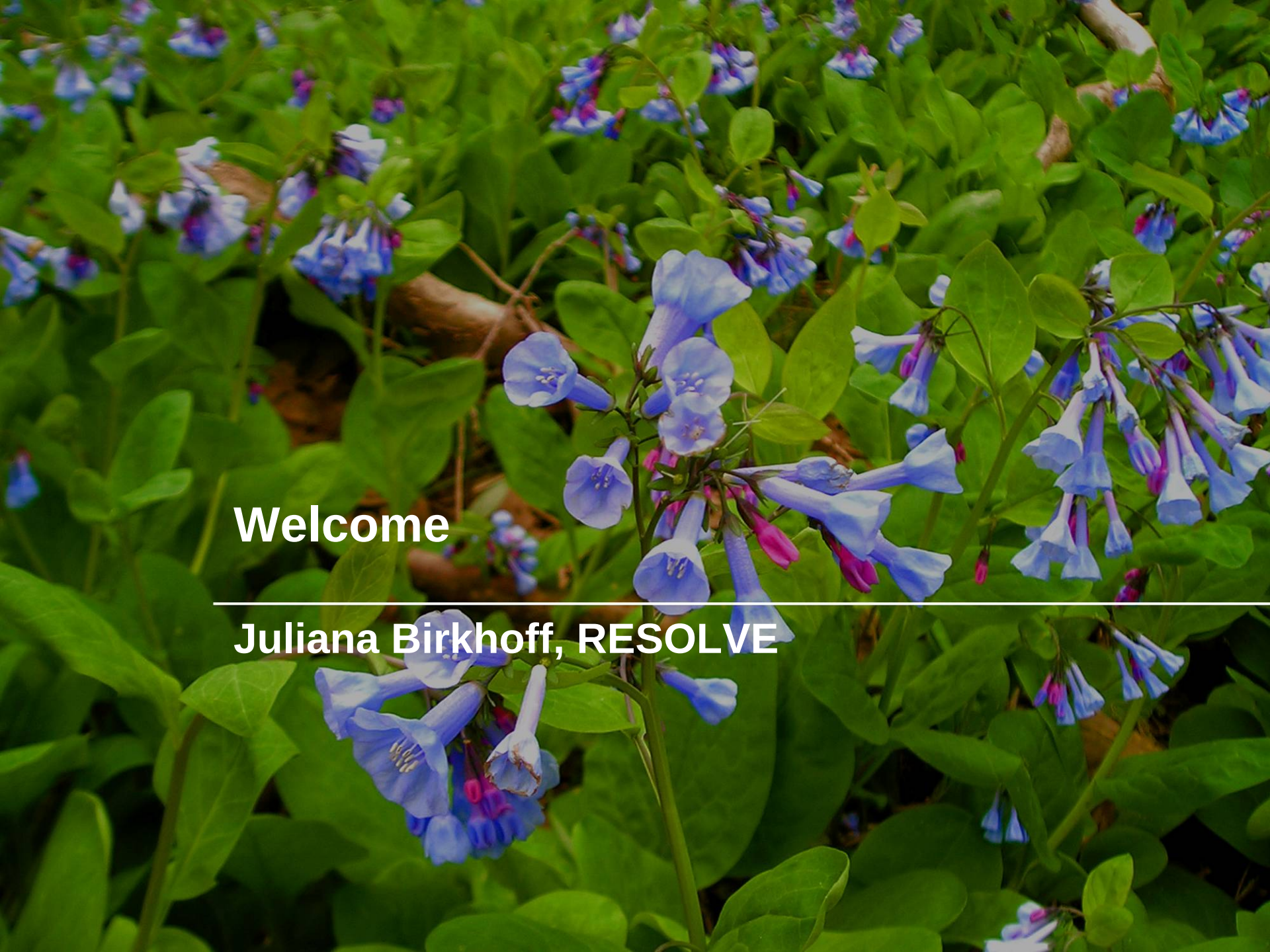
Accotink Creek
Watershed Management Plan

Watershed Advisory Group Meeting #3

May 14, 2009

Fairfax County Department of Public Works and Environmental Services

Presented by Watershed Planning & Assessment Branch, Stormwater Management



Welcome

Juliana Birkhoff, RESOLVE

Today's Meeting Goals

- Learn how WAG input was incorporated into the subwatershed prioritization strategy
- Learn about the retrofit assessment process and work completed to date
- Breakout sessions to provide feedback
  - Northern WMAs
  - Southern WMAs
- Discuss possible field trip
- Review next steps and homework

