



Melissa S. Peacor
County Executive

COUNTY OF PRINCE WILLIAM

OFFICE OF EXECUTIVE MANAGEMENT

1 County Complex Court, Prince William, Virginia 22192-9201
(703) 792-6600 Metro 631-1703 FAX: (703) 792-7484


12-A

BOARD OF COUNTY SUPERVISORS

Corey A. Stewart, Chairman
Michael C. May, Vice Chairman
Maureen S. Caddigan
Pete Candland
W. S. Wally Covington, III
John D. Jenkins
Martin E. Nohe
Frank J. Principi

June 10, 2014

TO: Board of County Supervisors

FROM: Thomas Bruun 
Director of Public Works

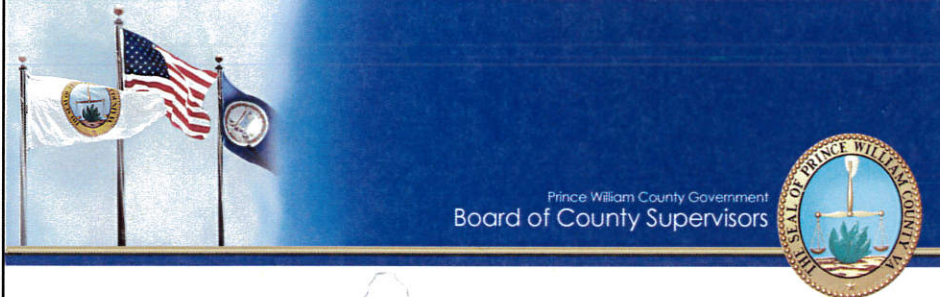
THRU: Melissa S. Peacor
County Executive

RE: Occoquan Watershed Presentation

The attached Occoquan Watershed Study Presentation was requested by Supervisor May to be presented to the entire Prince William Board of County Supervisors on June 17, 2014. The presentation is for informational purposes only and addresses how such studies are a critical planning tool for identifying and prioritizing watershed improvements for water quality and quantity. Attached please find the presentation that has been prepared in response to Supervisor May's request.

Attachment: As noted

TB/MTA/lyc/Occoquan Watershed Presentation memo 6-10-14.docx



Prince William County Government
Board of County Supervisors


Occoquan Watershed Study of 4 Subwatersheds

June 17, 2014

*Marc T. Aveni,
Chief, Environmental Services
Department of Public Works*

Presentation Overview

- Watershed Improvement Program
- Watershed Study Detail
- Study Results
- Costs
- Study & Funding Limitations
- Conclusions



Occoquan River Subwatersheds
Prince William County, Virginia

Map Legend:
■ Watershed
■ Subwatershed
■ Stream
■ Road
■ Rail
■ Water Body
■ Airport
■ School
■ Hospital
■ Park
■ Cemetery
■ Other

Map Source: www.watershedimprovement.com

| 2 |

Watershed Improvement Program

- Funded by SW Management Fee via CIP (\$965,000/yr)
- Federal and state regulatory requirements/permits
 - ◆ Municipal Separate Stormwater Sewer System (MS4) – EPA/DEQ
 - ◆ Chesapeake Bay TMDL (Total Maximum Daily Load)
- Objectives
 - ◆ Improve water quality
 - ◆ Address water quantity management
 - ◆ Maintain/improve water quantity control (flooding)
 - ◆ Downstream channel protection
- Implementation of watershed improvements
 - ◆ Retrofits of existing stormwater management facilities
 - ◆ Stream restoration
 - ◆ Riparian reforestation

| 3 |

Watershed Study

- Component of Watershed Improvement Program
- Identify improvement opportunities
- Focused particularly on urbanized areas
- Objectives:
 - ◆ Assess overall efficacy of stormwater infrastructure
 - ◆ Evaluate the health of streams and other natural resources
 - ◆ Identify CIP projects and estimate costs
 - ◆ Results used to prioritize projects based on available funding



