A LAND OF RIVERS

Anne Arundel County
WATERSHED
Protection & Restoration
PROGRAM

AARivers.org FY 2019 REPORT

ANNE ARUNDEL COUNTY MARYLAND

Introduction

Dear Anne Arundel County Resident,

Clean water is fundamental to who we are and what we value as stewards of Anne Arundel County. High quality creeks and streams, stable and ecologically diverse rivers, fully functional wetlands, and a healthy Chesapeake Bay are critical elements to a robust economy, resilient communities, and a vibrant quality of life.

Our *2019 Anne Arundel County, A Land of Rivers* report summarizes the watershed protection and restoration actions initiated by the Anne Arundel County Department of Public Works and our partners during fiscal year 2019 (July 1, 2018 – June 30, 2019). These actions, combined with those from previous years, will continue to reduce nutrient and sediment pollution to our waterways so we can achieve water quality goals prescribed in Anne Arundel County's 2012 Watershed Implementation Plan (WIP) for the Chesapeake Bay.

Since the creation of the WIP, we have charted a course to achieve clean water for current and future generations. The WIP envisions the County's strategies to achieve the water quality goals required by federal and state regulations. To fully accomplish this vision, we must continue to move forward to reduce runoff, improve water treatment infrastructure, as well as to protect, maintain, enhance, and restore our water resources. The County's Watershed Protection and Restoration Program is charged with implementing these efforts and reporting annually on our progress. This report highlights its work in 2019 and describes the strategic priorities moving forward.

While we still have a long way to go in achieving our ultimate vision, this report shows that we are making significant progress in both effectively and efficiently improving our waters.

The quality of our creeks, streams, and rivers is ultimately a reflection of how we take care of our land. Waterfront property owners, inland residents, recreational users, agricultural producers, and other businesses must all play a positive role in maintaining and improving the quality of our waterways. I encourage you to visit www.aarivers.org to learn more about the Watershed Protection and Restoration Program and to learn what you and your neighbors can do in your community to improve water quality and truly make Anne Arundel County *The Best Place.*

Sincerely,

Steuart Pittman
County Executive

Watershed Health

Over the last few decades, Anne Arundel County residents have consistently made clear that they want healthy watersheds, rivers, and streams. At the same time, regulatory mandates have increased pressure to address evolving ecological problems. As Anne Arundel County continues to grow, it will be possible to protect and restore water quality and habitat and prevent further degradation of our waterways through a watershed-based approach to protection and restoration.

Solutions that promote healthy watersheds while also addressing other infrastructure objectives are often the most cost-effective approaches.

The County defines a healthy watershed as one where hydrology, water quality, and habitat are suitable to protect human health, maintain viable watershed and other ecological functions and processes, and support healthy populations of native aquatic and terrestrial species. Improving watershed health is truly a county-wide effort. Anne Arundel County is committed to managing County operations in a manner that sustains our quality of life and economy while protecting the viability of our natural resources.

This watershed-based approach reflects and implements core Anne Arundel County values. In addition to protecting and improving watershed functions such as providing clean water and habitat, these projects promote improved public safety, economic vitality, and community stewardship. This approach relies on integrating the activities of multiple County departments, and maximizes the use of limited resources by implementing solutions that meet multiple objectives. The County works with regional watershed groups, community associations, business organizations, and individual citizens to accomplish its goals. This collaborative approach enables entities to share resources, combine efforts, and address watershed issues that require a comprehensive approach. By prioritizing improvements that achieve multiple benefits to watersheds and infrastructure, we can cost-effectively meet our regulatory obligations while also achieving a net benefit to the long-term health and livability of our County.

Solutions that promote healthy watersheds while also addressing other infrastructure objectives are often the most cost-effective approaches.

Regulatory Drivers

Anne Arundel County's National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES-MS4) permit and the Chesapeake Bay Total Maximum Daily Load (TMDL) set forth rigorous goals for controlling stormwater pollution and improving water quality. The NPDES-MS4 attainment goal tracks the restoration of 20% of Anne Arundel County's impervious surface area, such as roads, sidewalks, and driveways, which have little or no stormwater management. The County's Phase II Watershed Implementation Plan (WIP) tracks the nutrient and sediment load reductions allocated to the County by the State for achieving the Chesapeake Bay TMDL. Progress toward meeting the Chesapeake Bay TMDL is reported as 2-year milestones to the Maryland Department of the Environment.

The seven jurisdictions (Delaware, the District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia) in the Chesapeake Bay Program (CBP) partnership agreed to develop Watershed Implementation Plans (WIPs) in three phases to provide a framework for reducing nitrogen, phosphorus, and sediment loads to meet water quality standards in the Chesapeake Bay and its tidal tributaries. The Phase 3 WIPs provide a road map for the numeric and programmatic commitments the jurisdictions intend to implement between 2019 and 2025 so that all practices are in place by 2025 to achieve the Bay's dissolved oxygen, water clarity/submerged aquatic vegetation, and chlorophyll-a standards. In August of 2019, the State of Maryland posted its final Phase 3 WIP.

2018 – 2019 2 Year Milestone Highlights (Stormwater, Wastewater, Septic)

- **18** – stormwater management restoration projects
- **6** – NGO stormwater management projects funded
- **170** – culverts and storm drains repaired or replaced
- **6,779** – curb miles swept
- **223** – nitrogen reducing septic systems installed
- **13** – septic systems connected to sewer

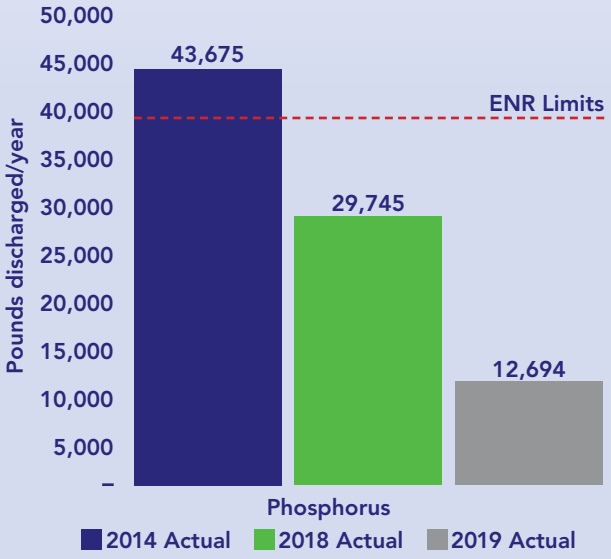
The Restoration Plan

Anne Arundel County is committed to helping Maryland meet its Chesapeake Bay clean-up goals by 2025. The County has already upgraded its six Water Reclamation Facilities (WRFs) to the highest level of wastewater treatment technology, dramatically reducing the amount of nitrogen and phosphorus to local waterways and the Chesapeake. In addition, the WPRP continues to provide treatment for stormwater runoff from those areas of the County developed prior to modern stormwater management regulations. Finally, the County is pursuing innovative strategies to deal with additional wastewater pollution from the septic sector, in concert with the Anne Arundel County Health Department and Maryland Department of the Environment.

