



A LAND OF RIVERS



Anne Arundel County
Bureau of Watershed
Protection
& Restoration

AARivers.org
FY 2023 REPORT



DPW & YOU

Making a difference, together

Introduction



Dear Anne Arundel County Resident,

In the tenth year of our watershed restoration efforts and two years into the County's current 5-year State-issued stormwater permit, we are already over halfway to achieving our current clean water goals. The implementation progress that we've made over the past couple of years has positioned us to comply fully with this new permit well in advance of our required benchmarks and to go above and beyond in accelerating the recovery of our local waterways.

Our restoration projects and programs continue to receive national recognition and awards, including our Millrace Dry Pond project, recognized by the National Association of Counties (NACO) for the innovative partnership between the County and residents that transformed an outdated dry detention stormwater facility into a thriving wetland ecosystem and model outdoor recreation facility. Additionally, the County was again recognized by the Water Environment Federation (WEF) for managing a high-performing Municipal Separate Stormwater Sewer (MS4) Program and our ability to effectively and creatively manage stormwater and green infrastructure initiatives.

The Bureau of Watershed Protection & Restoration (BWPR), within the Department of Public Works, leads these efforts in its role to provide clean water under its Municipal Separate Storm Sewer System (MS4) permit and the Chesapeake Bay Total Maximum Daily Load (TMDL). To date, the County has completed over 164 restoration projects and over 1,000 stormwater infrastructure projects to preserve our waterways for future generations.

This Bureau's 2023 Anne Arundel County *A Land of Rivers* report summarizes the watershed protection and restoration actions initiated by the County and our partners during fiscal year 2023 (July 1, 2022 - June 30, 2023). These actions, combined with those from previous years and work by countless community groups and individual residents, will continue to restore our waterways and protect our communities.

In Anne Arundel County, we are inexorably tied to these streams, rivers, and the Chesapeake Bay. This *A Land of Rivers* report continues to document the conditions of our waterways, describe solutions and communicate the urgent need to protect our County's waters, and live up to our promise to make Anne Arundel County *The Best Place - For All*.

Sincerely,

A handwritten signature in black ink, appearing to read 'Steuart Pittman'.

Steuart Pittman
County Executive

RIVERS



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, a watershed-based approach to restoration will promote the sustained protection of water quality and native habitat. 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.

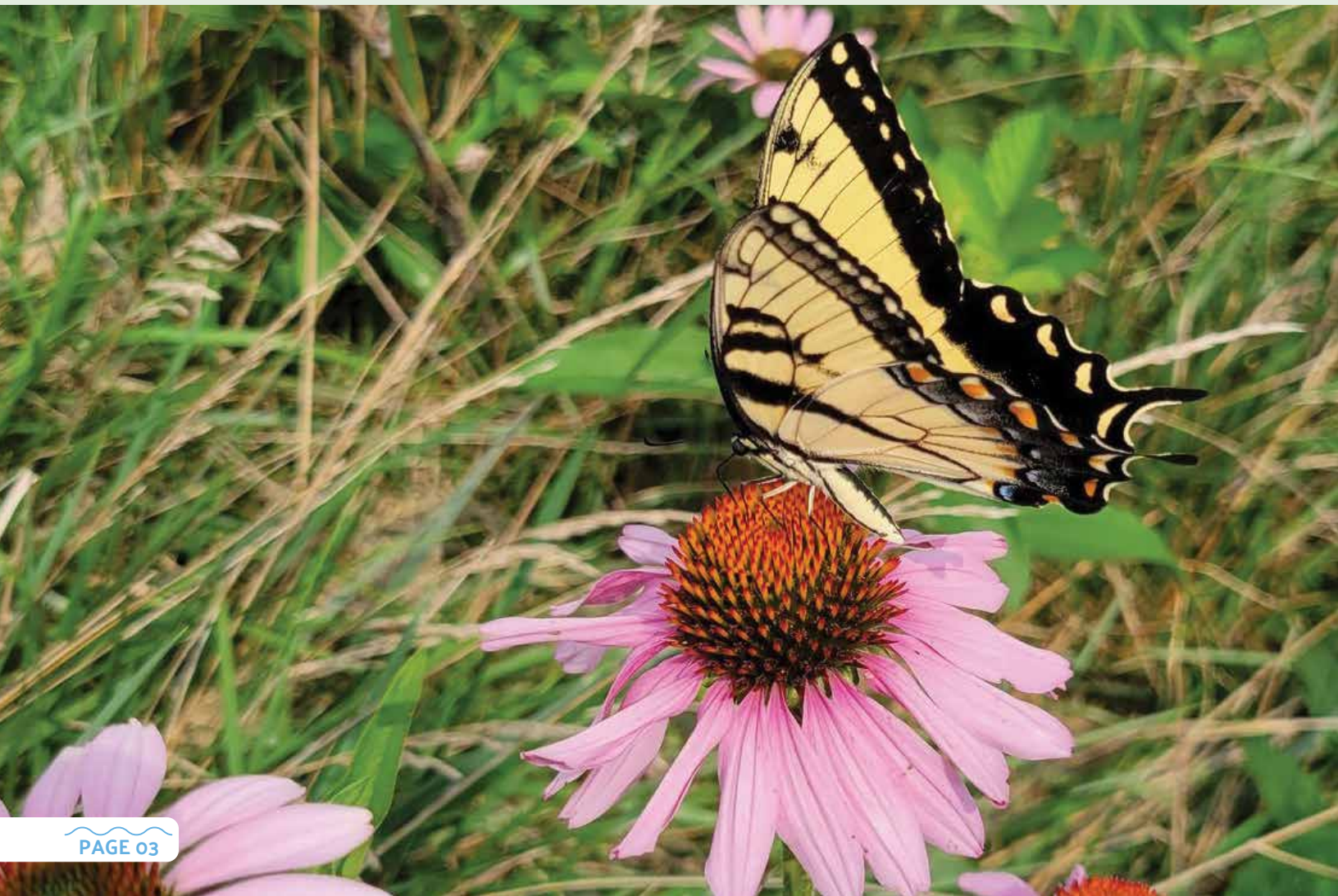
Regulatory Drivers

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. Under the County's previous NPDES MS4 permit, the County restored the equivalent of 4,996 acres of Anne Arundel County's impervious surface area, such as roads, sidewalks, and driveways, which have little or no stormwater management. The current NPDES-MS4 permit goal requires the management of an additional 2,998 acres of impervious surface.

