

NORTHERN VIRGINIA STREAM RESTORATION BANK – RESTON ROTARY PRESENTATION

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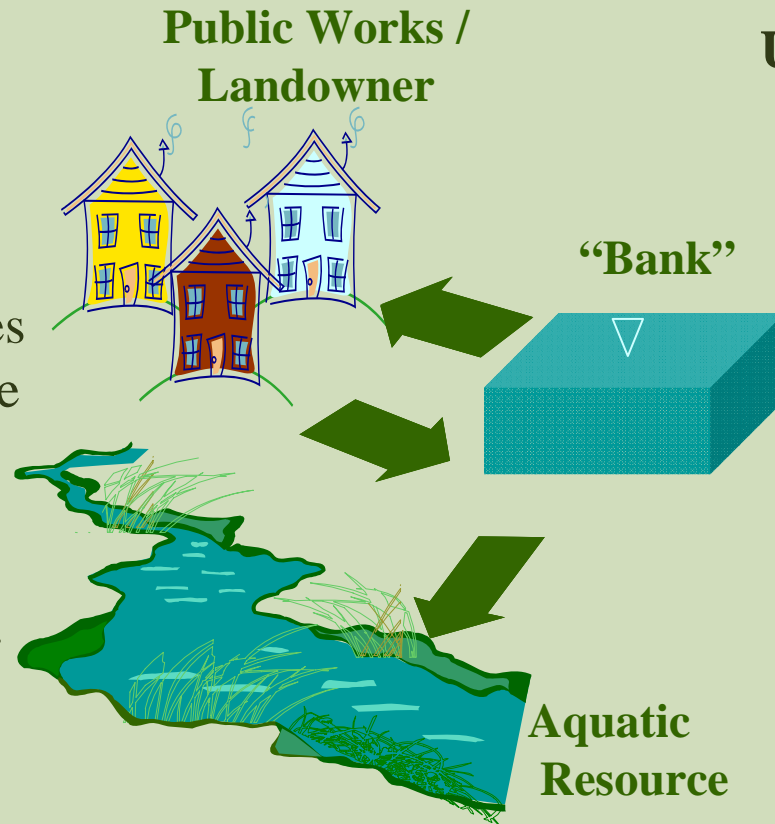


- Natural & Cultural Resource consulting firm to developers & public works
- Founded with 1 employee in 1991
- Currently 76 Staff
 - Archeology, Engineering, Environmental Science, Environmental Technology, GIS, Regulatory, & Surveying
- Consulted on over 2,100 project sites encompassing approximately 140,000 acres
 - On/Off Site Mitigation
 - Streams: 46 sites / 45,600 lf
 - Wetlands: 85 sites/ 290 acres
 - 17 Mitigation Banks
 - 630 Wetland Credits
 - 95,500 lf of Stream Restoration

WHAT IS MITIGATION BANKING ?

HOW IT WORKS

A Public Works Agency or private landowner needs to impact aquatic resources on their property. In the past, they would have had to restore aquatic resources as compensation, either on- or off-site.

