



# NORTHERN VIRGINIA STREAM RESTORATION BANK- THE GLADE REACHES 1 & 1A, 2, AND 3

**Presented by Michael S. Rolband**  
**P.E., P.W.S., P.W.D.**

Wetland Studies and Solutions, Inc.  
5300 Wellington Branch Drive · Suite 100 · Gainesville · Virginia 20155  
[www.wetlandstudies.com](http://www.wetlandstudies.com)



# PROJECT STATUS – GLADE REACHES 1 & 1A, 2, AND 3

- The Glade Reaches 1 & 1A, 2, and 3 have been revised based on citizen comments and are ready for DRB review.
- Assuming approval, Reach 1 construction would start in mid January.
- For Reaches 2 and 3 we plan on additional citizen input.
- Therefore, the plan is to defer the start of construction of Reaches 2 and 3 until mid-February to allow more time for
  - refinements based on additional citizen meetings.
  - coordination and planning for a plant rescue.
  - coordination to leave firewood for community use.

# CASE STUDY

## STONY RUN, BALTIMORE MD

### Chesapeake Bay Foundation Article

✈ Last Look

### A Stream Reborn

By Tom Pelton

**I**n Baltimore, a city of row houses, a stream called the Stony Run nourishes a cathedral of trees. The creek runs near my front porch and is the heart of my neighborhood. The gnarled roots of sycamores dangle into the waters like the fingers of old men. My daughters run down to the stream after school to mold cats from the clay. Acres of lush parkland fringe the waterway—creating an oasis of peace amid the racket and violence of urban life.

The river is a gathering place for families, many of whom decided to raise their children here because of the park. So when Baltimore launched a massive project to rebuild the Stony Run three years ago



GETTY IMAGES

Typically deep-woods creatures, barred owls were attracted to the new crayfish population in Baltimore's rebuilt Stony Run.

their lost clay mines in their scramble to catch frogs on the riverbanks. Hardy little fish called black-nosed dace darted between the rocks. Before the project, the stream was pretty but dead. Today, the stream remains attractive, as the contractors spared many of the grand old sycamores. And now the creek swarms

The construction can look messy, at first—and often these programs don't have enough money to go as far as they should. For example, the Stony Run project didn't do anything to stop polluted runoff that, during rainfalls, gushes into the stream from nearby parking lots. These lots could also be rebuilt, so they absorb rain instead of funneling it into the creek.

“These projects have the potential not only to multiply wildlife, but also to improve water quality and create jobs during a time of recession.”

But even when restoration projects are limited, they can spark the unexpected and magical. For example, at 5 a.m. one morning, I awoke in a cold sweat to hear what sounded like insane monkeys shrieking from the treetops outside my bedroom window. As it turned out,

Wetland

Studies and Solutions, Inc.

# CASE STUDY

## STONY RUN, BALTIMORE MD

### Article Excerpts....

- *“... when Baltimore launched a massive project to rebuild the Stony Run three years ago, many neighbors were outraged.”*
- *“The project required cutting down more than 150 trees and bulldozing the creek to flatten its banks and armor the shores with lines of boulders.”*
- *“In late 2006, the rebuilding was done – and the stream looked awful.”*



# CASE STUDY

## STONY RUN, BALTIMORE MD

- *“But then something miraculous happened. The pools of water formed by the new dams became breeding grounds for thousands of green frogs, bull frogs, and American toads.”*
- *“And now the creek swarms with crayfish the size of small lobsters.”*
- *“Typically deep-woods creatures, barred owls were attracted to the new crayfish population in Baltimore’s rebuilt Stony Run.”*



# LAND CONSERVATION AWARD



## County of Fairfax, Virginia

To protect and enrich the quality of life for the people, neighborhoods and diverse communities of Fairfax County

December 4, 2008

Mr. Mike Roldand  
Reston Home Owners Association  
5300 Wellington Branch Drive, Suite 100  
Gainesville, VA 20155

RECEIVED

DEC 10 2008  
WETLAND STUDIES AND  
SOLUTIONS, INC.

Subject: 2008 Land Conservation Awards

Dear Mr. Roldand: *Nike* :

I am happy to inform you that your project, Northern Virginia Stream Restoration has been selected as a winner of the 2008 Fairfax County Land Conservation Awards in the Linear Project category. This award recognizes the outstanding efforts by your company in protecting downstream properties and natural resources from erosion and sedimentation during the land development process.

To acknowledge this special achievement, a plaque will be presented to a representative of your organization at our awards program, which will take place on Friday, January 23, 2009, from 10:00 a.m. to 11:00 a.m., in the Board Auditorium at the Government Center Building, 12000 Government Center Parkway, Fairfax, Virginia 22035. To facilitate the presentations, please contact Miriam Hernandez, at (703) 324-1950 to confirm that you and/or your representatives will be present to accept the award.

Congratulations and thank you for your cooperation in this noteworthy environmental effort!

Sincerely,

Jack W. Weyant, P.E.  
Director

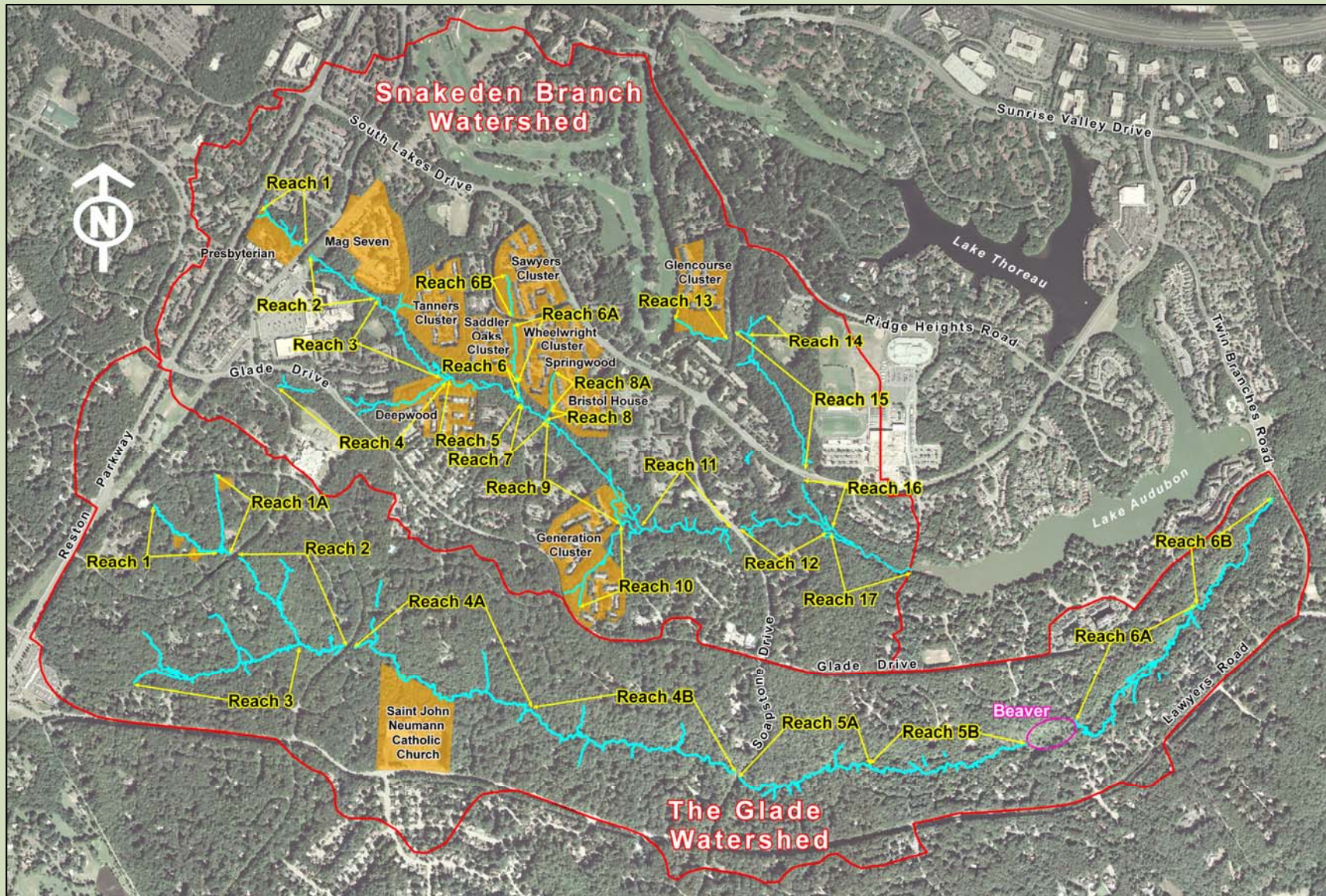
cc: Jimmie D. Jenkins, Director, Department of Public Works and Environmental Services (DPWES)  
James W. Patteson, Director, Land Development Services, DWPES

Department of Public Works and Environmental Services  
Land Development Services, Environmental and Facilities Inspections Division  
12055 Government Center Parkway, Suite 334  
Fairfax, VA 22035-5503  
Phone: 703-324-1950, TTY: 711, Fax: 703-324-1822  
[www.fairfaxcounty.gov/dpwes](http://www.fairfaxcounty.gov/dpwes)

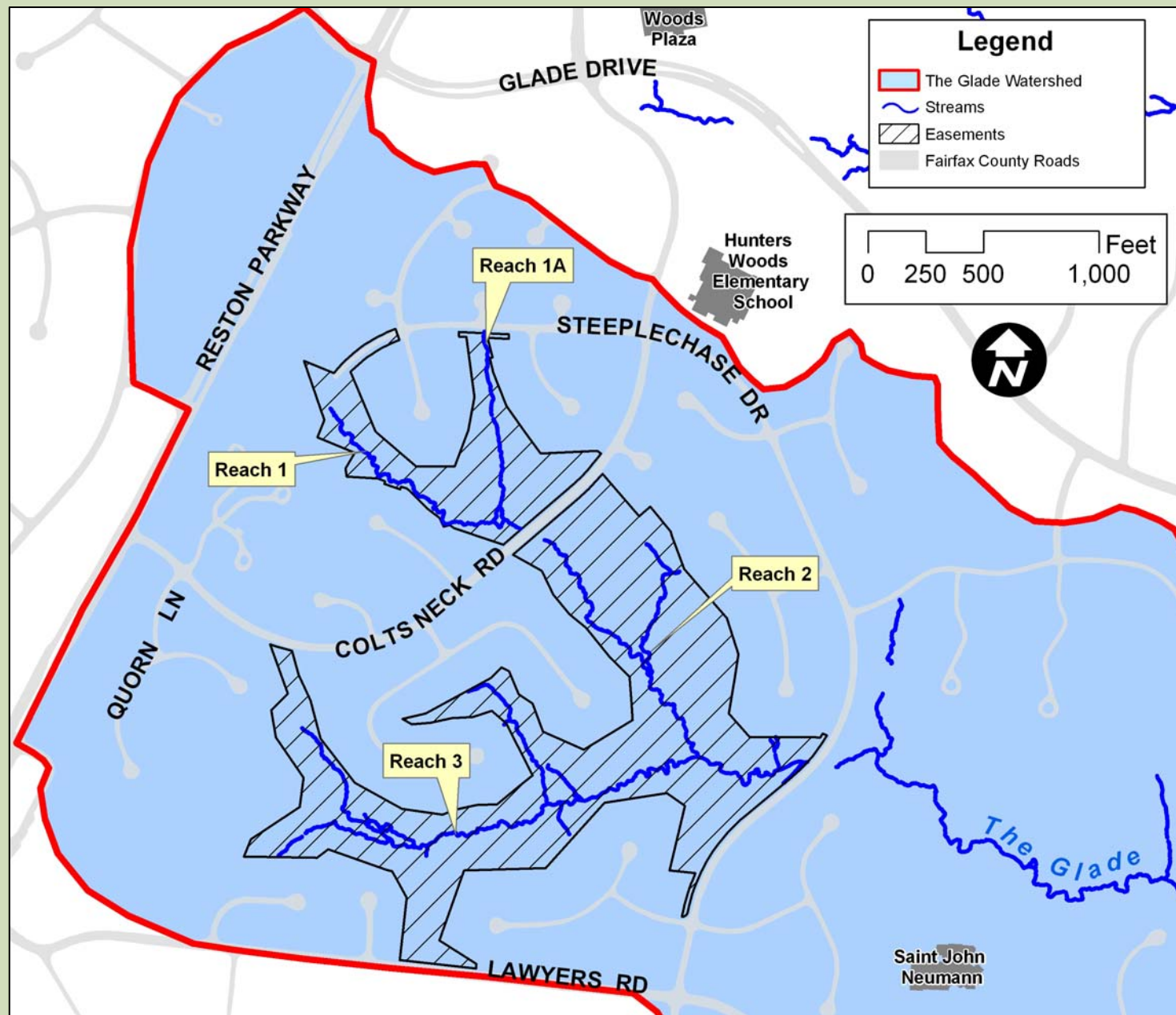


Wetland  
Studies and Solutions, Inc.

