Little Rocky Run
Johnny Moore Creek
Watershed Management Plan

Watershed Advisory Group #2
March 16, 2009

Fairfax County Department of Public Works and Environmental Services
Presented by Watershed Planning & Assessment Branch, Stormwater Management

Watershed Plan Goals and Objectives

Goals and Objectives

- Developed to improve efficiency of the Watershed Management Planning Process
- Promote consistency in the watershed plans that are to be developed by the county's various consultants.
- Allow for a countywide evaluation that addresses stakeholder concerns while providing an efficient and effective means of assessment.

Terminology

- **Goals-** a general statement about the desired outcome of a watershed management strategy

- **Objectives-** more specific statements that define how the goals are accomplished
  - cannot be directly measured, so measurable indicators that are directly linked to the objectives are needed

- **Indicators –** yardsticks for measuring how well the objectives are met (environmental conditions)
  - a quantifiable endpoint to measure the watershed conditions

The First Round

Initial set of six Watershed Management Plans

- Each plan had own goals and objectives
  - Developed independently, non-standard format, no indicators
- Issues from this approach
  - Implementation, tracking, inconsistency
  - Time Consuming Public Process
    - Less time devoted to project selection and evaluation

Lesson Learned

- The county needed consistent goals and objectives to develop a systematic approach for countywide watershed management

The Second Round

The final seven Watershed Management Plans

- Overarching goals and objectives
  - Consolidated from all first round plans
- Solutions for a range of problems
  - Implementation, tracking, inconsistency issues
- Streamlined Public Process
  - More time devoted to project selection and evaluation

Goals and Objectives

- **Countywide watershed planning goals**
  1. Improve and maintain watershed functions in Fairfax County, including water quality, habitat, and hydrology.
  2. Protect human health, safety, and property by reducing stormwater impacts.
  3. Involve stakeholders in the protection, maintenance and restoration of county watersheds.

- **Watershed Planning Objective Categories***
  1. Hydrology
  2. Habitat
  3. Stream Water Quality
  4. Drinking Water Quality
  5. Stewardship

*each category has one or more specific objectives associated with it

Objectives

Objective	Linked to Goal(s)
CATEGORY 1. HYDROLOGY	
1A. Minimize impacts of stormwater runoff on stream hydrology to promote stable stream morphology, protect habitat, and support biota.	1
1B. Minimize flooding to protect property, human health, and safety.	2
CATEGORY 2. HABITAT	
2A. Provide for healthy habitat through protecting, restoring, and maintaining riparian buffers, wetlands, and instream habitat.	1
2B. Improve and maintain diversity of native plants and animals in the county.	1
CATEGORY 3. STREAM WATER QUALITY	
3A. Minimize impacts to stream water quality from pollutants in stormwater runoff.	1, 2
CATEGORY 4. DRINKING WATER QUALITY	
4A. Minimize impacts to drinking water sources from pathogens, nutrients, and toxics in stormwater runoff.	2
4B. Minimize impacts to drinking water storage capacity from sediment in stormwater runoff.	2
CATEGORY 5 STEWARDSHIP	
5A. Encourage the public to participate in watershed stewardship.	3
5B. Coordinate with regional jurisdictions on watershed management and restoration efforts such as Chesapeake Bay initiatives.	3
5C. Improve watershed aesthetics in Fairfax County.	1, 3

Indicators

Watershed Impact Indicators
Benthic Communities
Road Hazards
Fish Communities
Building Hazards
Aquatic Habitat
Flood Complaints
Channel Morphology
In-stream Sediment
Hydrology
Nitrogen Loading
Phosphorous Loading
Headwater Riparian Habitat
Wetland Habitat
Sediment Loading

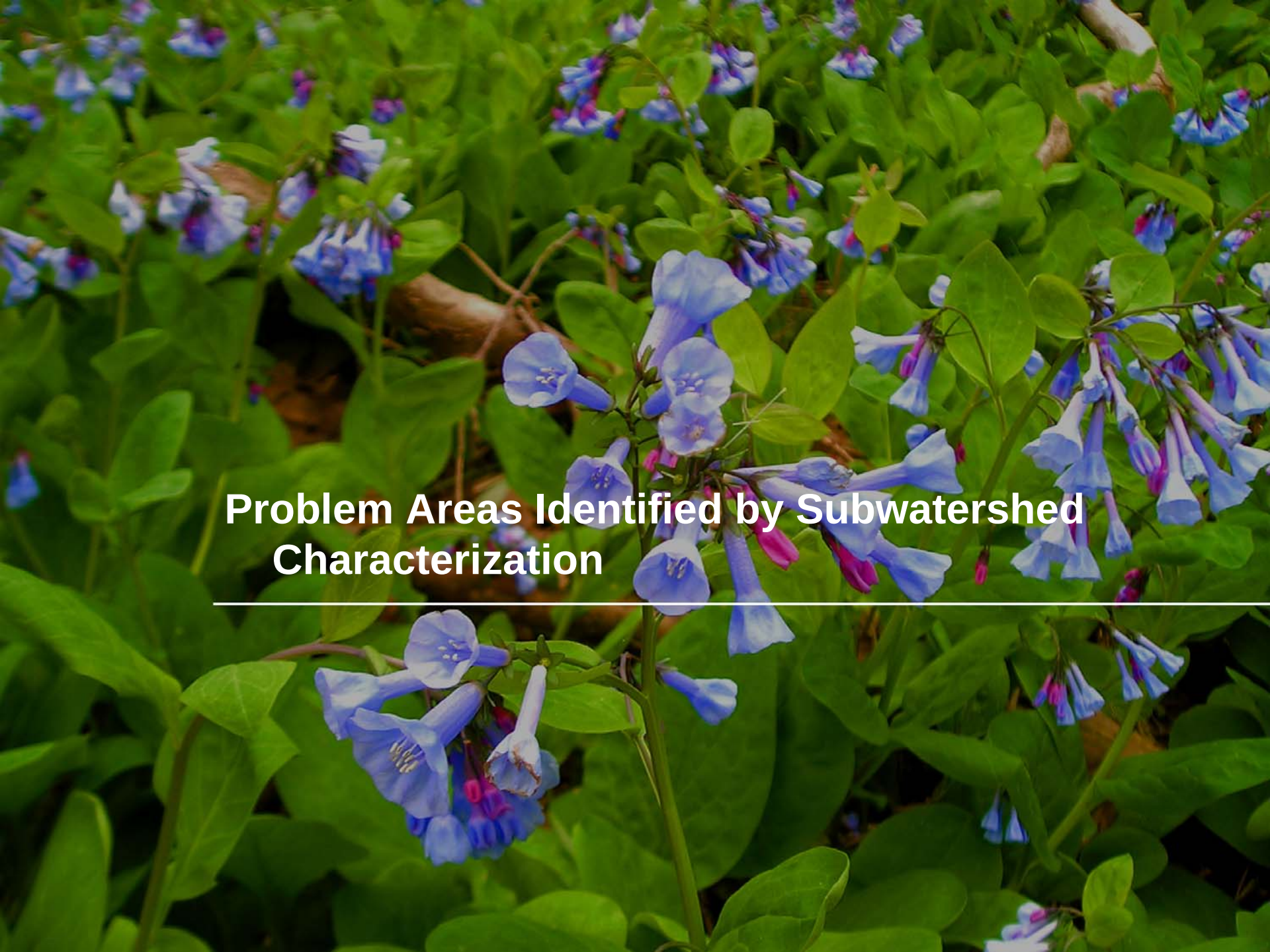
Source Indicators
Channelized/Piped Streams
Stream Buffer Deficiency
Impervious Area
Nutrient Loading
Stormwater Outfalls
Sediment Loading
Parcels served by septic
Urban Land Cover
Population density
VPDES Point Sources
Erosion and Sediment permits
Sanitary Sewer Crossings
Other Hot Spots

How does it work?

- **Goal-** Improve and maintain WS functions in FFX CTY, Including Water Quality, Habitat & Hydrology
  - **Objective-** Minimize impacts to stream water quality from pollutants in STW runoff
    - **Indicator-** Fish Community Rating
      - Other Related Indicators: Nutrient Loads, Habitat Quality, Sediment, etc.

Expectations

- Extensive work was done in developing goals and objectives during 1st Round
- We do not intend to re-invent the wheel
- We are open to new ideas on watershed specific goals & objectives not yet considered
- WAG time is to be primarily devoted to assisting with project identification and selection
- WAG members are encouraged to help generate community support for the plan



Problem Areas Identified by Subwatershed Characterization

Subwatershed Characterization - Introduction

- County identified need to be able to more effectively compare projects across watersheds (as well as consulting teams)
- Biological, physical, and programmatic data have been compiled (and continue to be collected) for a broad range of indicators
- Many indicators have been labeled as ‘predictive’, allowing for future conditions analysis
  - Help differentiate between areas in need of preservation versus restoration
  - Allow County to quantify benefits of proposed watershed plan items

Subwatershed Characterization

County Wide Goals

1. ***Improve and maintain watershed functions in Fairfax County, including water quality, habitat, and hydrology***
2. ***Protect human health, safety, and property by reducing stormwater impacts***
3. ***Involve stakeholders in the protection, maintenance and restoration of county watersheds***

Hydrology - 1 & 2

Habitat - 1

Stream Water Quality – 1 & 2

Drinking Water Quality - 2

Stewardship - 3

Watershed Impact Indicators

- Benthic Communities
- Fish Communities
- Aquatic Habitat
- Channel Morphology
- Hydrology
- RPA Riparian Habitat
- Headwater Riparian Habitat
- Wetland Habitat
- Road Hazards
- Building Hazards
- Flood Complaints
- In-stream Sediment
- Nitrogen Loading
- Phosphorous Loading
- Sediment Loading

