



Maryland
Department of
the Environment

**Triennial Capacity Development Report to the Governor
for
MARYLAND PUBLIC DRINKING WATER
SYSTEMS
Calendar Years 2023 - 2025**

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Executive Summary

A key component of the Maryland Department of the Environment (MDE) mission to protect public health and the environment is to ensure safe, reliable, and sustainable drinking water supplies for Maryland communities. Through implementation and enforcement of the Safe Drinking Water Act (SDWA), MDE's Water Supply Program (WSP) works to ensure that public water systems have the technical, managerial, and financial capacity necessary to meet current and future drinking water needs. The SDWA requires states to maintain a capacity development program and to report periodically on its effectiveness. Maryland has implemented an EPA-approved capacity development strategy since 2001, with subsequent revisions to address evolving needs and requirements.

This triennial report summarizes Maryland's capacity development activities and performance for CY23-CY25. Overall, most of Maryland's public water systems continue to demonstrate strong capacity, with substantial long-term improvement in several key areas. The percentage of public water systems maintaining compliance with certified operator requirements rose from 59% at the 2001 baseline to 85% in 2025. Over that same time period, Maryland saw an increase from 43% to 94% of community water systems maintaining emergency response plans. Between CY23-CY25, MDE worked with water systems to resolve 81% of significant deficiencies identified through "sanitary surveys," which are rigorous federally-required and state-executed drinking water inspections.

At the same time, water systems face increasingly complex technical, financial, regulatory, and operational challenges. Between FFY23-FFY25, MDE programmed \$463 million in financial assistance for drinking water infrastructure projects. However, Maryland's drinking water infrastructure needs are estimated at \$14.6 billion over the next 20 years. This challenge is particularly significant for small systems: 72% of Maryland's 460 community water systems serve 1,000 people or fewer, resulting in very small rate bases to support a wide range of capital and operational demands. Major challenges include recruiting and retaining certified operators, implementing new federal requirements to address contaminants like lead and PFAS, preparing for and hardening against risks posed by cyber threats, extreme weather, and other emergencies, and cost of maintaining infrastructure. In addition, small water systems may be more vulnerable to population and economic shifts that can affect both water availability and the financial sustainability of water systems. Population declines can cause fixed infrastructure maintenance costs to be divided among fewer remaining residents, leading individual water rates to increase, while rapidly increasing populations can stress limited supplies of source water. Water systems

across Maryland may also face funding shortfalls for capital improvement projects as the Infrastructure Investment and Jobs Act (IIJA) funds sunset.

Over the last triennial review period, MDE has responded by significantly expanding its own capacity to support water systems, and by pursuing a more proactive and resilient approach to capacity development within water systems. Priorities include strengthening asset management, modernizing the operator certification process, implementing new statutory cybersecurity requirements, expanding emergency preparedness, improving the State's ability to assess financial capacity, and conducting targeted outreach to systems showing indicators of higher risk or lower capacity. WSP is also expanding coordination with technical assistance providers and using compliance, system, and demographic data to identify systems that may benefit from earlier intervention.

These efforts are intended to identify vulnerabilities earlier, direct assistance and oversight where they are most needed, and prevent capacity deficiencies from becoming persistent compliance or public health problems. Recent staffing additions have strengthened WSP's ability to advance this work, although sustained resources remain essential as infrastructure, regulatory, workforce, and technical-assistance demands continue to grow. Together, these measures will help Maryland communities maintain safe, reliable, and sustainable drinking water systems as conditions and requirements continue to evolve.

Introduction

This report has been prepared for the Governor's Office in accordance with Section 1420 (c)(3) of the SDWA and follows previous triennial capacity development reports submitted to the Governor's Office since 2002. It documents challenges and progress related to capacity development and evaluates the State's effectiveness as reflected by inspection and compliance data collected from CY23-CY25. The report will be published on MDE's website.

The SDWA requires that state capacity development programs have two main components:

1. Legal authority to ensure that public water systems (PWS) have sufficient technical, managerial, and financial capacity to meet drinking water standards; and
2. A strategy to identify and assist existing water systems in need of improving technical, managerial, and financial capacity to comply with regulations and public health standards.

A public water system is any facility that serves 25 or more individuals for more than 60 days per year. There are three types of PWS: community water systems (CWS) that serve year-round residential consumers; non-transient non-community (NTNC) water systems that serve recurring consumers and include schools, daycares, and places of employment; and transient non-community (TNC) water systems that serve different consumers each day and include campgrounds and restaurants. Statistics on water systems in Maryland can be found in Appendix A.

Maryland's legal authority for ensuring new water systems have sufficient TMF capacity was established in Code of Maryland Regulations (COMAR) 26.04.01.36 and adopted in 1999. It requires new systems to submit plans for finances, operations, emergency management, staffing, and source water adequacy. Maryland's strategy to improve existing public drinking water system capacity was originally approved by the EPA in 2001, and has been revised several times to meet new requirements and address emerging challenges. Both the regulations for new systems and the strategy for existing systems focus primarily on CWS and NTNC water systems, as they provide drinking water to recurring consumers and have the largest potential impact on public health.

A sustainable and resilient water system relies upon three critical and interdependent components, similar to a three-legged stool: technical, managerial, and financial capacity. Technical capacity encompasses both physical infrastructure (source water, treatment, storage, and distribution) and operator capability, including technical knowledge, formal training, and

continuing education. Managerial capacity includes ownership accountability, staffing and organization, and the effectiveness of relationships with consumers and regulatory agencies. Financial capacity refers to the financial resources of the water system, including credit worthiness, fiscal controls, asset management, and the ability to generate sufficient revenue.