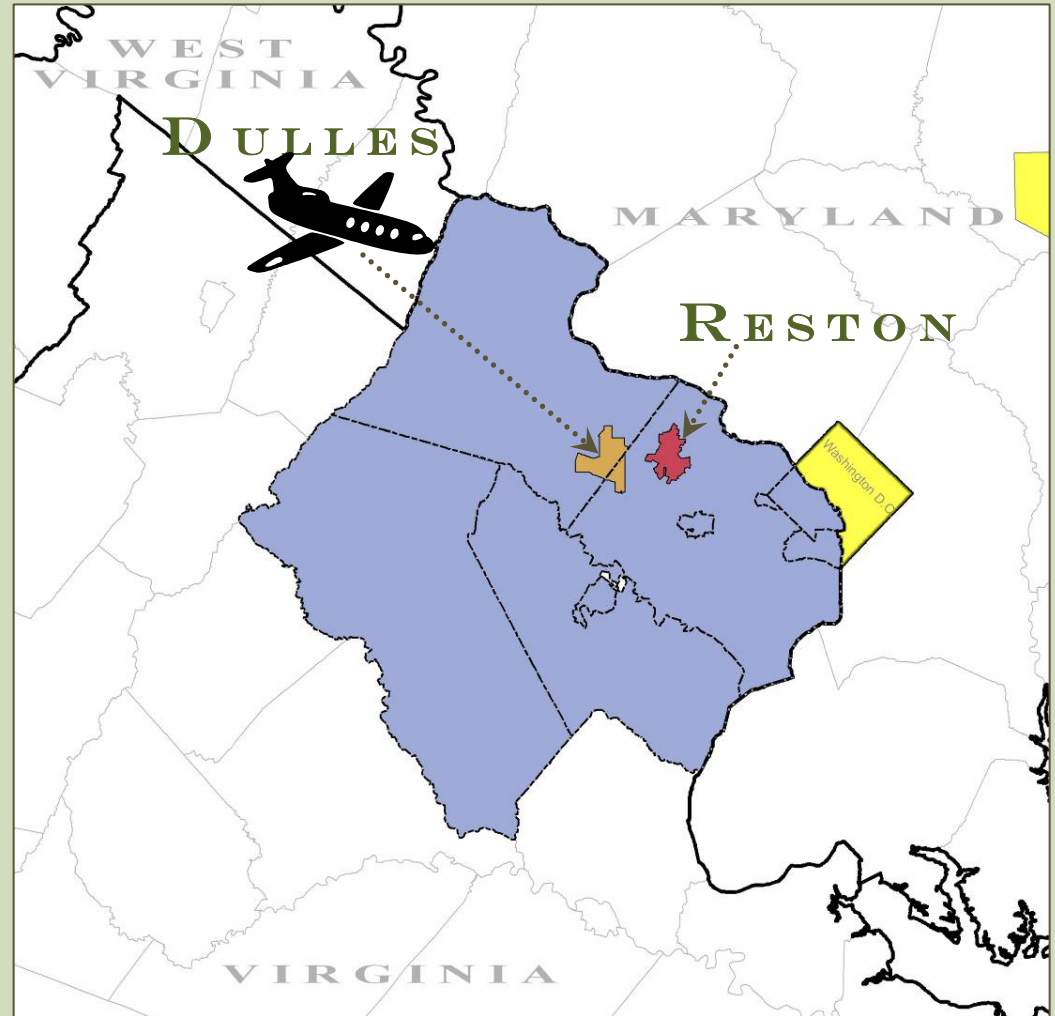


Under the market-oriented system, they can go to a “bank” created by a Bank Sponsor who has obtained credit for restoring aquatic resources elsewhere in the same portion of the rivershed & physiographic province.

By purchasing aquatic resource credits from the Bank Sponsor, the mitigation requirements of a permit for stream impacts is satisfied. Stream restorers use this pooled money to create much larger, well-designed, & ecologically valuable conservation projects.

WHY A STREAM BANK IN RESTON ?

