





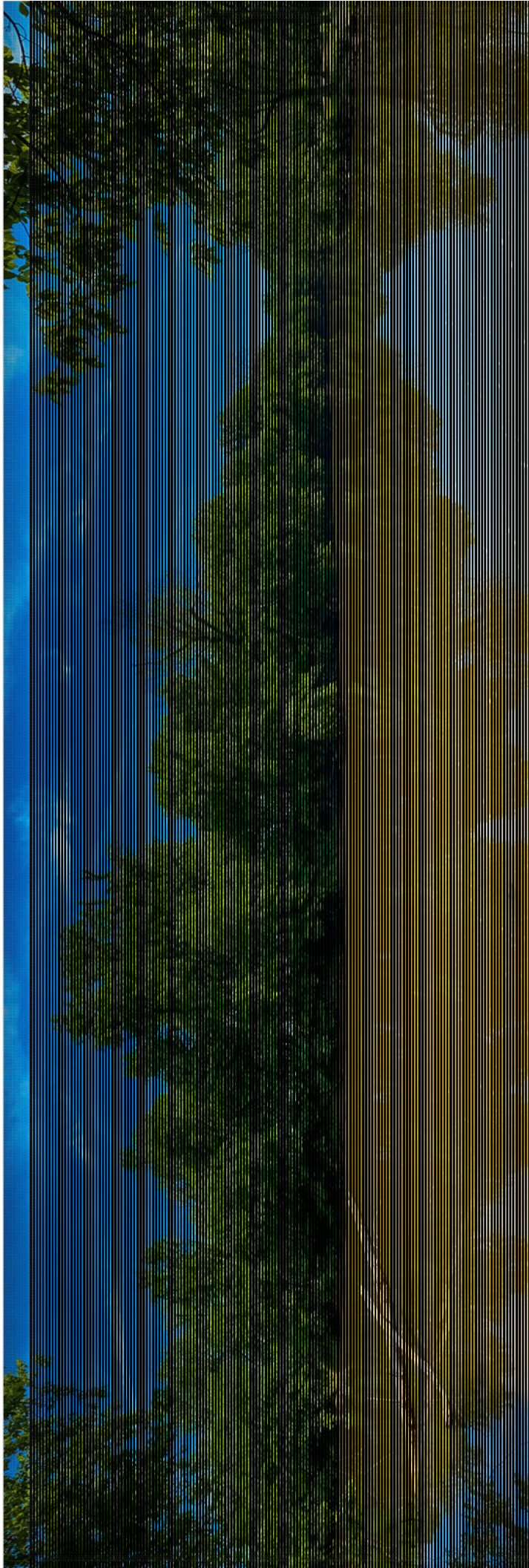
Broad Run Benthic TMDL Study

First Public Meeting

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Water Quality Planner
Virginia Department of Environmental Quality
February 27, 2025

Agenda

- Welcome and Introductions
 - Opening Remarks / Introductions
 - Meeting Objectives
- Overview of Water Quality Planning
- Water Quality Impairment in Broad Run
- Overview of the TMDL Study for Broad Run
- Wrap-up and Next Steps

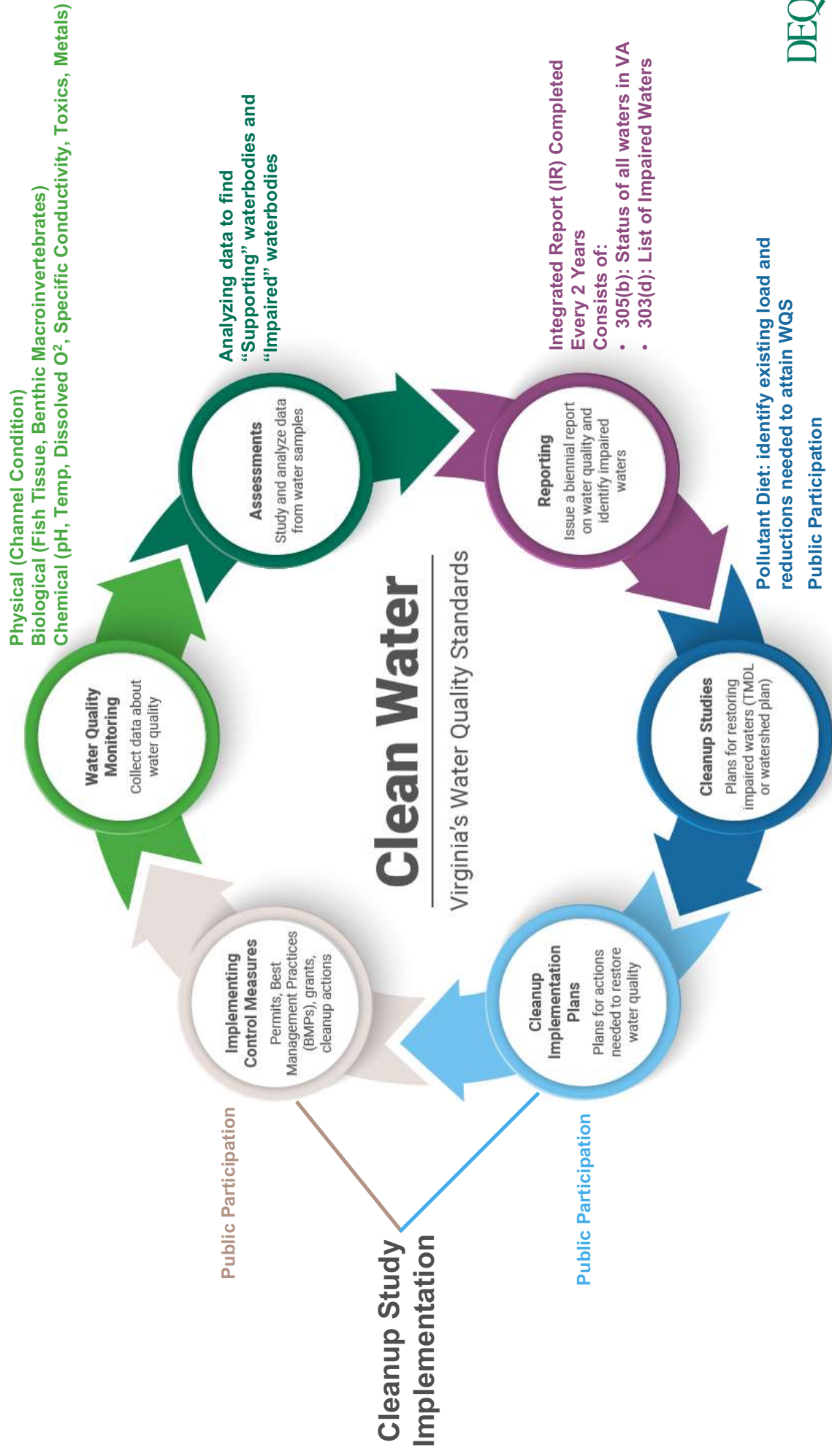




Overview of Water Quality Planning

Water Quality Standards

- Designated Uses
 - All waters designated for:
 - Recreation, aquatic life, wildlife, fish consumption, and shellfish (tidal)
 - Additional use that can be designated: public water supply
- Criteria
 - To protect and maintain designated uses
 - Numeric
 - Narrative
- Anti-degradation
 - Protects and maintains existing water quality from being degraded



Benthic Macroinvertebrate Community

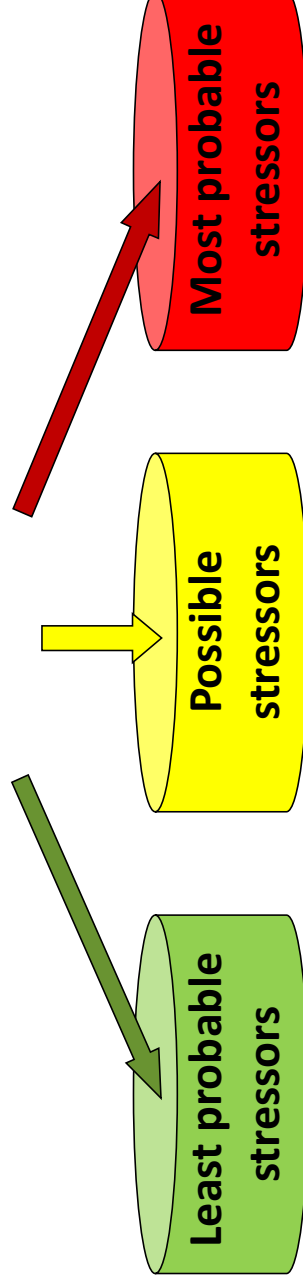
- One metric to evaluate attainment of the Aquatic Life Use
- Indicator of Biological Community Health
 - Live on the stream bottom 1-2 years, relatively sedentary
 - Indicates long-term effect of pollution and ecosystem impact
 - Evaluated using the Virginia Stream Condition Index (VSCI)
 - Multi-metric index
 - Based upon a reference community of organisms



Benthic Stressor Analysis

“What is causing the benthic community to be unhealthy?”