This additional impervious surface management, and the associated nutrient and sediment reductions, will address the County's Phase III Watershed Implementation Plan (WIP) loads allocated to the County by the State for achieving the Chesapeake Bay TMDL. Progress toward meeting the Chesapeake Bay TMDL is reported in the County's NPDES MS4 Annual Report 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 III 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.



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 in local waterways and the Chesapeake. In addition, the BWPR continues to provide treatment for stormwater runoff from those areas of the County developed before 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. More information can be found at www.ourwAater.org.

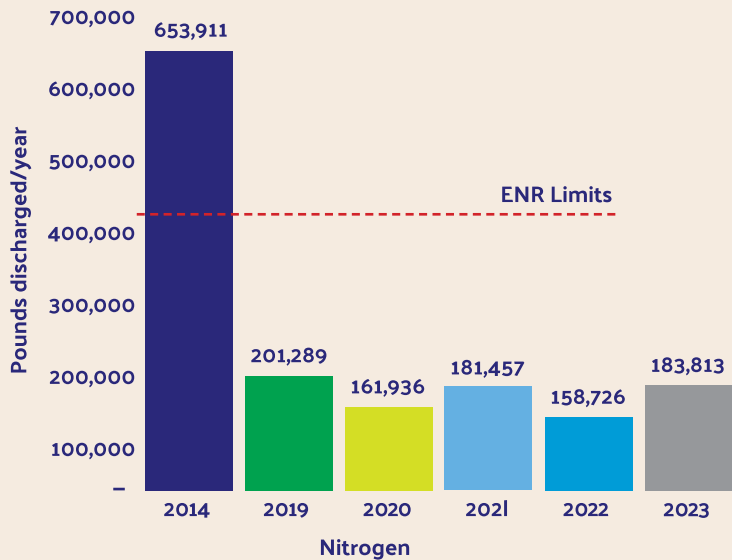


The health of Anne Arundel County's waterways is tied to the health of its watersheds. While the health of the Chesapeake Bay itself is integrally tied to inputs from the region's largest waterways, such as the Susquehanna and Potomac Rivers, the health of our rivers and creeks has been demonstrated to be largely driven by activities – both past and present – in our own, local watersheds. Nutrient discharges from our water

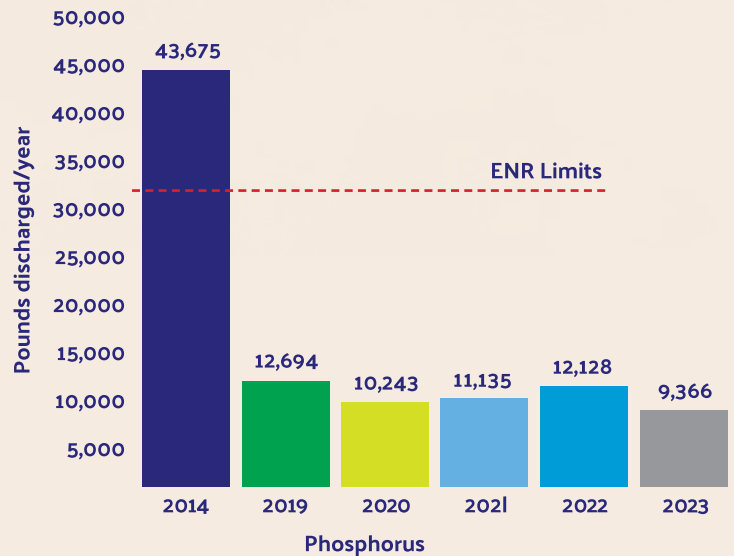
reclamation facilities and septic systems, coupled with sediment and nutrients delivered from our businesses and homes, are the drivers of our local impairments due to excessive stormwater runoff. Our restoration work, paired with that being required of the other bay jurisdictions, can ensure that our creeks and rivers, as well as the Chesapeake Bay, are on the path to recovery.

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.

Anne Arundel County Permitted Nitrogen Discharge Limits



Anne Arundel County Permitted Phosphorus Discharge Limits





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

Stormwater Remediation -

As of the end of FY20, the County met the primary restoration goal of its fourth-generation MS4 permit by restoring the equivalent of 4,996 acres of impervious surface. The County's fifth-generation MS4 permit was issued in November 2021 and set a new goal requiring the restoration of an additional 2,998 acres of impervious surface by November 4, 2026. The County has been making

excellent progress and by the end of FY23 has restored the equivalent of 2,217 acres of impervious surface and is well over halfway to meeting this new permit goal.

Septic System Conversions -

There are approximately 41,500 septic systems in Anne Arundel County. Of these, over 14,000 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 the Department of Health continue to work closely together to direct Bay Restoration Funds for septic conversions and septic-to-sewer connections, as revenues are available. In FY23, BRF funds were leveraged to cost-share 157 pretreatment units and 18 connections to public sewer. For more information on the BRF grant program, visit www.ahealth.org.