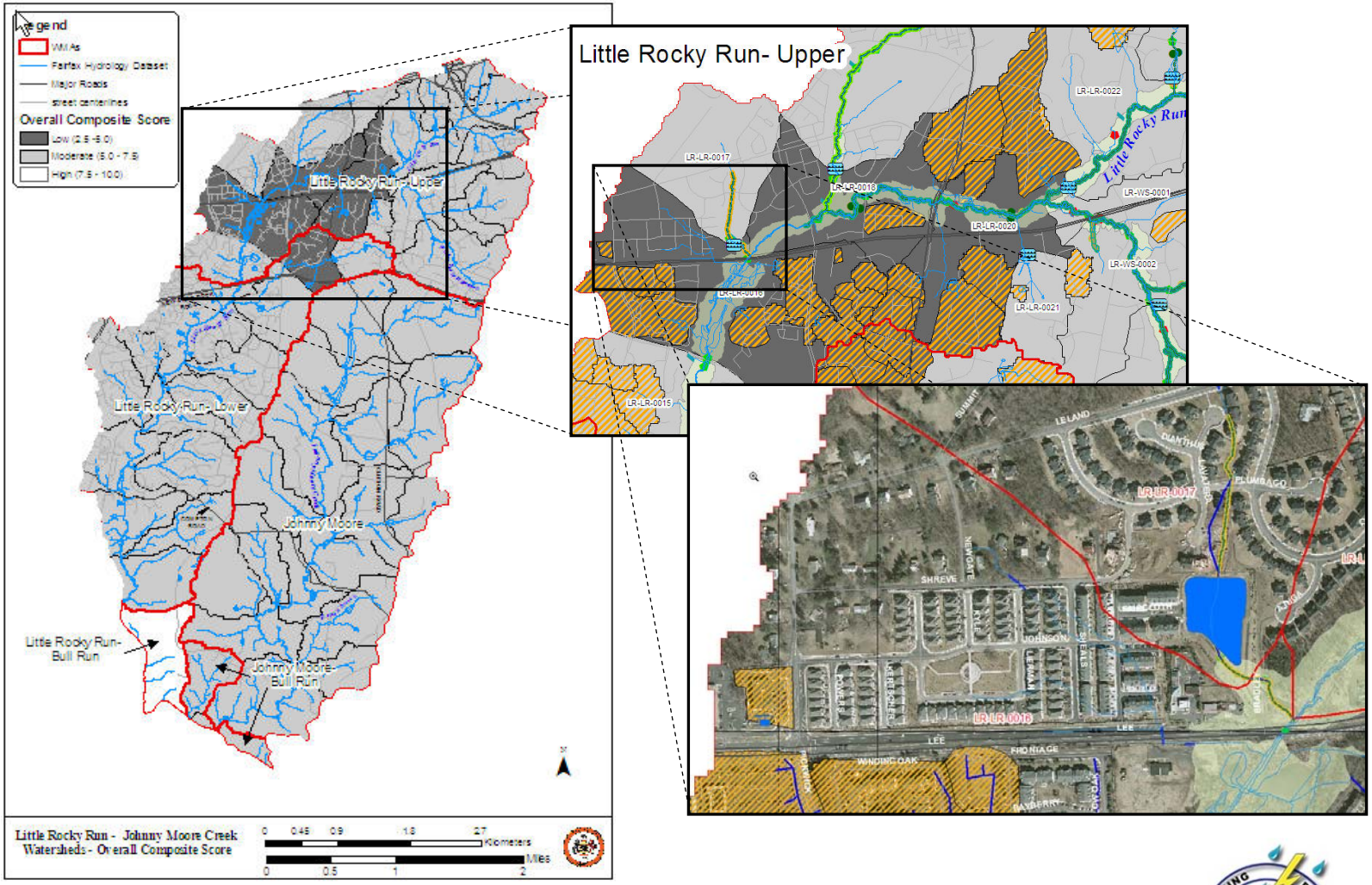
Source Indicators

- Channelized/Piped Streams
- Impervious Area
- Stormwater Outfalls
- Parcels served by septic
- Population density
- Erosion and Sediment permits
- Sanitary Sewer Crossings
- Stream Buffer Deficiency
- Nutrient Loading
- Sediment Loading
- Urban Land Cover
- VPDES Point Sources
- Other Hot Spots

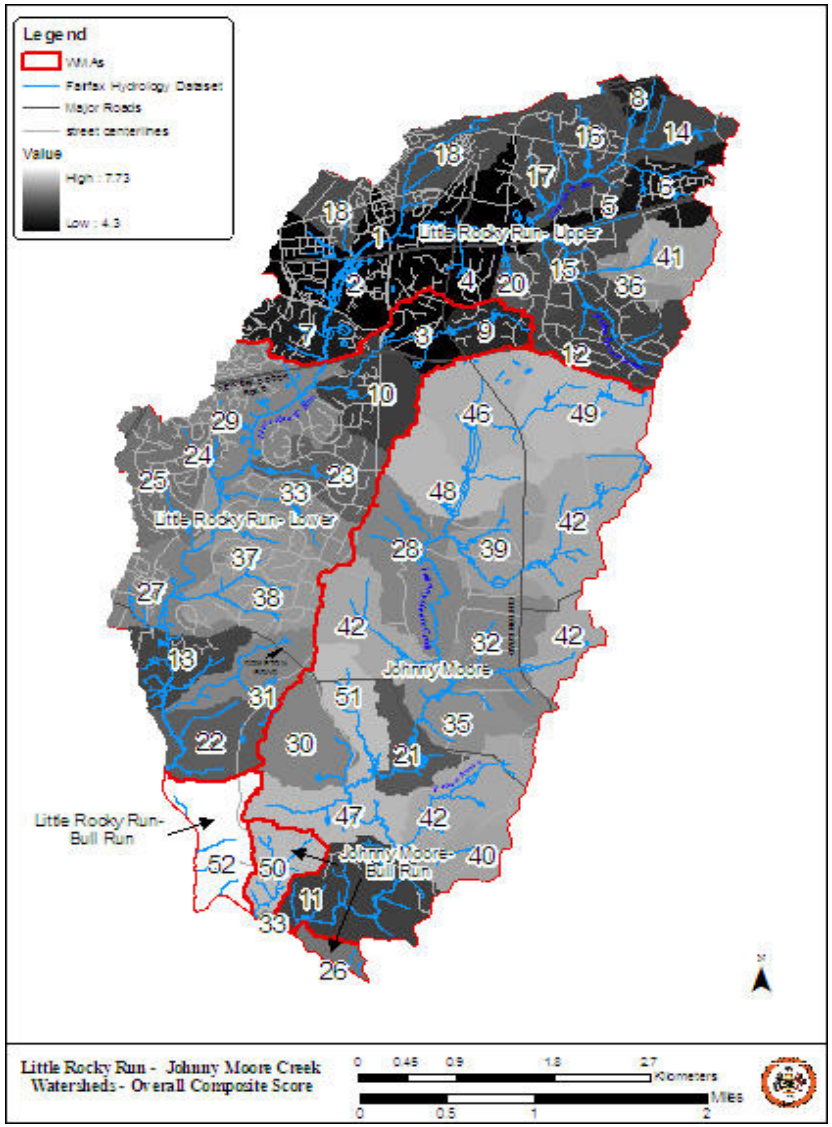
Analysis

- **Overall Composite Score**
  - Average of all Objective Scores
  - Low scoring subwatersheds likely fall short of more than one County objective/goal
  - Target not only those with a low score, but upstream subwatersheds (overlaps with source metrics)
- **Objective Composite Score**
  - Average of impact indicators that relate to objectives (i.e. Nutrient Loading, Sedimentation, Benthic Surveys, and Fish counts relating to Stormwater Quality Objective)
  - Allows closer examination of remaining subwatersheds, since a good Overall Composite score does not guarantee that all objectives are being met
- **Source Composite Score**
  - Average of source metrics per watershed
  - Help visualize watershed stressors that may be located upstream of impaired watershed
  - Establish link between stressor and impact
  - Help determine areas in danger of future degradation

Overall Composite – Countywide Scale



Overall Composite – Watershed Scale



Upper Little Rocky

- Contains majority of impaired subwatersheds
- Home of most recent development, only VPDES hotspot, highest impervious percentage (high density residential, commercial, I-66, Braddock, FFX Co Pkway, etc.)