Subwatershed Strategy

Bill Frost, KCI

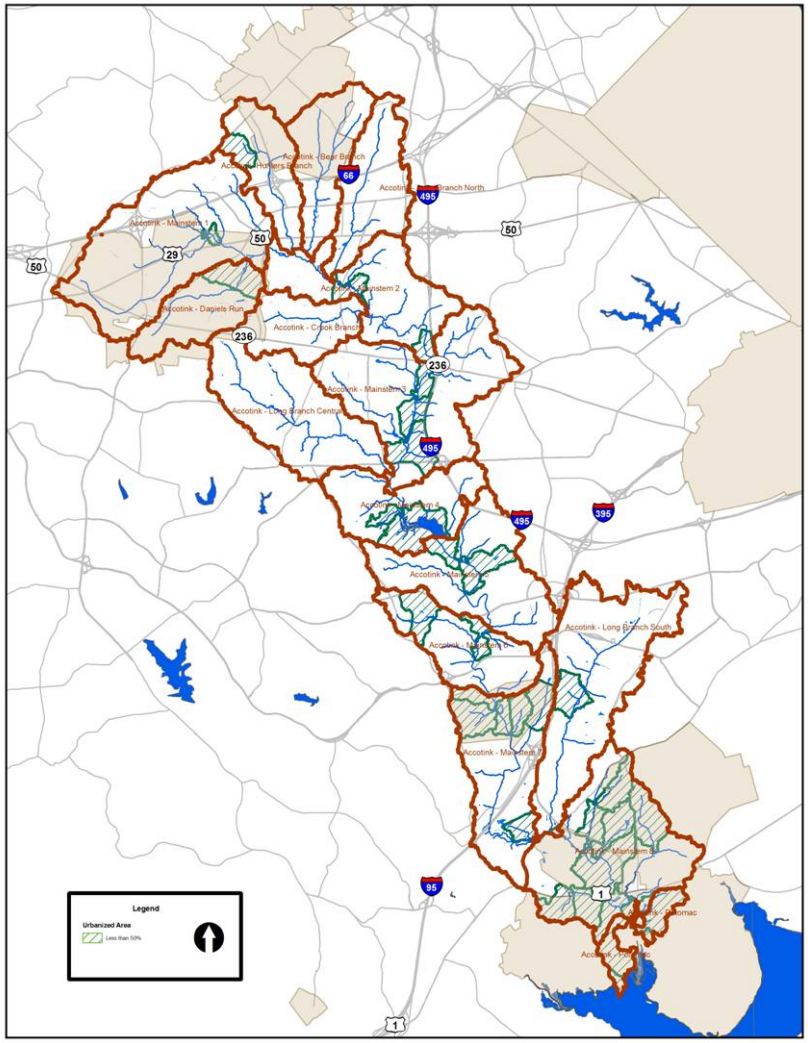
Procedure

- Goals
  - Incorporate WAG input from second meeting
  - Incorporate Fairfax County's ranking and indicators
- Intended Result
  - Target and prioritize areas for preservation and restoration

WAG Input

- Focus on preserving pristine areas first. Once degraded, it is nearly impossible to restore them. Follow with improvements to highly impaired areas, then to those in between.
- Identify locations which are only slightly impaired, which could be restored to expand the population reservoir.
- Identify highly impaired watersheds where only one factor (indicator) is causing the poor ranking and address the single cause.

Strategy 1- Preservation



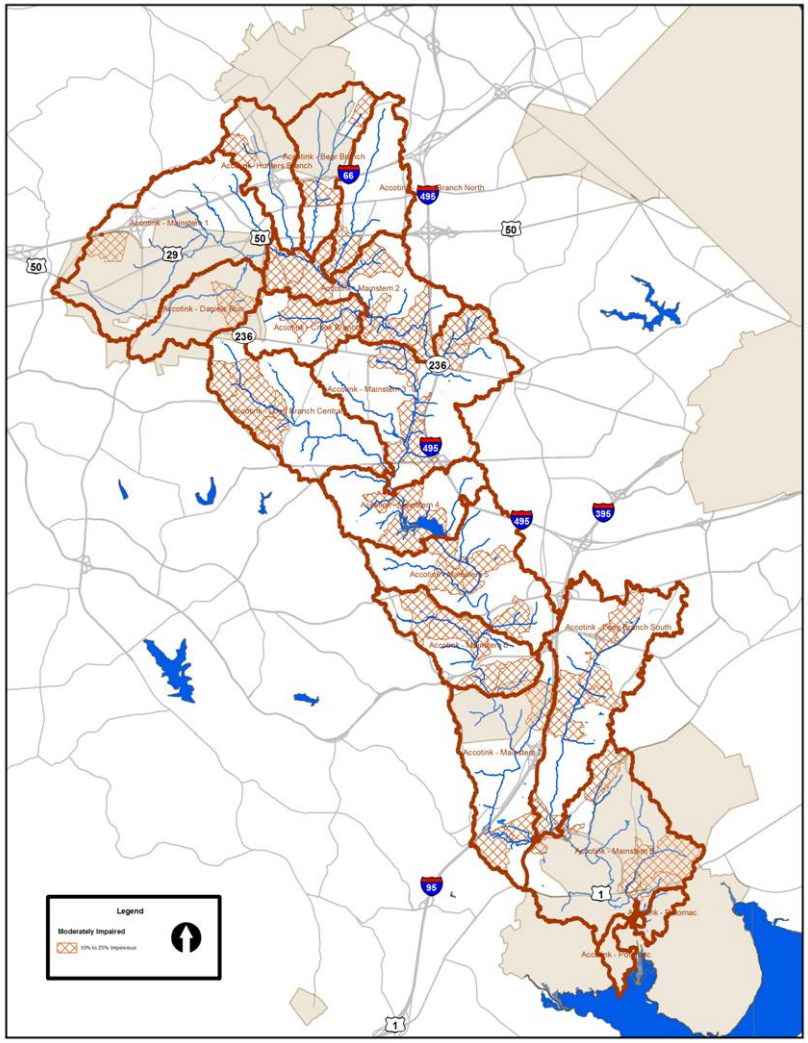
Focus on preserving pristine areas first.

Source Indicators (Selection)	Rationale
Urban Land Cover (<50%)	50% Urban Land is approximately 20% of the subwatersheds. Includes all subwatersheds <10% total imperviousness.

Urban Land Cover

HDR- High Density Residential
MDR- Medium Density Residential
LDR- Low Density Residential
HIC- High Intensity Commercial
LIC- Low Intensity Commercial
INT- Institutional
IND- Industrial
TRANS- Transportation