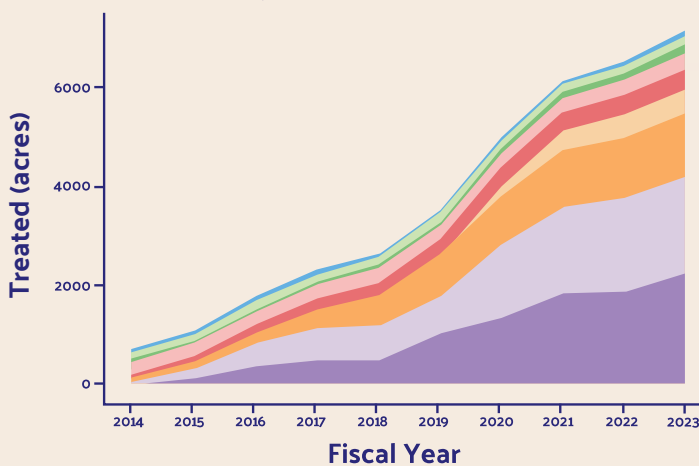
Progress Toward the Chesapeake Bay TMDL

While the currency of the County's MS4 is "impervious acres treated," that number is a stand-in for nutrient and sediment pollution reduced by those water quality practices. Both through its stormwater permit, and as a condition of the Chesapeake Bay Total Maximum Daily Load

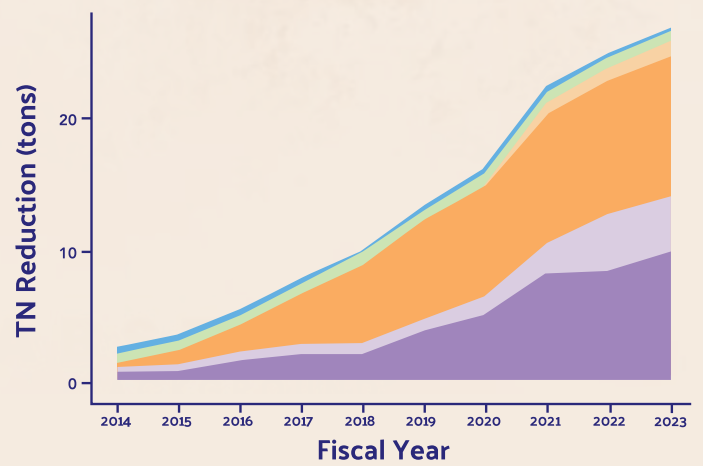
(TMDL), the County is required to reduce those pollutants both to local waterways, such as the Patapsco and Severn Rivers, and to the Chesapeake Bay. MDE assigned each Maryland jurisdiction a pollution allocation. The following figures demonstrate the County's progress toward

achieving the nitrogen, phosphorus, and sediment pollution reductions in our local waterways; these results are from clean water efforts associated with the stormwater sector actions.

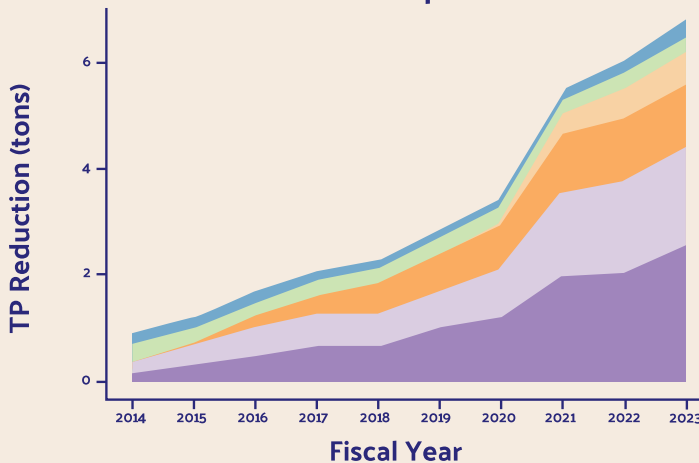
Impervious Restoration



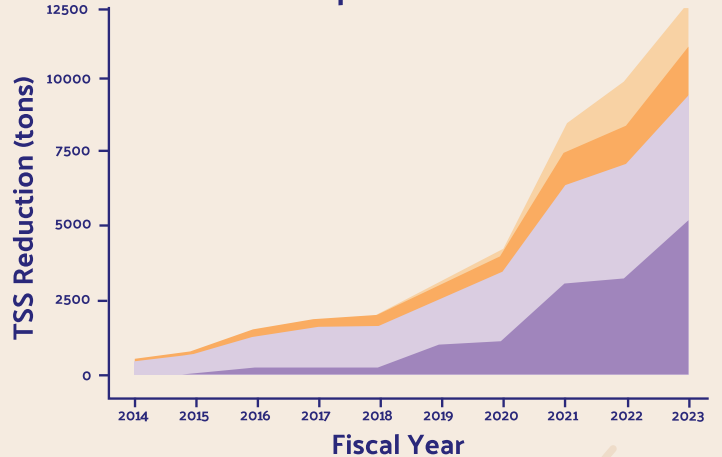
Total Nitrogen



Total Phosphorus



Total Suspended Sediment



- Land Cover Conversions
- Inlet Cleaning
- Street Sweeping
- Septic to Sewer Connections
- Septic Pumping
- Septic Denitrification Units
- Outfall Stabilizations
- Upland BMPs
- Shoreline Restorations
- Stream Restorations

The Funding History

Through fiscal year 2023, 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, the Department of Public Works Bureau of Highways, the Anne Arundel County Soil Conservation District, and the Department of Public Works Bureau of Watershed Protection and Restoration working to protect and restore the County’s watersheds.

As required by Anne Arundel County’s NPDES-MS4 permit, the FY22 Financial Assurance Plan was introduced on September 6, 2022, at the Anne Arundel County Council Meeting as Resolution 37-22. The Resolution was passed on October 3, 2022. The FY24 Financial Assurance Plan will be submitted to the County Council by December 31, 2024.

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 an 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 \$93.71 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	$\$93.71 \times 0.4$	\$37.48
R1, R2, R5	\$93.71	\$93.71
RA, RLD	$\$93.71 \times 2$	\$187.42
Non-Residential	Actual sf of impervious surface divided by 2,940 x \$93.71	Varies



Bureau of Watershed Protection & Restoration – Carrying out the Plan

The Bureau of Watershed Protection and Restoration 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 outlined in the County Code. Implementation of the BWPR 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 benefits to water quality, floodplain connection, and native habitat on a broad scale.

In addition to the work above, funds from the WPRF are used to address a multi-million-dollar 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.