# LOCATION MAP – GLADE WATERSHED



# LOCATION MAP – GLADE REACHES 1 & 1A, 2, AND 3

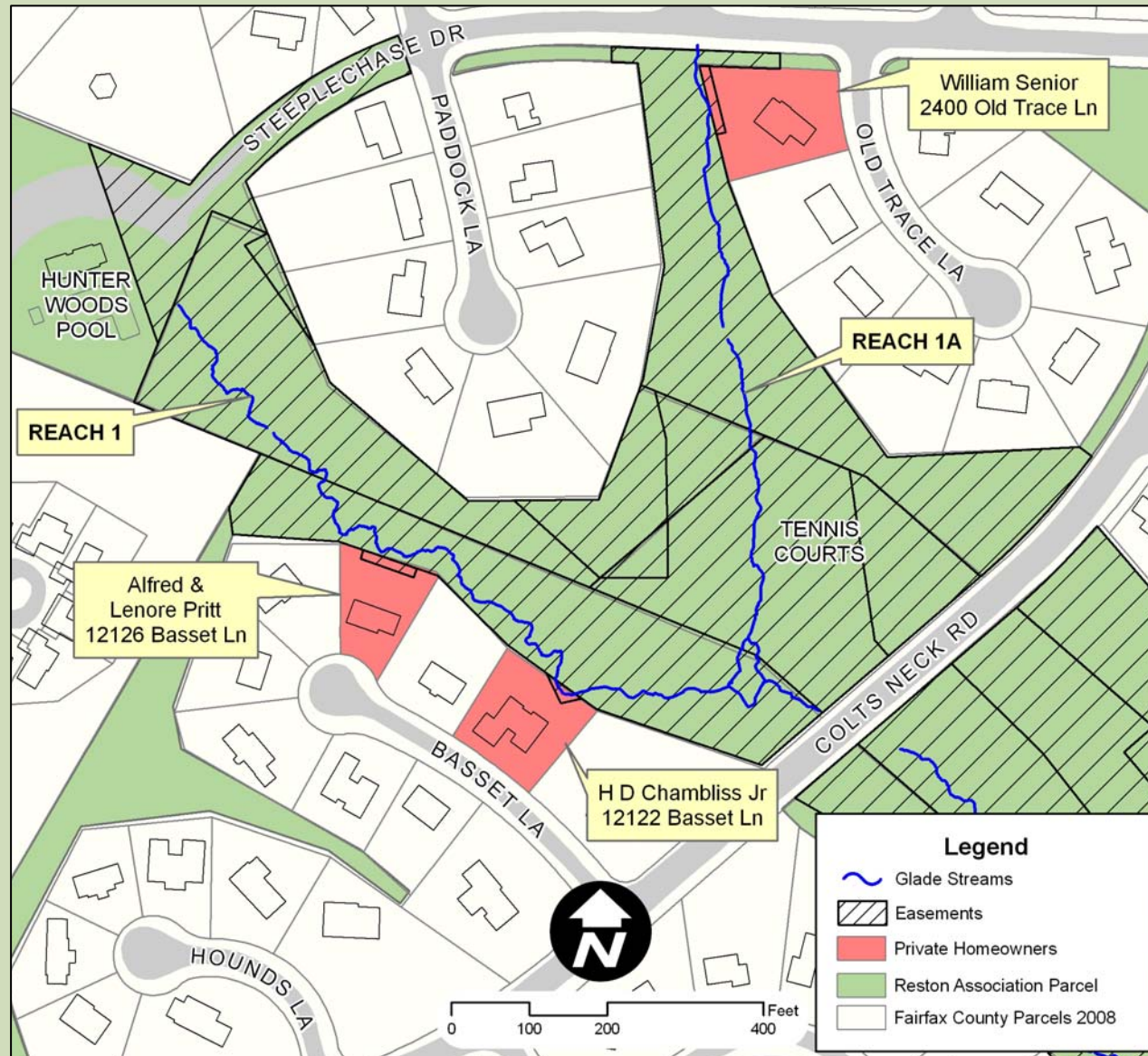


# LOCATION MAP – THE GLADE REACHES 1 & 1A

Recorded Easements for Reaches 1 & 1A:

GREEN = Reston Association

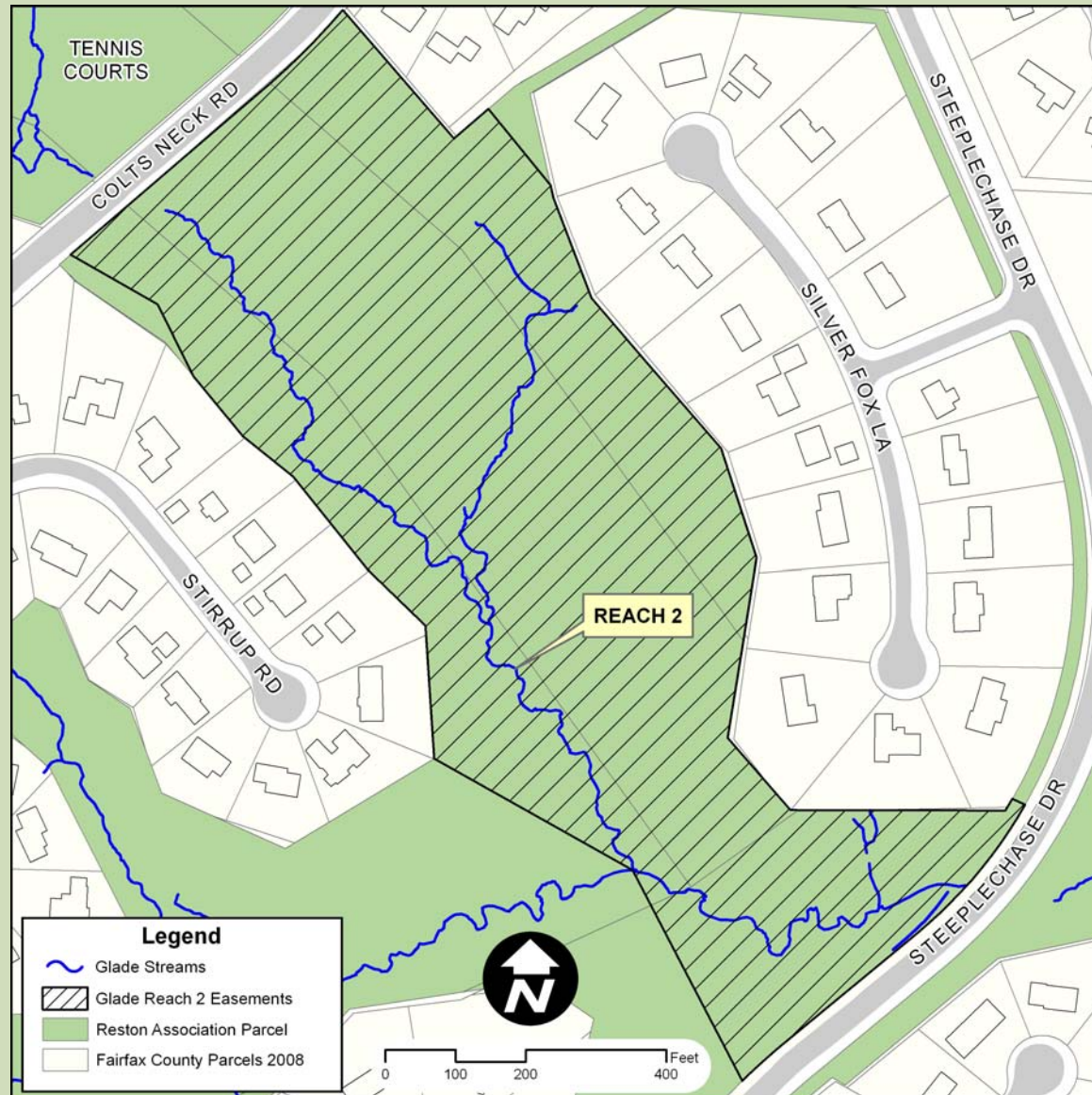
PINK = Private Homeowners



# LOCATION MAP – THE GLADE REACH 2

Recorded Easements for Reach 2:

GREEN = Reston Association



# LOCATION MAP – THE GLADE REACH 3

Recorded Easements for Reach 3:  
GREEN = Reston Association



# EXISTING CONDITIONS – GLADE REACHES 1 & 1A



# EXISTING CONDITIONS – GLADE REACHES 1 & 1A



# EXISTING CONDITIONS – GLADE REACHES 1 & 1A



# EXISTING CONDITIONS – GLADE REACHES 1 & 1A



# EXISTING CONDITIONS – GLADE REACH 2



# EXISTING CONDITIONS – GLADE REACH 2



# EXISTING CONDITIONS – GLADE REACH 2



# EXISTING CONDITIONS – GLADE REACH 3



# EXISTING CONDITIONS – GLADE REACH 3

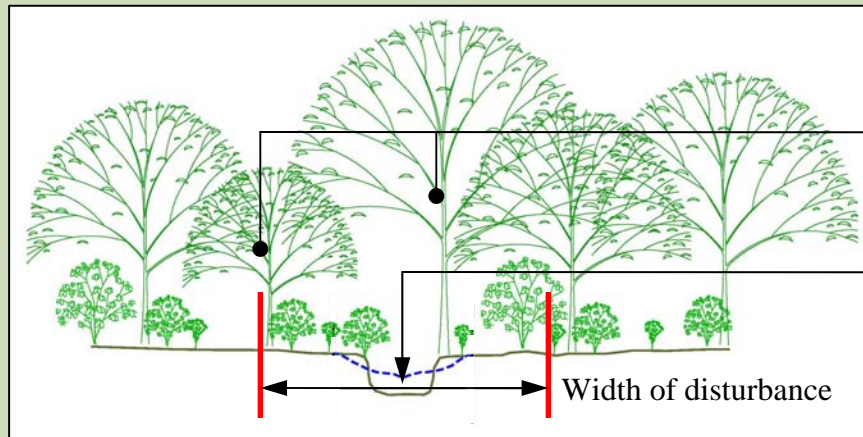


# EXISTING CONDITIONS – GLADE REACH 3



# RESTORATION APPROACH

**Priority 1 Restoration** - Raise stream to reconnect with the floodplain.

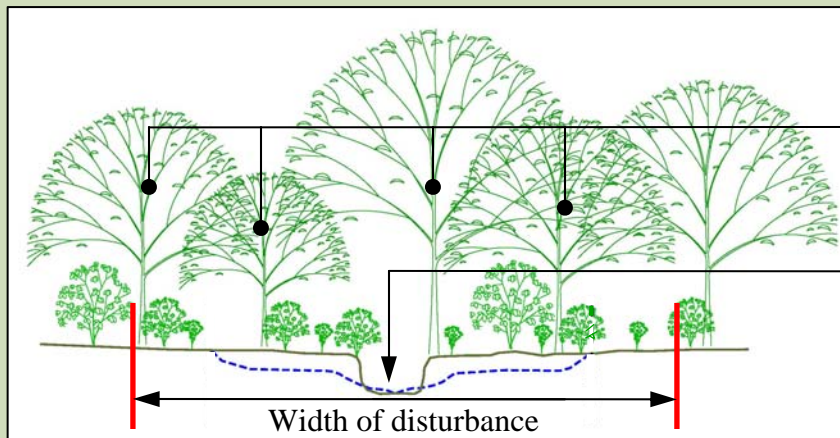


## Snakeden Branch Reach 2 – Priority 1 Restoration



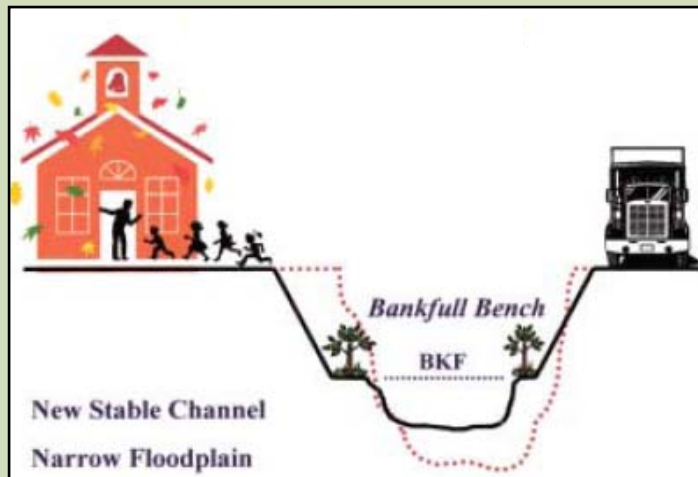
# RESTORATION APPROACH

**Priority 2 Restoration** – Excavate floodplain at lower elevation.



Many trees removed

Large cut volumes result in waste material



**Priority 3 Restoration** – Confined stream valleys (not relevant in The Glade).

Wetland

Studies and Solutions, Inc.

# RESTORATION APPROACH

## Priority 4 Restoration – Stabilize in-place



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

# SUMMARY OF CHANGES

## **Reaches 1 & 1A, 2, and 3**

- Conducted Wildlife Habitat Evaluation and refined LOC to avoid features when possible.
- Modified LOC to clearly depict impact areas – rather than field adjust during construction.
- Marked trees to be removed.
- Refined alignments/structures where possible (on the plans instead of field adjustments) to reduce tree impacts.

## **Reaches 1 & 1A**

- Moved stockpile area from woods to pool parking lot and will also utilize the tennis court parking area – eliminates stockpile area in the woods.
- Relocated bridge.

## **Reach 2**

- Eliminated restoration of upper segment of tributary 1.
- Moved construction entrance to avoid “lady slipper” area and reduced stockpile area.

## **Reach 3**

- Eliminated 2<sup>nd</sup> construction entrance and reduced stockpile area.
- Revised access routes to incorporate more usage of existing trails.

# REDUCED LOC - REACHES 1 & 1A



Previous LOC - 2.9 ac



Revised LOC - 2.1 ac

LIMITS OF CLEARING SUMMARY THE GLADE - REACHES 1 & 1A		
<b>Area Within LOC</b>		
Parking	0.30	acres
Trails (paved)	0.11	acres
Trails (unpaved)	0.20	acres
Utility Easement	0.02	acres
Natural Areas	1.5	acres
<b>Total LOC</b>	<b>2.1</b>	<b>acres</b>
<b>Total Easement Area</b>	<b>9.5</b>	<b>acres</b>

# WILDLIFE EVALUATION – REACHES 1 & 1A

## Total Features Identified

- Woodpecker/Cavity Nest - 6
- Stick Nest - 3
- Squirrel Nest - 5
- Redshouldered Hawk Nest - 3
- Fox (Subsurface Run) - 3
- Snag - 5

## 2 features to be removed

- squirrel nest
- inactive cavity



# DESIGN REFINEMENTS - REACHES 1 & 1A

- ① Wall features to protect trees.
- ② Bridge adjustment/relocation.