WSP ensures safe drinking water and promotes capacity development through two key regulatory mechanisms: the sanitary survey and the Water Appropriations and Use Permit. A sanitary survey is an onsite inspection of a public water system's water source(s), water treatment plant(s), storage capacity, distribution system(s), water quality test results, and operations and maintenance procedures. Sanitary surveys allow WSP's Engineering & Technical Assistance Division (ETAD) staff to identify significant deficiencies that include TMF capacity shortcomings, as well as acute threats to public safety. WSP ETAD engineers work with water systems to help correct all deficiencies. While sanitary surveys provide a hands-on view of water system health, the Water Appropriations and Use Permit process allows for additional regulatory requirements. All community water systems are required to apply for an appropriations permit which provides a reasonable allocation of water based on the activities of the water user, and the impacts of withdrawal on other users and the environment. The appropriations permit is a vehicle for other permit conditions such as requirements for water audits at larger systems, capacity management plans, and water conservation plans. With these two tools, WSP can implement a wide range of capacity development initiatives at existing systems.

As new issues arise that are not fully addressed by the original capacity development strategy, revisions are made:

- In 2009, the strategy was revised to enhance the State's drought management program, conducting hydrologic studies of both the Fractured Rock and Coastal Plain regions of the State, assisting water systems with developing and implementing capacity management plans and Water Resource Elements for their comprehensive plans, and promoting water systems' use of water conservation technologies.
- In 2017, concern over lead contamination following the Flint water crisis led Maryland to pass House Bill 270, which requires the development of regulations for all public and nonpublic schools in Maryland to test for the presence of lead in each drinking water outlet in all occupied school buildings. The requirements provide another avenue by which WSP can ensure that school water systems are aware of contaminants in their water, increasing their technical capacity. WSP revised its capacity development strategy to include its implementation of this legislation.
- In 2022, WSP incorporated asset management into its capacity development strategy, as required by the 2018 federal American Water Infrastructure Act. The current revision promotes asset management plans during WSP routine sanitary survey process, through

WSP technical assistance partners such as Southeast Rural Community Assistance Project and Maryland Rural Water Association, and through prioritization points on Drinking Water State Revolving Fund (DWSRF) applications.

- By the end of 2027, WSP plans to submit a revised capacity development strategy that will incorporate a series of new initiatives based around the theme of “resiliency.” The revised strategy will include proactive outreach to water systems that may need assistance, new strategies for promoting asset management plans, and initiatives for deepening partnerships with technical assistance providers.

Overall, water systems throughout Maryland achieve high levels of compliance with the SDWA. MDE’s Annual Compliance Report to EPA for CY2025 indicated only 4.8% of SDWA violations in Maryland were for health-based standards, namely maximum contaminant level (MCL) or treatment technique (TT) violations, with the remaining issued for monitoring and reporting violations. Comparatively, the percentage of health-based violations issued by MDE were 3.6% in 2022 and 7.1% in 2019. This demonstrates the diligence of drinking water operators and managers, as well as the effectiveness of WSP. At the same time, remaining challenges require innovative solutions to be incorporated into the strategy.

Current Challenges & Responses

Factors that present capacity development challenges for Maryland water systems include aging infrastructure, lack of certified operators, regulatory changes related to emerging contaminants, shifting population trends, and the need for robust water system emergency response planning.

Infrastructure

Aging drinking water infrastructure is a nationwide issue, and Maryland is no exception. According to the EPA’s *7th Drinking Water Infrastructure Needs Survey and Assessment*, Maryland’s total drinking water capital needs between January 1, 2021, and December 31, 2040, are \$14.6 billion. Although funding from the Infrastructure Investment and Jobs Act (IIJA) covered a portion of these projects, further investment is required to meet future needs. This estimate represents the total cost of installation, rehabilitation, expansion, or replacement projects that are essential for systems to continue providing safe drinking water to the public and does not include routine operating costs. Exceptional periods of development in the mid-20th century produced water infrastructure that is currently reaching or has passed its intended lifespan. Replacement of long-term infrastructure is too often not properly accounted for at smaller systems that do not have the resources to conduct long-term planning and analysis. Addressing these funding needs is essential to maintaining and building TMF capacity among Maryland water systems.

The State provides critical financial support to water systems by administering low-interest loans and grants through the Drinking Water State Revolving Fund (DWSRF). From FFY23 through FFY25, MDE's Water Infrastructure Financing Administration (WIFA) programmed \$463 million million to support 145 drinking water infrastructure projects across Maryland—allocating 51% as loans and 49% as principal forgiveness or grants. The majority of programmed funds during this period were sourced from the federal Infrastructure Investment and Jobs Act. Yet, while this assistance is vital, local water systems must absorb the vast majority of Maryland's estimated \$14.6 billion in required infrastructure capital. Consequently, systems must establish robust asset management and long-term financial plans to ensure infrastructure is replaced cost-effectively and without service disruptions. Deferring routine maintenance and capital upgrades until catastrophic failure only escalates financial expenses, environmental degradation, and public health risks.

WSP will address these challenges through a renewed focus on promotion of asset management. An asset management plan is a living document that tracks the criticality, performance, maintenance, and lifespan of system assets. They are used to make informed financial planning decisions and optimize budgeting and preventative maintenance schedules. Maryland currently promotes asset management primarily through sanitary surveys, prioritization points on DWSRF applications, and training led by MDE-funded partners. In July of 2026, a new workgroup was formed to reassess Maryland's asset management strategy and investigate how to grow asset management practices within the state. Additionally, WSP is studying water rates across Maryland, which will aid in targeted outreach efforts to systems that may have capacity issues as a result of low water rates that do not match the true cost of water.