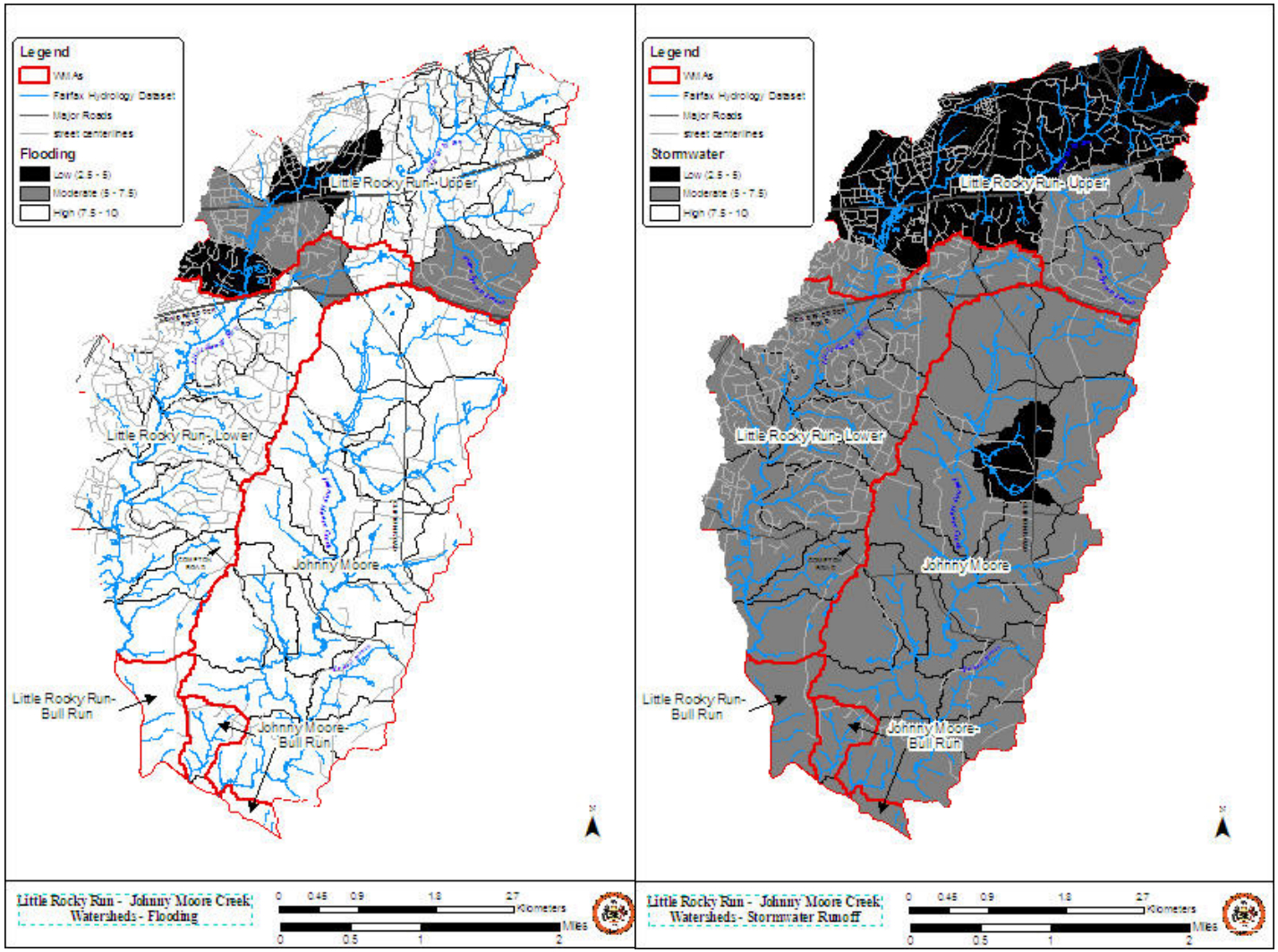
Lower Little Rocky

- More stable than Upper Little Rocky, owing mostly to lack of recent development
- Low Ranked Area (along New Braddock) is headwater subbasin with room for projects near school and recreation zone

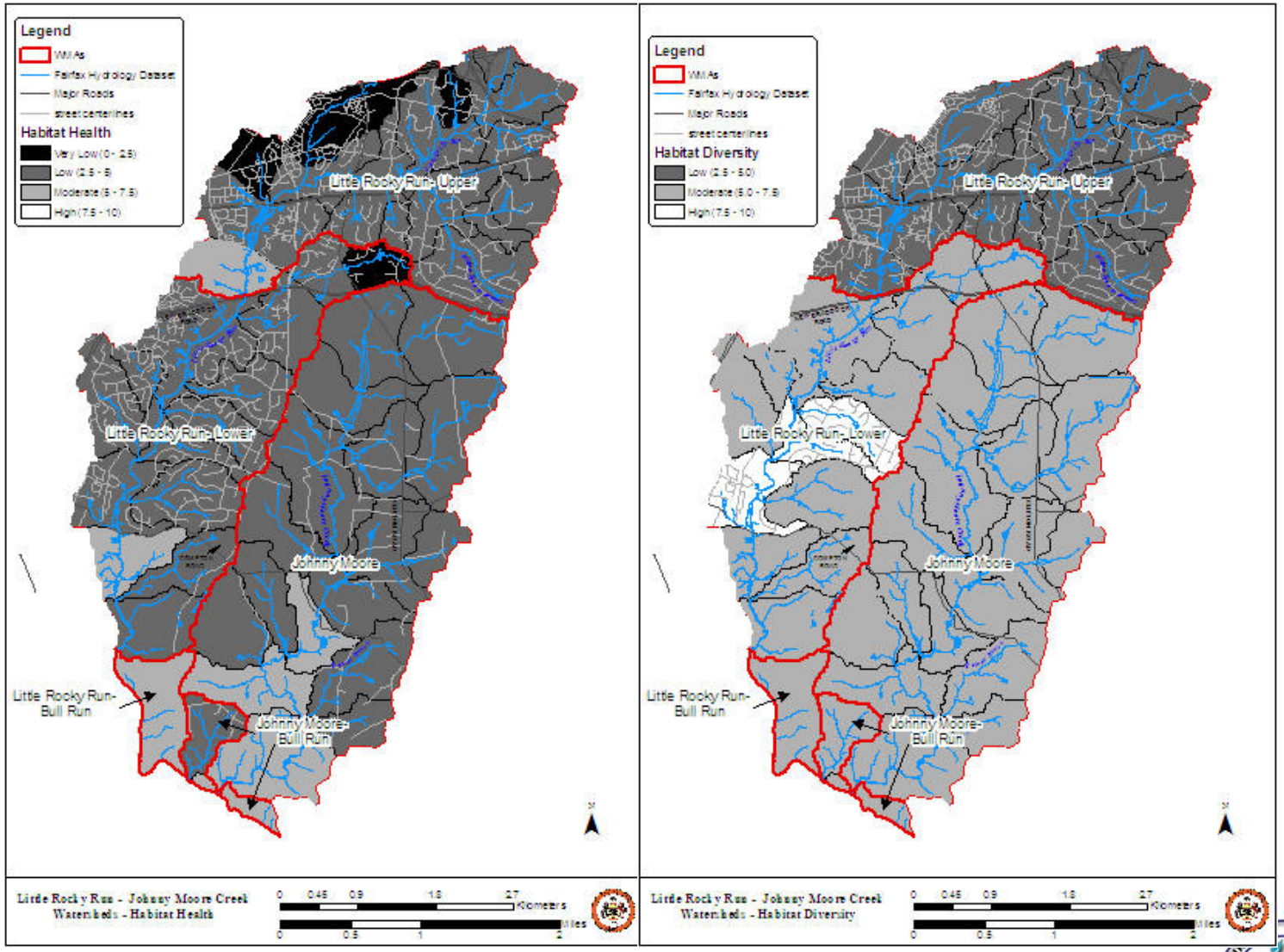
Johnny Moore Creek

- Contains majority of highest ranked watersheds
- Several erosion areas and more nutrient-rich landuses watershed-wide may be targeted for restoration

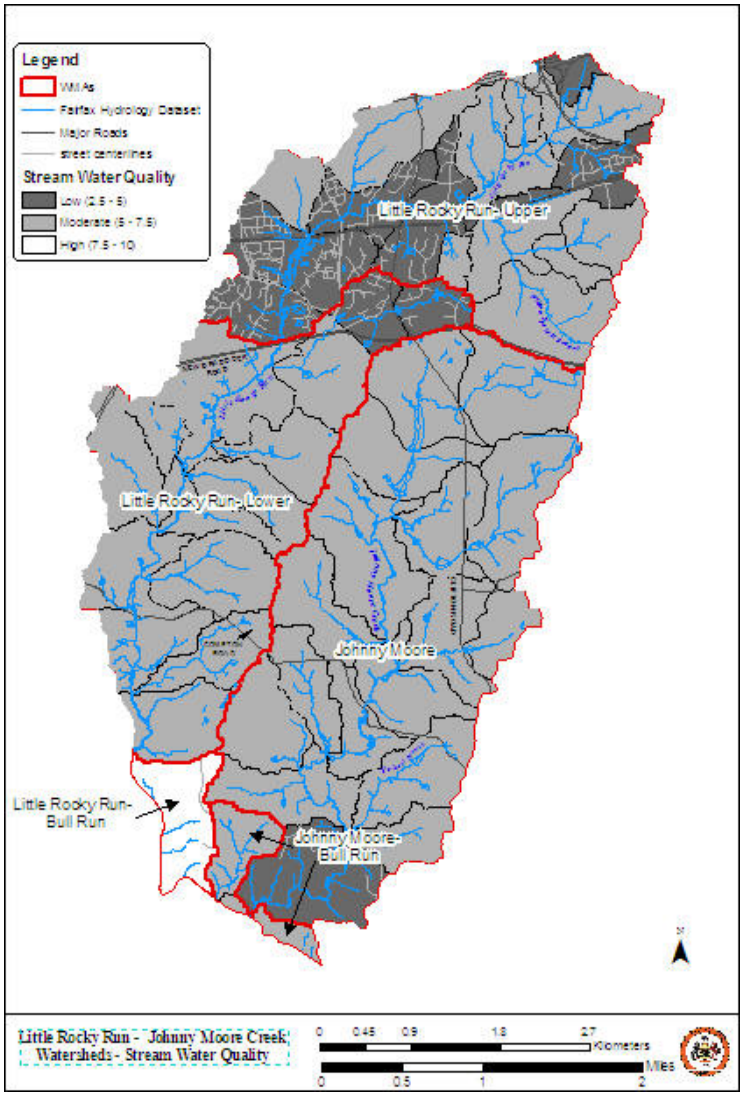
Hydrology


Legend
WMAs
Fairfax Hydrology Dataset
Major Roads
street centerlines
Flooding
Low (2.5 - 5)
Moderate (5 - 7.5)
High (7.5 - 10)
Little Rocky Run- Upper
Little Rocky Run- Lower
Johnny Moore
Little Rocky Run- Bull Run
Johnny Moore- Bull Run
Little Rocky Run - Johnny Moore Creek; Watersheds - Flooding
0 0.45 0.9 1.8 2.7 Kilometers
0 0.5 1 2 Miles
Legend
WMAs
Fairfax Hydrology Dataset
Major Roads
street centerlines
Stormwater
Low (2.5 - 5)
Moderate (5 - 7.5)
High (7.5 - 10)
Little Rocky Run- Upper
Little Rocky Run- Lower
Johnny Moore
Little Rocky Run- Bull Run
Johnny Moore- Bull Run
Little Rocky Run - Johnny Moore Creek; Watersheds - Stormwater Runoff
0 0.45 0.9 1.8 2.7 Kilometers
0 0.5 1 2 Miles

