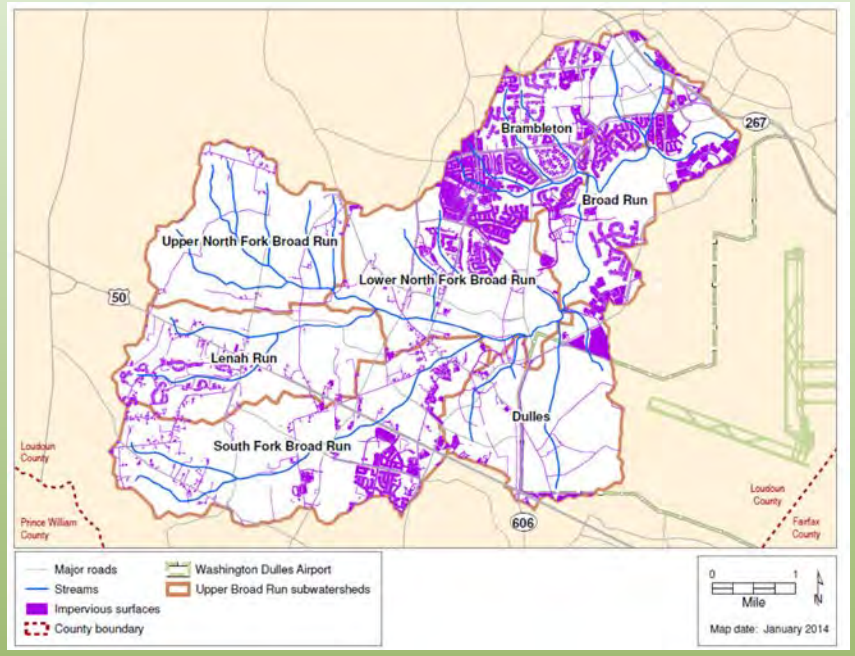
Upper Broad Run Watershed Management Plan



Watershed Partnership Workgroup Meeting #4

Nancy Roth, M.S., PMP
Alexi Boado, M.S., M.P.A.

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June 5, 2014 – Brambleton community building, Palladian Blue Terrace

Agenda

1. Welcome and introductions
2. Overview of watershed plan development process
3. Updates to watershed recommendations
   - Stormwater pond conversions and other upgrades
   - Stream restoration
   - Community-based actions
4. Updates to pollutant load and load reduction estimates
   - Reflect updated recommendations
   - Future land use
5. Planning for community outreach meeting (week of June 23)
6. Other work in progress
   - Draft watershed plan
   - Presentation to WRTAC June 23
7. Beyond the watershed plan – implementation

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Overview of Watershed Plan Steps

- **Public Involvement**
  - **Community meeting (September 2013), 1 more planned (June 2014)**
  - **Watershed Partnership Workgroup meetings, 3 to date (Oct. 2013, Jan. 2014, April 2014), 1 today (June 2014)**
  - **WRTAC presentation (Feb. 24, 2014) + 1 more planned (June 23, 2014)**
- **Development of vision, goals, and objectives**
- **GIS investigations**
- **Field investigations**
- **Development of proposed watershed management actions and strategies**
- **Modeling pollutant loads and expected load reductions**
- **Interim report draft (reviewed by WPW), now final**
- **Refine proposed actions and strategies**
- **Model future land use and pollutant loads**
- **Watershed plan report (draft review by WPW)**

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Updates to Watershed Recommendations

- Stormwater pond conversions and other stormwater management upgrades
- Stream restoration
- Community-based actions

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Stormwater pond conversation and other stormwater management upgrades

- Seeking opportunities to enhance water quality treatment in existing stormwater infrastructure
- Current database of BMPs (94) reviewed to select best candidates for field investigation
  - Reviewed database and other information to confirm pond subtype (e.g., Dry Pond v. Dry Ponds with Extended Detention)
- 28 small and/or “manufactured” BMPs
  - Small drainage = not cost effective to update
- 66 “ponds”
  - Large drainage areas = cost effective to update

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66 “Ponds”

- Types
  - 19 wet ponds
  - 46 “dry” ponds
  - 1 wetland
- Ownership
  - 35 County-owned
  - 28 privately-owned
  - 3 school-owned
- Screening for field visit
  - Type of pond (efficiency), date of construction, aerial pictometry, conversations with County staff
  - = 35 “ponds” field visited of 66
    - Budget limited