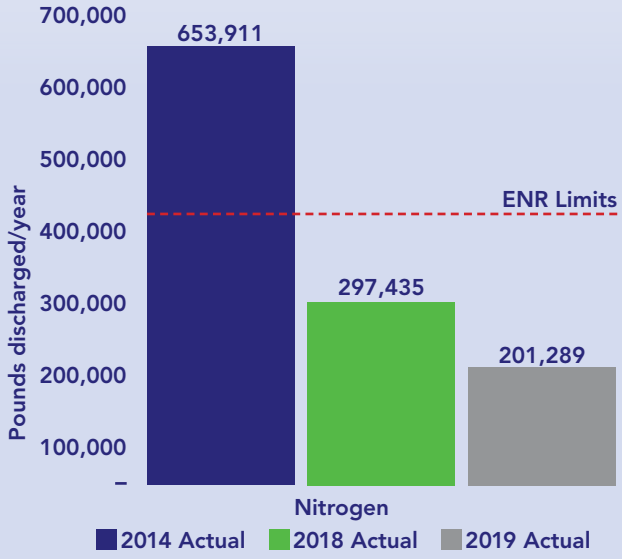
Water Reclamation Facilities – Enhanced Nutrient Removal
Anne Arundel County's $249 million investment to upgrade each of its six Water Reclamation Facilities (WRF) with Enhanced Nutrient Removal (ENR) technology was completed in July 2017. These ENR upgrades have enabled each plant to remove a far greater amount of nutrients, like nitrogen and phosphorus, from treated wastewater discharged to our rivers, creeks, streams, and Chesapeake Bay after the treatment process.

All County-owned facilities have been upgraded to achieve annual average nutrient goals of wastewater effluent quality of Total Nitrogen (TN) at 4 mg/l and Total Phosphorus (TP) at 0.3 mg/l. Over the past two years, the new facilities have been performing at a level well below the required limits for Total Nitrogen and Total Phosphorus discharge rates.

Anne Arundel County Permitted Phosphorus Discharge Limits



Anne Arundel County Permitted Nitrogen Discharge Limits



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Stormwater Remediation

At the end of FY19, the County had achieved over 52% of the restoration requirements under its current MS4 permit, with the rest of the required work in the procurement, design, and construction pipeline. The County was able to use the over performance of it's WRF's to generate "Nutrient Credits" to trade in time with the stormwater sector and achieve permit compliance.

Septic System Conversions

There are approximately 41,000 septic systems in Anne Arundel County. Of these, several thousand are located within the "Critical Area," land within 1,000 feet of tidal waters. The typical septic system does not remove nitrogen, instead delivering about 23.2 pounds of nitrogen per year to the groundwater, which eventually makes its way to our streams and rivers.

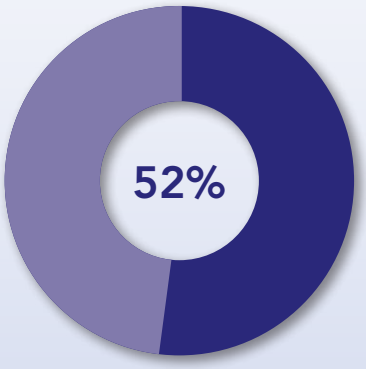
The Anne Arundel County Department of Health locally administers the Bay Restoration Fund (BRF). The BRF is a state-supported initiative that provides funding to replace conventional septic tanks with nitrogen-reducing technology.

The units reduce the amount of harmful nutrients, such as nitrogen, that septic systems discharge into the Chesapeake Bay and its tributaries. An upgraded, nitrogen-removing septic system cuts a system's nitrogen load in half. The Department of Public Works and Anne Arundel County Health Department continue to work closely together to direct Bay Restoration Funds for septic conversions and septic-to-sewer connections, as revenues are available.

In FY19 the Department of Health improved water quality through the BRF, which cost-shared 223 pretreatment units and 13 connections to public sewer. For more information on the BRF grant program, visit www.aahealth.org.

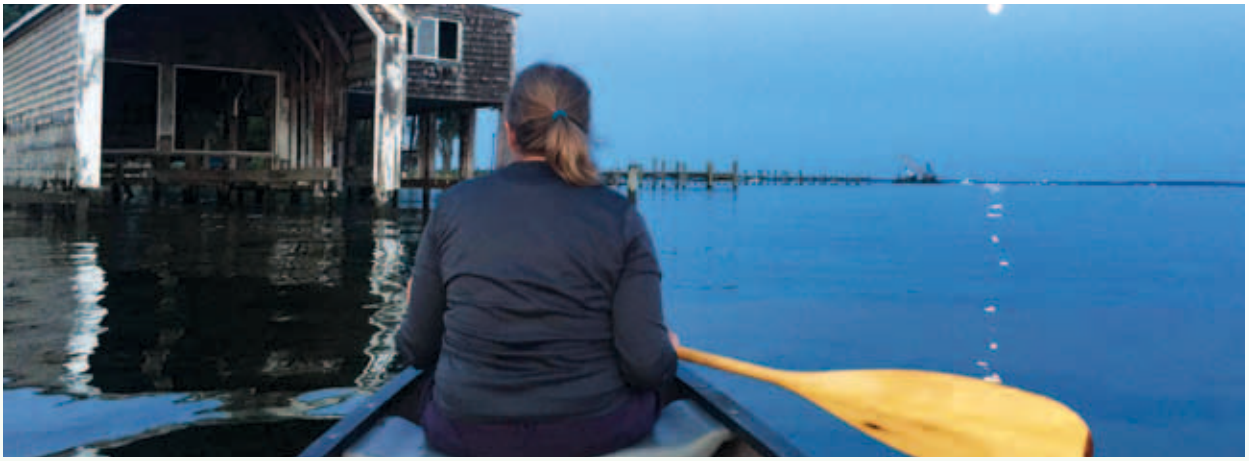
WPRP MS4 Attainment Goals

(acres to date/required acres)