Operator Certification

Having a certified operator is a critical component of the TMF “three-legged stool” required to run a resilient water system. Complex regulatory changes and advancing treatment technologies require water system operators to obtain and consistently increase their knowledge with additional training. Since 2001, when data was first collected, compliance with the certified operator requirement has increased from 59% to 85% in Maryland. Despite that progress, many water systems currently struggle to provide competitive salaries necessary to attract and retain operators, and are located in rural areas where there are fewer practicing operators. Additionally, water operators are aging, with their median age significantly higher than national workforce averages, according to the 2018 Brookings Institute report, *Renewing The Water Workforce*. While steady progress is being made, Maryland's capacity development strategy must address the greater challenges of the remaining systems without operators, and look towards the next generation of water operators.

The Board of Waterworks and Waste System Operators (the Board) is housed within the WSP and establishes the education, experience, and examination standards for Maryland's operators. The Board is working to address the shortage of certified operators by building an accessible pathway for Class G operator certification. "Class G" refers to a system that does not utilize chemical treatment, and therefore does not require knowledge of chemicals to ensure public health. Many systems without certified operators are Class G systems, and cite the cost and time necessary for certification as the main obstacle. WSP believes that developing a certification pathway tailored to Class G systems will help to reduce administrative barriers and support broader compliance with operator certification requirements across the state. Additionally, the Board is creating an online portal to modernize the certified operator application process and reduce application processing time. These measures are projected for completion in 2027.

Emerging Contaminants

PFAS and other emerging contaminants present a major challenge for even the most well-operated water systems. PFAS are a large group of synthetic chemicals that are used in products, industrial processes, and other applications, and which may enter the environment through a variety of pathways. Because they break down slowly over time they can accumulate in water, land, and organisms. Scientific studies have shown exposure to PFAS is linked to harmful health effects, including some cancers. In 2024, the EPA promulgated a rule setting MCLs for six PFAS substances. PWSs currently have until April 26, 2027 to conduct initial testing and reporting, and until April 26, 2029 to prepare for the enforcement of the MCLs. In 2026, EPA proposed repealing its regulatory determinations on four of the six PFAS substances. WSP aims to assist water systems with navigating federal regulations so they are prepared for long-term financial and technical planning of PFAS remediation projects. WSP expects to receive primacy for EPA's PFAS National Primary Drinking Water Regulation in early 2027.

WSP has taken a proactive approach to assisting systems with PFAS remediation and preparing for future regulatory changes. Beginning in 2020, WSP initiated a five year "PFAS in Public Drinking Water Study," which tested all CWS and NTNC systems in Maryland. WSP then conducted targeted outreach to systems with results over the future MCL, working with them well in advance of federal regulatory deadlines to create remediation plans and explore opportunities for funding. These efforts have assisted many water systems in addressing PFAS in the drinking water supply and preparing for regulatory changes. The Maryland Department of the Environment (MDE) has drafted proposed PFAS drinking water regulations mirroring federal standards, set for publication in the Maryland Register on October 30, 2026, with an expected effective date as early as December 21, 2026 and federal primacy in early 2027. Following implementation, MDE will shift from proactive assistance to active enforcement, beginning with

initial monitoring on April 26, 2027, and full Maximum Contaminant Level (MCL) compliance enforcement on April 26, 2029.

Population Shifts

According to the Maryland Department of Planning, State Data and Analysis Center, the population of Maryland grew by 123,386 between 2020-2025, but the growth was not evenly distributed. Some Western Maryland counties lost residents while some Southern Maryland and Eastern Shore counties gained residents, with annualized growth rates as high as 1.7%. Systems that lose customers often must still maintain the same distribution system while bringing in less revenue, which redirects resources away from upgrades, planning, and innovation. Meanwhile, high population growth, especially in areas utilizing confined aquifers, can strain the health of groundwater sources.

To ensure that growing communities do not exceed their water capacity, WSP continues to require capacity management plans from large systems that are using more than 80% of their allocations granted by water appropriation and use permits. These plans require systems to conduct a quantitative analysis of their current and future water capacity, and allow systems to better understand their own capacity and growth, as well as indicate to WSP which systems require further targeted assistance and/or enforcement actions. Additionally, WSP has set an 80% management threshold for confined aquifers in Maryland and will not issue permits that would reduce confined aquifer levels below 80% of its available drawdown. This threshold ensures that adequate water will be available for Maryland's residents and ecosystems well into the future. For systems that are struggling financially as a result of population loss, WSP continues to advocate for consolidation with larger water systems as a way of reducing the impact of population fluctuations.

Emergency Response

In addition to emergencies caused by aging infrastructure, increasingly severe weather, drought conditions, and cybersecurity attacks present additional challenges for Maryland's water systems, and necessitate stronger emergency response planning. Concerns include source water availability, severe weather events that require emergency response, contamination events upstream from sources of drinking water, cybersecurity attacks on water infrastructure, and increased incidence of harmful algal blooms that result in the presence of cyanotoxins in drinking water. A robust capacity development program requires strategies that encourage emergency response planning, source water analysis, and capacity management to address these challenges.

Senate Bill (SB) 871 - Cybersecurity Planning and Assessments, was signed into law on May 13,

2025, and took effect October 1, 2025. This legislative effort drew heavily from Maryland's 2024 Water and Wastewater Systems Cybersecurity Action Plan, which MDE developed in response to a White House National Security Council request to states. In developing the plan, MDE coordinated with MDEM, DoIT, the Governor's Office of Public Safety and Homeland Security, and CISA. This approach requires 148 community water and sewerage systems to designate cybersecurity points of contact, conduct annual awareness training, implement incident reporting and service disruption planning, and—if serving more than 3,300 customers—adopt Maryland Cybersecurity Standards, commit to a Zero Trust framework, and complete biennial cybersecurity maturity assessments (CMAs). As of September 14, 2026, 143 of the 148 required community water and sewerage systems (97%) have submitted required CMA certifications or have CMAs scheduled with EPA. WSP is working directly with the remaining five water systems to schedule CMAs, and expects to achieve 100% compliance by October 1, 2026. Cybersecurity training is also required for Maryland operator and superintendent license certification. Through its implementation By implementing SB 871, MDE is taking a leadership role in helping water systems prepare for and respond to cyberattacks.