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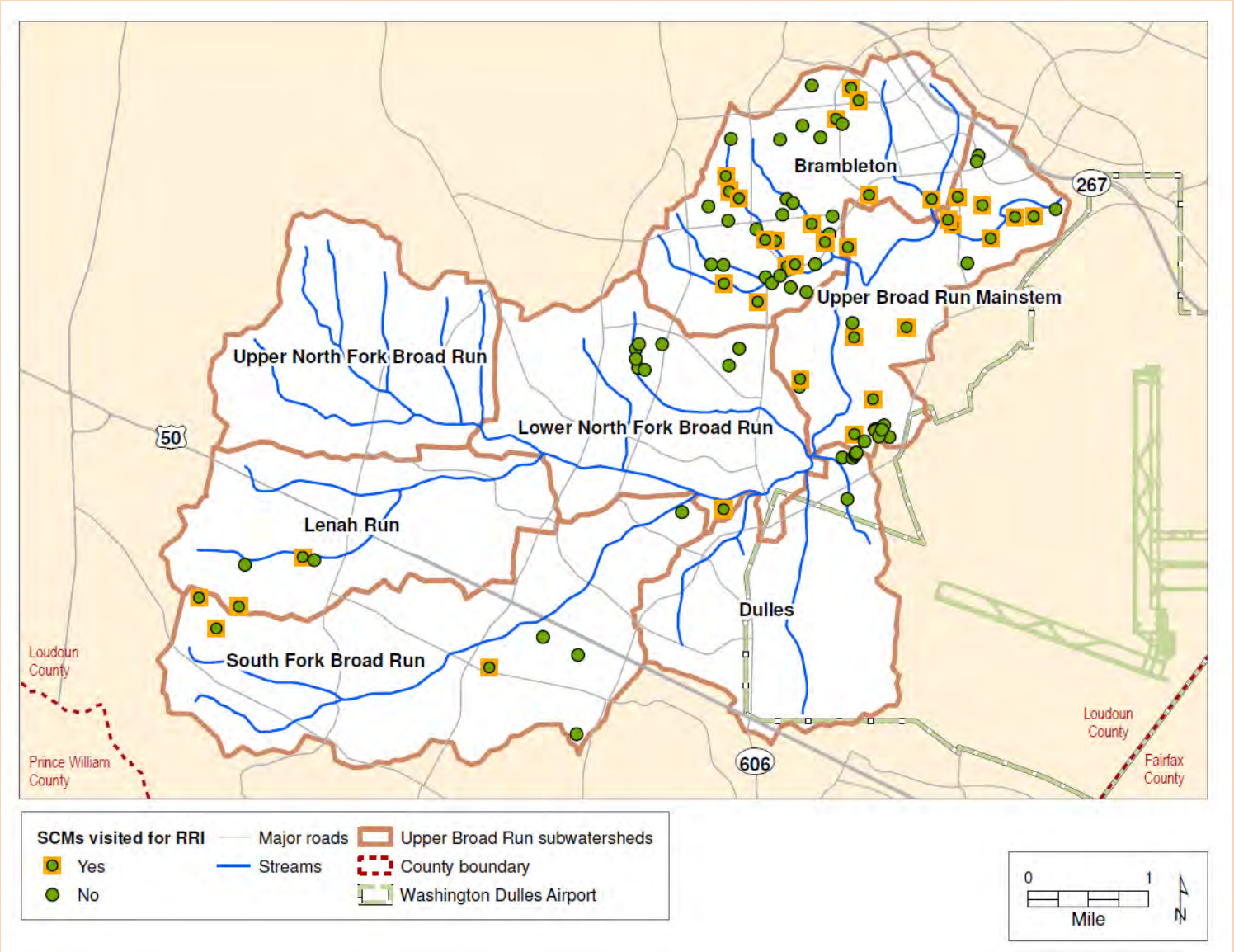
Retrofit Reconnaissance of Existing Stormwater Ponds



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Results of Field Investigations

- 35 ponds visited
  - Access to 14 engineering plans available for verification of pond type changed the calculus

  We now know or speculate:
  - 5 dry ponds (volume-control only)
  - 24 extended detention dry ponds (WQ and volume)
  - 2 *enhanced* extended detention dry ponds (have a marsh included)
  - 1 extended detention wet pond
  - 3 wet ponds

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Recommended Stormwater Pond Conversion and Other Upgrades

- Field Time + Plan Review Yielded:
  - 5 (high priority)
  - 11 (medium and medium/high) possible pond conversions
  - 17 low
  - 2 not upgradeable / state-of-the-art
- 7 retrofits within pond boundaries or nearby
- Poor soils (slow percolation) and flat topography made conversion to wet pond or wetlands most common recommendation (27)

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Example: Recommended Stormwater Pond Conversion – High Priority

Structure ID:	AJ2430	**Project Type:**	Pond Conversion
Subwatershed:	Upper Broad Run Mainstem	**Restoration Priority:**	High
Project Name:	Mercure Circle Dry Pond Conversion	**Drainage Area:**	15.57 acres
Nearest Address:	Mercure Circle		