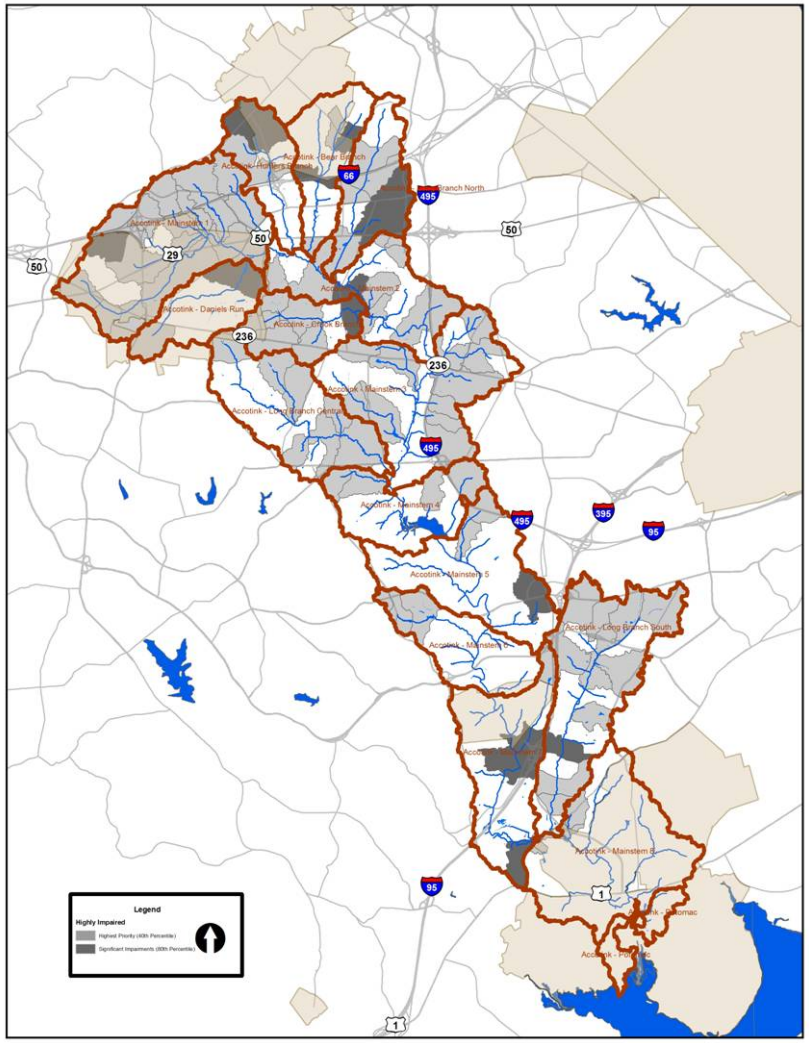
Strategy 2 - Limited Impairment



Identify locations which are only slightly impaired, which could be restored to expand the population reservoir.

Source Indicators (Selection)	Rationale
Total Impervious Area (TIA) Percentage from 10% to 25%	TIA values meet the definition of Impacted areas (some degradation, can be mitigated)

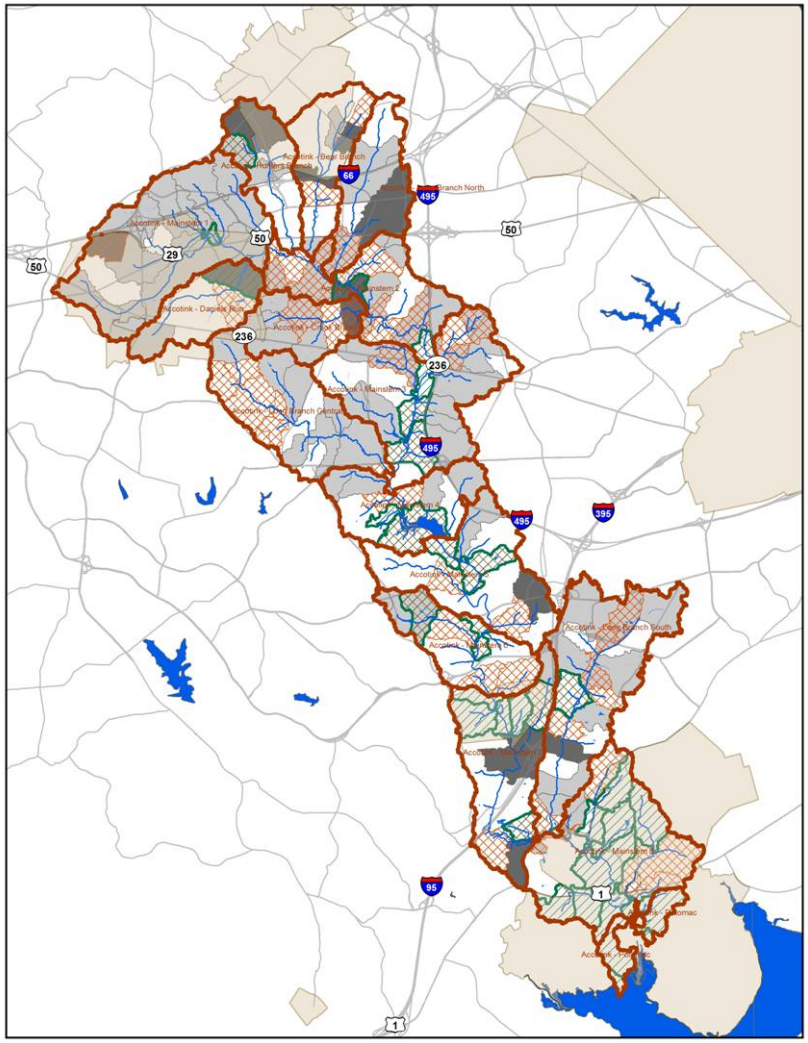
Strategy 3 - Retrofit Poorly Ranked Areas
Strategy 4 - Retrofit High Priority Problems



Identify highly impaired watersheds where only one factor (indicator) is causing the poor ranking and address the single cause.

