

Local Government Advisory Committee

September 24, 2026

Wastewater 101: Overview of Wastewater Treatment

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AQUALAW

Agenda

- 💧 **New Presidential Chesapeake Bay Executive Order**
- 💧 **Past: Wastewater Treatment Plants**
- 💧 **Present: Bay Progress**
- 💧 **Future: Sector Challenges and Opportunities**
- 💧 **Questions and Discussion**

An aerial photograph of the Chesapeake Bay area, showing the intricate coastline, numerous islands, and the surrounding land. The water is a deep blue, and the land is a mix of green and brown. The title is centered over the bay.

CHESAPEAKE BAY EXECUTIVE ORDER

Executive Order (E.O.)

Providing Meaningful Water Quality Improvements Through Collaboration and Oversight of Federal Support

~ Issued on Sept. 16, 2026

Repeals President Obama's 2009 E.O.

- ~ *Chesapeake Bay Protection and Restoration*
- ~ Created a Federal Leadership Committee to coordinate participating federal agencies
- ~ Also, a wide range of other issues (e.g., climate change)
- ~ Repeal is meant to remove “unnecessary administrative costs” and direct resources instead to targeted water quality improvement

Stormwater Management Fees

E.O. Signals Disapproval of Fees

- ~ As an affordability issue
- ~ “In some instances, this lack of clarity has led to harmful impacts on affected Americans. For example, many localities have implemented stormwater management fees, commonly referred to as “rain taxes” that impose hundreds of dollars in annual financial burdens on residents and small businesses...with little to no measurable benefits...”

EPA Directive

- ~ Work with Bay States and DC
 - ~ “assess the additional financial burdens placed on residents of these jurisdictions” by SWU fees
 - ~ Explore ways to promote health of Bay without increasing costs on residents
 - ~ “take measures to encourage the repeal or rescission of stormwater management fees”

Other Directives



Specific Federal Agencies Listed

- ~ Secretary of War, Secretary of the Interior, Secretary of Agriculture, Secretary of Commerce, Secretary of Homeland Security, EPA Administrator



Review Funding

- ~ “assess the current support” provided and “focus any resources-fiscal or personnel- on more direct, on-the-ground projects, in areas of highest need, that would result” in water quality improvements
- ~ Redirect funding “away from activities that do not generate measurable progress towards stated goals, to implementation of projects that will directly reduce nutrient and sediment run-off into the Chesapeake Bay and its tributaries”

Point and Counterpoint: White House Fact Sheet

“The Order rescinds the outdated and misguided Obama Administration 2009 Executive Order 13508, withdrawing its vague and confusing federal requirements that have been leveraged in support of stormwater management fees, or “rain taxes,” imposed by States or localities that unnecessarily raise costs for American households.”

“Federal programs and resources for protecting the health of the Chesapeake Bay need to appropriately prioritize and focus on projects that will result in the most direct and impactful water quality improvements for the Bay. With continued investment and improved coordination, the Federal government will better complement and support effective State, local, and private sector investments, resulting in the most targeted and efficient use of taxpayer dollars.”

Point and Counterpoint: Mayor of Annapolis

“Today we learned that environmental policies put in place 15 years ago to protect the Chesapeake Bay were revoked by the Trump Administration. The environmental health of the Chesapeake Bay, and local tributaries that feed the Bay, is **not open for debate**; it is not a policy preference that can be dialed back by Executive Order. For Annapolis, **protecting our waterways is a core duty** to our residents, the local economy, and the future that we hand to the next generation.” Mayor Jared Littman

Observations

Stormwater Funding is Critical

- ~ Municipal separate storm sewer system (MS4) permits are expensive, failure to comply carries serious potential enforcement consequences
- ~ See slides below (EX of MD restoration, ongoing inspection and maintenance costs)

Stormwater Utility Fees Are a State and Local Issue

- ~ An E.O. cannot repeal local fees that are authorized by state law
 - ~ EX: VA Code §15.2-2114 & MD Code ENV. §4-202.1, §4-204
- ~ Stormwater utility fees are not the only stormwater management fees localities charge

Federal Agencies

- ~ Often very difficult to get federal facilities to pay local fees
- ~ E.O. validates these complaints

MD Restoration Costs (Alone, No Other MS4 Program Costs)

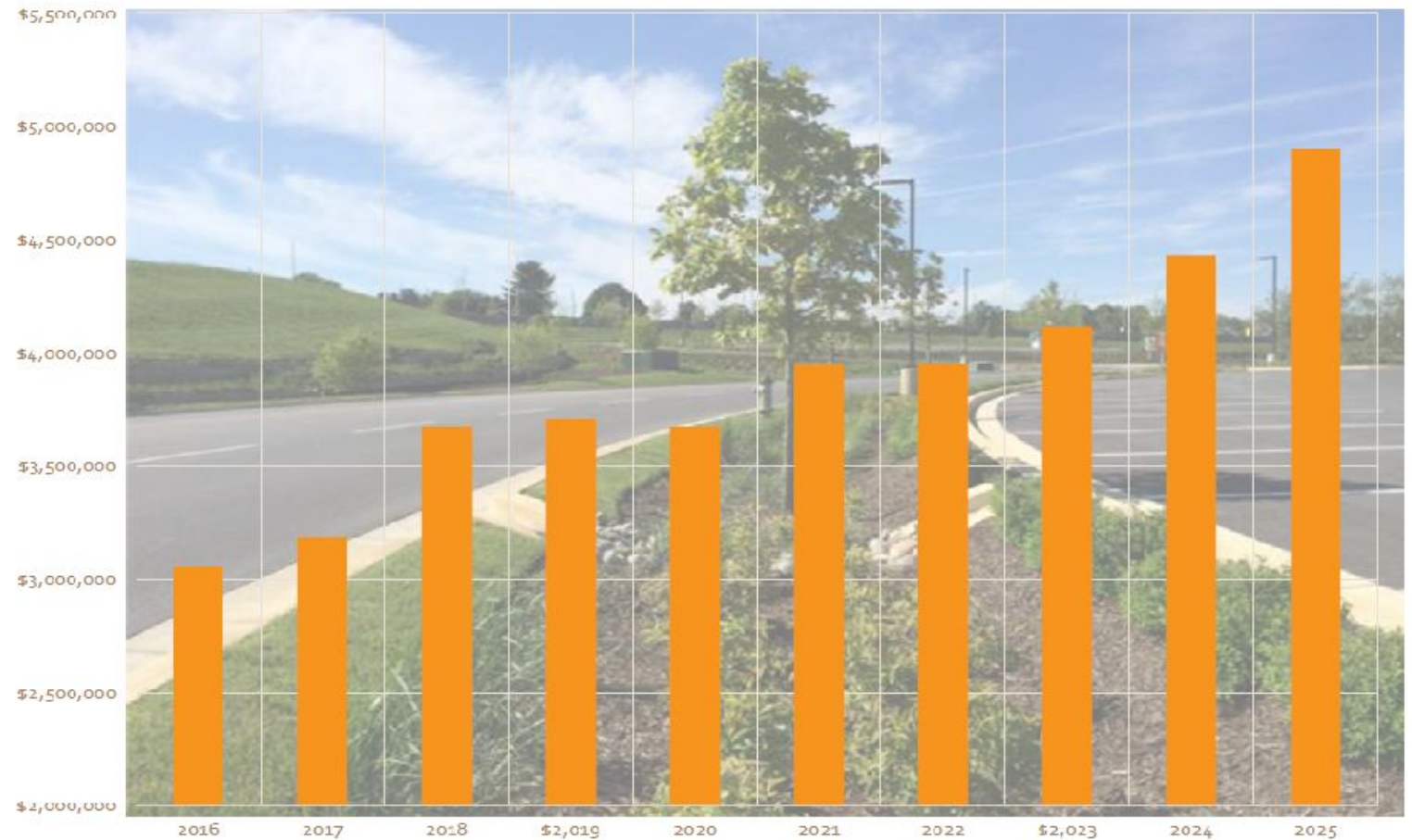
PERMITTEE	RESTORATION TOTAL	O&M TOTAL
Anne Arundel Co.	\$163.7 M (FY 22-27)	\$126.1 M (FY 22-27)
City of Baltimore	\$225 M (FY 22-27)	\$127.5 M (FY 22-27)
Frederick Co.	\$68 M (FY 23-28)	\$70.6M (FY 23-28)
Harford Co.	\$71 M (FY 23-28)	\$128M (FY 23-28)
Montgomery Co.	\$105.6M (FY 24-27)	\$100.6 M (FY 24-27)
Prince George's Co.	\$205.7 M (FY 23 – FY 27)	\$145.1 M (FY 23 – FY 27)