MS4 Permit Progress Tracking
2608 out of 4996 Completed

Funding History



Through fiscal year 2019, the majority of the County's stormwater-related work was funded through the Watershed Protection and Restoration Fee (WPRF), an impervious surface-based fee on properties throughout the County. That work includes not only the County's clean water restoration projects, but also the maintenance and replacement of existing drainage infrastructure, the inspection of public and private stormwater facilities, and key programmatic efforts around environmental education, illicit discharge detection and elimination (IDDE), and monitoring of restoration projects to evaluate their success. As detailed in this report, the WPRF supports staff in the Department of Inspections and Permits, Department of Public Works Bureau of Highways, Anne Arundel County Soil Conservation District, and the Department of Public Works Watershed Protection and Restoration Program working to protect and restore the County's watersheds.

In February of 2019, the WPRP submitted a Financial Assurance Plan to MDE detailing the past, present, and anticipated expenditures required to satisfy its current MS4 permit. That plan is available at aarivers.org and will be updated again in 2021.

How is the fee calculated?
The Department of Public Works utilized Geographic Information Systems (GIS) technology along with parcel data collected from the Consolidated Property File and County Zoning Maps to estimate the imperviousness of residential properties in the various zoning districts. This information was used to determine a baseline Equivalent Residential Unit (ERU) of impervious surface of 2,940 sq. ft. An ERU is the base unit for calculating the annual charge for residential and non-residential properties. Currently the charge is $89.25 per ERU, per year.

The fee structure varies between land use type and intensity as seen in the table below:

ANNUAL WATERSHED PROTECTION AND RESTORATION FEE RATES		
Zoning	Rate Calculation	Current Fee
R10, R15, R22	$89.25 x .4	$35.70
R1, R2, R5	$89.25	$89.25
RA, RLD	$89.25 x 2	$178.50
Non-Residential	Actual sf of impervious surface divided by 2,940 x $89.25	Varies

To view the WPRF for your property, visit www.aarivers.org

Healing Our Rivers

The health of Anne Arundel County's waterways is tied to the health of its watersheds. While the health of the Chesapeake Bay itself is integrally tied to inputs from the region's largest waterways, such as the Susquehanna and Potomac Rivers, the health of our rivers and creeks has been demonstrated to be largely driven by activities – both past and present – in our own local watersheds. Nutrient discharges from our water reclamation facilities and septic systems, and sediment and nutrient runoff from our businesses and homes are the drivers of our local impairments. Our restoration work, paired with that being required of the other bay jurisdictions, can ensure that our creeks and rivers, as well as the Chesapeake Bay, are on the path to recovery.

Watershed Protection and Restoration Program - Carrying Out the Plan

The Watershed Protection and Restoration Program develops and delivers technical environmental assessment, restoration planning and implementation information and regulatory support to the Departments of Public Works, Inspections and Permits, and the Office of Planning and Zoning. This support enables these agencies to carry out their responsibilities for successfully managing delegated programs outlined in the County's NPDES-MS4 Permit, the State's Critical Area program, and the State Forest Conservation Act, as well as their responsibilities for land use decisions set forth in the County Code.

Implementation of the WPRP stormwater restoration strategy is focused on three key areas:

- **Stormwater Pond Retrofits -** Existing facilities, such as dry ponds, detention ponds, or infiltration basins that have failed or are outdated are rebuilt to optimize their pollution reduction capacity and provide an array of ecosystem benefits.

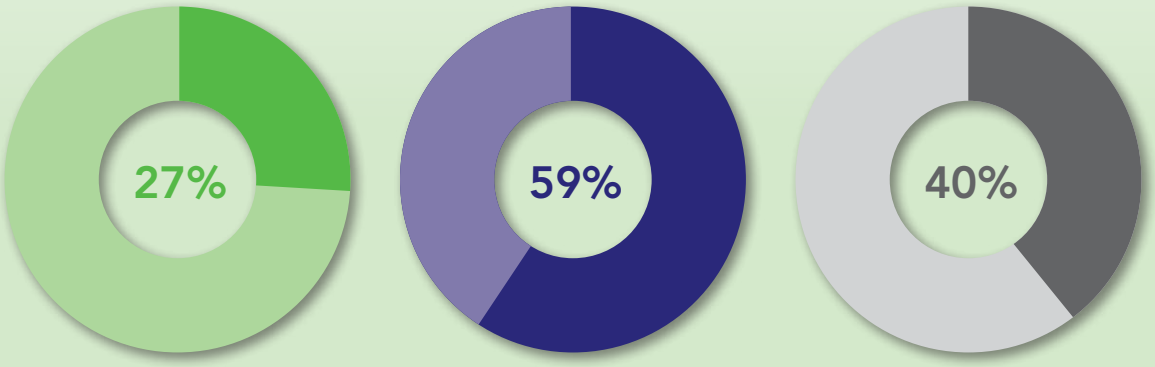
- **Stormwater Outfall Repairs -** Eroded or failing stormwater outfalls – locations where drainage systems discharge onto erosive soils – are reconstructed into systems that can both safely convey high flows as well as provide water quality benefits and habitat.

- **Stream & Wetland Restoration -** Stream erosion is the largest contributor of sediment and phosphorus to our local rivers, and the County's strategy to stabilize and re-hydrate valley bottoms through restoration will provide water quality, floodplain connection, and ecological benefits on a broad scale.

In addition to the work above, funds from the WPRF are used to address a $40+ million backlog of stormwater infrastructure repairs and replacement, ensuring that the County's culverts and drainage infrastructure are functioning properly and are not a threat to public health and safety.

WPRP Restoration Project Goals

(Number of projects completed/anticipated)



Stream & Wetland Restoration
13 out of 49 Completed

Stormwater Pond Retrofits
85 out of 144 Completed

Stormwater Outfall Repairs
16 out of 40 Completed

WPRP Restoration Projects Completed in FY19

The following projects were constructed to meet multiple objectives including: water quality enhancement, infrastructure protection, improved flood attenuation, improved fish habitat, and improved riparian functions.