*Note : Structures may also be field modified as necessary to reduce impacts to adjacent trees.*



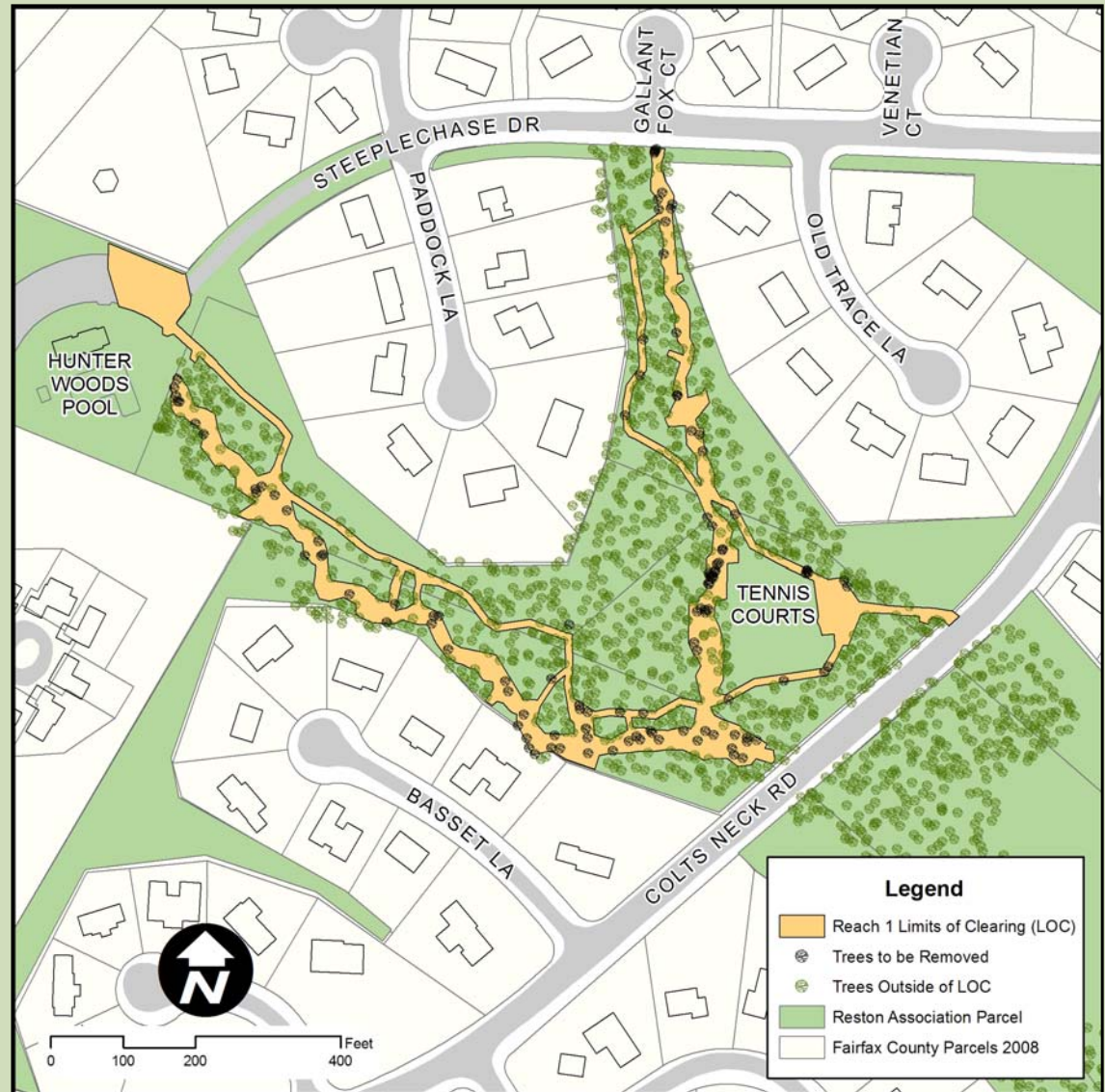
# TREE SAVE SUMMARY – REACHES 1 & 1A

TREE SAVE SUMMARY THE GLADE - REACHES 1 & 1A			
DIAMETER (IN)	STATUS*		
	TBR <sup>1</sup>	DND <sup>2</sup>	TST <sup>3</sup>
4-5" (Sapling)	39	188	227
6-9" (Pole)	39	257	296
10-17" (Small)	32	307	339
18-29" (Medium)	3	211	214
30"+ (Large)	0	15	15
<b>TOTAL</b>	<b>113</b>	<b>978</b>	<b>1091</b>

1. TBR means to be removed.  
 2. DND means do not disturb.  
 3. TST means total surveyed trees.  
 \* Compiled 12/10/08

## TOTAL PLANTINGS

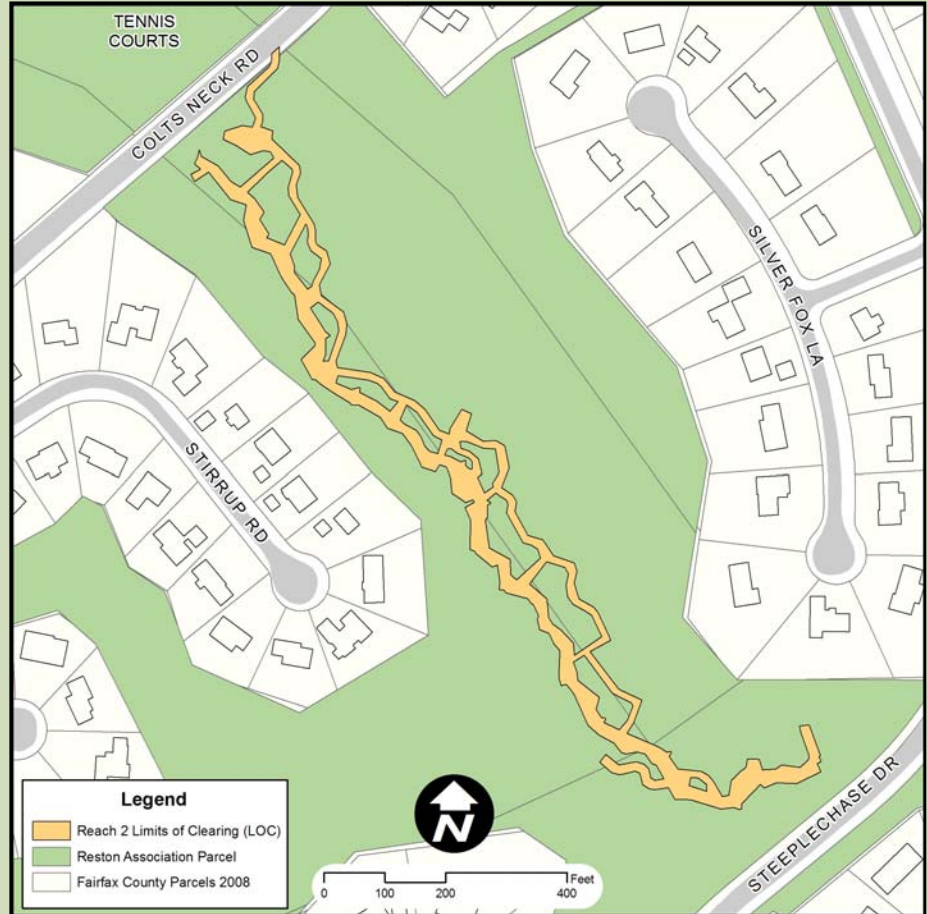
**2,371 Trees  
-and-  
3,296 Shrubs**



# REDUCED LOC - REACH 2



Previous LOC – 3.5 ac



Revised LOC – 1.7 ac

LIMITS OF CLEARING SUMMARY THE GLADE - REACH 2		
<b>Area Within LOC</b>		
Trails (unpaved)	0.03	acres
Trails (paved)	0.02	acres
Utility Easements	0.03	acres
Natural Areas	1.6	acres
<b>Total LOC</b>	<b>1.7</b>	<b>acres</b>
<b>Total Easement Area</b>	<b>16.0</b>	<b>acres</b>

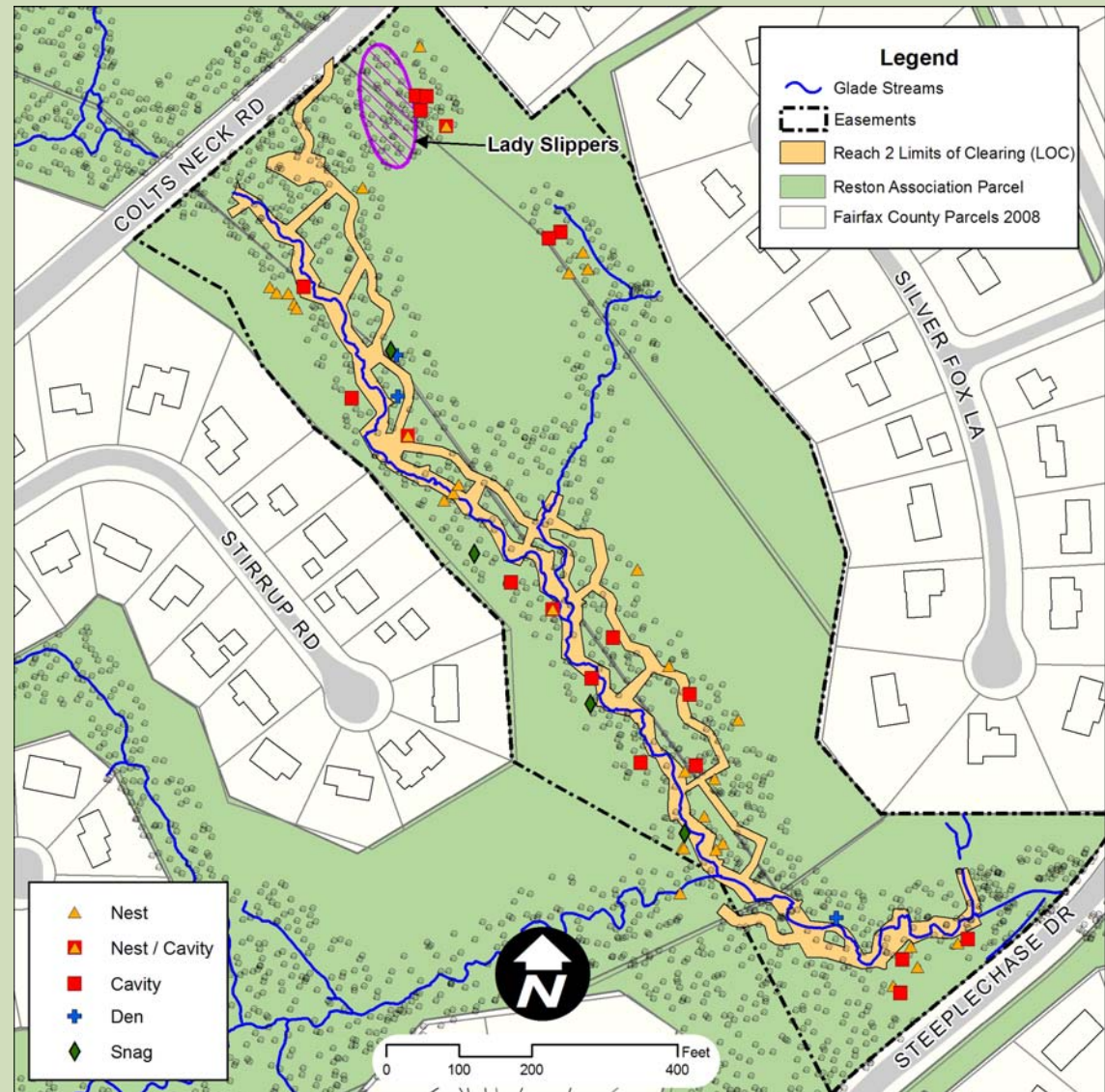
# WILDLIFE EVALUATION – REACH 2

## Total Features Identified

- Woodpecker/Cavity Nest - 20
- Stick Nest - 4
- Squirrel Nest - 27
- Unknown Den - 3
- Snag - 4