Source Indicators (Selection)	Rationale
Composite Score <83	Rank value selects worst 40% of subwatersheds
Any indicator worse than the 80th percentile value	Ensures serious impairments are reviewed regardless of overall subwatershed priority

All Areas



Map showing all areas for potential retrofits or preservation

Priority Areas (5 WMAs)

WMA	Type 1 Preservation	Type 2 Impacted	Type 3 High Priority Composite Score	Type 4 High Priority Objective Score
Bear Branch		AC-BB-0010 AC-BB-0040	AC-BB-0000 AC-BB-0045	AC-BB-0015 AC-BB-0035
Crook Branch		AC-CR-0000 AC-CR-0005 AC-CR-0015	AC-CR-0010 AC-CR-0015 AC-CR-0020 AC-CR-0025 AC-CR-0030	AC-CR-0000
Daniels Run	AC-DR-0000	AC-DR-0005 AC-DR-0010	AC-DR-0025	AC-DR-0000
Hunters Branch	AC-HB-0025	AC-HB-0025	AC-HB-0015 AC-HB-0025	AC-HB-0010 AC-HB-0030 AC-HB-0035
Long Branch Central		AC-LB-0000 AC-LB-0045 AC-LB-0050 AC-LB-0055 AC-LB-0060 AC-LB-0065 AC-LB-0070	AC-LB-0005 AC-LB-0010 AC-LB-0015 AC-LB-0025 AC-LB-0035 AC-LB-0040 AC-LB-0075	

AC-LB-0005

Subwatershed	Rank	Runoff	Flooding	Habitat	Water Quality	Overall Score	Strategy Type	Source
80th Percentile	*83*	*0.45*	*1.32*	*0.32*	*0.33*	*3.85*		
AC-LB-0000	137	0.51	1.98	0.53	0.33	4.65		
AC-LB-0005	**66**	0.51	1.45	0.48	**0.33**	4.07	3	WQ
AC-LB-0010	**12**	0.51	**0.96**	0.37	**0.33**	3.47	3	Flooding, WQ
AC-LB-0015	**76**	0.51	1.58	0.43	**0.33**	4.15	3	WQ
AC-LB-0020	130	0.63	1.58	0.53	0.33	4.59		
AC-LB-0025	**45**	0.51	**1.32**	0.43	**0.33**	3.89	3	Flooding, WQ
AC-LB-0030	97	0.51	1.72	0.43	0.33	4.28		
AC-LB-0035	**10**	0.49	**0.83**	0.37	**0.33**	3.45	3	Flooding, WQ
AC-LB-0040	**53**	0.49	**1.32**	0.37	**0.33**	3.95	3	Flooding, WQ
AC-LB-0045	167	0.61	1.85	0.43	0.42	5.00		
AC-LB-0050	102	0.56	1.32	0.32	0.42	4.31		
AC-LB-0055	175	0.67	1.98	0.53	0.42	5.29		
AC-LB-0060	162	0.61	1.72	0.48	0.42	4.92		
AC-LB-0065	154	0.61	1.72	0.43	0.42	4.86		
AC-LB-0070	116	0.61	1.32	0.43	0.42	4.47		
AC-LB-0075	**55**	**0.45**	1.45	0.48	0.42	3.98	3	Runoff

Potential Retrofit Sites

Bill Frost, KCI

Identifying the Cause of Problems

- Goal - Find a set of indicators that ...
  - can be used to identify the source of the problems in each subwatershed
  - has minimal overlap

- Four indicator groups were used
  - Stormwater Runoff Impacts - stream degradation
  - Flooding Hazards - flooding
  - Habitat Health - terrestrial and riparian habitat
  - Drinking Water Quality - runoff water quality

- Use of Groups simplified the effort of pinpointing the problems

Using Indicators for Identifying Causes

Impact / Source Indicator	Storm Water Runoff	Flooding Hazards	Habitat Health	Habitat Diversity	Stream WQ	Drinking WQ	Storage Capacity	Source Composite
Benthic Communities	o			o	o			
Fish Communities	o			o	o			
Aquatic Habitat	o		o					
Channel Morphology	o							
Instream Sediment	o				o		o	
Hydrology	o							
Number of Road Hazards		o						
Magnitude of Road Hazards		o						
Residential Bldg Hazards		o						
Non-residential Bldg Hazards		o						
Flood Complaints		o						
RPA Riparian Habitat			o					
Headwater Riparian Habitat			o					
Wetland Habitat			o					
Terrestrial Forested Habitat			o					
E. Coli					o	o		
Upland Sediment					o	o	o	o
Nitrogen					o	o		o
Phosphorus					o	o		o
Total Impervious								o
DCIA								o
Stream Buffer Deficiency								o
Outfalls								o
VPDES Permits								o
Percent Urbanized Area								o
Parcels with OSDS								o
Sewer Crossings								o
Channelized Streams								o
E&S Permits								

Comparison of Sites and Priority Areas

- Concerns Identified
  - Based on strategy and indicator groups
    - Stormwater Runoff Impacts - stream degradation
    - Flooding Hazards - flooding
    - Habitat Health - terrestrial and riparian habitat
    - Drinking Water Quality - runoff water quality
- Potential Causes
  - Based on review of individual indicators
- Project Sites Identified
  - Retrofit assessment

AC-LB-0005

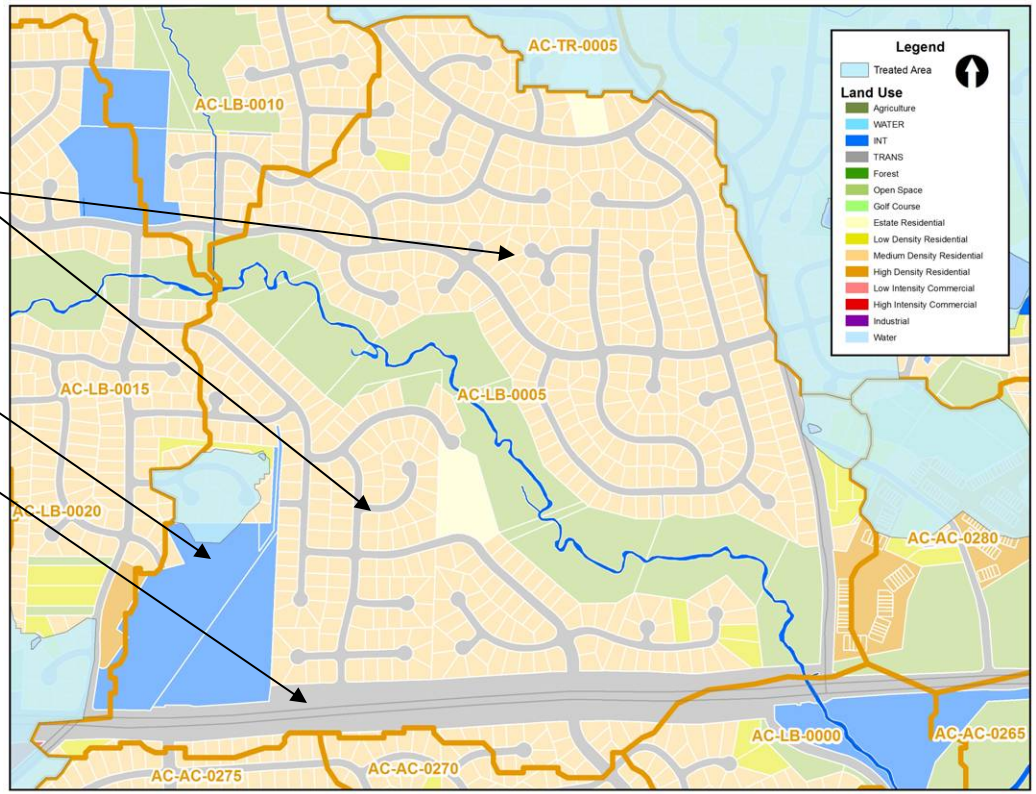
Subwatershed	Concern	Indicator Metrics	Potential Cause	Strategy
AC-LB-0005	WQ	Modeled pollutant loads.	Runoff from untreated MDR, INS, major road	SWM retrofit projects

