



A Landscape Assessment of Nutrient Loading Potential to the Chesapeake Bay

Evaluating Non-Point sources on Army Installations

**Alexis Coplin¹, Natalia Almodóvar Rosario², Dr. Terry Sobecki¹, Dr.
David Soballe³**

1. USACE Cold Regions Research and Engineering Laboratory (CRREL)
2. University of Puerto Rico Mayagüez Campus
3. USACE Environmental Laboratory (EL)



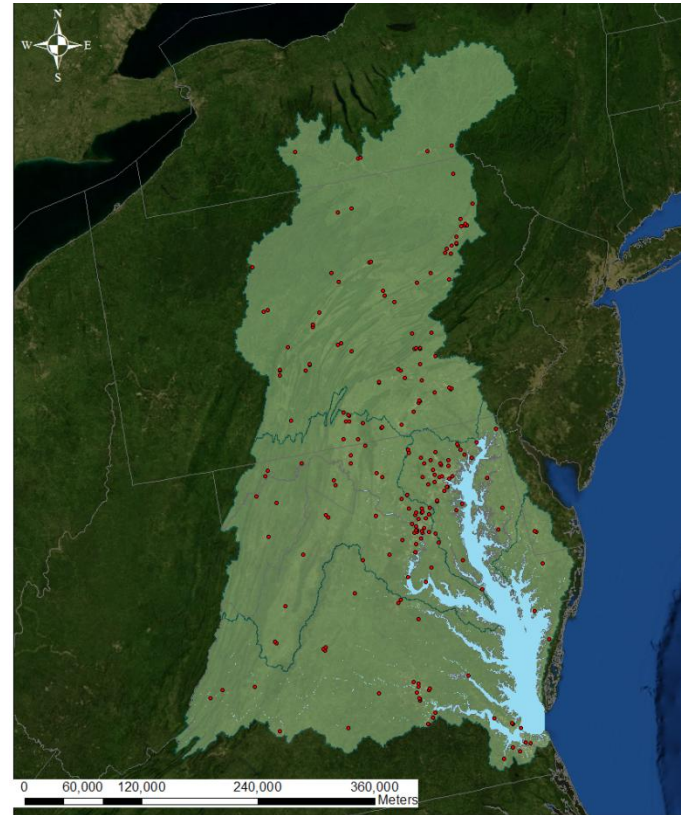
Background

Purpose: Chesapeake Bay TMDL

- Executive Order 13508 → DoD Chesapeake Bay Action Plan

Objective: Develop assessment method to identify installation land areas with nutrient export potential

- 86 installations*
- Approx. 420,000 acres*
- 1% of Bay watershed*



*From DoD Chesapeake Bay Strategic Action Plan, 2008

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TMDL

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

- **Load Allocation** consists of non-point sources
- Includes natural and anthropogenic nutrient sources
- Distribution across landscape is heterogeneous

Construction



Soil erosion & nutrient runoff



Stream Bank Erosion

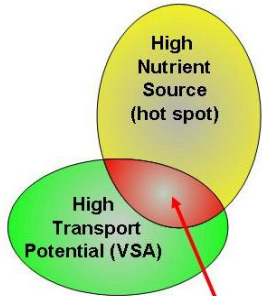
Point Sources





Methods and Materials

Schematic of Critical Source Area Concept



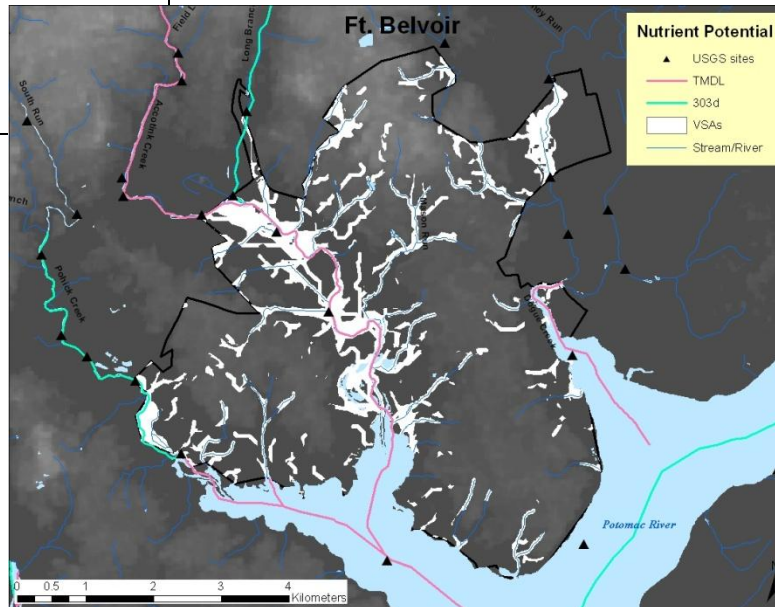
The portion of the land in a watershed most likely to contribute nutrients to surface waters during storm events