## 1 feature to be removed

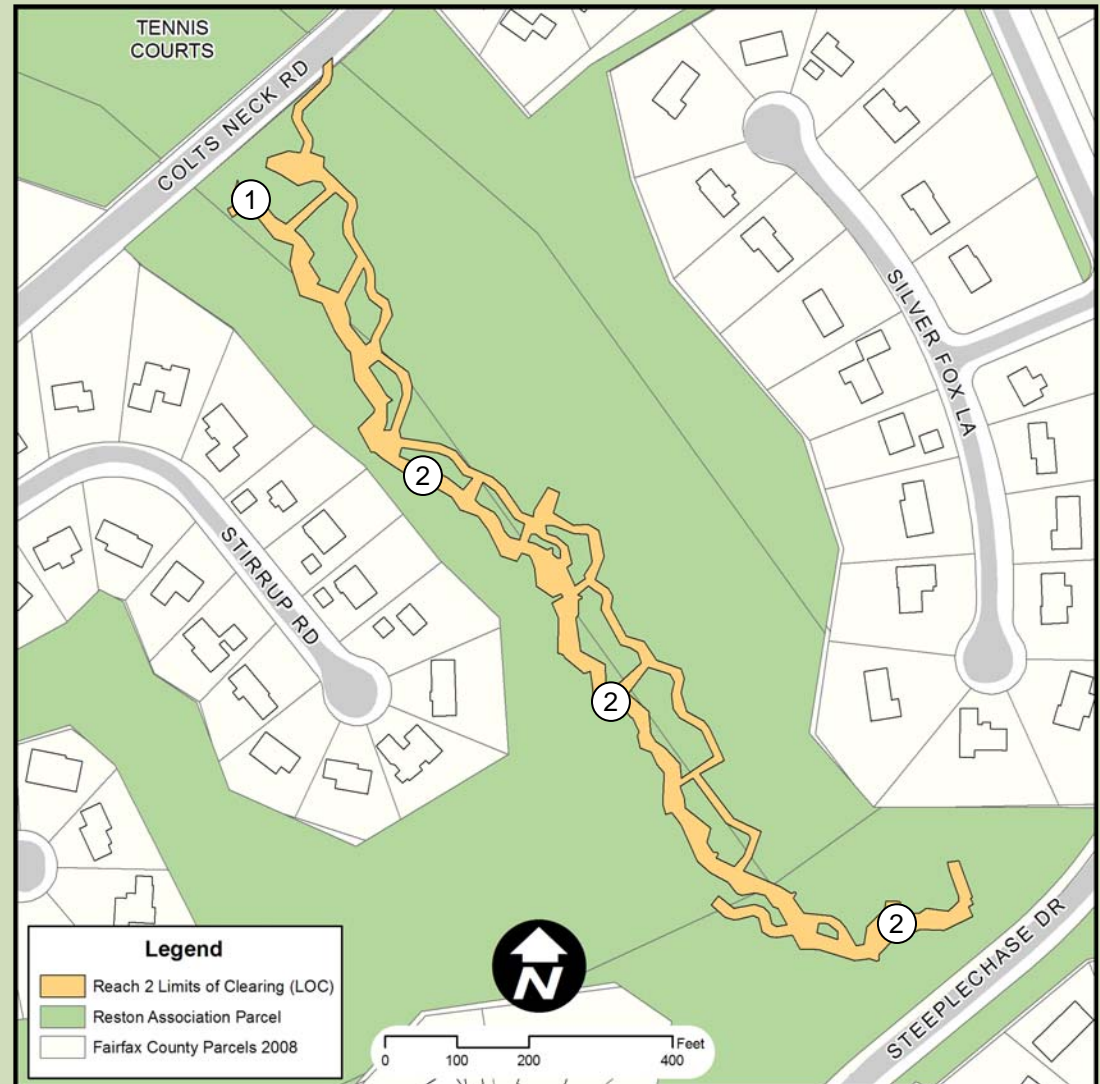
- inactive cavity in snag



# DESIGN REFINEMENTS - REACH 2

- ① Wall feature to protect trees.
- ② Channel realignment area.

*Note : Structures may also be field modified as necessary to reduce impacts to adjacent trees.*



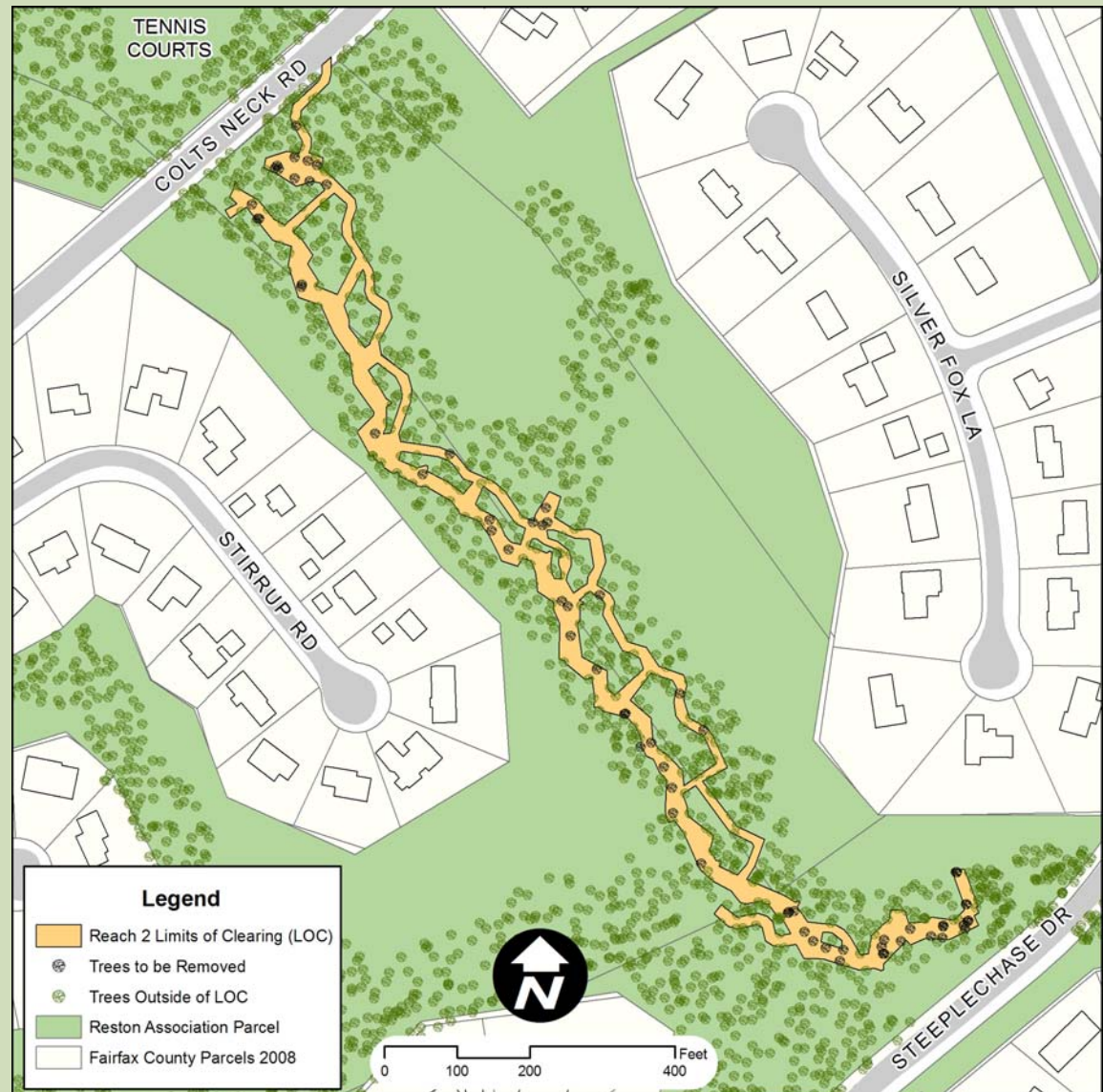
# TREE SAVE SUMMARY – REACH 2

TREE SAVE SUMMARY THE GLADE - REACH 2			
DIAMETER (IN)	STATUS*		
	TBR <sup>1</sup>	DND <sup>2</sup>	TST <sup>3</sup>
4-5" (Sapling)	18	193	211
6-9" (Pole)	21	322	343
10-17" (Small)	17	335	352
18-29" (Medium)	8	270	278
30"+ (Large)	1	23	24
<b>TOTAL</b>	<b>65</b>	<b>1143</b>	<b>1208</b>

1. TBR means to be removed.  
 2. DND means do not disturb.  
 3. TST means total surveyed trees.  
 \* Compiled 12/10/08

## TOTAL PLANTINGS

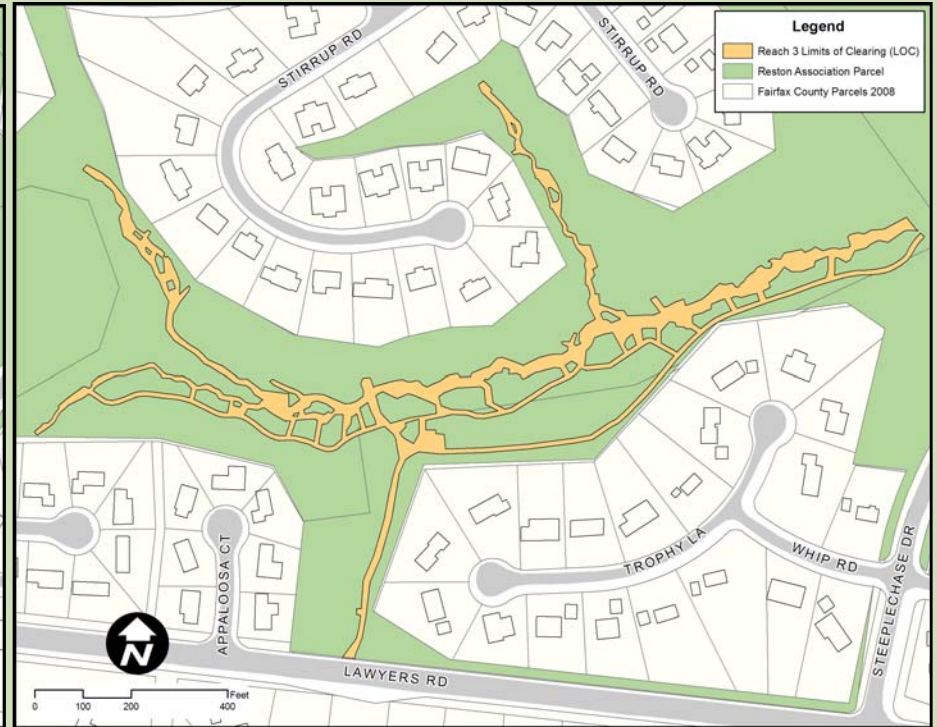
2,215 Trees  
-and-  
3,013 Shrubs



# REDUCED LOC - REACH 3



Previous LOC - (5.2 ac)



Revised LOC - (2.7 ac)

LIMITS OF CLEARING SUMMARY THE GLADE - REACH 3		
<b>Area Within LOC</b>		
Trails (paved)	0.04	acres
Trails (unpaved)	0.60	acres
Utility Easement	0.09	acres
Natural Areas	2.0	acres
<b>Total LOC</b>	<b>2.7</b>	<b>acres</b>
<b>Total Easement Area</b>	<b>20.7</b>	<b>acres</b>

# WILDLIFE EVALUATION – REACH 3

## Total Features Identified

- Woodpecker/Cavity Nest - 49
- Stick Nest - 17
- Squirrel Nest - 29
- Subsurface Run - 2
- Snag - 3
- Den in Deadfall - 6
- Song Bird Nest - 1

## 5 features to be removed

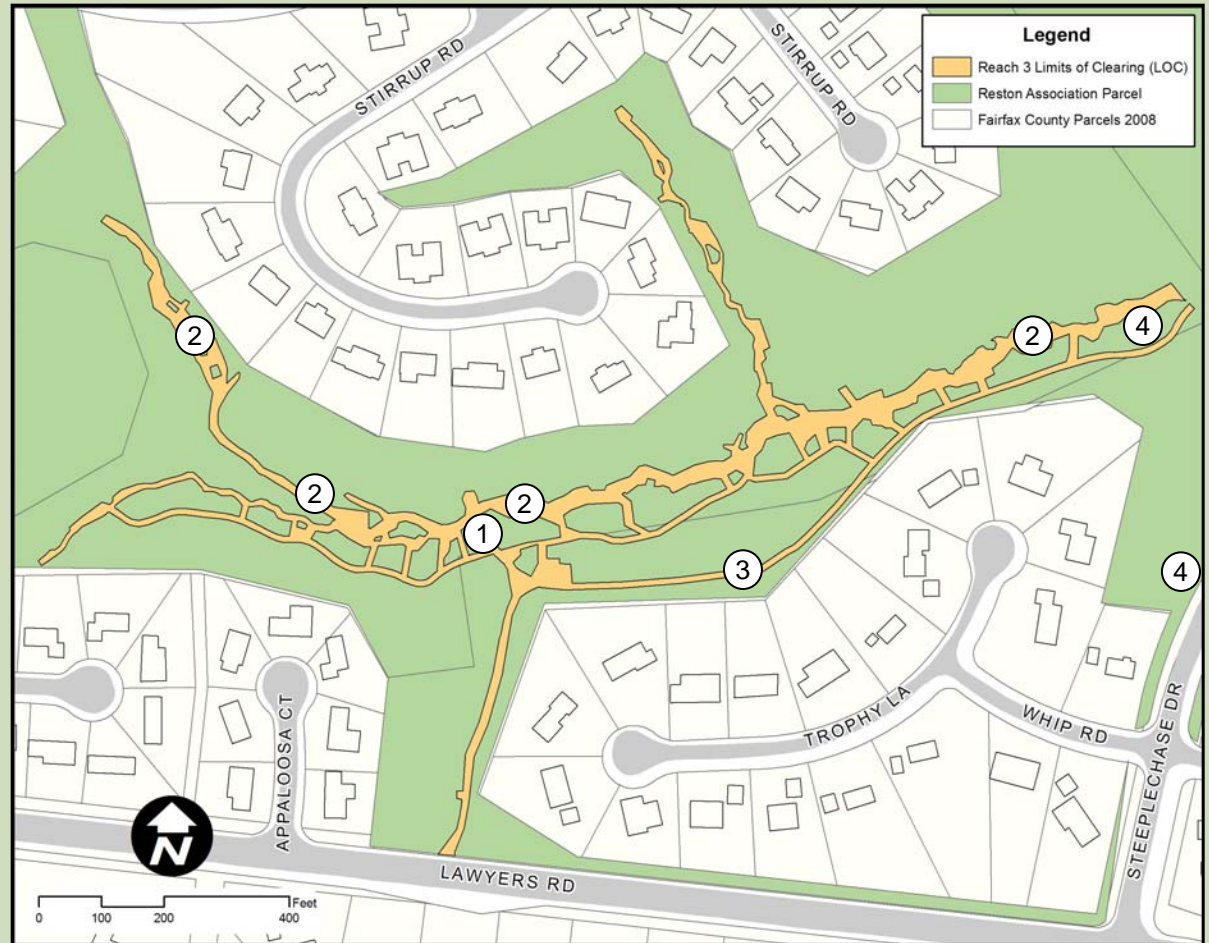
- inactive song bird nest
- inactive subsurface run
- snag in live tree
- stick nest and cavity in snag.