Inspection & Maintenance Obligations

Montgomery County's Stormwater Management BMP Inspection Costs

- More than 9,000 inspections in FY24 (including re-inspections)
- Inspection have increased significantly since due to influx of ESD BMPs
- FY25 Inspection cost: \$4,899,261
 - Above Ground (Structural): \$885,144
 - Above Ground (ESD): \$2,772,941
 - Underground: \$1,241,177

10 Years of SWM BMP Inspection Costs



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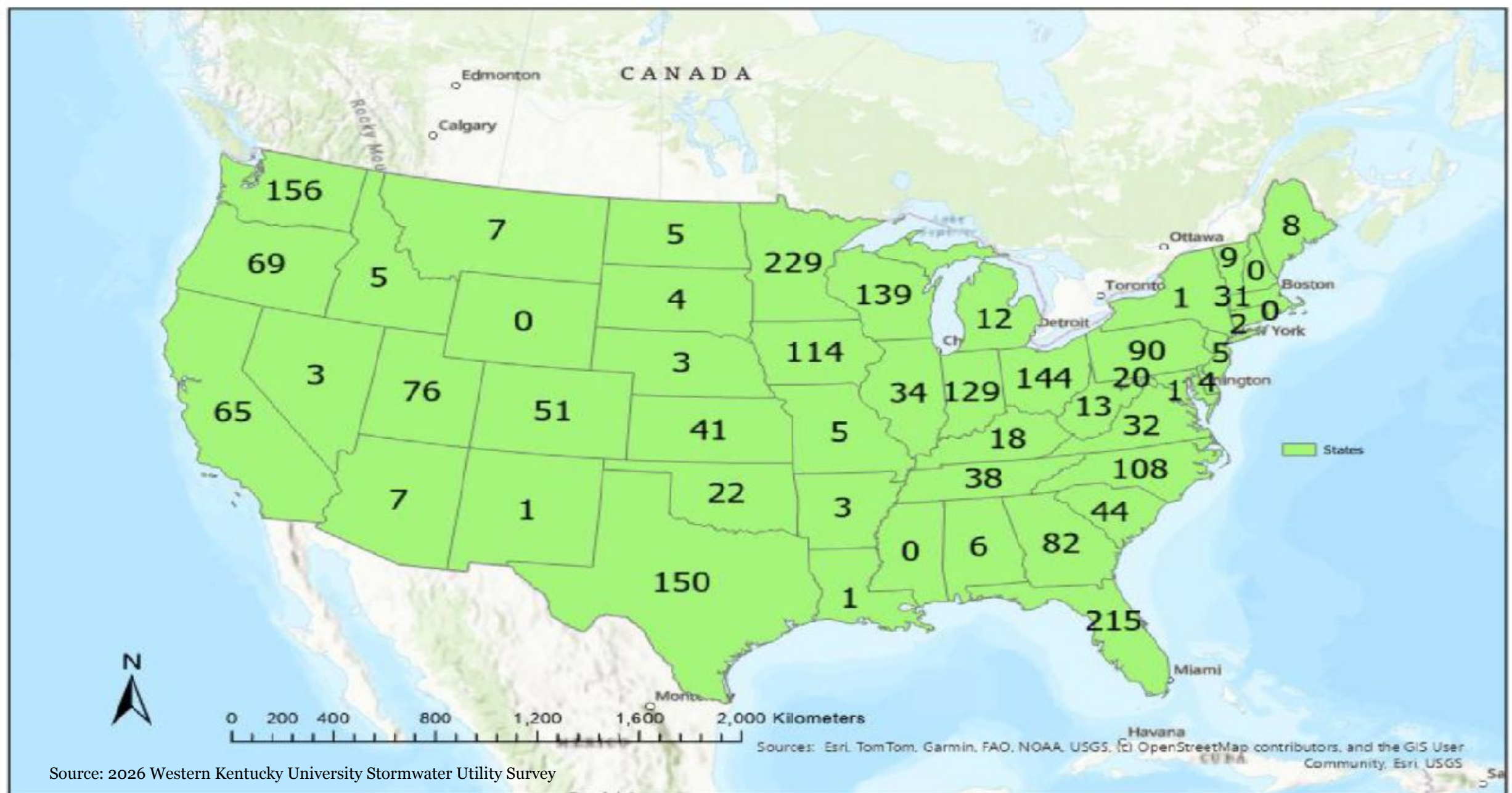
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Back to 2012?

- **Controversy in MD re the “Rain Tax”**
 - In response to General Assembly bill imposing local fee requirement
 - Opponents used the Morton Salt girl to argue against HB 987
 - The “shall” from 2012 law became “may” in 2015
- **New E.O. Raises Stakes Again**
 - Fees may face scrutiny even outside of the Bay Watershed
 - ~ 2,200 localities have fees across U.S.



