

Photos on cover (from top left): Colvin Run Stream Restoration; Revitalize, Restore, Replant (R3); Launcelot Outfall Restoration; Fish Monitoring, Illicit Discharge and Improper Disposal Team. (Photo credits Fairfax County) Report prepared and compiled by: The staff of the Stormwater Planning Division Department of Public Works and Environmental Services Fairfax County, Virginia 22035 703-324-5500, TTY 711 https://www.fairfaxcounty.gov/publicworks/stormwater

December 2018



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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.

State agencies

Virginia Cooperative Extension, Environmental Horticultural Division of Fairfax County

County agencies

Fire and Rescue Department, Hazardous Materials Investigative Services Section Health Department

Department of Public Works and Environmental Services Building Design and Construction Division Code Development and Compliance Division Maintenance and Stormwater Management Division Site Development and Inspection Division Solid Waste Management Program Urban Forest Management Division Utilities Design and Construction Division Wastewater Collection Division Wastewater Planning and Monitoring Division Wastewater Treatment Division *Other government agencies* Northern Virginia Regional Commission

Northern Virginia Soil and Water Conservation District

Private organization Clean Fairfax Council

1. Introduction

Stormwater runoff is rain and snowmelt that flows across the land and impervious areas such as paved streets, parking lots and rooftops. Runoff picks up and carries sediments, nutrients, toxic substances, pathogens and other pollutants to lakes, streams, rivers, wetlands and coastal waters. These pollutants have the potential to harm aquatic life, impair recreational uses, and pollute drinking water supplies. Stormwater runoff can also reach high volumes that often result in a surge of stormwater emptying into receiving waters that may severely erode stream banks and damage sensitive stream ecosystems.

Fairfax County is a leader in stormwater management. Fairfax County's Stormwater Management Program supports the water quality goals of the Board of Supervisors' Environmental Agenda, which 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.

This report highlights the accomplishments of the Stormwater Management Program from July 1, 2017 through June 30, 2018:

- Watershed Management Planning: Between 2005 and 2011, the Board of Supervisors adopted 13 watershed management plans that cover all 30 of the county's watersheds. The plans encouraged public involvement and provide an assessment of stormwater conditions and recommend protection strategies and improvement projects to be considered.
- 2. Stormwater Capital Projects: The county and its partners continued to implement stormwater management-related capital projects, including flood mitigation projects, stormwater management facility retrofits, low impact development (LID) projects, stream restoration and stream stabilization projects.
- 3. *Operations*: The county maintains and operates its stormwater management facilities and stormwater drainage infrastructure. The county also implements best management practices (BMPs) for guiding new development and redevelopment: operation of county roadways and parking areas; use of pesticides, herbicides and fertilizers on county properties; detection and elimination of sources of illegal discharges; spill response; controlling industrial and high risk runoff; and construction site erosion and sediment control.
- 4. *Monitoring and Assessment:* The county conducts water quality monitoring, dry weather screening, wet weather screening, physical habitat evaluations and biological assessment of fish, bacteria, and aquatic macroinvertebrates.
- 5. *Public Outreach and Education:* The county continues to partner with schools and local organizations to educate residents about water quality and encourage environmental stewardship.
- 6. *Strategic Initiatives:* The county and its partners work proactively to improve the county's stormwater management through the flood response program, MS4 program planning and watershed management planning.

While 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 in county and state agencies and private organizations.

2. Watershed Management Planning

Between 2005 and 2011, 13 watershed management plans, which cover all 30 county watersheds <u>https://www.fairfaxcounty.gov/publicworks/stormwater/watersheds</u>, were developed and adopted by the Board of Supervisors. From this planning effort, more than 1,700 structural and non-structural projects were proposed to help restore and protect our vital natural resources. The overarching goals for the watershed plans are:

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

The plans were developed with the assistance of the community through public meetings and stakeholder group meetings. This public involvement process helped to ensure that the plans met the needs in the watershed and have the support of county residents. Public involvement is encouraged during plan implementation and periodic updates are given to the watershed advisory groups and other public interest groups. A presentation on watershed management plan implementation is available online at watersheds (https://www.fairfaxcounty.gov/publicworks/stormwater/watersheds.

The number of structural projects selected for implementation each year is determined as part of the annual budget process. 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. The non-structural projects and structural projects represent a holistic approach to watershed management.

The non-structural recommendations have been reviewed, categorized by feasibility and consolidated by themes. Project feasibility, MS4 permit compliance, effectiveness and resource needs were considered. Priority has been given to permit-related recommendations, but this does not preclude other recommendations from being implemented. At this time, more than half of the recommendations are categorized as "ongoing", which means the recommendations have been or continue to be implemented through outreach and education.

3. Stormwater Capital Projects

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). This system is designed to receive and transport stormwater runoff throughout the county. Additionally, public stormwater management facilities are designed to affect the quantity and quality of stormwater. These facilities are constructed and retrofitted by multiple county organizations and through partnerships with local and regional organizations.

This section summarizes the capital projects, by type, completed during July 1, 2017 to June 30, 2018.

New Construction of Stormwater Management Ponds

There were no new regional stormwater management facilities completed during July 1, 2017 to June 30, 2018.

Flood Mitigation

There were no flood mitigation projects completed during July 1, 2017 to June 30, 2018.

Retrofit of Existing Stormwater Management Facilities

Stormwater management facility retrofits are intended to improve water quality and 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 reduce downstream flooding and erosion. Table 3-1 describes one retrofit project completed by DPWES during July 1, 2017 to June 30, 2018.



Figure 3-1: Royal Lake Dam Safety Rehabilitation

Project Name	Description	Watershed
Royal Lake Dam Safety Rehabilitation	Rehabilitation included dredging of 84,769 cubic yards of sediment from Royal Lake, modifying an existing decanting basin, installing two new articulating concrete block boating ramps, two sediment forebay berms\weirs, 37 fish habitat structures, retrofitting the existing riser with new sluice gate operations, repaving two access roads, stabilizing the lake shoreline and stream banks and enhanced landscaping.	Pohick Creek

Table 3-1: Retrofit projects completed from July 1, 2017 to June 30, 2018.

Low Impact Development

Fairfax County promotes the use of low impact development (LID) practices that provide onsite infiltration, groundwater recharge, and filtration of pollutants. These practices help protect streams and other natural resources by improving hydrologic conditions so as to mimic a natural state. LID projects are used to help the county meet multiple stormwater management goals and provide the following benefits:

- A variety of LID techniques can be used to meet stormwater requirements for new developments or to retrofit developed areas.
- LID projects capture and treat stormwater runoff at its source and are often a more 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.
- Innovative projects provide opportunities for scientific research.
- Residents may often implement and maintain LID practices on their properties.
- Certain LID practices provide aesthetically pleasing alternatives for stormwater management.

The latest Virginia Stormwater Management Program regulations and the county Stormwater Management Ordinance (Chapter 124) encourage the use of LID practices by crediting the reduction in stormwater volume towards water quality requirements.

Department of Public Works and Environmental Services (DPWES), Fairfax County Park Authority (FCPA), and Fairfax County Public Schools (FCPS) contributed to the design and implementation of three projects within the county that incorporated one or more LID practices (Table 3-2).



Figure 3-1: Mantua Elementary School Stormwater Enhancements.



Figure 3-3: Public Safety Headquarters

Project Name	Description	Watershed	Partners
Nottoway Park BMP Retrofits, Phase 1	Restoration of 580 linear feet of stream to create a channel with a stable pattern, profile, and dimension. This project also reduced the active stream bank erosion with structures such as cross-vanes and a step pool storm water conveyance channel, and restored the site with native trees, shrubs, and herbaceous plantings	Accotink Creek	Community, FCPA
Mantua Elementary School Stormwater Enhancements	Installation of a Virginia BMP Clearinghouse Level 2 Infiltration Facility with a 10,000 cubic foot capacity that treats stormwater runoff from five acres of Mantua Elementary School property, 65% of which is covered with impervious surfaces. Water outfalls into Crook Branch to the south of the property.	Accotink Creek	Community, FCPS,

Table 3-2: LID projects completed from July 1, 2017 to June 30, 2018.

Project Name	Description	Watershed	Partners
Public Safety Headquarters	Green roofs and permeable pavements, in addition to other stormwater bio filter treatment, will have an impact that goes all the way to the Chesapeake Bay by slowing down, filtering, absorbing and purifying rain water as it leaves the site. A 25,000-gallon tank harvests some of the runoff and reuses it for the plantings in front of the site.	Difficult Run	Fairfax County Police Department (FCPD), Comprehensive Development Plan (CPD), Fire and Rescue (FRD), Building Design and Construction Division (BDCD).

Stream Restoration and Outfall Stabilization

During July 1, 2017 to June 30, 2018 the county completed five stream restoration and eight outfall stabilization projects. These are summarized in Table 3-3.



Figure 3-4: Turkey Run @ Truro Subdivision stream restoration.