Proposed Action:	Convert existing dry pond to a wet pond or wetland facility
Benefits:	Improve stormwater quality controls, business outreach, improve aesthetics
Key Issues for Implementation:	Engage nearby businesses and promote benefits of pond prior to conversion
Planning Level Cost Estimate:	TBD

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Example: Recommended Stormwater Conveyance Conversion – High Priority

Structure ID:	JC4162	**Project Type:**	Conversion to Bioswale
Subwatershed:	Brambleton	**Restoration Priority:**	High
Project Name:	Gleedsville Manor Bioswale	**Drainage Area:**	7.78 acres
Nearest Address:	Gleedsville Manor Drive		

Proposed Action:	Convert concrete channel stormwater conveyance to a bioswale
Benefits:	Improve stormwater quality controls, public education, improve aesthetics
Key Issues for Implementation:	Engage residents, promote bioswale benefits; no apparent utility conflicts
Planning Level Cost Estimate:	TBD

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Stream Restoration

Site Selection Criteria:

- Stream Corridor Assessments (SCA)
  - Erosion Severity = Very Severe, Severe, or Moderate AND…
  - Correctability = Best, Good, or Moderate

- Retrofit Reconnaissance Investigations (RRI)
  - Downstream condition of channel matches SCA erosion criteria OR…
  - Taking pond off-line will improve stream condition and restore natural hydrology

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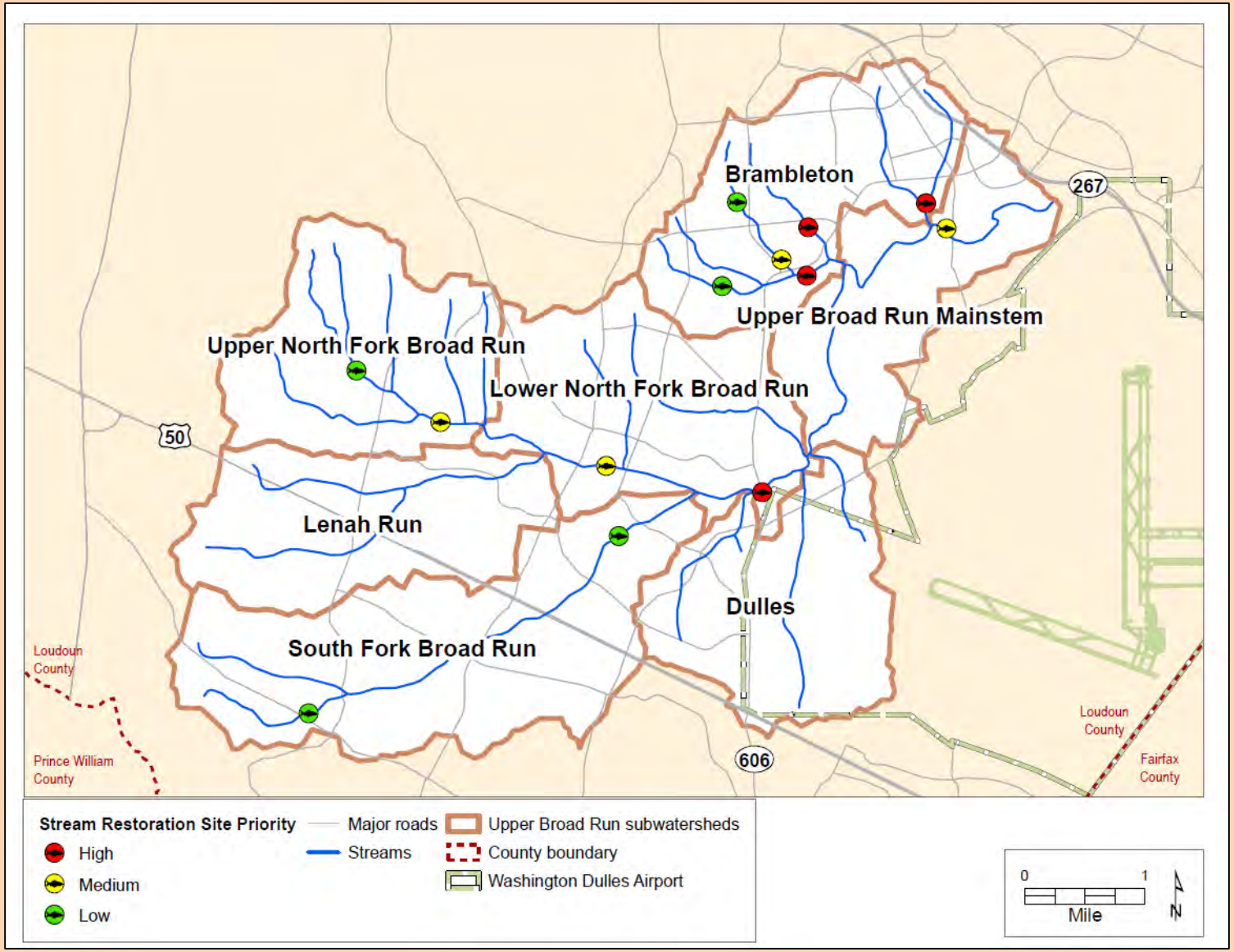
Stream Restoration Site Locations