Nutrients in saturation excess runoff

Critical Source Area

Land Cover/Use	Class	Terrain Surface Nutrient Levels		
		Background	Medium	High
Agriculture/other	7			X
Urban/Built Up	6			X
Barren/Sparsely vegetated	5			X
Forest	1,2,15	X		
Grassland	4	X		
Wetland	9,14		X	

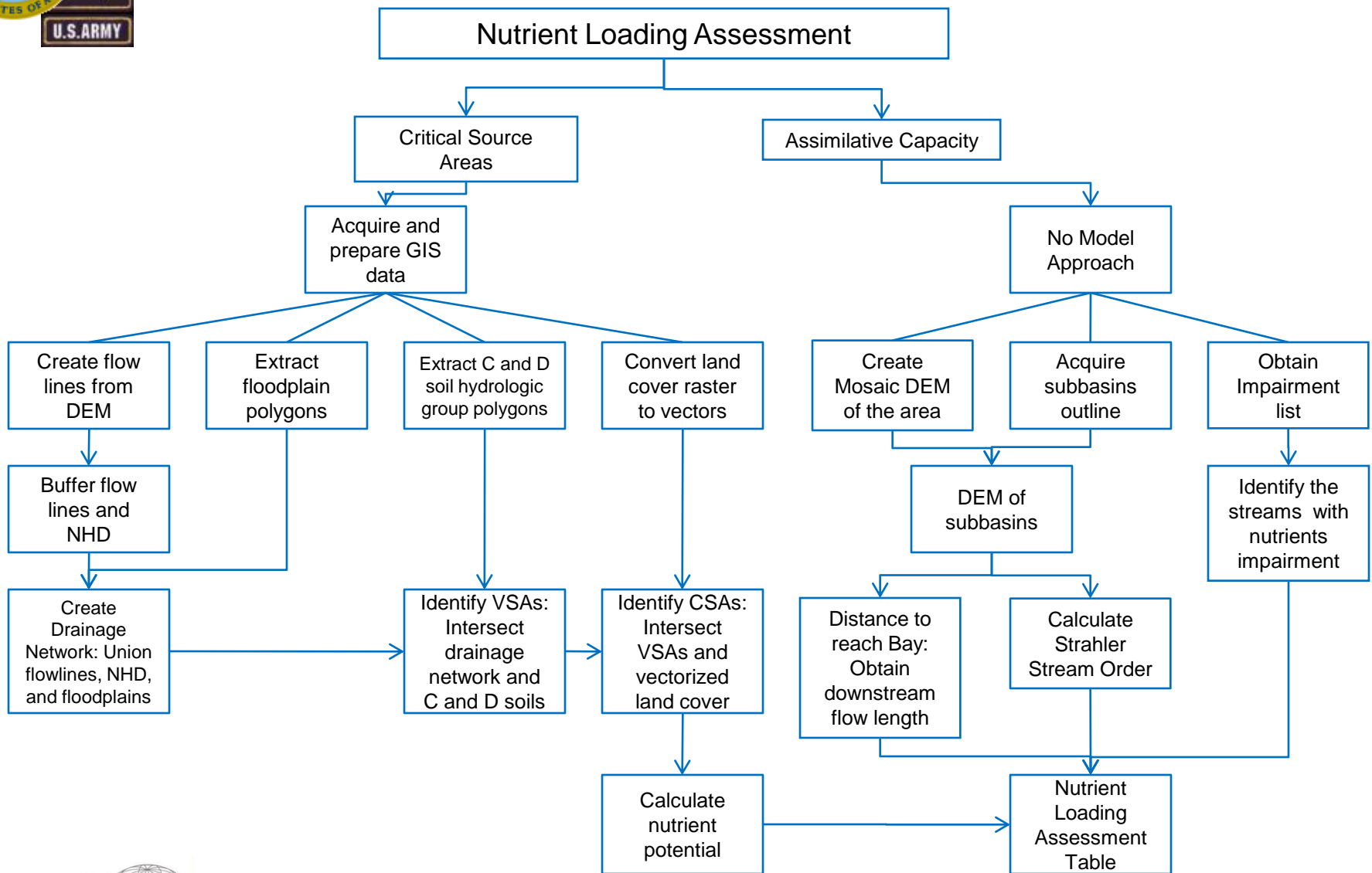
Based on Gburek et al., 2000



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Methods and Materials

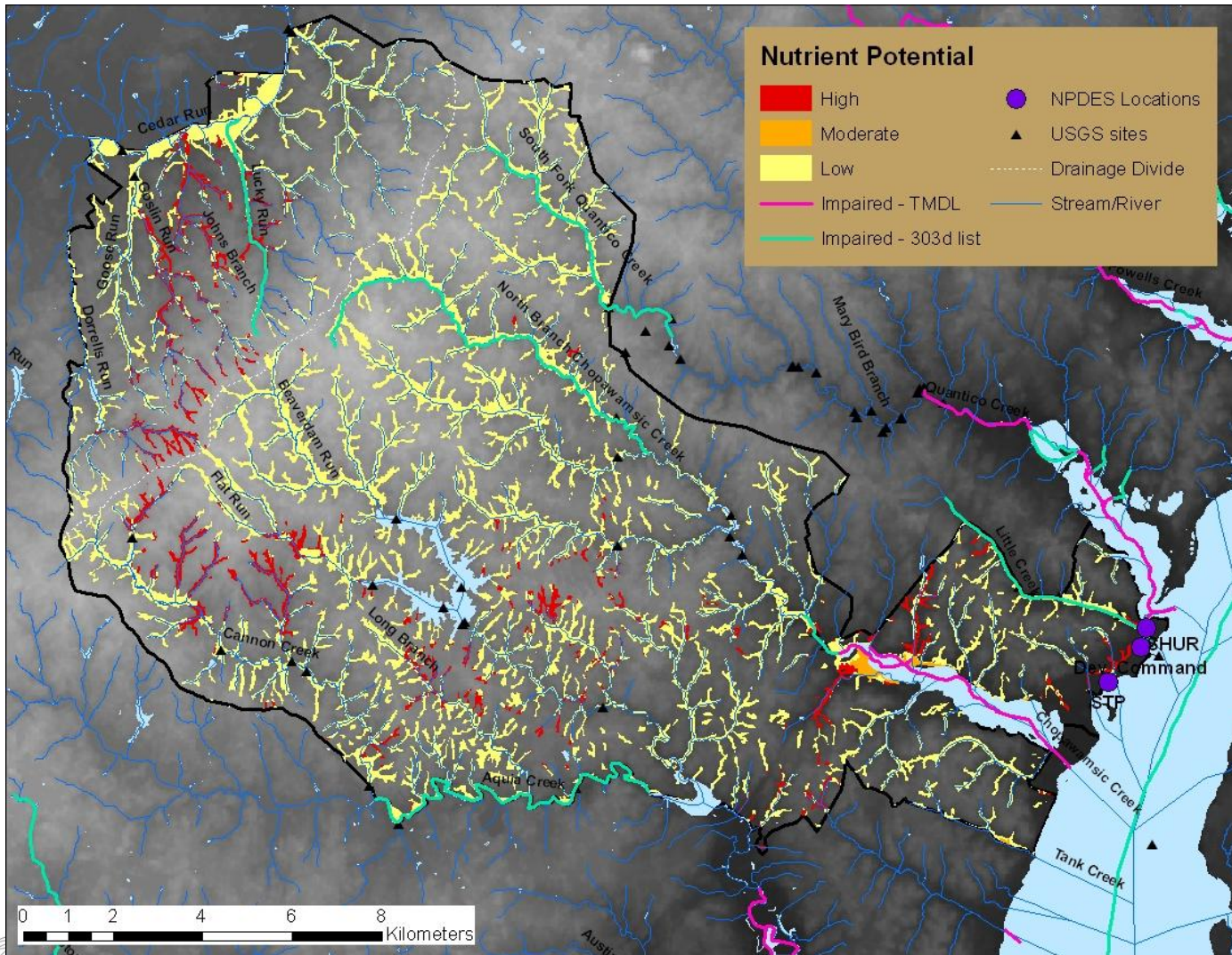


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Results

Marine Corps Base Quantico (MCBQ)

