution that threatens them, and how people can work together to improve the quality of local waterways and those downstream. Watershed walks were conducted in the following watersheds in 2006:

- Accotink Creek
- Difficult Run
- Donaldson Run
- Holmes Run
- Little Rocky Run
- Popes Head Creek
- Turkey Run

Watershed Cleanups

Fairfax County staff, in partnership with numerous other local agencies and groups, support ongoing efforts to improve the water quality and habitat of Fairfax County's waterways by participating in semi-annual and annual watershed cleanups. In 2006, there were more than 100 cleanup events in the county with over 1,000 participants. These efforts removed almost 60 tons of trash from local waterways. Large-scale annual and/or semi-annual events that the county participates in include:

- The Alice Ferguson Foundation's Potomac Watershed Cleanup.
- The Virginia Department of Conservation and Recreation's Adopt-a-Stream Program.
- The International Coastal Cleanup.

- The Friends of the Occoquan's Occoquan River Cleanup (Figure 5.3).

Figure 5.3 Participants in the Friends of the Occoquan cleanup used boats to access much of the shoreline.

Figure 5.4 Volunteers participating in buffer restoration and tree planting.

Stream Buffer Restoration and Seedling Sale

Fairfax County continued its countywide riparian buffer restoration project in collaboration with various partners to mitigate stormwater runoff into local streams and to support the Board of Supervisors' adopted Environmental Agenda. In 2006, the county, regional partners (including the Fairfax County Park Authority (FCPA), Earth Sangha, Fairfax ReLeaf, and McLean Trees), and many volunteers restored 14 stream buffer areas. Invasive plants were removed and over 1,800 trees or shrubs were planted by 400 volunteers (Figure 5.4).

Fairfax County continued to partner with NVSWCD to provide assistance to their annual seedling sale. This annual program emphasizes the role of vegetation in preventing erosion, conserving energy, and decreasing and filtering stormwater runoff. In 2006, 6,580 tree and shrub native plant seedlings, mostly in 300 packages of 14 seedlings each, and in 325 packages of ground cover, were sold to citizens at a small cost.

In addition, FCPA, Fairfax ReLeaf, and the Virginia Department of Forestry all hosted independent stream buffer restorations in the county in 2006. For example, FCPA planted 5.6 acres of county parkland with over 1,500 trees and shrubs. With the help of volunteers, FCPA aggressively managed invasive, non-native plants on over eight acres of parkland, including sites within the Resource Protection Area. Three hundred native plants, trees, shrubs and ground covers were planted on several Invasive Management Area program sites.

Public School Environmental Education Partnerships

Meaningful Watershed Experience Program

Fairfax County Stormwater Management continued to partner with Fairfax County Public Schools to implement the Meaningful Watershed Field Experience Program. In 2006, Stormwater Management participated in three teacher trainings workshops to build teacher understanding and awareness at approximately 16 schools. More than 100 teachers were trained

at these workshops. Ultimately, this resulted in meaningful outdoor watershed experiences for more than 1,000 seventh grade students.

Recycling Program

Fairfax County's Solid Waste Management Program continued to provide support and education in the public school system regarding preventing litter and supporting recycling. In 2006, the program:

- Continued to support the Schools County Recycling Action Program (SCRAP).
- Sent information about America Recycles Day to all 150,000 Fairfax County Public School students.
- Sent litter/recycling newsletters to all fifth and seventh grade students.
- Awarded $500 to twelve schools to fund school environmental projects.
- Offered the "Critters Don't Need Litter" program twice in 2006 through the Clean Fairfax Council.
- Hosted its 5th annual Community Recycling Roadshow for more than 500 residents at Herndon High School on November 4 (Figure 5.5).

Figure 5.5 Electronic equipment ready for recycling at the fifth annual Community Recycling Roadshow.

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. In 2006, Stormwater Management continued to partner with the county's Wastewater Department to bring the program to twelve schools and speak to more than 1,500 students.

