

Coordinating ESD's and WIP with Smart Growth and Growing

**Caroline County's approach to Watershed Plan
Implementation**

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Caroline County Department of Planning & Codes**

**MPCA Annual Meeting
November 2011**

Caroline County Land Use

Land Use

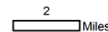


Agricultural: 78%
Residential: 14%
Exempt: 6%
Commercial: 1%
Industrial: .3%

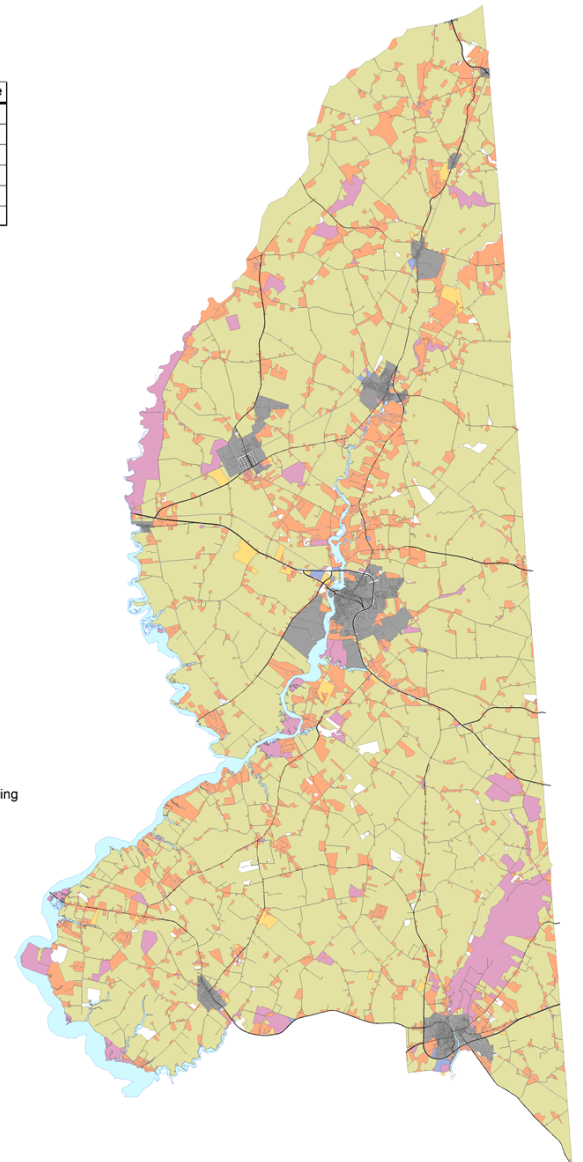
Caroline County, MD Land Use

Land Use	Acreage	Percentage
Agricultural	154,785.06	77.46%
Commercial	2,562.01	1.28%
Exempt	11,187.46	5.6%
Industrial	507.64	0.25%
Residential	27,372.87	13.7%
Unknown	3,416.98	1.71%