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Stream Restoration Sites – High Priority

Station ID	Subwatershed	Length of erosion (ft)	Height of erosion (ft)	Site Description	Proposed Action	Benefits	Sequencing concerns	Known Utilities and Other Constaints
LNF-ES-077-2014	Lower North Fork	35	6	Severe erosion of right bank occurring where Loudoun County Parkway is proposed to cross Broad Run. Large debris jam downstream is the cause of the erosion. Transmission line ROW on other side of stream.	Stabilize stream bank	Improve stream stability, erosion, and instream habitat; Prevent property and structural loss.	Need to consider potential restoration in conjunction with road construction.	Beside Transmission line ROW and planned road crossing
BRAM-ES-059-2014	Brambleton	90	2.5	Within highly impervious catchment. Several trees close to falling in stream. Close to end of Addlestone Pl. Within thin wooded area with residential housing to the south and Loudoun County Parkway to the north.	Stabilize stream bank and reconnect with floodplain	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	No apparent utility conflicts; however, the presence or absence of utilities should be confirmed prior to restoration
BRAM-RS-265-2014	Brambleton	2500	6	Pond within Lyndora Park. Focus is on the inline pond, channels leading to the pond, and outflow channel. Stream downstream of pond is very unstable.	Take pond off-line, remove geese, convert upstream channels to bioswales, and stabilize downstream erosion	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss; Improve community usage; Opportunity for public education.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	Sewer line ROW and footpath in close proximity to candidate project. Portions of Lyndora Park may be impacted.
BRAM-RS-263-2014	Brambleton	700	4	Stream with eroded banks beside JC4380. Site is near Airmont Hunt Dr. and Ryan Rd. Site is downstream of a lot of recent and ongoing development, including Moorefield Station Elementary School.	Stabilize stream bank	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	No apparent utility conflicts; however, the presence or absence of utilities should be confirmed prior to restoration

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Example: Stream Restoration Site – High Priority

Project ID: BRAM-ES-059-2014
Subwatershed: Brambleton
Project Type: Stream Restoration
Nearest Address: Addlestone Place

Restoration Priority: High
Erosion Length: 90 feet
Erosion Height: 2.5 feet

Proposed Action: Stabilize stream banks and reconnect stream with floodplain
Benefits: Improve stream stability, erosion, and instream habitat, etc.
Key Issues for Implementation: Manage upstream flows; no apparent utility conflicts, check prior to restoration
Planning Level Cost Estimate: TBD

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Stream Restoration Sites – Medium Priority

Station ID	Subwatershed	Length of erosion (ft)	Height of erosion (ft)	Site Description	Proposed Action	Benefits	Sequencing concerns	Known Utilities and Other Constaints
UNF-ES-123-2014	Upper North Fork	25	3	Approximately 10 feet upstream Of Fleetwood Rd.	Stabilize stream bank	Improve stream stability, erosion, and instream habitat; Prevent property and structural loss; Reduce road flooding.	None	Beside Roadway
LNF-ES-114-2014	Lower North Fork	750	4.25	Along mainstem between Belmont Ridge Rd. and Evergreens Mill Rd. Adjacent to transmission line ROW and old crop field. Very little tree cover. Erosion is prevalent in the vicinity of this site. A lot of active bank slumping occurring, potentially contributing substantial amounts of sediment to stream.	Stabilize stream bank and reconnect with floodplain	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	Adjacent to Transmission line ROW
BRAM-ES-060-2014	Brambleton	40	1.5	Within thin wooded corridor near Claiborne Parkway and Loudoun County Parkway. Residential yards close to eroding bank. Heavy deposition on opposite bank.	Stabilize stream bank and reconnect with floodplain	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	Residential yards 10-15 feet from left bank (looking downstream).
MAIN-RS-264-2014	Mainstem Upper Broad Run	1000	4.5	Erosion along both sides of mainstem near High Haven Terrace. Both sides of stream are forested for most of the length of erosion. This site is close to the Upper Broad Run watershed outlet, and thus is subject to the cumulative effects of the watershed's upstream flows.	Stabilize stream bank	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	Water line and Sewer line crossings occur close to this area. Multiple property owners within proposed project area.