Project Name	Description	Watershed
Turkey Run @ Truro Subdivision	Restoration of approximately 3,850 linear feet of stream channel using natural channel design techniques to improve water quality, provide channel stability, enhance ecological function, improve floodplain connectivity, and mitigate a safety issue. This project includes an outfall plunge pool, rock cross vanes, step pools, a reinforced channel bed, and native planting re-vegetation.	Accotink Creek
Flatlick Branch, Phase 2	Restoration of approximately 4,600 linear feet of Flatlick Branch and its tributaries using natural channel design techniques to improve water quality, channel stability, ecological function, floodplain connectivity, protection of utilities, and safety. This project includes outfall step pools, rock steps, boulder riffles, rock cross vanes and J- hooks, a reinforced channel bed, large woody debris habitat features, wetland habitat creation, outfall stabilization, and reforestation with native vegetation.	Cub Run
Accotink Tributary @ Oakford Drive	Restoration of approximately 1,538 linear feet of stream using natural channel design techniques to improve water quality, provide channel stability, enhance ecological function, and improve floodplain connectivity. This project includes plunge pools, rock cross vanes, step pools, a reinforced channel bed, woody debris features, and native plantings.	Accotink Creek
Colvin Run at Lake Fairfax Park, Phase 1	Restoration of 2,220 linear feet of Colvin Run in the Difficult Run watershed using natural channel design principles. Project replaced an undersized road culvert, reduced erosion using in-stream grade control, created overbank wetland areas, installed woody debris to support habitat improvement, and restored with native plantings.	Difficult Run

Project Name	Description	Watershed
Turkeycock Run @ Mason District Park	Restoration of approximately 1,600 linear feet of Turkeycock Run using natural channel design techniques to improve water quality, provide channel stability, enhance ecological function, improve floodplain connectivity, and mitigate a safety issue. This project includes an outfall plunge pool, rock cross vanes, step pools, a reinforced channel bed, native plantings and a pollinator meadow.	Cameron Run
Robinson Parcel 19 Outfall Improvement	Restoration of approximately 300 linear feet of eroded channel using natural channel design techniques to improve water quality, provide channel stability, enhance ecological function, improve floodplain connectivity, and mitigate a safety issue. This project includes an outfall plunge pool, rock cross vanes, step pools, a reinforced channel bed, and native planting revegetation.	Difficult Run
Babson Ct	Restoration of 324 linear feet of outfall channel which also included a 66 linear foot tributary. The goals of the project were to address public safety concerns, stabilize a deeply eroded channel by using natural stream design techniques and provide enhanced water quality. Additionally, MSMD staff incorporated in the scope of work the removal of 250 cubic yards of sediment from a County maintained dry pond. The pond was restored with native vegetation and coir matting.	Accotink Creek
Lazy Creek Ct	Restoration of 159 linear feet of an eroded channel located in a Resource Protection Area. The goals of the project were to address public safety concerns, stabilize a deeply eroded channel by using natural stream design techniques and provide enhanced water quality.	Pohick Creek

Project Name	Description	Watershed
Tyson's Galleria	Restoration of 199 linear feet of eroded outfall channel located in a Resource Protection Area. The goals of the project were to address public safety concerns, stabilize a deeply eroded channel by using natural stream design techniques and provide enhanced water quality.	Scotts Run
Crestmont Circle	Restoration of 145 linear feet of eroded channel located in a County stormwater drainage easement. The goals of the project were to address public safety concerns, stabilize a deeply eroded channel by using natural stream design techniques and provide enhanced water quality.	Pohick Creek
Harvest Green Ct	Restoration of 407 linear feet of eroded channel located in a Resource Protection Area. The goals of the project were to address public safety concerns, stabilize a deeply eroded channel by using natural stream design techniques and provide enhanced water quality.	Sugarland Run
Stone Mill Ct	Restoration of 262 linear feet of eroded channel. The goals of the project were to address public safety concerns, stabilize a deeply eroded channel by using natural stream design techniques, and provide enhanced water quality.	Difficult Run
Launcelot	Restoration of 90 linear feet of eroded channel located in a Resource Protection Area. The goals of the project were to address public safety concerns, stabilize a deeply eroded channel by using natural stream design techniques, and provide enhanced water quality.	Accotink Creek

4. Operations

Fairfax County's stormwater management program is designed to prevent harmful pollutants from entering the stormwater conveyance system and being discharged into local water bodies. Controlling and managing sources of stormwater pollutants are vital components of the program, and specific actions the county took during July 1, 2017 to June 30, 2018 are described in this section.

Inspection and Maintenance of Stormwater Management Facilities

The county's stormwater management facility inventory is valued at more than \$0.5 billion. 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. This primarily includes stormwater dry ponds located in residential subdivisions. MSMD inspects and oversees all stormwater management private facilities. During July 1, 2017 through June 30, 2018, MSMD inspected 1,077 of the 2,159 county-maintained SWM and BMP facilities and 954 of the 4,455 privately-maintained SWM and BMP facilities.

Also during July 1, 2017 to June 30, 2018, MSMD continued its routine maintenance program for countymaintained SWM/BMP facilities by cleaning and/or mowing 1,381 ponds. Cleaning involves removing trash, sediment and debris from the trash rack, control structure and inflow channels within 25 feet of the control structure. At each stormwater management facility, deposited sediment is removed from the trickle ditch upstream from the control structure and appropriately disposed of offsite. The cleaning helps keep the facility functioning as designed. In addition, 390 county-maintained LID/green infrastructure facilities were maintained as part of MSMD's routine maintenance program.

MSMD continued a partnership with the Fairfax County Sheriff's Office to use Community Labor Force (CLF) crews to help remove trash in most publicly maintained stormwater ponds. During July 1, 2017 to June 30, 2018, the CLF work crews removed trash from more than 1,300 ponds.

To ensure that dams meet state safety requirements, county staff with expertise in dam design and construction perform annual inspections of 20 state regulated dams that are operated by DPWES. 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 seven times per year.

Storm Drainage Infrastructure Management

Fairfax County maintains an inventory of its storm drainage infrastructure tracked through a layer in the geographic information system (GIS). The infrastructure inventory is continuously updated from the results of routine inspections and maintenance activities conducted by MSMD staff. Between July 1, 2017 and June 30, 2018, the GIS database layer was updated with new assets from as-built plans and onsite inspections of system components within identified easements. More than 75 as-built construction plans were digitized, while continuing efforts to review the inventory's completeness and spatial accuracy resulted in updates to 171 tax map grids. The county's stormwater conveyance system, valued at more than \$1 billion, includes 1,291 miles of pipes and almost 64,000 storm structures. In 2011, DPWES began development of a comprehensive condition assessment program that will eventually support a sustainable rehabilitation program for the county's storm drainage infrastructure. Between July 1, 2017 and June 30, 2018, MSMD continued implementation of its infrastructure inspection and rehabilitation program. Staff inspected 262 miles of storm pipe, consisting of 13,100 pipe segments and as many storm structures by visual ground surface observations. Internal pipe condition assessment video and photo documentation was completed for 86 miles of storm pipe. These inspections combined resulted in about 27 percent of the storm drainage network being photographed or screened for structural deficiencies and maintenance needs, consistent with the MS4 program requirement to inspect 100 percent of the county's storm drainage system every five years and at least 15 percent annually. In addition, 1.5 miles of storm pipe in the county's inventory were rehabilitated or renewed through replacement or by lining the entire pipe segment using trenchless technology (cured-in-place pipe lining) methods, and 11 miles of pipe and structures were cleaned, cleared and maintained. Eight outfall channel restoration projects totaling 1,613 linear feet were completed during FY 2018.

Roadways

The Virginia Department of Transportation (VDOT) maintains and operates public roads (interstate, primary, secondary, residential) in Fairfax County. However, the county maintains several miles of discontinuous road segments, many of which are unpaved. A portion of Fairfax County's roadways program involves sweeping parking lots associated with county facilities such as government centers, libraries, public schools (funded by Fairfax County Public Schools), fire stations, police stations, health centers, bus transit facilities, park-and-ride lots, commuter rail stations, public housing facilities, staffed park locations, and roads and sidewalks in the county's Community Revitalization Districts (CRDs). Last year, the program was reduced to focus efforts on very large facilities and Virginia Pollutant Discharge Elimination System 9VPDES) permitted facilities.

This year, sweeping was reduced for the 2017-2018 season as sand is no longer used for deicing activities at Fairfax County Board of Supervisors-owned facilities. Additionally, the county's sweeping contractor, East Coast Sweeping, declined requests to sweep during this year's typical sweeping season (April 2018 - July 2018) and announced the closing of their business. Fairfax County is in search of a new sweeping contractor to fill this role and resume the sweeping program in 2019, albeit at levels similar to the 2016-2017 season. From July 1, 2017 – June 30, 2018 and prior to closing their business, East Coast swept one public facility and roadways in six of the county's Community Revitalization Districts removing 157 cubic yards of debris.

As part of the continued effort to limit the discharge of pollutants from county facilities, the county updated its Standard Operating Procedures (SOPs) for Outdoor Materials Storage, Roadways and Parking Lots Construction and Maintenance, Vehicle and Equipment Repair and Maintenance, and Parking Lot and Street Sweeping during this time period. These SOPs are intended to be used county-wide by Fairfax County agencies. (none of these should be capitalized)

Pesticide, Herbicide and Fertilizer Application Program

County agencies involved in the administration of parks and athletic fields have some form of nutrient and pest management plans. These are implemented or put into practice by FCPA staff or contractors. County personnel and private contractors follow the Virginia Department of Conservation and Recreation's (is this the Virginia Department of Environmental Quality DEQ?)) nutrient management guidelines, the Virginia Department of Agriculture's guidelines, and the Virginia Pesticide Control Act.

The Park Authority has two Virginia state-certified nutrient management planners on staff, one for parks and one for golf courses. To date FCPA has nutrient management plans for 650 acres of golf courses and 214 acres of natural turf athletic fields where nutrients are applied. Thirty-one acres of park land are managed under an integrated pest management plan.

During July 1, 2017 to June 30, 2018 the Northern Virginia Soil and Water Conservation District's certified nutrient management planner prepared nutrient management plans for 758.7 acres of parcels in agricultural use. These included "new plans" for 127.65 acres of land that did not have a nutrient management plan previously and "revised plans" for 631 acres of land on which nutrient management plans were about to expire, or had expired. Most of this land is managed for grazing purposes (pastures), vineyards, hay or vegetable production.

The federal and state pesticide laws and regulations require pesticide applicators to be certified for application of 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 2017, 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, commercial landscapers 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 2017 through 2018, VCE trained 523 commercial pesticide applicators for re-certification in Northern Virginia. The trainees provided the following feedback about the experience:

- 96% of participants responding to the survey reported "I know what I need to do to comply with state and federal laws and regulations."
- 96% stated "I've learned more about proper use of application equipment (calibration, drift minimization)."
- 92% stated "I've learned more about proper pesticide storage areas."
- 94% stated "I read pesticide labels and use the personal protective equipment (PPE) they require."
- 85% understand how pesticides affect pollinators.
- 83% have gained new knowledge to make safe and informed decisions about pesticide use.
- 84% have gained new knowledge for identifying and controlling pests of ornamentals.
- 84% understand the legal changes affecting pesticide applicators through the legal update.