Thomas Jefferson High School Mentoring Program

Fairfax County Stormwater Management continued to work with a group of Thomas Jefferson High School seniors to identify potential sources of *E. coli* in surface water using Optical Brightener Monitoring techniques. During the 2005-2006 school year, the program grew from two participants to nine students investigating four different areas of the county.

Technical Support and Training

Environmental Horticulture Division of Fairfax County Extension

- More than 2,500 residents and commercial horticultural companies used the extension office's soil testing service to determine the precise levels of fertilizer and liming necessary for a healthy landscape.
- Provided professional training to more than 770 people at the annual three-day Green Industry Professional Seminar. The Environmental Horticulture Division also plays a major role in the Virginia Nursery and Landscape Association Certification training.

- Trained more than 60 landscape professionals and local government employees for testing with Virginia Department of Agriculture and Consumer Services to become certified Pesticide Applicators or Registered Technicians.
- Provided recertification training and credit at the annual Green Industry Seminar to more than 500 horticultural professionals.

Northern Virginia Soil and Water Conservation District

- Hosted five Green Breakfast Series events: topics included an update on the county's stream protection programs; a status report on the implementation of recommendations made by the New Millennium Occoquan Watershed Task Force; a tour of a LEED-certified "Gold" green building; an update on the county's Urban Forest Management Program; and air quality.
- Launched the Neighborhood Ecological Stewardship Training Program, a series of adult education opportunities designed to increase participants' connection to their local environment and the larger Chesapeake Bay watershed. The program provided the framework for 149 participants to engage in 123 programs. More than 35 organizations partnered with NVSWCD to support and carry out the program.

Solid Waste

- Sponsored five household and three business hazardous waste collection events throughout the county.
- Hosted four successful computer recycling events in partnership with ServiceSource.

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 the continual increase in 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 guidelines to control stormwater runoff close to the source.

Public Facilities Manual

Six low impact development (LID) practice amendments have been developed for inclusion in the county's Public Facilities Manual. These amendments were adopted by the Board of Supervisors in March 2007:

- Bioretention basins & filters
- Vegetated swales
- Vegetated roofs
- Permeable paving
- Reforestation
- Tree box filters

Better Site Design

The use of multiple LID practices on a site is very effective in reducing the volume of water flowing from the site into county streams. The county recommends and encourages that "Better Site Design" development techniques and LID practices be used to the full extent as allowed by the Public Facilities Manual and the related Letters to Industry to reduce the volume of water leaving a site.

Supplemental Plant Lists

Three plant lists have been developed to supplement the Public Facilities Manual's LID practice amendments and posted electronically as part of DPWES' Letters to Industry (http://www.fairfaxcounty.gov/dpwes/publications/lti/07_03.htm). These lists offer plant recommendations for:

- Bioretention Facilities
- Extensive Vegetated Roofs
- Intensive Vegetated Roofs

Adequate Outfall and Drainage Diversions

In addition to the LID amendments, DPWES developed amendments to the adequate drainage provisions of the Public Facilities Manual to address adequate outfall and drainage diversions. These amendments were adopted by the Board of Supervisors in February 2006. These amendments clarify the extent of downstream analysis that must be provided and provide options for proving no adverse impact and a proportional improvement of outfalls. The amendments will

provide guidance as to when a diversion may be justified and requirements for analyzing downstream impacts.

New Development - Plan Review and Site Inspection

Through its plan review process, the Department of Public Works and Environmental Services (DPWES) enforces the Public Facility Manual and the Zoning Ordinance and Subdivision Ordinance criteria related to stormwater for new development and redevelopment. DPWES also reviews Erosion and Sedimentation Control plans for compliance with the county's and the Department of Recreation's requirements. In 2006, 886 plans were reviewed, and 638,052 sites under construction were inspected. A class and a workshop on constructability issues were conducted through the Engineers and Surveyors Institute. In February 2006, a Letter to Industry was issued to announce the addition of two amendments to the Public Facilities Manual. The first amendment clarified the requirements for drainage divides; the second revised the requirements of stormwater outfall from a development site. More information can be found on the following Web site:

www.fairfaxcounty.gov/dpwes/publications/lti/06_04.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.