1. List potential causes applicable to the watershed
 - For example: nutrients, sediment, toxics, etc.
2. Analyze the available data and information for and against each possible stressor
 - Such as water chemistry, habitat, land use, point and nonpoint sources
3. Categorize each cause into:



Total Maximum Daily Load (TMDL)

A **TMDL** is the total amount of a pollutant a waterbody can receive and still meet the water quality criteria for that pollutant

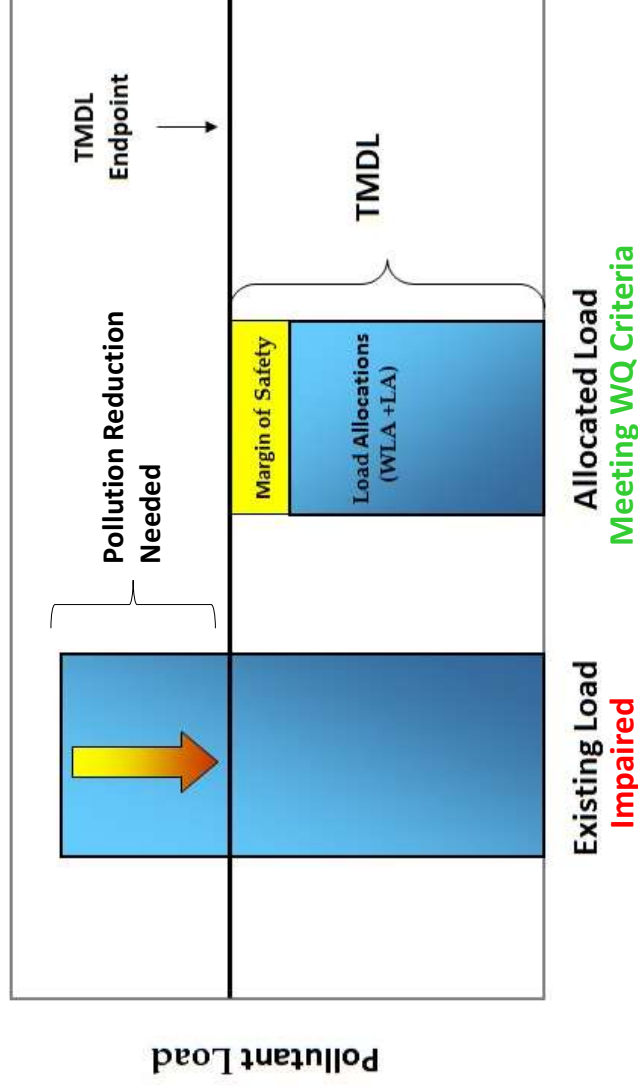
$$\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS}$$

Where:

WLA = Wasteload Allocation

LA = Load Allocation

MOS = Margin of Safety



TMDL Development Process



Characterize the Watershed

- Evaluate data on land use, soils, hydrology, ecoregion, etc.

Conduct a Pollutant Source Assessment

- Identify point (permitted) and nonpoint (unpermitted) sources
- Identify existing pollutant loads

Establish the TMDL endpoint

- Identify a numeric value/threshold that meets applicable water quality criteria

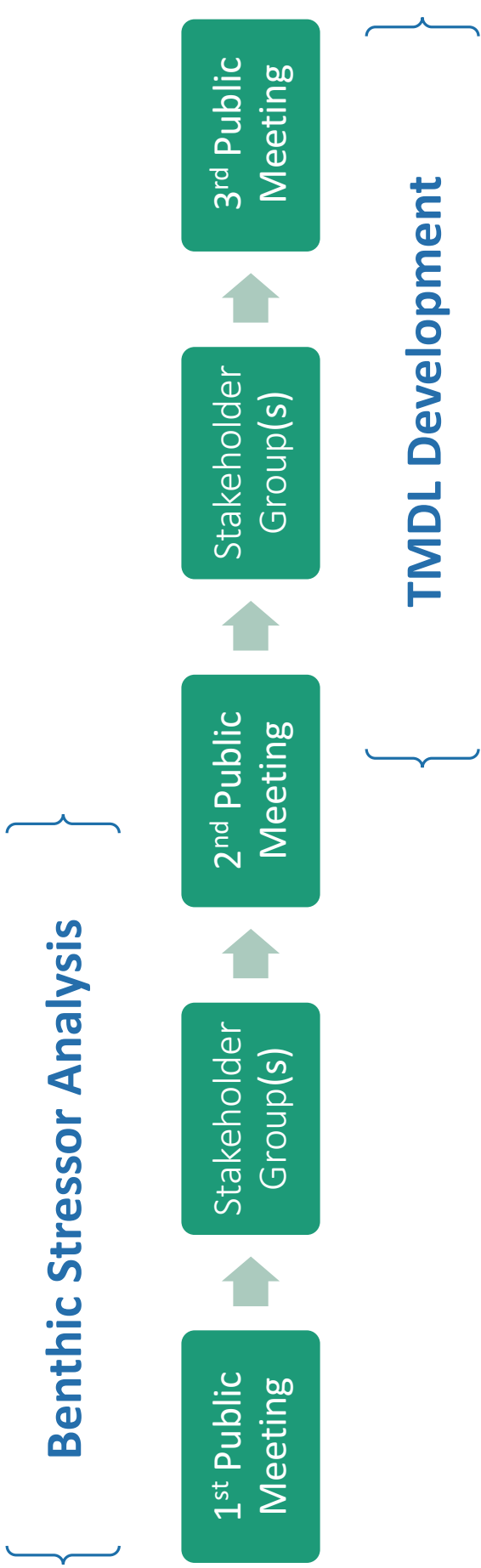
Identify the TMDL Condition and Needed Pollutant Reductions

- Model baseline and projected conditions to identify a scenario (loads) that attains the TMDL endpoint
- Calculate the pollutant reduction needed (the difference between the baseline and TMDL condition)

Allocate the TMDL to Pollutant Sources

- Assign pollutant load allocations to point and nonpoint sources to achieve reductions needed to meet the TMDL
- Include an allocation for future growth (FG) in WLA and a margin of safety (MOS)

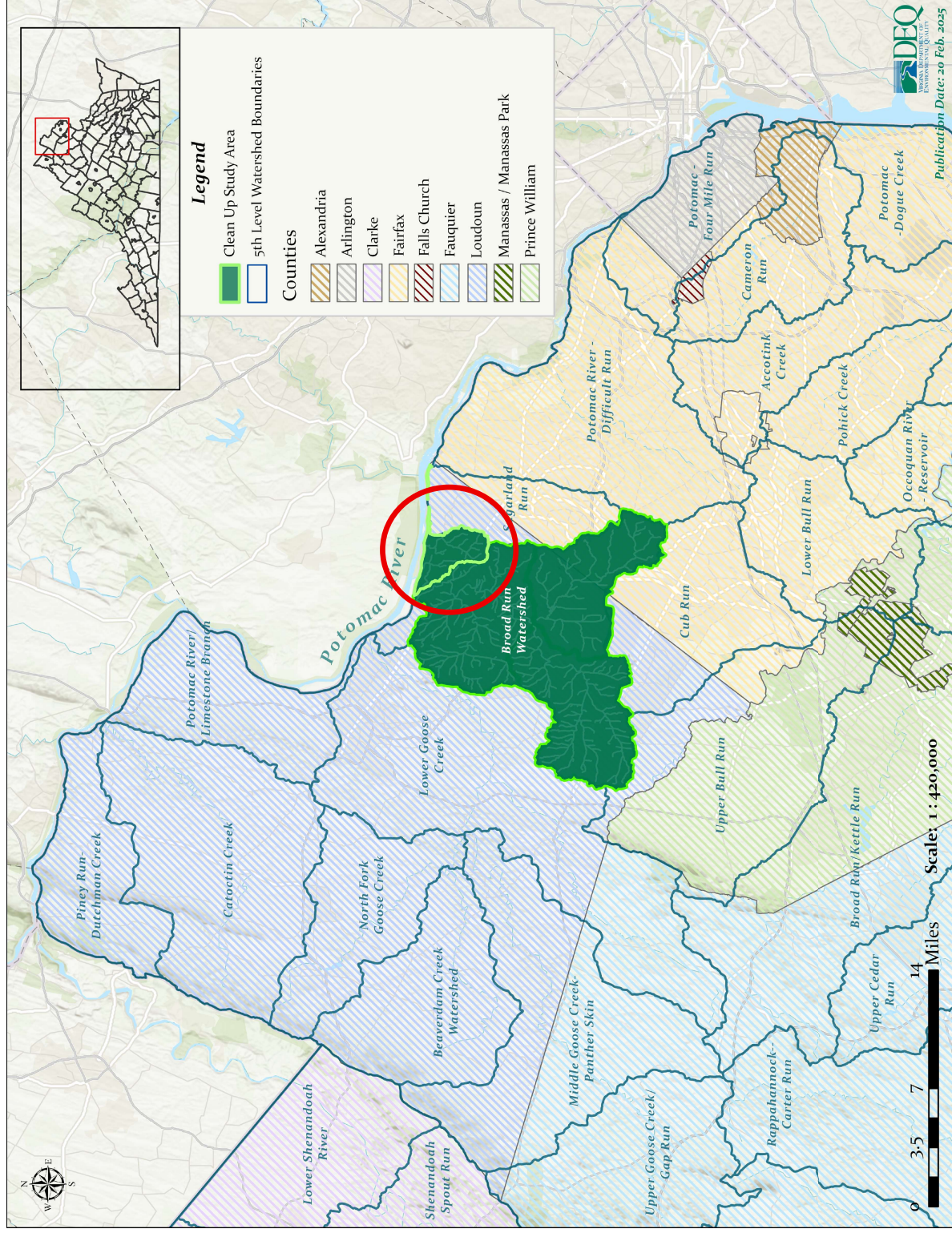
Public Participation in a Benthic TMDL Study