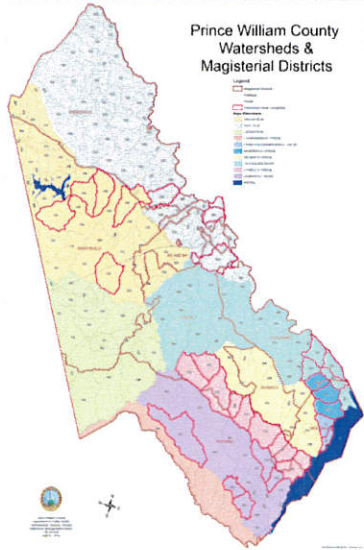
Stream Restoration – Cow Branch

| 4 |

Recent Watershed Studies/Projects

- Powells Creek- SWM Pond #190 Retrofit
- Marumsco/ Farm Creek- East Longview Stream Stabilization
- Bull Run Lower- Sudley Place Reforestation with HOA
- Quantico Creek- Dewey's Creek Stream Restoration with grant
- Broad Run- SWM Pond #494 Retrofit
- Occoquan- To be discussed during this presentation

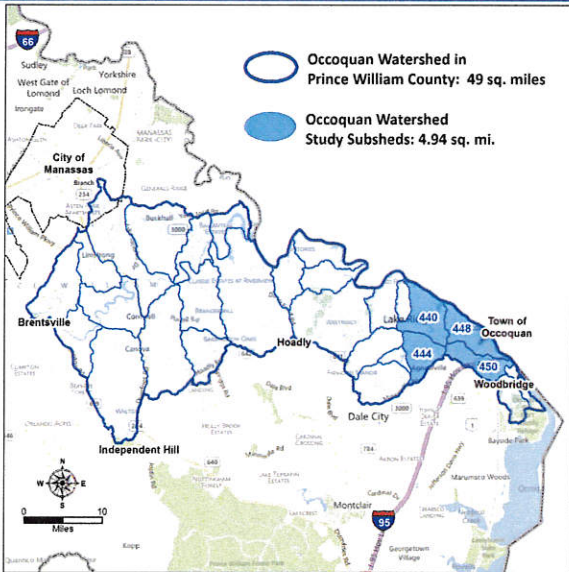
- 222 Subwatersheds in County
 - ◆ 37 subwatersheds studied to date
 - ◆ Approximately 50% of the urbanized subwatersheds studied



