II. Programmatic and Numeric Implementation Between 2018 and 2025

Maryland has 53 tidal subwatersheds (Figure 3) within the five major basins (Figure 4) that must achieve their specific water quality standards. The State input Phase III WIP pollution reduction practices (Table 3 lists core practices) into the Bay watershed model, along with their geographic location, to calculate expected reductions of nitrogen, phosphorus, and sediment into Chesapeake Bay's tidal waters by 2025. Subsequently, Maryland aggregated the subwatershed pollution reductions by pollutant-sector (Tables 4-6) to determine if the State met its 2025 planning targets. Furthermore, Maryland projected the pollution reduction trends beyond 2025 (Figure 5) to characterize future sector growth and associated increases in pollution loads. Appendix B provides detailed descriptions of pollution reduction programs and practices by sector.

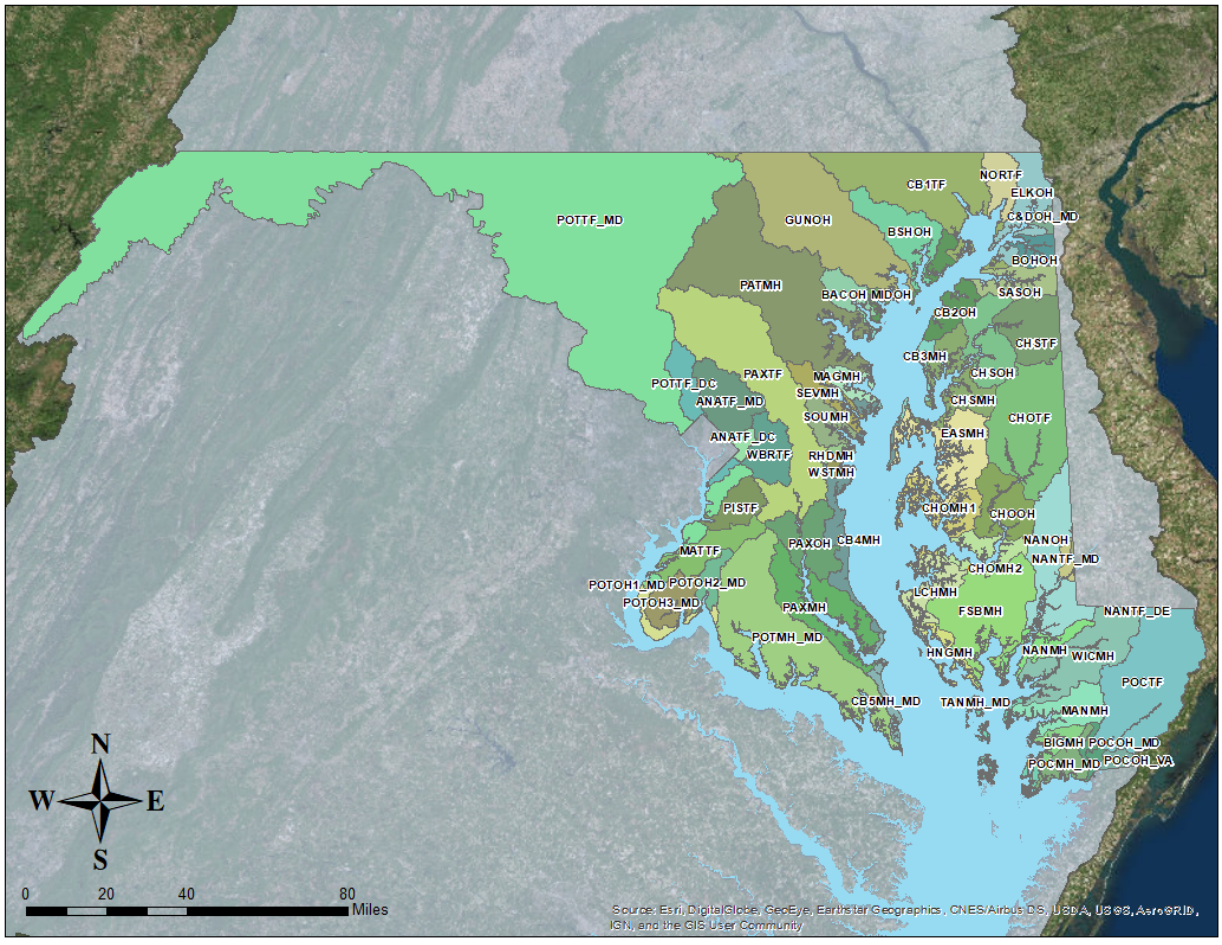


Figure 3: *Maryland's 53 tidal subwatersheds draining into Chesapeake Bay.*

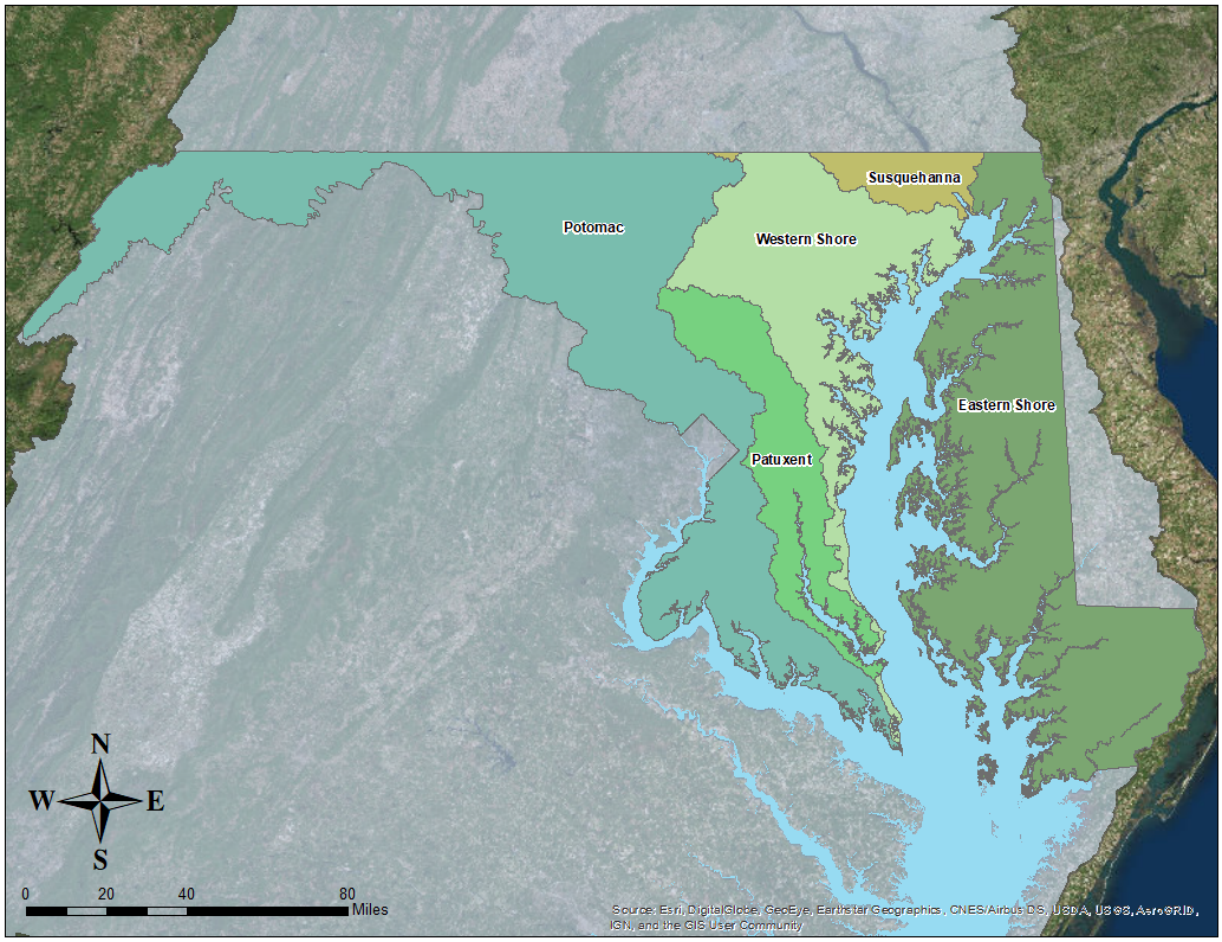


***Figure 4**: Maryland 5 major basins for which EPA has assigned pollution targets.*

***Table 3:** Core aspects of Maryland's Phase III WIP strategy. NOTE: The table below is not intended to capture all practices, just the highlights. For details on each sector's strategies, refer to Appendix B.*