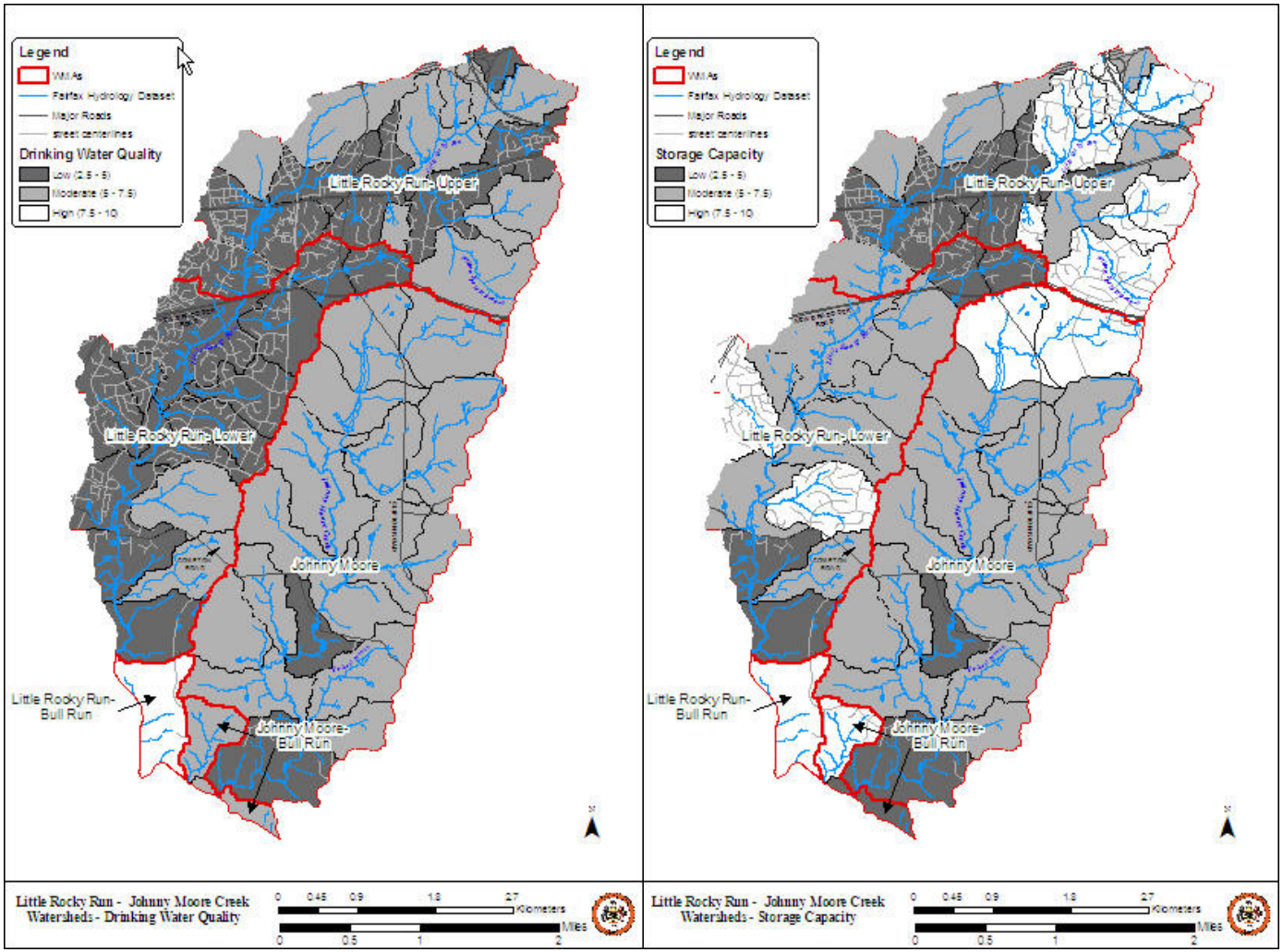
Habitat


Legend
WMAs
Fairfax Hydrology Dataset
Major Roads
street centerlines
Habitat Health
Very Low (0 - 2.5)
Low (2.5 - 5)
Moderate (5 - 7.5)
High (7.5 - 10)
Little Rocky Run- Upper
Little Rocky Run- Lower
Johnny Moore
Little Rocky Run- Bull Run
Johnny Moore- Bull Run
Little Rocky Run - Johnny Moore Creek Watersheds - Habitat Health
Legend
WMAs
Fairfax Hydrology Dataset
Major Roads
street centerlines
Habitat Diversity
Low (2.5 - 5.0)
Moderate (5.0 - 7.5)
High (7.5 - 10)
Little Rocky Run- Upper
Little Rocky Run- Lower
Johnny Moore
Little Rocky Run- Bull Run
Johnny Moore- Bull Run
Little Rocky Run - Johnny Moore Creek Watersheds - Habitat Diversity
Kilometers
Miles

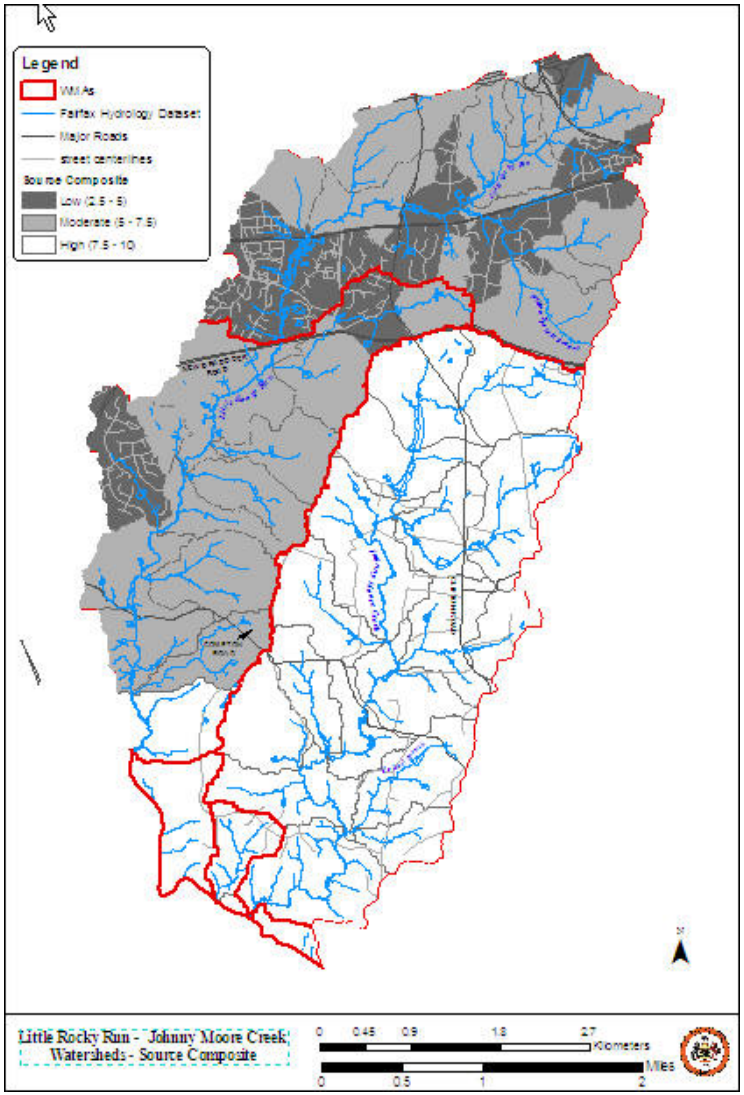
Stream Water Quality



Drinking Water Quality



Source Composite



Sources include (but not limited to)

- Impervious Areas (Directly Connected and Total)
- Stormwater Outfalls
- Nutrient Concentrations
- Hot Spots (from field investigation)
- Population Density
- Sanitary Sewer Crossings
- Buffer Deficiency
- Parcels served by septic

