

PROTECT, RESTORE, AND ENHANCE



FAIRFAX COUNTY WASTEWATER MANAGEMENT

# SUSTAINING THE ENVIRONMENT AND PROTECTING PUBLIC HEALTH



# Quality of water = Quality of life



*Gunston Cove, Lorton, VA.*

George Mason University, with funding and assistance from our wastewater management program, has been monitoring water quality and biological communities in Gunston Cove since 1984. The cove receives treated wastewater from the Noman M. Cole, Jr. Pollution Control Plant and inflow from two creeks that drain much of central and southern Fairfax County. Record water clarity levels have allowed submerged aquatic vegetation and native mussels to rebound and flourish, and we have observed an increase in the number of fish species. These are clear signs of a healthy ecosystem. The long-term study proves that ecological restoration and protection of public health can be achieved through robust wastewater management. Monitoring the ecology of Gunston Cove ensures a healthy habitat is preserved and helps the plant achieve the goals of Envision, a rating system for sustainable infrastructure.

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**H**ere in Fairfax County we are fortunate to have an abundance of earth's most precious resource – clean water. Our local drinking water utility treats water from two rivers and pumps it into homes, schools, restaurants, and businesses. We quench our thirst with clean tap water and use it for cooking, cleaning, and flushing toilets. Tap water keeps our yards and playing fields green, cleans our vehicles, fills our pools, and is used by industries that fuel our economy. Clean water is so ubiquitous in our area that many people simply take it for granted. Most people seldom think about where wastewater goes after it is flushed or goes down the sewer drain.

This is where Fairfax County's Wastewater Management Program fits into the water cycle. Each day, our system conveys 100 million gallons of wastewater from homes and businesses to treatment plants around the region. The wastewater is treated to meet high standards and strict state and federal requirements. The treated water, or effluent, is then released back into the environment where it provides habitat for aquatic wildlife, opportunities for outdoor recreation, and eventually flows into waterways that supply drinking water treatment plants where the cycle begins again. Nature doesn't create new water; it is just recycled. We are using the same water that has been here for millions of years.

Quality of Water = Quality of Life, is more than just a catchy slogan. This simple statement reflects the importance of clean water to our community's health and prosperity and is at the core of everything we do. Wastewater management makes communities livable, especially densely populated places like Fairfax County and the greater Washington, D.C. metropolitan area. The fact is life would not be sustainable if untreated wastewater – a potent stew of sewage, used cooking oil, chemical detergents, bacteria, pathogens, and excess nutrients – was released directly into the environment. Water-borne diseases like cholera and typhoid would spread quickly and receiving waters and their ecology would be greatly damaged without modern wastewater treatment systems.

Our program ranks as one of the most reliable in the country. Even though our system is aging at the same time we are expanding service to meet growth, we experience fewer than ten sanitary sewer overflows per year. (The median number of preventable sanitary sewer overflows for a system of our size is 145 per year.) Our program is recognized annually by the National Association of Clean Water Agencies as a Platinum Peak Performer, and we are certified for environmental stewardship by the Virginia Department of Environmental Quality as an E4 Environmental Enterprise, the highest level attainable. We are committed to providing a resilient, efficient, and affordable wastewater treatment program that serves customers throughout the region.

## WORKING TOGETHER

### REGIONAL PARTNERSHIPS



*South Van Dorn Sanitary Sewer Stream Crossing.*

## ◀ SOUTH VAN DORN SANITARY SEWER EMERGENCY REPLACEMENT AND STREAM RESTORATION

A sagging sanitary sewer pipe that runs under a stream and active railroad tracks was identified as an environmental threat. If the pipe had ruptured, sewage would have flowed into the creek and emergency repairs may have impacted rail service. We designed an environmentally friendly approach to protect the new pipe and coordinated with other county agencies to repair the eroding streambanks at the same time. The rehabilitation included months of nonstop sanitary sewer bypass operation, construction of an access road on Park Authority property, the removal of 105 linear feet of concrete pipe, and the installation of a new encased pipe. Natural stream restoration techniques were used to stabilize the stream and prevent future erosion.

**S**ome of the wastewater generated in Fairfax County is treated by surrounding jurisdictions, and in turn the county treats flow from neighboring jurisdictions through several service agreements.