Additionally, MDE adopted COMAR 26.04.01.31, effective July 1, 2026, to strengthen emergency response procedures across public water systems. This regulation expands upon the prior framework governing Boil Water Advisories—public notifications issued when water supply contamination is suspected or confirmed. Specifically, COMAR 26.04.01.31 establishes a formal definition for a drinking water "outage," mandates explicit reporting protocols for system interruptions and flooded groundwater sources, and outlines required response actions during specific emergency scenarios. Establishing clear definitions and reporting protocols is designed to streamline compliance for regulated entities and enhance MDE's emergency coordination across the state. While emergencies cannot always be prevented, quick and efficient responses to them can safeguard public health, and this bill enhances WSP's ability to do so.

WSP promotes resiliency to climate conditions through partnerships with organizations such as the Interstate Commission on the Potomac River Basin, the Susquehanna River Basin Commission, and MDWARN, a mutual aid network across the State. To address harmful algal blooms (HABs) that result from weather events, WSP began a project in 2020 to enhance management in Maryland's drinking raw water reservoirs (pre-treatment). This includes a preliminary assessment to establish baseline levels of toxins resulting from HABs for comparison with future sampling programs. Twenty priority reservoirs were selected in 2020 and sampling was done in July 2021 and late summer 2022. This is in addition to 50+ bloom samples that are routinely tested during HAB season. MDE has continued this effort in CY24 and CY25.

Federal Funding Challenges

Federal funding is vital to MDE's mission of delivering safe, sustainable drinking water to Marylanders. However, the upcoming expiration of Infrastructure Investment and Jobs Act (IIJA) funding represents a significant decline in future capital funding and financing that MDE is able to provide to drinking water systems. In the period of FFY23-FFY25, IIJA funds accounted for more than half of the direct financial assistance distributed to water systems by MDE's Water Infrastructure Financing Administration (WIFA), while also covering key operational costs within MDE through administrative set-asides. Compounding this challenge, recent federal Budget Proposals have recommended dramatic reductions in annual funding for State Revolving Funds. The threat of dwindling, or at least uncertain, federal support arrives precisely as Maryland's water systems face expanding regulatory mandates and infrastructure investment needs.

The Effectiveness of Maryland's Strategy

The effectiveness of Maryland's capacity development strategy is measured through the progress made towards improving the TMF capacity of water systems in the State. Data from the federal Safe Drinking Water Information System (SDWIS), sanitary survey inspection records, and public water system survey responses are used to identify improved performance and areas where additional capacity development efforts are needed.

Since 2001, WSP has circulated a capacity development self-assessment survey to all CWSs every 6 years. Survey questions were initially formulated by a workgroup of representatives from local, state and federal public agencies, and private industry to solicit information about the TMF capacity of Maryland's PWSs. This report uses data from the 2020 survey results. Responses from the 2026 self-assessment fall outside of the timeframe of this report, but are informing WSP's actions moving forward.

Table 1: Data For Assessing TMF Capacity

Data Source	Measure of Capacity		2025	2020	2014	2007	2001
Technical							
Enforcement Targeting Tool (ETT)	Number of ETT systems (CWS & NTNC) at the end of calendar year		12	4	9	NA	NA
Historical Significant Noncompliance ¹	Number of Historical SNC Systems (CWS & NTNC)		NA	NA	NA	37	51
LCR Compliance Data ²	Lead and Copper monitoring violations (CWS & NTNC)		6%	8.4%	13%	<13%	13%
LCR Compliance Data	Lead Service Line Inventory reporting violations (CWS & NTNC)		20%	NA	NA	NA	NA
Sanitary Survey ²	Systems with certified operators	CWS	94%	90%	91%	86%	80%
		NTNC	77%	67%	76%	74%	40%
Sanitary Survey ²	Percentage of significant deficiencies resolved ⁴		81%	80%	97%	90%	67%
Managerial							
Self-Assessment ³	Respondents aware of whether SDWA regulation changes will require additional treatment or equipment		NA	24%	55%	45%	30%
Self-Assessment ³	Service connections metered	Residential	NA	64%	74%	60%	25%
		Commercial	NA	71%	71%	50%	4%
Self-Assessment ³	Systems that can meet average daily demand with largest source out of service		NA	83%	69%	64%	52%
Sanitary Survey ²	Percentage of CWS systems with emergency plan of operation		94%	81%	83%	75%	43%
Financial							
Self-Assessment ³	Average number of years since water rates were changed		NA	3	1	1	4
Self-Assessment ³	Systems with financial records audited annually		NA	75%	90%	78%	53%

¹ Values are from Historical SNC (HSNC) lists. The EPA no longer requires states to submit HSNC lists. This measure has been changed to report EPA's newest measure, the Enforcement Tracking Tool (ETT). This does not compare directly with the number of HSNC systems reported in previous years.

² Data from EPA SDWIS State database.

³ Maryland Department of the Environment staff conducts sanitary surveys of PWS on a regular basis. Frequency ranges from more than once a year to once every five years. The current federal requirement is a minimum of one sanitary survey per system every three years for community systems and once every five years for non-community water systems.