Hydrologic connectivity important factor when evaluating stressors

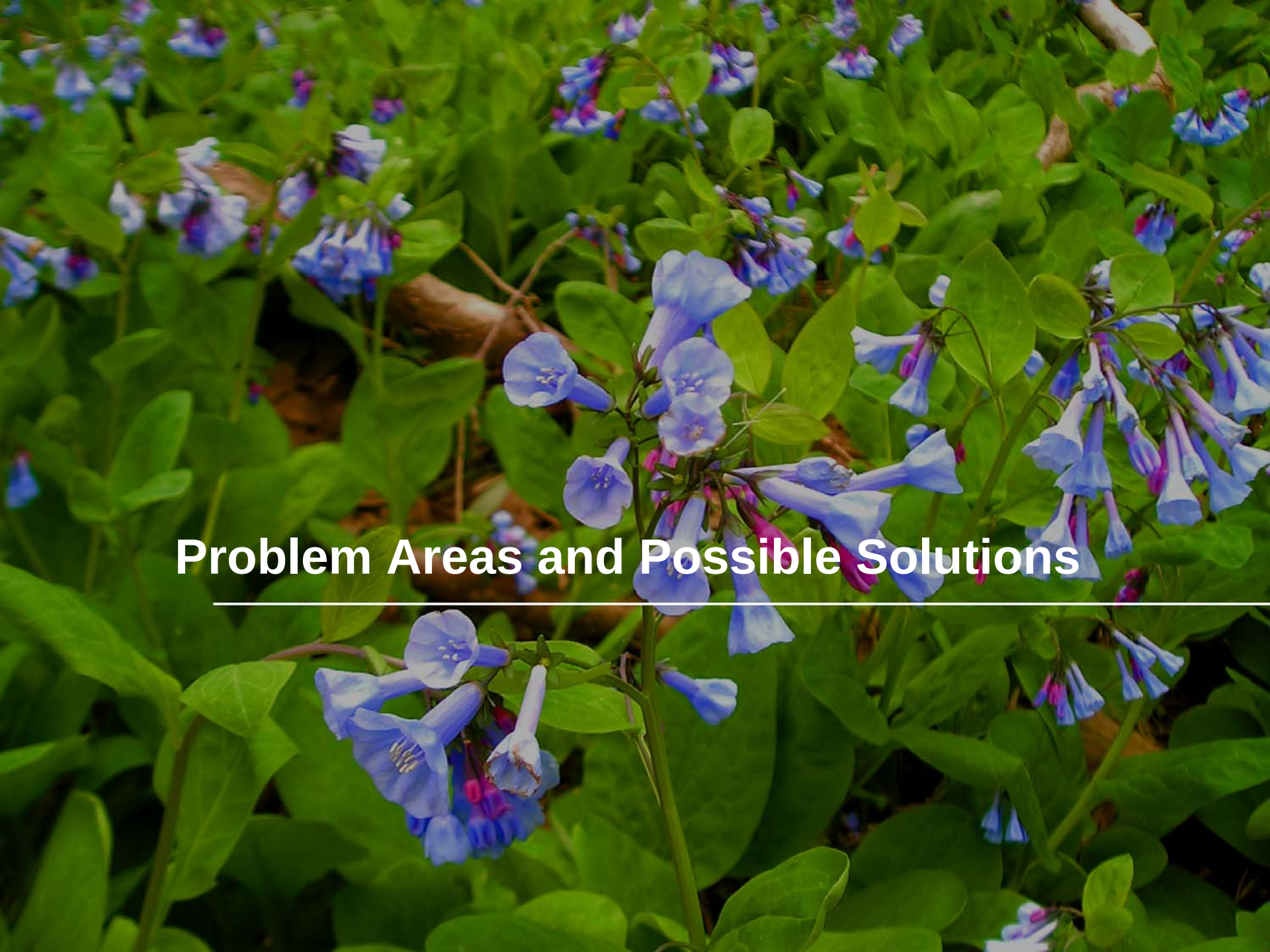
General Thoughts

- Subwatershed Ranking used to identify currently impacted subwatersheds, subwatersheds in danger of becoming impacted, and potential sources or stressors that may result in impairment
- Subwatershed Ranking is not a replacement for common sense and will be used in conjunction with WAG input, field reconnaissance, County identified problem areas, etc.
- WAG input is vital as potential preservation/restoration strategies are devised
- Establishing a baseline allows County to quantify benefit of watershed management plan project proposals and compare across watershed boundaries

What's Next?

- We're in the process of finalizing characterization for existing conditions
- We will create a future conditions characterization based on predictive sources and impacts (i.e. using comprehensive plan Landuse data to estimate increases in impervious areas which directly impact runoff volume, nutrient concentrations, etc.)
- A future conditions, with plan implementation, scenario will allow us to analyze the effectiveness, or lack thereof, of proposed treatment strategies

Discussion: Review problem maps



Problem Areas and Possible Solutions

Treatment Options/Strategies

- Best Management Practices for Water Quality / Quantity Control
  - Structural Stormwater Controls
  - Manufactured BMPs
  - Low Impact Development Techniques
- Stream Restoration
- Non Structural Measures
  - Reforestation
  - Zoning

New Stormwater Management Facilities

- Install new BMP and Low Impact Development (LID) facilities in areas that do not have existing stormwater management facilities, or in areas where retrofitting existing facilities is not feasible.
- Effective at schools and other sites with available land area

Common Areas for Retrofits

Location	Type of Retrofit
Existing Detention Pond	Increased storage and / or improved outlet for greater water quality treatment and flow control
Immediately upstream of existing road culverts	Wetland, or extended detention facility for water quality treatment
Within large open spaces, such as golf courses and parks	Ponds or wetlands for water quality / quantity control
Within or adjacent to large parking lots	Grassed swales, bioretention, or manufactured BMP for water quality control.
Individual Lot	Low Impact Development techniques

Stormwater Pond Retrofit Options

- Modification of existing BMP
  - increase storage
  - add water quality features (sediment basins, micropools, etc.)
- Used where best fits into existing landscape
- Retrofits can be used to address:
  - Erosion
  - Pollutant loads
  - Correct past mistakes

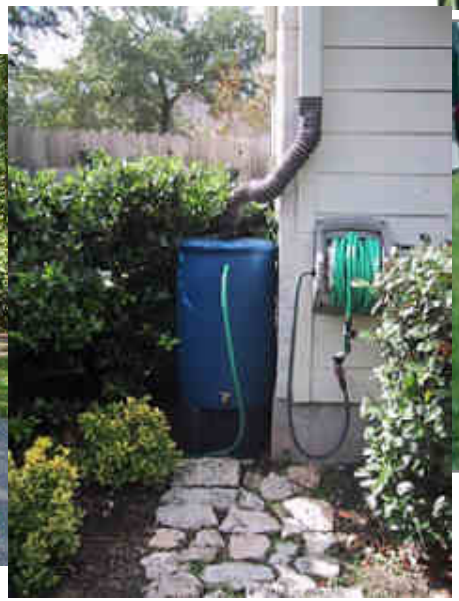
Manufactured BMPs

- Stormwater bioretention and filtration systems
- Optimized for high volume/flow and pollutant removal
- Can be used in highly developed sites
  - Landscaped areas
  - Green space
  - Parking lots
  - Streetscapes

Low Impact Development (LID)

- Approach that duplicates the original hydrology of the watershed
- Based on five principles
  - Conservation and minimization
  - Storage
  - Conveyance
  - Landscaping
  - Infiltration
- LID is a lot level approach to stormwater management
- Treats rainfall on site, allows water to infiltrate into the ground

Low Impact Development (LID)



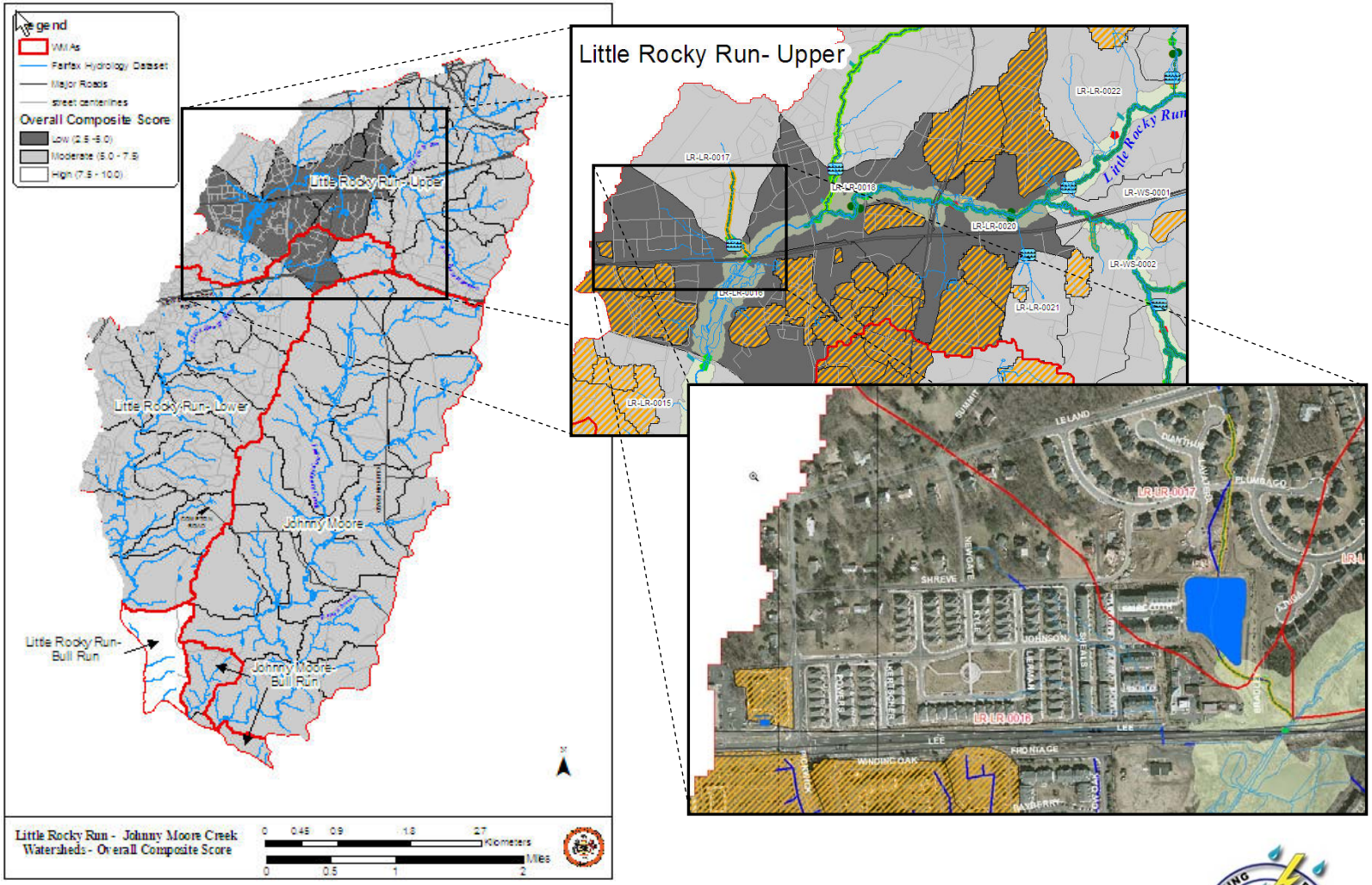
Culvert Retrofits

- Extended detention by control structure and pool
- Installed upstream from existing road culverts
- Used on small tributary streams – issues with fish passage
- Settles out pollutants and mitigates small flow increases

Stream Restoration Approaches

- Utilize bioengineering techniques
  - Self-sustaining solutions that allow for adjustments over time
  - Incorporate living material into solution
  - Minimize use of concrete or stone
- Control the source of the water, when possible, to reduce excess runoff to stream
- Encompass the entire stream reach within the design, rather than a band-aid approach to a specific problem area

