



**NORTHERN VIRGINIA STREAM RESTORATION BANK  
STATUS REPORT AND  
THE GLADE REACH 4A & 4B FINAL APPROVAL  
JUNE 16, 2009**

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

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[www.wetlandstudies.com](http://www.wetlandstudies.com)



# MONTHLY STATUS REPORT

## Snakeden Branch

- **Reach 1-12, 14-17:** 100% complete.
- **Reach 13:** Easement signed; Revised plans and in permit process

## The Glade

- **Reach 1:** 100% complete.
- **Reach 2:** 25% complete.
- **Reach 3:** 10% complete.
- **Reach 4:** DRB FINAL Plan review tonight.
- **Reach 5:** 1<sup>st</sup> Preliminary Plan stream walk scheduled June 27<sup>th</sup>.
- **Reach 6:** Strategy and access walk conducted June 13<sup>th</sup> and joint 1<sup>st</sup> Preliminary Plan stream walk scheduled June 27<sup>th</sup> with Reach 5.

## Colvin Run – Hydro and Survey Underway



# MONTHLY STATUS REPORT

## SNAKEDEN REACH 1



May 2008



June 2009



# MONTHLY STATUS REPORT

## SNAKEDEN REACH 12 AT SOAPSTONE



April 2009



June 2009



# MONTHLY STATUS REPORT

## SNAKEDEN NEAR NATURE HOUSE



April 2009



June 2009



# MONTHLY STATUS REPORT

## SNAKEDEN REACH 15



April 2009



June 2009



# MONTHLY STATUS REPORT

## SNAKEDEN REACH 16



April 2009



June 2009



# MONTHLY STATUS REPORT

## GLADE REACH 1



After Construction  
(April 2009)



1 Month After Construction (May 2009)



# MONTHLY STATUS REPORT

## GLADE REACH 1A



After Construction  
(April 2009)



1 Month After Construction (May 2009)



# MONTHLY STATUS REPORT

## GLADE REACH 1 - CHAMBLISS



After Construction  
(April 2009)



2 Months After Construction (June 2009)



# MONTHLY STATUS REPORT

## GLADE REACH 2



Pre-Construction  
(February 2009)



During Construction (June 2009)



# MONTHLY STATUS REPORT

## GLADE REACH 2



Pre-Construction  
(February 2009)



During Construction (June 2009)



# MONTHLY STATUS REPORT

## TRIBUTARY TO GLADE REACH 3



Pre-Construction  
(February 2008)



During Construction (June 2009)

# THE GLADE REACH 4

## COMMUNITY OUTREACH SCHEDULE

January 21 – Wednesday	9:00 – Noon	First Small Group Meeting on Reaches 4A and 4B to Discuss Staging, Access, and Horizontal Stream Alignment
February 17 – Tuesday	9:00 – Noon	Second Small Group Meeting on Reaches 4A and 4B to Discuss Staging, Access, and Horizontal Stream Alignment
March 7 – Saturday	9:00 – 2:00 PM	Community-wide Meeting on Reaches 4A and 4B for Preliminary Plan Review – <b>Pavilion</b>
March 9 – Monday	5:00 PM	Post Preliminary Plan (Reaches 4A and 4B) Presented on March 7 on Web Site
March 25 – Wednesday	5:00 PM	Post 1 <sup>st</sup> Preliminary Plan Revision Set (Reaches 4A and 4B) on Web Site
March 28 – Saturday	9:00 AM – Noon	Second Community-wide Meeting on Reaches 4A and 4B for Preliminary Plan Review – <b>Pavilion</b>
	Noon – 2:00 PM	Lunch and Q&A Session
April 2 – Thursday	5:00 PM	Post 2 <sup>nd</sup> Preliminary Plan Revision Set (Reaches 4A and 4B) on Web Site
April 7 – Tuesday	5:00 PM	Post 3 <sup>rd</sup> Preliminary Plan Revision Set (Reach 4B; no revisions were made to 4A) on Web Site
April 21 – Tuesday	7:00 PM	DRB – Reach 4 Preliminary Plan Review
May 9 – Saturday	9:00 – 2:00 PM	First Community-wide Meeting on Reach 4 Final Plan <b>Pavilion</b>
May 11 – Monday	N/A	Post Draft Final Plans on Web Site
May 30 – Saturday	9:00 AM – Noon	Second Final Plan Review for Reach 4 – <b>Pavilion</b>
	Noon – 2:00 PM	Lunch and Q&A Session
June 9 – Tuesday	N/A	Post Any Revisions to Final Plan on Web Site
June 16 – Tuesday	7:00 PM	DRB Review of Reach 4 Final Plan