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Stream Restoration Sites – Medium Priority

Station ID	Subwatershed	Length of erosion (ft)	Height of erosion (ft)	Site Description	Proposed Action	Benefits	Sequencing concerns	Known Utilities and Other Constaints
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BRAM-ES-060-2014	Brambleton	40	1.5	Within thin wooded corridor near Claiborne Parkway and Loudoun County Parkway. Residential yards close to eroding bank. Heavy deposition on opposite bank.	Stabilize stream bank and reconnect with floodplain	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	Residential yards 10-15 feet from left bank (looking downstream).
MAIN-RS-264-2014	Upper Broad Run Mainstem	1000	4.5	Erosion along both sides of mainstem near High Haven Terrace. Both sides of stream are forested for most of the length of erosion. This site is close to the Upper Broad Run watershed outlet, and thus is subject to the cumulative effects of the watershed's upstream flows.	Stabilize stream bank	Improve stream stability, erosion, and instream habitat; Improve floodplain connectivity and nutrient cycling functions; Prevent property and structural loss.	Prior to undertaking restoration design, must first manage flow issues from upstream development.	Water line and Sewer line crossings occur close to this area. Multiple property owners within proposed project area.

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Example: Stream Restoration Site – Medium Priority

Project ID: LNF-ES-114-2014
Subwatershed: Lower North Fork
Project Type: Stream Restoration
Nearest Address: Belmont Ridge Rd. and Evergreens Mill Rd.

Restoration Priority: Medium
Erosion Length: 750 feet
Erosion Height: 4.25 feet

Proposed Action: Stabilize stream banks and reconnect stream with floodplain
Benefits: Improve stream stability, erosion, and instream habitat, etc.
Key Issues for Implementation: Manage upstream flows; adjacent to Transmission line ROW
Planning Level Cost Estimate: TBD

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Other Types of Proposed Stormwater Control Measures (SCMs) – including Community-Based Actions

- Urban nutrient management (i.e., lawn care practices)
- Reforestation
    - Stream buffers
    - Upland areas
- New Stormwater Control Measures (SCMs) such as bioretention, bioswales, urban filtration practices, etc. not associated with an existing dry or wet pond
- Downspout disconnection
- Impervious cover removal

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Pollution loads and load reductions

- Updates to pollutant load and load reduction estimates

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Table 4-21: Pollutant Removal Efficiencies of Select BMPs as Provided by VAST February 2014			
Select BMPS from VAST**	**Nitrogen Effectiveness (%)**	**Phosphorus Effectiveness (%)**	**Sediment Effectiveness (%)**
Urban Nutrient Management Plan Low Risk Lawn	6	3	0
Street Sweeping 25 times a year-acres	3	3	9
Urban Nutrient Management Plan	9	4.5	0
Vegetated Open Channels - C/D soils, no underdrain	**10**	**10**	**50**
Urban Nutrient Management Plan High Risk Lawn	20	10	0
Dry Detention Ponds and Hydrodynamic Structures	**5**	**10**	**10**
Permeable Pavement w/o Sand, Veg. - C/D soils, underdrain	10	20	55
Permeable Pavement w/ Sand, Veg. - C/D soils, underdrain	20	20	55
Dry Extended Detention Ponds	**20**	**20**	**60**
Wet Ponds and Wetlands	**20**	**45**	**60**
Vegetated Open Channels - A/B soils, no underdrain	**45**	**45**	**70**
Bioretention/raingardens - C/D soils, underdrain	**25**	**45**	**55**
Urban Forest Buffers	25	50	50
Permeable Pavement w/o Sand, Veg. - A/B soils, underdrain	45	50	70
Permeable Pavement w/ Sand, Veg. - A/B soils, underdrain	50	50	70
Urban Filtering Practices	**40**	**60**	**80**
Bioswale	**70**	**75**	**80**
Bioretention/raingardens - A/B soils, underdrain	**70**	**75**	**80**
Permeable Pavement w/o Sand, Veg. - A/B soils, no underdrain	75	80	85
Permeable Pavement w/ Sand, Veg. - A/B soils, no underdrain	80	80	85
Urban Infiltration Practices w/o Sand, Veg.-A/B soils, no underdrain	**80**	**85**	**95**
Urban Infiltration Practices w/ Sand, Veg. - A/B soils, no underdrain	**85**	**85**	**95**
Bioretention/raingardens - A/B soils, no underdrain	**80**	**85**	**90**

Restoration Strategies

Two categories:

County-led strategies - large capital projects

Citizen-based strategies - locally based programs

Partnership between County government, other agencies, citizens, businesses, and other organizations