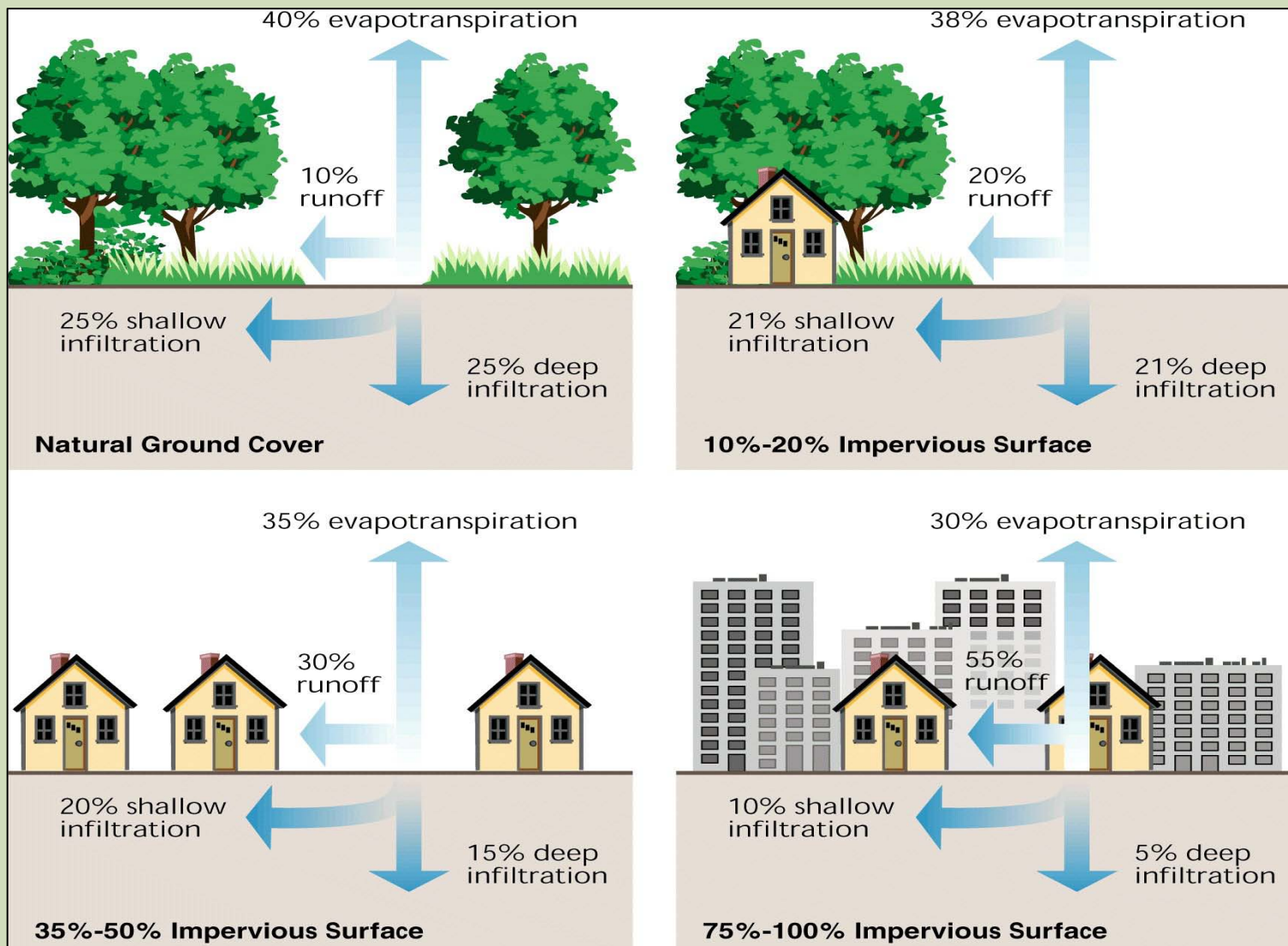
1. Degrading streams are located in preserved corridors (*without stormwater management*) & mostly controlled by a single entity (*Reston Association*).
2. Community members are actively involved in protecting local natural resources (*Watershed Plan published in April 2002*).
3. Community of Reston includes entire watersheds
4. There is a demand for stream mitigation in the region.
5. Bank service area is determined by HUC & Physiographic Province.



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THE URBAN WATERSHED PROBLEM



Source: USDA

URBAN STREAM SYNDROME (USS)

- Total Phosphorus (TP), Total Nitrogen (TN), and Total Suspended Solids (TSS) flows downstream



Eroding meander bend adjacent to Wiehle Ave in Reston



Exposed sewer manhole – Reach 12 in Snakeden

CORRECTING THE PROBLEM

Option 1: Watershed Improvements- remove impervious areas

- Retrofit hard surfaces with pervious pavements- pervious concrete or pavers
- Retrofit buildings with green roofs

A reduction in impervious area results in a reduction in runoff



Green roof at WSSI



**Pervious concrete
at WSSI**



GravelPave2 infiltrating a large rainstorm at WSSI



**Pervious pavers
at WSSI**

CORRECTING THE PROBLEM

Option 2: Watershed Improvements – stormwater management

- Provide conventional stormwater management facilities throughout the watershed
- Install low-impact development features- swales, rain gardens, green roofs, and pervious pavements