Industrial and High Risk Runoff Facilities

Staff of SWPD and Stormwater GIS used desktop analysis to update the list of potential industrial and high risk runoff (IHRR) facilities located within the county's MS4 service area, which included approximately 590 facilities in FY 2018. During this reporting period SWPD's code specialists inspected 73 facilities in accordance with SOPs.

Educational materials on stormwater best management practices were provided to facilities to assist businesses with identifying and controlling stormwater runoff as part of the inspections. The county continued to track discharge monitoring reports (DMRs) submitted by VPDES permittees that discharge to the county's MS4, and notifying DEQ of permittees that failed to submit DMRs to the county as required by their permits.

Hazardous Materials Spill Prevention and Response

The Fire and Rescue Department (FRD) Hazardous Materials Response Team (HMRT), when requested by Fire Department first responders, 911 dispatch protocols or the Fire Marshal's Office, responds to 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 HMRT conducts monthly training on each of the three shifts. Last year each shift conducted a minimum of 252 hours of training per month regarding hazmat technician operations for a total of 3024 hours per shift. The entire fire department operational personnel receive 4 hours per person of online hazmat operations refresher training totaling approximately 4000 hours. The HMRT 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 include personal protective equipment, technical tools and equipment for spill control, and absorbent products such as pads and booms for spill containment. The Fire Marshal's Office maintains a contract with two major commercial hazardous materials response companies to provide additional containment and clean-up support for large-scale incidents.

During July 1, 2017 to June 30, 2018, the Fire and Hazardous Materials Investigative Services section of FRD (FHMIS) received 484 complaints. One hundred and sixty of the complaints involved the release of various petroleum or chemical substances. Of the 160 releases, most involved the release of petroleum products including home heating fuel oil (29), gasoline (18), motor oil (9), or hydraulic oil (7). Other releases investigated involved antifreeze, paint, sewage, wastewater discharges, water treatment chemicals and mercury. Storm drains or waterways were involved in 38 of the releases. Documentation of individual releases and the county's responses is maintained by FHMIS. In both emergency and non-emergency spills, FHMIS enforces appropriate codes and ordinances to ensure that responsible parties take appropriate spill control and cleanup actions to protect and restore the environment.

FHMIS monitors contaminated sites that have a potential for the contaminant to come into contact with surface waters or stormwater management facilities. As a part of the oversight program, FHMIS, 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 sewers. FHMIS then monitors the discharge for the duration of the agreement. During July 1, 2017 to June 30, 2018, the Hazardous Materials Technical Support Branch of FHMIS monitored two oversight cases. Most of these oversight files involve contaminated underground storage tank sites.

The Fire and Rescue Department 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 and local business representatives that handle hazardous materials. FRD updates its Hazardous Material Emergency Response Plan annually.

Illicit Discharge and Improper Disposal (IDID)

The objective of the IDID program is to detect and eliminate unauthorized discharges of non-stormwater to the county's storm drainage system and state waters. The IDID program consists of proactive and complaint-driven components. The program is proactive about providing educational resources to residents and businesses in efforts to prevent pollution and to raise public awareness on how to report suspected illicit discharges. The majority of illicit discharge investigations are initiated through reports made to the county. Two inspectors within SWPD are dedicated to investigation of illicit discharges. The program receives operational support from multiple divisions within DPWES as well as the Departments of Code Compliance, Health, and Land Development Services, the Fire Marshal's Office, and others. These organizations coordinate responses to a variety of complex pollution issues across the county. From July 1, 2017 to June 30, 2018, SWPD investigated and closed 23 cases involving illicit discharge or improper disposal cases? (need a noun there) to the county's MS4. Five investigations are ongoing.

Inspection and maintenance of the county's sanitary sewers help prevent sewage leaks to the MS4 and waterways. Rehabilitation and repair includes dig-up repairs, manhole rehabilitation and trenchless pipe repair, which uses 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. Additionally, the program uses closed circuit television (CCTV) to inspect trunk sewer mains in an effort to specifically identify defective sewer lines for repair and rehabilitation. During July 1, 2017 to June 30, 2018, 1,099,100 linear feet of sewer lines were inspected.

The Sanitary Sewer Extension and Improvement Program addresses pollution abatement, public health considerations and provides sanitary sewer services to areas identified by the Health Department as having non-repairable or malfunctioning septic systems. During July 1, 2017 to June 30, 2018, there were Sanitary Sewer Extension and Improvement projects being implemented.

Land Conservation Awards Program

The county sponsors an annual Land Conservation and Tree Preservation Awards program to recognize builders, contractors, developers, engineers, project managers and site superintendents whose projects demonstrate excellence in the design and implementation of erosion and sedimentation controls and their commitment to tree preservation and landscape plantings in Fairfax County. The winners of the 2017 Land Conservation and Tree Preservation Awards were recognized during a public ceremony on February 2, 2018. The program gave awards to four sites in the following categories: large single family residential, large commercial, small commercial, special projects, infill lot, and the best protected environmentally sensitive site of the year. Five sites received awards for tree planting and preservation. An outstanding developer, engineering firm, contractor and superintendent were recognized. County employees were recognized with awards for outstanding E&S county inspectors and outstanding E&S county reviewers. Winners of the 2017 Land Conservation Awards include:

Large Single Family Residential: Piney Run

Large Commercial: Metro Center II, Bldgs. I & II

Special Projects: Lee District Park Chessie Trail

Infill Lot: 1601 White Pine Drive

The winner of the Best Protected Environmentally Sensitive Site is Piney Run.

Builders, contractors, developers, engineers, project managers and site superintendents whose projects demonstrate excellence in the design and implementation of erosion and sedimentation controls and their commitment to tree preservation and landscape plantings in Fairfax County were recognized.

Outstanding Engineering Firm: Urban, Ltd. For Walhaven Woods

Outstanding Superintendent: Patrick Hobbs, Jr. for Piney Run and Paul Atherton for Thompson Property

Outstanding Contractor: S.W. Rodgers Company, Inc. for Piney Run

Outstanding Developer Owner: Elm Street Development for Piney Run

5. 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 DPWES and other regional partners.

Water Quality Monitoring

In-Stream Monitoring

In compliance with the MS4 permit, an in-stream monitoring program was developed to evaluate the condition of select streams within Fairfax County. Five stream sites were selected for monitoring during the term of the permit, and an SOP was created to detail county monitoring protocols. Monitoring began at these sites in 2017 and trends will be evaluated in the future when sufficient data has been gathered.

Dry Weather Screening

During July 1, 2017 to June 30, 2018, the county selected 100 MS4 outfalls for dry weather screening in accordance with the general protocol outlined in "Fairfax County Dry Weather Screening Program: Site Selection and Screening Plan," (May 2014). Physical parameters were recorded at each outfall with enough flow to be sampled. Water was found to be flowing at 30 of the outfalls, and was tested for a range of pollutants (specific conductivity, detergents, fluoride, pH, phenol, copper, and temperature) using field test kits. Of the outfalls tested, four required follow-up investigations because they exceeded the allowable limit for at least one pollutant. Upon retesting these sites, two either had no flow or were no longer in exceedance. Two sites required additional 'track down' to determine the cause of flow. Flow



Figure 5-1: Sampling a flowing outfall during dry weather screening. Photo by Fairfax County.

from one of the tracked-down sites was eliminated after an apartment complex repaired the leaking pipes from their structure. The other tracked-down site is still under investigation.

Wet Weather Screening

Wet Weather Screening was conducted during July 1, 2017 to June 30, 2018 according to the "Standard Operating Procedures for the MS4 Wet Weather Screening Program" (2017). Two sites were monitored on a quarterly basis. Runoff samples were collected via automated sampler and event mean concentrations (EMCs) calculated for total petroleum hydrocarbons, chemical oxygen demand, total phosphorous, total nitrogen, Kjeldahl nitrogen, nitrate-nitrite nitrogen, zinc, cadmium, copper, lead,

chromium, nickel, hardness, total? suspended solids (TSS), ortho-phosphorous, and alkalinity. These two sites are part of a larger suite of ten targeted sites t that will be monitored during 40 storm events between 2014 and 2018 (every year two sites will be monitored quarterly). These sites were identified in industrial and commercial areas and were ranked according to their county land use code, potential to contribute pollutants to the MS4 and information gathered from field reconnaissance.

The water quality analysis indicates that the runoff from the two selected sites is not a significant source of pollutants to the MS4. Levels of two pollutants, copper and zinc, were elevated at both sites for three of the four quarters. Elevated copper and zinc concentrations are common in urban and suburban runoff and have been observed in the majority of the sampling sites throughout the previous study period.

Biological Monitoring

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.

A probability-based site selection sampling methodology was used to identify randomly-selected stream bioassessment locations throughout Fairfax County. These sites were stratified and proportionally distributed throughout the county based on Strahler stream order applied to all perennially flowing streams in Fairfax County. Using this "stratified-random" methodology (probabilistic monitoring) eliminates any site selection bias and is commonly used as a cost-effective way of obtaining a statistically defensible determination of stream conditions at a countywide scale.

Fifty-three sites were sampled for benthic macroinvertebrates during calendar year 2017: 40 sites randomly selected within Fairfax County as part of the annual probabilistic monitoring program; 11 Piedmont reference locations in Prince William National Forest Park; and two Coastal Plain reference site in the Kane Creek watershed of Fairfax County. Of the 40 randomly selected sites, 21 sites were sampled for fish. Additionally, fish were sampled at seven Piedmont reference sites and two Coastal Plain reference sites. A multi-metric indicex of biological integrity (IBI) was developed previously for aquatic benthic macroinvertebrate communities within Fairfax County. Water quality, fish community, bacteria and stream habitat characteristics were also 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 https://www.fairfaxcounty.gov/publicworks/stormwater/report-fairfax-county-streams-2005-2007. Figure 5-2 shows the locations of the calendar year 2017 monitoring sites and their respective stream orders.

The biological health of the benthic macroinvertebrate 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 communities. The macroinvertebrate IBI is applied to all randomly selected sites.