⁴ Referred to as "percentage of major non-regulatory deficiencies resolved" on previous reports

Discussion of Maryland Current Capacity vs. Baseline

Data from Table 1 is used to measure the technical, managerial, and financial capacity of Maryland water systems.

1. Technical Measures

WSP uses the capacity development self-assessment survey results, data from the EPA's Enforcement Targeting Tool (ETT) lists, and data compiled from SDWIS to measure the technical capacity of water systems in Maryland. Overall, Maryland water systems show strong technical capacity and improvement on many metrics since baseline data was collected in 2001.

The EPA tracks systems with significant noncompliance using the ETT. Any system with 11 or more points is considered to be in significant noncompliance. Systems acquire points based on the length violations have gone unresolved and whether they are acute health risks. The ETT data in Table 1 displays the number of unresolved systems on the list at the end of the calendar year. Before the ETT was created, EPA required states to report a list of "significant noncompliance systems." These two reporting methods are not directly comparable, but overall show a general decline in significant noncompliance since baseline data was gathered.

As of December 2025, 12 systems were on the ETT list. All 12 of these systems had at least one Lead and Copper Rule violation, and only two had violations other than lead and copper. WSP believes the increase in ETT systems in 2025 can be explained by the new violations for lead service line inventory reporting under the new Lead and Copper Rule Revisions and will decrease as systems complete these inventories.

Water system monitoring requirements can vary widely from year-to-year and as a result, more violations occur in some years than in others. In CY25, MDE issued seventy lead and copper monitoring and reporting violations that occurred at 59 water systems (6%). Additionally, water

systems had to meet new requirements for the Lead and Copper Rule Revisions (LCRR) in 2024 when they had to complete and submit Lead Service Line Inventories. Under the LCRR, 202 water systems received reporting violations for Initial Lead Service Line Inventory reporting in CY25 (20%). WSP will continue to provide information to water suppliers regarding all Safe Drinking Water Act requirements, provide training opportunities, and give presentations at training events around the State with the goal of ensuring all water systems understand their responsibility for new and existing regulations.

The sanitary survey data shows several metrics of technical capacity such as operator certification and significant deficiency data (Table 1). A properly trained operator is the foundation of a successful water system. Compared to baseline data, Maryland has demonstrated sustained growth in operator compliance. By the end of 2025, 81% of significant deficiencies had been resolved, showing slight growth from 2020, and significant improvement from baseline. These positive compliance trends occurred alongside expanded inspection capacity, routine technical assistance, and targeted training initiatives conducted since 2023.

2. Managerial Measures

Metrics for water system success in the managerial domain are sourced from compliance data and self-assessment survey results. Measures of managerial success are mixed. Compliance data indicates that the percentage of systems with emergency response plans (ERPs) increased from 43% to 94% from 2001 to 2025, respectively. This increase strengthens overall operational readiness during public health emergencies. This progress occurred in conjunction with enhanced regulatory focus on emergency planning and coordination of technical assistance provided by industry partners. At the same time, responses to the self-assessment survey question, “are managers aware if additional treatment or equipment is required because of future Safe Drinking Water Act regulations?” has lowered from baseline (Table 1). Taking this feedback, WSP instituted a strong program for assisting systems with new PFAS regulations, and as new regulations are promulgated, it will consider specific strategies for ensuring a successful rollout.

Other methods for preparing systems for upcoming regulations include training through partners such as the College of Southern Maryland’s Maryland Center for Environmental Training, which receives federal funding for operator training initiatives. In addition, WSP provides routine updates about regulatory requirements to regional partners, including the Maryland Rural Water Association, the Chesapeake Section American Water Works Association, and the Water and Wastewater Operators Association of Maryland, Delaware and DC, who then pass these updates on to operators, superintendents, and decision makers during training classes and at annual conferences.

Another managerial success is the increase in the number of backup water supplies and interconnections, which is one of the key ways managers can contribute to overall capacity. Wells occasionally need repairs that put them out of service, and surface water sources may have flow-by requirements that lead to the system being unable to withdraw during periods of low flow. When systems do not have an adequate backup supply, important maintenance can be deferred, and issues with a source can lead to major and costly disruptions. Maryland systems improved responses from 52% in 2001 to 83% in 2020 when answering the question, “can the system meet average daily demand if the largest source is out of service?” WSP plans to continue growing this percentage by advocating for backup water supplies.

3. Financial Measures

WSP’s main source for measuring financial capacity of Maryland’s water systems is the self-assessment survey (Table 1). There are no financial metrics from compliance data. The WSP is evaluating methods to enhance its assessment of water systems’ financial capacity. In an effort to accomplish this, WSP is currently revising its asset management promotion strategy, which considers infrastructure criticality and lifetime, to better assist Maryland water systems in making informed financial planning decisions. Growing awareness of the lack of financial health data—coupled with expanded WSP staff capacity—provides an important opportunity to broaden financial analysis of water system capacity.

The 2020 survey results show that, compared to baseline, water rate updates and financial audits are occurring more frequently. 75% of surveyed water systems performed an annual independent financial review in 2020, an improvement over the 2001 baseline of 53%. Additionally, there has been a decrease in the average number of years since rates were changed between 2020 and baseline. Despite this progress, further improvement is needed. Overall, the financial data indicates the need for more research and an increased focus on the financial health of water systems.

WSP has taken initial steps to address this gap in financial health data. While its results fall outside the reporting period for this document, the updated 2026 self-assessment survey incorporates expanded financial metrics to provide a more comprehensive evaluation of water system fiscal stability. Financial questions comprise a larger proportion of the 2026 assessment compared to previous iterations and feature standardized multiple-choice formats to facilitate quantitative data analysis. The revised survey also introduces targeted questions on core financial health topics, including asset management. Beyond the self-assessment, WSP is evaluating methods to collect financial health indicators more routinely, such as integrating financial screening into the sanitary survey process. While historical capacity development efforts

prioritized technical oversight, expanding focus across all three TMF domains provides a more comprehensive framework to support long-term system sustainability.