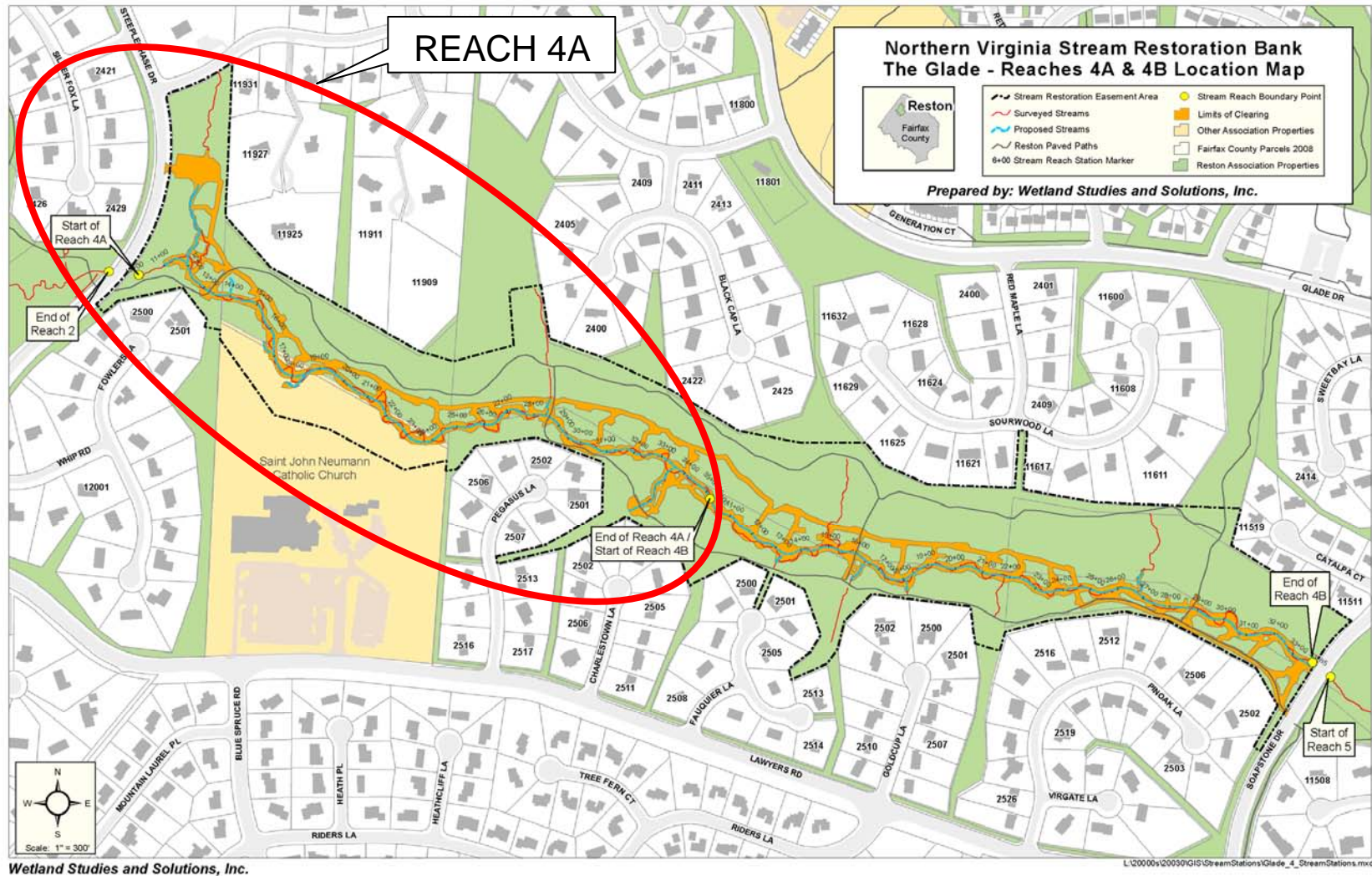


# THE GLADE – REACH 5 & 6

## COMMUNITY OUTREACH SCHEDULE

April 18 – Saturday	9:00 AM – Noon	Community-wide Meeting to Discuss Strategy and Access for Reach 5 – Starting at Fire Ring
June 13 – Saturday	9:00 AM – Noon	Community-wide Meeting to Discuss Strategy and Access for Reach 6 – Starting at Basketball Court
June 27 – Saturday	9:00 – 2:00 PM	First Community-wide Meeting on Reach 5 and Reach 6 for Preliminary Plan Review – Starting at Basketball Court
June 29 – Monday	5:00 PM	Post Preliminary Plans (Reach 5 and Reach 6) on Web Site
July 25 – Saturday	9:00 – 2:00 PM	Second Community-wide Meeting on Reach 5 and Reach 6 for Preliminary Plan Review – Starting at Basketball Court
July 27 – Monday	N/A	Post Revised Reach 5 and Reach 6 Preliminary Plans on Web Site
August 18 – Tuesday	7:00 PM	DRB – Reach 5 and Reach 6 Preliminary Plan Review
September 5 – Saturday	9:00 – 2:00 PM	First Community-wide Meeting on Reach 5 and Reach 6 Final Plans – Basketball Court
September 8 – Tuesday	N/A	Post Draft Final Plans on Web Site
September 26 – Saturday	9:00 – 2:00 PM	Second Final Plan Review for Reach 5 and Reach 6 – Basketball Court
October 5 – Monday	N/A	Post Any Revisions to Final Plans on Web Site
October 20 – Tuesday	7:00 PM	DRB Review of Reach 5 and Reach 6 Final Plans

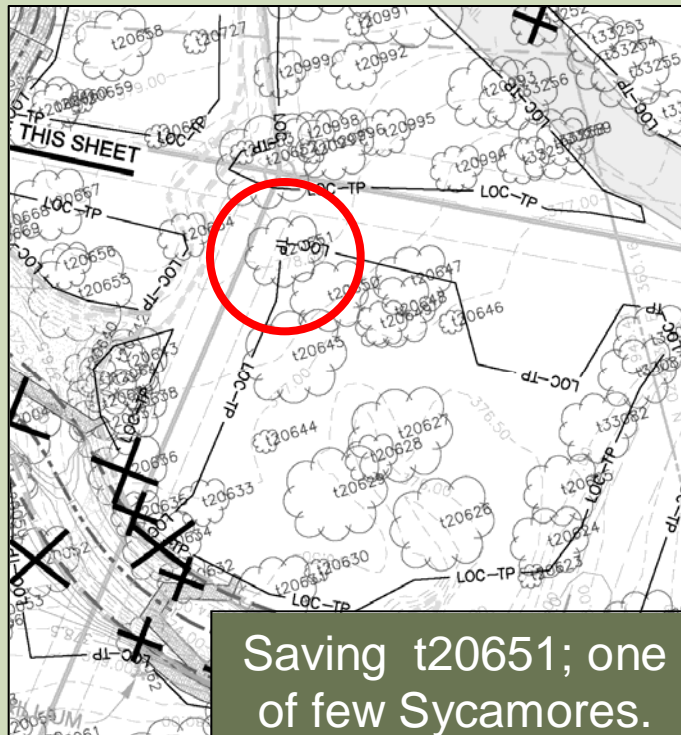
# OVERVIEW MAP – REACH 4A



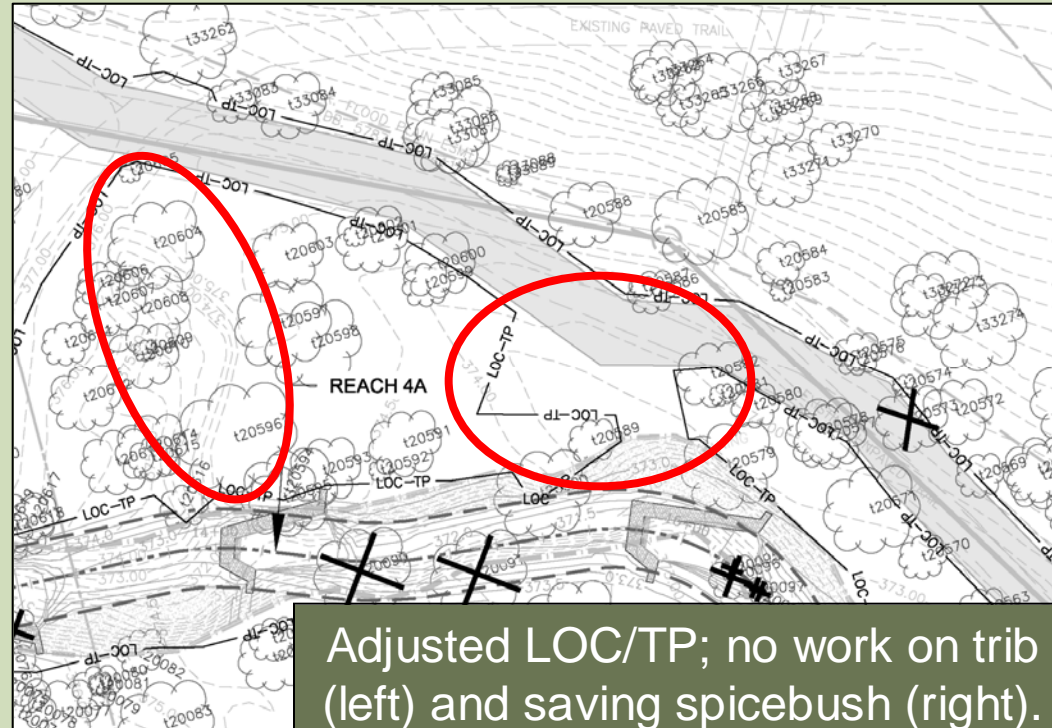


# REVISIONS TO PRELIMINARY PLAN REACH 4A

Minor LOC/TP revisions to avoid trees throughout.