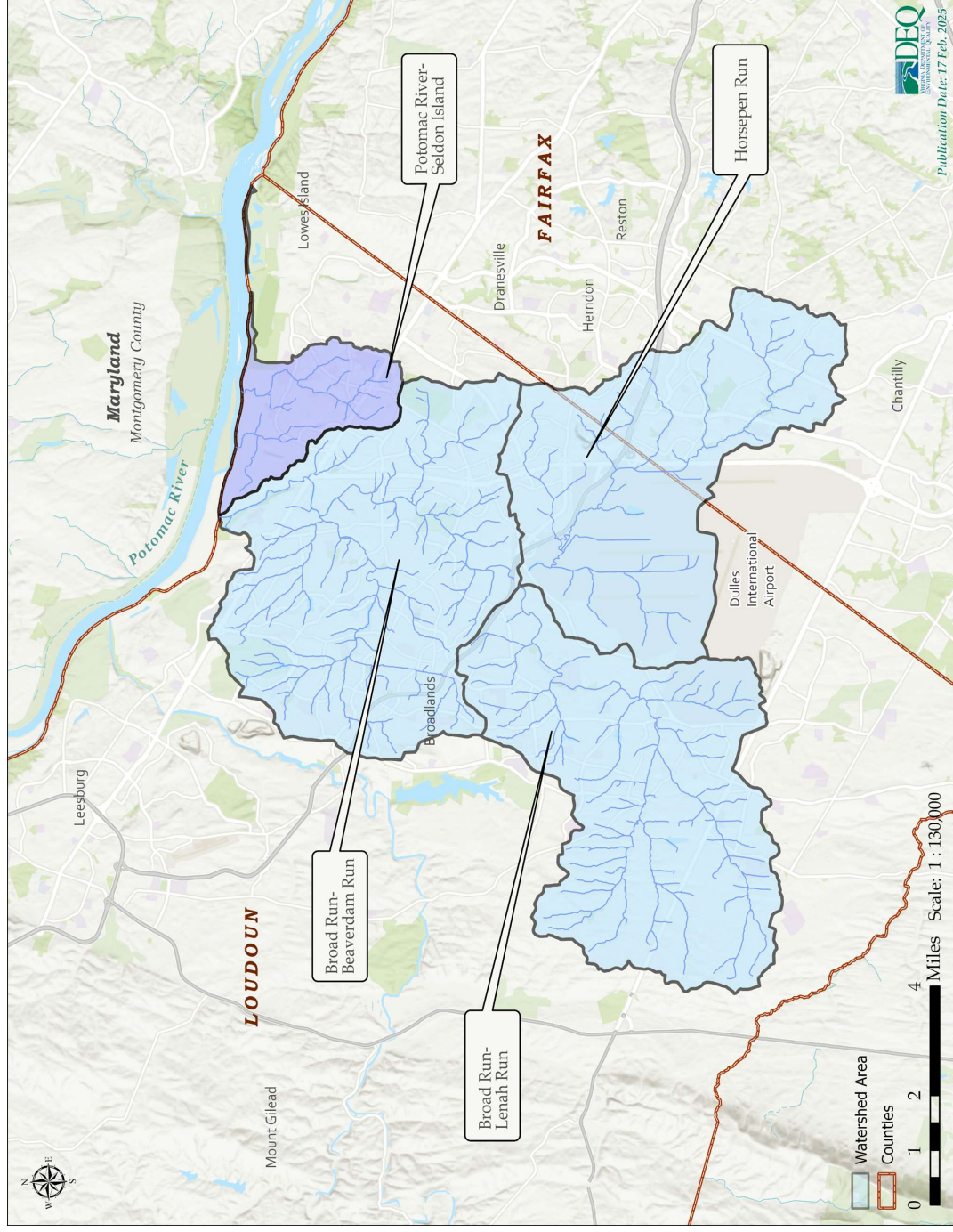


Water Quality Impairment in Broad Run

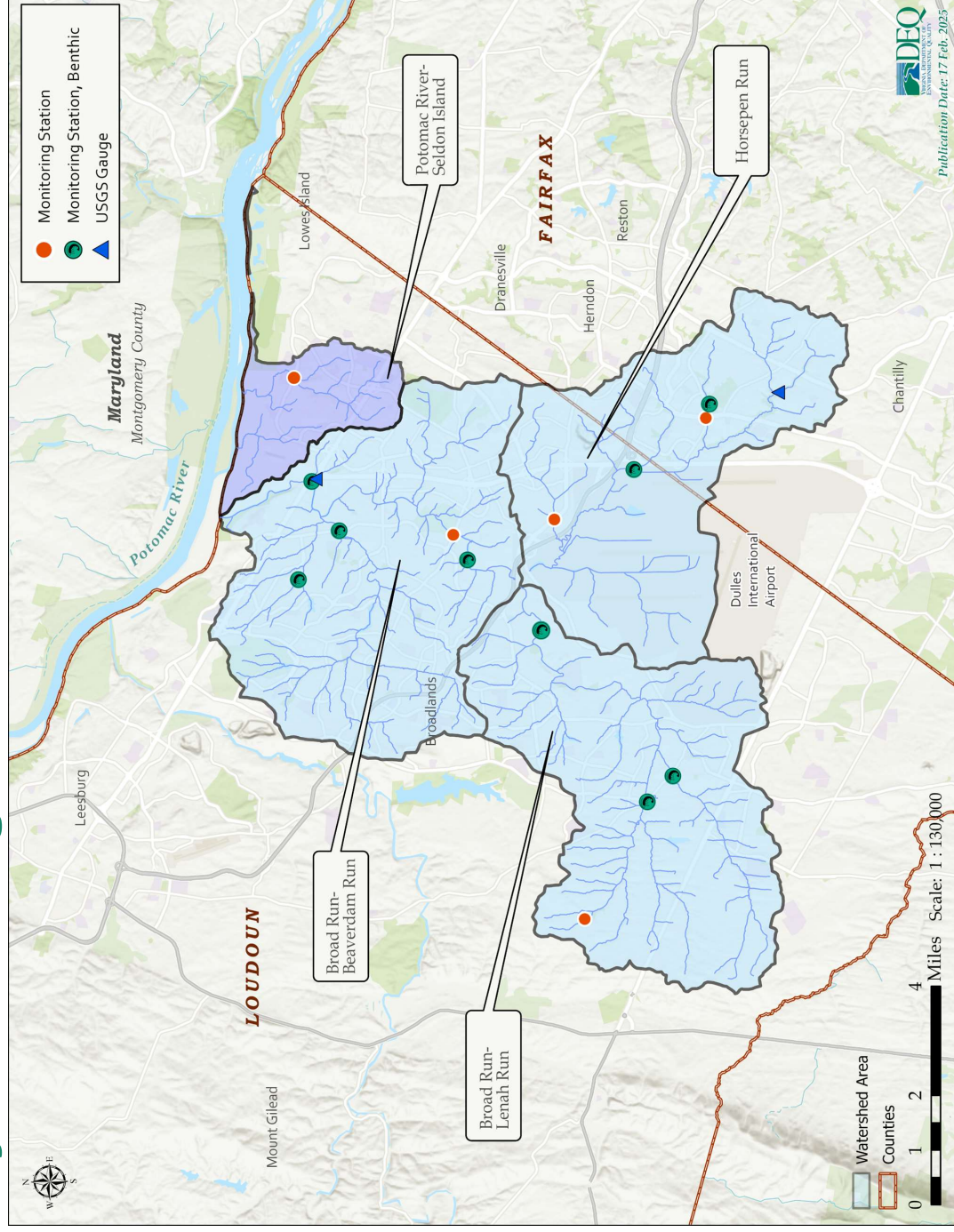
Project Location



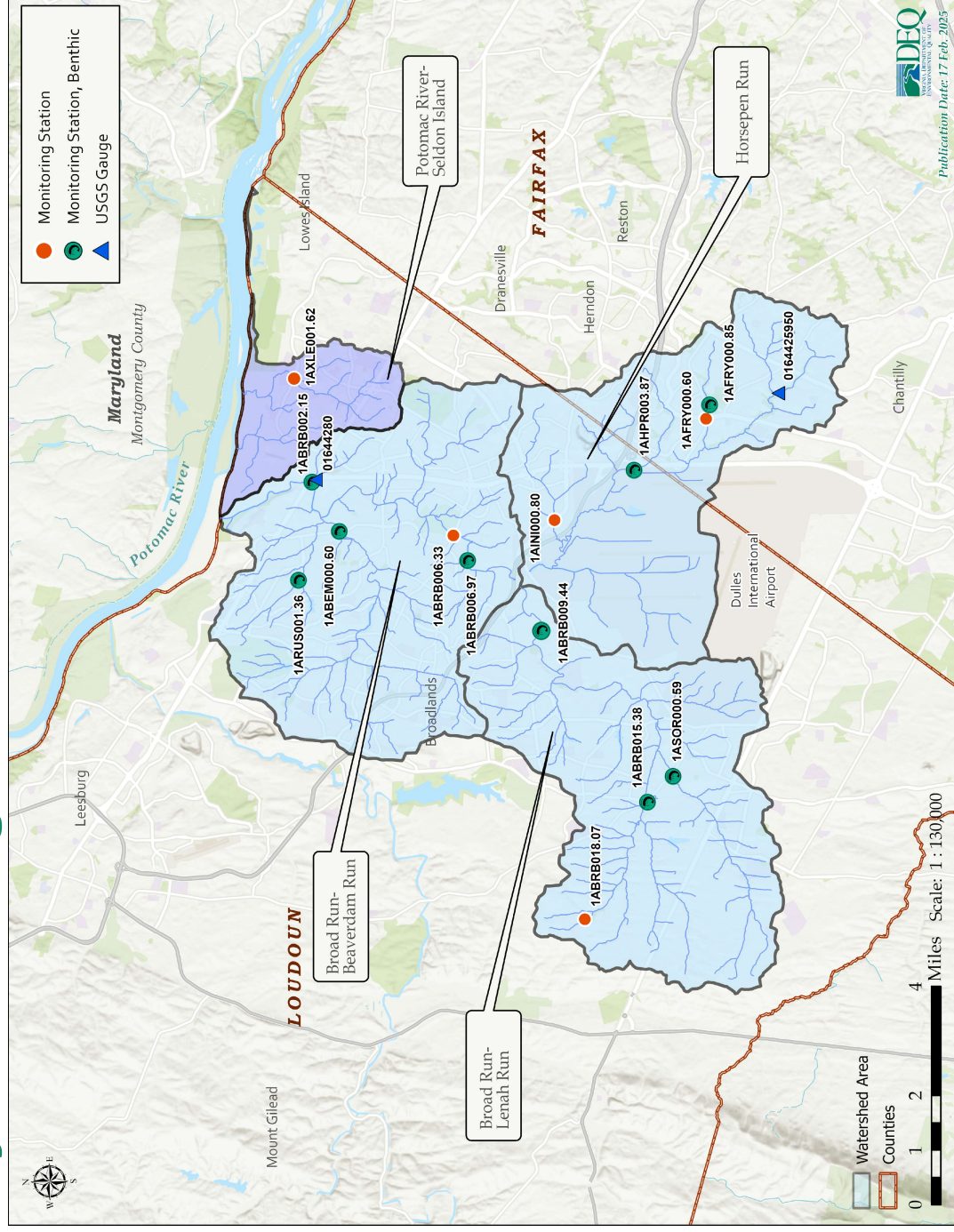
Project Location



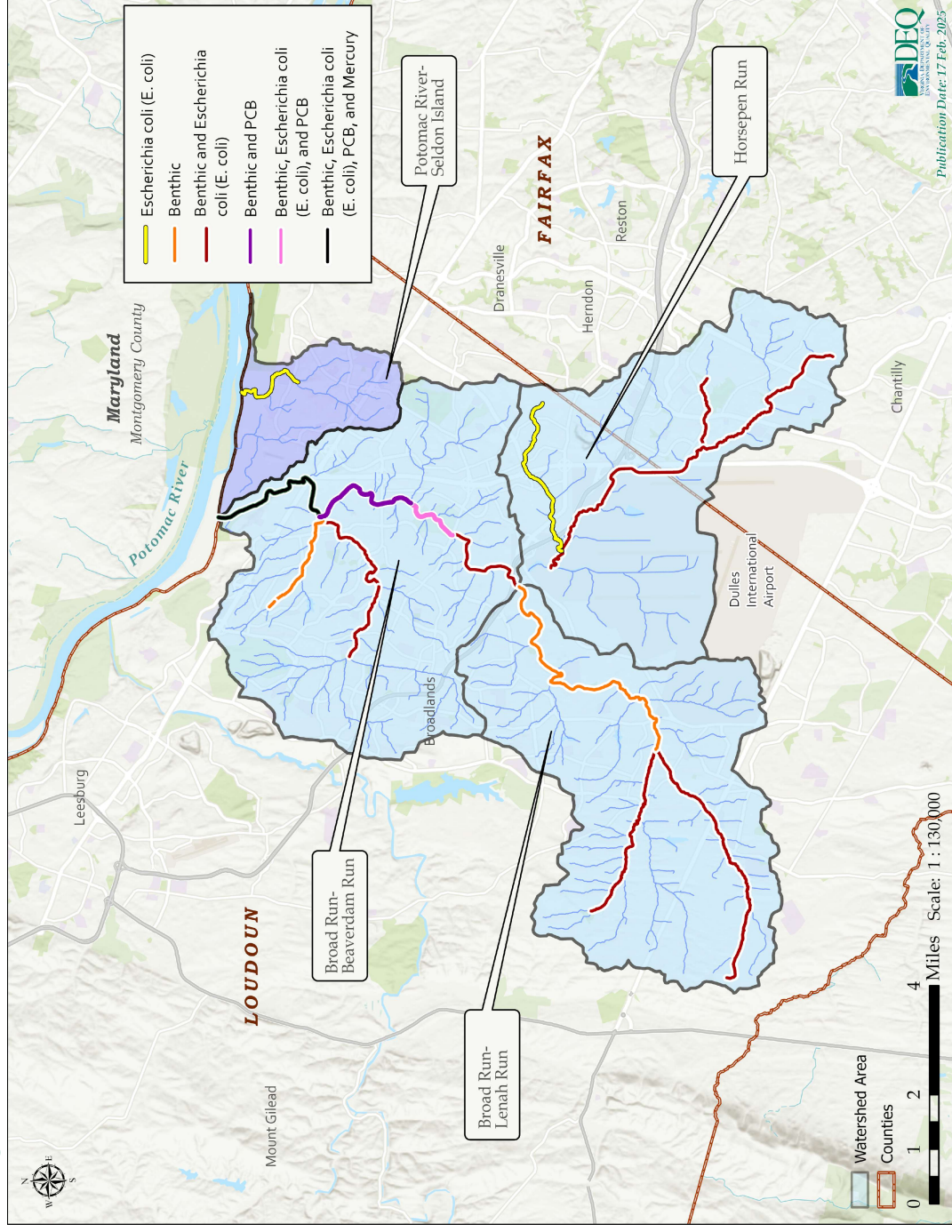
Water Quality Monitoring Locations



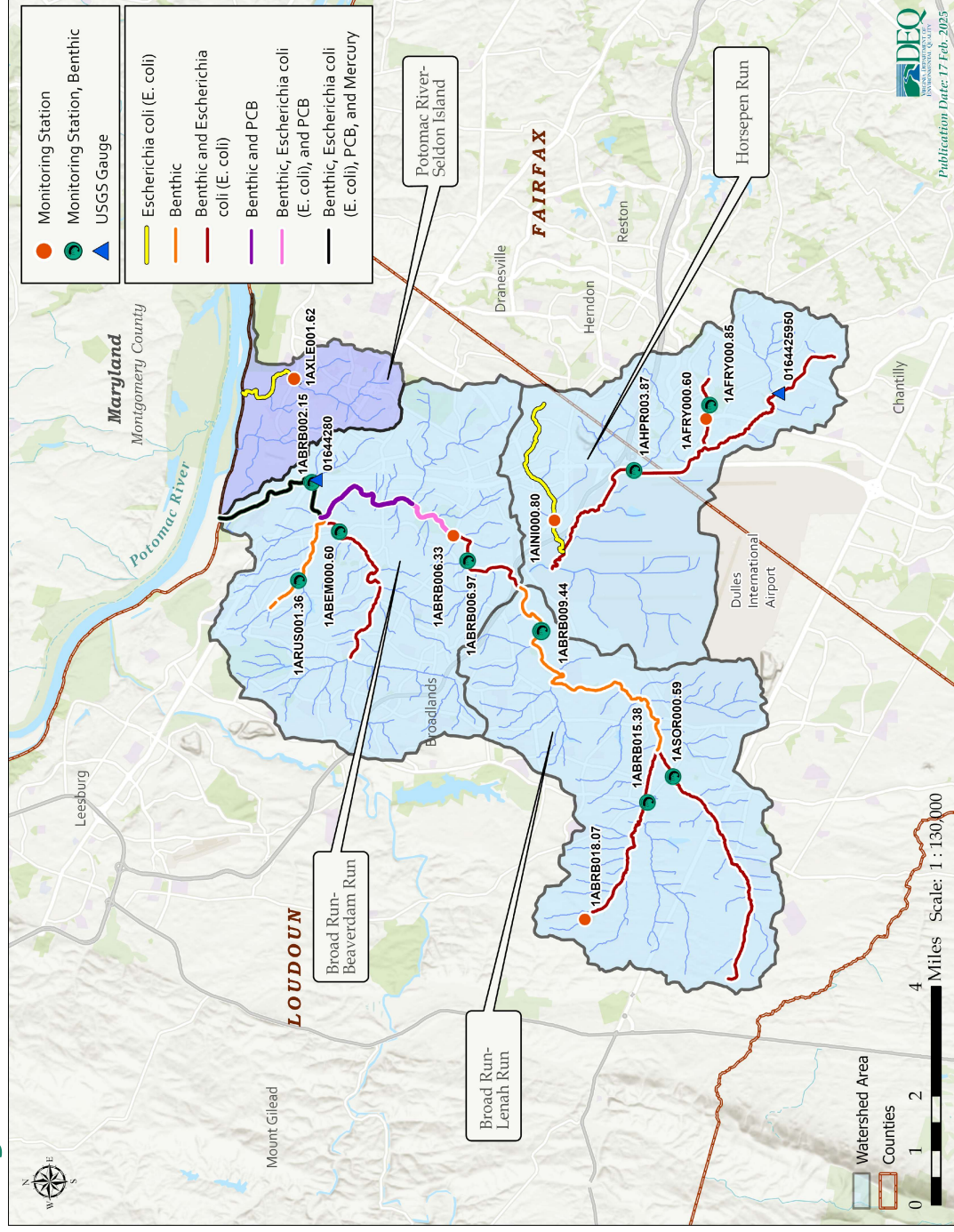