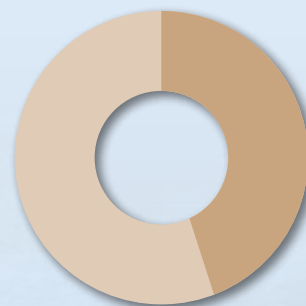
BWPR Restoration Project Goals (Number of projects completed/anticipated)



Stream & Shoreline Restoration
40 out of 85 completed

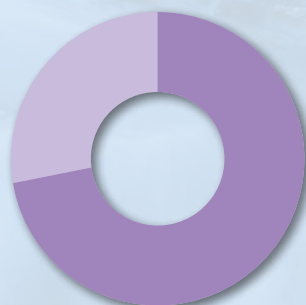


Stormwater Management
36 out of 63 Completed



Outfall Stabilizations
8 out of 18 Completed

BWPR MS4 Attainment Goals (acres to date/projected acres)

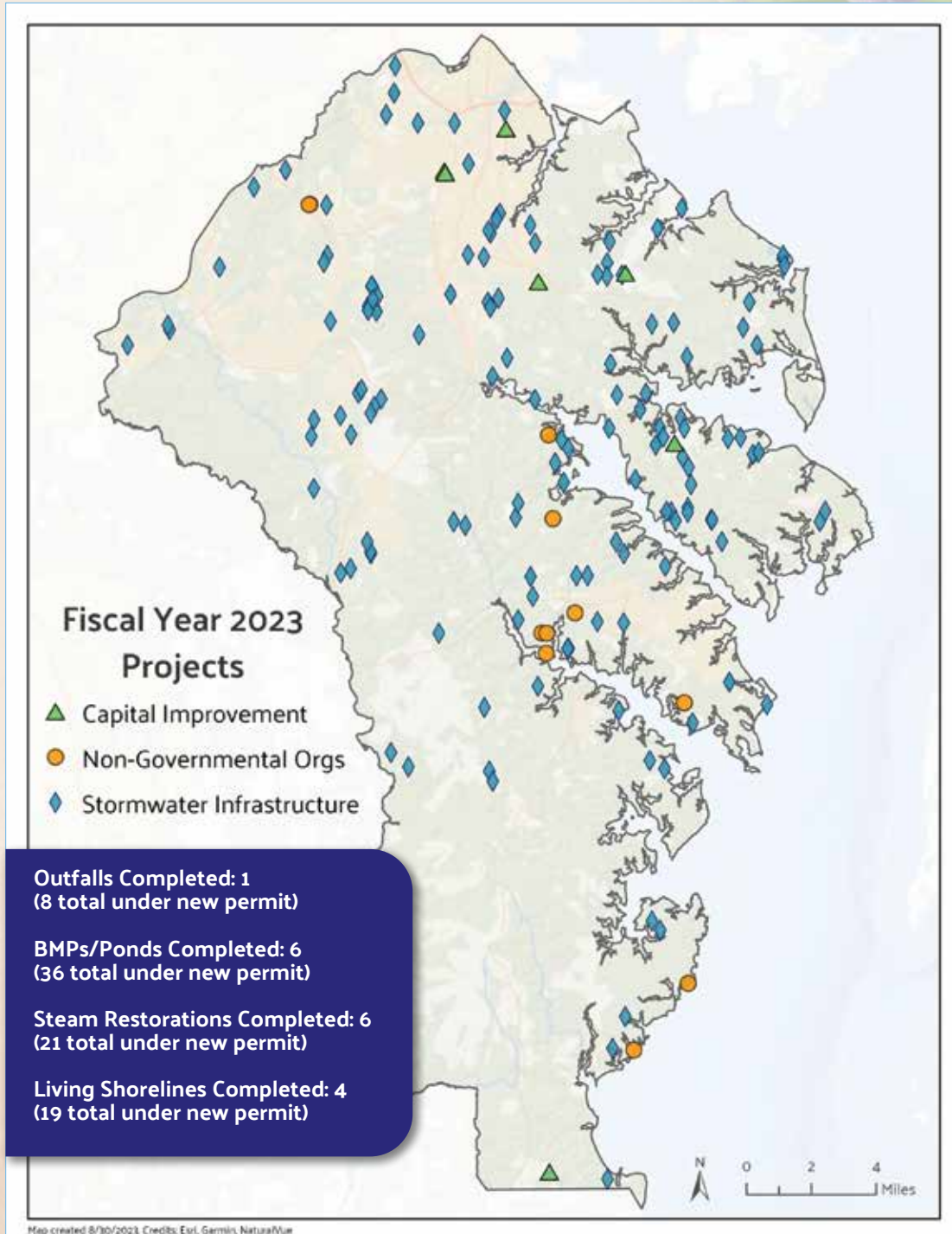


Impervious Acres Treated
2,217 of 2,998 completed

BWPR Restoration Projects Completed in FY23

The following projects were constructed to meet multiple objectives including:

- 🌿 water quality enhancement
- 🌿 improved fish habitat
- 🌿 infrastructure protection
- 🌿 improved riparian functions
- 🌿 improved flood attenuation



More detail on the locations of these projects can be found at aarivers.org using the BWPR Watershed Restoration Projects Viewer.

Highlighted Capital Improvement Project

The Najoles Road (Millersville Post Office) Pond & Stream Restoration involved retrofitting a poorly functioning stormwater pond on the east side of Najoles Road in Millersville, as well as restoring an unnamed tributary to Severn Run located on the west side of the road. Portions of the tributary are located within an SHA drainage easement and continue onto Department of Natural Resources (DNR) land (Severn Run Natural Area) as the system flows west to the confluence with Severn Run. Anne Arundel County partnered with SHA and DNR to complete this project, with all three (3) parties contributing funding. Through the application of innovative and cost-effective techniques, this project accomplished the complementary goals of stormwater management, water quality enhancement, habitat creation, and public engagement.