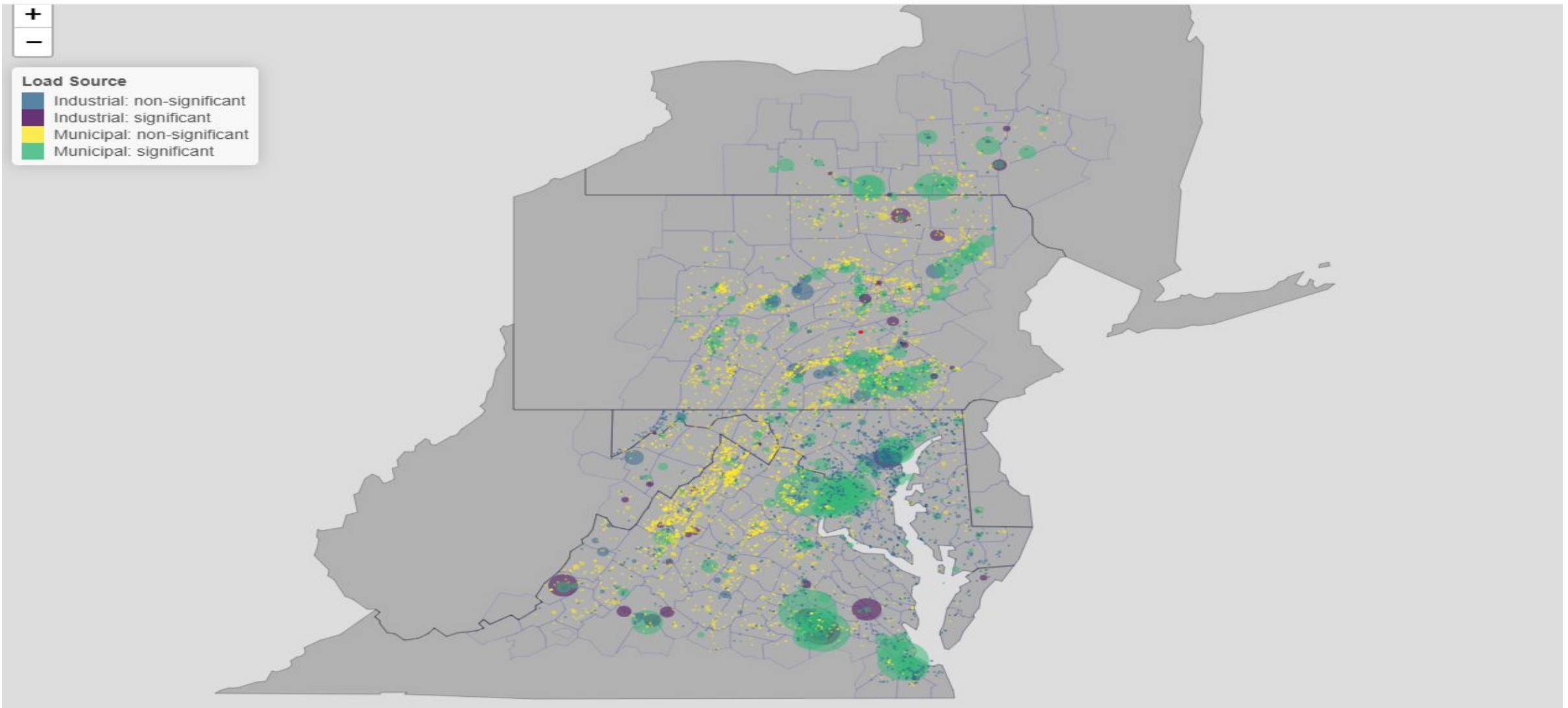


Stormwater Utilities by State 2026

An aerial photograph of a coastal bay, likely San Francisco Bay, with a city skyline visible in the background. The water is a deep blue, and the land is a mix of green and brown. The text is overlaid in the center of the image.

THE PAST: THE ROLE OF WASTEWATER TREATMENT PLANTS IN BAY CLEAN-UP

Where Are the Wastewater (WW) Plants in the Bay Watershed?



WW Plants Were First Out Of The Gate



STORIES OF PROGRESS IN ACHIEVING HEALTHY WATERS EPA Region 3 Water Protection Division

Wastewater Out Front in Bay Restoration

Chesapeake Bay Watershed • June 23, 2016

Clean Water Act programs administered by EPA and the delegated states have played a central role in the success of the wastewater sector in effectively meeting nutrient limits in the Chesapeake Bay “pollution diet” a decade early.

State & Local Commitment to WW Nutrient Upgrades

Caps on Nutrient Discharges

- ~ Bay TMDL (2010) & Watershed Implementation Plans (WIPs) establish nutrient allocations for Wastewater Treatment Plants (WWTPs)

States Provide Partial Grants for Upgrades

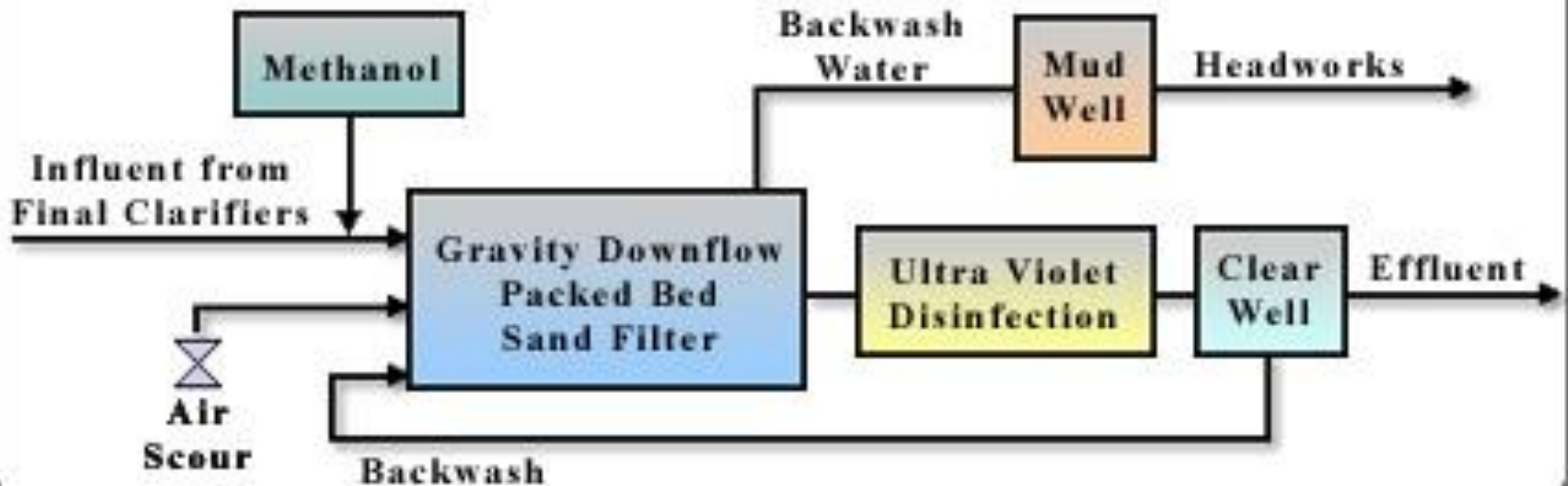
- ~ EX: VA Water Quality Improvement Fund, MD Bay Restoration Fund