Water Quality Monitoring Locations



Water Quality Assessment of Broad Run



Water Quality Assessment of Broad Run



DEQ Water Quality Monitoring Data

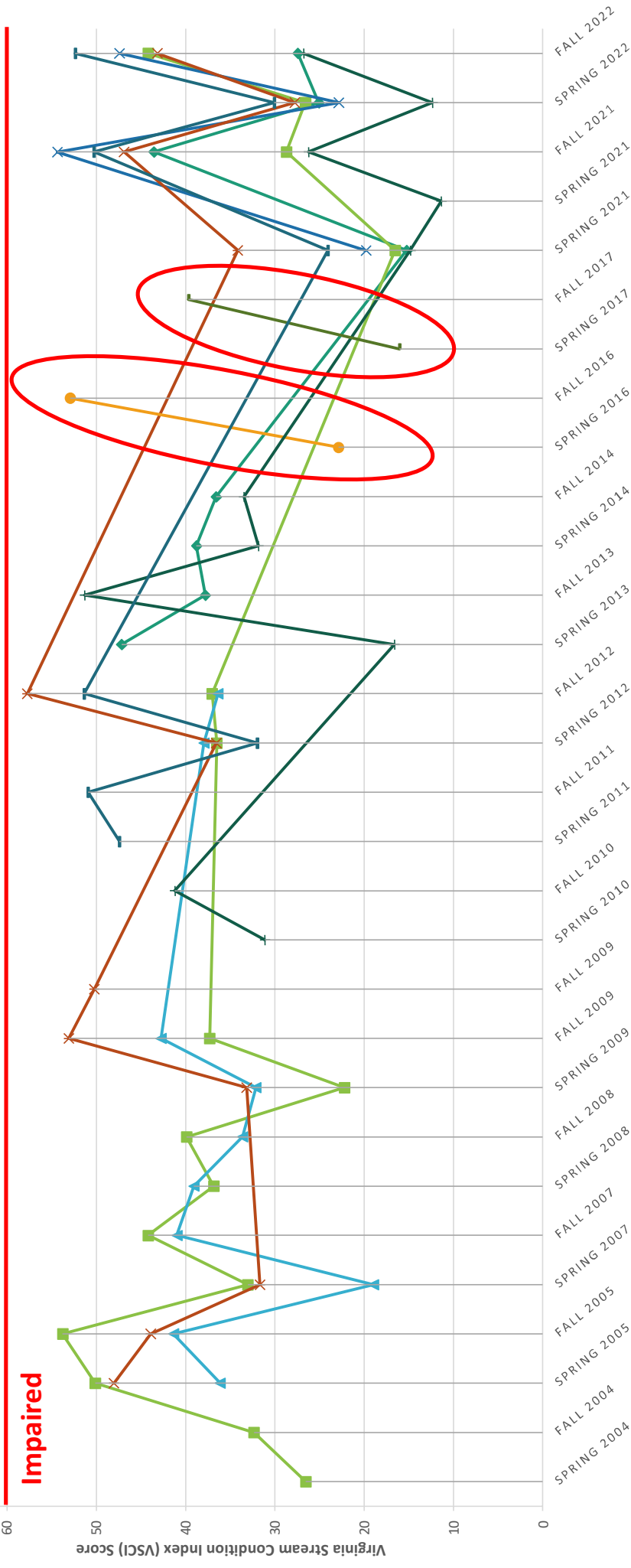
- Chemical (2004-2022)
 - Field parameters (pH, dissolved oxygen, specific conductivity, temp.)