*Conventional dry pond in
Fairfax County*



Green roof at WSSI



Water quality swale at WSSI

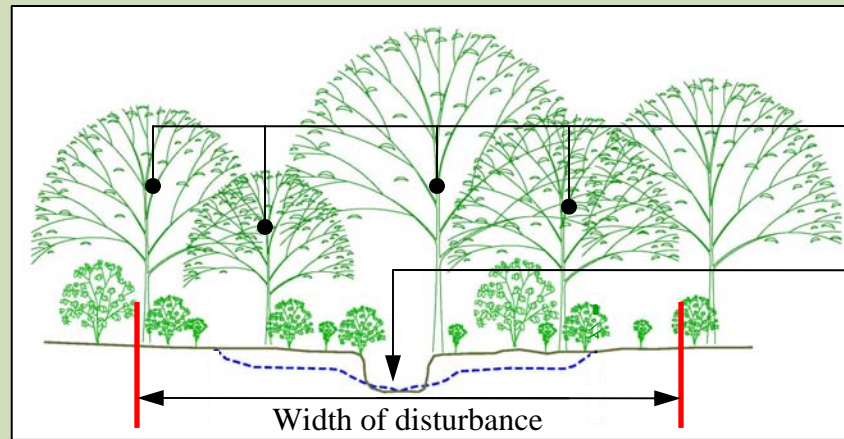


Rain Garden at WSSI

CORRECTING THE PROBLEM

Option 3: Restore streams to handle these flowrates.

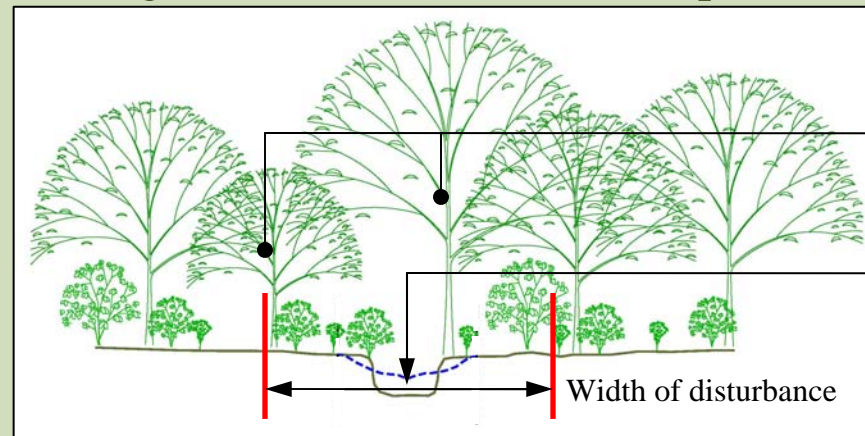
Lowering the floodplain results in a larger project area.



Many trees removed

Large cut volumes result in waste material

Raising the bed is much less disruptive.



Fewer trees removed

Balanced cut and fill volumes result in less waste

CORRECTING THE PROBLEM

Option 4: Stabilize stream to prevent additional degradation.

- Does not reconnect stream to the floodplain.
- Does not reduce stream velocity.