Best Management Practices Handbook

The Northern Virginia Regional Commission (NVRC) continues to revise the 1992 edition of the Northern Virginia Best Management Practices Handbook to incorporate LID guidelines. The current handbook does not always reflect today's stormwater management trends. Research and technology has grown over the last ten years regarding stormwater management and best management practice design. The Best Management Practices Handbook is a widely used resource for Fairfax County planners and public works staff. Twelve designs and water quantity sizing guidelines are currently under development. A Steering Committee, which includes the director of Public Works for Fairfax County, is providing guidance and oversight to the Technical Advisory Committee comprised of local government staff and private industry. It is anticipated that a final draft of the document will be available by Spring 2007.

Floodplain Management

The U.S. Army Corps of Engineers and county staff performed a flood study to more accurately assess the flooding risks to the Belleview and New Alexandria communities and other nearby communities. Completed in February 2006, this study produced the critical hydrologic, hydraulic and statistical models necessary to perform benefit-cost analysis for flood reduction alternatives. The Corps is currently determining benefit-cost ratios for three alternatives to reduce the flooding risks in these communities, which should be completed by December 2007. Results will enable the Corps to recommend an alternative and to determine if federal funding may be requested for the final design and construction of the alternative based on the benefit-cost ratio.

A similar effort is underway for the Huntington residential community located on the lower reach of Cameron Run. This study is assessing alternatives and computing benefit-cost ratios for mitigating flooding in this community, a significant portion of which lies within the 100-yr floodplain. It is also scheduled to be completed by December 2007.

The county is also nearing the completion of a three-year effort to create digital flood insurance rate maps with FEMA.

Online Floodplain Warning Tool

A new DPWES permits database launched in February 2006 is equipped with a floodplain warning tool. Because only about 500 miles of the county's 900 miles of floodplain are mapped, this tool was needed to flag permits associated with properties within or overlapping floodplains. A collage of available floodplain data with approximate floodplain limits was used where no other data were currently available. A table was then created of all Fairfax County properties that are impacted by floodplains. Because the database program references only this table, updated floodplain information can easily be added as each of the watershed master plans is completed and as new studies are submitted. Mapping of much of the county's minor floodplains using aerial photography and other tools will be completed over the next five years as the watershed master plans are completed.

Cameron Run Study

In September 2004, the US Army Corps of Engineers, Fairfax County, and the City of Alexandria undertook a partnership to develop a feasibility study with the aim of improving water quality, flood protection, and habitat in the Cameron Run watershed. Beginning in 2006, NVRC provided support to this multi-jurisdictional project by providing logistical and technical support for project partners, publishing a public e-newsletter about project activities, and hosting a Web page dedicated to the project (http://www.novaregion.org/cameron_run.htm). The partner organizations defined six project goals:

- Reducing stormwater impacts on the Cameron Run watershed from impervious areas to help restore and protect the streams.
- Preserving, maintaining, and improving watershed habitats to support native flora and fauna.
- Preserving, maintaining, and improving the water quality of the streams to benefit humans and aquatic life.
- Improving stream-based quality of life and recreational opportunities for residents of and visitors to Cameron Run watershed.
- Providing adequate, cost-effective flood protection for adjacent communities along major tributaries in the Cameron Run watershed.
- Building framework for long-term regional cooperation.

The watershed feasibility study is scheduled to be completed in March 2009.

Floatable Monitoring

As part of its Adopt-a-Stream program, the county is developing a floatable debris monitoring Web site to promote ongoing efforts by local and regional trash cleanup and adopt-a-stream groups, as well as keep track of the amount and types of trash found in streams. The data collected will serve to indirectly measure the success of litter control programs and education and public outreach activities aimed at preventing littering, especially down storm drains.

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