The drainage area for this tributary to Severn Run is approximately 125 acres, with 63 of those acres flowing to the stormwater pond

before entering the tributary. The design approaches for this site were broken into three (3) reaches based on existing conditions: the upstream stormwater management pond; the first 1,100 linear feet of the stream consisting of very steep canyon-like banks; and the lower 700 linear feet of a broader floodplain valley. Retrofitting the pond included increasing the detention and storage capacity. The first 1,100 linear feet of the stream were restored by grading the tall steep banks and bench slopes, filling some of the incised channels, installing grade controls, and maintaining surface flow to maximize habitat potential. The lower 700 linear feet of the stream were restored using riffle weirs to promote floodplain reconnection. Native emergent and woody vegetation was planted throughout the project to further enhance the habitat complexity. This project reduced pollution loads by 361 tons/year of total suspended sediment, 773 lbs/year of total nitrogen, and 218 lbs/year of total phosphorus resulting in water quality benefits for the Severn

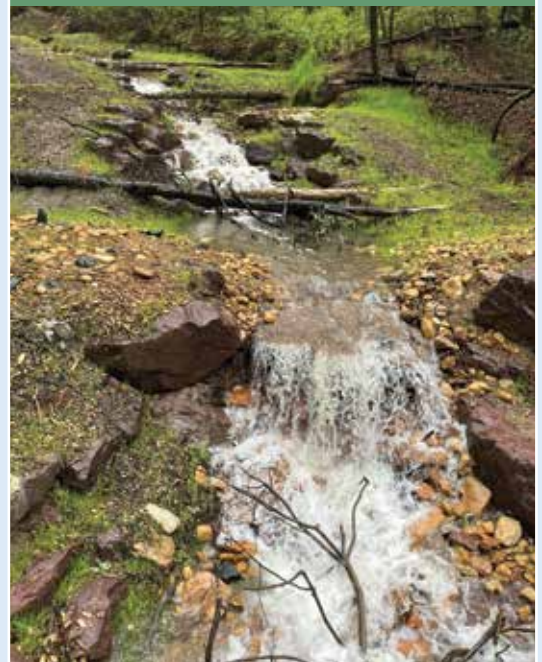
River and Chesapeake Bay watershed.

Along with the water quality benefits, this site has yielded multiple opportunities for public engagement and education. First, a volunteer-led planting event was executed in the spring of 2023, where a team of 15 volunteers planted 1,700 native livestakes in the lower floodplain. Then, our long-time partners at Chesapeake Connections held a 2-week program in the summer of 2023 where AACPS students learned about the importance of protecting our local waterways and executed additional native tree and shrub plantings throughout the site. Most recently in the fall of 2023, a group of six (6) volunteers from the Chesapeake Conservation & Climate Corps program volunteered to install 250 native alder tubelings to encourage beaver activity in the lower floodplain. To learn more about this project, please visit www.aarivers.org.

BEFORE RESTORATION



AFTER RESTORATION



Stormwater Infrastructure Program (SIP)

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 not only keep those assets in good working order but also protect water quality and habitat functions.

The Stormwater Infrastructure Program 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, culverts, and public best management practices (BMPs) throughout the County, as well as address any associated design and permitting requirements. These projects are

normally identified and transferred to the SIP by the Road Operations Division and are scheduled in a worst-first priority order.

Funds from the Bureau of Watershed Protection and Restoration 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.

STORMWATER INFRASTRUCTURE PROGRAM PROJECTS BUDGETED IN FY23	
Culvert & Closed Storm Drain Repair	\$5,167,000
Emergency Storm Drain	\$2,350,000
Storm Drain/SWM Infrastructure (BWPR)	\$1,000,000
TOTAL	\$8,517,000

FY23 STORMWATER INFRASTRUCTURE PROGRAM BWPR CAPITAL PROJECTS	
Council District	# of SIP Projects
1	18
2	33
3	24
4	14
5	34
6	30
7	25
TOTAL	178

SIP & Road Operations Division Milestones

The Stormwater Infrastructure Program is responsible for managing the inventory, inspection, and maintenance of over 1180 stormwater

management facilities that are collectively referred to as Best Management Practices (BMPs). In addition, SIP 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.

2023 MILESTONES	
ACTION	RESULT
BMPs Inspected	553
Curb Miles Swept	6,658
Tons of Litter Collected (Street Sweeping)	443
Storm Drain Structures Cleared	2,168
Linear Feet of Drain Pipe Cleared	48,342
Linear Feet of Ditch Cleaned	39,013
Storm Drains Cleared	4,325



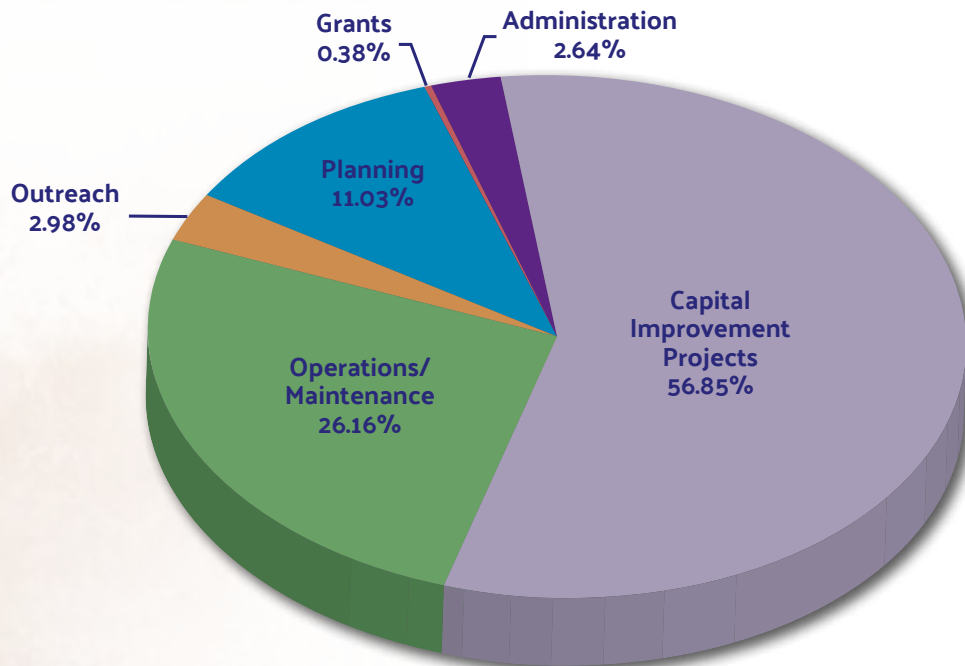
Watershed Protection & Restoration Fund Revenue and Expense Report

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 FY23, the tenth year of implementation for the Watershed Protection and Restoration Fund in Anne Arundel County, Maryland. This report includes expenses incurred beginning July 1, 2022, through June 30, 2023.