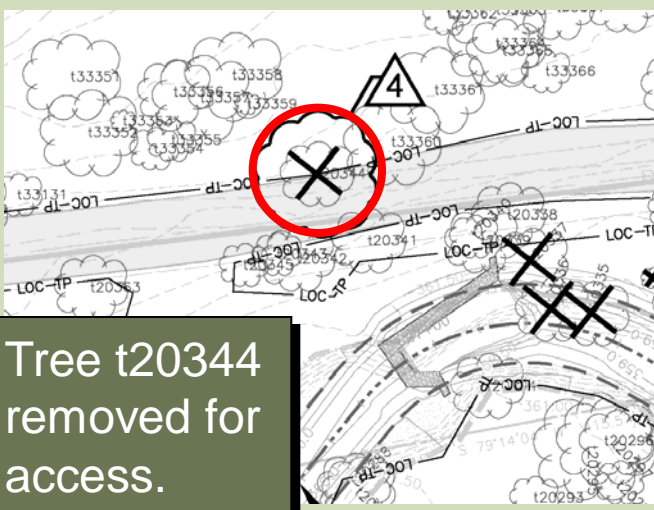
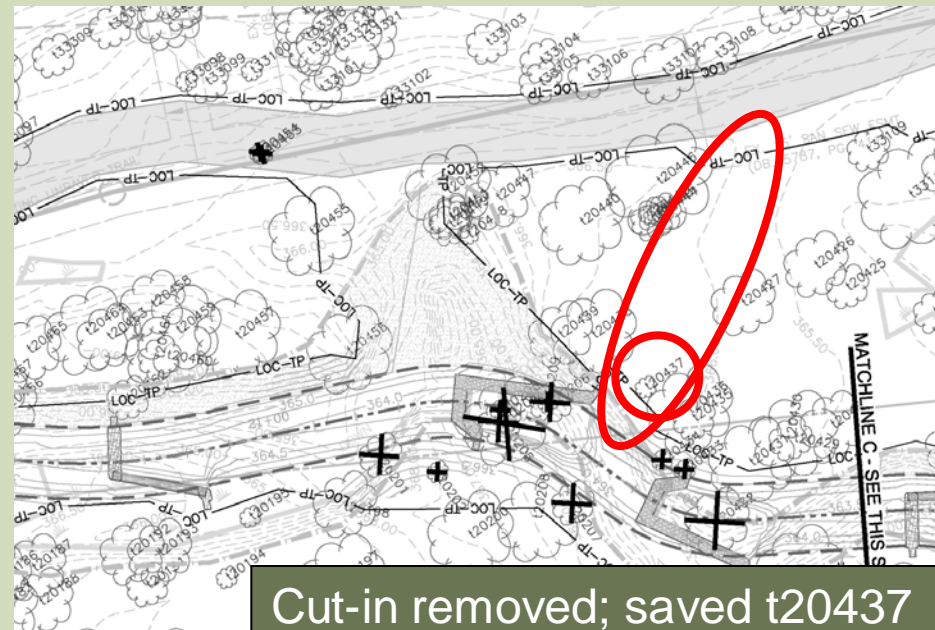
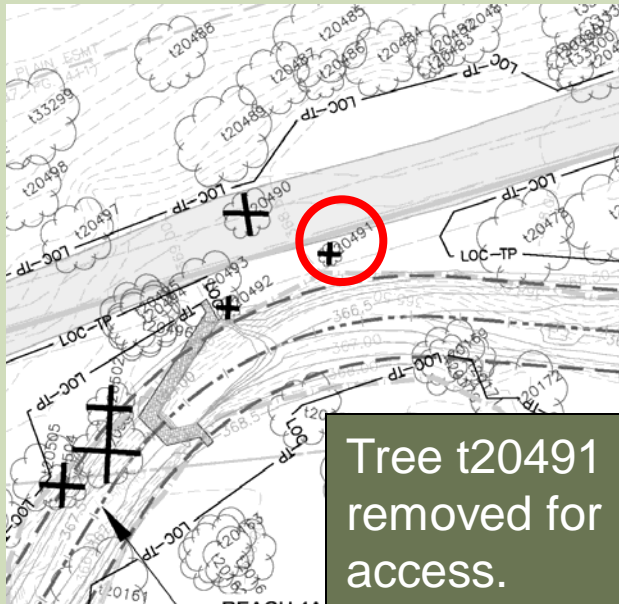


Saving t20651; one of few Sycamores.

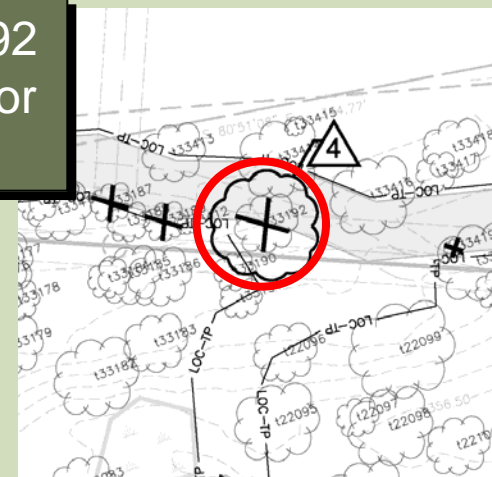


Adjusted LOC/TP; no work on trib (left) and saving spicebush (right).

# REVISIONS TO PRELIMINARY PLAN REACH 4A (CONT.)

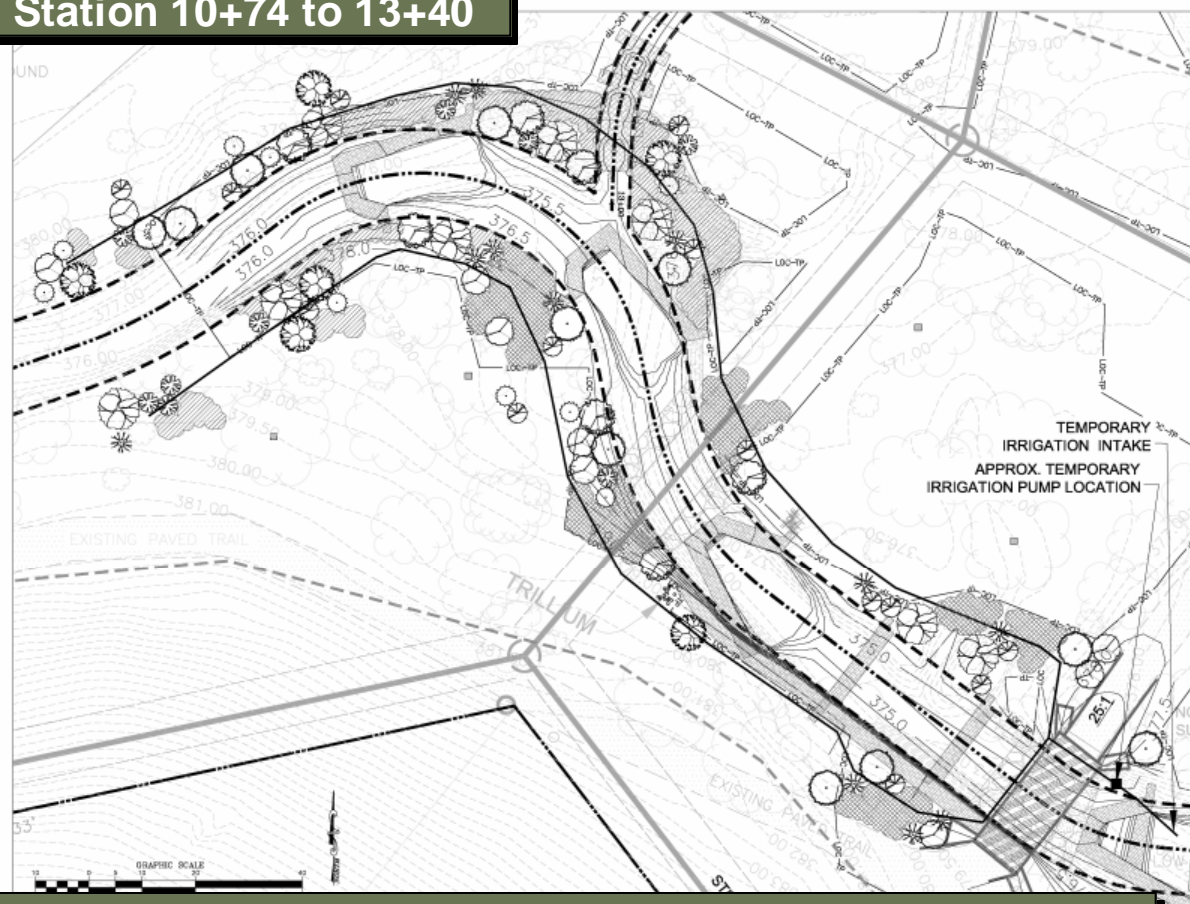


Tree t33192 removed for access.