Upgrade Requirements, Operations Are Enforceable

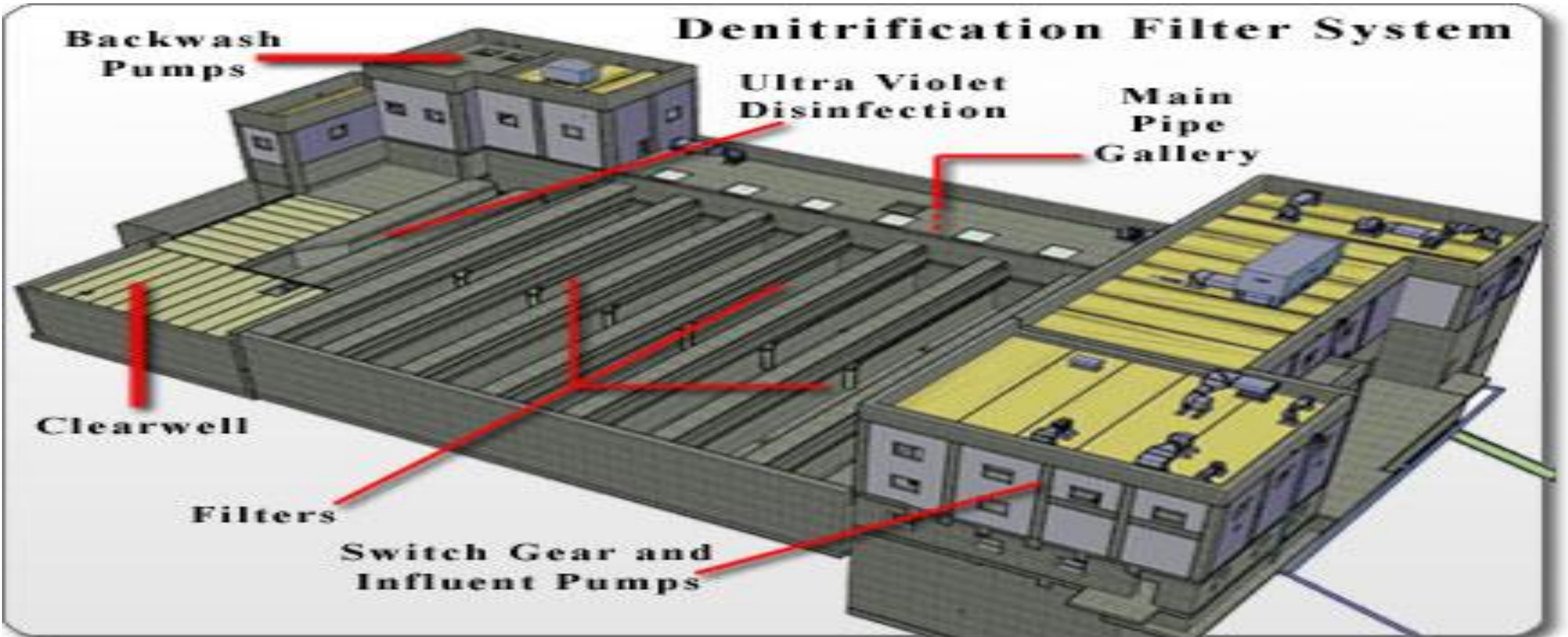
- ~ State grant terms
- ~ State discharge permits
- ~ Compliance reporting

An Example from Our Friends in Maryland

Schematic of Denitrification Filter Process



An Example from Maryland (cont.)



Quick Guesstimate?



Plant Above Was Upgraded in 2012

- ~ Design Flow for Plant is 29 Million Gallons Per Day (MGD)



Goals for ENR Upgrade

- ~ Achieve 3.0 mg/l for total nitrogen discharges, .03 mg/l for total phosphorus discharges
- ~ Consistent with Maryland State Policy



What Do You Estimate it Cost?

- ~ ???

An aerial photograph of the San Francisco Bay Area, showing the city of San Francisco, the Golden Gate Bridge, and the surrounding hills and water. A semi-transparent blue overlay covers the left side of the image, creating a gradient effect. The text "THE PRESENT: BAY PROGRESS" is centered over the image in a bold, black, serif font.

THE PRESENT: BAY PROGRESS

Bay Wide Progress

Units:	Million Pounds per Year	Million Pounds per Year	Million Pounds per Year	Million Pounds per Year	Million Pounds per Year	Million Pounds	Percent	Million Pounds	Percent	Million Pounds	Percent	Percent
	1985	2009	2024	2025	2025 Interim Targets w/ CEC	1985 to 2025 change	1985 to 2025% Change	2009 to 2025 Change	2009 to 2025 % Change	2009 to 2025 Targets Change	2009 to 2025 Targets % Change	% of 2025 reduction goal achieved in 2025
Nitrogen	333.33	270.14	235.67	237.09	203.95	-96.24	-29%	-33.05	-12%	-66.19	-25%	50%
Phosphorus	29.17	16.75	13.09	13.16	12.78	-16.01	-55%	-3.59	-21%	-3.97	-24%	90%
Sediment	20,318	18,830	17,390	17,555	18,587	-2,763	-14%	-1,275	-7%	-243	-1%	100%