Revenues – The Stormwater Fee was first billed on property taxes on July 1, 2013. 223,153 properties in Anne Arundel County were subject to the fee. For FY23, Anne Arundel County received \$26,056,000 in revenues as of June 30, 2023. In addition to the Stormwater Fees, the County received \$1,858,000 in State and Federal grants to fund watershed protection and restoration projects.

Expenditures – Operating expenditures for FY23 totaled \$26,182,000. It should be noted that beginning in FY20, the County has taken a more aggressive approach to debt service. In FY23, the County paid \$12,331,000 out of the total operating expenditures directly toward debt service. Of the remaining operating expenditures, \$6,848,000 was spent on operations and maintenance activities for the County’s stormwater infrastructure. An additional \$2,888,000 was spent on planning for future improvements to these systems.

FY23 Operating Expenditures





Surface Water Monitoring Program

The Surface Water Monitoring Program is responsible for evaluating the in-stream water quality of the County's non-tidal streams and rivers. The program monitors the health and water quality of the County's streams and rivers in a variety of ways and for a variety of reasons, including:

Biological Health – Biological assessments are a highly effective, scientifically validated approach to understanding the overall health and quality of streams. Since 2004, the County has monitored the biological health of its non-tidal waterways for two overarching purposes: to establish a general baseline of knowledge regarding stream health and to compare future conditions over the long term to see if management actions are successful in restoring watershed health to degraded systems.

Fish and aquatic insect communities are the stream

communities the County uses to understand overall stream health. Aquatic insects are somewhat stationary and integrate a whole season of water quality impacts in a way that a single water sample or short series of water samples simply cannot do.

Fish use different kinds of stream habitat and are mobile, providing a different understanding of stream health. Changes in biological communities from their known and well-studied natural condition can indicate impairment in stream health.

BWPR finished its third round of aquatic biological sampling and first County-wide fish community assessment in 2021, providing the first complete baseline of fish distribution across the County and continuing the ongoing assessment of aquatic insect communities performed since the program's inception in 2004. Using this fish distribution

information, BWPR staff produced an atlas of freshwater fishes found in the County, which can be found on the BWPR Ecological Assessment & Evaluation unit's Biological Monitoring webpage. In 2023, BWPR embarked on the fourth round of aquatic biological sampling. This five-year round will provide additional information on fish distribution and allow us to assess the continuing status and trends of the aquatic biological stream resources in the County.

While biological monitoring is one of the County's primary surface water monitoring tools, BWPR also assesses stream and riparian area physical habitat and surface water quality samples in conjunction with biological monitoring, and for project-specific purposes. For more information about the Ecological Assessment & Evaluation Unit, please visit www.aarivers.org.

Monitoring for Restoration Success

To determine if stream restoration projects are meeting their objectives and ensure that funds are spent efficiently, monitoring is sometimes performed on select projects to measure water quality, biological response, and stream valley stability both before and after restoration activities. For example, detailed monitoring to characterize post-restoration conditions is nearing completion in the Cowhide Branch watershed. Here, the stream restoration involved the removal of a large dam, to restore free movement of fish within the watershed, as well as aquatic habitat and stream channel stability restoration. The Cowhide Branch project, completed in 2018, now provides an accessible habitat for fish and attracts waterfowl and other wildlife. In 2021, BWPR staff observed evidence of beavers in the restored area and, shortly thereafter, a beaver dam was

observed within the restored stream reach. Beaver activity is now regularly seen in this watershed.

BWPRs post-restoration monitoring of this project includes water quality, aquatic biological community condition, physical stream stability measurements, in-stream and riparian habitat assessment, and vegetative community monitoring. The physical stability and fish community assessments are also performed in the stream reaches above the restoration reach so the actual level of restored fish habitat can be determined. Nearly five years of post-restoration data have been collected and, with the monitoring period coming to a close in early 2024, a summary report to document project accomplishments will be developed.

A second project currently being monitored for efficacy is the Furnace Branch project. The restoration work consisted of removing a 1960s-era concrete flood channel from its beginning in culverts under Georgia Avenue to its end at the south end of 7th Street in Glen Burnie and restoring a more natural stream and wetland complex. Additionally, a degraded existing natural channel at the end of the floodway was also restored using the same techniques. Water quality data are still being collected and analyzed, but the reach has shown definite improvements in the biological community. Fish populations, for example, have meaningfully improved, going from no species observed in the pre-restoration concrete channel to six species observed in 2022. Assessment work continues at this project.



Illicit Discharge Detection & Elimination (IDDE) Program

BWPR 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). BWPR collaborates with other County agencies that have the legal authority to inspect and enforce any identified illicit discharges. The County screens a minimum of 150 outfalls yearly for dry-weather flow conditions; if dry-weather flow is observed, the discharge is tested for pollutants, and the source of the pollution is investigated. The County's IDDE program has been successful in the identification and removal of a wide variety of sources of pollutants, including illicit wastewater connections, upland pollutant sources, illegal dumping, and spills.

Case Study: Church Creek Sewage Discharge

In April 2022, excessive turbidity in a tributary to Church Creek was reported to the County by a concerned citizen. Upon initial

investigation by Inspections and Permits (I&P) staff, the turbidity was tracked back to a previously unmapped 60-inch outfall near the Festival at Riva and Forest Plaza shopping centers. Further investigation by I&P tracked the source of discharge through the storm drain infrastructure up to the intersection of Riva Road and Forest Drive, where the storm drain system runs underneath Riva Road and was inaccessible at the time.