Participation at **all levels** is critical for success

Photo credit: Rain Barrels of Annapolis

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Pollutant Removal Analysis

Two Implementation Scenarios

- **Maximum Potential**: All available units
- **Projected: with expected participation rates**

Reduction estimates based on available BMP removal efficiencies

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Pollutant Load Reductions

Summary of Pollutant Load Reduction Estimates (TN, TP, and Sediment)

BMP	How Credited	TN Efficiency	TP Efficiency	Sediment Efficiency	Max Potential TN Load Reduction (lbs/yr)	Max Potential TP Load Reduction (lbs/yr)	Max Potential Sediment Load Reduction (lbs/yr)	Units Available		Projected Participation (%)	Projected TN Load Reduction (lbs/yr)	Projected TP Load Reduction (lbs/yr)	Projected Sediment Load Reduction (lbs/yr)
Existing Stream Restoration	Lbs per Ln Ft	0.2	0.068	54.25	100	34	27,125	500	ft	100	100	34	27,125
Existing SCMs	Efficiency	varies	varies	varies	6,352	608	377,219	2,007	acres	100	6,352	608	377,219
SCM Conversion	Efficiency	varies	varies	varies	829	128	24,697	413	acres	100	829	128	24,697
New SCMs (NSA, ISI, PAA, HSI)	Efficiency	varies	varies	varies	237	43	20,038	43	acres	50	118.7	21.32	10,019
Impervious Cover Removal (ISI)	LU Conversion	N/A	N/A	N/A	0	0	0	0	acres	50	0	0	0
Reforest Stream Buffer	LU Conversion + Efficiency	25%	50%	50%	4,589	305	77,939	419	acres	65	2,983	198	50,660
Pervious Area Reforestation	LU Conversion	N/A	N/A	N/A	389	15	4,594	50	acres	50	195	7.61	2,297
New Stream Restoration	lbs per Ln Ft	0.2	0.068	54.25	1,028	350	278,845	5,140	ft	75	771	262	209,134
Downspout Disconnection (NSA)	Efficiency	50%	60%	90%	519	62	35,862	47	acres	33	171	21	11,834
Tree Plantings (NSA)	LU Conversion	N/A	N/A	N/A	404	16	4,765	52	acres	33	133	5	1,572
Tree Plantings (ISI)	LU Conversion	N/A	N/A	N/A	396	15	4,668	51	acres	66	261	10.21	3,081
Urban Nutrient Management	Efficiency	varies	varies	N/A	2,511	40	N/A	1,650	acres	50	1,256	20	N/A
				Total	17,355	1,616	855,752				13,170	1,315	717,639
				Total Existing Urban Load (lbs/yr)	80,056	4,568	1,603,670				80,056	4,568	1,603,670
				Reduction Achieved	**21.7%**	**35.4%**	**53.4%**				**16.5 %**	**28.8 %**	**44.7%**

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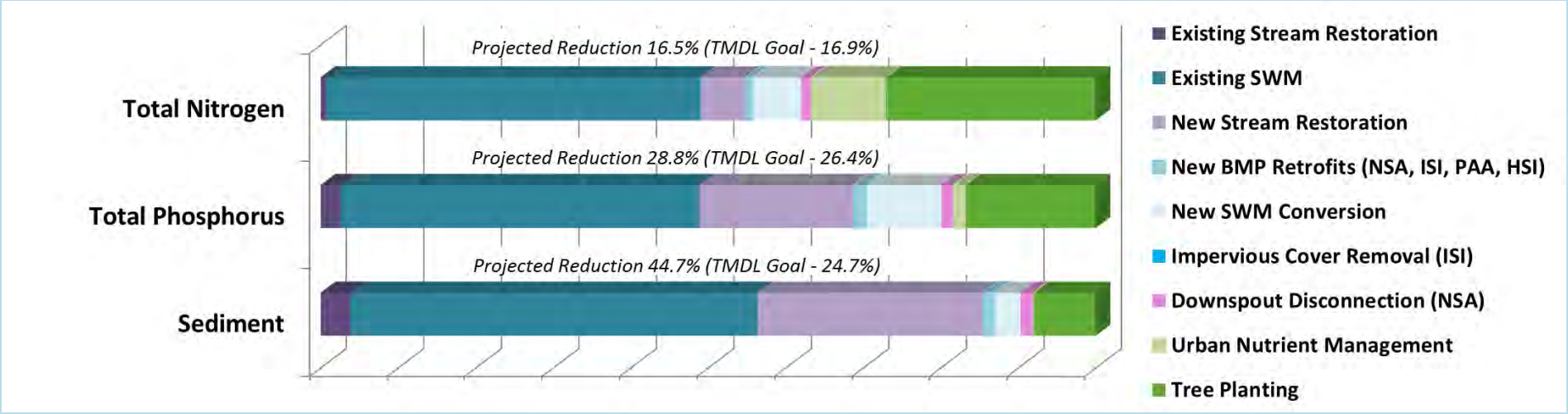
Updated 6/5/14