Almost all untreated

Medium Density Residential (MDR)

Institutional (INS)

Transportation



Schedule - Retrofit Assessments

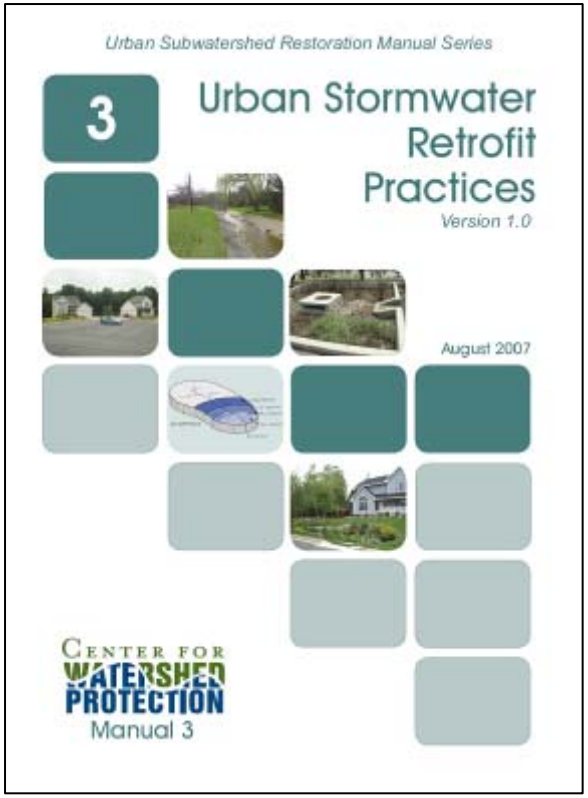
- Stormwater Retrofits (Spring, 2008)
  - Most feasible sites
  - Conducted simultaneously with upland reconnaissance
- Stream Restoration (Spring, 2009)
  - Stream restoration sites
- Additional Retrofits (After WAG#3)
  - Additional sites if needed in priority areas

Stormwater Retrofits

The Challenge

- It can be difficult to find enough retrofit locations to meet county goals and objectives.
- Required storage volumes can be so large that there is not enough land area available, particularly when channel protection and flood control are restoration objectives.
- Depending on watershed condition and restoration objectives, hundreds of retrofit sites may be needed.
- The more impervious a watershed becomes, the more storage is required and the more difficult it becomes to find retrofit sites.

Procedure



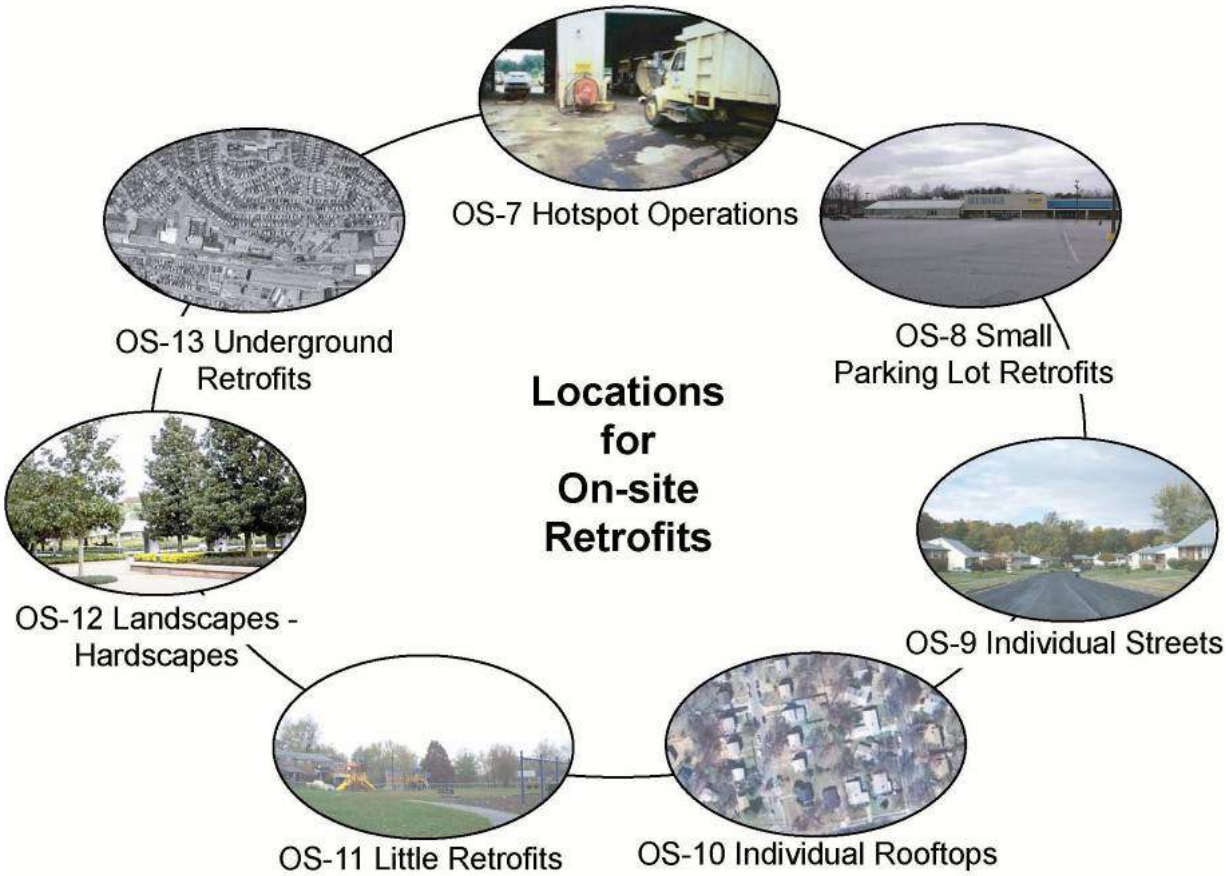
- Based on procedures from the Center for Watershed Protection
  - Desktop analysis
  - Field assessment