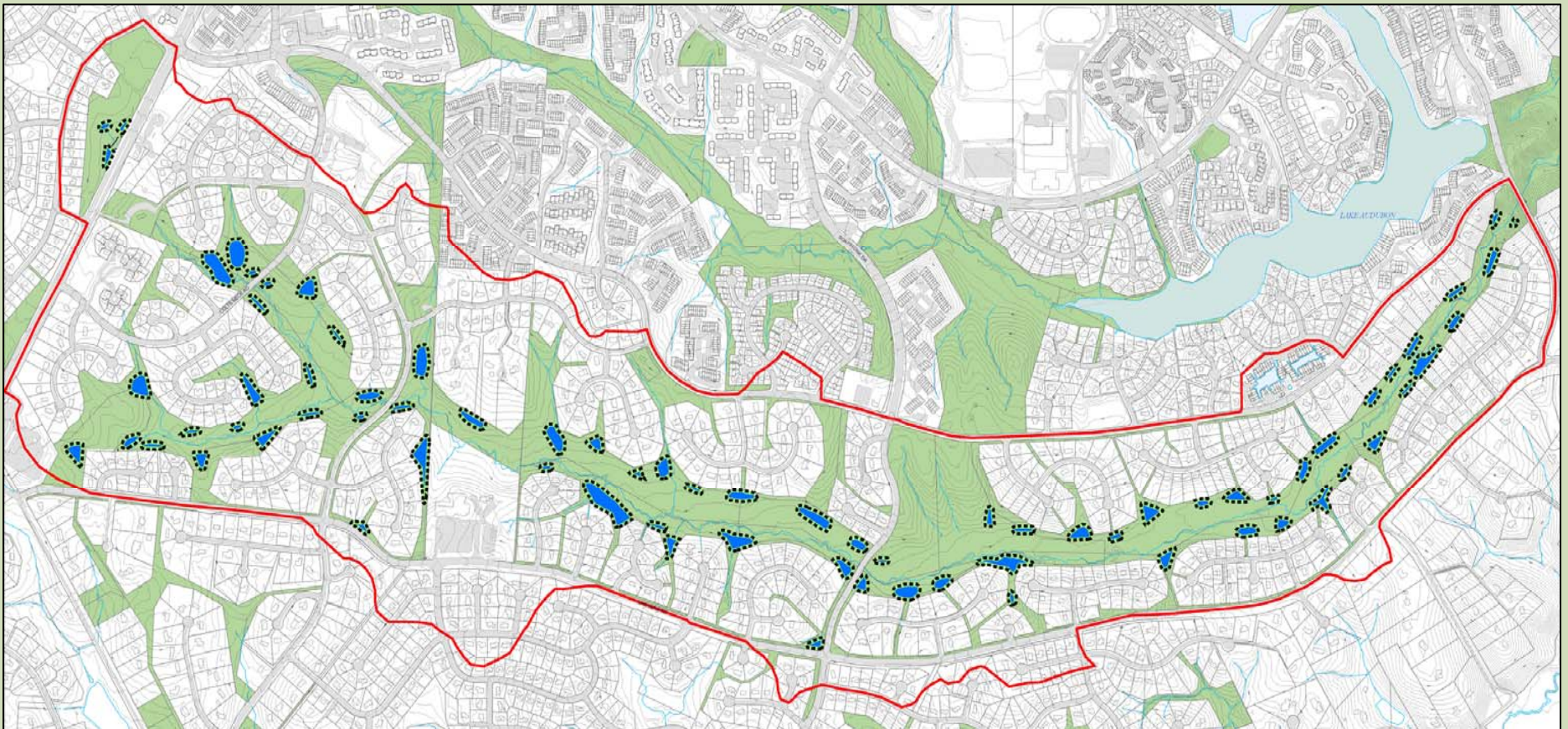


Snakeden Branch Reach 2 (2003, by others) – Long-term stability not achieved using this approach.

CONVENTIONAL STORMWATER SCENARIO

Results

- 75 ponds
- 29.3 acres disturbance from grading



BIO-RETENTION SCENARIO

Results

- 830 Bio-retention facilities
- 36.7 acres disturbance from grading



WHY RESTORE ?

Reconnect to the existing floodplain to:

- Slow velocities
- Increase evapotranspiration
- Remove pollutants (TP, TN, and TSS)
- Improve riparian habitat
- Restore groundwater levels

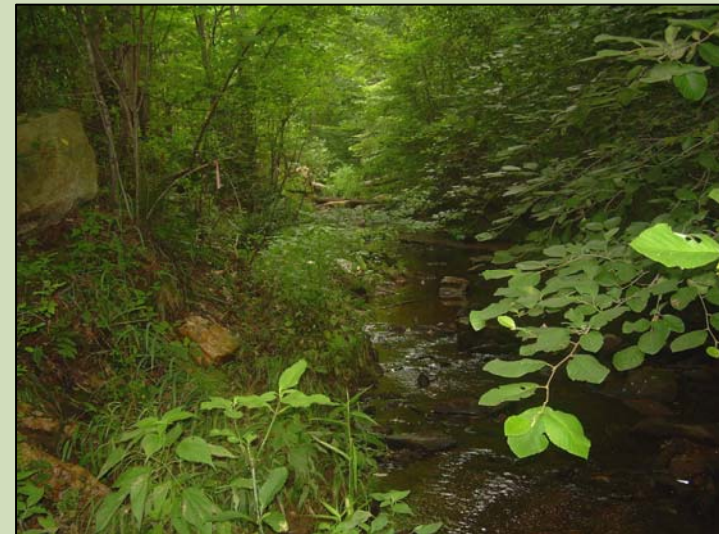
UVA Research Park – Charlottesville, VA



Stream relocation - 1999



After planting



Same stream - 2007

URBAN STREAM - DESIGN REALITIES

1. Significantly more flow than rural streams.
2. Significantly more “*bankfull*” events than in rural watersheds.
3. Given site constraints, reinforcement is necessary.
 - Rock structures – using native diabase rock
 - Reinforced bed
 - Heavy planting densities – native vegetation only