Prince William County Watersheds & Magisterial Districts

| 5 |

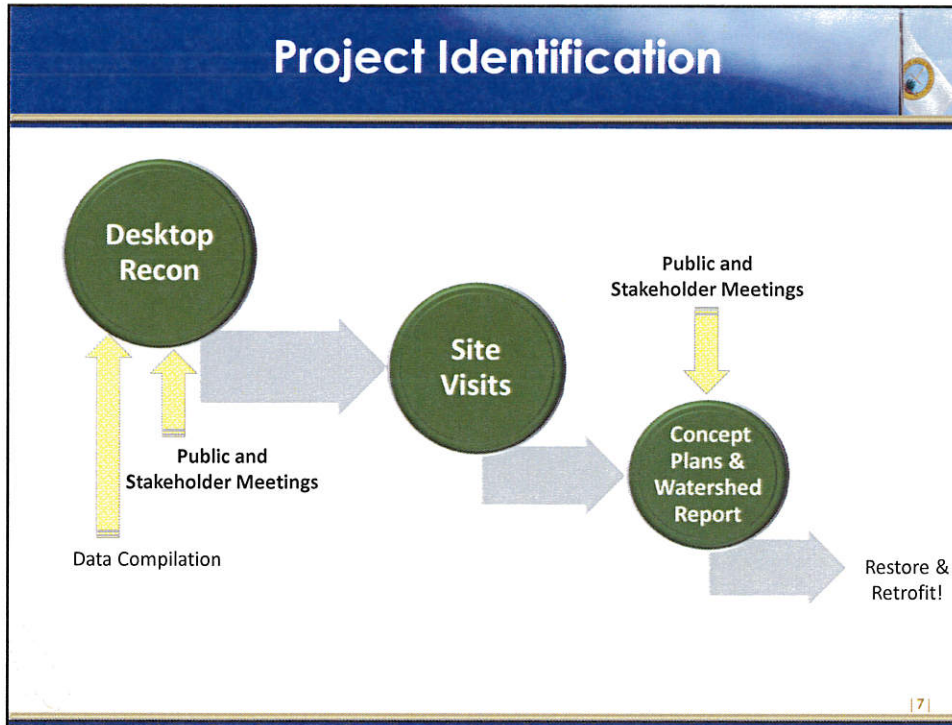
Focus of Occoquan Study



Occoquan Watershed in Prince William County: 49 sq. miles

 Occoquan Watershed Study Subheds: 4.94 sq. mi.

| 6 |



Existing Conditions Analysis

- Existing Impervious Surfaces
- Stormwater Management Facilities
- Water Quality Monitoring Stations
- Forest Cover
- Topography
- Soils and Geologic Features
- Floodplains
- Maintenance Responsibility (Public/Private)
- Land Use/Zoning
- Subwatershed Areas

Study Area – 4 Subwatersheds

| 8 |

Priority Matrix for SWM Facilities

Criteria	Most Desirable	Moderate	Least Desirable
Ownership	Publicly maintained	HOA Open Space	Privately maintained
Facility Type	Dry Pond	Wet Pond	Underground facilities
Facility Age	> 10 years	2-10 years	< 2 years
Outlet Control	No BMP, 10 year control only	No BMP, 2 and 10 year controls	0.5 inch + BMP + 2 and 10 year controls
Drainage Area	10-100 acres	1-10 acres; 100-500 acres	< 1 acre; > 500 acres
Adjacent Land Uses	Open, forested	Landscape	Residential
Percent Impervious	> 30%	10-30%	< 10%

| 9 |

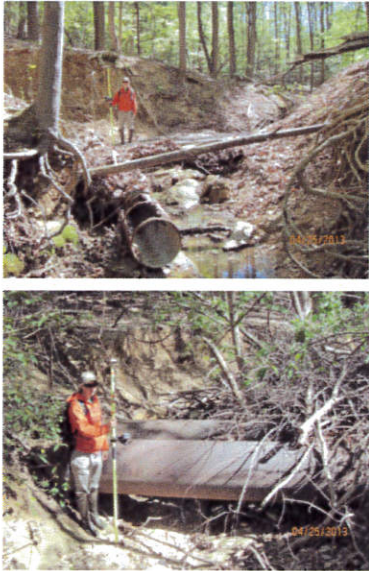
Priority Matrix for Stream Restoration Sites

Criteria	Most Desirable	Moderate	Least Desirable
Ownership	Publicly owned	HOA open space	Privately owned
Adjacent Land Uses	Forested	Maintained	Developed
Available Forested Buffer	> 100 feet	25-100 feet	< 25 feet
Flow Type	Perennial	Intermittent	Ephemeral
Drainage Area	50-500 acres	25-50 acres; 500-800 acres	< 25 acres; > 800 acres
Restoration Length	> 1,000 feet	300-1,000 feet	< 300 feet
Existing % Impervious	> 15%	10-15%	< 5%
Highly Erodible Soils	Highly erodible soils in stream		No highly erodible soils in stream
Construction Accessibility	Short distances from public roads, few required easements		Long, wooded, multiple easements and/or owners