Sector Progress

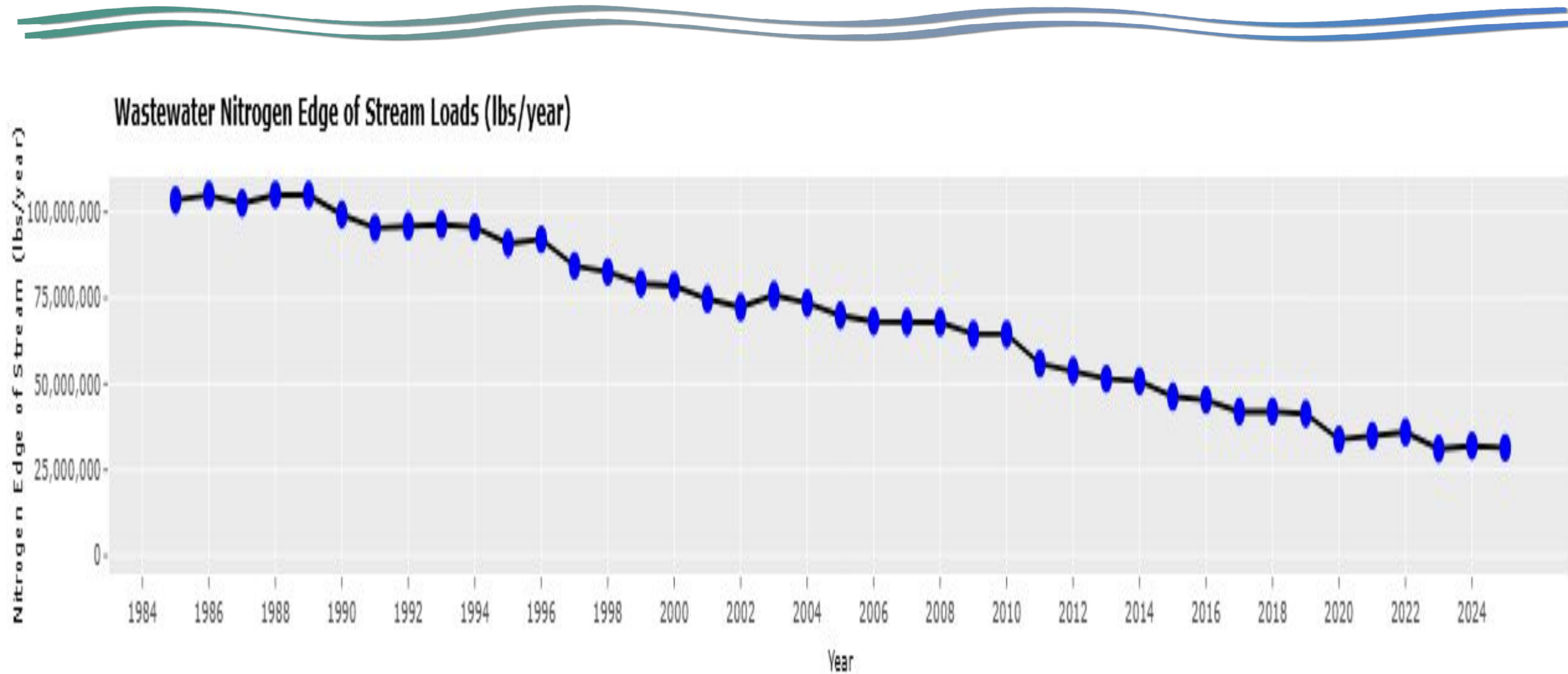
Progress towards 2025 Interim Source-Sector Targets

Legend:

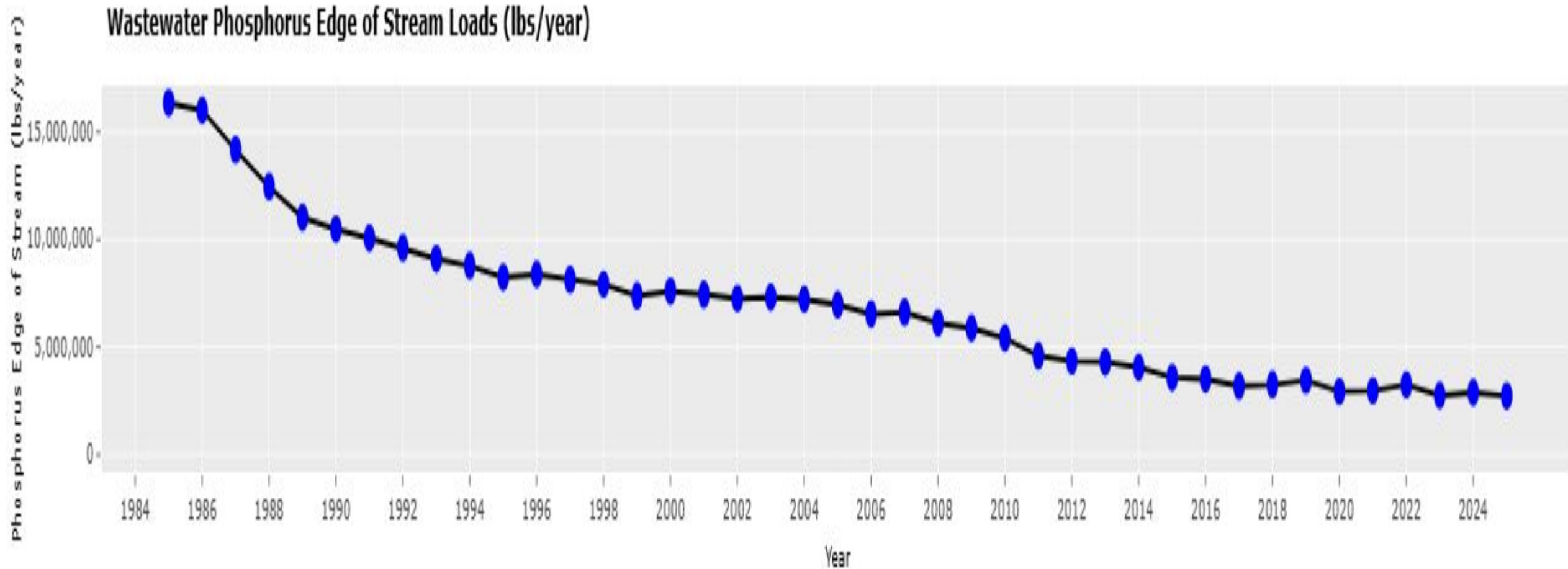
	100% progress achieved
	65-99% progress achieved
	40-64% progress achieved
	<40% progress achieved
N/A	Data Not Available

	Agriculture			Developed			Natural			Septic			Wastewater		
	N	P	S	N	P	S	N	P	S	N	P	S	N	P	S
Delaware	0%	37%	98%	0%	100%	100%	0%	34%	86%	100%	100%	N/A	100%	100%	100%
District of Columbia	N/A	N/A	N/A	100%	100%	100%	71%	67%	56%	100%	N/A	N/A	100%	100%	100%
Maryland	34%	43%	37%	100%	100%	100%	79%	100%	78%	100%	0%	N/A	100%	100%	100%
New York	27%	16%	100%	0%	20%	2%	32%	64%	45%	100%	N/A	N/A	100%	100%	100%
Pennsylvania	0%	15%	48%	0%	43%	36%	17%	44%	48%	100%	N/A	N/A	100%	100%	65%
Virginia	42%	51%	78%	0%	100%	0%	59%	88%	34%	0%	100%	N/A	100%	97%	100%
West Virginia	43%	71%	85%	0%	24%	0%	0%	73%	78%	0%	0%	N/A	100%	100%	100%