## Station 10+74 to 13+40



REACH 4A LEGEND	
—	PROPERTY BOUNDARY
---	EXISTING CONTOURS (0.5')
---	EXISTING INFRASTRUCTURE
---	FLOODPLAIN EASEMENT
---	EXISTING EASEMENT
---	PROPOSED BANKFULL
---	PROPOSED CENTERLINE
---	PROPOSED CONTOURS (0.5')
---	LIMITS OF CLEARING
---	PROPOSED TEMP. IRRIGATION
---	PROPOSED MODIFIED CROSS VANE
---	PROPOSED ROCK STEP
○	EXISTING TREE
△	NEST
□	CAVITY
○	SUBSURFACE EROSIONAL FEATURE
◇	SNAG
+	DEN
---	EXISTING CHANNEL BACKFILL AREA

REACH 4A MEANDER PLANTING PLAN	
<b>2" CALIPER TREES</b>	(QTY) SCIENTIFIC NAME (COMMON NAME)
○	(7) BETULA NIGRA (RIVER BIRCH)
○	(9) CERCIS CANADENSIS (EASTERN REDBUD)
○	(11) CORNUS FLORIDA (FLOWERING DOGWOOD)
○	(12) ILEX OPACA (AMERICAN HOLLY)
○	(8) PLATANUS OCCIDENTALIS (AMERICAN SYCAMORE)
○	(6) QUERCUS PALUSTRIS (PIN OAK)
<b>B&amp;B SHRUBS</b>	(QTY) SCIENTIFIC NAME (COMMON NAME)
○	(9) ILEX VERTICILLATA (COMMON WINTERBERRY)
○	(9) CORYLUS AMERICANA (AMERICAN HAZELNUT)
○	(14) VIBURNUM DENTATUM (SOUTHERN ARROWWOOD)
<b>1 GAL. HERBACEOUS</b>	(QTY) SCIENTIFIC NAME (COMMON NAME)
○	(70) OSMUNDA CINNAMOMEA (CINNAMON FERN)
○	(70) POLYSTICHUM ACROSTICHOIDES (CHRISTMAS FERN)
(729 TOTAL SF)	(70) THELYPTERIS NOVEBORACENSIS (NEW YORK FERN)
<b>1 GAL. HERBACEOUS</b>	(QTY) SCIENTIFIC NAME (COMMON NAME)
○	(48) EUPATORIUM FISTULOSUM (JOE PYE WEED)
○	(48) EUPATORIUM PERFOLIATUM (BONESET)
○	(48) RUDBECKIA HIRTA (BLACK-EYED SUSAN)
(825 TOTAL SF)	(48) THELYPTERIS NOVEBORACENSIS (NEW YORK FERN)
○	(48) VERBESINIA ALTERNIFOLIA (WINGSTEM)

NOTES	
1.	Herbaceous plants to be installed randomly throughout specified planting area with a spacing of 2' o.c.
2.	Transplants from other reaches will be used as much as possible for all or part of the shrubs and/or herbaceous plants specified above. Transplants must be as large or larger than the sizes specified above (for a shrub or herbaceous plant), be an identical match to the species it is replacing, and be approved by the construction manager prior to installation. Transplants may only be harvested from within the approved stream restoration LOC (i.e. areas to be impacted). Construction manager will coordinate with the contractor to tag and relocate transplants.
3.	Substitutions based upon availability of nursery stock shall be requested and approved by the construction manager prior to installation. For herbaceous species, substitutions using transplant material (as described above) shall be given first preference over substitutions using nursery stock. It is anticipated that only fern substitutions/transplants will be available. Thus, it is acceptable to use them in place of non-fern species, provided they are one of the three species specified and a mixture of the three are used.
4.	Temporary irrigation lines to remain in place with sprinkler heads removed after second growing season. Irrigation to be used for the first growing season, and if needed, during second growing season if drought conditions exist.

### Addition of Supplemental Planting Plan (Sheet 25A):

1. Request received by Save the Glade Coalition to preserve area
2. WSSI re-examined design for possible implications (8 options in total)
3. Proposed vegetation:
  - 2" caliper trees, B&B shrubs, 1 gallon transplanted herbaceous plants
4. Temporary irrigation system for up to two years
5. Proposed Supplemental Planting Plan endorsed by STG Coalition

# OVERVIEW MAP – REACH 4B

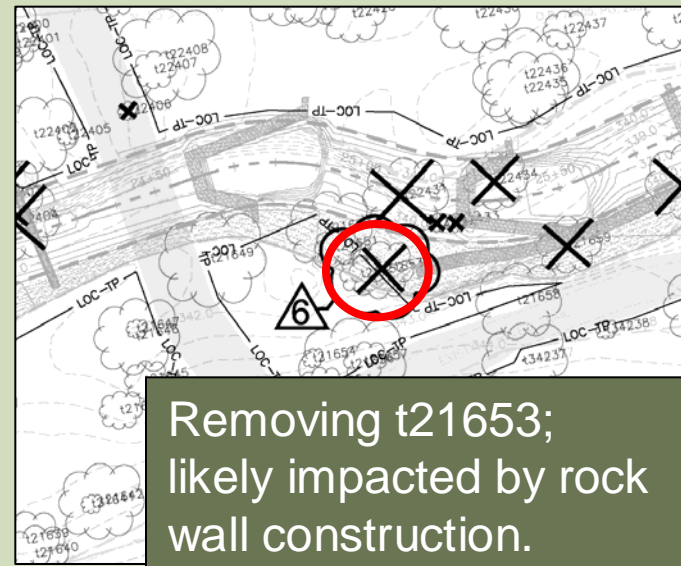
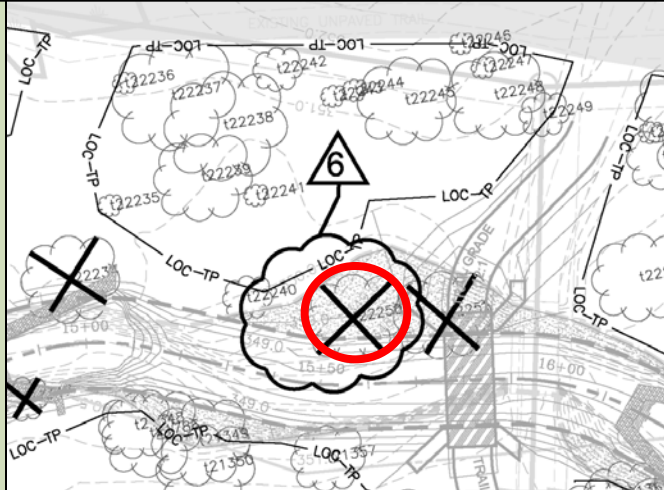




# REVISIONS TO PRELIMINARY PLAN REACH 4B

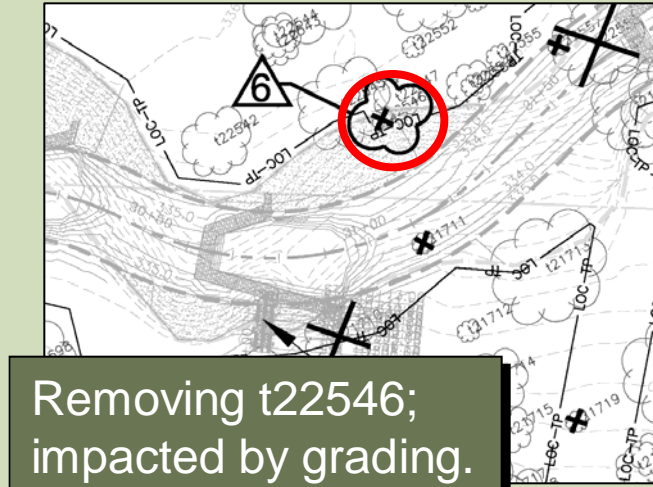
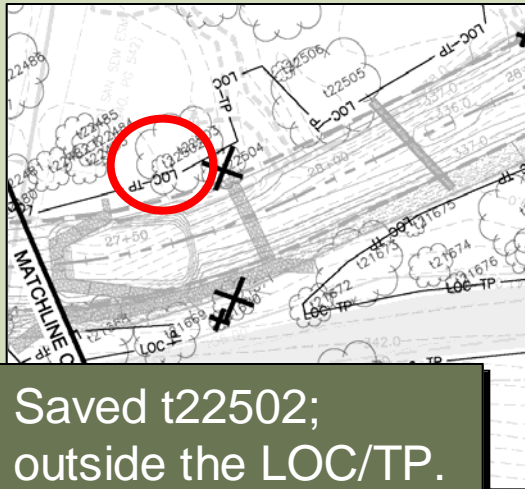
**Minor LOC/TP revisions to avoid trees throughout.**