Outfalls Completed: 16

BMPs/Ponds Completed: 15

Stream Restorations Completed: 5

Highlighted Projects

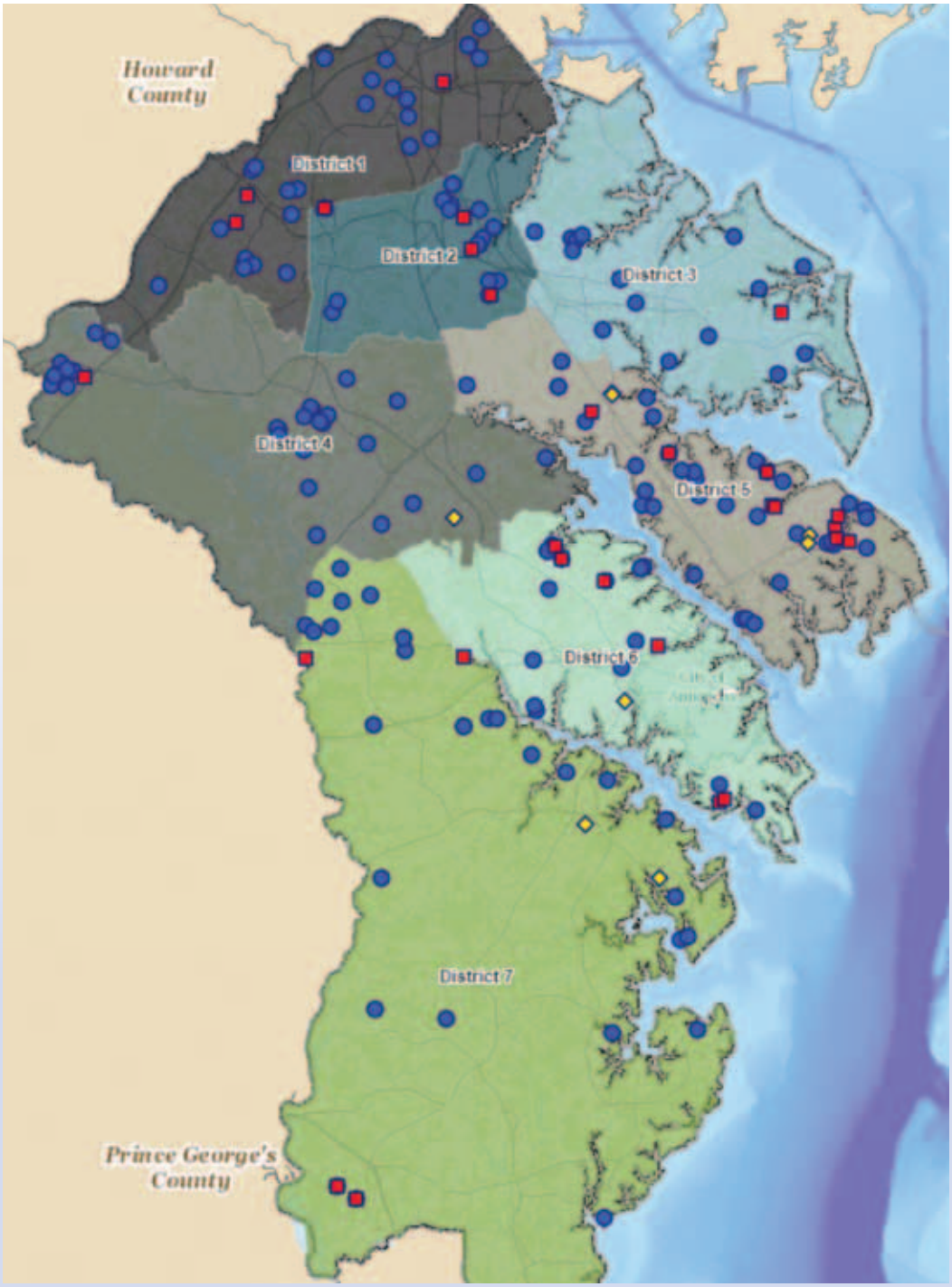
Cape St. Claire Shopping Center Outfall Repair: This outfall is located within a wooded area near Cape St. Claire Recreation Area, across the street from the Cape St. Claire Shopping Center. The ephemeral outfall channel drains to an unnamed tributary to the Little Magothy River and was extremely incised, contributing significant amounts of sediment and nutrients downstream. The project included a sequence of step pool structures and a boulder cascade to restore and stabilize the existing, eroded channel, while enhancing natural habitat and improving water quality flowing to the Magothy River.

Cowhide Branch Stream Restoration: About 20 years ago, a large stormwater management pond located upstream failed. To prevent severe sediment loading from occurring within the tidal area of Weems Creek downstream, a stone check dam was installed near the intersection of Admiral Drive and Jennifer Road. At the time of installation, the understanding was that this dam was a temporary measure. The dam was an insurmountable impediment to migratory and resident fish species movement.

The project removed the dam as part of a larger stream restoration project for this reach of Cowhide Branch. The impoundment created by the dam system was converted into a wetland seepage system, and a series of low stage weirs were installed up and down stream of the dam site to restore fish passage to the reach from tidewater.

Bacon Ridge Stream Restoration: As part of the WPRP Watershed Restoration Grant Program, the Arundel Rivers Federation restored a highly eroded section of Bacon Ridge Branch in Crownsville using an innovative, low-impact log jam technique, which mimics the natural impacts of beaver dams.

WPRP Restoration Projects Completed in FY19



Legend:

- Completed WPRP Restoration Projects
- Completed WPRP Watershed Restoration Grant Projects
- Completed IMD Storm Drain Improvement Projects

Infrastructure Management Division (IMD) - Stormwater Management

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Effective operations and maintenance practices are critical to watershed health. The County operates and maintains a wide range of infrastructure to protect public health and safety, water quality, and property. It is important to ensure operations and maintenance activities to not only keep those assets in good working order, but also protect water quality and habitat functions.

The Infrastructure Management Division is responsible for managing the inventory, inspection, and development of the County's Stormwater Infrastructure Capital Program. This program aims to repair and/or replace aging, damaged storm drain systems and culverts throughout the County, as well as address any associated design and permitting requirements. These projects are normally identified and transferred to the IMD by the Road Operations Division and are scheduled in a worst-first priority order.