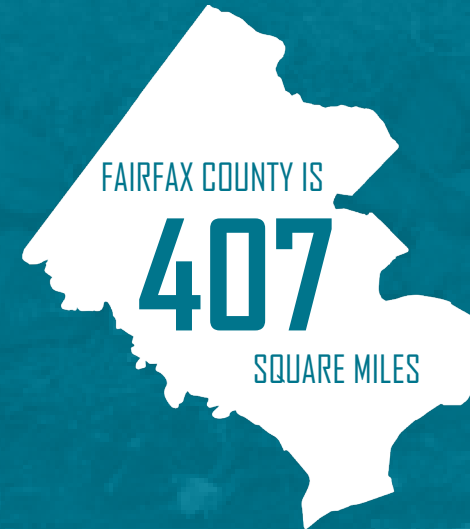
Fairfax County owns and operates one wastewater treatment plant, the Noman M. Cole, Jr. Pollution Control Plant, in Lorton. This facility treats approximately 40 percent of the 100 million gallons of wastewater generated each day, including some flow from neighboring jurisdictions. The remaining 60 percent is conveyed to other plants for treatment under interjurisdictional agreements.

Similar to watersheds, in which stormwater runoff flows downhill toward the nearest waterway, the sanitary sewer system can be divided into distinct sewersheds, where wastewater is conveyed through a vast network of underground pipes. The cities of Fairfax and Falls Church, and the Towns of Herndon and Vienna use our sewer system through service agreements.

The majority of homes and businesses are connected to the county's 3,600 miles of sanitary sewer, but not all

of them. Our partner, the Fairfax County Health Department, regulated 21,000 on-site septic systems located in rural neighborhoods and less developed areas. These in-ground systems are emptied regularly by large pump trucks that haul the waste to area treatment plant.

To manage such a large wastewater conveyance system we rely on cooperation among county agencies. For example, in fiscal year 2016, 137 manholes and nine pipes located near stream crossings were repaired or protected. Our staff collaborated with teams from Stormwater Management and the Fairfax County Park Authority to find efficiencies and lessen any impacts on the environment and residents. Land Development Services issues permits and inspects our work. Working together, we approach our projects holistically and consider the needs of our partners.



FAIRFAX COUNTY IS

407

SQUARE MILES

HOME TO MORE THAN

1.1 MILLION PEOPLE



372,000

RESIDENTIAL  
& COMMERCIAL  
CUSTOMERS

## FOLLOW THE PIPES

### COLLECTING AND TREATING



*Water reuse pipes at Noman M. Cole, Jr. Pollution Control Plant.*



*A young resident inspects a CCTV robot.*

## ◀ CLOSED CIRCUIT TELEVISION (CCTV) INSPECTIONS

Preventive sewer maintenance protects the environment and public health by reducing the number of backups and overflows. We use specialized robots outfitted with closed circuit television cameras to detect defects in pipes buried deep underground. These robots are sent into older sewer lines to look for signs of infiltration, deterioration, structural integrity, and blockages. The crew reviews a live video feed on a monitor in their truck. Once problems are identified, they recommend and develop solutions. Using robots to identify problems before they occur saves time and money on repairs and cleanup.

**L**ike any complex system of buried pipes, pumps, and sophisticated treatment plants, our wastewater system requires continuous monitoring and maintenance. Blockages caused by pipe collapses, tree roots, and cooking byproducts can lead to messy backups and costly cleanups. We monitor wastewater flow using a mix of manual and wireless data collection techniques to locate problem areas in the pipe network.

Approximately 40 MGD (million gallons per day) of wastewater is treated at the Noman M. Cole, Jr. Pollution Control Plant each day. The effluent, or discharged treated water, consistently meets high standards and strict federal and state air and water quality requirements. For its high performance the program has earned the National Association of Clean Water Agencies' Platinum Award for 19 consecutive years.

Our wastewater treatment plant relies on living organisms that feed on organic matter. These "bugs" are sensitive to harsh chemicals and other pollutants that are often improperly disposed of in the collection system. These pollutants also damage pipes and machinery. Staff in our environmental monitoring laboratory test wastewater flowing to and from our treatment plant daily to protect the wastewater system's infrastructure and the environment.