Watershed Specifics – Finding potential projects



Example 1 – Untreated Residential area (includes Hotspot area)

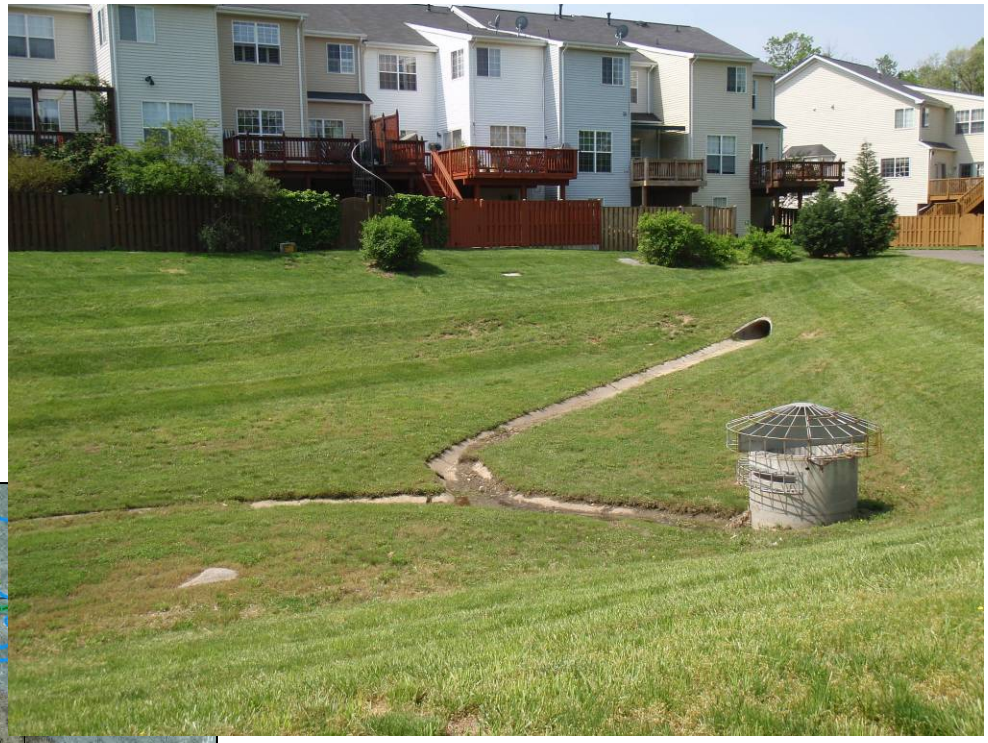
Common Area BMP/LID?

Pond Retrofit?

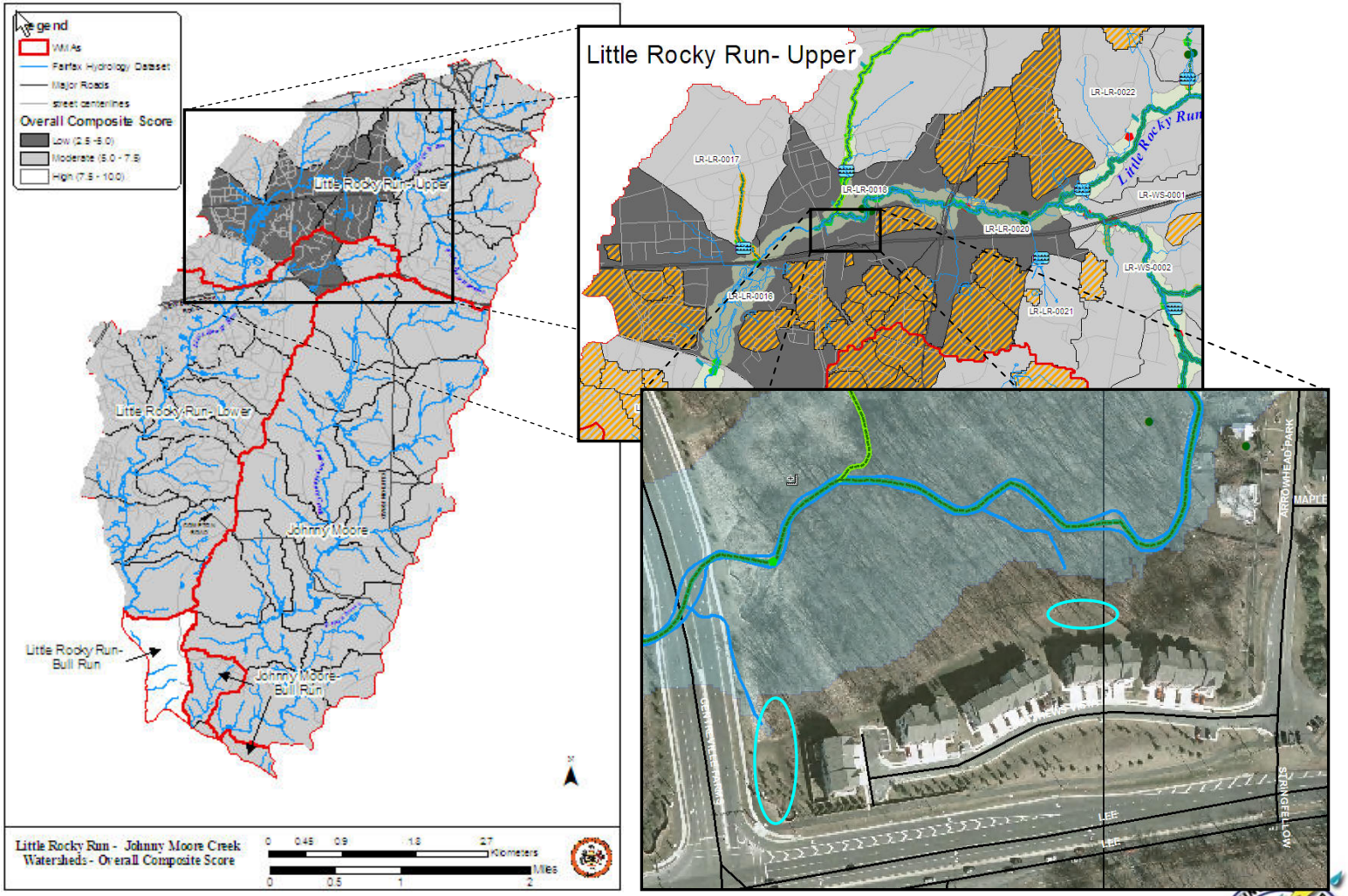
Curb Inlet Retrofit?

Example 2 – Remove Trickle Ditch

- Sediment collects in trickle ditch only to get resuspended and flushed downstream during next event
- Evaluate need for expanded WQ benefit (outlet configuration, sediment forebays, micropools, etc.)