Funds from the Watershed Protection and Restoration Program are used to address stormwater infrastructure repairs and replacements, ensuring that the County's culverts and drainage infrastructure are functioning properly and are not a threat to public health and safety.

INFRASTRUCTURE MAINTENANCE DIVISION PROJECTS BUDGETED IN FY19	
Culvert & Closed Storm Drain Repair	$4,767,000
Emergency Storm Drain	$600,000
Storm Drain/SWM Infrastructure (WPRP)	$2,000,000
TOTAL	**$7,367,000.00**

FY19 INFRASTRUCTURE MANAGEMENT DIVISION WPRP CAPITAL PROJECTS	
Council District	# of IMD Projects
1	27
2	17
3	16
4	30
5	34
6	17
7	29
TOTAL	**170**

IMD & Road Operations Division Milestones

The Infrastructure Management Division is also responsible for managing the inventory, inspection, and maintenance of over 850 stormwater management facilities that are collectively referred to as Best Management Practices (BMPs). In addition, IMD works alongside the Road Operations Division to sweep County roads to remove loose materials, litter, and other debris that is unsightly, hazardous, or could cause possible drainage obstructions.

2019 MILESTONES	
ACTION	**RESULT**
BMP's Inspected	591
Curb Miles Swept	6,654
Tons of Litter Collected (Street Sweeping)	479
Storm Drain Structures Cleared	3,987
Linear Feet of Drain Pipe Cleared	120,752
Linear Feet of Ditch Cleaned	180,217
Storm Drains Cleared	4,932

Watershed Protection and Restoration Fund Revenue and Expense Report

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Maryland Environment Code Ann §4-202.1 (2013) requires that a county make a report publicly available, beginning on July 1, 2014, and every two years thereafter. This requirement was amended in FY15 to require annual reporting of operating expenditures. The following report is being issued to meet these revised requirements, and includes revenues and expenses for FY19, the sixth year of implementation for the Watershed Protection and Restoration Fund in Anne Arundel County, Maryland. This report includes expenses incurred beginning July 1, 2018 through June 30, 2019.

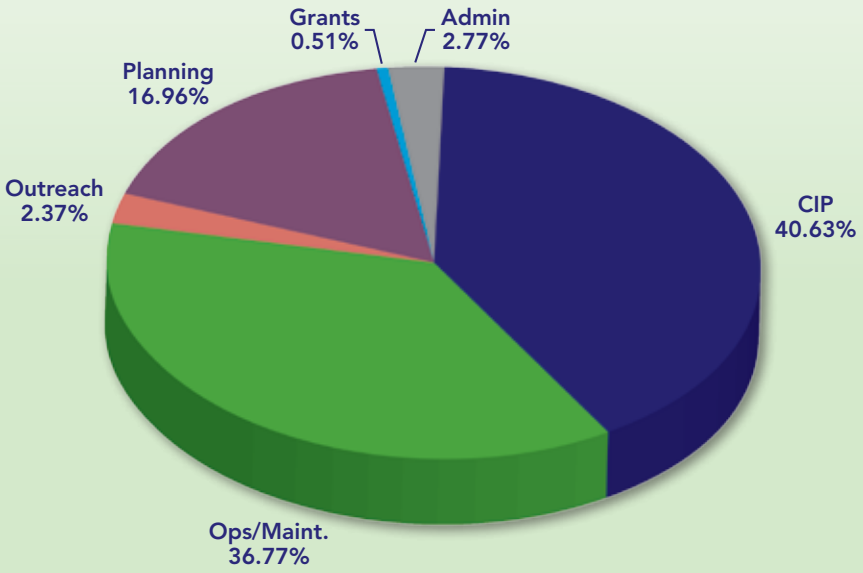
Revenues

The Watershed Protection and Restoration Fee was first billed on property taxes on July 1, 2013. There were 212,980 properties in Anne Arundel County that were subject to the fee. For FY19, Anne Arundel County has received $22,017,000 in revenues as of June 30, 2019. In addition to the Watershed Protection and Restoration Fee, the county has received $1,732,000 to fund watershed protection and restoration projects from other sources.

Expenditures

Operating expenditures for FY19 totaled $17,026,000. Of these expenditures, $6,260,000 was spent on operations and maintenance activities for the county's stormwater infrastructure. An additional $2,887,000 was spent for planning for future improvements to these systems. The fund balance of $6,723,000 will be used to pay debt payments associated with the capital improvement projects required to update the aging infrastructure and the construction of best management practices for locations that do not meet current requirements.

FY19 Operating Expenditures



Biological Monitoring Program – Paleochannel Project

An Investigation of the Pre-Colonial Coastal Plain Stream Channel and Riparian Area

Anne Arundel County has partnered with the US Geological Survey to characterize historic conditions through a variety of assessment methods including radioisotope dating of the soil layers, identifying pollen and other plant materials found in the soils layers, and using trenching and other methods to identify the form of the historic stream channel underneath legacy sediments.

Since European settlers arrived in Anne Arundel County around 400 years ago, human activities have had a profound impact on the streams and rivers that flow through our landscapes. Beginning with the removal of upland forests and conversion of these areas to farm fields, followed by the continuing slow transformation to developed land, land cover changes have at different times resulted in tremendous movement of soil from upland areas into stream channels and the valleys through which they flow, burying these pre-Colonial plant and animal communities and possibly altering the character and form of these receiving streams. These "legacy sediments" are thought to fill floodplains across the Chesapeake Bay and are believed to make up a significant fraction of sediment currently delivered to the Bay.

While it is known that most of the Chesapeake Bay watershed was once covered by dense forest, when it comes to Coastal Plain streams and their surrounding valleys, scientists are unsure of what these areas looked like in pre-Colonial times. Historic accounts of stream valleys in the Piedmont physiographic region describe these places as full of swamps, springs, and meadows. It is also known that beaver *(Castor canadensis*) was prevalent all over the Eastern US and that this species had profound impacts on streams through dam building and foraging activities. In contrast to the Piedmont floodplain swamp paradigm, many stream valleys in Anne Arundel County today typically contain a single stream that meanders its way across a floodplain area which has possibly been impacted by legacy sediment delivery, as shown in the adjacent photo. Beavers have all but disappeared from the landscape.