Our system is built to handle wastewater from homes and businesses, but industrial and commercial wastewater requires a higher level of monitoring and treatment. Staff in our Industrial Waste section ensure compliance with federal, state, and county regulations. Industrial and commercial entities are required to treat or control pollutants discharged to the wastewater collection system and treatment plants. Toxic and harmful substances can damage the sanitary sewer system, disrupt the operation of wastewater treatment plants, and endanger our personnel. We issue permits, sample discharges, survey businesses, and take enforcement actions when public health, the environment, or the wastewater system are endangered.

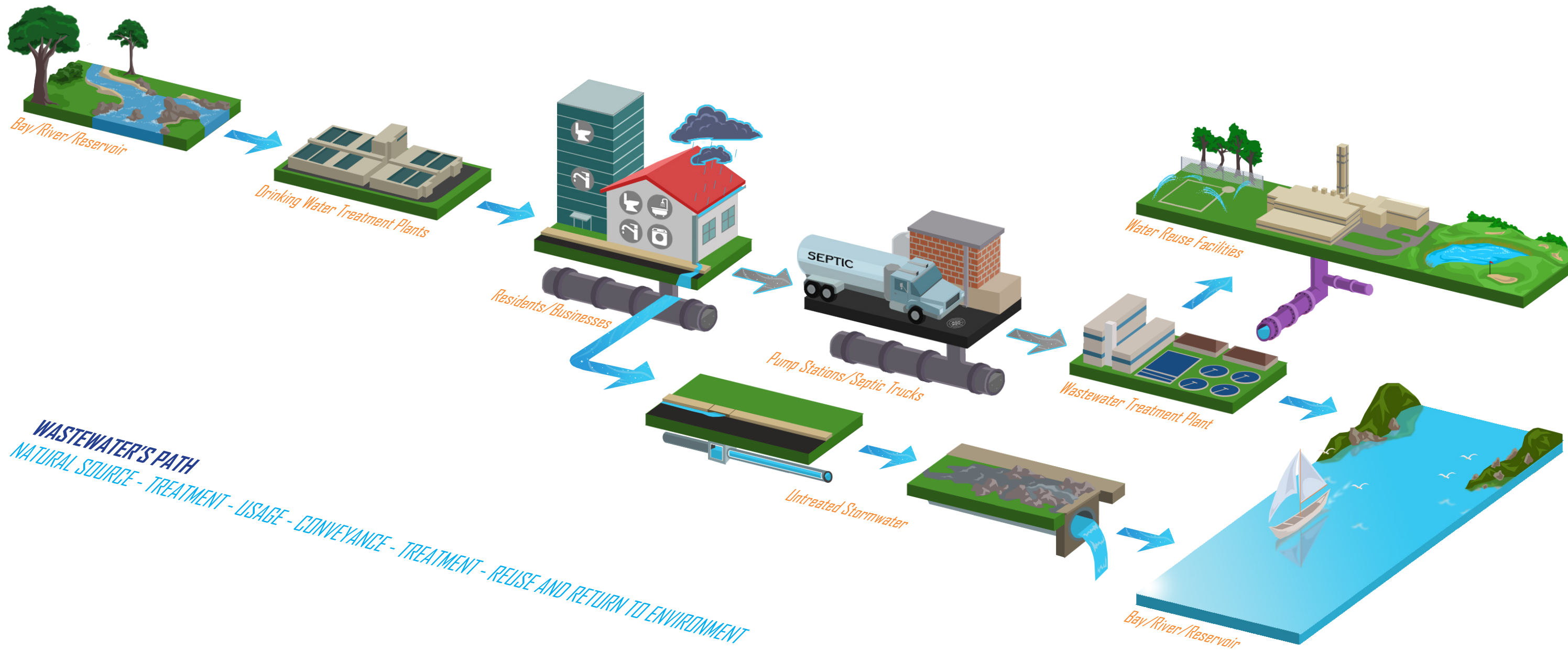
Our staff plays an important role in economic development, too. Developers look for reliable infrastructure, such as ours, when evaluating locations to build new homes and businesses. We evaluate developers' plans to make sure they meet county codes before connecting with existing infrastructure. Looking toward the future, we assess long-term needs for wastewater service. Careful planning ensures we have the infrastructure in place to support the county's growing residential and business population.