Additional State Measures:

WSP experienced staffing shortages over the period of 2018-2024, but has filled many positions since then, and this has allowed WSP to pursue various initiatives to promote resiliency. This includes conducting proactive capacity development outreach, expanding emergency preparedness efforts, and targeted enforcement and compliance assistance.

The additional staff allowed WSP to assemble a cross-divisional workgroup in 2025 to begin revising Maryland's capacity development strategy. This resulted in the expansion of the Capacity Development Coordinator role, which now conducts outreach to systems based on various sources of data including the scores from the capacity development self-assessment survey, system age, environmental justice score, history of SDWA violations, significant deficiencies, and ownership type. All factors are given a point value and CWSs with high points are prioritized for outreach. This targeted outreach and point system is part of WSP's new capacity development strategy. The Coordinator works with systems on a voluntary basis to address capacity deficiencies, connect systems with technical assistance providers, provide resources and information, and ensure continued support. This proactive approach prevents future SDWA violations through early intervention and proactive planning, establishing a balanced framework that supports long-term regulatory compliance.

Additionally, WSP has incorporated cybersecurity and emergency response into our top priorities. With increased staffing, WSP has increased our ability to develop guidance, conduct outreach directly with struggling systems, and promote training around cybersecurity and emergency response. It has also allowed the WSP to revise and improve the processes for regulatory requirements such as water audits and water loss reduction plans, conduct research on important areas of focus such as water rates across the State, and build stronger relationships with partner organizations across Maryland.

In late 2025, WSP's newest division, the Compliance and Oversight Division, began targeting high-scoring Enforcement Targeting Tool (ETT) systems with escalating enforcement and specialized compliance assistance. Because many of these systems face complex, multi-violation and system capacity challenges, they require the dedicated time and focused oversight that this division now provides. Early results show a reduction in the average duration systems remain on the ETT list. Additionally, WSP plans to expand this division to focus more resources for technical and compliance assistance. Because these initiatives launched in late 2025, their full

impact will be more comprehensively reflected in 2026 compliance data.

Additional Priorities

In addition to continuing the capacity development-related activities described throughout this report, WSP is taking the following steps to further improve water system capacity:

- **Submit an Updated Capacity Development Strategy:** Formalize and submit a revised state capacity development strategy to the EPA, detailing proactive system outreach, enhanced asset management promotion, and newly integrated cybersecurity standards.
- **Execute Targeted Outreach for Vulnerable Systems:** Deliver tailored, early-intervention support to resolve operational issues prior to non-compliance at vulnerable systems.
- **Modernize Operator Certification Oversight:** Launch a web-based portal to streamline operator certification processes for customers while improving compliance oversight of non-compliant water systems.
- **Expand Technical Assistance Partnerships:** Deepen collaborative frameworks with state training organizations and technical assistance providers to align industry resources with highest-priority system needs.
- **Deliver Regulatory Implementation Support:** Provide comprehensive training and technical guidance to help water suppliers navigate newly enacted and upcoming state and federal drinking water standards.
- **Maintain Real-Time Drought Monitoring:** Continuously evaluate statewide hydrologic conditions and provide timely public updates via the Maryland Department of the Environment's (MDE) drought information platforms.
- **Promote All-Hazards Emergency Preparedness:** Assist water utilities in developing robust emergency response protocols to maintain operational continuity during extreme weather events, physical disruptions, and cybersecurity threats.
- **Transition PFAS Oversight to Enforcement Readiness:** Maintain proactive PFAS monitoring and public communication support while transitioning internal frameworks toward future regulatory enforcement and capital funding allocation.
- **Codify Harmful Algal Bloom (HAB) Guidance:** Finalize state-level HAB response policies and operational guidance to assist water suppliers in detecting and mitigating cyanotoxin risks.
- **Establish a Dedicated HAB Response Sampling Framework:** Transition HABs sampling project into a response sampling program
- **Foster Intra-Agency Programmatic Alignment:** Strengthen interdisciplinary collaboration across divisions within the Water and Science Administration to streamline regulatory, planning, and funding initiatives.

- **Advance Lead Service Line Inventory Completion:** Provide ongoing technical support and compliance monitoring to ensure public water systems complete and verify their lead service line inventories.

Conclusion

The findings in this triennial report demonstrate that Maryland public water systems maintain a strong foundation for TMF capacity. Through routine sanitary surveys, training, outreach, targeted assistance, and persistent regulatory enforcement, Maryland ensures that water systems comply with drinking water regulations and have the resources they need to be successful. Particular areas of success include higher rates of emergency response plans, resolved significant deficiencies, and improved compliance with certified operator requirements. Additionally, increased staffing has allowed WSP to improve processes and optimize our use of resources. WSP will build on this progress through a more proactive, data-driven approach that identifies higher-risk systems earlier and targets assistance, oversight, and enforcement where they are most needed.

Despite these achievements, water systems face an evolving landscape of complex, interconnected challenges. Aging infrastructure, an aging population of certified operators, and the financial pressures of population shifts all strain system capacity. Furthermore, emerging contaminants like PFAS, cybersecurity threats, and increasing severe weather events require water systems to adapt beyond standard operational routines. A growing area of focus is the financial health of water systems, with the understanding that the root of many technical and managerial issues is lack of funding.