Sector	Core Phase III WIP Strategies	TN Reduced *(lbs TN EoT/yr)*	TP Reduced *(lbs TP EoT/yr)*	Cost
Agriculture ***Maintain Current Practices***	Conservation Technical Assistance *(1 million acres of Conservation Plans + Design & Oversight of all BMP implementation)*	1,100,000	53,000	$13,800,000
	Nutrient Management Compliance	1,600,000	76,000	$3,100,000
	Cover Crops | ***470,000 acres/year***	2,300,000	2,000	$25,500,000/yr
	Manure Transport | ***100,000 tons/year***	228,000	26,000	$2,000,000/yr

Sector	Core Phase III WIP Strategies	TN Reduced *(lbs TN EoT/yr)*	TP Reduced *(lbs TP EoT/yr)*	Cost
Agriculture ***Future Practices***	Verification of existing BMPs	87,500	1,500	$3,500,000
	Implementation of Additional BMPs *(The Maryland Agricultural Water Quality Cost-Share (MACS) Program)*	652,000	10,600	$65,100,000
Atmospheric Deposition of Nitrogen ***Potential future practices not currently counted towards Maryland's Phase III WIP***	126 Petition to EPA *(Optimization of power plants to 5 upwind states)* ***No WIP credit***	250,000	-	Unknown
	Green House Reduction Act *(Plan for a 40% reduction in GHGs by 2030)*	No estimate	-	Unknown
	Regional Greenhouse Gas Initiative *(Regional cap and trade program for power plants)*	No estimate	-	Unknown
	Clean and Renewable Energy Standard (CARES) (100% clean electricity by 2040)	No estimate	-	Unknown
	Transportation Initiatives *(Mobile source emission reduction programs (fuel standards, MPG, and Evs))*	No estimate	-	Unknown
	Maryland EmPOWER *(Residential and commercial energy efficiency program)*	No estimate	-	Unknown
Atmospheric Deposition of Nitrogen ***Potential future practices not currently counted towards Maryland's Phase III WIP***	Volkswagen Settlement *(NOx mitigation projects in high emitting sectors)*	No estimate	-	Unknown
	Maryland's 2019 Petition to the Ozone Transport Commission *(Optimization of power plants in Pennsylvania)* ***No WIP credit***	No estimate	-	Unknown

Sector	Core Phase III WIP Strategies	TN Reduced *(lbs TN EoT/yr)*	TP Reduced *(lbs TP EoT/yr)*	Cost
Conservation Practices	Land Conservation; Local and State-level land conservation and land use programs and policies that prevent nutrient pollution	85,000	6,000	$125,000,000/yr *(Maryland Agricultural Land Preservation Foundation (MALPF) for 2019-2025, Rural Legacy Program, and Program Open Space-Stateside)*
Natural Filters on Public Lands	Upland Tree Planting and Streamside Forest Buffers | ***1,150 acres***	8,000	700	$11,900,000
	Wetland Restoration | ***175 acres***	600	50	$875,000
	Stream Restoration | ***6 miles***	2,500	2,250	$22,400,000
	Shoreline Management (Living Shoreline Technique) | ***0.56 miles***	150	100	$1,800,000
	Oyster Aquaculture | ***350,000 bushels***	20,000	1,000	$17,500,000
	Oyster Reef Restoration | ***867 acres***	65,000	3,300	$4,700,000
Natural Filters on Other Lands	Accelerate pace of tree planting and wetlands creation through financial and permit incentives	Captured in Agriculture and Stormwater Strategies		
Septic	Best Available Technology (BAT) Upgrades | ***6,440 systems***	40,000	-	$70,100,000
	Connection to Wastewater Treatment Plants (WWTP) | ***1,600 connections***	16,800	-	$9,100,000
	Septic Pumping *(Not available until Septic Stewardship Plans developed by 2021)*	-	-	TBD - Septic Stewardship
Stormwater	Complete current Phase 1 Municipal Separate Storm Sewer (MS4) permits restoration requirement *(completion dates: 2018 and 2019)* | ***20,000 impervious acres***	85,000	43,000	$1,180,000,000