Land Use

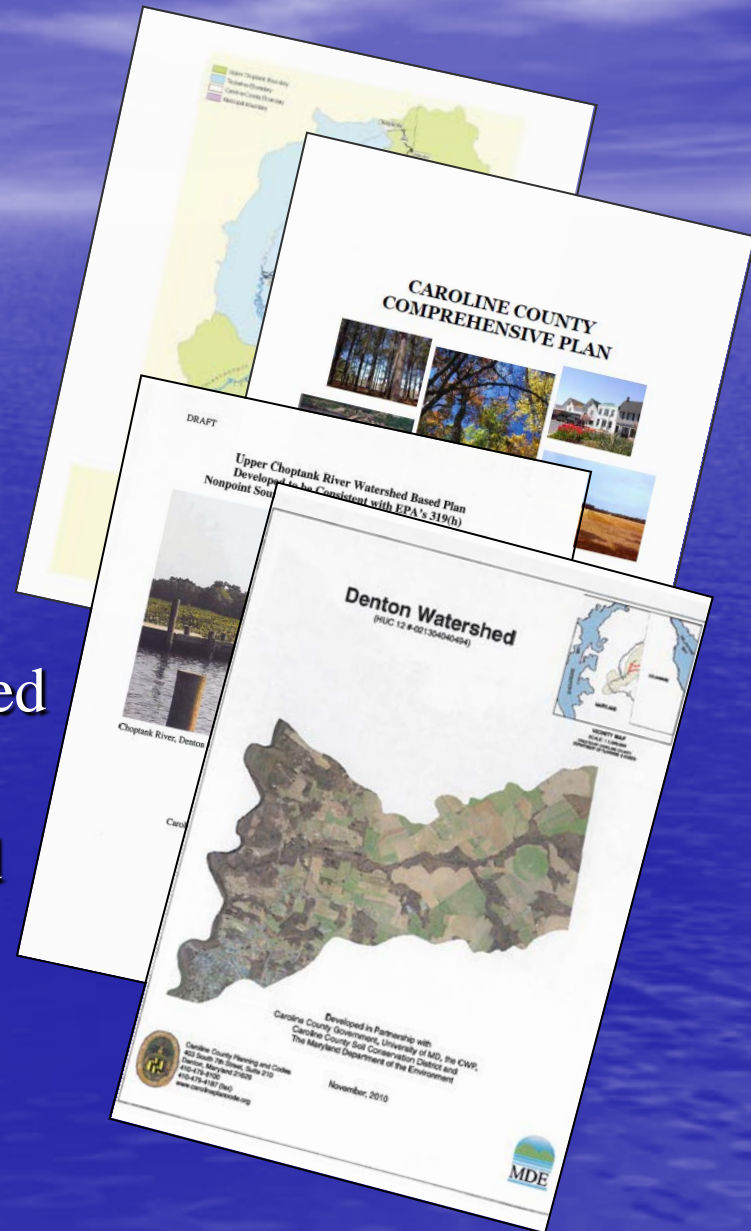


Caroline County
Department of Planning, Codes, and Engineering
December, 2008



Watershed Planning in Caroline County

- 2006 Water Quality Improvement Report
- 2007 Upper Choptank & Tuckahoe Creek Watershed Characterizations
- 2009 Water Resources Element
- 2010 Upper Choptank River Watershed Plan 2010 WIP Phase I Pilot
- 2011 County-wide 12-digit watershed plans & analysis
- 2011 WIP Phase II (in progress)



Caroline County WIP Phase II

- Agricultural Component: MDA, SCD, Caroline County Extension, and local agricultural community working on this piece
- Municipal WWTP: 2 upgrades completed or in progress for Major WWTP
- Septic Systems: Regional WWTP Planned for the North County region to include 5 towns and some County properties (~\$25M)
- Urban Nonpoint Source Pollution: 10 incorporated municipalities and the County must reduce 44,000 lbs of Nitrogen

Non-point Urban Strategies

How do we address existing development?

- 12-digit assessments that include:
 - GIS Analysis of land use
 - On-the-ground Assessments
 - Load reduction estimates
 - Water quality monitoring before & after
 - Time & Money
- Start implementation with publicly owned properties