# DESIGN REFINEMENTS - REACH 3

- ① Bridge Realignment.
- ② Channel realignment area.
- ③ Greater use of trails for access.
- ④ Remove Entrance and Stockpile Area.

*Note : Structures may also be field modified as necessary to reduce impacts to adjacent trees.*

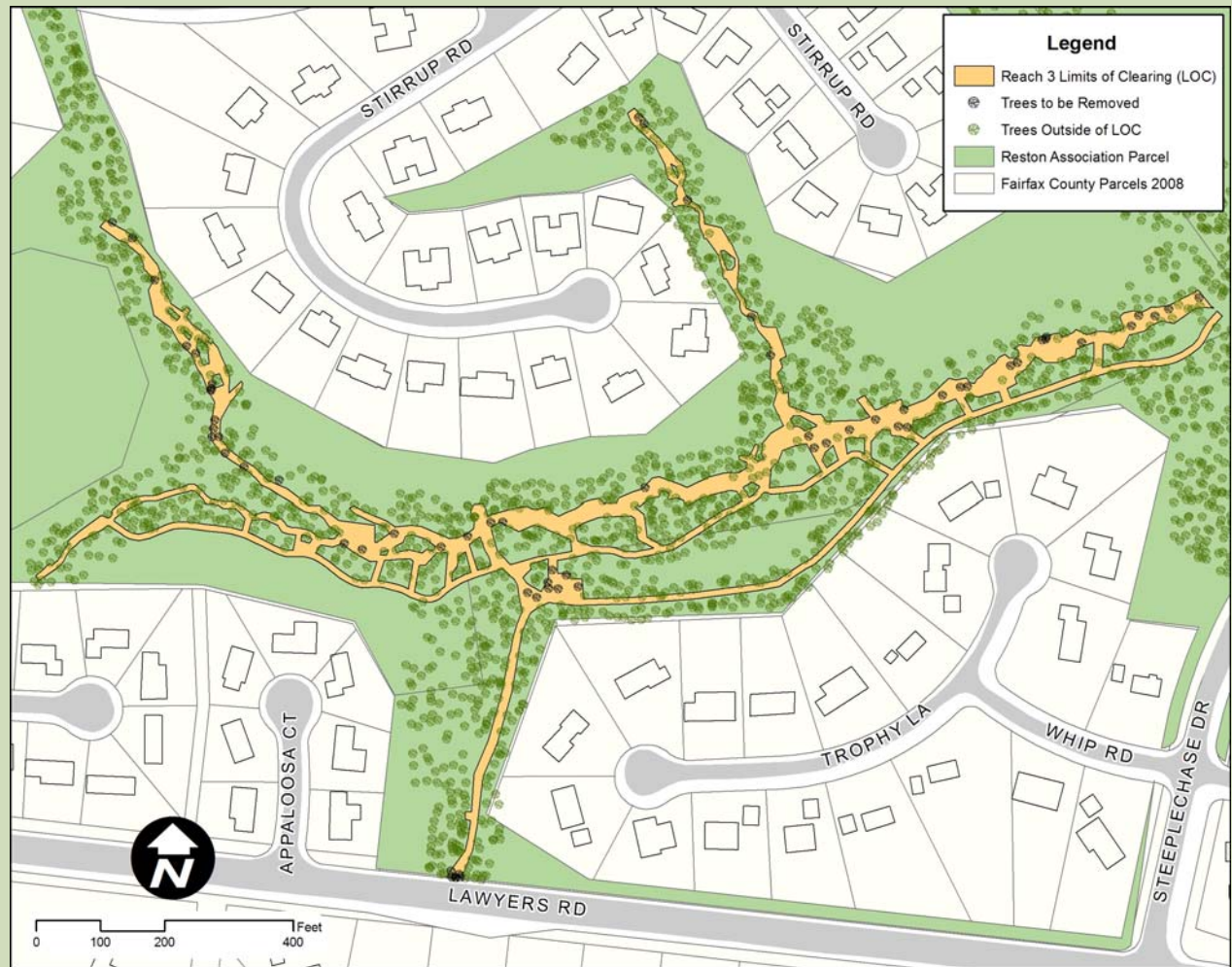


# TREE SAVE SUMMARY – REACH 3

TREE SAVE SUMMARY THE GLADE - REACH 3			
DIAMETER (IN)	STATUS*		
	TBR <sup>1</sup>	DND <sup>2</sup>	TST <sup>3</sup>
4-5" (Sapling)	18	438	456
6-9" (Pole)	22	559	581
10-17" (Small)	16	461	477
18-29" (Medium)	4	340	344
30"+ (Large)	2	67	69
<b>TOTAL</b>	<b>62</b>	<b>1865</b>	<b>1927</b>
1. TBR means to be removed. 2. DND means do not disturb. 3. TST means total surveyed trees. * Compiled 12/14/08			

## TOTAL PLANTINGS

**4,168 Trees  
-and-  
6,077 Shrubs**



# PLANTING – TREES & SHRUBS

Split into 2 planting zones:

- Riparian
  - 1 gallon containers (planted at 640 plants/acre)
  - Both trees & shrubs
- Streamside
  - live stakes/tubelings (planted 1ft o.c.)
  - shrubs (planted 3ft o.c.)

**TOTAL PLANTINGS:**    **Reach 1 - 2,371 Trees -and- 3,296 Shrubs**  
                                  **Reach 2 - 2,215 Trees -and- 3,013 Shrubs**  
                                  **Reach 3 - 4,168 Trees -and- 6,077 Shrubs**

- **Tree Species:** Pin Oak, Willow Oak, White Oak, Northern Red Oak, Sweet Gum, River Birch, Sycamore, Red Maple, Box Elder, and Black Willow
- **Shrub Species:** Silky Dogwood, Southern Arrowwood, American Holly, Service-Berry, Black-Haw, Eastern Redbud, Elderberry, Flowering Dogwood, and Brookside Alder



# PLANTING - RIPARIAN SEED MIX

- Applied at a rate of 125 lbs/acre
- Custom mix
- Consists of native species found in a healthy, diverse NOVA ecosystem:

- **5 Tree Species**

- Box Elder
- Musclewood
- Black Gum
- American Sycamore
- Red Maple

- **21 Forbs**

- Oxeye Sunflower
- Joe-Pye Weed
- Grass Leaved Goldenrod
- Orange Coneflower
- Virginia Spiderwort
- PLUS 16 additional species!

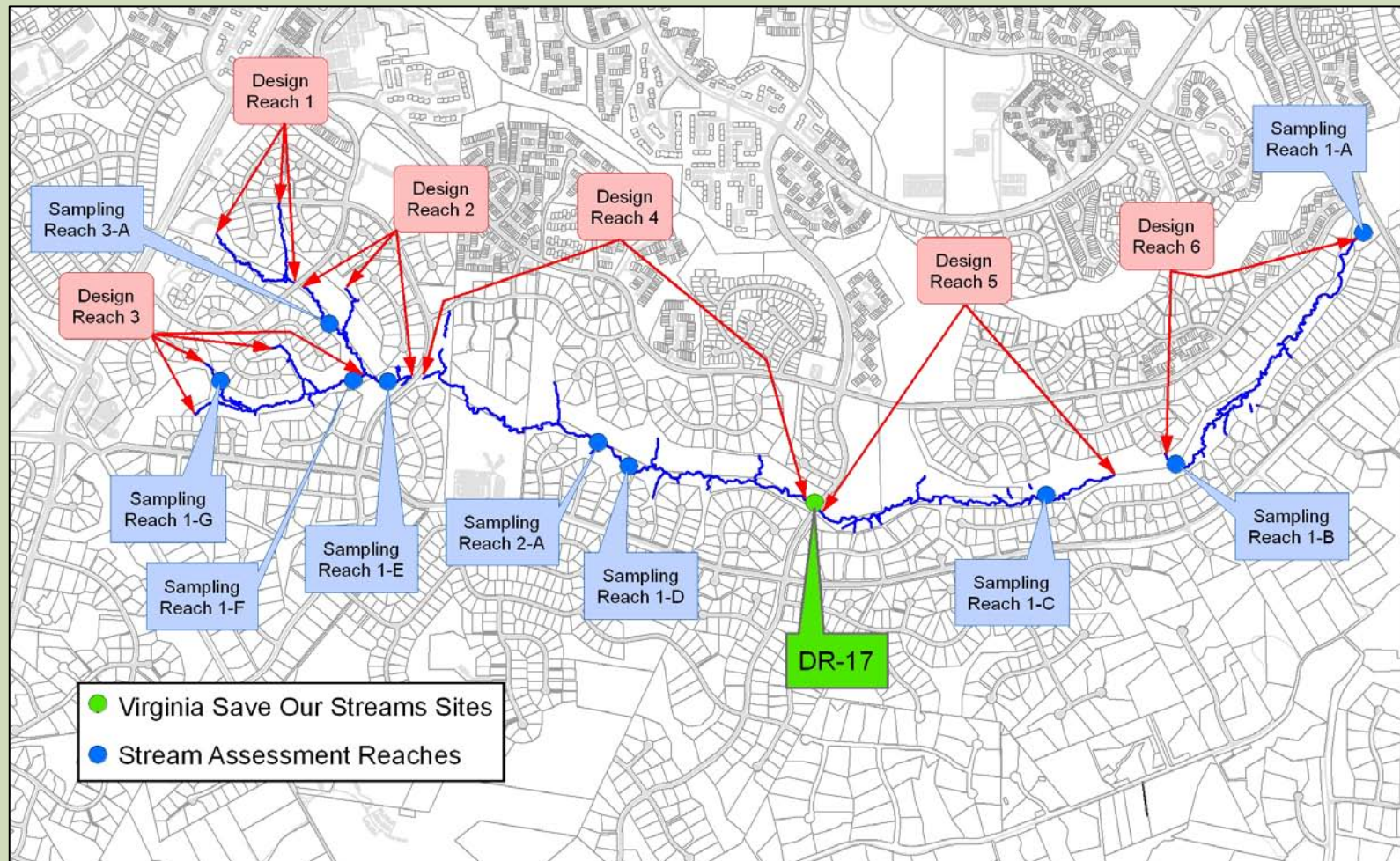
- **5 Shrub Species**

- Buttonbush
- Witch Hazel
- Winterberry
- Bladder Nut
- Southern Arrow Wood

- **6 Grass Species**

- Squarrose Sedge
- Bottlebrush Grass
- Riverbank Wild Rye
- Virginia Wild Rye
- Annual Ryegrass
- Foxtail Millet

# BASILINE BIOLOGICAL STREAM MONITORING LOCATION MAP



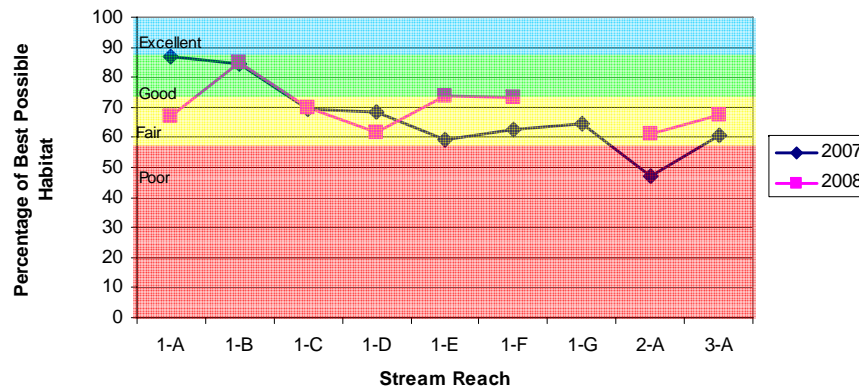
**The location of WSSI's biological monitoring reaches and Virginia Save Our Streams sites in relation to the stream restoration design reaches in The Glade watershed.**

# BASELINE BIOLOGICAL STREAM MONITORING DATA

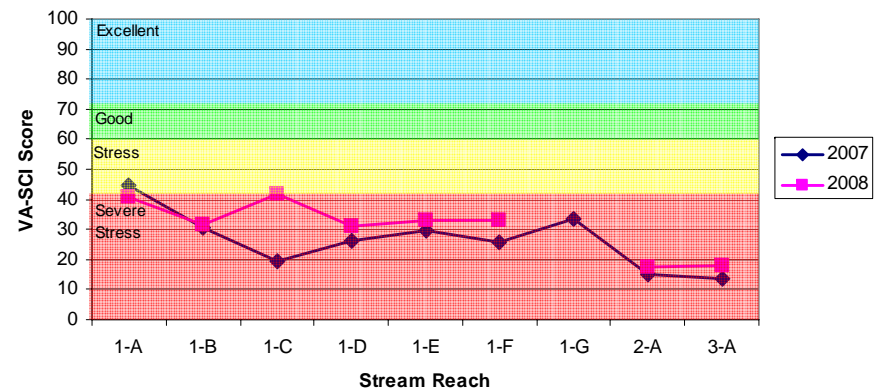
- WSSI conducting long-term biological stream monitoring - habitat and benthic macroinvertebrates.
- 2007 and 2008 Baseline Results - stream habitat on average is “Fair” and the benthic macroinvertebrate community is in “Severe stress” prior to restoration.
- Virginia Save our Streams data from The Glade indicates “Unacceptable Ecological Condition”.