## Removing t22250; uprooting.

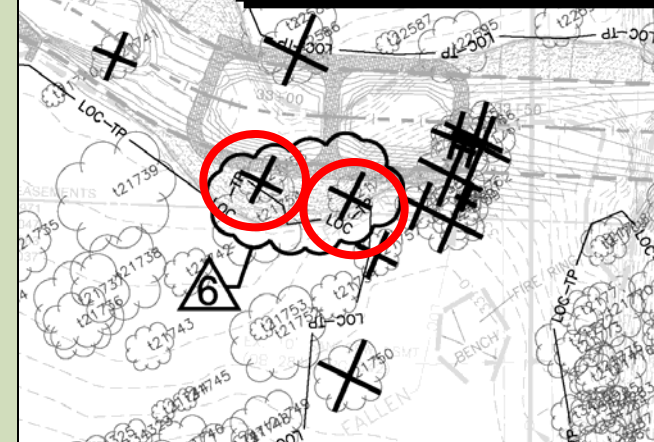


Removing t21653;  
likely impacted by rock  
wall construction.

# REVISIONS TO PRELIMINARY PLAN REACH 4B (CONT.)



Removing t21755  
(left) which will  
most likely be  
impacted by rock  
step and & t21756  
(right) which has  
fallen.





# SAVE THE GLADE LETTER OF SUPPORT

- WSSI met with the Save the Glade Steering Committee multiple times to discuss the plans during the design phase including a meeting with DRB members.
- We have incorporated many of their comments and suggestions.
- Letter of support sent June 4<sup>th</sup>, 2009.

4 June 2009

To the Reston Design Review Board,

The majority of the Save the Glade Coalition steering group authorized the undersigned to make a final review of the WSSI designs for Reach 4 of the Glade Stream.

Going beyond the plans last reviewed and approved by the DRB, Mike Rolband took another walk with us to examine if there was any reasonable way to preserve an additional portion of the area between Steeplechase Drive and the “stinky” bridge. Mike then had his staff examine the area again and draw up some alternatives.

WSSI concluded that, for reasons related both to the rate of drop of the stream depth and the current location of a sewer line, the only solution that might preserve the area was, unfortunately, too risky with regard to long-term stability of the remediation.

Recognizing our concern with the particular beauty of this exposed area, Mike proposed an enhancement to his initial proposed design, that is, to populate the disturbed area with additional replacement vegetation, of wider variety and larger size, and to arrange for a pump to water this vegetation for two years. We all view this as a reasonable period for the trees to establish themselves.

Moreover, we want to commend Mike and WSSI for “going the extra mile” regarding the Glade Stream aesthetics.

{ On behalf of the Coalition, we recommend that the DRB accept this revised proposal and authorize WSSI to proceed with its work in Reach 4 accordingly. }

Alfred Kromholz

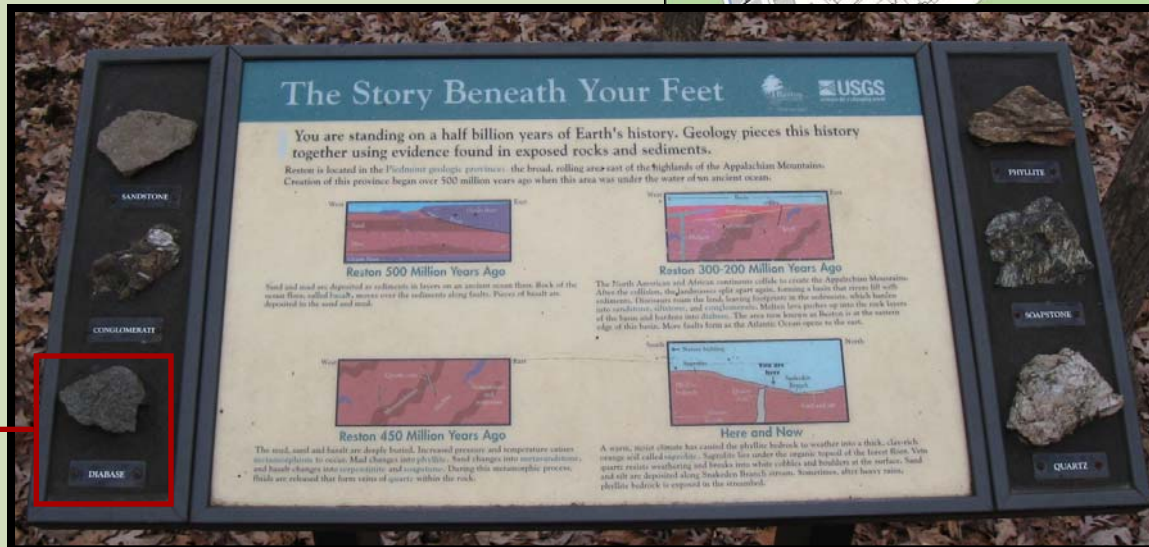
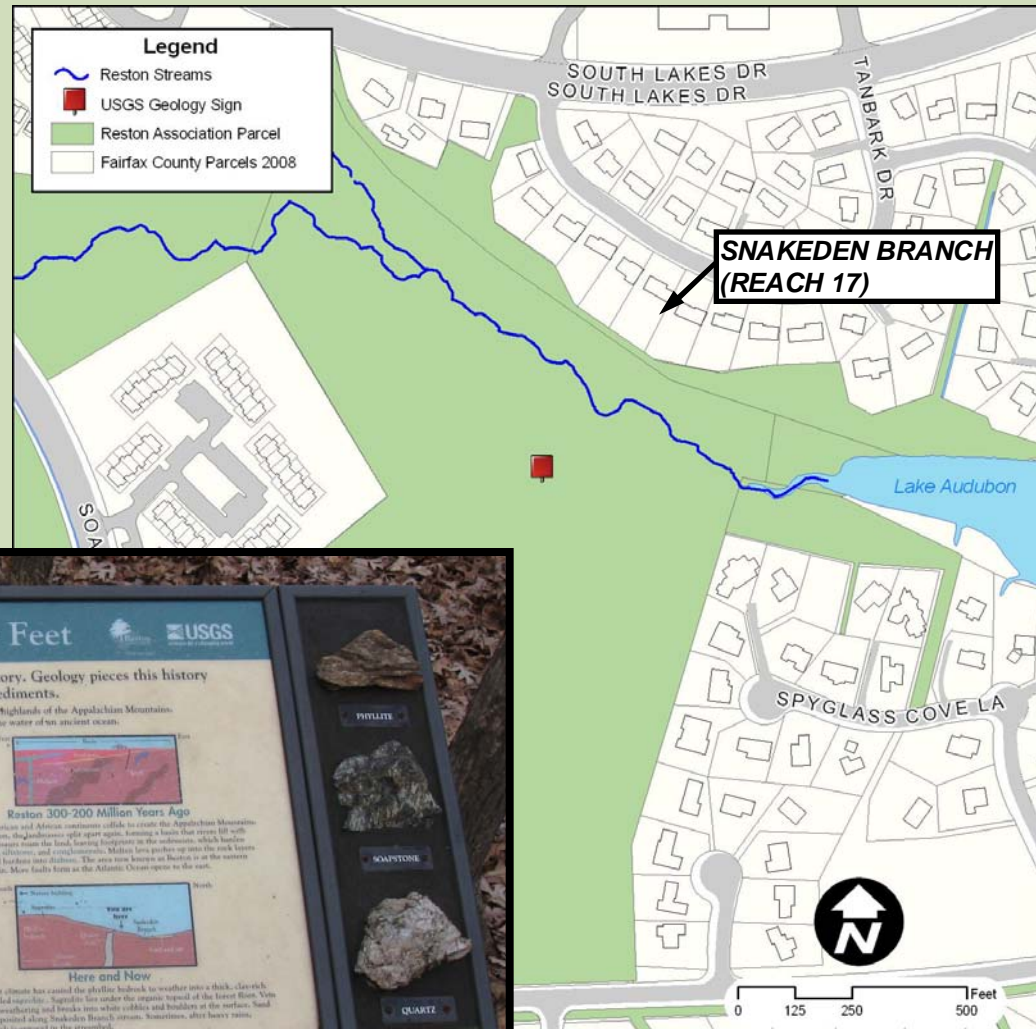
Ira Merin