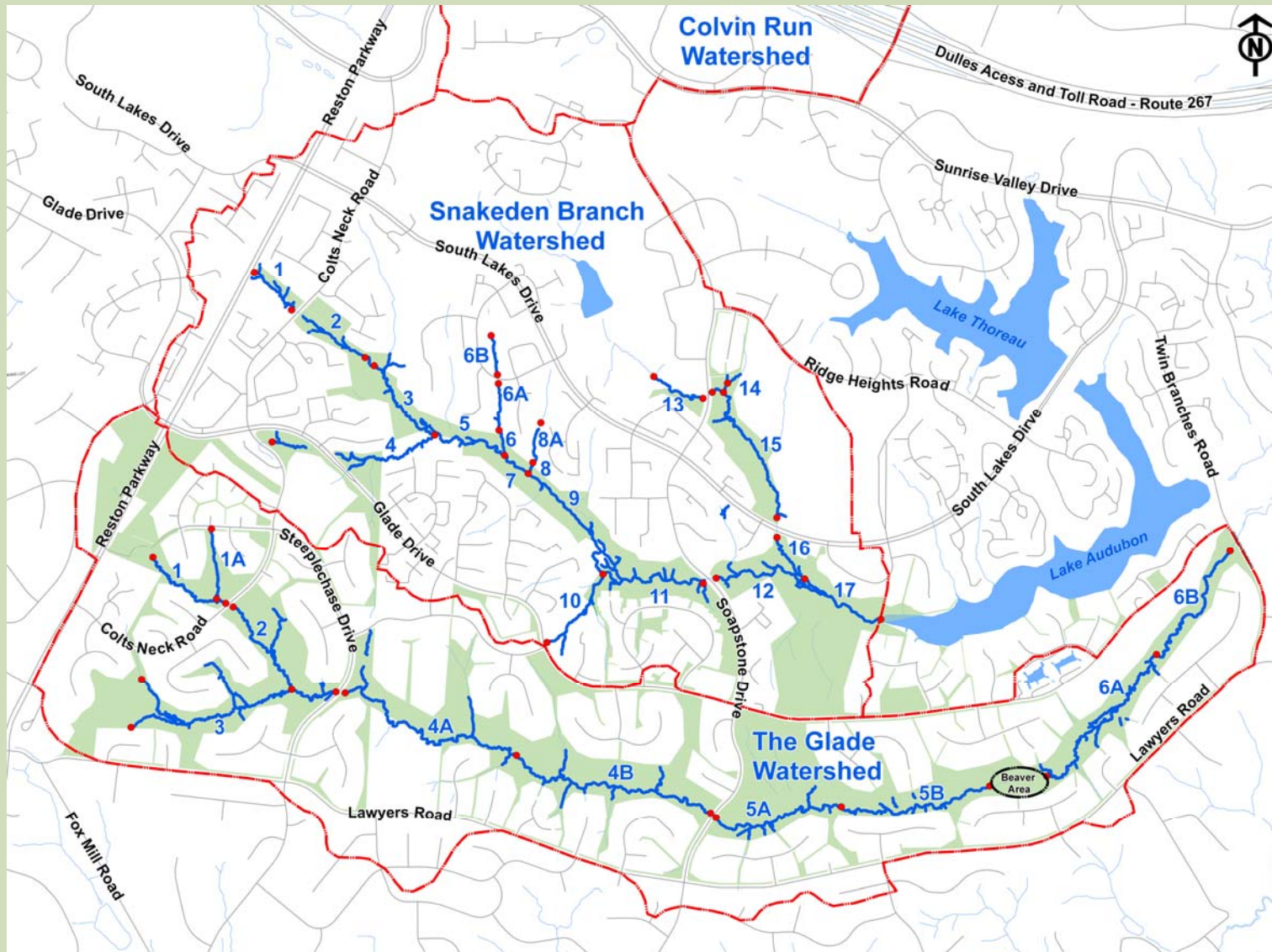


Snakeden Branch – Reach 3 (after 6 months)



McLean Place (after 4.5 yrs)