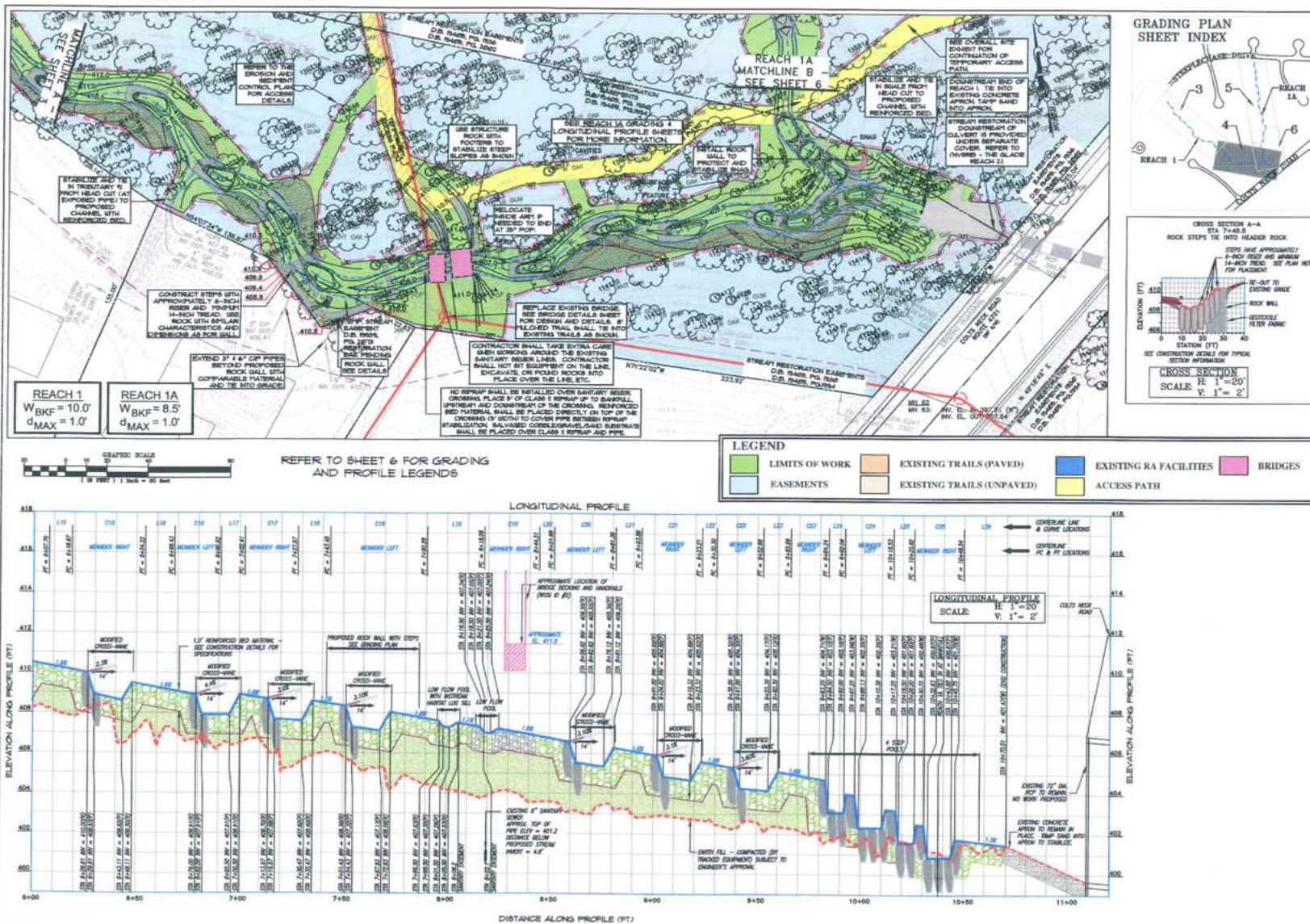
**Comparison of Habitat Assessment Scores for 2007 and 2008  
Pre-construction Monitoring for The Glade**



**Comparison of Virginia Stream Condition Index Scores for  
2007 and 2008 Pre-construction Monitoring for The Glade**



# TYPICAL GRADING PLAN - REACHES 1 & 1A



**Wetland**  
Studies and Solutions, Inc.

Northern Virginia Stream Restoration Bank  
The Glade - Reaches 1 & 1A  
Fairfax County, Virginia

Reach 1 Grading Plan and Longitudinal Profile (cont'd)

DATE: OCTOBER 2008

SCALE: 1" = 20'

REVISIONS

No.	Date	Description
1	10/20/08	Initial Design

Historical Data: VCR NAD 83  
Vertical Datum: NAVD 83  
Secondary and Triage Source: W100 and Further Original Data

Design: KLS  
Check: KLS  
Approved: FRG

Sheet #  
4 of 73

Computer File Name:

# 

## 

### 

#### 

##### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

###### 

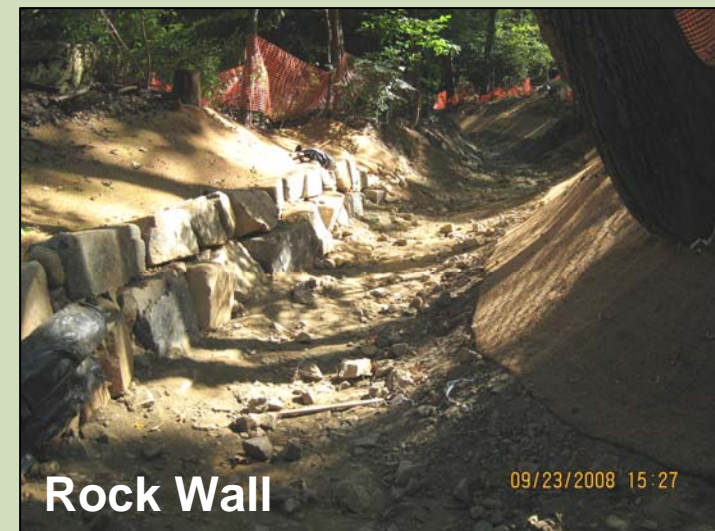
###### 

######

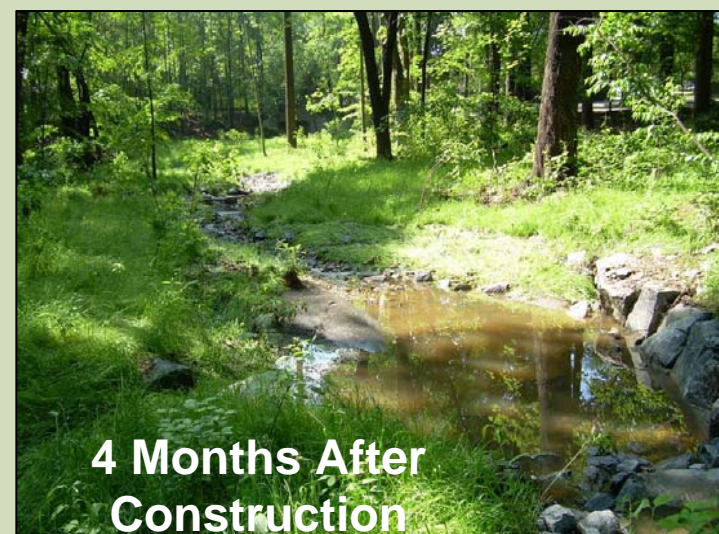
# CONSTRUCTION ACCESS IN SMALLER STREAMS



# TYPICAL STRUCTURES FOR SMALLER STREAMS



# SNAKEDEN BRANCH - REACH 1 (W = 14 FT, D = 1 FT)



# SNAKEDEN BRANCH - REACH 10 (W = 10 FT, D = 0.5 FT)



# SNAKEDEN BRANCH - REACH 6A (W = 10 FT, D = 1.5 FT)



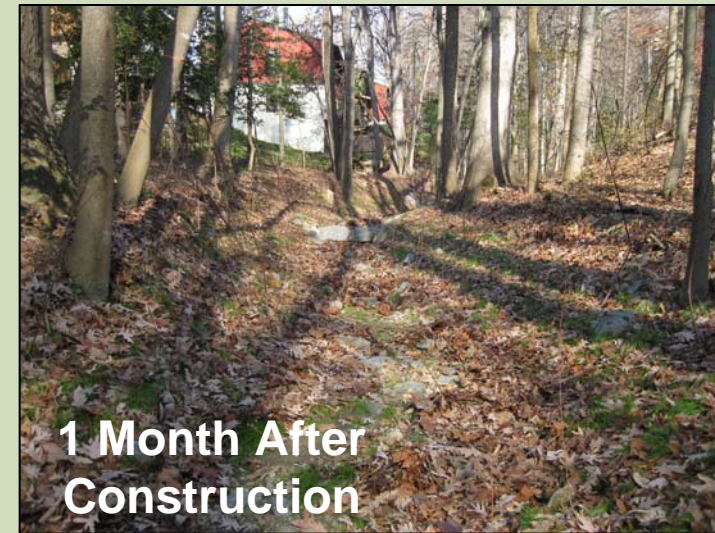
# SNAKEDEN BRANCH - REACH 6A (W = 10 FT, D = 1.5 FT)



# SNAKEDEN BRANCH - REACH 6B (W = 9 FT, D = 1.2 FT)



# SNAKEDEN BRANCH - REACH 8A (W = 8.5 FT, D = 0.8 FT)

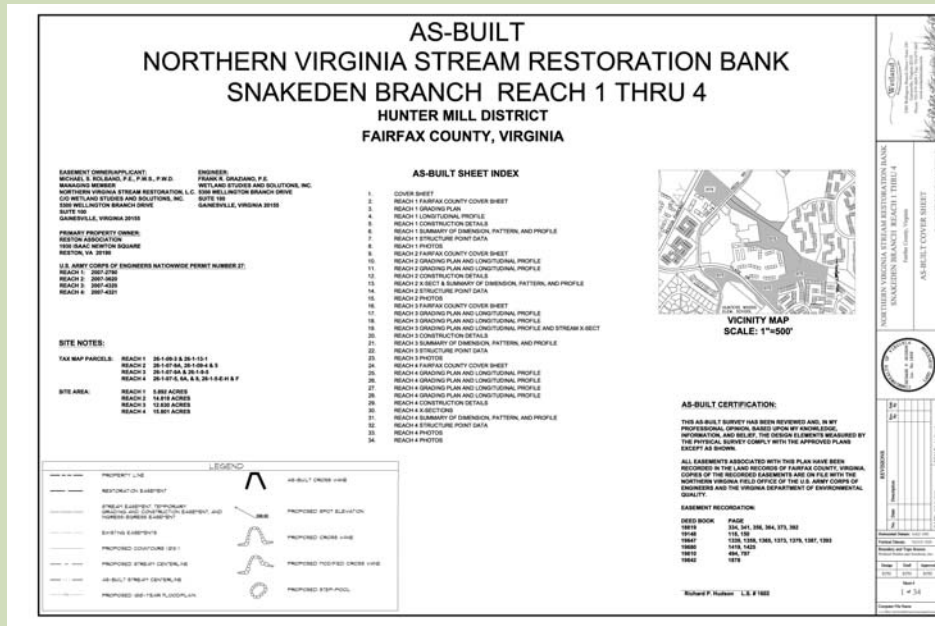


# MONITORING AND MAINTENANCE

## 10-year monitoring program

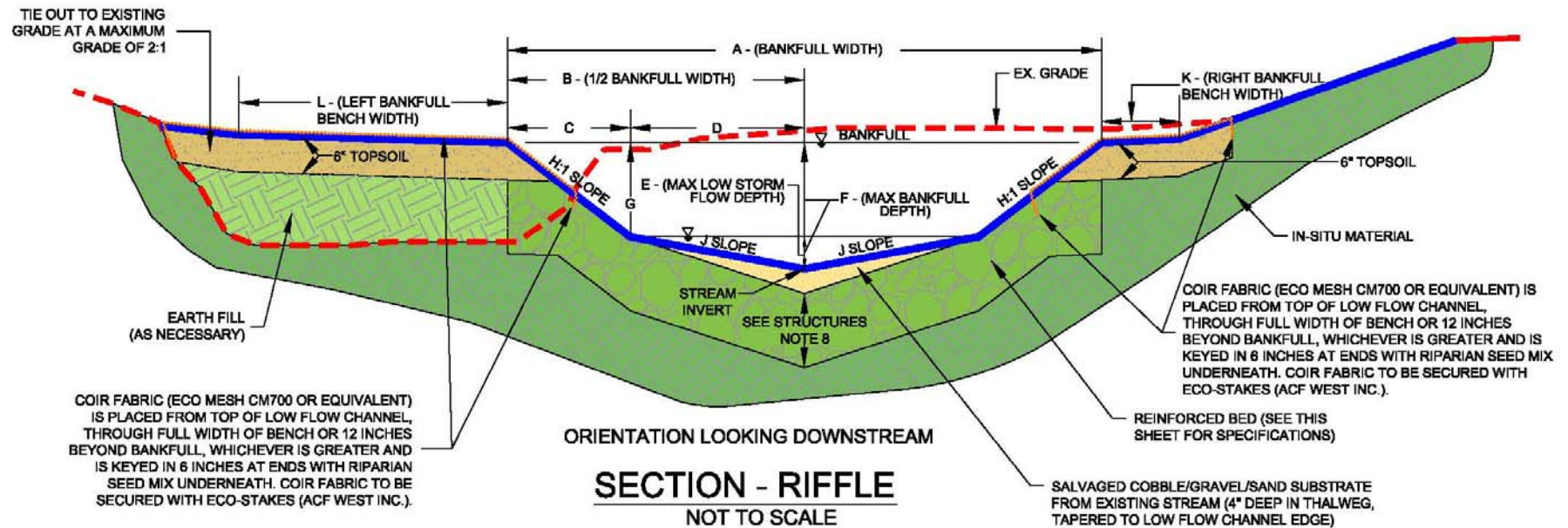
- Streambed surveys
- Structure surveys
- Vegetation surveys
- Biological Surveys
- As-built for Reaches 1- 4 has been approved.