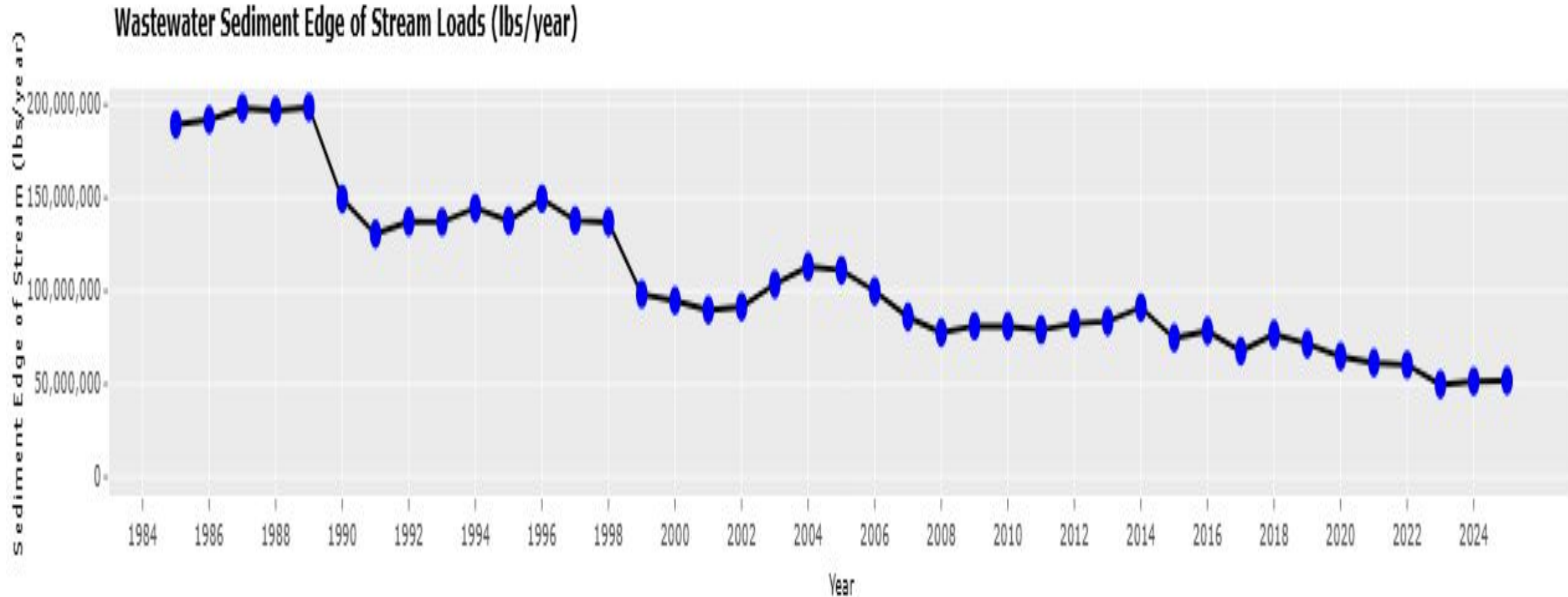
How Much Progress Has WW Made in **Nitrogen** Reductions?



How Much Progress Has WW Made in Phosphorus Reductions?



How Much Progress Has WW Made in Sediment Reductions?



A stylized world map with a blue background and white landmasses. The map is centered on the Atlantic Ocean, showing the continents of North America, South America, Europe, and Africa. The text is overlaid on the map.

THE FUTURE: CHALLENGES AND OPPORTUNITIES

Challenge #1: Funding

Significant Challenge for WW

- ~ Previously upgraded plants are aging, need to be renewed
- ~ Also need to fund on-going maintenance in other parts of collection system (e.g., pump stations, sewer lines)

Nationwide Problem, Not Just a Bay Issue

- ~ From ASCE 2025 Report Card on America's Infrastructure: Wastewater is a D+
- ~ “Over time, wastewater treatment systems are increasingly expected to produce advanced treatment capabilities owing to tightening environmental regulations, improved ability to detect and address emerging contaminants, and changing public opinion about pollutants”

More Work to Do: Future VA WW Needs

Table 3.1: 2025 WQIF Needs Survey Results – Total Project Costs (No Time Horizon)

Estimated Total Project Costs	WQIF-Eligible Project Costs	Estimated Eligible Grant Total
\$3,556,183,535	\$1,742,926,951	\$1,204,133,162

Table 3.2: 2025 WQIF Needs Survey Results – WQIF Point Source Funding Need for 2026 to 2030

WQIF Grants	2026	2027-2028 Biennium		2029-2030 Biennium		Total Need (2026 – 2030)
	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	
Applicant	\$419,727,590	\$401,889,942	\$129,330,219	\$105,165,103	\$113,445,308	\$1,169,558,162
TOTALS	\$419,727,590	\$531,220,161		\$218,610,411		\$1,169,558,162

More Work to Do: Future Maryland WW Needs



The BRF Crossroads: Securing the Next Decade

ANNUAL REVENUE

~\$110 M

- \$21M/year in current debt service
- Debt fully retired in 2030
- Current law cuts revenue 50% in 2030
- Opportunity to reinvest and maintain performance

Creative Approaches to Funding



EX: Conowingo Pay-for-Success Program

- ~ 1st solicitation funded by MD (\$20 M) to buy TN reductions
- ~ Eligible projects in Susquehanna River Basin



EX: MD Clean Water Commerce Act

- ~ Allows State to use BRF to buy TN, TP, and Sed. reductions
- ~ Reauthorized in 2021, funded by \$20 M/yr. from BRF, sunsets in 2030



EX: VA Pay-for-Outcomes Program

- ~ Pilot program est. in 2024, \$20 M to buy NPS nutrient reductions
- ~ First solicitation resulted in ~580,000 pounds of TN, av. cost of \$32.73/lb.
- ~ Equivalent of 1 year's runoff from over 52,000 acres of parking lots, roads, rooftops

Challenge #2: Affordability



WW Costs Have Increased Significantly

- ~ See slides below from Black & Veatch 2024 Rate Report (50 largest cities)
- ~ Will continue to increase for infrastructure renewal costs



Local Ratepayers Are Paying WW + Other Water Utility Costs

- ~ Drinking Water (upgrades to water plants and lines, pump stations, reservoirs, etc.)
- ~ Additional costs for emerging contaminants (PFAS)

Water and Sewer Rates

Figure 6

Trend in average typical bill for residential water and sewer customers (7,500 gallons).