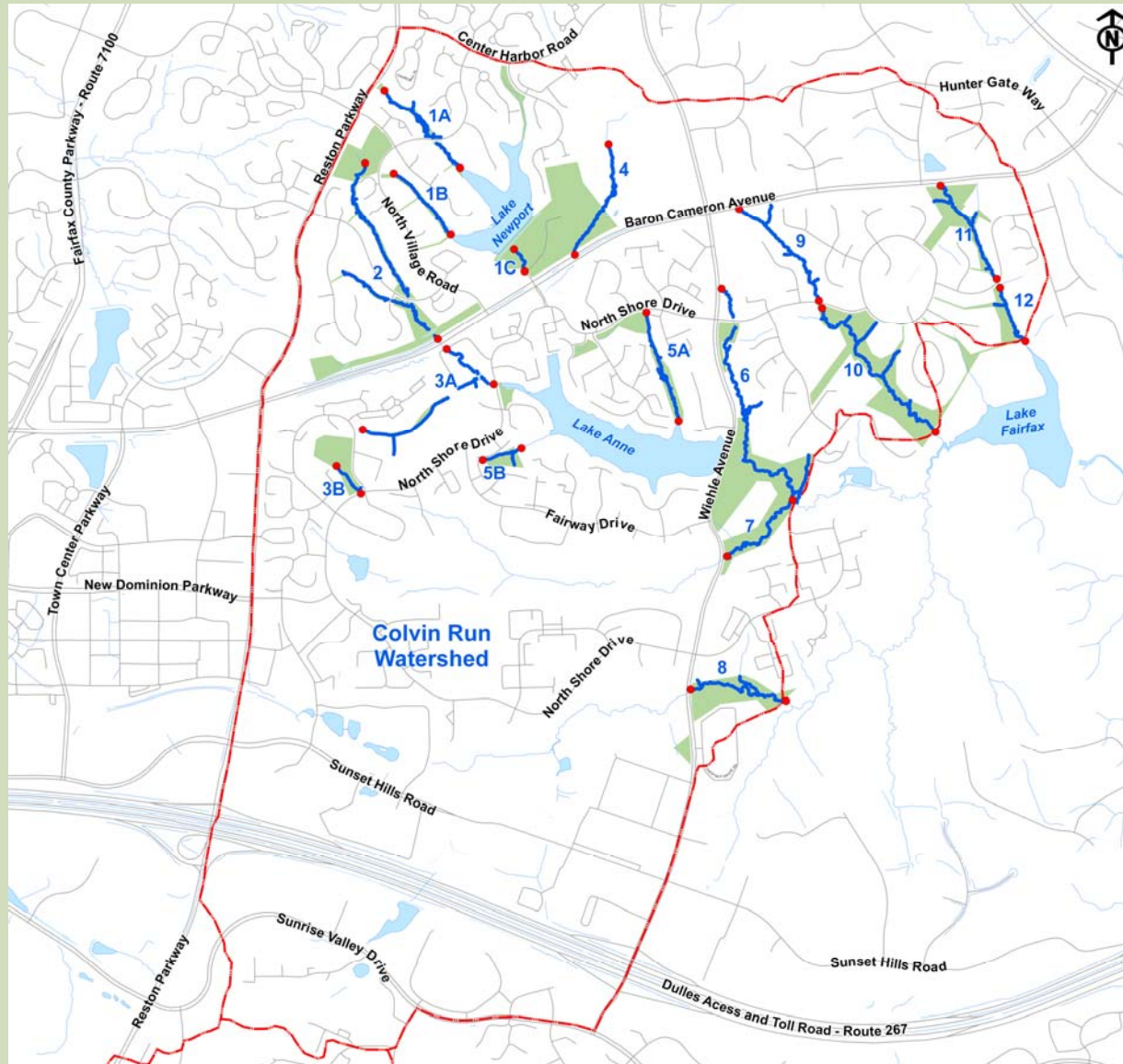
SNAKEDEN BRANCH AND GLADE REACHES



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COLVIN RUN REACHES



CONSTRUCTION – REACH 1



CONSTRUCTION – REACH 3



CONSTRUCTION – REACH 12



TROPICAL STORM HANNA (9/06/08)

100-YR EVENT (6.22" IN 9 HOURS)