*Must meet success criteria outlined in MBI – or fix!*

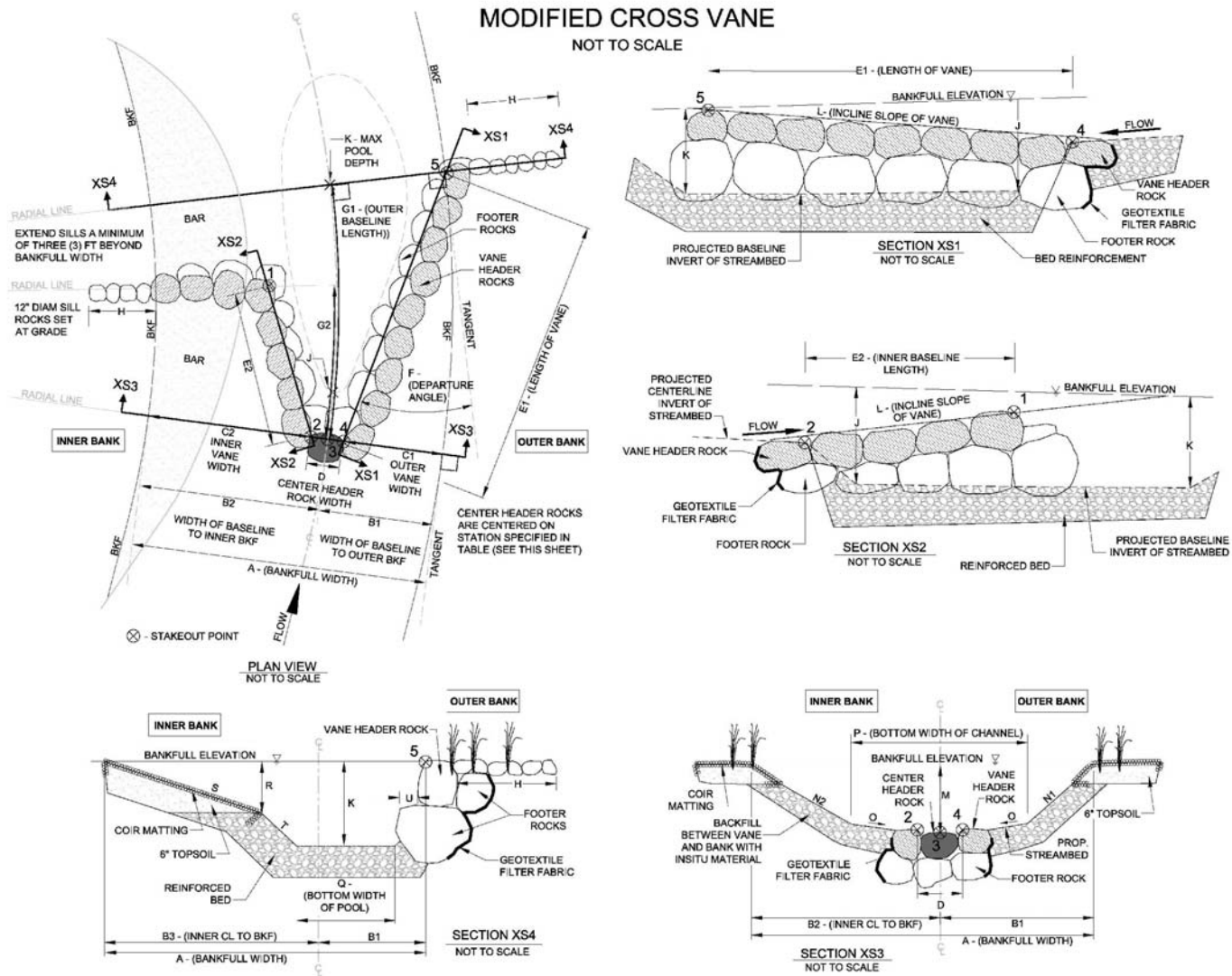


# ADDITIONAL DOCUMENTS

# TYPICAL CROSS SECTION

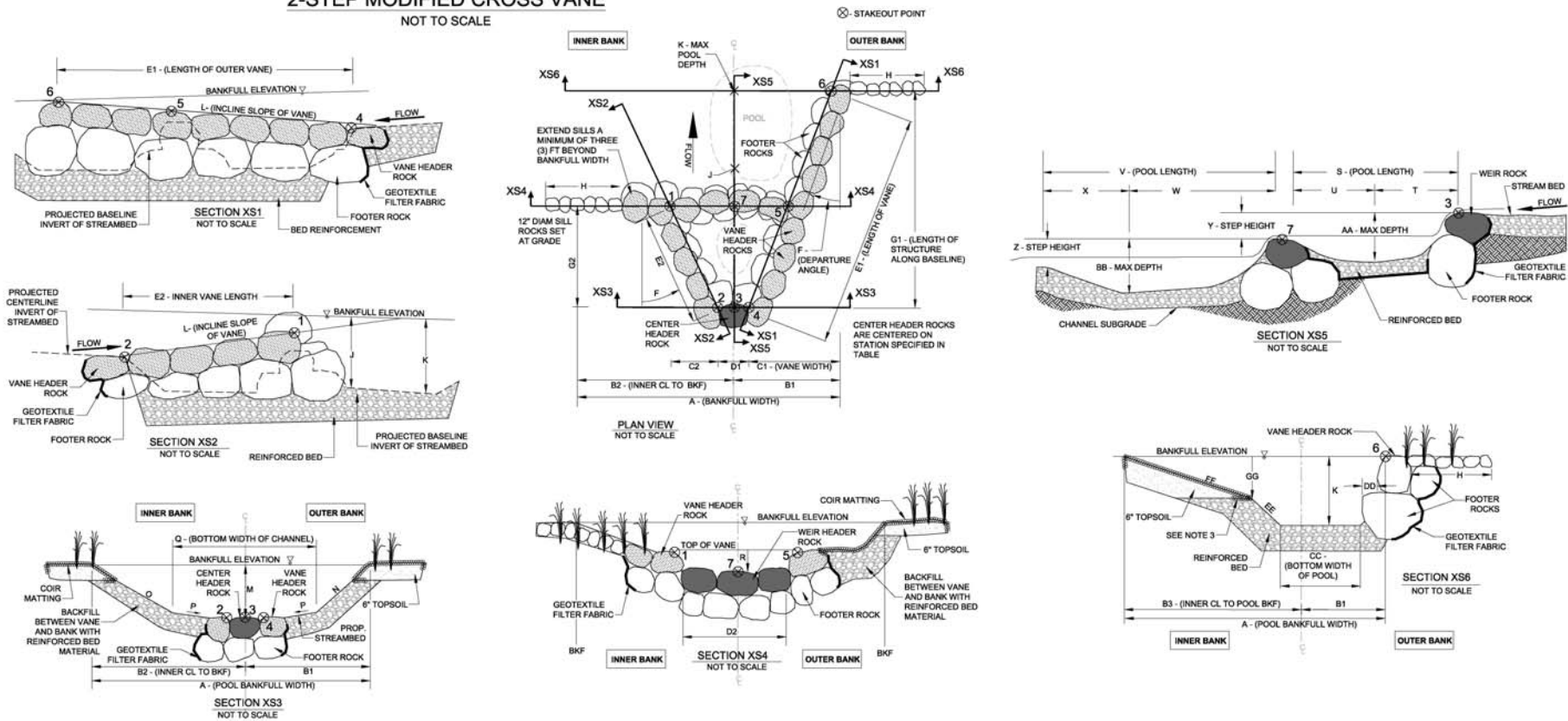


# TYPICAL CONSTRUCTION DETAILS

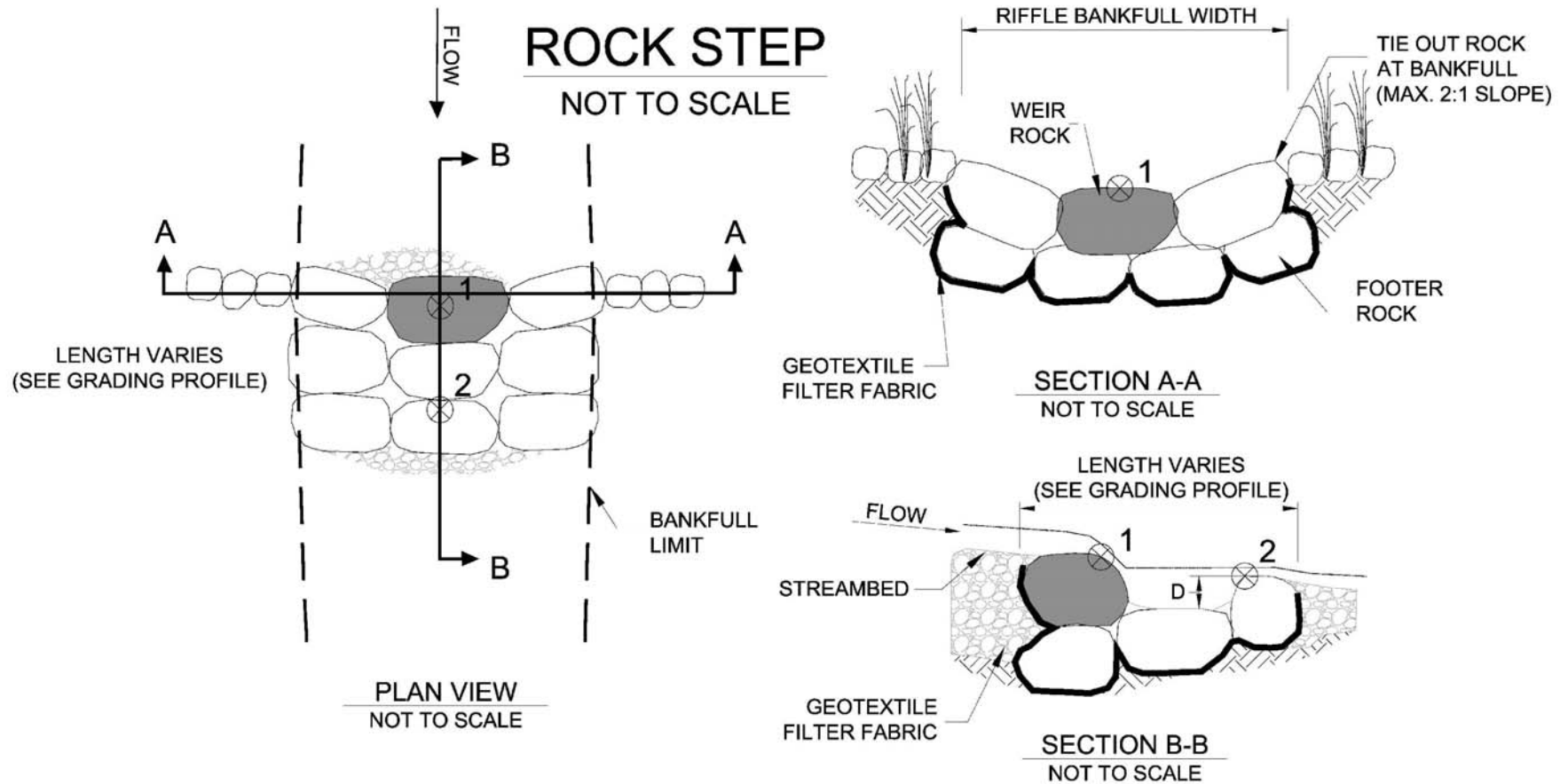


# TYPICAL CONSTRUCTION DETAILS

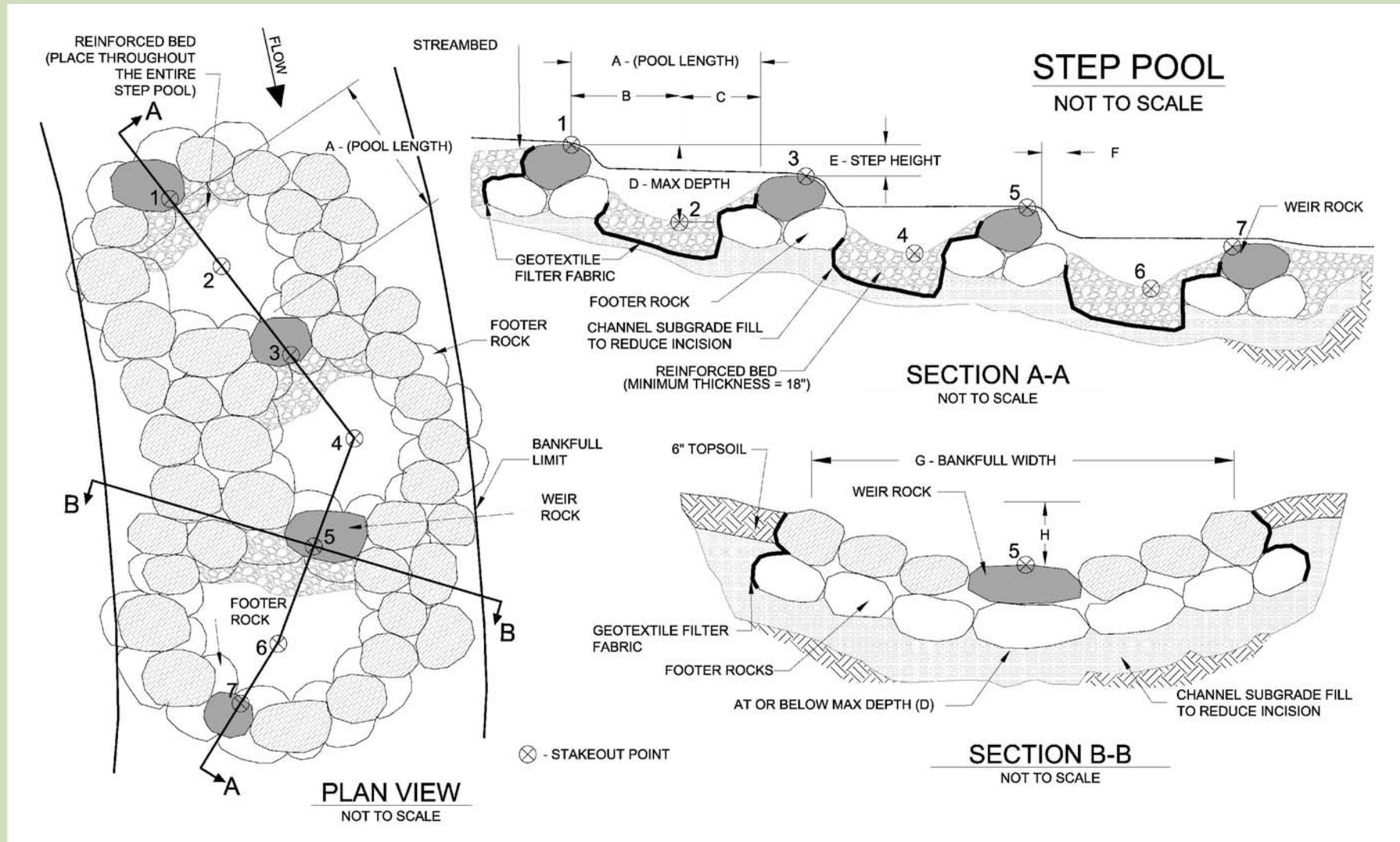
## 2-STEP MODIFIED CROSS VANE NOT TO SCALE