Reductions from Proposed Restoration Strategies



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Updated 6/5/14

Future Land Use Analysis

- Use existing GIS data to quantify land use coverage for built areas
- Apply proportions to areas zoned for future development
- Estimate proportions of land use types for classifications not represented at present
- Examine population v. impervious surface data for 2025, 2040
- Estimate land use and impervious cover for 2025 and 2040

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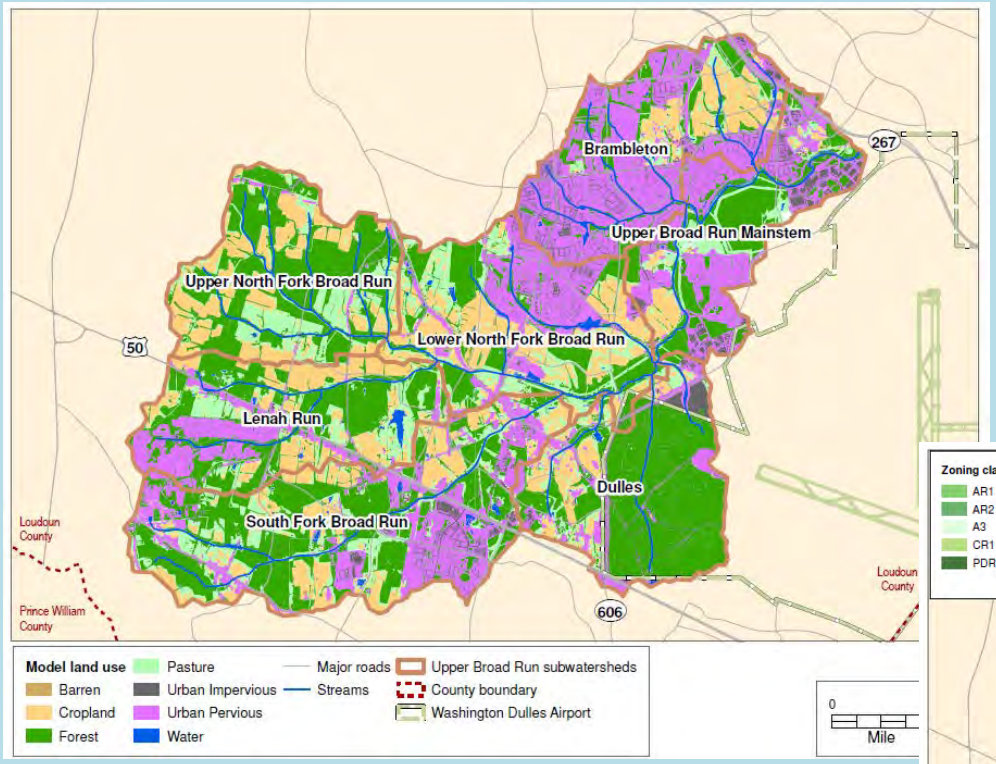
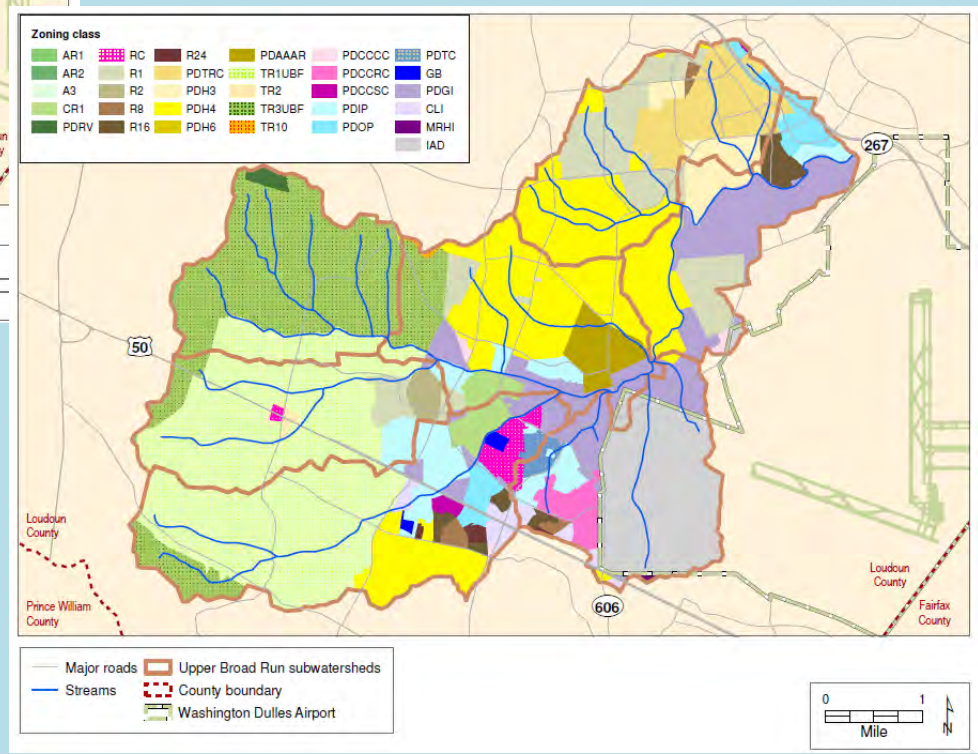
Future Land Use Analysis