Sector	Core Phase III WIP Strategies	TN Reduced *(lbs TN EoT/yr)*	TP Reduced *(lbs TP EoT/yr)*	Cost
	Complete new Phase 1 MS4 restoration requirement *(completion dates: 2023 & 2024)* | ***17,500 impervious acres***	86,000	12,000	$1,195,000,000
	Complete Current Phase 2 MS4 restoration requirement *(completion date: 2025)* | ***3,000 impervious acres***	15,000	6,000	$208,000,000
	Miscellaneous implementation on non-MS4 counties *(e.g. trading, trust fund)* | ***400 impervious acres***	3,000	400	$42,000,000
Wastewater	Complete Bay Restoration Fund (BRF)-Funded Enhanced Nutrient Removal (ENR) upgrades to 67 significant municipal wastewater plants	4,000,000	100,000	Fully Funded Pre-WIP III
	Continue funding ENR upgrades for non-significant municipal plants through the BRF *(11 additional plants by 2025, for a total of 16)*	25,000	5,000	$50,000,000
	Provide Operations and Management (O&M) Grant through the BRF for facilities achieving nitrogen discharge concentrations of 3.0 mg/L	425,000	No additional planned reductions	$10,000,000/yr
	Incentivize higher treatment levels (beyond 3.0 mg/L of nitrogen) through water quality trading and the Clean Water Commerce Act (through 2021)	No estimate	No estimate	$10,000,000/yr
	Complete upgrades to federal significant municipal plant	3,000	300	No State costs
	Continue minor industrial reductions	No estimate	No estimate	No State costs
	Maintain achievement of significant industrial Waste Load Allocations	No additional reductions	No additional planned reductions	No State costs

Sector	Core Phase III WIP Strategies	TN Reduced *(lbs TN EoT/yr)*	TP Reduced *(lbs TP EoT/yr)*	Cost
Wastewater	Implement sewer projects to address combined sewer overflows (CSOs), sanitary sewer overflows (SSOs) and inflow and infiltration (I/I)	20,000	2,000	$40,000,000

Natural loads include a category for stream bed and bank loads in the Phase 6 Chesapeake Bay Model. The stream loads are impacted by upland land use and BMPs. Thus, a stream's nutrient load is reduced by applying upland BMPs to developed and agricultural land surrounding a stream. Recognizing that these stream nutrient reductions are the result of implementation by the Agriculture and Stormwater source sectors, Maryland attributed those natural nitrogen reductions back to the corresponding sector (Table 4). Additionally, many counties are restoring streams as part of their MS4 stormwater permits. The reductions from these practices are also attributed back to the Stormwater sector.

These model outputs demonstrate that Maryland has sufficient practices across sectors to achieve its 2025 pollution targets and remain below its nitrogen target past 2045 (Figure 5). With a feasibility based approach, progress is not even across sectors. The wastewater and agricultural sectors achieve the most substantial nitrogen reductions from 2017 progress levels, 41 percent, and 20 percent respectively, while stormwater achieved a 2 percent reduction, and septic sector loads decreased by 1 percent.

Table 4: *Nitrogen: Statewide current & Phase III WIP loads delivered to Chesapeake Bay.*

Source Sector: Nitrogen	2017 Progress* (M lbs TN/yr)	Phase III WIP* (M lbs TN/yr)	Change in Load* (M lbs TN/yr | Percent)
Agriculture **	22.4	17.8	-4.6 | -20%
Natural ***	8.1	8.1	0.0 | 0%
Septic	3.1	3.1	0.0 | -1%
Stormwater **	9.4	9.2	-0.2 | -2%
Wastewater	11.3	6.6	-4.7 | -41%
Total	**54.2**	**44.8**	**-9.4 | -17%**

*** Note: Individual values may not total add to totals due to rounding.**

** *Agriculture and stormwater reductions include natural load reductions, -0.16 and -0.09 M lbs. TN/yr. respectively. These reductions are attributed to practices implemented by the agriculture and stormwater sectors.*