Research done over the last 10 years in the Piedmont seems to confirm this picture of a beaver-mediated, floodplain swamp system buried under these legacy sediments. However, very little rigorous investigation has been done to determine the prevalence, and possible impacts, of these sediments on channel form in the Coastal Plain region. In contrast to the Piedmont, there is a dearth of information on the pre-Colonial streamside ecosystem and historic channel form under these sediments.

Illicit Discharge Detection and Elimination (IDDE) Program

The WPRP is responsible for implementing the County's Illicit Discharge Detection and Elimination (IDDE) Program, which focuses on identifying and eliminating illicit discharges to the County's storm drain system. An illicit discharge is defined as any discharge to the storm sewer system that is not composed entirely of stormwater (except where allowed by a discharge permit). WPRP collaborates with other County agencies that have the legal authority to inspect and enforce any identified illicit discharges. The County's IDDE program has been successful in the identification and removal of a wide variety of sources of pollutants, including illicit connections, upland pollutant sources, dumping and spills. During the course of the County's annual outfall field screening, observed flow during dry weather conditions is tested for pollutants and the source of flow is investigated.

During FY19, 155 outfalls were successfully inspected and seven (7) potential sources of illicit discharges were identified. Of these, five were confirmed as illicit discharges. The Department of Inspection and Permits has resolved all of these incidents. To report a potential illicit discharge or other environmental violation contact the Anne Arundel County Environmental Hotline at 410-222-7171.

Case Study

In June 2019, while performing routine work at the County's Parole Plaza stormwater monitoring station, the County's stormwater monitoring consultant observed discolored, odorous water actively discharging to a Church Creek tributary from a storm drain outfall. While the discharge did not test positive for any of the usual pollutants tested for under the IDDE program, the odorous and discolored water triggered a site investigation and track down. The consultant reported the incident and I&P and WPRP staff immediately investigated. Upon arriving at the site, the team confirmed the discharge and began searching for a source. The team was able to trace the discharge back to pressure washing activities at nearby parking garage. The team found numerous inlet drains in the parking garage left unprotected, allowing wash water to enter the storm drain system. The team required power washing operations to immediately cease and confirmed that the discharge at the outfall had significantly decreased, indicating the direct connection between the wash down activity and the illicit discharge of non-stormwater to the storm drain system. The team explained the situation to the power washing crew leader and garage property manager, who both agreed to cease all power washing activity at the garage until a wash water recapture system is put in place to prevent wash water from entering the storm drain system. The County will continue to monitor this location.

Watershed Partnerships

Successful conservation and preservation of Anne Arundel County's watersheds takes teamwork. To that end, in 2014 the Anne Arundel County Department of Public Works, in partnership with the Chesapeake Bay Trust, created the **Anne Arundel County Watershed Restoration Grant Program,** a community grant program to support watershed restoration activities throughout the County in order to improve water quality in local streams and rivers.

The grant program was created to engage local nonprofit organizations, landowners, and communities in efforts to restore the County's waterways; to provide resources to these groups to enable them to implement greening and water quality projects; and to assist Anne Arundel County's efforts to meet the requirements of its state and federal stormwater permit and local waterway cleanup plans. This program encourages on-the-ground restoration activities that reduce stormwater flow and pollutants and engage Anne Arundel County residents in these activities.

Below is a list of organizations that were awarded funding from Anne Arundel County for water quality restoration projects in 2019:

ORGANIZATION	PROJECT DESCRIPTION	WATERSHED	FUNDING AMOUNT	MATCH AMOUNT	IMPERVIOUS ACRES TREATED
Arundel Rivers Federation	Gravely-Kings Branch Stream Restoration	South River	$378,487	$1,976,433	16.6
Chesapeake Rivers Association	Circle Drive Outfall Restoration in Winchester on the Severn	Severn River	$161,544	$256,688	2.3
Arundel Rivers Federation	Beechnut Kennels Bioretention Project	Rhode River	$47,331	$4,000	0.44
Annapolis Roads Property Owners Association	Mayapple Watershed Remediation	Severn River	$38,358	$9,752	0.47
Arundel Rivers Federation	Herrington Harbour North Headcut Stabilization, Wetland Enhancement, & Living Shoreline	Herring Bay	$192,940	$98,244	9
Alliance for the Chesapeake Bay	Cape St. Claire Living Shoreline and Marsh Project	Magothy River	$298,868	$235,000	38.88
TOTAL			**$1,117,528**	**$2,580,117**	**67.69**

More information about the grant program can be found at www.cbtrust.org.

Arlington Echo Outdoor Education Center - Chesapeake Connections

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The Arlington Echo Outdoor Education Center is operated by the Office of Environmental Literacy and Outdoor Education Program of Anne Arundel County Public Schools. Arlington Echo Outdoor Education Center offers Anne Arundel County students year-round opportunities to experience the natural environment.

The Outdoor Education programs at Arlington Echo use environmental and outdoor learning to enhance, extend and enrich classroom curriculum. Arlington Echo hosts fourth grade elementary students on day and overnight trips, but also hosts middle, and high school groups.

Chesapeake Connections is the Outdoor Education outreach program of Arlington Echo which connects classroom instruction with a series of relevant hands-on experiences that lead to environmental stewardship. The staff at Arlington Echo Outdoor Education Center provide support and expertise to complete yearlong environmental service-learning projects as part of Chesapeake Connections with many Anne Arundel middle and elementary schools. The service-learning projects are incorporated into each school's curricula and involve using community areas or school grounds for environmental restoration activities. The program works to restore and/or create bogs, raingardens, and manage runoff areas on school grounds or in the community to treat stormwater pollution. These projects meet growing environmental needs in our area and help protect the Chesapeake Bay.

The WPRP has partnered with the Chesapeake Connections program to provide hands-on experiences for Anne Arundel County students through the planting of native trees and other vegetation at several restoration projects. In 2019, over 1,500 Anne Arundel County Public School students participated in planting events at 4 newly restored water quality project sites around the County. Below is a listing of those opportunities that occurred during 2019:

- **Cape St. Claire Outfall Repair:** Severna Park Middle (450 students)
- **Towering Oaks Pond Retrofit:** Marley Middle (300 students)
- **Revell Downs Outfall Restoration:** Lindale Middle (407 students), Chesapeake Science Point (80 students)
- **Granite Baptist Stream Retrofit:** Old Mill Middle South (312 students)

Anne Arundel County Watershed Stewards Academy (WSA)

The Anne Arundel County Watershed Stewards Academy was created in 2009 out of a partnership between Arlington Echo Outdoor Education Center and the Anne Arundel County Department of Public Works to build capacity within communities to reduce pollutants entering our waterways via stormwater runoff. The Watershed Protection and Restoration Program continues to provide critical support in connecting Stewards and communities with watershed studies, planning, and restoration efforts.