Figure 5-2: Location of calendar year 2017 biological monitoring sites

IBI results from the 40 randomly selected macroinvertebrate sites suggest that approximately 25 percent of the county's waterways are classified as being in "excellent" or "good" condition while 75 percent are classified as "fair," "poor" or "very poor" based on a decreased biological integrity of the streams. Twenty-one sites were sampled for fish in 2017.

Table 5-1 shows a breakdown (stratified by stream order) of the calendar year 2017 biological monitoring results for benthic macroinvertebrates and the scoring ranges for the rating categories. Table 5-2 shows the monitoring results at individual sites.

Stream	Number of	Minimum	Maximum	Standard	Mean IBI	Dating	Rating	Score
Order	Samples	Score	Score	Deviation	Score	Kating	Category	Range
1	20	4.5	99	25.6	33.1	Poor	Excellent	80 - 100
2	10	23.6	84.1	20	57	Fair	Good	60 - 79.9
3	7	22.1	72.3	17.6	42.5	Fair	Fair	40 - 59.9
4 & 5	3	35.1	65.7	16	47.6	Fair	Poor	20 - 39.9
All	40	4.5	99	23.9	41.8	Fair	Very Poor	0 - 19.9

Table 5-1. Benthic macroinvertebrate san	nnlina	results by stree	am order fro	m calendar	vear 2017
	ipiiiig	results by stree	ini oraci jio	in culchuur	yeur 2017

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 qualityand 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 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 5-3 and Figure 5-4 shows the SQI for all years probabilistic monitoring has been employed. The July 1, 2017 to June 30, 2018 SQI remains the same as it was in 2017.

Sampling Year	Very Poor	Poor	Fair	Good	Excellent	Index Value
2004	40	30	17	13	0	2
2005	15	32.5	35	7.5	10	2.7
2006	38.6	36.4	11.4	11.4	2.3	2
2007	17.5	35	12.5	20	15	2.8
2008	27.5	30	20	15	7.5	2.4
2009	37.5	37.5	12.5	7.5	5	2.1
2010	17.5	37.5	22.5	15	7.5	2.6
2011	12.5	35	20	20	12.5	2.9
2012	33.3	30.8	20.5	5.1	10.3	2.3
2013	22.5	27.5	17.5	15	17.5	2.8
2014	27.5	25	15	27.5	5	2.6
2015	10	30	40	17.5	2.5	2.7
2016	17.5	37.5	22.5	15	7.5	2.6
2017	17.5	37.5	20	20	5	2.6

Table 5-2: Countywide SQI for sampling years 2004-2017 showing percentage of sites in each rating



Figure 5-3: Trends in the countywide stream quality index

The benthic IBI was calculated from 2004 to 2007 by comparing data collected in the county against the reference data collected that same year. From 2008 to 2012, the IBI was calculated comparing the cumulative reference data from 2004-2008. With ten years of reference data available, the Benthic IBI is calculated using the cumulative reference data collected over the past ten 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 5-3.

Table 5-4 presents a summary of biological monitoring data collected countywide since 2004. Results are presented 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 fish. For general conditions of these particular watersheds, see the 2003 Stream Protection Strategy (SPS) Baseline Study at 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 2007 annual stream report has detailed watershed condition maps showing the results of county and resident volunteer monitoring data from 1999 through 2006 and can be found at

https://www.fairfaxcounty.gov/publicworks/stormwater/report-fairfax-county-streams-2005-2007.

Bacteria Monitoring

SWPD continued its bacteria monitoring program while ensuring that it is consistent with current standards and practices, and uses the most effective procedures. This monitoring provides information on the general levels of bacteria in streams, but also is used as a screening tool that can identify areas of concern for further, more intensive investigations of potential sources (e.g. sewer leaks).

As recommended by the U.S. Environmental Protection Agency, the bacterium *Escherichia coli* (*E. coli*) is used by Fairfax County as the water quality indicator for fecal contamination in surface water. To determine levels of *E. coli* in county streams, grab samples of stream water were taken at 40 sites in 14 watersheds throughout the county. Staff collected samples five times during the year. Five samples were taken during the peak growing season (April to October) and one sample was taken during winter months

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

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

The county's analysis is based on the frequency that the level of *E. coli* exceeded the instantaneous threshold of 235. Because there are several methodologies to determine the level of *E. coli* in surface water, each with its own unit (i.e., MPN, CFU), all discussion of *E. coli* concentration will remain unitless at a state level. *E. coli* samples are processed at the Fairfax County Health Department laboratory, using the Colilert[®] Quanti Tray/2000 by IDEXX and Skalar San++ Analyzer. The upper limit of detection for the Quanti Tray/2000 yields a most probable number (MPN) of 2420. The remaining chemical parameters are recorded in the field using a handheld multi-probe water quality meter.

For samples collected during calendar 2017, 82 percent of Fairfax County's bacteria monitoring locations did not exceed DEQ's standard of 235 units per 100 mL of water more than twice (Figure 5-5). Fairfax County concurs with officials from the DEQ and the Virginia Department of Health, who caution that it is impossible to guarantee that any natural body of water is free of risk from disease-causing organisms or injury.



Figure 5-4: Percentage of sites exceeding Virginia's instantaneous water quality standard for E. coli.

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

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

USGS Monitoring Network

In 2007, the county entered into a five-year Joint Funding Agreement (JFA) with the US Geological Survey (USGS) to create a Water Resources Monitoring Network. This study was designed to be an ongoing, long-term monitoring effort to describe current conditions and trends in both water quality (e.g. nutrients and sediment) and water quantity. The study is focused on evaluating the benefits of the projects implemented under the watershed improvement program.

A five-year JFA was approved by the Board of Supervisors (Board) in June 2012 to extend the original five-year agreement and to expand the monitoring network. The original network consisted of four automated continuous stream gaging stations and 10 partial record (less intensely monitored) sites. The expanded network added one automated stream gaging station and five partial record sites to provide a more comprehensive overview of Fairfax County. Another five-year JFA was approved by the Board in August 2017 to consolidate the monitoring networks and continue the partnership.

The monitoring network, designed to fulfill the objectives of the study, consists of five automated continuous water resources monitoring stations and fifteen less-intensely monitored sites. The first four

automated stations were constructed in 2007 and achieved full operational capability in 2008. The fifth station became fully operational in the second quarter of 2013. Instruments at these stations collect stream flow data every five minutes and water quality (water temperature, pH, dissolved oxygen, 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 twenty 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.

Continuous Data Collection

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

Discrete Data Collection

- Grab samples were collected monthly at all 20 monitoring stations, resulting in 264 samples collected and analyzed (including QA samples). Water level and water quality parameters were measured at the time of sampling. Samples were further analyzed for nutrients and suspended sediment concentration.
- Storm event samples were collected using automated samplers at the five intensive monitoring stations. These samples were collected in response to elevated turbidity and stream flow conditions during storms, resulting in the collection of 126 samples that were analyzed for the same suite of nutrients and suspended sediment concentration as the monthly grab samples.
- Fifty-four manual stream flow measurements were made across the 20 sites to support the maintenance of the stream flow rating curve for each site.

A report summarizing the data collected at the original 14 station network through the first five years of the study (2007-2012) was published by the USGS. This can be found at: <u>http://pubs.usgs.gov/sir/2014/5073/</u>. This report includes calculations of annual nutrient and sediment loads (lbs/year) and yields (lbs/acre/year) from the four watershed stations equipped with fully automated (continuous monitoring) gages. Interpretation of long term water quality trends requires multiple years of data for statistically rigorous evaluation (5-10 years); thus, these analyses are not yet available for this study.

A new, two-phased analysis and reporting approach is currently underway to accomplish the objectives of this monitoring effort. Phase 1 will consist of expanded watershed characterization to include 5 additional years of data and 6 additional sites. The second report will describe landscape changes and relations between those changes and in-stream responses.

This cooperative study is a progressive and unique effort to characterize conditions in urban and suburban streams. This study is expected to facilitate an understanding of watershed scale responses to management practices, which has yet to be accomplished by other studies in small, urban watersheds.

Volunteer monitoring

Northern Virginia Soil and Water Conservation District (NVSWCD) continued its volunteer stream monitoring program from July 1, 2017 to June 30, 2018. This program supplements the county's stream bio-assessment program. The data collected support the findings of the county's program and help provide trend data. The data alert staff to emerging problems. The program builds awareness of watershed issues among participants. 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. Data collected by volunteers are shared with Fairfax County, the Virginia DEQ, Virginia Save Our Streams, and other interested organizations or individuals. The data help confirms findings of biological monitoring performed by county staff, provide information on trends, and may serve as a first alert in areas where the county may monitor only once in five years.

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.

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

Water Quality and Total Maximum Daily Loads (TMDLs)

Under the Clean Water Act, states are required to monitor water quality and assess compliance with water quality standards every two years. Water quality standards designate uses for waters and define the water quality needed to support each use. There are six designated uses for surface waters in Virginia:

- Aquatic life.
- Fish consumption.
- Public water supplies (where applicable).
- Shellfish consumption.
- Swimming.
- Wildlife.

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, and a Total Maximum Daily Load must be developed. A TMDL is a watershedspecific limit of the pollutant causing the impairment, and reducing the pollutant loads to that limit should restore the waterbody's ability to support the designated use.

Water Quality Assessments are performed by the Virginia Department of Environmental Quality and are available at:

http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2014305(b)303(d)IntegratedReport

Information on TMDL development in Virginia is available on DEQ's website: <u>www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDev</u> <u>elopment.aspx</u>

TMDL Action Plans and Implementation

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)

Contamination by fecal coliform bacteria is the most common cause of water quality violations in Virginia streams. According to DEQ and the USGS, "Although fecal coliform bacteria are not necessarily dangerous to humans, their presence in streams indicates that the water is contaminated with fecal waste from warm-blooded animals. For this reason, fecal coliform bacteria are known as 'indicator organisms;' their presence in recreational waters indicates an increased risk to human health." In Virginia, water quality standards for bacteria were changed in 2003 from more general fecal coliform bacteria to *E.coli* (*Escherichia coli*). *E. coli* is a subset of fecal coliform bacteria and is considered a better indicator of the pathogenic potential of contamination. To date, the following bacteria TMDLs have been established in Fairfax County and have assigned reductions to the county's MS4:

- Accotink Creek
- Four Mile Run
- Bull Run (includes Cub Run, Johnny Moore Creek and Little Rocky Run)
- Popes Head Creek
- Difficult Run
- Hunting Creek (includes Cameron Run and Holmes Run)
- Sugarland Run
- Mine Run
- Pimmit Run

On March 31, 2017, the county submitted a Bacteria TMDL Action Plan to DEQ that addresses the TMDLs listed above; the county is awaiting DEQ approval.