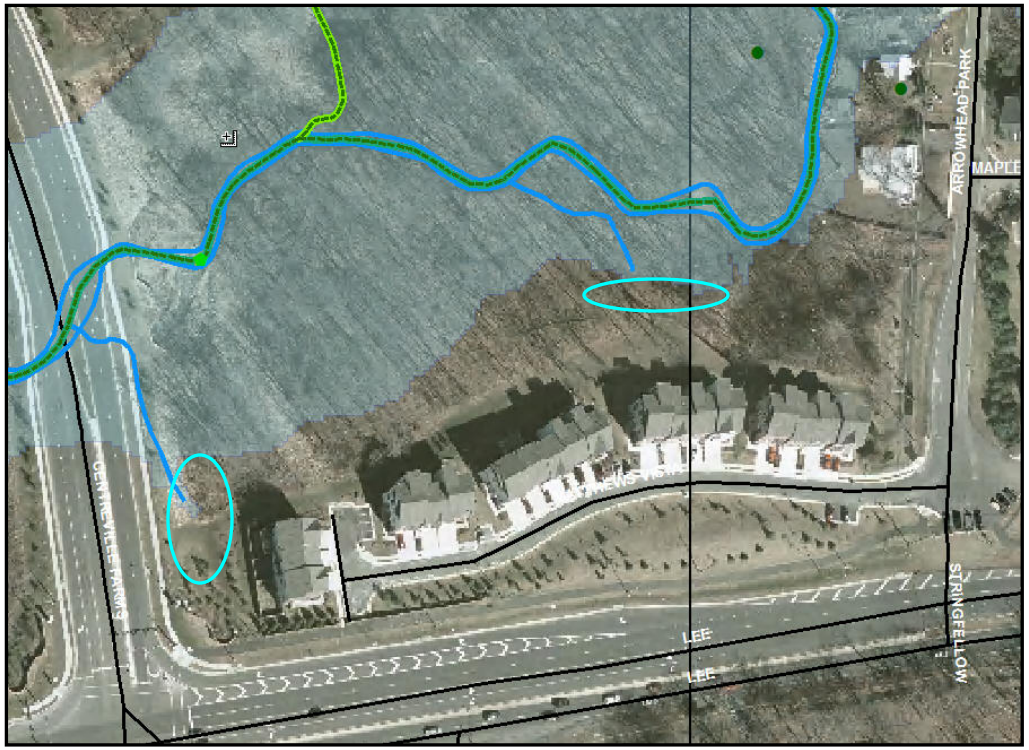


Example 3 – Untreated Parcels

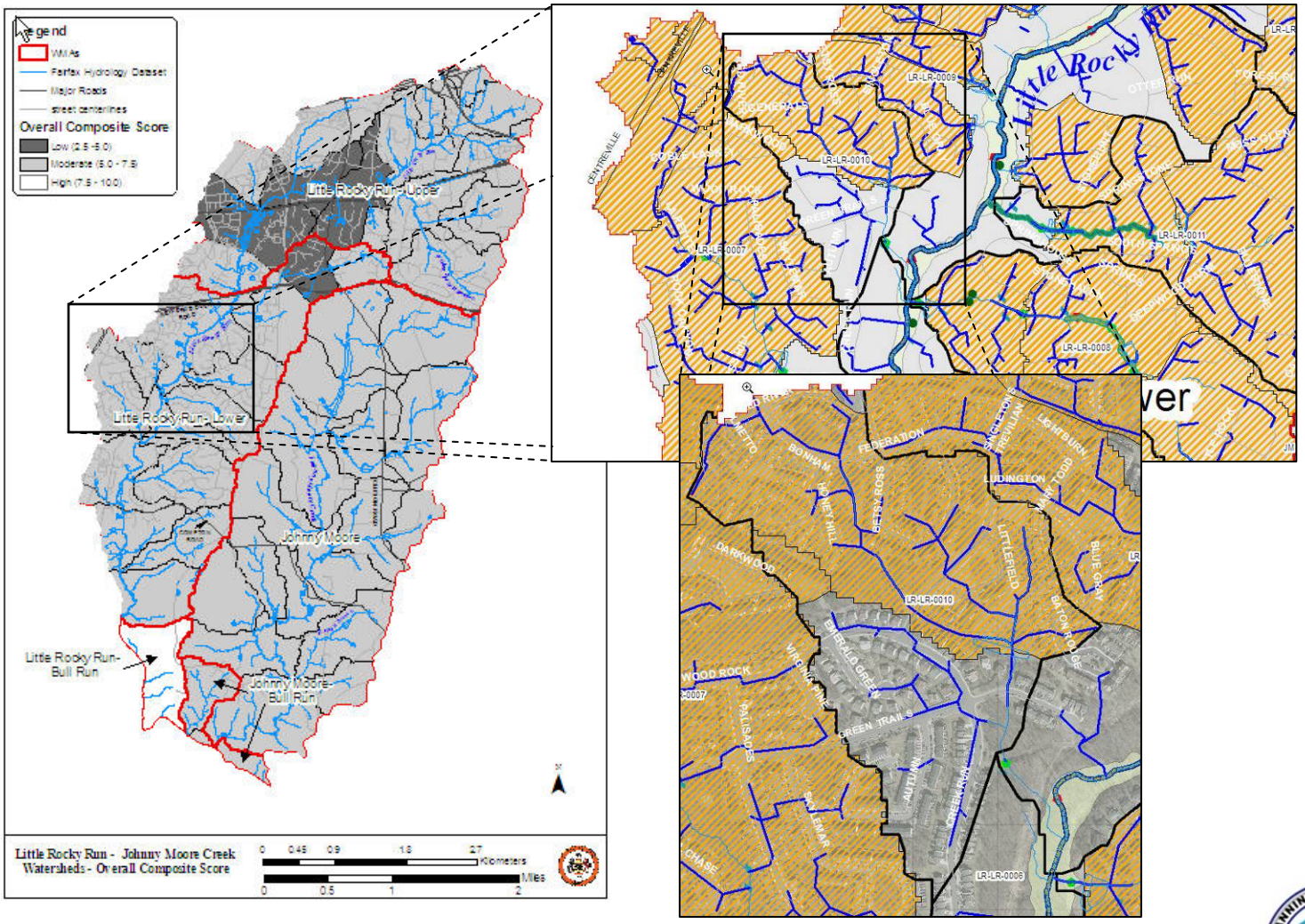


Example 3 – Untreated Parcels

- Total Drainage area of ~ 3 Acres
- Total Impervious area ~1.75 Acres
- Need to avoid work in floodplain/buffer areas to maximum extent possible
- Two possible collection and treatment areas
- Good candidate for BMP retrofit (bioretention, infiltration trench, etc.)

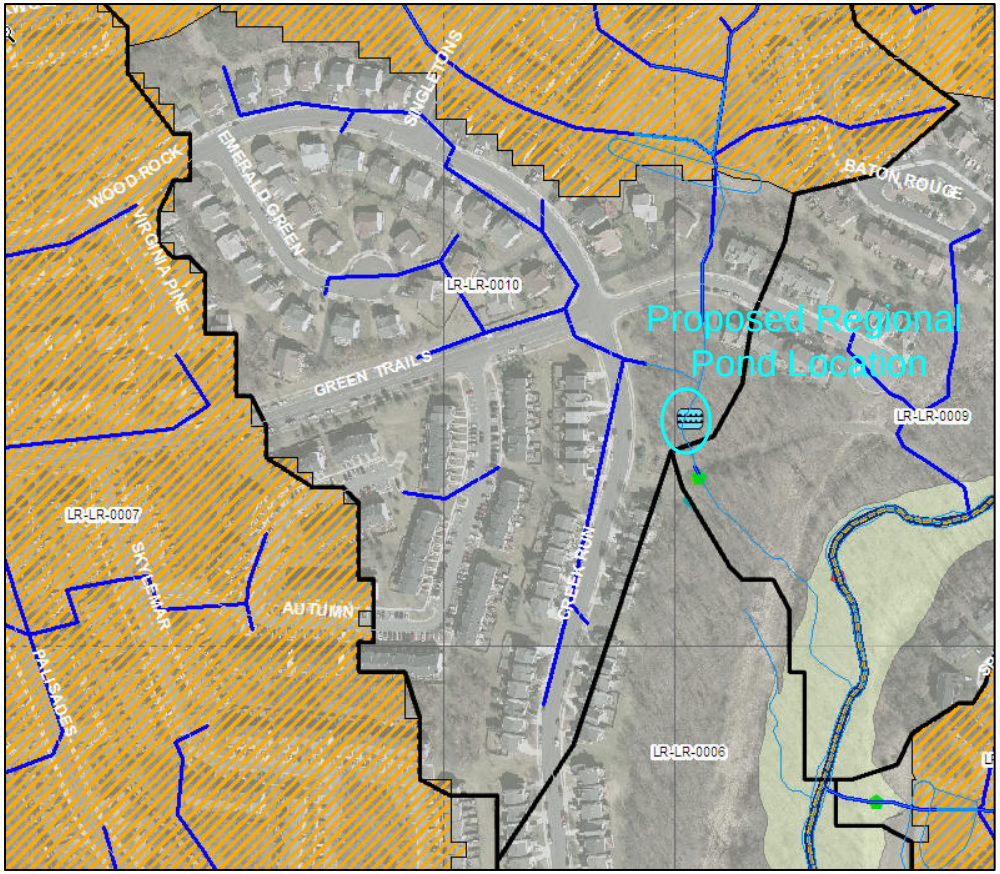


Example 4 – Inactive Regional Facility

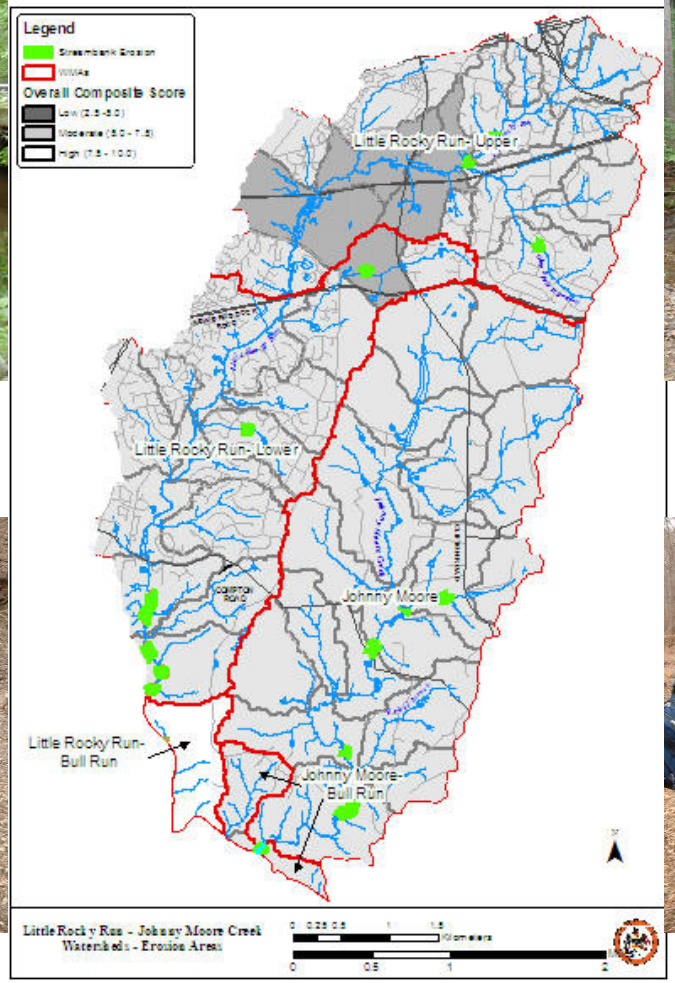


Example 4 – Inactive Regional Facility

- Total Drainage area of ~ 25 Acres
- Total Impervious area ~7 Acres
- Investigate neighborhood for retrofit possibilities (grass swales, bioretention, infiltration, etc.)
- Depending on feasibility of retrofit, modified regional facility to be considered – open space available