Source: Black & Veatch

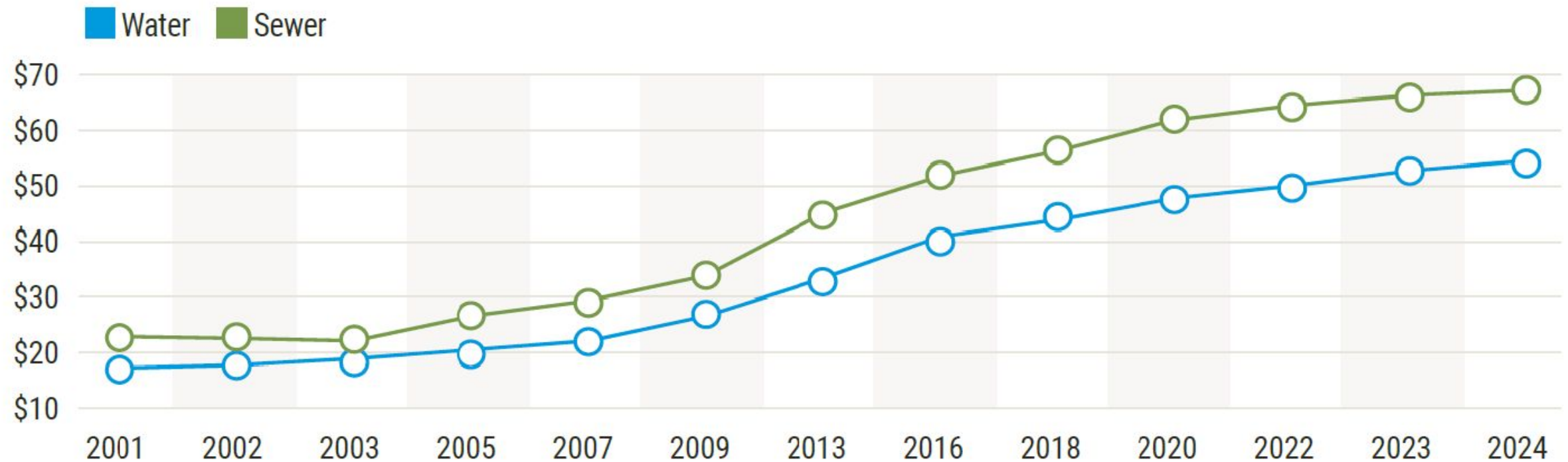
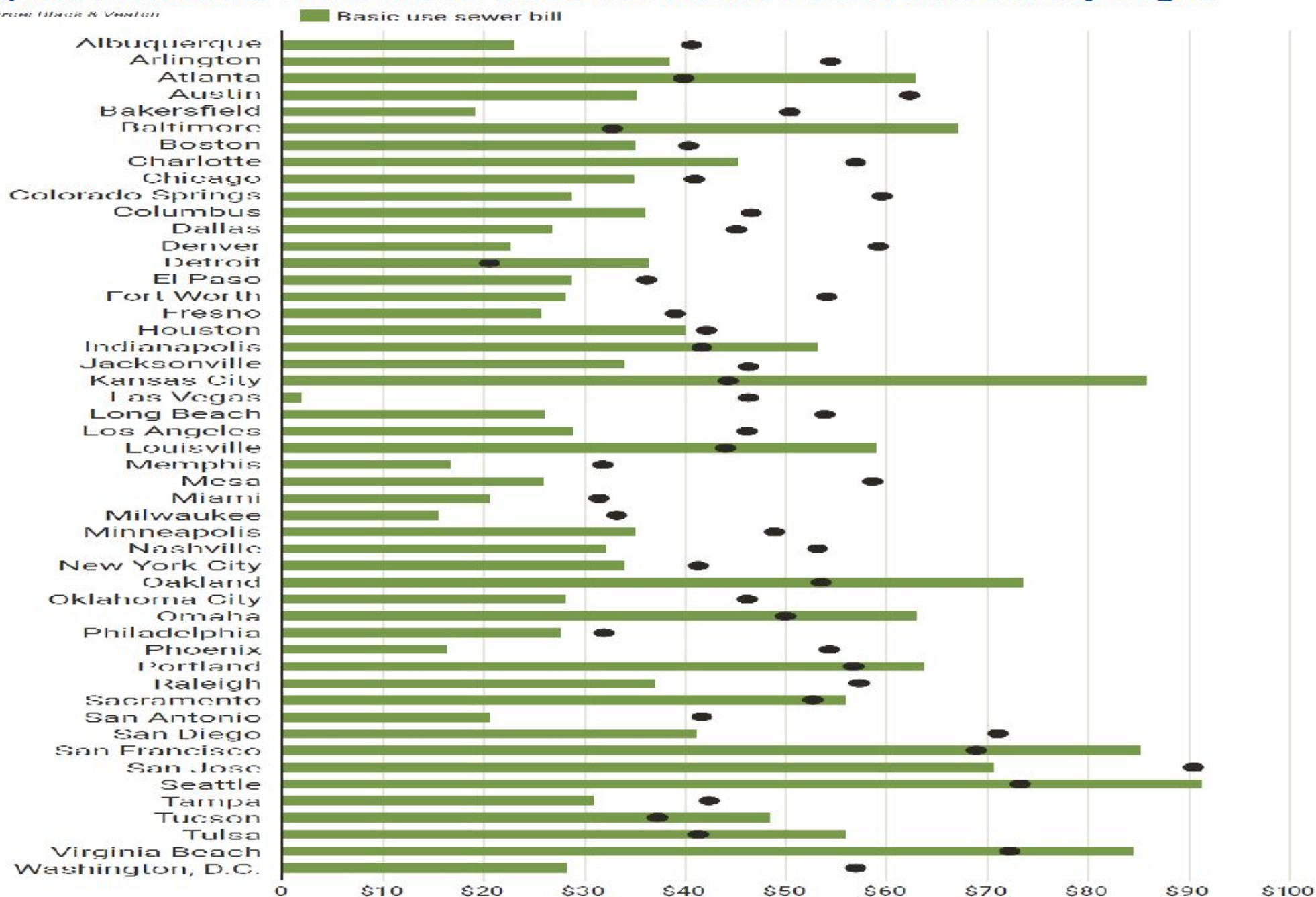


Figure 9

Typical residential sewer bill for basic use versus USEPA affordability target.