| 10 |

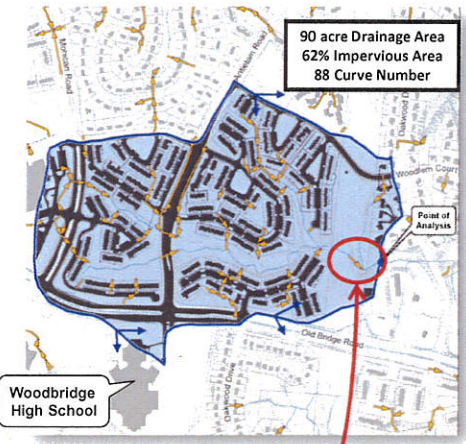
Study Results

- Site Visits
 - ◆ 20 Streams (6 miles)
 - ◆ 20 SWW Facilities
- Projects Compiled into 2 Lists:
 - ◆ Stream Restoration
 - ◆ SWM Water Quality Retrofits
- Lists ranked to determine most compatible for implementation
- Conceptual Plans Developed
 - ◆ 3 SWM water quality retrofits
 - ◆ 6 stream restoration reaches
- Priority Projects Identified
 - 2 SWM retrofits
 - 1 stream restoration



| 11 |

SWM Water Quality Retrofit




90 acre Drainage Area
62% Impervious Area
88 Curve Number

Point of Analysis

Woodbridge High School

SWM Facility #489



| 12 |

Stream Restoration

115 acre Drainage Area
36% Impervious Area

Lake Ridge Middle School

Point of Analysis

Woodbridge High School

Reach 5

131

The map shows a residential area with a stream network. A red box highlights 'Reach 5' on the stream. Two photographs on the right show stream restoration work: the top one shows a large log being placed across a stream, and the bottom one shows a streambed with rocks and logs.

SWM Water Quality Retrofit

SWM Facility #28

Lake Ridge Baptist Church

Point of Analysis

Facility 489

90 acre Drainage Area
40% Impervious Area
84 Curve Number

141

The map shows a residential area with a stream network. A red circle highlights 'SWM Facility #28'. Two photographs on the right show SWM facility construction: the top one shows a large, flat, open area with a large pipe or structure, and the bottom one shows a streambed with rocks and logs.

Cost Estimates

- Projects prioritized based on available funding
- Engineer's estimate for priority projects
- Typically spend half these estimates by utilizing in-house design and construction services
- Annual SWM Fee funding - **\$965,000**
- Proffers (FY15 Allocation) - **\$113,024**
- Grants
 - ◆ National Fish and Wildlife Grant - **\$330,750**
 - ◆ Stormwater Local Assistance Fund - **\$280,000**
- Other funding sources
 - ◆ Public/private partnerships – Prince William Environmental Bank
 - ◆ Service Authority contributions

Water Quality Retrofits - Engineer's Estimate		
Facility 28	Estimated cost:	\$ 600,000
	Cost per lb TP ¹ :	\$ 10,000
Facility 489	Estimated cost:	\$ 519,000
	Cost per lb TP ¹ :	\$ 8,000

Stream Restoration - Engineer's Estimate		
Reach 5	Estimated cost:	\$ 1,441,000
	Cost per lb TP ¹ :	\$ 12,000

| 15 |

Study Limitations

- Not a flooding study
- Town of Occoquan approached for add-on Flooding Assessment, but declined to participate
- Scope of Flood Assessment proposed by consultant:
 - ◆ Determine the flow volume from the 3 subject watersheds
 - ◆ Evaluate the Town's storm sewer network
 - ◆ Study the backwater effects of the Occoquan River
- Cause of flooding likely a combination of all three, according to consultant

| 16 |

Conclusions

- Retrofit and Repair SWM Facilities
 - ◆ Develop construction plans for the 3 conceptual projects
 - ◆ Monitor and/or perform necessary maintenance on other facilities
- Stream Restoration Projects
 - ◆ Develop construction plans for the 6 conceptual stream restorations
 - ◆ Seek grant and proffer funding to extend SWM fee use
- Repair and Monitor Exposed Utilities and Infrastructure

- Questions?