The County's IDDE consultants (KCI, Inc.) and BWPR staff joined the investigation a short time later. Discharge was again observed at the unmapped outfall, and chemical tests of the discharge showed excessive levels of ammonia, leading the team to suspect an infiltration of sewage into the storm drain system. Discharge was once again tracked back through the storm system to Riva Road. County Bureau of Utility Operations staff were also called to the scene to assist in the investigation and provide traffic control to allow for access to manholes along Riva Road.

Once traffic control was in place, the team removed sewer and storm drain manhole covers along Riva Road. With the help of KCI's

pole-mounted camera equipment, Utilities' staff discovered an antiquated designed overflow pipe allowing the sewer line to divert flow to the stormwater pipe under certain conditions. Utilities' staff also identified a blockage in the sanitary sewer line that was causing sewage to divert to the storm drain system via the overflow device. Utilities promptly removed the blockage in the sewer line and permanently plugged the overflow, preventing any future diversion of sewage to the storm drain system from occurring. Follow-up research revealed that the overflow was originally installed in 1968. Before this discovery, it was believed that no combined sewer overflows had been identified in Anne Arundel County.

This case study highlights the important role that citizens can play in identifying and reporting suspected pollution to our waterways. It also serves as an excellent example of the coordination and cooperation between multiple County agencies in finding and fixing sources of water quality impairment. Through the efforts of all, a 55-year-old potential point source of pollution was discovered and eliminated.



Watershed Restoration Grants

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 partnered with the Chesapeake Bay Trust to create the Anne Arundel County Watershed Restoration Grant Program. This community grant program supports local nonprofit organizations, landowners, and communities in their efforts to restore the County’s waterways through the implementation of greening and water quality projects. Restoration activities funded through the grant program assist Anne Arundel County’s efforts to

meet the requirements of its state and federal stormwater permit and local waterway cleanup plans while simultaneously engaging and educating Anne Arundel County residents in the importance of improving the health of our 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.

For more information about the Anne Arundel County Watershed Restoration Grant Program, please visit www.cbtrust.org.

Below is a list of organizations that were awarded funding from Anne Arundel County for water quality restoration projects in 2023:

ORGANIZATION	PROJECT DESCRIPTION	WATERSHED	FUNDING AMOUNT	MATCH AMOUNT	IMPERVIOUS ACRES TREATED
Girl Scouts of Central Maryland	Camp Whippoowill Shoreline Restoration	Magothy River	\$300,000	\$1,722,858	29.6
Arundel Rivers Federation	Long Point Shoreline Stabilization	South River	\$385,185	\$465,300	45.9
Arundel Rivers Federation	Preserve at Broad Creek Restoration	South River	\$168,742	\$54,500	1.4
Chesapeake Rivers Association (Severn Riverkeeper)	Broad Creek (Belvoir Plantation) Gully and Stream Restoration	South River	\$299,732	\$638,187	12.6
TOTAL			\$1,126,659	\$2,880,845	89.5

Highlighted Nonprofit Grant-Funded Project

Quiet Waters Park, a public park owned by the Anne Arundel County Department of Recreation & Parks that is located in Annapolis in the Harness Creek (South River) watershed, partnered with BWPR to restore 1000 ft of Caffrey Run. The project was managed by Arundel Rivers Federation, designed by Gannett Fleming and Environmental Systems Analysis, Inc. and construction was completed by Meadville Land Service.

This project contributes to the County's waste load allocation goals toward the Chesapeake Bay Total Maximum Daily Load (TMDL) by maximizing the water quality credit potential of the site. Arundel Rivers utilized a valley restoration design approach to arrest both channel and bank erosion, provide pollutant load reductions, and restore the ecological function of the stream. This project reduced

pollution loads by 148 tons/year of total suspended sediment, 338 lbs/year of total nitrogen, and 156 lbs/year of total phosphorus resulting in water quality benefits for Harness Creek and the South River. Given the high-visibility location within a public park that sees over half a million visitors annually, this project serves as an excellent demonstration of an effective stream restoration and stormwater management practice.

This is the first major project in a long-term partnership between the Anne Arundel County Department of Recreation & Parks, the Chesapeake Bay Trust, and the Arundel Rivers Federation to restore degraded streams, increase the resiliency of the park's shorelines, and improve habitat throughout Quiet Waters Park. The stream is near one of the most frequented areas of the park which includes the ice rink, pond,

pagoda, and a hiking/biking trail that crosses directly over this stream. The erosion was actively threatening the structural stability of a pedestrian bridge that is part of the park's trail system. Bank erosion and head cuts caused loss of bank material which threatened the trails and sent pollution downstream. The channel was disconnected from its floodplain throughout the project area, which meant a loss of habitat value and that the land was unable to soak up water as nature intended. With the completion of this project, the stream has been stabilized and the floodplain reconnected, providing invaluable wetland habitat as well as stormwater treatment before the water enters Harness Creek.

To learn more about this project, please visit www.aarivers.org.

BEFORE RESTORATION



AFTER RESTORATION



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 Bureau of Watershed Protection and Restoration continues to provide critical support in connecting Stewards and communities with watershed studies, planning, and restoration efforts. The 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.

Replant Anne Arundel - A County-wide Tree Planting Initiative:

WSA continued the Replant model to implement new tree planting projects across the County in fall 2022 and spring 2023. 4,295 new trees were planted during this project period as follows:

- **Tree Troopers:** WSA continues to partner with the Alliance for the Chesapeake Bay to offer a short course, Tree Trooper Training, for community leaders who want to lead tree projects. Since the fall of 2022, there have been 1,922 trees planted

through the Tree Troopers program. WSA had one Tree Trooper training in the spring of 2023, in which 30 new Tree Troopers were trained. Their projects will be installed in the fall of 2023.

- **Backyard Buffers:** In spring 2023, WSA distributed 1,850 bare root seedlings, provided by the Maryland Department of Natural Resources, to over 90 County Residents.
- **Groves of Gratitude:** Groves of Gratitude distributed a total of 485 trees to over 80 County Residents in Fall 2022.