WSA trains citizens in Anne Arundel County to help neighbors reduce pollution in our local streams, creeks, and rivers. WSA's hands-on training course gives Stewards the tools to bring change to their communities, by turning knowledge and good intentions into action. Stewards work with communities to install projects such as rain gardens or conservation landscapes that capture polluted runoff. Collectively, these community and individual actions add up to better health for our local waterways and the Chesapeake Bay.

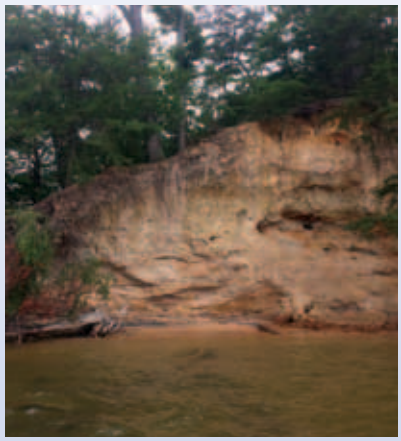
2019 WSA Successes

- Installed 964,538 square feet of new-in-the-ground projects
- Reached 31,688 County residents, providing technical assistance or environmental education
- Planted 7,463 Native Plants and Trees
- Stewards donated 8,984 volunteer hours towards restoration, education, and outreach in their communities
- Removed 6,640 square feet of invasive species
- Removed 11,050 pounds of trash

For more information about WSA visit www.aawsa.org

Public-Private Partnerships – A Win-Win Situation

In FY19, the Watershed Protection and Restoration Program entered into its third public-private partnership with three firms to restore 6,700 feet (over 1.25 miles) of stream and shoreline through its innovative Full Delivery of Water Quality Improvements contract. The $5.43 million "Full Delivery of Water Quality Improvements" contract is uniquely structured to help the County better satisfy its Municipal Separate Storm Sewer System (MS4) and Chesapeake Bay Total Maximum Daily Load (TMDL) permits and goals by partnering with the private sector.



These restoration projects will help keep our waterways healthy by protecting the shoreline from erosion; providing homes, food, and refuge for fish and wildlife; and filtering pollutants from runoff. Specifically, the contract consists of three separate projects:

- BayLand Consultants & Designers, Inc. (Hanover) was awarded $2.81 million to design and construct 3,625 linear feet of living shoreline in the South River watershed.
- Underwood & Associates (Annapolis) was awarded over $363,000 to design and construct 911 linear feet of living shoreline in the Severn River watershed.
- Restoration Systems, LLC (Raleigh, NC) was awarded $2.25 million for the restoration of approximately 1,775 linear feet of stream and wetlands feeding the upper South River watershed as well 480 linear feet of shoreline near the mouth of the river.

The full award will only be paid upon completion of the projects and verification of the project's benefits. The County's capital program includes a similar effort for Fiscal Year 2020.

These restoration projects will help keep our waterways healthy by protecting the shoreline from erosion; providing homes, food, and refuge for fish and wildlife; and filtering pollutants from runoff.

Anne Arundel Soil Conservation District –

Helping the County Meet its Chesapeake Bay Cleanup Commitments

For more than 70 years, farmers have turned to the Anne Arundel Soil Conservation District as a trusted source of knowledge and technical expertise in managing and protecting soil and water resources on their farms. Today, farmers, developers, businesses, environmental groups, and government agencies rely on the District to help them meet nutrient and sediment reduction goals outlined in the county's Watershed Implementation Plan to protect and restore the Chesapeake Bay by 2025.

Agricultural Programs

Agriculture is making tremendous strides on behalf of the Bay, accounting for approximately 46% percent of all nutrient and sediment reductions since 2009. This success is largely due to the on-the-ground efforts of our soil conservation professionals, who work with farmers to develop Soil Conservation and Water Quality Plans (SCWQPs) that address natural resource and environmental concerns for their farms. These plans usually include a menu of best management practices (BMPs) that can be installed to protect soil and water resources. Cover crops and streamside buffers are often recommended to prevent nutrients from crop fields and nurseries from entering waterways. Livestock fencing, watering facilities and improved pasture management practices help farmers protect streams from livestock impacts.

In FY 2019, the Anne Arundel Soil Conservation District developed/updated 22 SCWQPs for county farms. These plans included more than 86 (37 WIP) BMPs. The design, installation and construction supervision of these practices are the responsibility of the District's technical staff.

Urban Programs

Construction and road building projects can have a significant impact on water quality. The District is authorized to review and approve erosion and sediment control plans for projects in the County. This ensures that environmental safeguards are in place to minimize soil erosion, nutrient runoff and sediment buildup in local waterways. In FY 2019, the District reviewed 1,111 erosion and sediment control plans for construction projects on 23,311 acres. Approximately 22% of these plans were approved (241 approved plans with 1,428 acres of disturbance). To further protect the county's valuable natural resources, the District provides planning, design and management services for local stream restoration projects, shoreline stabilization projects, and drainage management projects.

Conservation Partners

The Anne Arundel Soil Conservation District works with a number of local, state and federal agencies to carry out its mission, including the Maryland Departments of Agriculture, Natural Resources Conservation Service, Farm Service Agency, University of Maryland Extension, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Southern Maryland Resource Conservation and Development and U.S Navy.

Small Farms

The Soil Conservation District along with the Natural Resources Conservation Service has been working with small farms to install high tunnels which are green houses in which you plant right into the soil verses raising plants in trays on tables. These high tunnels allow a grower to get a jump start on growing crops by allowing earlier germination, provide for more effective pest and weed control, protection from predators such as birds and deer, more efficient use of fertilizer and the capability to extend the growing season. High tunnels can be constructed and utilized on urban agriculture land as well.