Procedure - Potential Retrofit Locations

- Storage

Procedure - Potential Retrofit Locations

- On-site Systems



Desktop Analysis - Storage

Retrofit Location	What to Look For
SR-1: Existing Pond	Evaluate stormwater layer to find existing stormwater ponds with a contributing drainage area greater than 5 acres *or* Superimpose topography, drainage layers and aerial photos to identify low points in the drainage network where dry ponds may exist.
SR-2: Roadway Culvert	Superimpose topography and headwater stream layers (zero, first and second order) over the local and state road network to identify road crossings.
SR-3: Below Outfall	Superimpose publicly-owned stream corridor land parcels at least two acres in area with storm drain outfalls with a diameter greater than 12 inches and less than 60 inches.
SR-4: Conveyance System	Superimpose ditch lines, zero-order streams, conveyance easements or open channels with open land adjacent to the drainage network
SR-5: Transport Right-of-Way	Compare local, state or federal highway right-of-way layers against the stream or drainage network to identify open spaces one acre or greater *or* review highway agency GIS for existing stormwater infrastructure or treatment practices suitable for retrofitting.
SR-6: Large Parking Lot	Match large contiguous parking areas/rooftops greater than 5 acres in size with adjacent open land in public or institutional ownership, or owned by the same landowner.

Desktop Analysis - On-site

Retrofit Location	What to Look For
OS-7: Hotspot Operation	Review land use maps to identify commercial, industrial, or municipal land uses *or* search permit databases to identify industrial operations that hold stormwater permits.
OS-8: Small Parking Lot	Search for parking lots less than five acres in size that are municipally or institutionally owned.
OS-9: Individual Street	Screen for streets that meet street retrofit feasibility criteria, such as slope, right-of-way width, open section drainage, presence/absence of sidewalks and parking lanes.
OS-10: Individual Rooftop	Superimpose property ownership layers with aerial photos or planimetric data to locate large municipal, institutional, commercial or industrial buildings that may be assessed for demonstration rooftop retrofits *or* look for clusters of building permit data that indicates areas experiencing active redevelopment
OS-11: Little Retrofit	A desktop search is not helpful in finding specific locations for little retrofits, although a GIS can help find tax reverted vacant lots and publicly owned parcels, such as parks, schools, recreation centers to investigate in the field.
OS-12: Landscape/ Hardscapes	A desktop search is not helpful in finding specific locations for landscaping and hardscaping retrofits although it can find the general public spaces with high exposure and outdoor amenities, such as parks, schools, central business districts, spaces etc.
OS-13: Underground	A desktop search is not helpful in finding specific locations for underground retrofits, although storm sewer and utility maps are essential for field investigations.

Field Assessment

Stormwater Management Site Investigation Form

PROJECT: ACCOTINK DATE: 4/2/08 ASSESSED BY: KAC
SUBWATERSHED: PHOTO ID# 199-200 ADC PAGE / GRID:
RECON SITE ID AC-LB-0005-R05C LOCATION: Swim Club

Land Ownership	County	State	Federal	Private	HOA	Unknown
SWM Type Retrofits:	Wet pond	Dry pond	Wetland	Green Roof	DS disconnect	Tree plantings
New:	Wet pond	Dry pond	Wetland	Filters	Infiltration	
Onsite:	Bioretention	Dry swale	Wet swale	Sand filter	Infiltration	WQ Inlet

Office: Drainage Area		Volume Req'd		Surface Area Req'd
A (Ac)	0.70	WQv		Pond
I (%)	90%	CPv		Wetland
IA (Ac)		Qp		Sand Filter
Major LU				Bioretention
				Dry Swale

Current Condition Structural	Embankment failure	Riser failure	Outlet clogged	Sedimentation	Active Erosion	
WQ within facility	Algae	Odor	Color	Trash	Debris	Deposition
Downstream	Algae	Odor	Color	Trash	Active erosion	Sedimentation