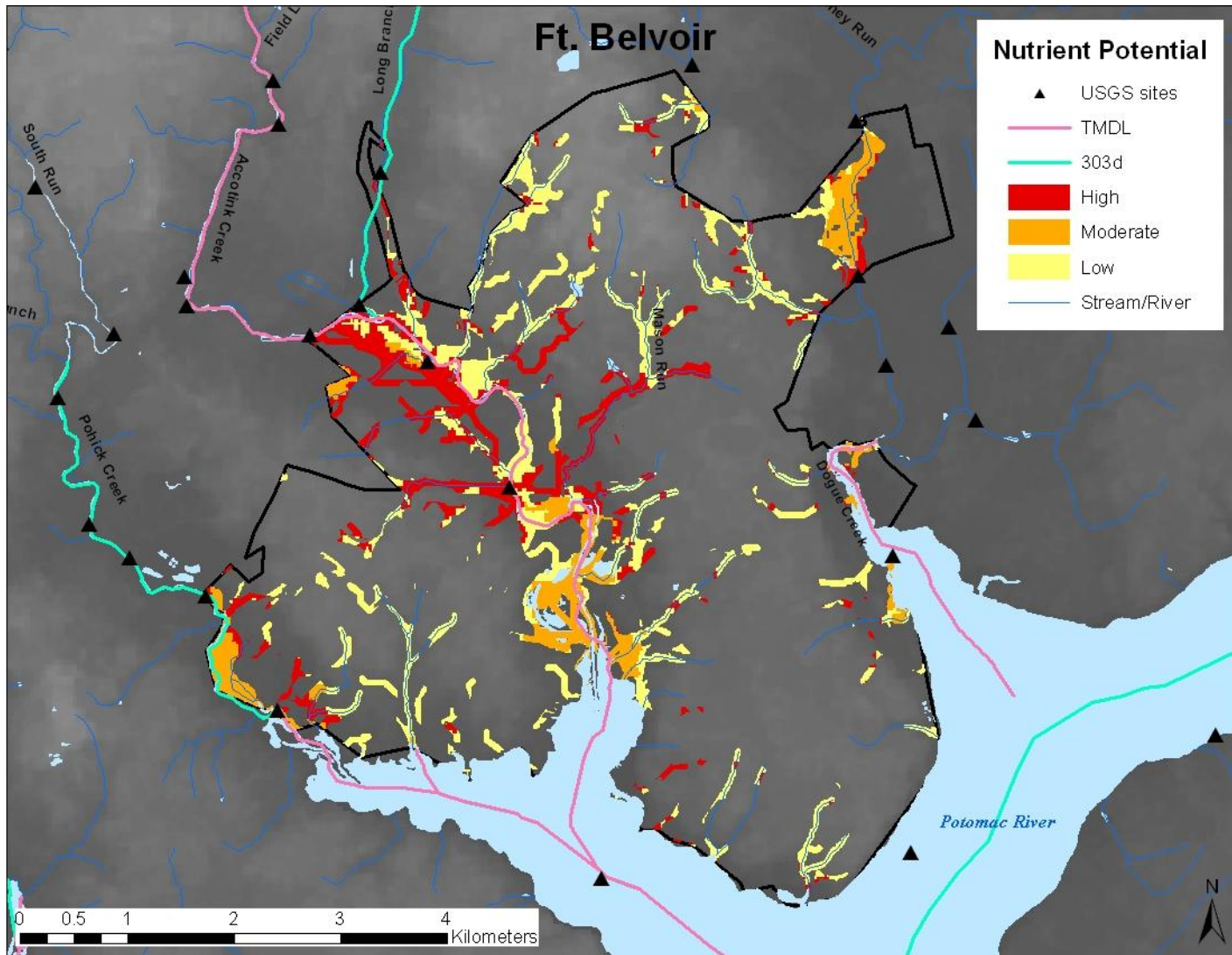


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Results



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Results

Available 305(b) report/303(d) list impairment data MCBQ

Waterbody	Impairment	Designated Use(s)
Aquia Creek	PCBs, E. Coli, Fecal Coliform, Chloride	Fish consumption, recreation, aquatic life
North Branch Chopsawamsic Creek	E. Coli	Recreation
Chopsawamsic Creek	Fecal Coliform, pH, PCBs	Recreation, aquatic life, fish consumption
Little Creek	E. Coli	Recreation
Lucky Run	Benthic macroinvertebrates bioassessment	Aquatic life
Quantico Creek	E. Coli, PCBs, Estuarine/sediment bioassessments	Recreation, fish consumption, aquatic life
South Fork Quantico Creek	E. Coli	Recreation
Potomac River Middle Tidal	Metals, Nutrients, Suspended Sediment	