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TROPICAL STORM HANNA

2 - DAYS LATER



MONITORING AND MAINTENANCE

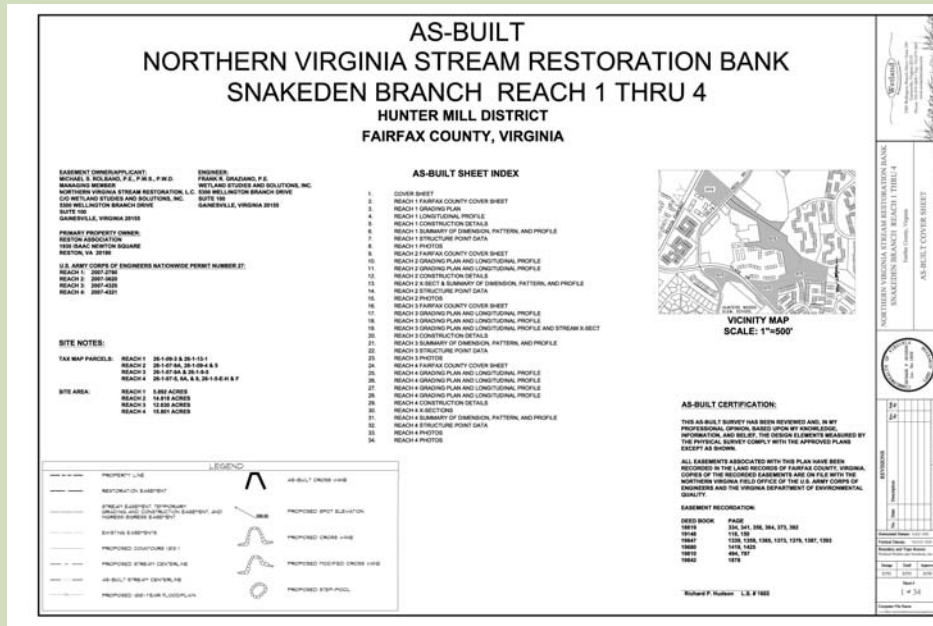
10-year monitoring program

- Streambed surveys
- Structure surveys
- Vegetation surveys
- Biological Surveys
- As-built for Reaches 1- 4 has been approved.

Post 10-year

- No legal requirement for monitoring and maintenance

Must meet success criteria outlined in MBI – or fix!

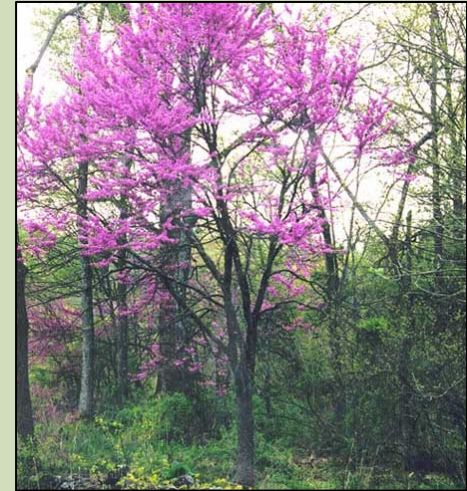


RESTORATION AREA PLANTINGS

- Seed mix includes 6 grass, 21 forb, 5 shrub and 5 tree species
- Plantings include 8 tree and 10 shrub species
- Riparian Forest: 640 trees/shrubs per acre
- Streamside:
 - 1 gallon container 3' O.C.
 - live stake/tubling 1' O.C.
- Increased sunlight on forest floor
- Edge effect established



Oxeye Sunflower



Eastern Redbud



GREATER WILDLIFE SPECIES RICHNESS

- Mature forest continues to provide habitat for raptors, wood peckers, bats and deer
- Recently planted areas provide habitat for small mammals, song birds, fox and deer
- All species benefit from the “edge effect”
- Restored stream allows detrital input to be processed, thus increasing stream health and function



Cottontail Rabbit



Red-shouldered Hawk



Orchard Oriole

KINGSTOWNE, FAIRFAX COUNTY (NVSWCD PROJECT)



End of Construction – Fall, 2000



Sixth Growing Season – Summer, 2006

CHESTERBROOK RESTORATION



CONCLUSION

1. Reston streams are seriously degraded due to urbanization – a situation made even worse by a lack of stormwater management. An ideal place to establish the NVSRB.
2. Fully restored streams will provide long-term stability & financial benefits to the community:
 - Phase I: \$70 million Restoration
 - \$450,000 to Reston Association
 - \$950,000 to Friends of Reston
 - \$3 million of new bridges for Reston
 - Reduced dredging costs for RA lakes
 - \$5 million Catastrophic Event Fund
3. Short-term construction disturbance will provide long-term societal and ecological benefits to a heavily used, urban stream valley network.



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QUESTIONS ?

- For Further Information on the Northern Virginia Stream Restoration Bank, go to: <http://reston.wetlandstudies.com/>