 - Solids (total dissolved solids, total suspended solids)
 - Nutrients (nitrogen, phosphorous)
 - Ionic strength
 - Metals
- Benthic (2004-2022)



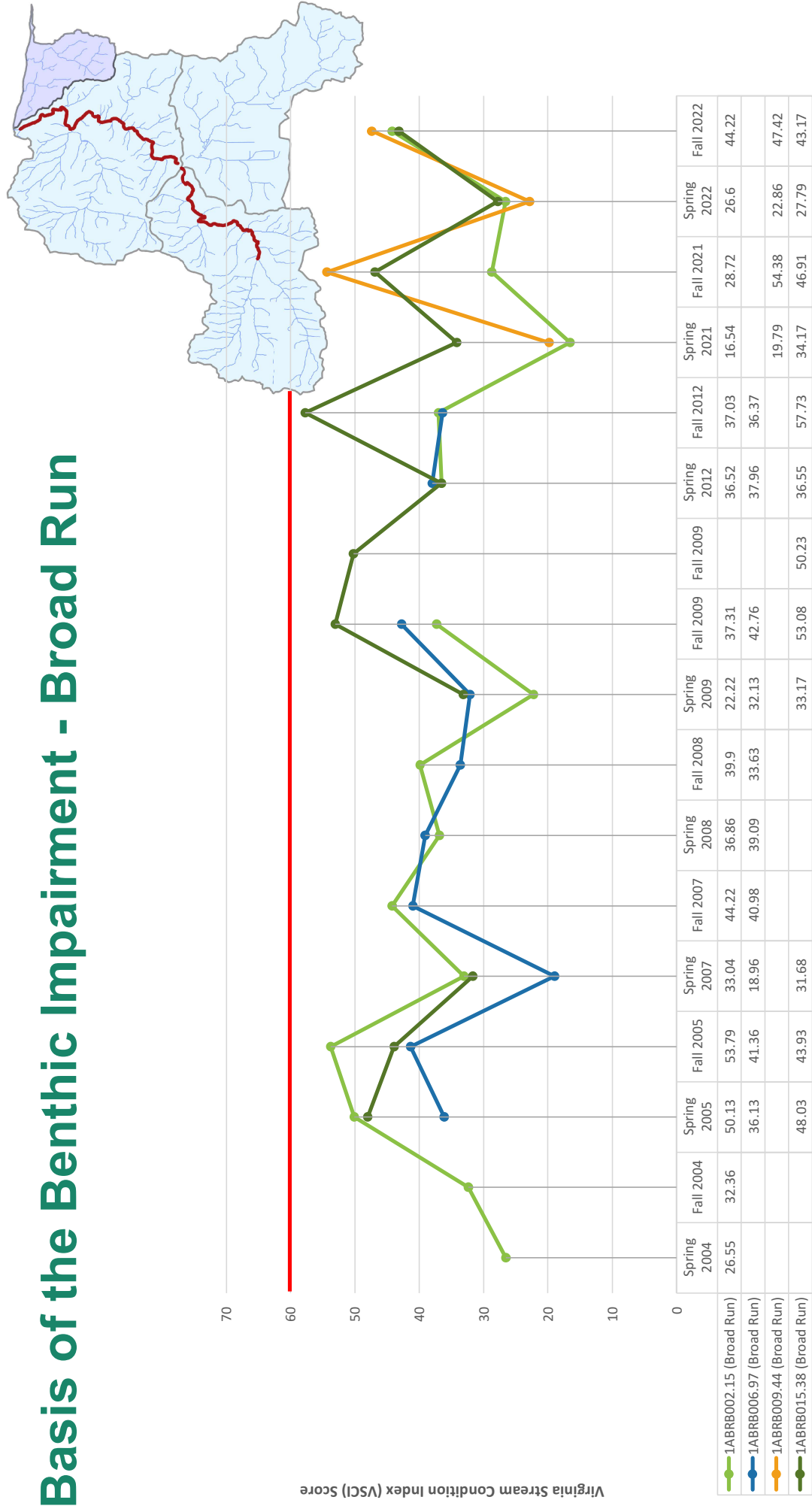
Basis of the Benthic Impairment

Unimpaired

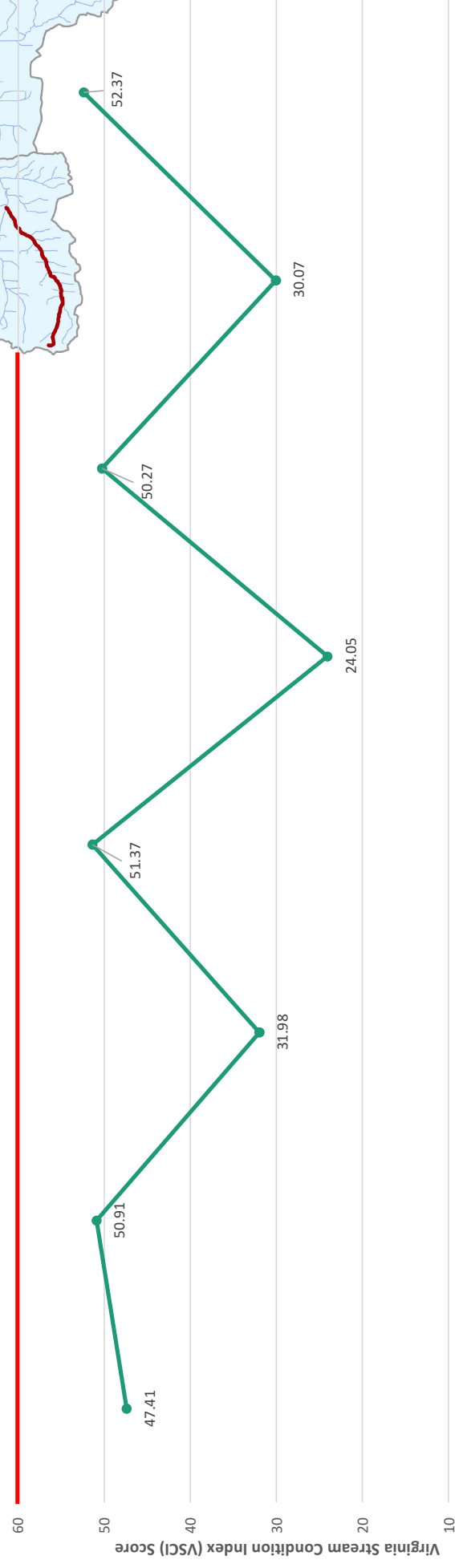
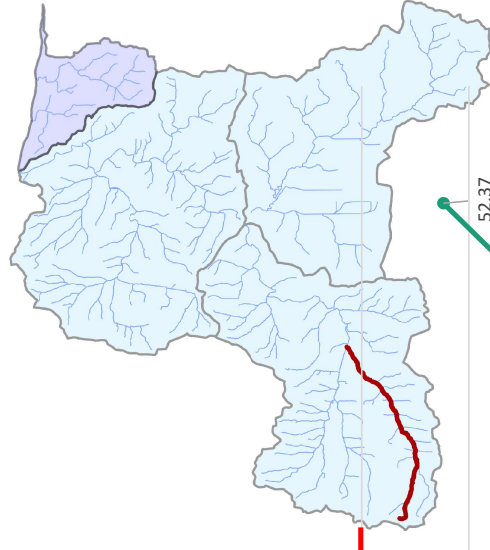
Impaired