RePollinate Anne Arundel:

Inspired by the RePlant Anne Arundel Program, and in collaboration with Anne Arundel County Master Gardeners and the USGS Bee Lab, the Watershed Stewards RePollinate Anne Arundel Program grew over 2,600 native plants and distributed them to over 50 different communities in the County in its first year (summer/fall 2022). As of June 2023, volunteers have grown over 4,200 plants for the second year of the program.

Save Our Trees: What started as an enthusiastic group of Stewards, neighbors, and friends working together to save trees from invasive vines is now officially a part of WSA! The mission of SOT is to have immediate and long-term impacts on the removal of English ivy and other invasive vines that are killing off mature canopy trees in Anne Arundel County and the City of Annapolis. Together, with community volunteers, SOT has removed vines from over 1500 trees in the last year! WSA looks forward to working with this

Steward-led initiative to engage communities and complement the organizational mission.

2023 WSA Successes:

- Reached 67,298 Anne Arundel County residents, providing technical assistance or environmental education.
- Planted 27,354 native perennials and shrubs and 4,471 trees for a total of 31,575 plants in the ground. In all, WSA led more than 689 new restoration projects and 259 maintenance events at existing projects.
- Stewards donated 8,730 volunteer hours towards restoration, education, and outreach in their communities
- Removed 740,000+ square feet of invasive species
- The WSA Staff hosted an additional 21 outreach and continuing education events, 2 short courses, and the 15-session Watershed Steward Certification Course (over 120 hours of training and outreach to over 1,100 attendees)

For more information about WSA, please visit www.aawsa.org.



Public-Private Partnership - Full Delivery of Water Quality Improvements Contract

Darcey Lane Outfall Restoration

- Launched in 2016, the County's "Full Delivery of Water Quality Improvements" contract was designed to increase the County's environmental restoration capacity. The contract is structured to help Anne Arundel County meet its federal pollution reduction permits and goals by partnering with the private sector to implement cost-effective restoration projects that reduce runoff. Specifically, the work supports the County's Municipal Separate Storm Sewer System (MS4) and Chesapeake Bay Total Maximum Daily Load (TMDL) permits.

During FY23, the Bureau of Watershed Protection and Restoration awarded \$2 million through its innovative Full Delivery of Water Quality improvements contract for the restoration of an eroding tributary to the Patuxent

River. The winning design-build team, Underwood & Associates, Inc. will undertake the landowner coordination, design, permitting, and construction of the outfall restoration project.

The Darcey Lane Outfall Restoration project, located in Davidsonville, will use the Step Pool Storm Conveyance (SPSC) techniques to restore an eroded channel using a series of berms and riffles to accomplish three goals. At the upstream end, a cobble riffle and berm will create a shallow water wetland on the floodplain. Downstream, the project will create a deep water pond for perennial fish habitat. Downstream the streambed will be raised 10 to 15 feet and protected from erosion to increase water storage volume, reduce peak flow downstream, improve water quality, provide bank stabilization, and create a wetland habitat

for rare and threatened flora and fauna.

The proposed design will create approximately 655 linear feet of stream channel and will restore and provide stream bank stabilization for 555 linear feet of incised bank. Native plantings will augment the project adding additional stability and wildlife benefits. This project will create a sand seepage habitat, which is vital for the rare plants that will be established at this site including Atlantic White Cedar and other bog obligate species.

The full award will only be paid upon completion of the project and verification of the project's benefits, which is anticipated to be completed in the fall of 2024. The County's capital program intends to make an additional solicitation in the fall of 2023.



Anne Arundel County Soil Conservation District

Soil Conservation Districts were formed in response to the Dust Bowl that occurred in the 1930s when eroding land led to dust storms and economic devastation. There was an initiative to form Soil Conservation Districts throughout the country and local landowners made up a Board of Supervisors that could convey to the federal government the needs of the local agricultural community. Each county in Maryland has a Soil Conservation office with Frederick County having two. Though they are in the process of merging into one.

The Anne Arundel District was formed in 1946. Working with agricultural landowners, the District provides guidance as well as engineering services to keep soil and nutrients on the land. The District partners with Anne Arundel County, the Maryland Department of Agriculture (MDA), the Natural Resources Conservation Service (NRCS), and the Southern Maryland Resource Conservation and Development (RC&D) to accomplish its mission. The office houses both state and federal employees, all working

together to accomplish the same goals. The office currently works with approximately 400 agricultural cooperators throughout the County. One of the services the District provides is to develop a Soil Conservation and Water Quality Plan or plans if the cooperator owns or works multiple farms, for each cooperator, that outlines existing and proposed conservation practices on the farm.

Since Soil Conservation Districts have experience with controlling soil on agricultural land, when the Maryland Sediment Control Law was passed in 1970, the state assigned the Districts with the task of reviewing all sediment and erosion control plans for urban development. Thus, the Anne Arundel Soil Conservation District reviews the sediment and erosion control portion of a grading plan that is submitted to the County as well as the sediment control portion of graded plans submitted to the City of Annapolis.

A high-priority mission of the District is to meet the federally mandated Chesapeake Bay Total

Maximum Daily Load (TMDL) by 2025. These goals have been set by the Environmental Protection Agency and reaching these goals in the agricultural community of the County is the responsibility of the Maryland Department of Agriculture. Soil Conservation Districts throughout the state have partnered with MDA to accomplish this task. Districts accomplish this by installing Best Management Practices (BMPs) on agricultural land. There are 125 Maryland BMPs, both agronomic and structural, each having its own standard and specification. One of our more recent tools to combat eroding streams on agricultural properties is Step Pool Storm Conveyance (SPSC) which, until recently, has only been installed on urban sites.

With Anne Arundel County working with the urban community and Soil Conservation working with the agricultural community, we are working together to meet our TMDL goals and thus improve the water quality in the Chesapeake Bay. Learn more at annearundelscd.org.





A LAND OF RIVERS



Anne Arundel County
Bureau of Watershed
Protection
& Restoration

AARivers.org
FY 2023 REPORT

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