Current land use

Zoning



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Future Land Use Analysis

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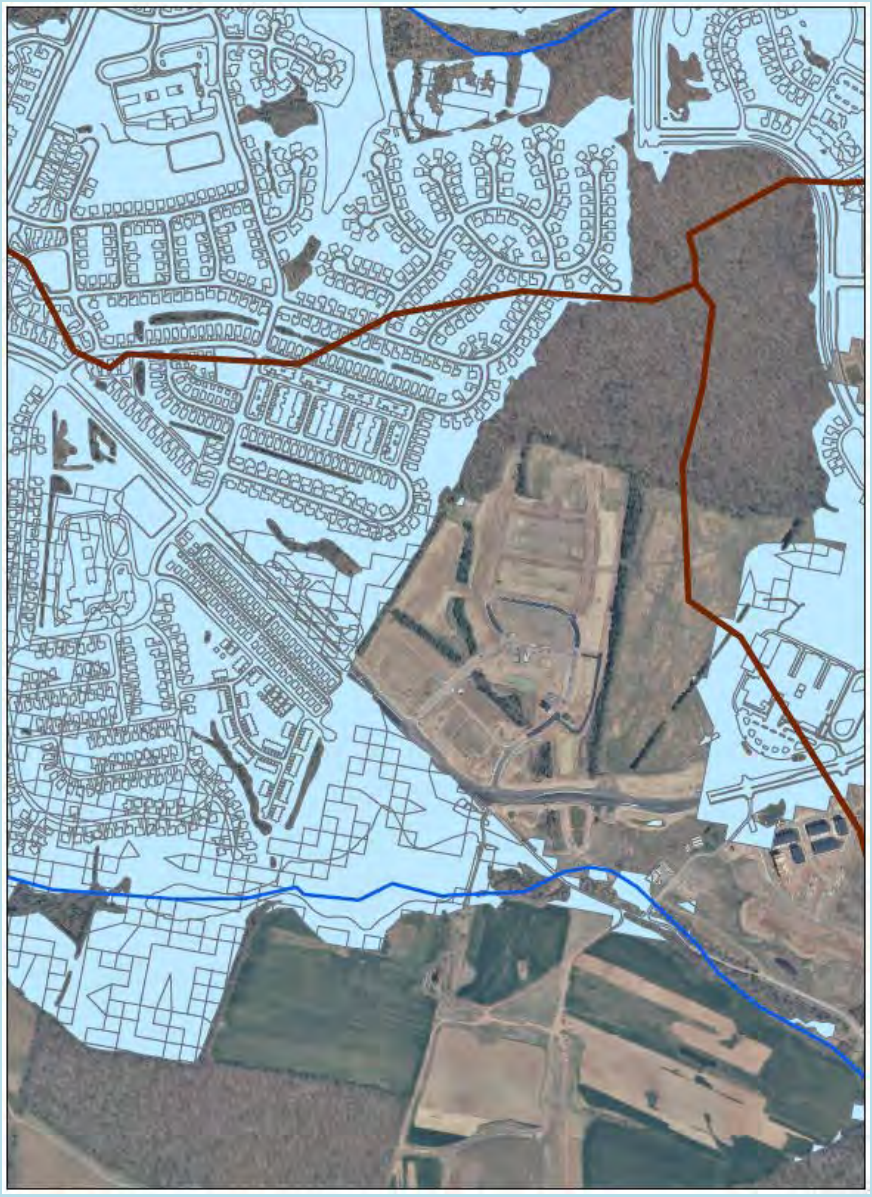

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Planning for community outreach meeting

- Week of June 23, location
- Present the watershed plan
- Encourage “what you can do” actions
- Displays
- Publicizing the meeting

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Other Work in Progress

- Draft watershed plan
- Presentation to WRTAC June 23

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Beyond the Watershed Plan

- Watershed plan implementation

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Thanks again for your participation!

www.loudoun.gov/upperbroadrunwatershed

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