Envirothon

Each year, the Anne Arundel Soil Conservation District sponsors a local Envirothon competition for high school students interested in learning about natural resources and gaining a better understanding of today's complex environmental issues. Designed by soil conservationists, foresters, wildlife experts and other natural resource professionals, the Envirothon moves students beyond the classroom to solve real life environmental problems in field settings. Students learn directly from natural resource professionals and compete at the local, state and national levels.

Step Pool Storm Conveyance Systems

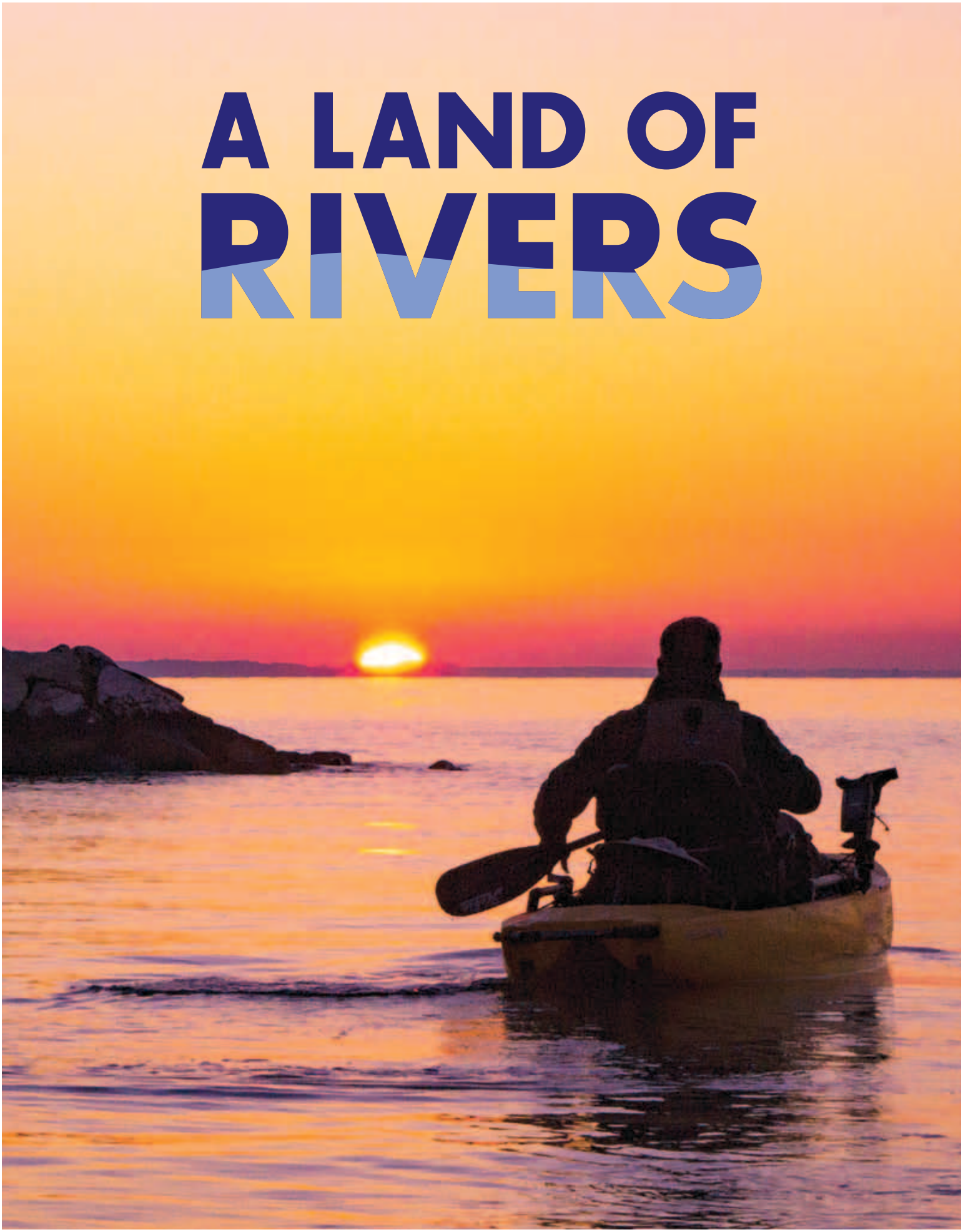
Anne Arundel County Watershed Protection and Restoration Program under the Department of Public Works is in the process of retrofitting existing stormwater management facilities, repairing eroding outfalls and restoring streams. One of the ways to stabilize a channel is to construct a Step Pool Storm Conveyance system. For the most part these conveyance systems have been installed in urban areas. That is until recently.

In 2015 the Anne Arundel Soil Conservation District was one of the partners that Maryland Therapeutic Riding Center (MTR) solicited to help find a solution and to advise on a design to alleviate stormwater from flooding their indoor riding facility. Water had to be collected and guided around the building and paddocks so as not to cause an erosion problem and still be crossable by horses and riders. Keith Underwood and Associates designed and installed a 1,600 linear foot regenerative open channel system to convey storm water around their buildings.

Currently the Anne Arundel Soil Conservation District is working with Keith Underwood of Underwood and Associates to design a conveyance system to safely transport the overflow from a stormwater management pond, through an equine facility in Davidsonville, in a safe, nonerosive manner. The existing pipe outfall for the pond is failing and causing sinkholes along its location which runs almost the entire length of the farm. This has become a safety hazard for the horses, riders and anyone on the premises. One option was to replace the pipe but by installing an open channel conveyance system, we can create wetland habitat, promote water infiltration and enhance the ecosystem.

ANNE ARUNDEL SOIL CONSERVATION DISTRICT Agricultural Best Management Practices (BMPs) Planted/Installed Fiscal Year 2019			
Best Management Practice	**Status**	**2025 WIP III Goal**	**Percent of WIP Goal Achieved**
Cover Crops – Traditional (AC)	3,937	4,667 AC/ Year	84%
Soil Conservation & Water Quality Plans (cumulative acres)	8,758	14,000 AC/ Year	63%
Forest Buffers (acres)	2.1	75	3%
Livestock Fencing (linear feet)	750	236,752	0.3%
Land Retirement to Open (acres)	31	538	6%
Watering Facility (number)	3 No. (53.1 AC treated)	Treats 10% of Pasture AC (346.1 AC)	15%

A LAND OF RIVERS



A LAND OF RIVERS

Anne Arundel County
WATERSHED
Protection & Restoration
PROGRAM

FY 2019 REPORT

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