Envt'l Constraints	Wetlands	No wetlands present.	Wetlands are present but no impacts from construction		Wetland impacts will be incurred and permits will be required.	
		5	4	3	2	1
	Forest	Site is in open space. No tree removal required.	Minimal tree removal at perimeter of site.		Forest impacts will be incurred and permits will be required.	
		5	4	3	2	1
	Soils	Ponds: C or D soils Infiltration: A soils	Ponds: B or C soils Infiltration: B soils		Ponds: A or B soils C or D soils	Infiltration:
	1	5	4	3	2	1
Design Constraints	Utilities	Utilities are not present in the project area.	Utilities are present in the project area and may constrain project design.		Utilities will greatly impact project design and may require expensive relocation.	
		5	4	3	2	1
	Construction Access	Open area, stockpile space, access with paved surface.	Impact to landscaped areas. Limited stockpile areas.		Impacts on sensitive areas. No stockpile areas near site.	
		5	4	3	2	1
	Slope	Flat or shallow for ponds or filtration, mild for swales.	May require check dams or energy dissipators.		May limit facility size or cause risk of slope failures.	
		5	4	3	2	1
Community Constraints	Adjacent Land Use Impacts	Commercial or industrial site with no nearby residential area.	Residential areas at some distance, site can be fenced.		Residential areas adjacent to site with easy access.	
		5	4	3	2	1
	Health and Safety	Project will not result in standing water.	Shallow water with safety bench, gentle slopes, fenced.		Potential for standing water, mosquitoes, or safety issues.	
		5	4	3	2	1
	Education / Stewardship	Close to school or community center, educational opportunity.	Close to parks or pedestrian routes, potential for signs.		Commercial or industrial area with limited visibility.	
		5	4	3	2	1

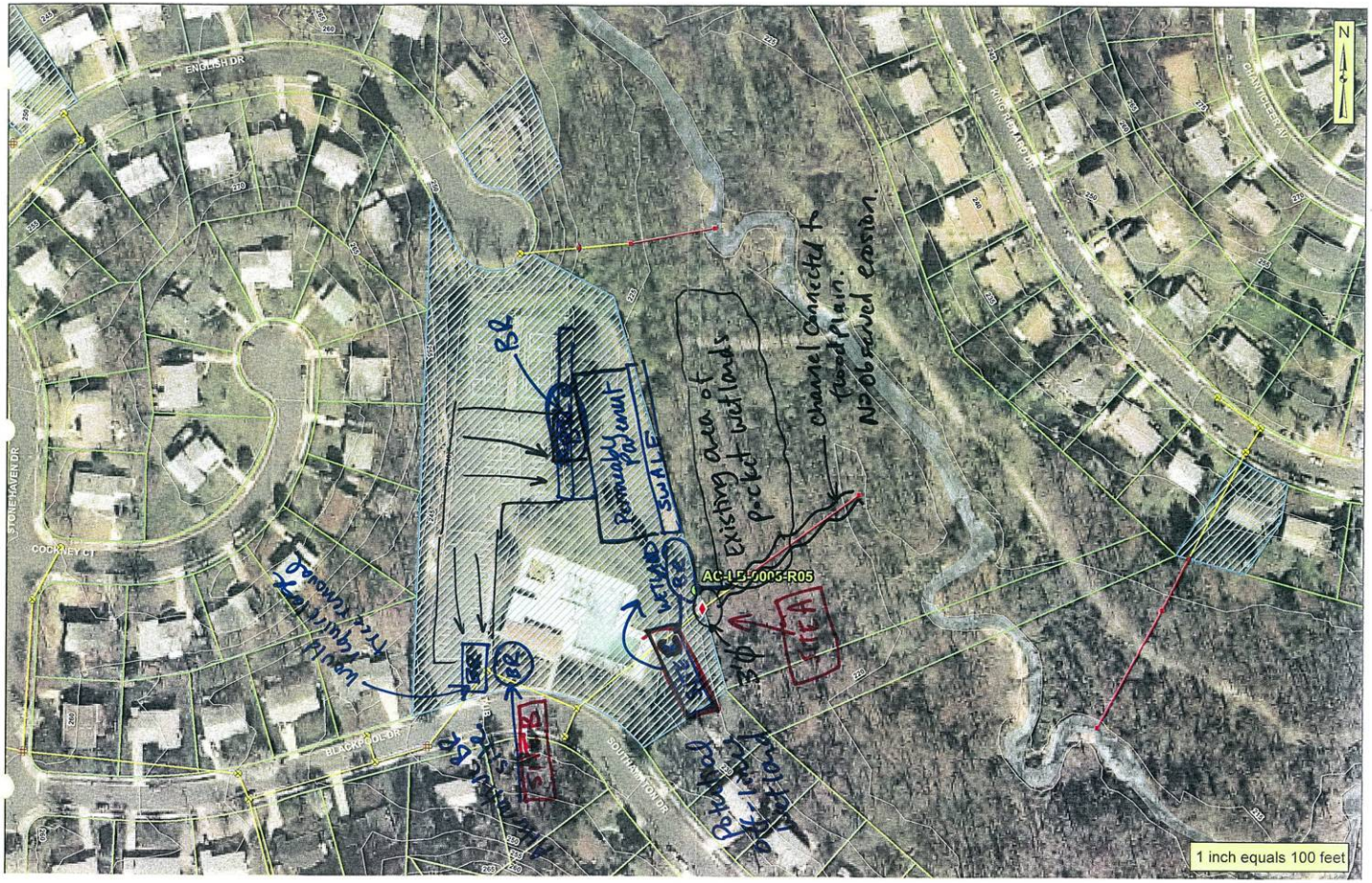
Retrofit Concept	Repairs		New Pond / Retrofit		Onsite System
	Riser		Wet pond / wetland		Bioretention
	Embankment		Extended detention		Dry swale
	Excavate		Lengthen flow path		Wet swale
	Channel		Replant vegetation		Sand filter
	Replant		Add micropool at riser		Infiltration
	Other		Add sediment forebay		WQ Inlet

Notes: SITE C
Bioretention or potential for small wetland below lower parking lot. A swale along lot edge can route water into area.
- SEE SKETCH ON AERIAL