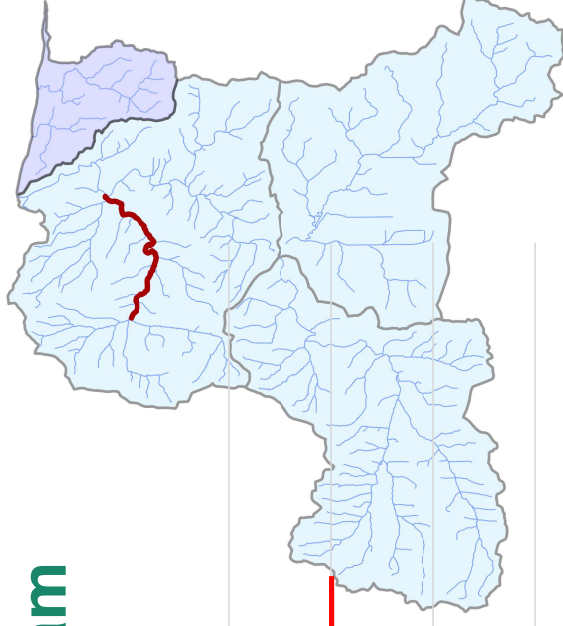
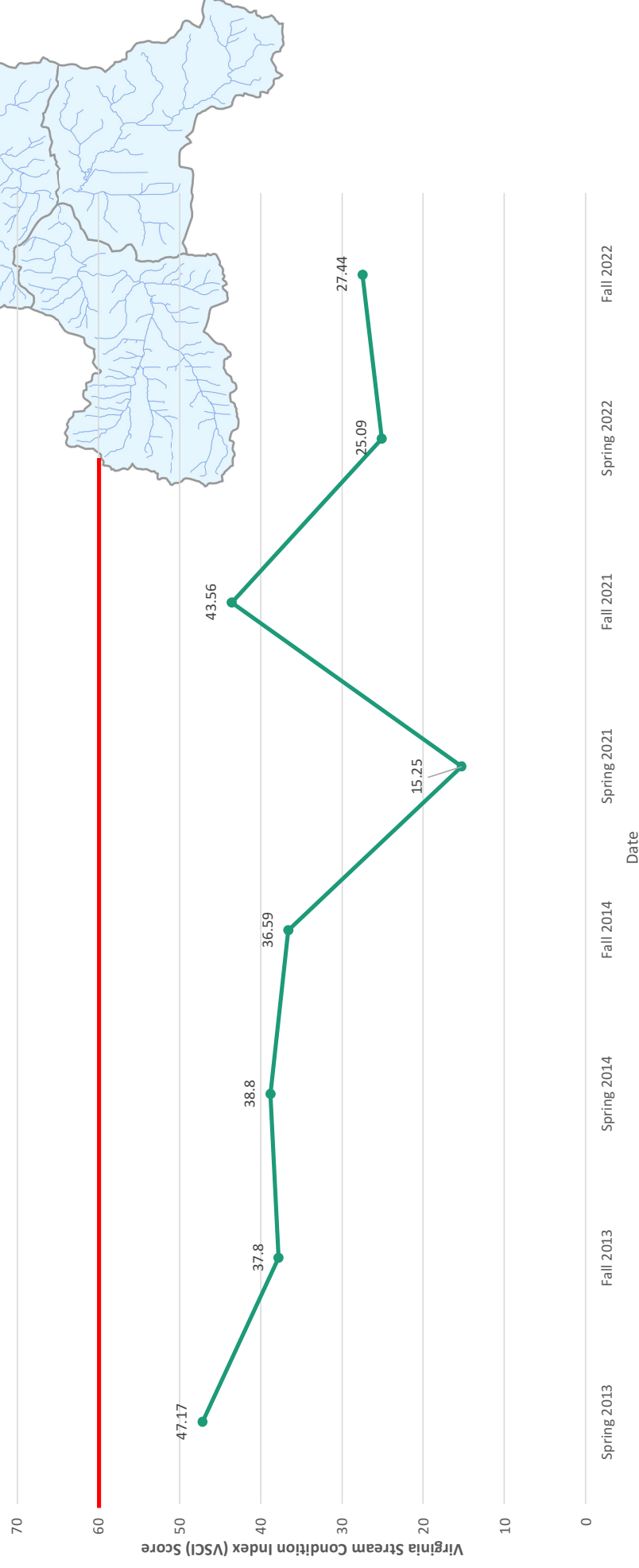
Basis of the Benthic Impairment - Broad Run



Basis of the Benthic Impairment - South Fork, Broad Run



Basis of the Benthic Impairment - Beaverdam



Basis of the Benthic Impairment - Horsepen



Data Analysis: Identifying Probable Stressors

- Evaluating monitoring data:
 - Water Quality Standards
 - Stressor Analysis using stressor thresholds developed from DEQ's Freshwater Probabilistic Monitoring Program
 - Seasonal water quality variations
 - Hydrology (stream flow and precipitation)
 - USEPA's Causal Analysis/Diagnosis Decision Information System (CADDIS)
- Consider other relevant data:
 - Surrounding land uses
 - Soil Types
 - Ecoregion





Other Potential Data Sources

- NOAA Rainfall Gauges
- Loudoun County
- Fairfax County
- Virginia Tech Occoquan Watershed Monitoring Lab
- Citizen Monitoring Groups