Source: Black & Veatch



Challenge #3: Continued Reliance on Sector



States Continue to Rely on Wastewater Sector

- ~ EX: MD's 2026-2027 Milestones: "Further incentivize MD's significant WWTPs towards achieving 2.85 mg/l TN statewide average by 2030, to address MD's Changing Environmental Conditions allocations"
- ~ EX: VA's Enhanced Nutrient Removal Certainty Program



Work is Needed on Nonpoint Source (NPS) Side

- ~ Must make additional NPS reductions as Bay jurisdictions continue to grow
- ~ Sewer moratoria are unpopular, can have significant economic impacts

Challenge #4: Climate Change

Climate is Changing

- ~ More frequent, heavier precipitation; rising sea levels; warming water temperatures

Bay Modeling

- ~ From Modeling Team to Water Quality Goal Implementation Team, Feb. 23, 2026
- ~ “An updated representation of future environmental conditions of increased temperatures and rainfall volumes and intensities through application of CMIP6 in Phase 7 compared to CMIP5 in Phase 6.”

New Workgroup

- ~ Climate Resiliency Workgroup becomes Adaptation Workgroup
- ~ Third meeting on Oct. 7, 2026

Outcomes

Adapting to Changing Environmental Conditions

Increase the capacity for pursuing solutions, including those that are nature-based, to improve planning and responses to changing conditions while balancing long-term resiliency of watershed communities, economies and ecosystems.

- By 2040, support at least seven sub-watershed areas with knowledge-sharing and technical assistance to identify adaptation options with a preference for nature-based solutions. These solutions include restoration and protection projects that will help address risks to people, infrastructure and habitats from changes in temperature, precipitation and landscapes.
- By 2040, inform and lead to an increase in the implementation of the identified adaptation options that prioritize and integrate nature-based solutions in the above sub-watershed areas.



The city of Lancaster, Pennsylvania, uses rain gardens to calm traffic and manage stormwater. Nature-based stormwater solutions can reduce pollution and make cities more sustainable.

Challenge #5: Emerging Contaminants

💧 PFAS and Biosolids

- ~ Subject of extensive legislative work in 2026 in VA and MD
- ~ Resulted in new laws that create tiered approach to land application
- ~ See slides below for overview

💧 Other Emerging Contaminants

- ~ From the 2025 Chesapeake Bay Agreement

Toxic & Emerging Contaminants

Reduce the amount and effect of toxic contaminants, such as PCBs, plastics, mercury and PFAS, on the waters, lands, fisheries, wildlife and communities of the Chesapeake Bay watershed through an increased understanding of their impacts and mitigation options.

- Promote information sharing between researchers, program managers and policymakers on the lessons learned, best practices and most up-to-date science, policy and communications around the toxic contaminants impacting the Chesapeake Bay watershed.



Students paddle on the Anacostia River, where partners are working to clean up contaminants.

CLEAN WATER 13

PFAS & Biosolids: MD HB 925 & SB 719

<i>ELEMENT</i>	<i>HB 925/SB 719 (AS INTRODUCED)</i>	<i>HB 925/SB 719 (AS PASSED)</i>
Effective Date	Oct. 1, 2027	Oct. 1, 2028
Applicability	Sewage sludge land application to agricultural or marginal land	Sewage sludge land application in Maryland to agricultural or marginal land
Monitoring Frequency	Once per month if blending	Once per month if commingling
Test Method	Method approved by MDE subject to level of quantitation of 2 ppb	1633A or equivalent approved by MDE; subject to a reporting limit developed by MDE
Data Disclosure to Landowner	None	For biosolids in 25-50 ppb tier, notification to owner or operator of land, adjoining landowners, and local officials 14 days before land application
Regulated PFAS	PFOA, PFOS, or a mixture of PFOA and PFOS	PFOA, PFOS, or a mixture of PFOA and PFOS
Compliance Metric	Average of samples for previous 12 mos.	Average of samples for previous 12 mos. May use samples taken using Method 1633 beginning Jan. 1, 2025 For commingling, mass balance calculation for a year if insufficient number of samples exist
Prohibited Tier	≥ 50 ppb	≥ 50 ppb
Restricted Tier	≥25 ppb to <50 ppb, for a period of not more than 12 months and pending the development of a mitigation plan, person may land apply at 3 dry tons/hectare max rate, w/ Class B setbacks, and additional setbacks if near public and private wells (with consultation with adjacent landowners and local officials from each jurisdiction within 1 mile of the property boundary) Complete source tracking study and mitigation plan; submit mitigation plan within 6 mos. of completing source tracking study; mitigation plan must be implemented within 2 years of triggering the 25-50 ppb tier	≥25 ppb to <50 ppb, during the development and implementation of the source tracking study and mitigation plan, person may land apply at 3 dry tons/acre max rate, Class B setbacks, and additional setbacks if near public and private wells (no consultation required) Complete source tracking study and mitigation plan; submit mitigation plan within 6 mos. of completing source tracking study; mitigation plan must be implemented within 5 years of triggering the 25-50 ppb tier
Unrestricted Tier	<25 ppb	<25 ppb
Blending	Blending w/other sewage sludge allowed until Sept. 30, 2029	Commingling w/other materials allowed for two years after biosolids monitoring triggers 25-50 ppb tier Commingling does not include more traditional blending that is meant to create more saleable product

PFAS & Biosolids: Virginia HB 1443 & SB 386

Monitoring Begins (if Land Applied)	January 1, 2027
Monitoring Applicability	Sewage sludge used for land application, distribution & marketing
Frequency	Monthly 1st year, then ≥Qtrly (reduce to Qtrly with DEQ approval)
Test Method	EPA Method 1633 or EPA revision (<i>i.e.</i> , 1633A) or DEQ approved
Data Disclosure to Landowner	Required (all 1633 analytes)
Regulated PFAS	July 1, 2027: PFOS “or” PFOA; after July 1, 2029: PFOS “and” PFOA (sum)
Limits Take Effect	July 1, 2027
Limits Applicability	Sewage sludge land application, distribution & marketing
Unrestricted Tier	<25 ppb
Restricted Tier	≥25 to <50 ppb: 3 dry tons/acre max rate (or DEQ-approved alt risk mgmt strategy)
Prohibited Tier	≥50 ppb
Compliance Metric	Rolling annual average
“Spike” Safeguard for Annual Avg	Retest required if any result >75 ppb; prohibit if 2 consecutive results >75 ppb
Blending	Allowed permanently; if blended, the above concentration limits apply to mixture
Permit Modifications	Required; minor modifications process
Work Group	Required study, extensive scope & future recommendations

Questions?

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