*** Includes atmospheric deposition of nitrogen to tidal waters.

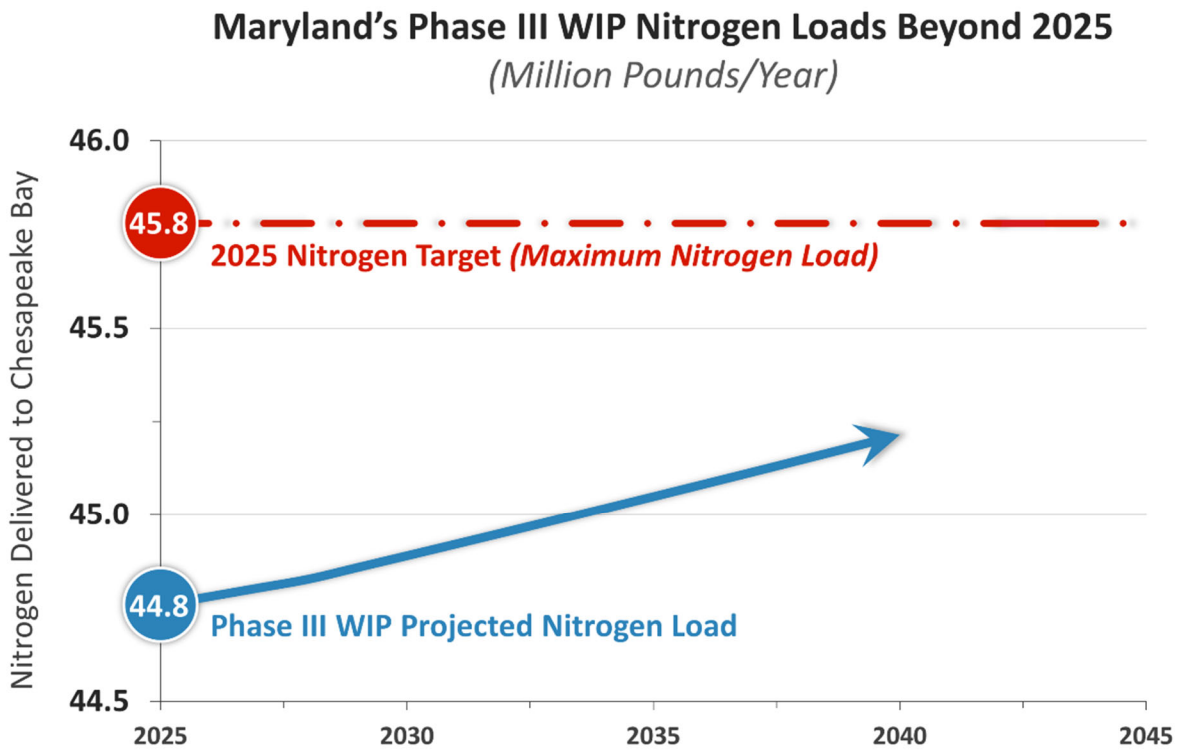
Table 5: *Phosphorus: Statewide current & Phase III WIP loads delivered to Chesapeake Bay.*

Source Sector: Phosphorus	2017 Progress* (M lbs TP/yr)	Phase III WIP* (M lbs TP/yr)	Change in Load* (M lbs TP /yr | Percent)
Agriculture	0.65	0.47	-0.17 | -26%
Natural	1.83	1.72	-0.11 | -6%
Stormwater	0.67	0.66	-0.01 | -2%
Wastewater	0.51	0.39	-0.12 | -24%
Total	**3.67**	**3.24**	**-0.42 | -12%**

Table 6: *Sediment: Statewide current & Phase III WIP loads delivered to Chesapeake Bay.*

Source Sector: Sediment	2017 Progress* (M lbs TSS/yr)	Phase III WIP* (M lbs TSS/yr)	Change in Load* (M lbs TSS/yr | Percent)
Agriculture	259	186	-74 | -28%
Natural	6.903	6.688	-216 | -3%
Stormwater	405	394	-11 | -3%
Wastewater	7	9	+2 | +26%
Total	**7,575**	**7,277**	**-299 | -4%**

*** Note: Individual values may not total add to totals due to rounding.**



Source: Maryland Phase III WIP Scenario; CAST 2019

Figure 5: *Total Nitrogen projected from Phase III WIP strategies implementation. Shown relative to total nitrogen target.*