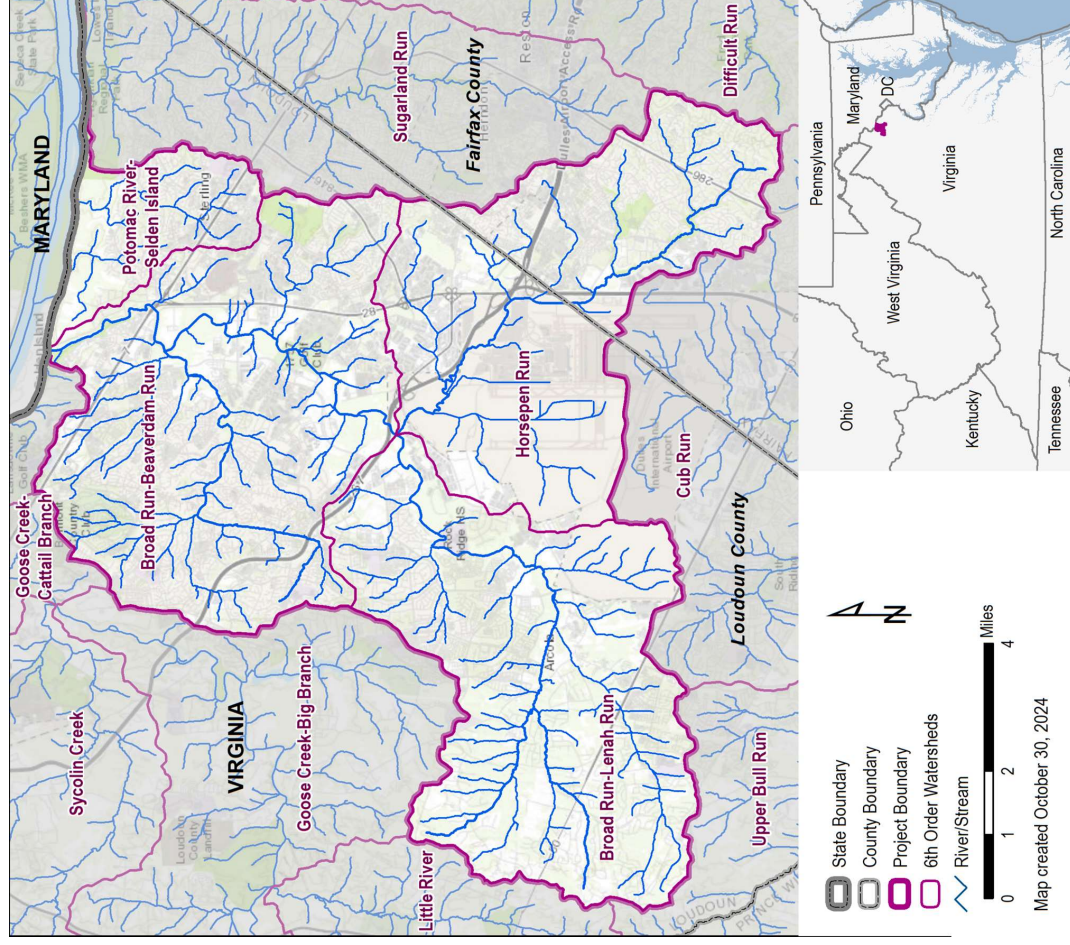


Watershed Characterization

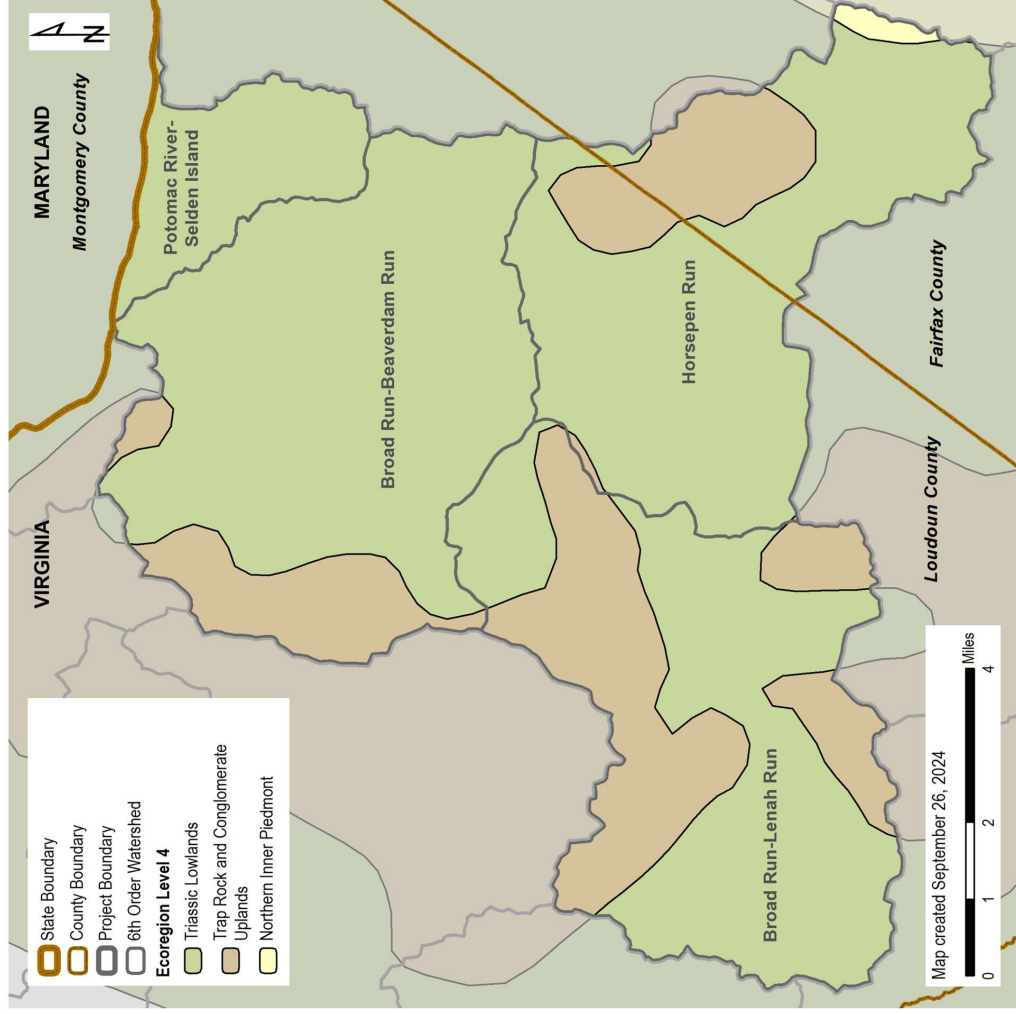
Interstate Commission of the Potomac River Basin (ICPRB)