Sediment (Benthic Impairment)

Sediment pollution is a leading cause of stream degradation and has been identified as one of the major stressors associated with the decline of aquatic habitats. While some sediment is a natural part of the water environment, too much sediment can smother bottom dwelling organisms and block sunlight to underwater plants, which serve as habitat to many aquatic species. In addition, other pollutants such as phosphorus and PCBs may be attached to sediment particles. To date, the following sediment TMDLs have been established in Fairfax County and have assigned reductions to the county's MS4:

- Bull Run (includes Cub, Johnny Moore and Little Rocky Runs).
- Popes Head Creek.
- Difficult Run.
- Accotink Creek.

On March 31, 2017, the county submitted a Benthic TMDL Action Plan to DEQ that addresses the Bull Run, Popes Head Creek and Difficult Run TMDLs listed above; the county is awaiting DEQ approval. The Accotink Creek TMDL will have an action plan created for it when the permit is renewed in April 2020.

Chlorides

Chloride and other ions occur naturally in waters as a function of mineral composition of soils and bedrock, however deicing salt is the primary source of chloride in urban watersheds. Elevated concentrations of chloride and other ions can disrupt the osmotic regulation of aquatic organisms. To date, the following chloride TMDLs have been established in Fairfax County and have assigned reductions to the county's MS4:

• Accotink Creek.

The Accotink Creek chloride TMDL will have an action plan created for it when the permit is renewed in April 2020. The Department of Environmental Quality initiated the Accotink Creek Salt Management Strategy (SaMS) committee began meeting during fiscal year 2018 in an effort to assist both regulated and non-regulated entities to manage and apply deicers/anti-icers consistent with the assumptions and requirements of the TMDL. It is intended that the chloride TMDL be implemented collaboratively through performance-based goals using BMPs.

PCBs

The Total Maximum Daily Loads of Polychlorinated Biphenyls (PCBs) for Tidal Portions of the Potomac and Anacostia Rivers in the District of Columbia, Maryland, and Virginia (PCB TMDL) were established by the U.S. Environmental Protection Agency in 2007 and were adopted by the State Water Control Board on April 11, 2008. While the Potomac River PCB TMDL assesses the tidal Potomac River and tributary waters, the TMDL only establishes waste load allocations for the direct drainage portions of the MS4-permitted jurisdictions. The TMDL for the tidal Potomac River is set at an aggregate 1,510 grams per year.

PCBs are a legacy pollutant--they were used as a coolant and as an insulator, particularly in transformers, hydraulic equipment, and electrical equipment. The manufacture of PCBs was banned in 1979; however, PCBs are persistent in the environment and do not readily decompose under normal conditions. They also tend to settle into the sediment of waterways or adsorb to terrestrial soils. PCBs may still be released by illegal or improper dumping of PCB-containing wastes or leaks from legacy electrical transformers containing PCBs. To date, the following PCB TMDLs have been established in Fairfax County and have assigned reductions to the county's MS4:

- Accotink Creek
- Belmont Bay
- Dogue Creek
- Four Mile Run
- Gunston Cove
- Hunting Creek
- Little Hunting Creek
- Occoquan River and Pohick Creek

On March 31, 2017, the county submitted a PCB TMDL Action Plan to DEQ that addresses the TMDLs listed above; the county is awaiting DEQ approval.

Accotink Creek TMDL

This issue is not part of the current TMDL Action Plans that the county submitted to Virginia DEQ on March 31, 2017. The Accotink Creek TMDL will have an action plan created for it when the permit is renewed in April 2020.

Accotink Creek was first listed as impaired in 1996 based on biological monitoring indicating that the aquatic life use was not supported. In 2011, the U.S. Environmental Protection Agency (EPA) established a stormwater TMDL for the Accotink Creek watershed that sought to reduce flow in Accotink Creek by nearly 50 percent. The TMDL identified stormwater runoff and sedimentation as the most probable stressors impacting the biological community and used flow as a surrogate for sediment in setting the required reductions.

Due to concerns about the feasibility of achieving a 50 percent reduction in in-stream flow and the failure of EPA to provide reasonable assurance that the required flow reductions would restore the biological community, the Board of Supervisors partnered with the Virginia Department of Transportation to challenge the TMDL in U.S. District Court. In January 2013, the court ruled that stormwater runoff is not a pollutant, so EPA is not authorized to regulate it via a TMDL, and remanded the TMDL to EPA. EPA then asked DEQ to develop a replacement TMDL.

DEQ began development of a replacement TMDL for Accotink Creek in 2014 and identified chloride, sediment, habitat modification and hydromodification as the most probable stressors causing the biological impairments. Of these four stressors, only two are pollutants (chloride and sediment) and can therefore be the subject of a TMDL. In addition to the biological impairment originally identified in 1996 in Lower Accotink Creek, DEQ has since identified biological impairments in Upper Accotink Creek and in Long Branch. A separate TMDL equation has been developed for each pollutant and each impairment.

The majority of the sediment load in the watershed is thought to be coming from streambank erosion. The required reductions in sediment load from MS4s for Upper Accotink Creek, Long Branch and Lower Accotink Creek are 76 percent, 73 percent and 45 percent, respectively. These reductions are in line with other sediment TMDLs developed to address biological impairments in Fairfax County.

The majority of the chloride load in the watershed is thought to be coming from road salt applications during the winter months. While sufficient data on the timing, location and magnitude of road salt applications were not available to support the calculation of sourcespecific reductions, DEQ estimates that the total required reductions in chloride load for Upper Accotink Creek, Long Branch and Lower Accotink Creek are 84 percent, 72 percent and 68 percent, respectively. This is the first chloride TMDL developed in Virginia, and Technical Advisory Committee members emphasized the need for DEQ to recognize that public safety must not be compromised by the TMDL. DEQ agreed to focus TMDL implementation on development of a collaborative regional salt management effort.

The Accotink Creek TMDLs were approved by the EPA on May 23, 2018. The county will be required to develop TMDL Action Plans for both TMDLs after the MS4 permit is renewed in 2020.

6. Public Outreach and Education

Fairfax County partners with several organizations to enhance public outreach and education campaigns with the goal of improving and protecting the environment. During July 1, 2017 to June 30, 2018, the following organizations contributed to the county's outreach efforts:

- Alice Ferguson Foundation: organizes the Potomac River Watershed Cleanup.
- Clean Fairfax Council: assists with watershed cleanups; organizes the annual Springfest event.
- Clean Virginia Waterways: coordinates the annual Virginia Waterways Cleanup as part of Ocean Conservancy's International Coastal Cleanup.
- Fairfax County Public Schools.
- Metropolitan Washington Council of Governments (COG): regional public education campaign about the value of water and ways to protect water infrastructure.
- Northern Virginia Soil and Water Conservation District (NVSWCD): provides support for outreach activities and assists residents to solve their drainage and erosion problems.
- 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 public education campaigns through radio public service announcements (PSAs), web pages, banner ads on Google and follow-up surveys of residents.

Numerous methods are used to inform, engage and educate the public. These include: news releases; news media stories that are seen on television, heard on radio and read in newspapers and magazines; articles written by staff and published in professional journals; public service announcements that air on Fairfax County Channel 16, on other regional public access television stations, and on You Tube; interviews with subject matter experts on the "County Conversation" that airs on Fairfax County Radio; pod casts; Facebook postings; Flickr picture postings; SlideShare PowerPoint postings; county web pages; publications such as fact sheets, brochures and booklets; and special events such as Fall for Fairfax and Springfest.

The county implements a public education program with the goal of providing information to its residents and encouraging public involvement in the following areas related to stormwater management:

Illicit Discharges and Improper Disposal

The county's MS4 is designed to collect and transport stormwater to local water bodies. The MS4 is not intended to receive any other substances unless they are specifically permitted by the Commonwealth of Virginia. The county's education program is designed to help residents recognize discharges that are not allowed in the MS4 and report them to the appropriate county or state authority.

Fairfax County's Stormwater website includes a page entitled "What's that Stuff in the Stream?" which provides descriptions and pictures of various stream conditions to help residents distinguish between what is a natural occurrence and what may be an illicit discharge. The website received 2,750 views in FY 2018. To help residents and businesses understand the regulations prohibiting illicit discharges, the county maintains a group of web pages about programs required by the MS4 permit and the Stormwater Management Ordinance; combined those pages received more than 5,600 views. Other county online resources cover specific topics related to illicit discharges. For example, there are web pages dedicated to best management practices for general car washing, outdoor vehicle washing in a business setting and swimming pool discharges; in FY 2018, these pages received 998 views, 1,321 views

and 1,277 views, respectively. Fairfax County maintains a video produced by Channel 16 entitled "How to Report Illegal Dumping into Storm Drains or Streams." This video was viewed 613 times in FY 2018.

In addition to online offerings, the county distributes printed materials through the mail or in-person site visits. In FY 2018, county staff distributed 76 printed pollution prevention packets, most through inperson visits to businesses. The county mailed outreach material describing stormwater management requirements and best management practices to 321 businesses involved in landscaping. The county sent educational letters and fact sheets to 62 pool service companies. The county reached 3,430 readers with an educational message about illicit discharges placed in the Health Department newsletter for food service establishments.

The county provides educational opportunities to our younger residents related to illicit discharges. For example, the "Stream Crime Investigation" lab for high school students reached 323 students with information on how to recognize illicit discharges. Likewise, presentations made to 173 students at a Water Quality Field Day event helped them to understand what it takes to be a pollutant detective. The county incorporated messages about the illicit discharge program in a Stormy the Raindrop visit to a local school, where approximately 70 children attended the presentation. The 'Stormy the Raindrop' puppet show was presented at the 2017 Fall for Fairfax event, where activity books were distributed. Stormy the Raindrop activity books were also given away at the 2018 SpringFest event.