Bob Wolf

*“On behalf of the Coalition, we recommend that the DRB accept this revised proposal and authorize WSSI to proceed with its work in Reach 4 accordingly.” – Save the Glade*

# OTHER SAVE THE GLADE EXPRESSED CONCERNS

## NATIVE ROCK





# OTHER SAVE THE GLADE EXPRESSED CONCERNS

## DIABASE ROCK

January 19, 2009

Via U.S. Mail and Email: RNarch@comcast.net

Mr. Richard Newlon, Chairman  
Reston Design Review Board  
Reston Association  
1930 Isaac Newton Square  
Reston, Virginia 20190

Dear Mr. Newlon,

I am a local geology professor, familiar with the Reston area via teaching, fieldtrips, etc. I have been asked by WSSI for my perspective on various Northern VA geological issues over the past few years. It is my present understanding that some Reston citizens are opposed to the use of diabase rocks within the Reston stream restoration project – suggesting that it is an “invasive and non-native rock.” This is hard to reconcile with the local geology. The Sugarland Run area sits within a region known for Mesozoic diabase dikes. Drake and Lee (1989) clearly indicate that Jurassic diabase (symbolized as Jd) is found locally. Specifically, diabase is found in the area under consideration due north of the United States Geological Survey (USGS) Reston Center between the Dulles Expressway and Baron Cameron, and bounded on the east by the Town Center Parkway and on the west by Route 7100 (Fairfax County Parkway). I would bring your attention to the following reference in particular: Drake, A.A., Jr. and Lee, K.Y., 1989, Geologic map of the Vienna quadrangle, Fairfax County, Virginia, and Montgomery County, Maryland: USGS, Geologic Quadrangle Map GQ-1670, scale 1:24000. This map is quite clear, and is viewable online via the National Geologic Map Database. Portions of the Reston area are sitting right on the strongly to weakly thermally metamorphosed Triassic sedimentary rocks (known commercially as graystone, or more scientifically as hornfels), and very near the Jurassic diabase (Jd) that Wetland Studies and Solutions, Inc. (WSSI) proposes to use for stream stabilization. Diabase is surely outcropping in the Sugarland Run vicinity. It is in no way “invasive and non-native”. The Quaternary alluvium characteristic of the modern streams must be a mix of the above, plus some particularly durable quartzite pebbles. Nevertheless, diabase is very much associated with this area, and entirely appropriate for use if it suits the physical properties needed for the Reston stream restoration project.

Sincerely,



Dr. Kenneth A. Rasmussen, Ph.D.  
Annandale, Virginia 22003

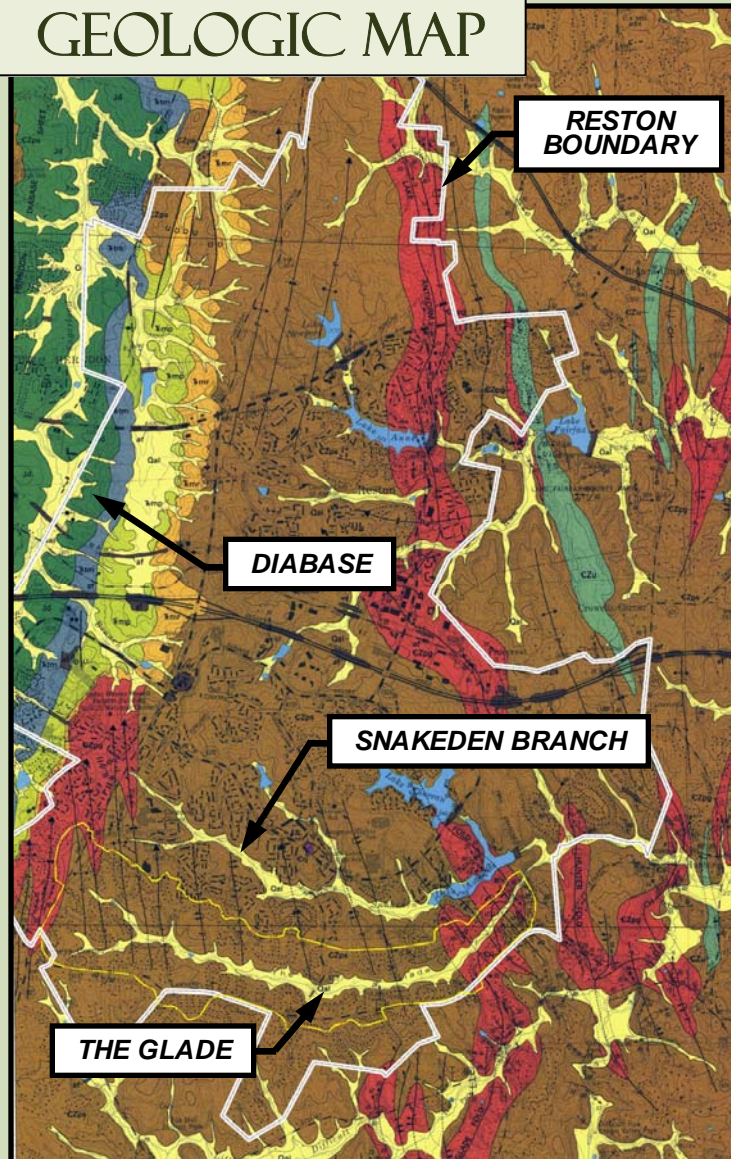
cc: Mike Rolband, WSSI Via Email: [mrolband@wetlandstudies.com](mailto:mrolband@wetlandstudies.com)  
Amy E. Tobias, WSSI Via Email: [atobias@wetlandstudies.com](mailto:atobias@wetlandstudies.com)

*“Diabase is surely outcropping in the Sugarland Run vicinity. It is in no way ‘invasive and non-native’.”*

*-Kenneth Rasmussen, Ph.D.*

# OTHER SAVE THE GLADE EXPRESSED CONCERNS

## GEOLOGIC MAP



### DESCRIPTION OF MAP UNITS

#### SURFICIAL DEPOSITS

- af** Artificial fill—Various sandy and gravelly materials; occupies low-lying areas filled for construction of highways, bridges, and railroad beds
- Qal** Alluvium (Holocene)—Sand, gravel, silt, and clay underlying sinuous flood plains along most streams; clastic sediments are in fairly well-bedded, well- to poorly sorted, graded fluvial, cyclic deposits with gravel at base of upward fining sequences; as much as 7 m (23 ft thick). Commonly micaceous silts and sands with quartz and crystalline rock pebbles, cobbles, and boulders in streams draining Piedmont terrain
- Qt** Terrace deposits (Holocene (?))—Gravel, sand, silt, and clay deposits along Potomac River