Fort Belvoir

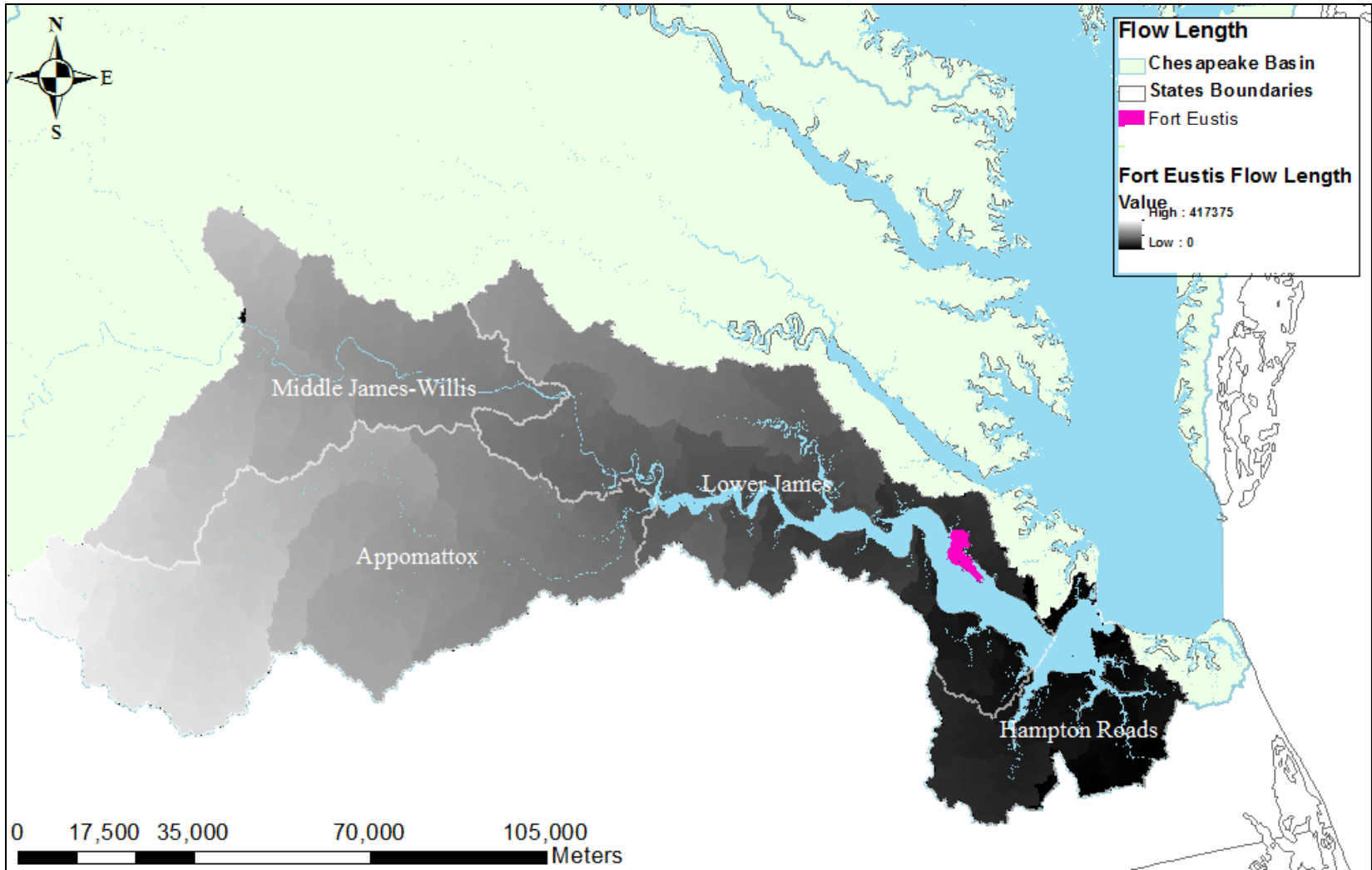
Waterbody	Impairment	Designated Use(s)
Dogue Creek	E. Coli, PCBs TMDL for PCBs set	Recreation, fish consumption
Accotink Bay	PCBs	Fish consumption
Accotink Creek	Benthic macroinvertebrates bioassessment, E. Coli	Recreation, aquatic life
Pohick Bay	PCBs, benzo(k)fluoranthene	Fish consumption
Pohick Creek	E. Coli	Recreation
Long Branch	E. Coli	Recreation
Gunstone Cove	E. Coli, PCBs TMDL for PCBs set	Recreation, fish consumption
Potomac River Upper Tidal	Biological (impaired biota), nutrients	

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Results



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Conclusions

- **Developed first order assessment method**
 - **First step in monitoring and remediation efforts**
 - **Provides basis for planning and implementation of spatially explicit BMPs**
 - **Provides common geospatial framework for contrasting different installation in terms of their individual impact on the Bay TMDL**
 - **Completed using existing geospatial data and hydrologic information**