Local Water Quality Improvement Initiatives

Fairfax County offers educational opportunities promoting individual and group involvement in local restoration and stream cleanup efforts. Residents are encouraged to consider best management practices, such as rain gardens, rain barrels, back yard composting and installing native plants and trees on their properties among other low impact development practices, to retrofit residential areas that do not have adequate stormwater controls.

SWPD posted numerous messages on the county's environmental Facebook page on such topics as household hazardous waste, tree pests, the Dead Run stream restoration, completed projects and their environmental benefits, and how to report illegal dumping into storm drains or streams.

Several stream restoration and other completed projects were posted to SlideShare and received 152,761 views as of July 2, 2018.

Programs posted to You Tube earned 35,834 views as of July 2, 2018 and include such topics as community meetings prior to stream restorations, the Dead Run Stream Restoration, wastewater management, how to recognize the signs of poor tree health, how residents can track projects in their neighborhoods through GIS mapping, public school planting events and so-called flushable wipes that clog sanitary sewer pipes.

Watershed Cleanups

Staff from the Stormwater Planning Division (SWPD), Solid Waste Management Program (SWMP), Wastewater Management (WWM), Fairfax County Park Authority (FCPA) and the Northern Virginia Soil and Water Conservation District (NVSWCD) continued to support large and small-scale volunteer cleanups coordinated by the Alice Ferguson Foundation, Clean Virginia Waterways and Clean Fairfax Council.



Figure 6-1: Solid Waste Management Cleanup. Photo by Fairfax County.

During July 1, 2017 to June 30, 2018, 56 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 FCPA's Parktakes Magazine, as well as on the internet. Staff from SWPD, SWM, WWM, FCPA and NVSWCD participated in these cleanups. More than 1,264 volunteers removed 47,995 pounds of loose litter and bulk trash from county streams.

According to Clean Virginia Waterways, 1,087 volunteers participated in the

International Coastal Cleanup in Fairfax County during September and November 2017. 18,201 pounds of trash and marine debris were removed from beaches and shorelines. Plastic bags, beverage bottles, food wrappers and containers, and litter from recreational activities and fast food consumption (i.e. cups, plates, etc.) were the most commonly collected trash items in the county.

Clean Fairfax Council documented the following metrics regarding litter and clean-up activities for July 1, 2017 to June 30, 2018:

- Number of clean up events either planned or supported 70
- Number of volunteers at clean up events 2,487
- Number of volunteer hours 15,655
- Tons of garbage collected 51

Stream Buffer Restoration

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

NVSWCD's seedling sale promoted urban reforestation, habitat enhancement and water quality protection. More than 7,400 native tree and shrub seedlings were sold.

Community Low Impact Development

NVSWCD provides information to residents to help them manage their land and protect water quality by controlling stormwater, preventing erosion and encouraging native vegetation. Several online and hard copy resources are provided by NVSWCD to serve as comprehensive guides for homeowners to care for their property, manage drainage and erosion, and low-impact landscaping. During July 1, 2017 to June 30, 2018 the following publications combined were visited or downloaded 107,627 times:

- You and Your Land-A Homeowner's Guide for the Potomac Watershed
- Residential LID Landscaping Guide
- Rain Garden Design and Construction: A Northern Virginia Homeowner's Guide
- Solving Drainage and Erosion Problems: A Guide for Homeowners

NVSWCD presented one rain garden workshop during July 1, 2017 to June 30, 2018. The workshop covered rain garden function, design, location, costs, construction, maintenance, planting and materials. The workshop was attended by 35 county residents and industry professionals.

NVSWCD coordinated a regional rain barrel initiative for Northern Virginia with neighboring jurisdictions. Nine "build-your-own" rain barrel workshops or pre-made distribution events attracted a total of 205 county residents and resulted in the distribution of 218 barrels. NVSWCD continued to partner in an artistic rain barrel program to renew interest in rain barrels and other best management practices.

NVSWCD coordinated two "build-your-own" composter workshops. Twelve participants constructed 12 tumbler-style composters. In addition, five individuals purchase five composter kits. NVSWCD organized the Watershed Friendly Garden Tour at eight sites showcasing low impact development practices including green roofs, porous pavers, rain gardens, composting, rain barrels, native species, and wildlife habitat. The goal of the workshop was to inspire visitors to adopt these practices in their own yards and schools. The tour attracted more than 224 participants.

During July 1, 2017 to June 30, 2018, 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 per year for plastic markers and glue. During each storm drain marking project, volunteers place a pre-printed label with a "no dumping" message on the storm drains in their neighborhoods. During July 1, 2017 to June 30, 2018, the storm drain marking program coordinated 10 projects that placed markers on 1,306 storm drains and educated more than 5,361 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. During July 1, 2017 to June 30, 2018, 150 volunteers contributed more than 2,000 hours to the program.

During July 1, 2017 to June 30, 2018, NVSWCD disseminated information on county environmental programs through two email lists, the *Green Breakfast* groups (819 recipients) and the *Watershed Calendar* group (1,914 recipients). NVSWCD continued to publish *Conservation Currents* which featured articles on rain gardens, stream restoration and stewardship. NVSWCD sent 2,800 copies per issue, mainly to homeowner associations whose editors are encouraged to reprint articles in their newsletters. Many articles are posted on the NVSWCD website and by June 2018 there were more than 1,000 e-subscribers.

According to the Virginia Cooperative Extension, residential lawns in Virginia comprise nearly 62 percent of the 1.7 million acres of managed turf grass 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 may reach storm drains or sewers and ultimately



Figure 6-2: Enviroscape watershed model presentation. Photo by NVSWCD.

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, the Virginia Cooperative Extension (VCE) Fairfax County Unit started a home lawn master gardener program to provide educational and technical services to homeowners with regard to residential lawn management. Fairfax County created the Home Turf Nutrient Management program to bring awareness to local water quality as it relates to residential lawn care practices. Local master gardener volunteers, under the guidance of the local extension agent, began the program by using master gardener interns as their first clients. VCE extension specialists trained volunteers on turf nutrient management practices. Each year, VCE master gardeners receive 20 hours of training on turf best management practices.

Since 2009, a team of VCE master gardener volunteers has led this program and helps 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. They have measured and developed more than one million square feet of turf for nutrient management plans.

In FY 2018, 85 homeowners had their lawns measured, 118 soil tests were submitted, and 85 urban nutrient management plans were written and given to the respective homeowner. These homeowner nutrient management plans covered 13.824 acres.

Proper Disposal of Used Oil, Household Hazardous Waste and Household Yard Waste

The Fairfax County Solid Waste Management Program (SWMP) plays an important role in protecting surface water resources through outreach efforts to promote responsible waste management practices.

The SWMP educates residents and business owners about reducing the volume of waste they generate, and how to dispose of and recycle waste properly.

Putting hazardous household wastes in the trash or down the storm drain contributes to the pollution of surface waters. The Fairfax County SWMP is responsible for the county's Household Hazardous Waste (HHW) Management Program. In this program county residents learn to dispose of hazardous waste such as used motor oil, antifreeze, and other automotive fluids.

The HHW program is one of the county's premier pollution prevention programs. The Fairfax County HHW program accepts hazardous materials free of charge from residents and disposes or recycles these materials per local, state and federal regulations. The safest way for Fairfax County residents to dispose of HHW is to carefully pack and bring them to one of the county's two permanent HHW collections sites, located at the I-66 Transfer Station and the I-95 Landfill Complex, both of which are open seven days a week.

Household hazardous waste refers to used or leftover contents of consumer products that contain materials with one of the four characteristics of a hazardous waste: toxic; ignitable; corrosive; or reactive. See the Virginia DEQ Household Hazardous Waste Fact Sheet for more information. Household hazardous waste should not be disposed of in the regular trash.

The Fairfax County HHW program accepts fluorescent lamps for disposal from county residents. SWMP staff continues to distribute educational brochures 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.

In addition to automotive fluids and fluorescent bulbs, the Fairfax County HHW program accepts a multitude of other hazardous chemicals for disposal from residents including pesticides, herbicides, insecticides, acids, bases, various solvents, mercury, aerosols, paints (all types), pool chemicals, and various cylinders - just to name a few. These wastes, along with countless others, are listed on the county's household hazardous waste website: <u>https://www.fairfaxcounty.gov/publicworks/recycling-trash/household-hazardous-waste</u>.

SWMP staff updated the residential HHW educational brochures in January 2016. These informative brochures are distributed to Fairfax County residents to help them identify the types of waste accepted at county facilities and make them aware of the seven day a week drop-off availability. These brochures are made available to the public online at the county HHW website or at one of the HHW permanent disposal drop-off locations.

Beginning in January 2015, the number of household hazardous waste remote collection events was reduced from four to one. By January 2016, these events were discontinued. In an effort to maximize the impact on environmental sustainability, while reducing unnecessary expenditures, a decision was made to phase-out the remote events and to establish two permanent, seven-day- a-week drop-off locations, which are available to residents at no charge.. The change has resulted in greater convenience for hazardous waste drop-off. Residential participation increased by 5.79 percent, and SWMP reduced budget constraints by \$80,000..

SWMP then focused on expanding its outreach efforts to county-based businesses. The management of commercial hazardous waste is regulated under 40 CFR Part 261. Any significant quantity of these wastes (defined by the regulation) generated under circumstances other than household use is subject

to tracking, documentation of use and proper recycling or disposal. Businesses that fall below defined thresholds for how much waste they generate and store are exempt from some of the substantive documentation and disposal tracking requirements although they must dispose of this waste in a proper, responsible manner.