Moving forward, WSP will address these vulnerabilities by continuing to implement a proactive, multilayered model for capacity development and a program-wide emphasis on resiliency. Backed by expanded staff capacity, WSP will prioritize data-driven, targeted outreach to high-risk systems, improving operator certification pathways, ensuring robust emergency response planning among water systems, and promoting asset management. Furthermore, the Program will actively support water systems navigating new regulations and emerging contaminants. Deepened partnerships both within the Department and across the drinking water sector will drive long-term resilience. Through these coordinated initiatives, WSP continues to advance its core objective of ensuring safe, reliable, and sustainable drinking water for all Maryland communities, now and in the future.

<i>Appendix A: Drinking Water Statistics</i>								
	2025	2022	2019	2016	2013	2010	2007	2004
Population of Maryland	6,265,347	6,164,660	6,045,680	6,016,447	5,928,814	5,773,552	5,618,344	5,558,058
Individuals served by community water systems	5,521,651	5,489,287	5,370,003	5,107,864	5,057,350	4,989,406	4,844,668	4,846,923
Percent of population served by community water systems	88%	89%	89%	85%	85%	86%	86%	87%
Percent of population served by individual wells	12%	11%	11%	15%	15%	14%	14%	13%
Number of public water systems	3,184	3,245	3,251	3,295	3,396	3,432	3,533	3,692
Number of community water systems	460	464	463	464	474	473	486	502
Number of non-community non- transient community water systems	544	546	541	532	544	550	559	576
Number of transient non-community water systems	2,180	2,235	2,247	2,299	2,378	2,409	2,488	2,614
Number of systems using surface water (includes purchased water)	125	89	74	65	60	59	69	66
Number of systems using only ground water	3,059	3,156	3,177	3,230	3,336	3,373	3,464	3,626

Appendix B: Capacity Development Case Studies

The following case studies provide some insight into the ways in which WSP continually works with water systems to improve their TMF capacity.

1. Christmas Tree Farm Trailer Park

Bacteria Violations / Low Capacity

St. Mary's County

CWS Population: 100

Christmas Tree Farm Trailer Park is a small, underserved, and historically disadvantaged community that faced significant challenges with water quality due to negligence, lack of resources, and the absence of a certified operator. For years, the system reported multiple positive Total Coliform (TC) and *E. coli* (EC) test results, indicating persistent contamination issues.

With assistance from the Maryland Department of the Environment (MDE), the community undertook a comprehensive effort to transform its water system. This included adhering to state compliance requirements and implementing critical upgrades, such as the complete reconstruction of the well, well house, and surrounding area. Potential contamination sources, including pet cemeteries, heavy machinery, and improperly disposed chemicals, were identified and removed. As of March 19, 2024, the system now has a certified operator.

The system also began properly chlorinating its water supply and ensuring the safe storage of treatment chemicals. These changes, along with the establishment of standard operating procedures (SOPs), have resulted in consistent water treatment. Since these improvements, the system has not recorded any positive TC or EC results. Additionally, the community has demonstrated proactive communication with MDE and now has a strong understanding of the requirements for maintaining compliance as a Community Water System (CWS).

2. Crow's Nest Lodge and Campground

Water System Termination

Frederick County

CWS Population: 50

The Crow's Nest Lodge and Campground was originally a transient water system (TNC); however, MDE reclassified the system as a CWS in 2010 when the County Health Department discovered residents were living in the trailers year-round. Because of this, Crow's Nest did not go through the regular capacity requirements for a new water system. As a CWS, MDE

documented water quality complaints and numerous deficiencies for operator certification, operations, and monitoring/ reporting. When the water system did not resolve deficiencies in a timely manner, MDE issued violations in FFY23-24, but the deficiencies were not resolved. The water system owners publicly stated in a local newspaper press release that they were unable to afford the corrective actions needed to return to compliance. The residents were forced to relocate and the CWS, a private business, closed in May 2025.

This case study, with its unfortunate conclusion, highlights the importance of technical, managerial, and financial capacity for water system sustainability. Technical failings included lack of a certified operator and operational processes; managerial failings included an unresponsive owner and disregard for regulatory requirements to protect public health; and financial failings may have included a lack of revenue or indifference to infrastructure investment. The unique history of this water system showcases how the framework for ensuring technical, managerial, and financial capacity for new water systems is critical to provide safe drinking water. In this case, the reclassified water system did not have the capacity as a CWS and ultimately failed.

3. West Nottingham Academy

PFAS issues

Cecil County

CWS Population: 250

Sampling conducted under MDE’s “PFAS in Drinking Water Study” in 2021 identified elevated levels of contamination in two wells serving West Nottingham Academy, with PFOA detected up to 18.73 ppt and PFOS up to 55.8 ppt. These exceed the upcoming MCLs of 4.0 ppt for PFOA and PFOS, enforceable in 2029. The WSP proactively reached out to the Academy to provide guidance and resources for determining the preferred approach to PFAS remediation. The WSP conducted site visits to discuss the options and maintained regular communication.

The Academy was interested in exploring funding for planning, design, and pilot testing for treatment alternatives, however WSP provided technical guidance regarding long-term remediation alternatives, identifying regional interconnection as a sustainable option. The WSP provided information and guidance on the Drinking Water State Revolving Fund (DWSRF) and its PFAS/Emerging Contaminants funding. In 2025, the Town of Rising Sun annexed the Academy into the city service area and applied to the DWSRF to finance the interconnection with the Town water system. A total of \$6,708,345 was awarded to the project in FFY25, with the majority of funds being emerging contaminant grants or principal forgiveness. WSP will continue monitoring the situation until the consolidation is complete.