12-digit Watershed Planning

Figure 2: Upper Choptank Targeted Subwatersheds

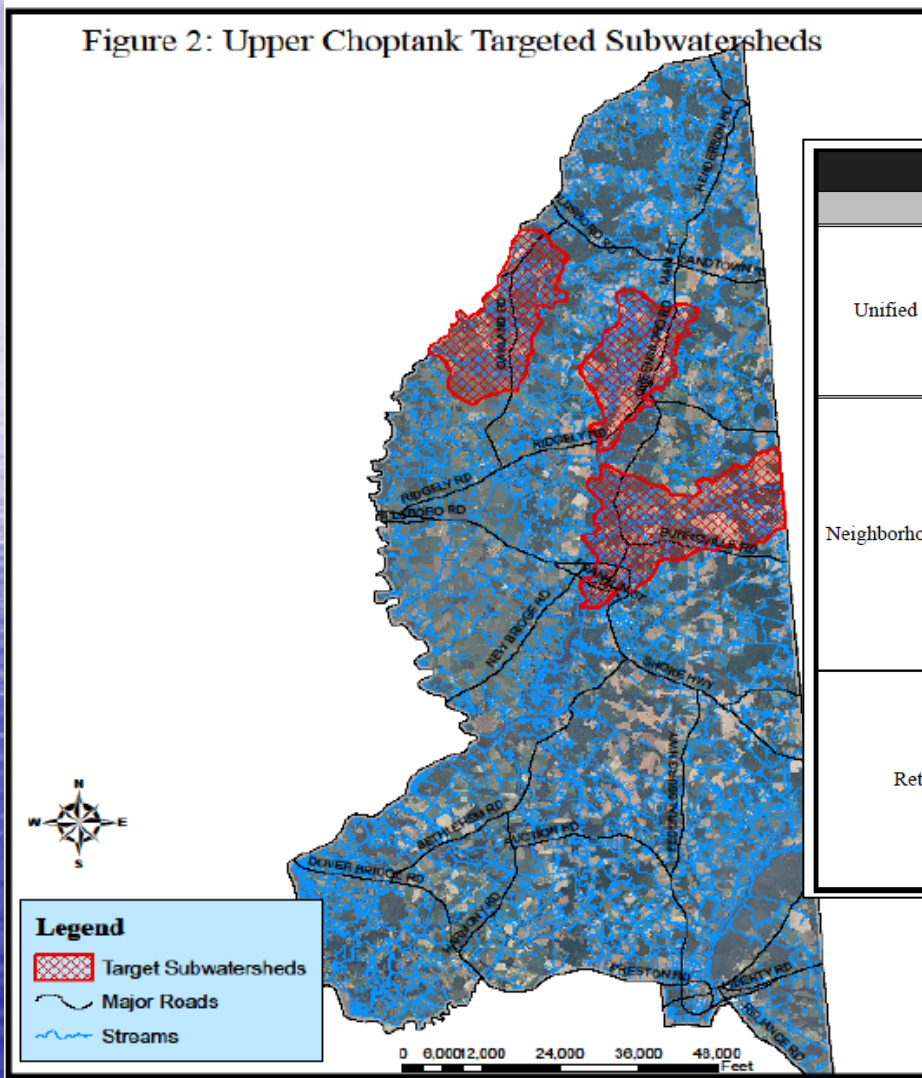


Table 1: General Findings from Field Assessments

	<ul style="list-style-type: none"> Evaluated 16 stream reaches, 3.31 miles
Unified Stream Assessment	<ul style="list-style-type: none"> Completed site impact evaluation at 9 stream crossings, 2 trash sites, 2 channel modification, 1 impacted buffer, and 8 stormwater outfalls Several opportunities to implement Regenerative Stormwater Conveyance projects were identified which would treat large "urban" areas.
Neighborhood Source Assessment	<ul style="list-style-type: none"> 4 Neighborhoods in Oakland, 5 Neighborhoods in Greensboro, and 8 neighborhoods in Denton Pollution severity index: (0 Severe, 3 High, 12 Moderate, 1 Low) Neighborhood restoration potential (2 High, 13 Moderate, 2 Low) Typical neighborhoods were single family homes developed in a wide range of eras (1940s-present) Types of recommendations include education on lawn care, demonstration rain gardens, septic system maintenance, and turf reduction.
Retrofit Inventory	<ul style="list-style-type: none"> Investigated 13 candidate sites in Greensboro and 27 candidate sites in Denton Created retrofit concepts for 22 sites. Focus on water quality treatment and public demonstration sites with an educational component. Types of recommended retrofits include bioretention, wetlands, filtration practices, bio-swales, and coastal plain outfalls.

CWP & Riverkeeper Subwatershed Work

Table 7: Summary of Neighborhood Pollution Prevention Opportunities

Site ID	Location Description	Pollution Severity	Restoration Potential	Residential Tree	Restoration Projects				
					Rain Garden	Lawn Management	Bio-Swale	Septic Outreach/Upgrade	Retrofit
O-700	Carlyn Dr	High	Moderate	⊙	⊙	⊙		⊙	
O-701	West Bridge	Moderate	Moderate	⊙	⊙	⊙	⊙	⊙	
O-702	Fox Chase	Moderate	Low						
O-703	Fox Field Farms	Moderate	Moderate	⊙					
G-600	Greensboro/Sunset Ave	Moderate	Moderate						
G-601	Infrastructure Only Lot	Low	High	⊙					
G-602	Cedar Run	Moderate	Moderate						
G-603	Wood Duck Dr	Moderate	Moderate						
G-604	Elmore Ct	High	Moderate	⊙					
D-500	Downtown Denton	Moderate	Moderate						
D-501	Mallard Landing	Moderate	Moderate						
D-502	Kathryn Ct	Moderate	Moderate						
D-503	Sandy Meadows	Moderate	Moderate	⊙					
D-504	High Street	Moderate	Moderate						
D-505	Wesleyan Center	Moderate	High	⊙					
D-506	Collins Point	High	Moderate	⊙					
D-507	Savannah Overlook	None	Low						



Figure 5: (a) Forested community with mature trees (O-702); (b) newer neighborhood with few trees and stormwater management (G-603); (c) stormwater dry pond in newer neighborhood (G-604) and; (d) large turf areas and roadside swale opportunity (O-703).

Denton/Caroline County DPW Project



- Bioretention in multiple areas
- Treat County-owned property & experience for DPW
- \$77,400 for Design & Implementation

Denton Municipal Parking Lot

- Install bioretention basin, filter strips
- Site is nearly 100% impervious currently
- Demonstration Site due to visibility to Public
- Experience for DPW Staff
- \$73,400 Design + Construction



Greensboro Municipal Parking Lot



- Install bioretention basin
- Site is nearly 100% impervious currently
- Demonstration Site due to visibility to Public
- Experience for DPW Staff
- \$38,500 Design + Construction

Greensboro DPW Garage



- Install bioretention basin, remove asphalt, treat rooftop runoff
- Site is 100% impervious currently
- Demonstration Site due to visibility to Public
- Experience for DPW Staff
- \$48,400 Design + Construction

Greensboro Public Library



- Install bioswale and roadside ditch
- Will capture both onsite and road runoff
- Demonstration Site due to visibility to Public
- Experience for DPW Staff
- \$39,400 Design + Construction

Nitrogen Reduction vs. Costs?

5 projects

**\$277,000 for Design &
Construction**

**Less than 100 lbs/N per year
reduced**

How will we handle this?

- Complete analysis to determine if the required reduction is achievable
- Implement ordinance change to ensure ESD is implemented at construction phase to avoid retrofit costs
- Try different types of projects (e.g. Roads)
- Look for the “biggest bang for the buck”
- Nutrient trading between sectors

Barriers to Achievement

- Focus on the Chesapeake Bay vs. local water quality
- Getting government to do things differently
Paying for retrofits
- Staff must stay involved in project
- Approved vs. new innovative BMPs

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