In Fairfax County, these Very Small Quantity Generators (VSQGs), formerly Conditionally Exempt Small Quantity Generators (CESQGs), typically consist of small county-based businesses, government agencies, non-profits, schools, universities and places of worship. To promote safe, cost-effective and responsible disposal of hazardous waste, the SWMP sponsors three events annually, using the services of a permitted hazardous waste management contractor. VSQGs are invited to bring their accumulated hazardous waste to these events, where they pay a fee for disposal. The economies-of-scale realized by these countywide events translate into a disposal fee that is generally lower than the cost to have a permitted hazardous waste contractor collect and appropriately manage the waste for an individual small business.

In January 2016, the number of VSQG events were expanded from three to six. In addition to the expansion of the events, SWMP updated its VSQG website and educational brochure. The brochure is available online or may be picked up at either of the permanent HHW disposal facilities. Details on the VSQG program and a list of permitted hazardous waste disposal companies are available on the county's VSQG website: <u>https://www.fairfaxcounty.gov/publicworks/recycling-trash/very-small-quantity-generators</u>.

The SWMP continues to maintain its Household Hazardous Waste Information Line (703-324-5068). The info line was updated in January 2016. This informative recording is available to residents and businesses 24 hours a day. The information line provides a comprehensive breakdown of the types of waste accepted at the HHW facilities and specifies the days and hours of operation at the permanent facilities.. The info line addresses residential and commercial waste disposal concerns and specialty waste handling questions.

The SWMP continues to collaborate with the Rechargeable Battery Recycling Corporation to make collection of rechargeable batteries available to the members of the Board of Supervisors and at major county buildings. Rechargeable batteries are also accepted at the county's HHW facilities.

Also, any person, business, or other entity can use the services of <u>www.Call2Recycle.org</u>. This is an industry-funded product stewardship initiative through which the manufacturer of a product known to contain hazardous constituents pays for the collection and appropriate disposal of the item at the end of its useful life. Program users sign up online and receive a cardboard box with a prepaid shipping label. The user fills the box with rechargeable batteries after the batteries are placed into individual plastic bags (to prevent arcing and potential fires in shipping). The user calls for pickup by UPS, which sends the container to a permitted hazardous waste disposal facility at no charge to the user. SWMP strongly encourages users of rechargeable batteries to participate in this free program.

Because of these efforts, and the increased volume of batteries collected through this program, Call2Recycling recognized the county by selecting it as a recipient of the 2015 Leaders in Sustainability Award. In addition to proper battery recycling, county residents can drop off (at no cost) lead acid batteries at any of the Interstate Battery of Northern Virginia stores conveniently located throughout Northern Virginia. All other types of batteries should be disposed of by way of one of the previously mentioned disposal methods. SWMP has continued its partnership program with Thermostat Recycling Corporation (TRC), which first began in October of 2013. The county partnered with TRC to further mitigate the amount of mercury polluting the environment. TRC is a non-profit organization that facilitates the collection and proper disposal of mercury-containing thermostats. TRC has an ongoing commitment to raising awareness of the universal need to properly dispose of mercury-containing thermostats, and actively solicits program participation across the country. Through national and regional advertising, industry events, workshops and other outreach activities, TRC creates a dialog with industry stakeholders and consumers and actively promotes the need for safe and proper disposal of mercury-containing thermostats.

As an ongoing waste minimization initiative, and to prevent cooking oil from being deposited in storm drains, the county partnered with Greenlight Biofuels in a pilot program to recycle waste vegetable and cooking oil. The pilot was so successful that a new contract was awarded in February 2015. Ongoing success and growth of the cooking oil recycling program has resulted in a new partnership solicitation between Atlantic Biofuels and Fairfax County.

The recycled waste vegetable oil is converted into biodiesel, a clean-burning fuel that results in a significant net emissions decrease with lower SO2 (sulfur dioxide) and NOX (nitrogen oxides) emissions than heavy oils. Biofuels generally burn cleaner than No. 2 residual fuel oil, with little or no sulfur emissions.

Through the HHW program, the county has formed a partnership with Habitat for Humanity to reduce and reuse the amount of waste latex paint being generated by homeowners. This very successful program was first initiated in January 2015. Through partnerships with various Habitat for Humanity ReStores throughout Virginia, the program redistributes usable latex paint delivered by residents to the HHW program, rather than sending it for disposal. Reusable paint will be donated to various participating Habitat for Humanity ReStores, allowing them to resell or reuse it.

It is important to note that, while latex paint has historically been managed through the HHW program, it is not a hazardous waste. When residents deliver latex paint to the county for disposal, they create additional unnecessary expenditures for the county. The donation of usable paint to Habitat for Humanity will provide the following benefits:

- Reduce the volume of paint disposed by 20 percent annually.
- Reduce potential environmental impacts from paint disposal.
- Establish a sustainable waste management practice.

The primary mission of the Habitat for Humanity ReStores is to generate revenue for the homebuilding efforts of their affiliates in local communities throughout Virginia. The Habitat ReStores aim to offer quality household goods and building materials to the public at reasonable prices and to divert unnecessary waste from disposal.

During July 1, 2017 to June 30, 2018, the SWMP continued its electronics recycling program for county residents. The program, formerly known as Electric Sunday, was expanded beginning on July 1, 2014, to seven days a week. Fairfax County residents can e-cycle old or unwanted electronics any day of the week at the I-66 Transfer Station and the I-95 Landfill Complex at no cost to residents. Businesses are excluded from participation and must properly dispose of their waste in accordance with 40 CFR Part 261.

In an ongoing effort to effectively manage the growing concerns surrounding the proper disposal of electronics waste and related material, Fairfax County implemented its most recent waste minimization initiative, the recycling of ink and toner cartridges. Beginning in November 2015, the county partnered with Evolve Recycling, a division of Clover Technologies Group, the global leader in collection, remanufacture, recycling and resale of electronic assets including laser and ink cartridges, printer parts, and wireless handsets.

Through the HHW and Electronics Recycling programs, the county has established four permanent drop-off locations for the collection and disposal of new or used ink and toner cartridges for recycle. Because of this initiative, Fairfax County has been able to reduce the overall volume of ink and toner cartridges making their way into landfills, while generating revenue..

Since the inception of the program in November 2015, the program has continued to gain momentum. From July 1, 2017 to June 30, 2018, the number of cartridges for recycle and reuse increased from the previous year. The county recycled 842 pounds of cartridges and 1,597 pounds of cartridges. This resulted in the reuse and recycling of 2,439 pounds of discarded ink and toner cartridges that would otherwise have been sent to a landfill.

In May 2018, the HHW Program was selected as an award recipient for funding of its newest proposed sustainability initiative, a propane cylinder evacuation system. The fully-funded project, in the amount of \$90.000, was approved by the Fairfax County Environmental Committee by way of the Environmental Improvement Program sustainability initiative.

The Propane Recycle and Extraction Program (PREP) focuses on environmental stewardship and alternative green energy. These initiatives are completed by installing a propane extraction and storage system at the I-66 Transfer Station. The program will be conducted in partnership with the Virginia Propane Gas Association (VPGA).

PREP is a program designed to provide Fairfax County with a steady source of consumable green energy in the form of propane collected from propane cylinders disposed of at the Household Hazardous Waste Facility by:

- Minimizing the amount of greenhouse gases emitted by the county
- Providing a secondary source of fuel for heat systems, generators, and other equipment fueled by propane
- Providing a safe and environmentally friendly means of recycling propane cylinders easily accessible to the residents and businesses of the county.

The PREP will reduce hazardous waste propane cylinder disposal by 100percent The reduction of waste will result in an environmentally beneficial circular economic solution to propane cylinder disposal that positively impacts all of Fairfax County. Furthermore, through a partnership with VPGA, PREP will provide invaluable public education and safety information about propane to residents and business.

SWMP continues to maintain the Know Toxics website in partnership with NVRC and the Northern Virginia Waste Management Board. This is 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

website provides a resource where businesses can learn how to legally and appropriately dispose of these materials.

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.

SWMP staff continued a significant public outreach program concerning recycling and solid waste management with more than 84 events (including tours, speaking engagements and exhibits).

SWMP continued updating and revising the "Recycling and Trash" portion of the county website to provide the most up-to-date information for county residents.

The Solid Waste Management Program continues to provide support and education in the community regarding litter prevention and recycling. During July 1, 2017 to June 30, 2018, the program staff:

- Continued to maintain SCRAPmail (Schools/County Recycling Action Partnership). 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.
- Gave 25 presentations to residents and businesses throughout the county.
- Awarded Johnie Forte environmental grants to eight schools to fund school environmental projects involving litter prevention, litter control or recycling.
- Partnered with NVRC to create a "train-the-trainer" event to educate solid waste managers in the Northern Virginia area about the proper management of universal waste. Seventy-five attendees completed the course.

Clean Water Partners

As a member of the multi-jurisdictional Northern Virginia Clean Water Partners, Fairfax County has supported several efforts tailored to stormwater specific messages. During July 1, 2017 to June 30, 2018, the Northern Virginia Clean Water Partners used television, print, internet advertising and the Only Rain Down the Storm Drain website (www.onlyrain.org) to distribute messages linked to specific stormwater problems, such as proper pet waste disposal, over fertilization of lawns and gardens and proper disposal of used motor oil. In addition to the multi-channel media campaign, educational events hosted throughout the Northern Virginia region also raised awareness and encouraged positive behavior changes in residents. The television and internet ads featured the well-known national symbol of non-point source pollution: the rubber ducky.

Specifically, from July 2017 through June 2018 four public service announcements (PSAs) featuring messages on the importance of picking up pet waste and general household stormwater pollution reduction measures aired on 36 English and Spanish language cable TV channels 17,922 times. The campaign also featured banner ads on Xfinity.com and Cox.com websites that promote the same messages as the cable TV ads. The Clean Water Partners featured two full-day, full page ads for Only Rain.org on the sign-in pages for Xfinity.com, and made updates to the Clean Water Partners website, onlyrain.org. Accomplishments also include:

- 5,299,360 total household television impressions*
- 1,222,561 total digital impressions including internet banner ads and in-stream video ads

- 17,922 number of times the ads aired on television from July 2017 to June 2018
- 500 online survey responses
- 75 percent of target audience reached

Clean Water Partners Annual Survey Highlights:

- 15 percent of respondents recalled seeing the ad after watching the video
- The highest number of impressions were delivered on Animal Planet
- 24 percent of respondents said they now pick up their pet waste more often
- 12 percent said they now properly dispose of motor oil
- 23 percent said they plan to fertilize fewer times per year
- 63 percent of residents surveyed stated that stormwater goes to the Potomac River, the Chesapeake Bay or to local streams
- Consistent with the past six years, the majority of respondents take their vehicle to a service station for oil changes (82.4 percent)

*Impressions are the number of times a PSA appeared on a single television or computer screen.