4. Briercrest Apartments

PFAS/Interconnection

Frederick County

CWS Population: 45

Briercrest Apartments is a privately owned apartment building with only one well. PFAS samples were collected from this system by MDE in October 2021, and detected PFOA at 25.7 ppt, PFOS at 4.15 ppt, and PFHxS at 142 ppt. The WSP discussed options with the system to protect their residents. As this is a very small community system that relies on a single well, the WSP reached out to the Frederick County Division of Water and Sewer Utilities to suggest interconnection with New Design, one of the County's largest water plants. The County applied for the DWSRF to interconnect during the 2023 round of funding. They received \$121,178, completed the interconnection in October of 2025, and Briercrest Apartments has officially consolidated with a larger water system.

5. Springview MHP

Frederick County

PFAS Interconnection

CWS Population: 70

Springview Mobile Home Park is a privately owned community water system consisting of one well. PFAS samples were collected from this system by MDE in September 2021. PFOS and PFOA were detected at 89.91 ppt and 23.41 ppt for a total PFOS+PFOA concentration of 113.41 ppt. The WSP discussed possible treatment options with the system owner. Similar to Briercrest Apartments discussed above, this is a small system with only one well. Again, the WSP reached out to the Frederick County Division of Water and Sewer Utilities to suggest interconnection with the New Design water system. The system applied for DWSRF funding during the 2023 round of funding, received a loan, and completed consolidation with the New Design water system in 2026.

6. Naylor Mill Mobile Home Park

PFAS/Interconnection

Wicomico County

CWS Population: 180

Naylor Mill Mobile Home Park in Salisbury, MD is a small community consisting of two wells and chlorine addition for disinfection. As part of MDE's PFAS study, MDE detected elevated PFAS levels at point of entry with PFHxS at 43.6 ppt, PFOS at 83.6 ppt, and PFOA at 4.71 ppt. The water system collected their own raw water samples from each of their wells and determined

the elevated PFAS was coming from just one of the wells. The system took that well out of service since they are able to meet demand with just one well. In October 2022, WSP began having discussions with Naylor Mill about their options for PFAS remediation and funding opportunities through MDE. WSP encouraged interconnection with the City of Salisbury's water system nearby and coordinated meetings with each of the systems to discuss logistics and concerns each of them had. The City of Salisbury applied for FFY 2023 DWSRF funding for an interconnection on Naylor Mill's behalf to extend their water service to them, and was awarded \$4,874,910 through the Bipartisan Infrastructure Law (BIL). Construction is expected to be completed in 2027.

7. Pocomoke City

CIPP Lining For Distribution Mains (WIIN Grant)

Worcester County

CWS Population: 4,100

Pocomoke City is a small, underserved, and disadvantaged community that has poor water quality with a high level of rust. The system experiences rust and corrosion problems caused by iron bacteria. The City has maintained an ongoing flushing program accompanied by periodic super chlorination of the entire distribution system.

The City was awarded a federal Water Infrastructure Improvements for the Nation Act (WIIN) Grant to fund a project that consists of cleaning, inspecting, and lining 8,725 feet of 6-inch water main on Market Street using cured-in-place pipe (CIPP) technology. The majority of pipes being replaced are unlined cast iron pipe. A combination of the pipe material and water age has resulted in higher-than-average iron levels that produce taste and odor complaints and may be contributing to the elevated disinfection byproduct concentrations. This has been an ongoing issue for several years. City operators flush hydrants regularly to prevent high concentrations of iron from forming, which results in significant amounts of wasted water. The water audit shows that they lose about 51% of water produced. While progress has been made, WSP continues to monitor the system to ensure that upgrades have addressed water quality issues.

8. Independence Village

Water Outage

Charles County

CWS population: 88

Independence Village is a small community water system with 23 connections serving about 88 people and is operated by a small home owners association. The water system consists of one old well drilled in 1973, chemical disinfection, and two 2,000 gallon hydropneumatic tanks. Funding

was procured from MDE about 20 years ago for some water plant improvements.

In July 2022, the WSP was informed of a water outage lasting several days due to well failure and program staff conducted a site visit. The community brought in hauled water by tanker until a well driller was able to evaluate the issue. The WSP approved a Boil Water Advisory until the well was repaired, chlorinated, and negative bacteria results were obtained. The system's certified operator quit during this event and the WSP connected the water system to an operator from a nearby town. The system was also referred to Maryland's technical assistance providers to seek funding as the well and water system are both deteriorating. In 2025, the system applied for DWSRF funding and was approved for a \$2,600,000 loan. However, they are still exploring other funding options with less financial burden on the community, as this is a large loan for a community of this size. MDE is working with the system to explore alternatives, such as grants.

9. Town of Perryville

Complaints of Discolored Water

Cecil County

CWS Population: 4,390

WSP received a complaint from a resident in August 2023 regarding ongoing discolored water. In response, WSP contacted the water system to investigate the issue. The Town acknowledged they receive multiple complaints from the same area and have taken several actions, including flushing fire hydrants, visual inspections of water towers, and reviewing water readings, all of which indicated water quality within acceptable ranges. They also consulted with a third-party engineering firm to conduct a water quality study to help them identify and address any water quality issues. Flushing the distribution system through hydrants is part of their efforts to improve water quality.

Despite these efforts, a resident filed another complaint about persisting discolored water. MDE expressed concern over the recurring problem and inquired about ongoing maintenance and the water quality study's potential impact on water discoloration. The town stated that they flushed water mains and hydrants, cleaned the Pilot water tower, and were initiating a water quality study to determine the cause of the issues. MDE applied for a Federal Water Infrastructure Improvements for the Nation (WIIN) Grant on behalf of the Town, and \$422,000 was awarded to them in November of 2025. This project is ongoing but has already resulted in key upgrades to the system.