KCI TECHNOLOGIES

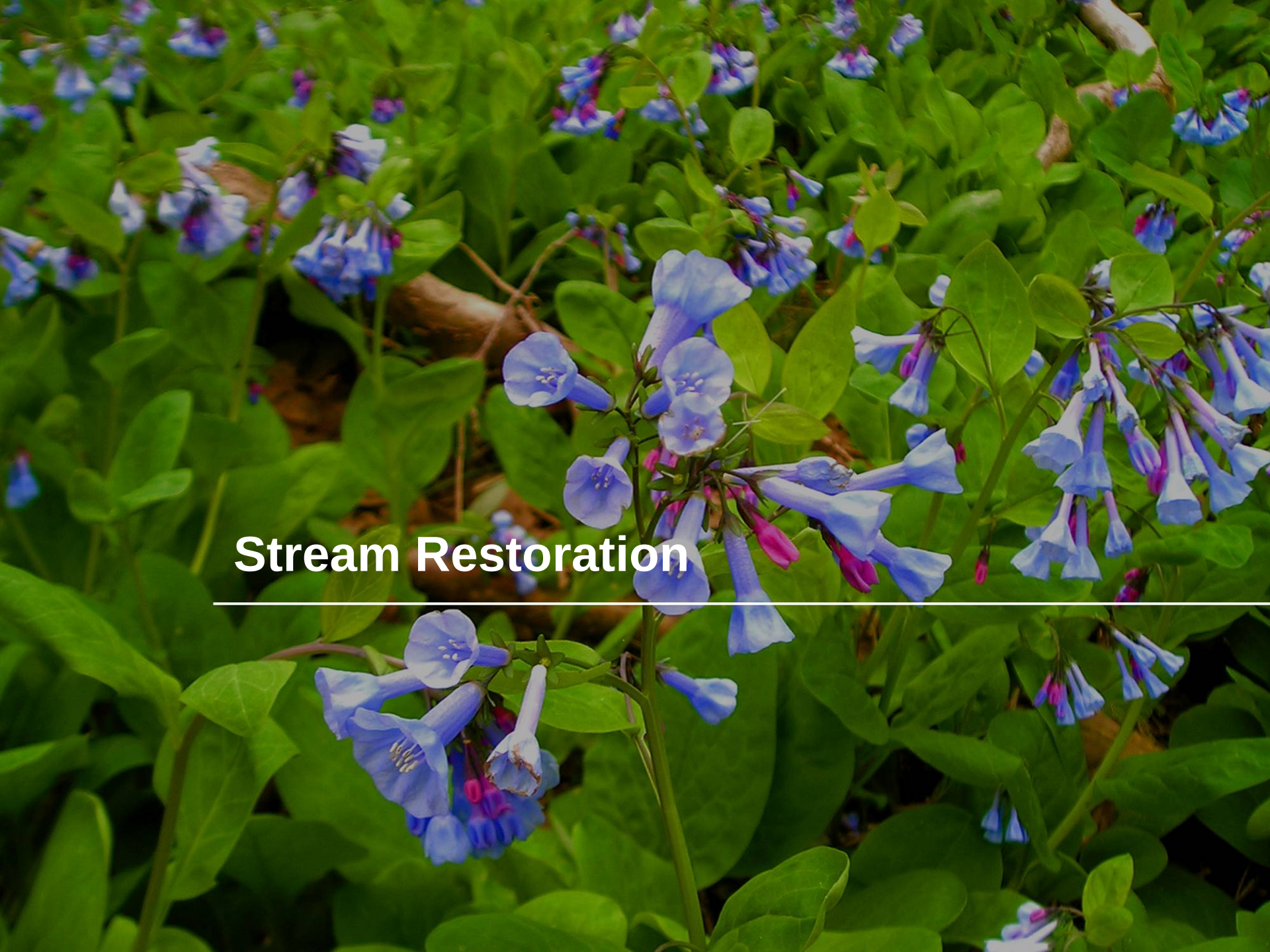
- Environmental Constraints
  - Wetlands
  - Forest
  - Soils
- Design Constraints
  - Utilities
  - Construction Access
- Community Constraints
  - Adjacent Land Use
  - Health and Safety
  - Education / Stewardship

Field Assessment



Example AC-LB-0005

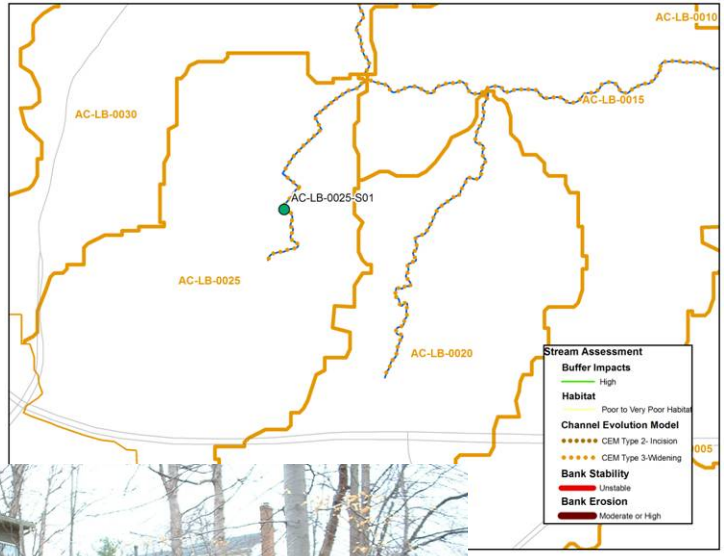
Indicator Group	Indicator	Potential Cause	Desktop Analysis	Project Site	Type of Project
WQ	Modeled pollutant loads	MDR, INS	Individual Rooftop	AC-LB-0005-R01	Bioretention
			Below Outfall	AC-LB-0005-R03	Outfall Protection
			Below Outfall	AC-LB-0005-R04	Outfall Protection
			Below Outfall	AC-LB-0005-R05a	Wetland
			Small parking lot	AC-LB-0005-R05b	Bioretention
			Small parking lot	AC-LB-0005-R05c	Bioretention



Stream Restoration

Procedure - Potential Stream Restoration Sites

- Review SPA Data
  - Active erosion
  - Unstable banks
  - Concrete channels
- Review SPA Photos
- Public input
- ID most feasible
- Field assessment



Breakout Discussion

Breakout Discussion

- Comments on:
  - Targeted priority areas
  - Proposed projects
  - Suggestions for areas that have been missed

Next Steps

- Finalize retrofit inventory
- Evaluate proposed projects
  - Preliminary cost estimate
  - Effectiveness
- Concept Design

- Next meeting
  - Late June / Early July