#### MESOZOIC ROCKS

- Jd** Diabase (Early Jurassic)—Medium- to dark-gray; largely equigranular, locally microcrystalline to fine-crystalline near the chilled margins, but coarse-crystalline in central parts of larger bodies. Consists of grayish-green to black crystals of augite and pigeonite and scattered granules or aggregates of magnetite and ilmenite which fill interstices between euhedral and subhedral light-gray plagioclase laths. Forms the Herndon sheet and a dike in the northwestern corner of the quadrangle
- Ttm** Thermally metamorphosed rocks (Late Triassic)—Gray to dark-gray, medium-bluish-gray, and olive-black hornfels and granofels which are metamorphosed sandstone of the Poolesville Member of the Manassas Sandstone. Cordierite hornfels and tourmaline granofels are the major rock types in the metamorphic aureole beneath the Herndon diabase sheet
- Tmp** Poolesville Member of Manassas Sandstone (Late Triassic) (Lee and Froelich, 1989)—Dusky-red to grayish-red to very dark-red, very fine- to medium-grained feldspathic, micaceous, ferruginous sandstone. Thin- to very thick-bedded and massive, and planar crossbedded. Locally it contains lenses and beds of light-gray to gray, medium- to very coarse-grained, feldspathic sandstone and quartzite pebble conglomerate. Thickness is variable but may exceed 1 km (3,281 ft) in places
- Tmr** Reston Member of Manassas Sandstone (Late Triassic) (Lee and Froelich, 1989)—Predominantly pebble to boulder conglomerate containing subangular clasts of schists, quartz, and quartzite in a matrix of fine- to coarse-grained arkosic sand or clayey silt. Contains some beds of micaceous, calcareous, clayey, feldspathic siltstone, fine- to medium-grained crossbedded sandstone; and pebbly, feldspathic, coarse-grained sandstone. In this quadrangle the unit ranges from 3 m (10 ft) to 30 m (98.5 ft) in thickness
- CZps** Peters Creek Schist (Early Cambrian and (or) Late Proterozoic) (Drake and Morgan, 1981)—Fine- to coarse-grained, lustrous, greenish-gray to gray, reddish-weathering, quartz-rich schist, and lesser mica gneiss. Fine- to medium-grained, light- to medium-gray, yellowish- to reddish-brown-weathering, well-bedded metagraywacke and semi-pelitic schist (CZpg). Both of these rock types contains abundant interbeds of the other rock type, as well as a few layers of calc-silicate rock. Much of the graywacke is graded, but some beds have a pseudolamination which is actually pressure-solution cleavage. Contains large mappable blocks of serpentinite and associated chlorite- tremolite-epidote schist, talc-chlorite schist, and talc-chlorite-actinolite schist (CZu). The unit's thickness is not known, as its base is marked by the Plummers Island thrust fault (Drake, 1985a). It is overlain on the west by Triassic rocks

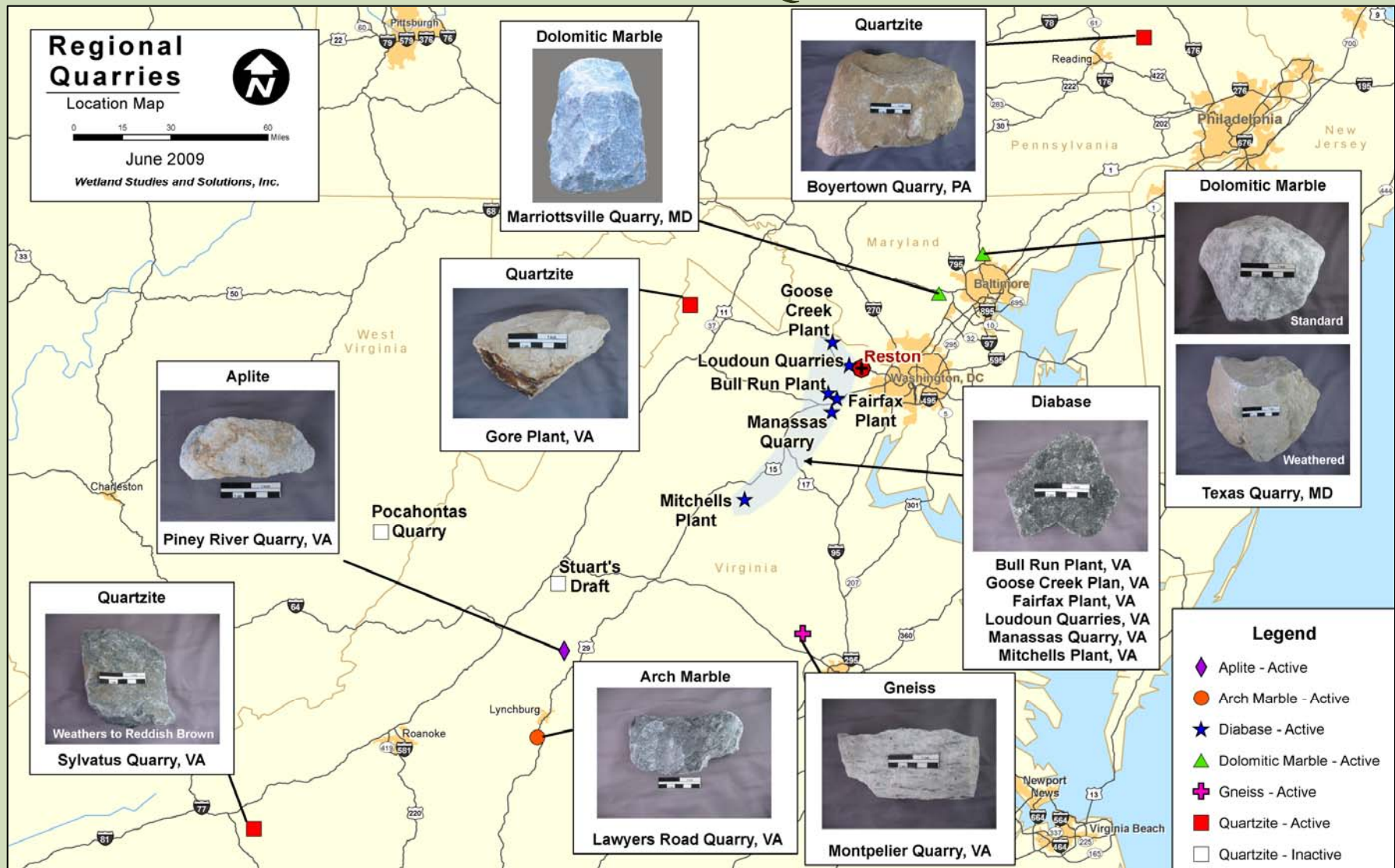
Source: USGS National Geologic Map Database  
Title: "Geologic Map of the Vienna Quadrangle, Fairfax County, Virginia, and Montgomery County, Maryland"

**Wetland**  
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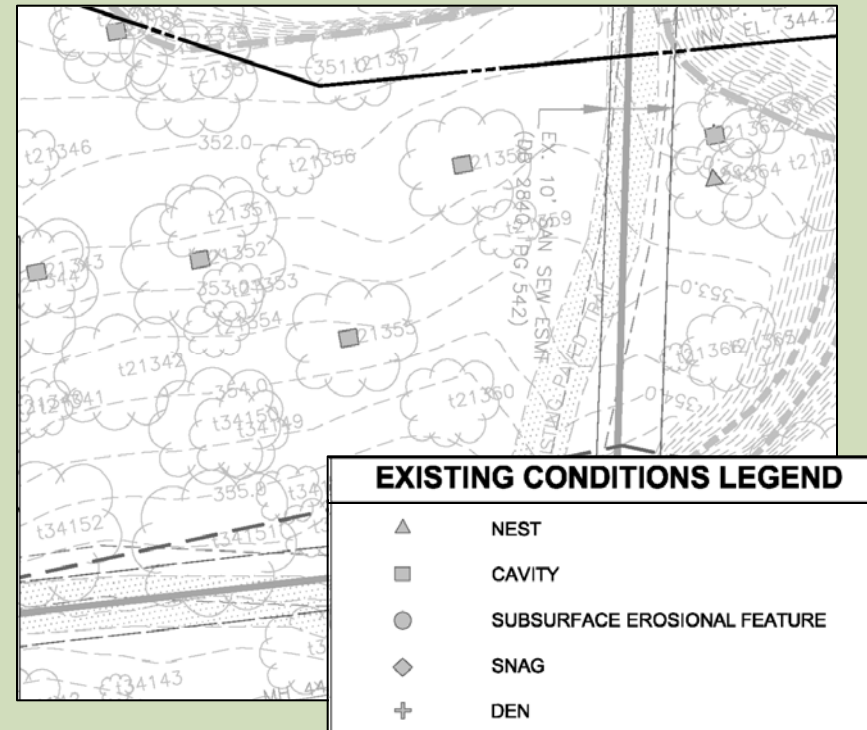
# OTHER SAVE THE GLADE EXPRESSED CONCERNS

## MAP OF LOCAL QUARRIES



# OTHER SAVE THE GLADE EXPRESSED CONCERNS WILDLIFE STUDY

- A study was completed February 25, 2009 (see website: <http://reston.wetlandstudies.com>)
- Regulatory agencies believe additional studies are not needed.
- Observation has shown increased usage post restoration.