**PEOPLE TOURED OUR  
WASTEWATER TREATMENT PLANT  
(2016)**

# WATER'S JOURNEY

PRESERVING OUR NATURAL RESOURCE



455 MILES  
OF PIPE CLEANED PER YEAR



3,600 MILES  
OF SANITARY SEWER PIPE  
CONSTRUCTED AND MAINTAINED

## IN THE COMMUNITY

### OUTREACH AND EDUCATION



A student lab intern conducts water quality testing.



Students learn why pH is important to water quality.

## ◀ WATER QUALITY FIELD DAY OR SEWER SCIENCE

In June 2017, the Department of Public Works and Environmental Services staff participated in the seventh annual Water Quality Field Day at Fairfax Water's Griffith Plant in Lorton. One hundred and forty seven sixth-graders from Fort Belvoir Elementary School learned about water quality and the environment at 13 interactive stations. This hands-on event is sponsored by a partnership between Fairfax County, Fairfax Water, Fairfax County Public Schools, George Mason University, and the Northern Virginia Soil and Water Conservation District. The event teaches students science, technology, engineering, and mathematics (STEM).

**P**rotecting community health and the environment is more than just a job for us, it's our passion. Our outreach team is proud of the role we play in protecting our natural resources through the development and implementation of educational programs and participation in targeted outreach events that are designed to engage the community, raise customer awareness, and foster stakeholder support.

Our educational programs support Fairfax County Public Schools by offering elementary, middle, and high school students the opportunity to participate in hands-on, curriculum-based environmental and water quality labs. At the high school level, the Sewer Science program is designed to meet the Virginia Standard of Learning (SOL) and science, technology, engineering, and mathematics (STEM) initiatives. This program teaches students the basic concepts of wastewater treatment, brings hands-on applications to science labs, and encourages students to become stewards of the environment and consider career opportunities in science. Since 2006, more than 18,900 high school students have participated in a Sewer Science Lab. In 2017, a middle school version of the program was introduced into schools and approximately 360 students have participated. We will be expanding this program to elementary schools in 2019.

We also help coordinate and participate in a Water Quality Field Day for sixth-graders. During the event students experience many components of water quality, which includes stormwater, drinking water, and wastewater. Students move through more than ten different stations where they participate in hands-on activities that teach them different aspects of water quality and how they can help protect the environment.

Our targeted outreach includes county-organized community events that are designed to educate the public on the wastewater collection and treatment process at the Norman M. Cole, Jr. Pollution Control Plant. In 2017, we participated in 12 community events where county staff used fun activities to educate children while also providing adults with information about the challenges the county faces from the improper disposal of items such as "flushable wipes," medications, and fats, oil and grease (FOG). All of our outreach events, educational programs, and materials are designed to help Protect, Restore, and Enhance the environment.

Big ideas are supported in our accredited environmental monitoring laboratory. Our scientists supervise and mentor students working on approved Water Quality Science Fair projects in the lab. A partnership with George Mason University's science department offers paid laboratory internships. We also partner with local high schools to offer paid internships in treatment plant operations.

**100,000**  
ANALYSES CONDUCTED  
PER YEAR IN THE  
ENVIRONMENTAL LAB



**18,900+**  
HIGH SCHOOL STUDENTS  
TOOK SEWER SCIENCE  
(SINCE 2006)

## KEEPING THE BOOKS

### FINANCIAL MANAGEMENT



*Plastic growth media for nitrogen removal.*

## UTILITY OF THE FUTURE TODAY

Our goal is to protect public health and the environment by providing sustainable, efficient services to the community. In 2016 we were recognized as a Utility of the Future (UOTF). This distinction is based on our adoption of the UOTF principles of water reuse, watershed stewardship, beneficial biosolids reuse, community partnering and engagement, energy efficiency, energy generation and recovery, and nutrient materials recovery. The UOTF recognition program is administered by the National Association of Clean Water Agencies, the Water Environment Federation, the Water Environment & Reuse Foundation, and the WaterReuse Association with input from the U.S. Environmental Protection Agency.



**40 MGD**  
**TREATED PER DAY**

(MGD = MILLION GALLONS PER DAY)

**W**astewater Management Program policies are established by the Fairfax County Board of Supervisors. The program derives 95 percent of its revenue from sewer service fees charged to customers. These fees fund capital improvements, personnel, materials, utilities, and maintenance costs.