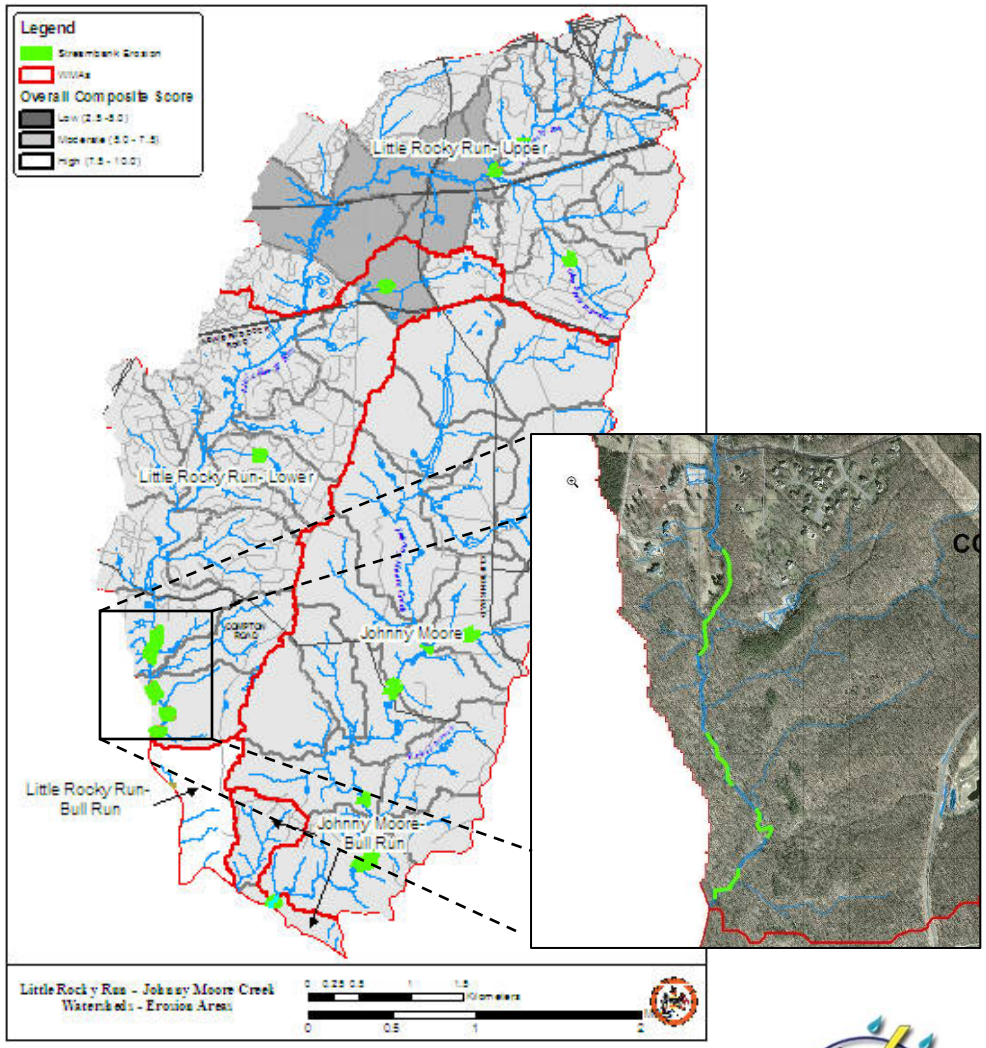


Example 5 – Stream Erosion

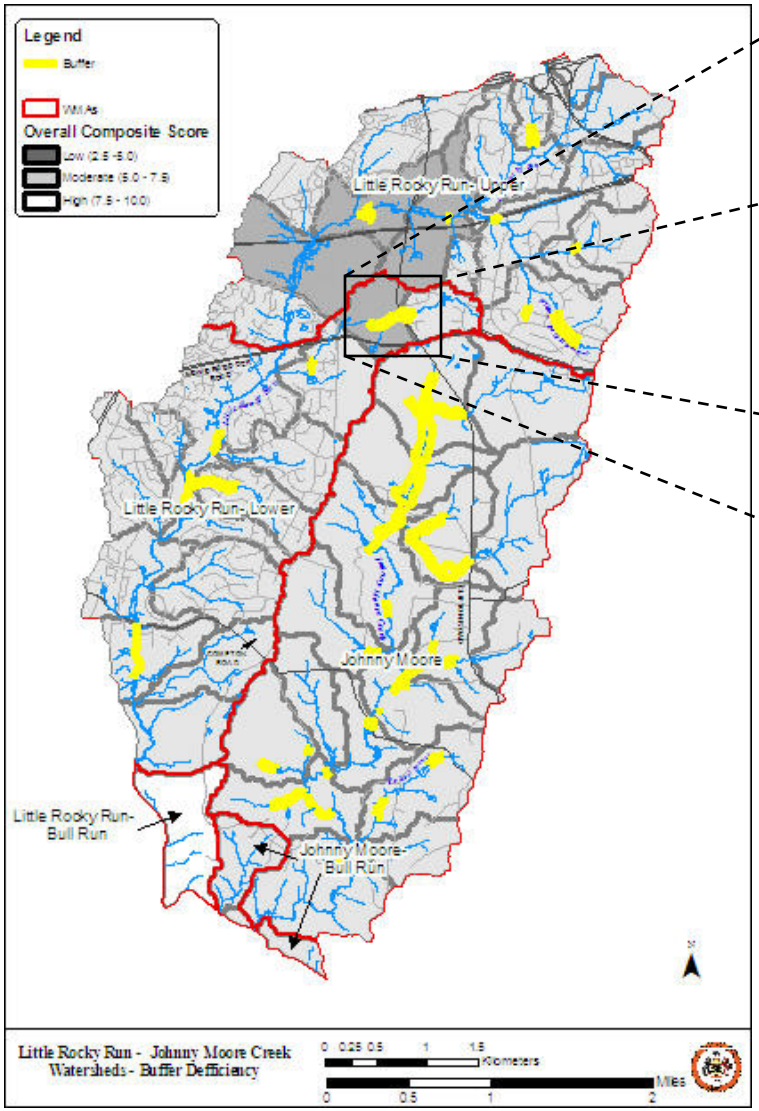


Example 5 – Stream Erosion

- Several severely eroded stream banks are in areas with poor access, near confluence with Bull Run
- Stream Restoration to address erosion areas, should be preceded by upland treatments which may reduce erosive velocities
- Upland areas experiencing erosion should be addressed in order to reduce sediment burden



Example 6 – Stream Buffer Deficiency

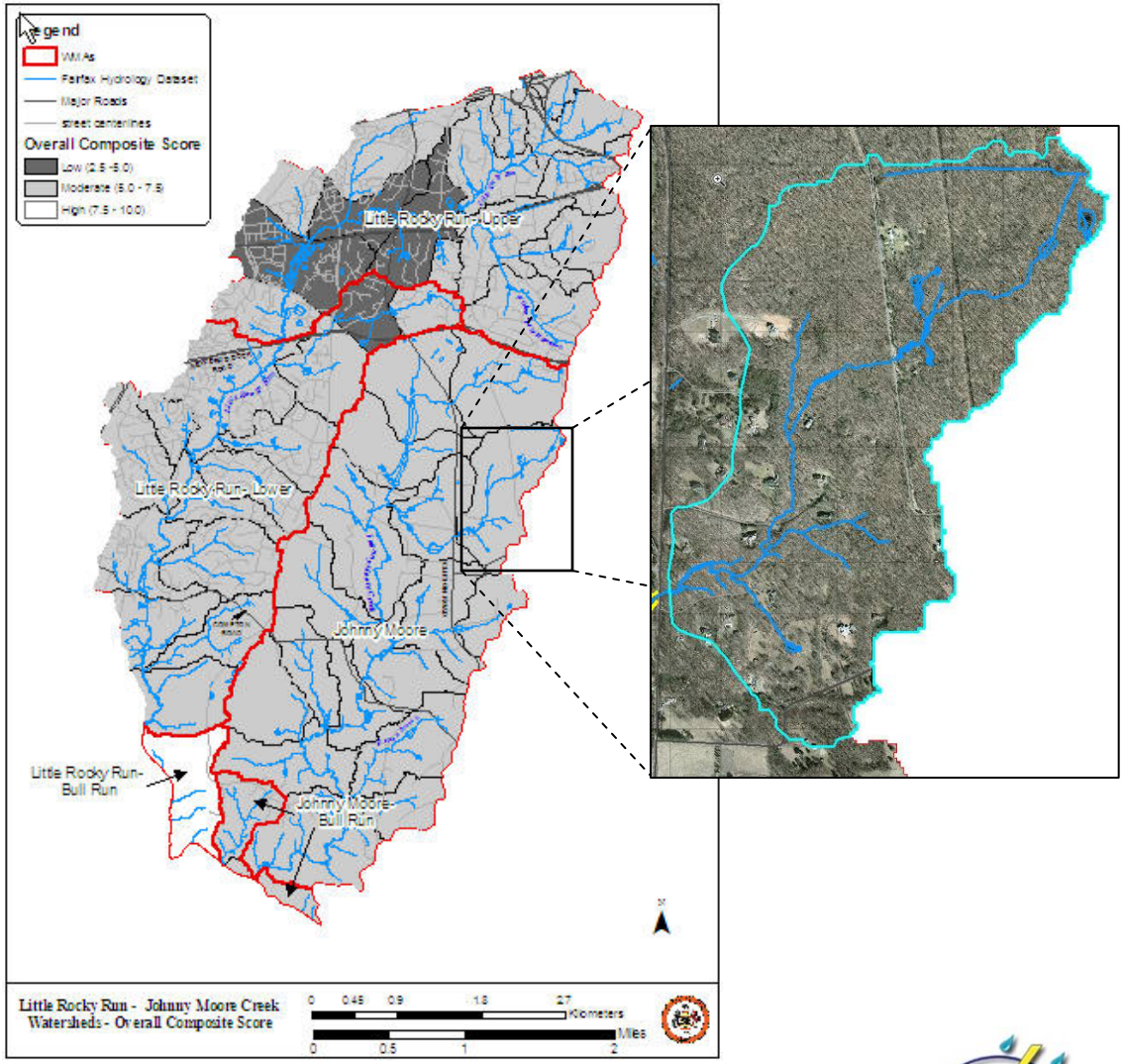


Example 6 – Stream Buffer Deficiency

- Several areas with deficient stream buffers
- Coordination with WAG important to determine potential buffer restoration sites
- County has set aggressive tree canopy goals
- Many opportunities on private property and golf courses
- Volunteers/donations may be available for buffer restoration projects

Preservation

- Areas meeting most or all objectives can be targeted for preservation
- Need to compare against future conditions to see what changes are predicted
- Downzoned area in Johnny Moore
- Parkland along Bull Run generally undisturbed



Questions?

Next Steps

- AMEC to begin identification of specific project areas
- WAG members will receive “homework” regarding possible project sites for feedback
- Next meeting in mid-April to discuss the proposed solutions

Thank you for attending!