# TYPICAL CONSTRUCTION DETAILS



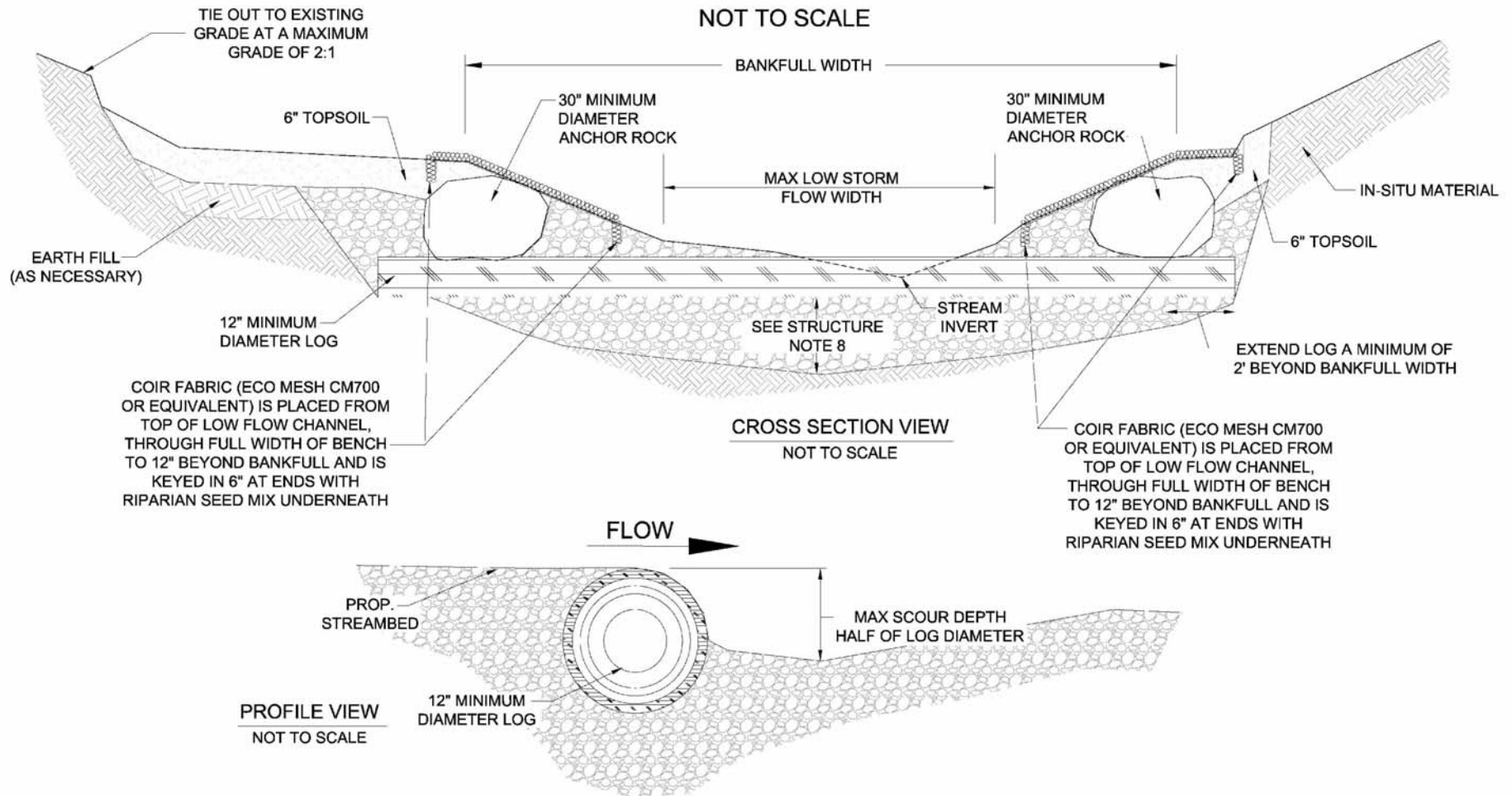
# TYPICAL CONSTRUCTION DETAILS



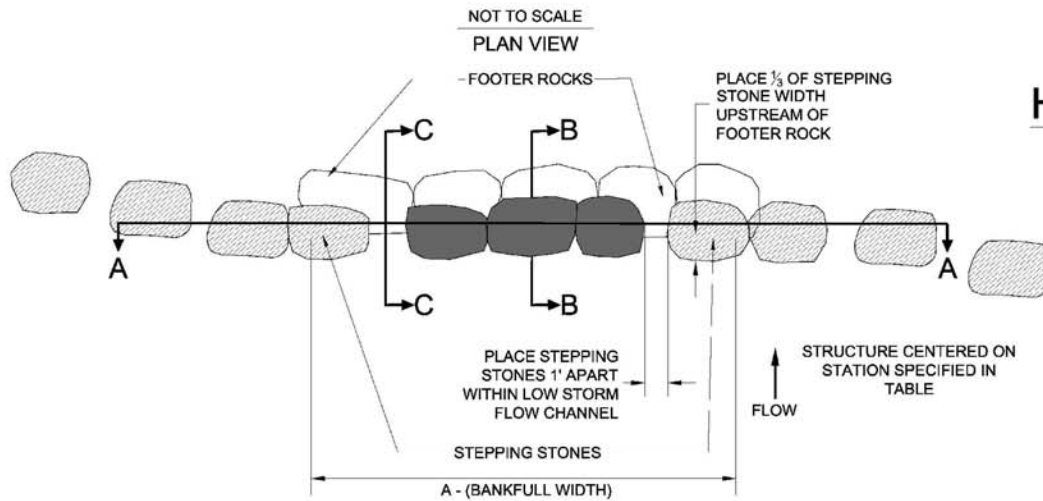
# TYPICAL CONSTRUCTION DETAILS

## IN-STREAM HABITAT LOG SILL

NOT TO SCALE

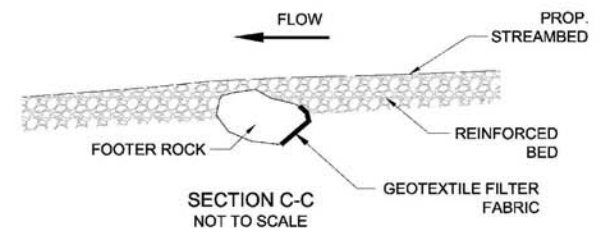
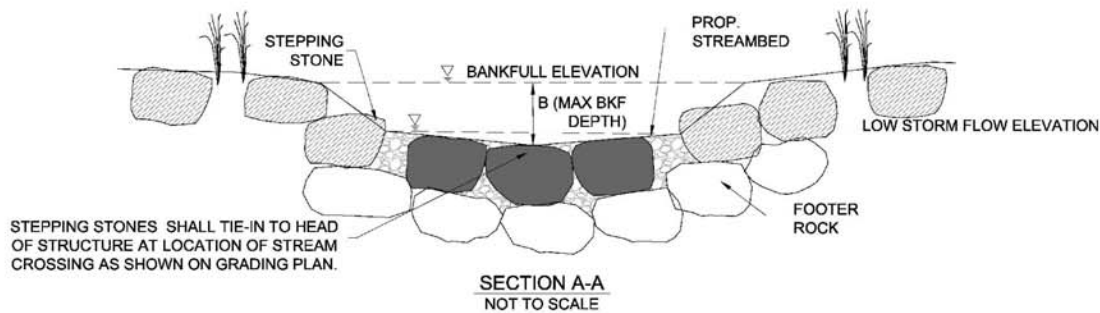
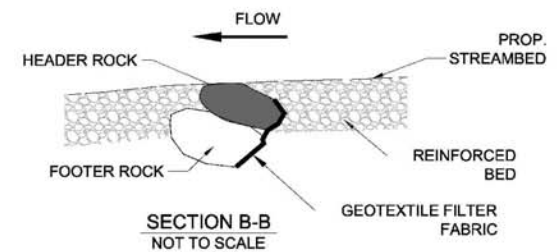


# TYPICAL CONSTRUCTION DETAILS

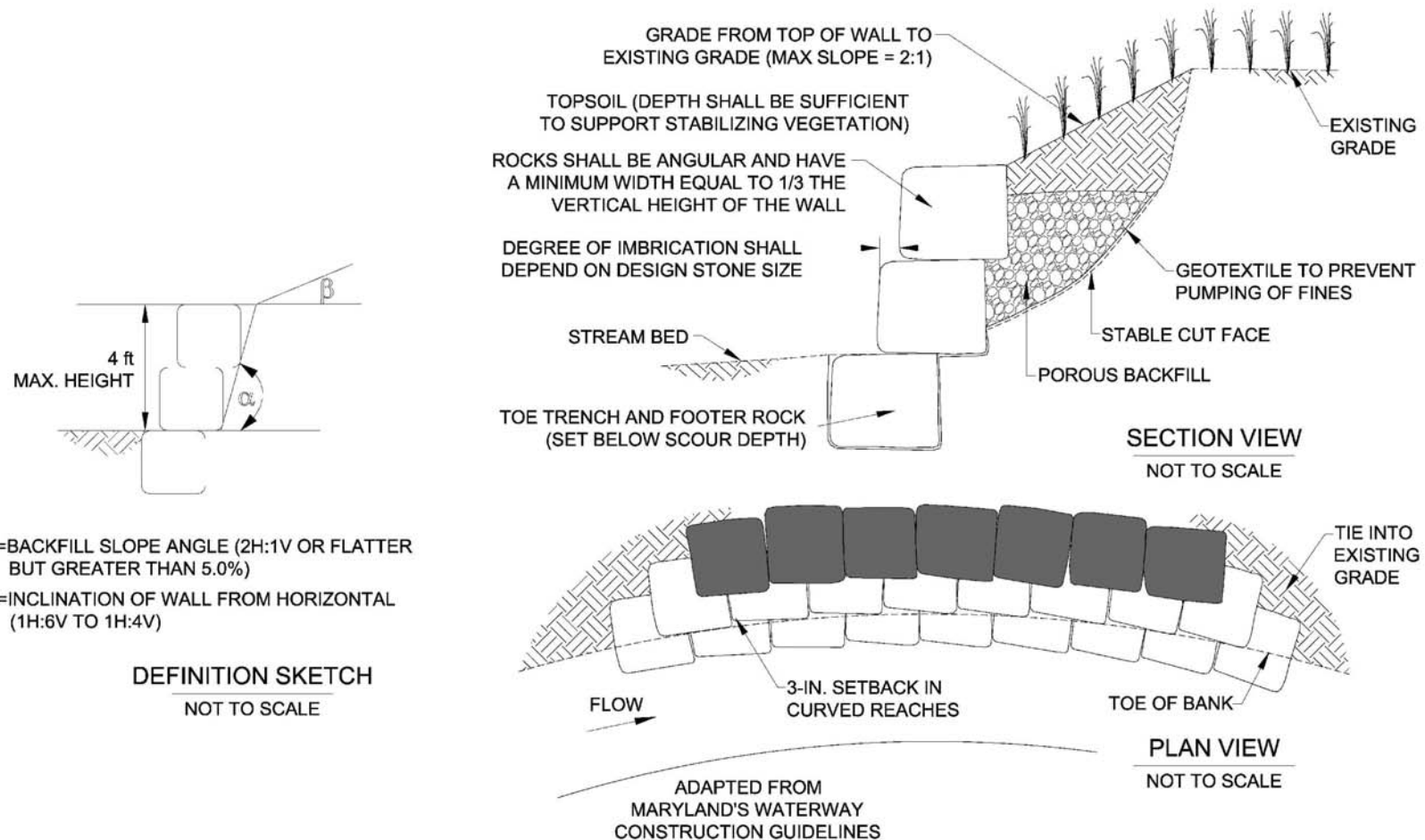


## STEPPING STONES AT HEAD OF PROPOSED STRUCTURE

NOT TO SCALE



# TYPICAL CONSTRUCTION DETAILS



**IMBRICATED RIPRAP WALL**  
NOT TO SCALE

CONSTRUCTION NOTE:  
STONE BLOCKS SHALL BE ROTATED INTO THE BANK DURING PLACEMENT SUCH THAT THE UPSTREAM BLOCKS OVERLAP THE DOWNSTREAM BLOCKS BY A MINIMUM OF 3 INCHES.