Contractor and Technical Support
of Broad Run Cleanup Study

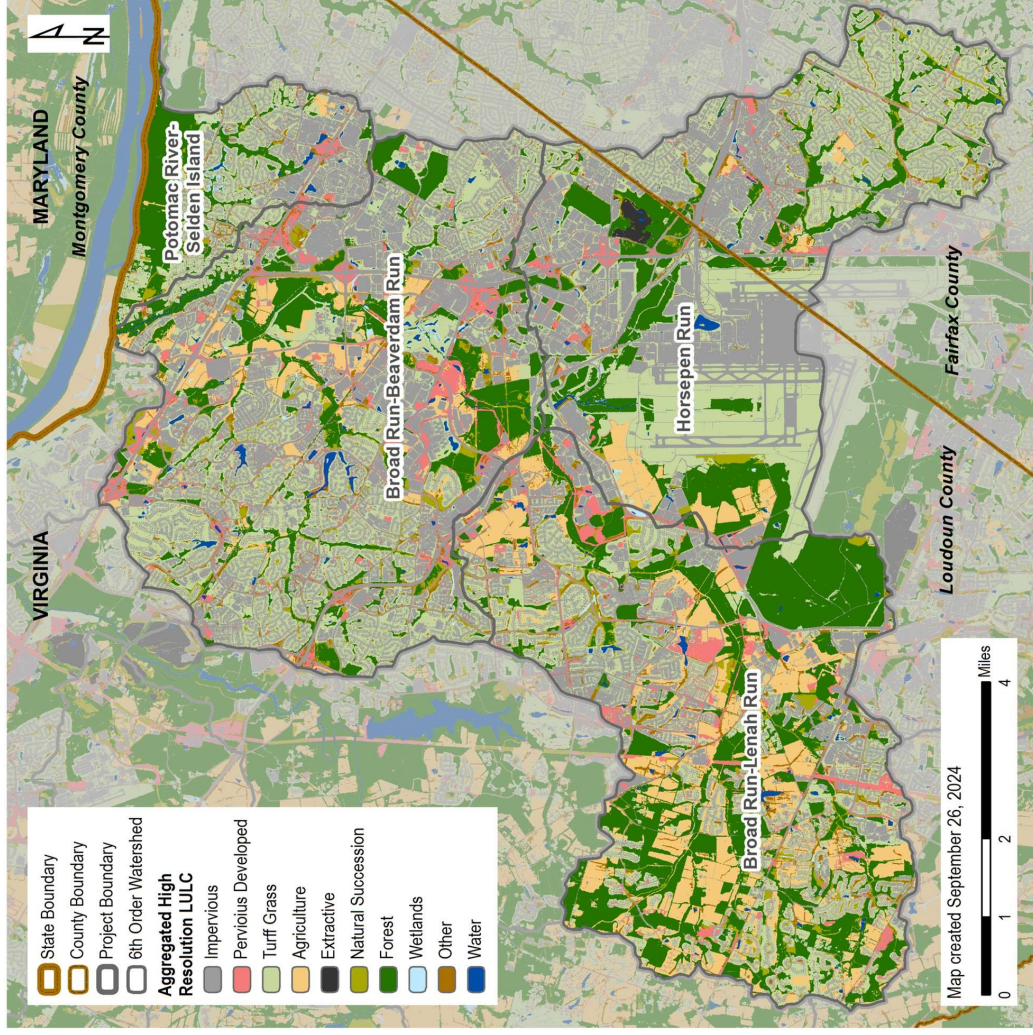
Watershed Boundary



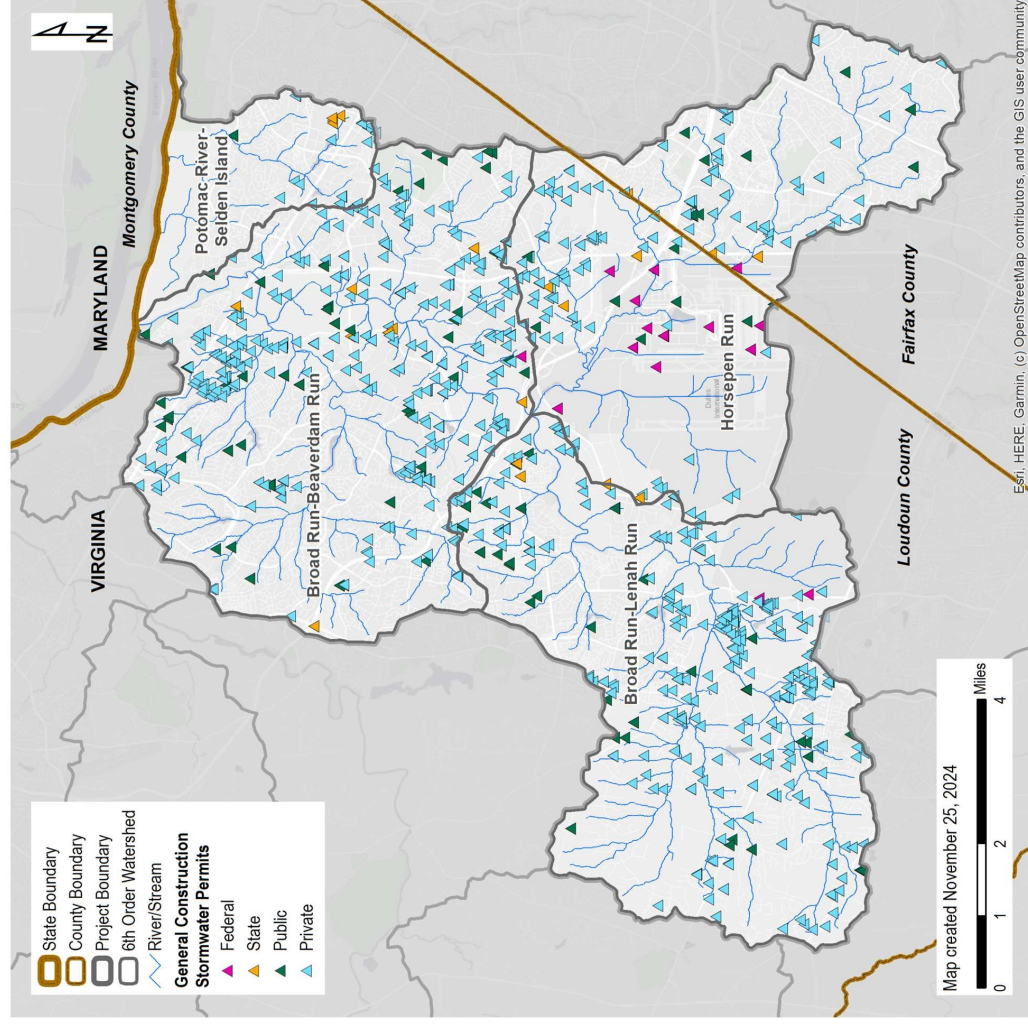
Ecoregions



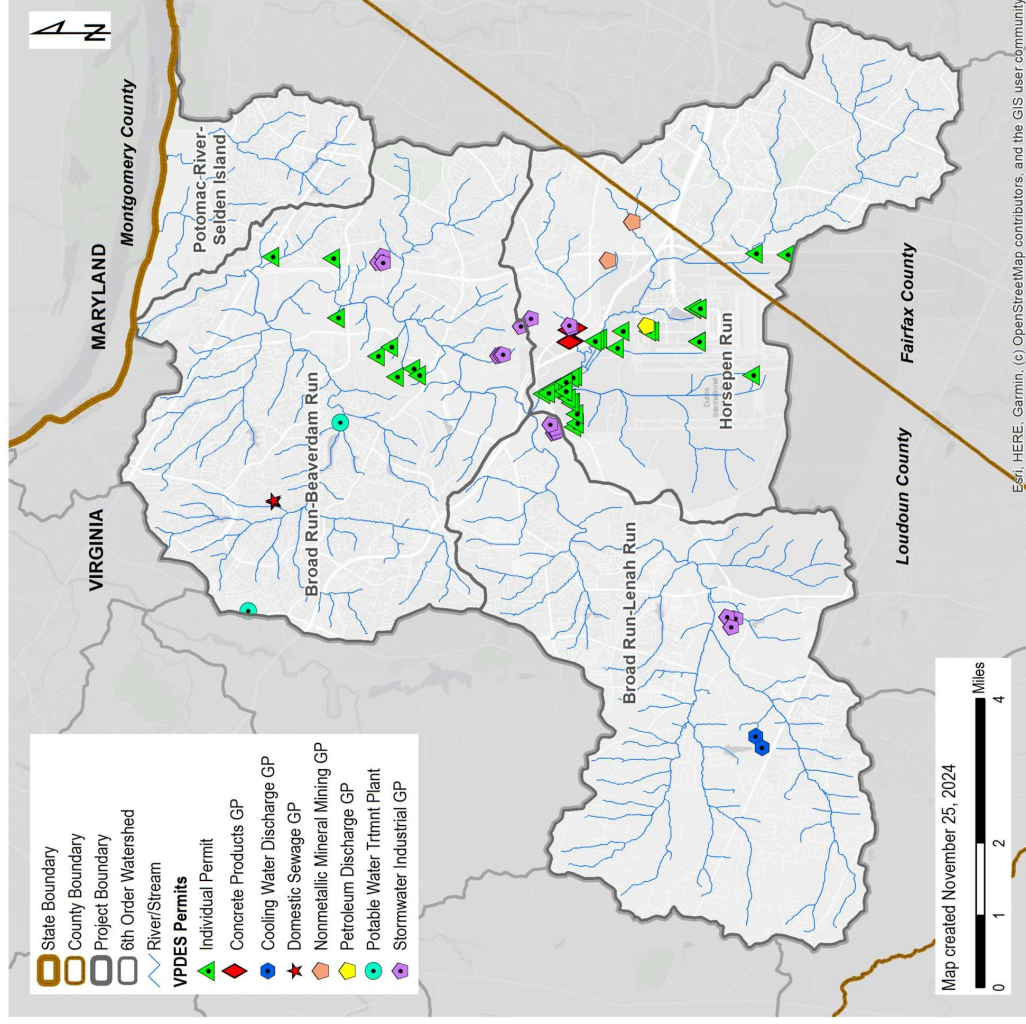
Existing Land Cover



Locations of Construction GP



Locations of Permitted Discharges



Authorized Discharges

Permit Number	Facility Name	Permit Type	Subwatershed
VA0089541	MWAA - Washington Dulles International Airport	VPDES IP	Horsepen Run
VA0091383	Broad Run Water Reclamation	VPDES IP	Beaverdam Run
VA0093017	WMATA Silver Line Phase II	VPDES IP	Horsepen Run
VAG110084	Vulcan - Sterling Plant	Concrete Products GP	Horsepen Run
VAG110088	Vulcan - Dulles Plant	Concrete Products GP	Horsepen Run
VAG110103	Titan Virginia Ready Mix LLC – Sterling	Concrete Products GP	Horsepen Run
VAG250162	Microsoft IAD11 Campus	Cooling Water Discharge GP	Lenah Run
VAG406139	Private Residence	Domestic Sewage GP	Beaverdam Run
VAG406509	Private Residence	Domestic Sewage GP	Beaverdam Run
VAG830621	Enterprise Rent-A-Car - Dulles Airport	Petroleum Discharge GP	Horsepen Run
VAG840095	Loudoun Quarries	Nonmetallic Mineral Mining GP	Horsepen Run

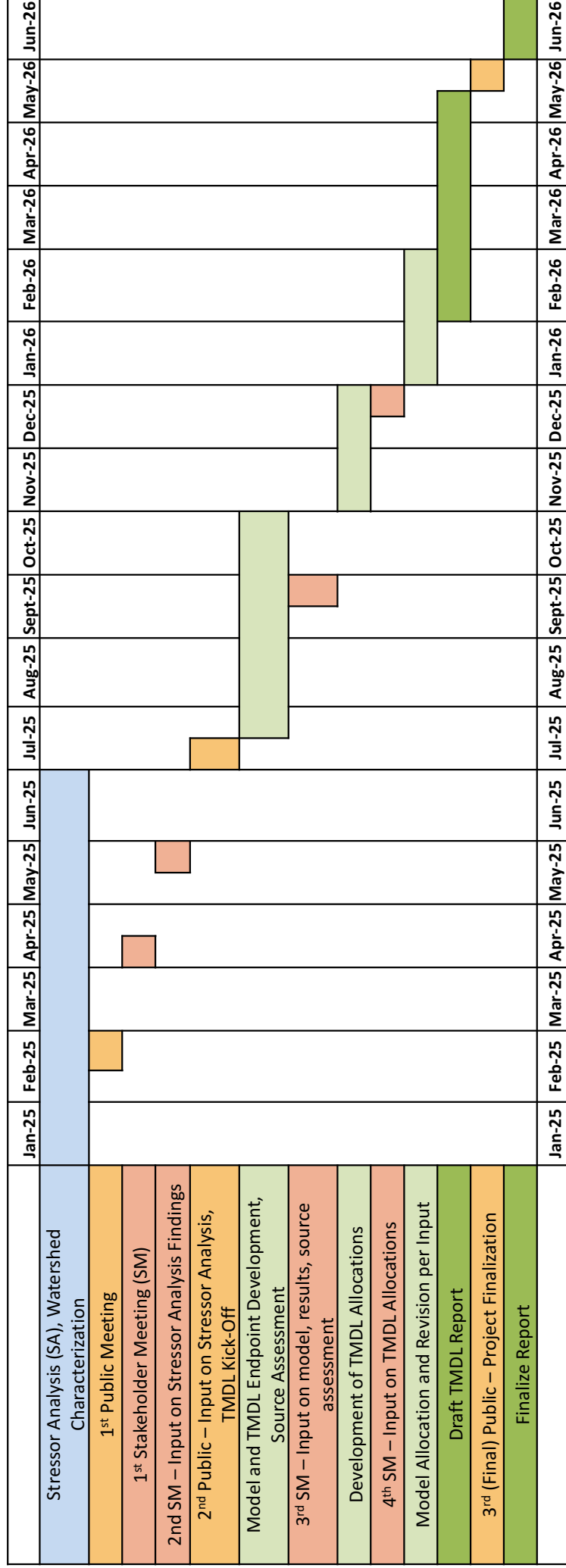
Authorized Discharges

Permit Number	Facility Name	Permit Type	Subwatershed
VAR050906	Trowbridge Steel Company Limited Liability Company	Stormwater Industrial GP	Horsepen Run
VAR051068	US Postal Service-Dulles Vehicle Maintenance Facility	Stormwater Industrial GP	Beaverdam Run
VAR051088	Waste Management of Virginia – Sterling	Stormwater Industrial GP	Beaverdam Run, Horsepen Run
VAR051145	TTM Technologies North America LLC	Stormwater Industrial GP	Beaverdam Run
VAR052420	Amazon com Services LLC - DDC4	Stormwater Industrial GP	Lenah Run
VAR052461	Amazon com Services LLC - DDC4 1	Stormwater Industrial GP	Lenah Run
VAR052545	Potomac Metals Inc	Stormwater Industrial GP	Lenah Run
Municipal Separate Storm Sewer Systems (MS4) Facilities			
VA0088587	Fairfax County	MS4 IP	Fairfax County
VAR040060	Herndon Town	MS4 GP	Fairfax County
VAR040067	Loudoun County	MS4 GP	Loudoun County



Timeline and Next Steps

Project Timeline





Next Steps

- Public Comment Period: (Feb 28 – March 31)
 - Seeking your input on:
 - Interest in participating in stakeholder meetings?
 - Additional data or information to inform stressor analysis?
 - Email: Amanda.R.Thompson@deq.virginia.gov
- Hold Technical Advisory Group (TAG)/Community Engagement (CE) meeting:
 - Share results on stressor analysis and the most probable stressor(s) identified
 - Obtain feedback on information shared