Educational Opportunities for Students

Fairfax County staff provides a variety of in class and in the field educational opportunities for students from kindergarten through high school and beyond.

Sewer Science

The Sewer Science Program teaches county high school students the importance of improving water quality and promotes environmental stewardship through a hands-on lab that uses specially designed tanks, analytical equipment, presentations and a customized student workbook. The program introduces students to differences between Stormwater and Wastewater Management as well as how these systems are connected and working together to help keep local waterways safe for human health and the environment. The Sewer Science Program was presented to 71 classes at 14 schools (24 teachers) in the county and reached more than 1,938 students.

Stormy the Raindrop Educational Campaign

Stormwater Planning Division continued the award-winning Stormy the Raindrop campaign. The program was designed to appeal to children in elementary school and younger with messages about local streams and watersheds and pollution prevention. Over the past several years, the program has used public appearances by a costumed raindrop character, puppet shows, coloring and activity books and a web page to reach young audiences. During July 1, 2017 to June 30, 2018, the program accomplished the following:

• The county distributed copies of Adventures of Stormy the Raindrop and copies of Stormy the Raindrop's Watershed Journey at various libraries, district offices and events. The activity books are available online at http://www.fairfaxcounty.gov/dpwes/stormwater.

 Both volumes of the activity books are being translated into Spanish to help reach a wider audience.

Field Guide to Fairfax County's Plants and Animals

The Field Guide to Fairfax County's Plants and Animals was developed in house with support from FCPS curriculum writers to provide teachers and students with a tool specific to Fairfax County that encourages outdoor classroom use.

> In the 2016-17 school year, all 15,500 fourth and fifth grade students and teachers received a copy of the guide. By providing the



Figure 6-3: Stormy the Raindrop talks to students about flood safety at Belle View Elementary School. Photo by Fairfax County.

field guide to fourth graders, it is hoped that teachers will integrate environmental education throughout the year and prepare students for the 5th grade science Standards of Learning.

• The field guide is available as an e-book at https://www.fairfaxcounty.gov/publicworks/stormwater/stormy-raindrop.

Stream Crime Investigation (SCI) Lab Exercise

The Stream Crime Investigation (SCI) lab was created by staff and emulates a combination of dry weather and wet weather pollutant screening to help identify, track down and prevent pollutants from reaching a neighborhood pond in a fictitious town. The target audience is high school but the lab is not tied to a specific SOL; it can be used in a variety of class types to help with any number of learning objectives. The lab introduces general watershed and stormwater concepts via a powerpoint presentation and then transitions into a hands-on lab using "kitchen chemistry" reactions to track down the source of soap, bacteria and nitrogen in the environment.



Figure 6-4: SCI Lab at Justice HS. Photo by Fairfax County. The name was changed recently to Justice High School.

The SCI lab was piloted in the 2014-15 school year with great success. A consultant was hired to

finalize the graphic design elements between school years. The 2015-16 school year was very successful and received great feedback and interest for returning to classrooms in subsequent years. The SCI lab was presented to 321 students in the 2014-15 school year, 505 students in the 2015-16 school year, 788 students in the 2016-17 school year, and 323 students in the 2017-18 school year.

Citizen Scientists - Floatable Monitoring Program

The citizen scientist floatable monitoring program is the newest and largest program within the outreach and education umbrella. Students are asked to participate as citizen scientists to help Fairfax County staff monitor the floatable loading from outfalls in and adjacent to local streams. The floatable monitoring program is the first program within stormwater planning that is designed to create a strong bond between staff and students through repeated interactions in this yearlong program. Since some students learn better through unconventional learning experiences, this is a way to provide teachers with an opportunity to reach those students and reiterate scientific concepts in an alternative way.

- 425 students from seven schools participated in the pilot study within the 2015-16 school year.
- 779 students participated in the Citizen Scientist Monitoring Program within the 2016-17 school year.

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. The program is coordinated locally by NVSWCD, which supported six teams between July 1, 2017 and June 30, 2018. In the spring 2018, NVSWCD's Marshall High School teamwon second place in the regional competition, while Thomas Jefferson High School for Science and Technology won third.

Other Educational Activities

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 programs help residents recognize connections between water quality problems in local streams and impacts to the Occoquan Reservoir, the Potomac River and the Chesapeake Bay. During July 1, 2017 to June 30, 2018, the county gave presentations to homeowner's associations, civic associations, resource fairs and various environmental events, and the local school system.

Fairfax County staff has matched the increased interest for non-traditional environmental education programs by Fairfax County Public Schools and private schools through expanded offerings of existing programs, such as Stream Crime Investigations, as well as developing new science curriculum based programs. These programs range from bioretention revitalization and planting programs (winner of a 2018 National Association of Counties and Virginia Association of Counties awards), stream geomorphology lessons and the citizen scientist floatable monitoring program (winner of a 2017 National Association of Counties and honorable mention Best Urban BMP in the Bay Award (Bubba). Fairfax County staff had more than 3,000 student interactions in FY 18.



Figure 6-5: Student from Mantua Elementary School installing a Blue Flag Iris within a bioretention facility.

Fairfax County participated as an exhibitor or environmental educator at several public events, including: Fall for Fairfax, Springfest (formerly Earth Day/Arbor Day), and other resource and environmental fairs. The county distributed educational fact sheets on such topics as dry ponds, pick up the dog waste, green roofs, the Fairfax County Stormwater Ordinance, litter control through volunteer opportunities, keep storm drains clear, the county's MS4 permit, native plants, pollinators and pollinator meadows, resource protection areas, protecting and improving water quality, stream restorations, discharging swimming pool water, tree care and pest prevention, outdoor vehicle washing, backyard composting and a pollution prevention package for businesses.

The county created and aired educational television programs on Fairfax County Channel 16, on YouTube and Fairfax County Radio during July 1, 2017 to June 30, 2018 on topics such as the Asian Longhorned Beetle, the pollinator meadow at the Government Center, how to report illegal dumping into storm drains and streams, the role of trees in stream restorations, the restoration of the Wakefield Park stream and Dead Run in McLean Central Park, training for contractors to manage stormwater facilities and the new thriving ecosystem at Gunston Cove.

Previously created PSAs that continue to air include: plastic bags in streams, "Stormy the Raindrop" watershed education, cigarette butts poison the water, Sgt. Storm drain Says 'Don't Litter', and fertilizer use. These programs also air on Fairfax County Channel 16 and are posted to YouTube. At present, there are 37 stormwater, wastewater and urban forestry-related videos posted to You Tube. As of June 29, 2017, more than 22,000 people watched the YouTube public service announcements.

Staff contributed several proposed projects and environmental benefits articles to homeowners' association and Supervisors' offices newsletters and websites.

Stormwater, wastewater and urban forestry staff provided approximately 50 media interviews for print, television and radio news. Topics included: snow budget surplus, UV Disinfection, the Huntington Levee, the Covanta fire, green infrastructure certification, APWA accreditation, flood warning, Snakeden Branch Restoration, the drug takeback day, the septage study and Tysons development.

Podcast messages were aired through the county's website for a weekly audience of about 350 listeners on topics such as tree pest control; recycling; household hazardous waste; flooding; the Government Center pollinator meadow; pollinators; fats, oils and grease (FOG); and protecting the Chesapeake Bay.

Northern Virginia Soil and Water Conservation District

During July 1, 2017 to June 30, 2018, NVSWCD provided displays and publications about environmental landscaping, stream restoration, volunteer monitoring, soils, storm drain marking, rain barrels and other environmental topics at 38 events.

NVSWCD gave 87 presentations to audiences in industry, government, youth and the general public, during which 4,496 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, erosion and sediment controls on construction sites, ecological concepts and nonpoint source pollution. The design and installation of rain gardens was featured at one workshop for homeowners. NVSWCD demonstrated the Enviroscape watershed model 58 times to 1,520 students in schools and scout programs.

Technical Support and Training

Northern Virginia Soil and Water Conservation District

- Provided technical advice on solving drainage and erosion problems to homeowners and homeowner associations during 271 site visits, which resulted in the installation of 46 stormwater best management practices cost-shared through the local and VASWCD-sponsored Conservation Assistance Programs.
- Responded to 2,249 information inquiries by telephone, email and through office visits to provide soils information and technical assistance to consultants, realtors, homeowners, and county agencies.

7. Flood Response

Stormwater Management proactively responds to flooding threats using the guidance provided by the county's flood response plan. The county annually reviews and updates this plan to incorporate operational changes, communications strategies and other actions. Electronic devices are installed at 20 dams and in the Huntington and Belle View communities. These devices are used to closely monitor the potential for flooding situations. Training, monitoring information and instructions, inundation flood maps and safety equipment are provided to staff involved in field monitoring.

In May 2018, Fairfax County's DPWES, Fire and Rescue Department, Police Department, and the Office of Emergency Management held their annual joint training on the flood response plan for the Huntington and Belle View communities. The training helps organizations determine when to take key

actions during a flooding event. Some of the actions discussed included when residents should move vehicles, shelter in place or evacuate. They discussed how to provide information to residents. The flood response training was provided by SWPD and MSMD staff to the Fairfax County Police Department (Mount Vernon District Station).

A FEMA-required, Flood Protection Information newsletter that included information about the natural and beneficial functions of floodplains specific to Fairfax County was



Figure 7-1: Joint training of Fire and Rescue Department and Stormwater Management employees for flood response at the Huntington and Belleview communities. Photo by Fairfax County.

mailed to approximately 20,000 county residents who live in or adjacent to floodplains. The county website provides relevant information on floodplains, flood insurance, flood preparedness and flood safety.

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