The Fiscal Control and Financial Planning staff manages seven separate enterprise funds. Branch staff continually analyze the financial position of the program to maintain competitive rates and high bond ratings and to achieve financial targets. Staff members develop and recommend sewer rate modifications for the board to approve, develop a capital improvement program, and lead the infrastructure asset management effort. In addition, the branch analyzes sources and uses of funds, collects availability fees, and oversees activities of two sewer service billing agents.



ANNUAL BUDGET  
**\$222M**

Every year our Comprehensive Annual Financial Report receives the highest recognition available in government accounting and financial reporting, the Certificate of Achievement for Excellence in Financial Reporting by the Government Finances Officers Association of the United States and Canada.

Our program was the first in the nation to receive Fitch and Standard & Poor and Moody's AAA sewer utility bond rating. These high credit ratings have enabled the county to sell bonds on behalf of the program at competitive interest rates which reduce costs of operations. The branch issues and manages debt to fund major wastewater system improvement projects.

The Fiscal Control and Financial Planning staff also manages two warehouses that represent the third highest valued inventory in the county. The branch's accounting accuracy for the program's assets exceeds county standards.

**YOU CAN HELP**

**THANK YOU**



*Laurel Hill Golf Course with water reuse systems.*

**A**s long as toilets flush, sinks drain, and trucks haul away septic tank waste, the average person doesn't think about where wastewater goes or how it's treated. But when pipes clog, costly sanitary sewer backups and overflows follow. There are some simple things everyone can do to protect our sewer system and the environment.

Toilets aren't trashcans.

Unused and expired medicine should be placed in the trash or returned through take back programs and authorized disposal programs. Medicine can bypass the treatment systems and have negative impacts on the environment. Safely disposing of medicine protects your family and pets and our water resources.

Toiletries are often labeled "flushable," but the only material you should flush is human waste and toilet paper. Products such as wet wipes, paper towels, cotton swabs, and feminine hygiene products should be placed in the trash, never in the toilet.

Cooking byproducts (fats, oils, and grease or FOG) should never be poured down the drain. They thicken inside pipes as they cool, causing backups. FOG also creates acidic conditions that damage wastewater conveyance and treatment infrastructure, which is expensive and difficult to repair.

Our pipes are often located in areas that are difficult to reach. They run beneath homes, under roads, through streams and parks. If you see our crews working nearby, please give them room to do their jobs. If you see suspicious activity around one infrastructure, call the police. Also, in such a large county, we can't be everywhere all the time. If you smell odors or see a backup or overflow, please report them to our 24/7 Trouble Response Center at 703-323-1211, TTY 711. We investigate reports immediately.

Thank you for your continued support of our program. Together, we can maintain the wastewater treatment system and keep our environment clean, safe, and healthy.

## ← WATER REUSE

The Noman M. Cole, Jr. Pollution Control Plant reclaims 420 million gallons of water each year. Rather than sending this valuable resource downstream, we use it locally. Reclaimed water goes through an extensive treatment and disinfection process before being sold for irrigation and industrial purposes. The treated water is used to keep baseball fields and fairways green and for cooling at the county's waste-to-energy plant. Customers pay less for reclaimed water than municipal water. Using reclaimed water conserves our drinking water resources, reduces the amount of nitrogen and phosphorous flowing toward the Chesapeake Bay, and makes our community more sustainable.

**420 MILLION**  
GALLONS RECLAIMED ANNUALLY



## AWARDS

### AND RECOGNITIONS



#### EXTRAORDINARY ENVIRONMENTAL ENTERPRISE

The Wastewater Management Program's accomplishments are recognized at the national, regional, and agency-wide levels through awards, accreditations, and ratings. Our three divisions – planning and monitoring, collection, and treatment – work together to maintain a safe, healthy, environment for residents. The Virginia Department of Environmental Quality recognized our commitment to superior environmental performance and environmental leadership in FY 2016 by renewing the program's Extraordinary Environmental Enterprise (E4) status.



*Pohick Bay Gunston Cove.*

## AWARDS

The Noman M. Cole, Jr. Pollution Control Plant has earned the Platinum Peak Performance Award from the National Association of Clean Water Agencies for 19 consecutive years. Fewer than a dozen of the nation's 16,500 wastewater treatment plants have achieved this level of excellence. Platinum Awards are awarded for five consecutive years of permit compliance. One hundred percent permit compliance dramatically impacts the quality of water leaving Fairfax County.



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