# OTHER SAVE THE GLADE EXPRESSED CONCERNS

## PLANTING MODIFICATIONS

**1. Citizen, WSSI and RA staff comments have been incorporated.**

**2. Modifications Include:**

- **Supplemental planting plan for Reach 4A**
- **Riparian Forest Species:**
  - Increased:** American Holly to 100/acre from 14/acre (with no alternates)
  - Removed:** Silky Dogwood & Elderberry
  - Added:** Swamp White Oak, Black Gum, American Hazelnut & Spicebush
- **Vegetation schedule has been updated to clarify streamside zones.**
- **Stream Bank Species:**
  - Removed:** Brookside Alder & Silky Dogwood
  - Added:** Common Winterberry, Northern Spicebush & Black-Haw
- **Stream Edge Species:**
  - Added:** Brookside Alder & Southern Arrowwood

# OTHER SAVE THE GLADE EXPRESSED CONCERNS (CONT.)

## PLANTING MODIFICATIONS

- **Riparian Seed Mix:**

**Inserted:** Species Group Division.

**Removed:** Bottlebrush Grass, White Wood Aster, White Turtlehead, Black Cohosh, Mist Flower, Appalachian Beard Tongue, Orange Coneflower, Virginia Spiderwort, Buttonbush, Bladder Nut, & Box Elder

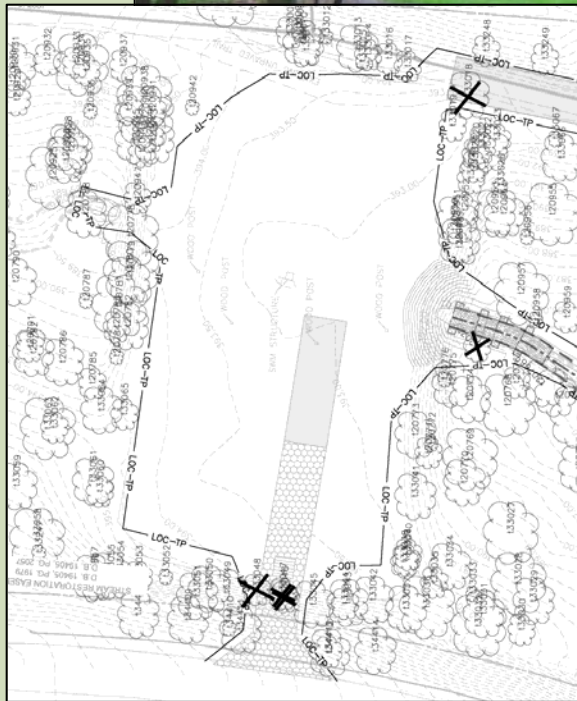
**Added:** Blunt Broom Sedge, Fox Sedge, Chufa, Soft Rush, Path Rush, Deer Tongue Grass, Smooth Panic Grass, New England Aster, Canadian Goldenrod, Showy Goldenrod, New York Ironweed, Common Milkweed, Beggar Ticks, Common Sneezeweed, Sensitive Fern, Blue Vervain, Lance Leaved Coreopsis, Pa Smartweed, Black Eyed Susan, Canadian Serviceberry, Black Chokeberry, Northern Spicebush, Common Ninebark, Black-Haw, Eastern Redbud, & Flowering Dogwood.

**Substitutions:** Clarified how species may be selected from each species group based upon availability.



# OTHER SAVE THE GLADE EXPRESSED CONCERNS (CONT.)

## TREE CLEARING & STAGING REACH 4A

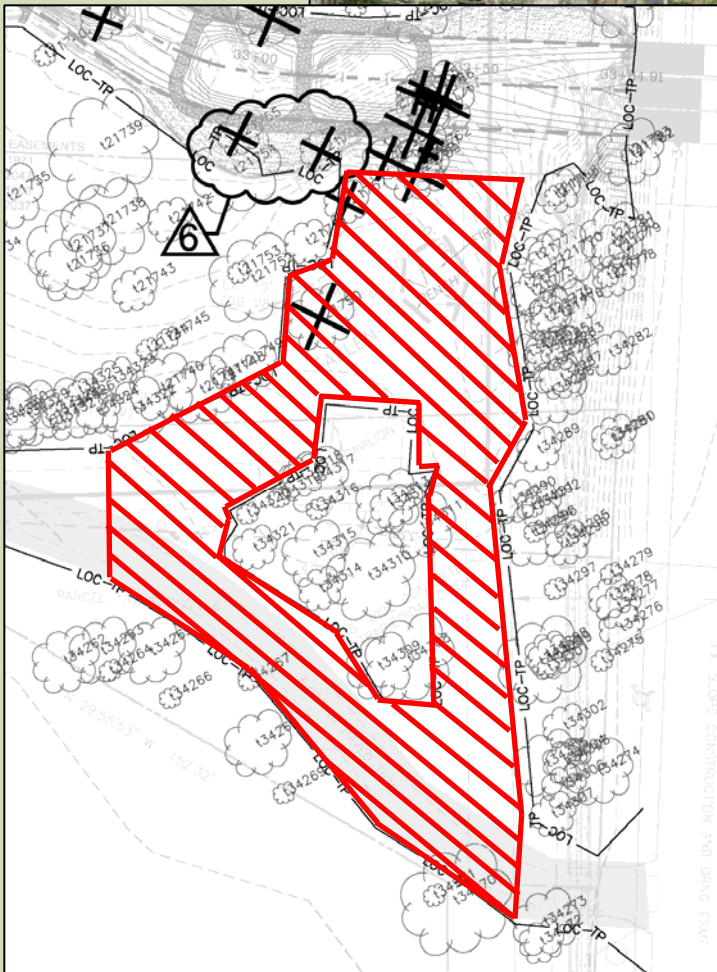


- Pony area selected to minimize tree loss (already cleared!).
- Will be restored to pre-construction conditions.
- Virtually unanimous support of community.



# OTHER SAVE THE GLADE EXPRESSED CONCERNS (CONT.)

## TREE CLEARING & STAGING REACH 4B



- Existing cleared area at the fire ring off Soapstone to be utilized as stockpile/staging area.
- Only 2 trees will be removed for this area; the remaining trees to be removed are for stream access and grading.



# OTHER SAVE THE GLADE EXPRESSED CONCERNS (CONT.)

## **Construction Timing vs. Nesting:**

- Appeal Approval mid July
- Access road construction through mid August.
- Stream channel tree clearing to begin August 15<sup>th</sup> except Wood Thrush area (Station 28+85 (last bridge) to Station 33+84 (Soapstone Drive)).
- Wood Thrush area cleared after September 15<sup>th</sup>

## **Wildlife Passage:**

- Sections along the bottom of the LOC fence (orange fencing) will be pulled up as done in Reach 1-3

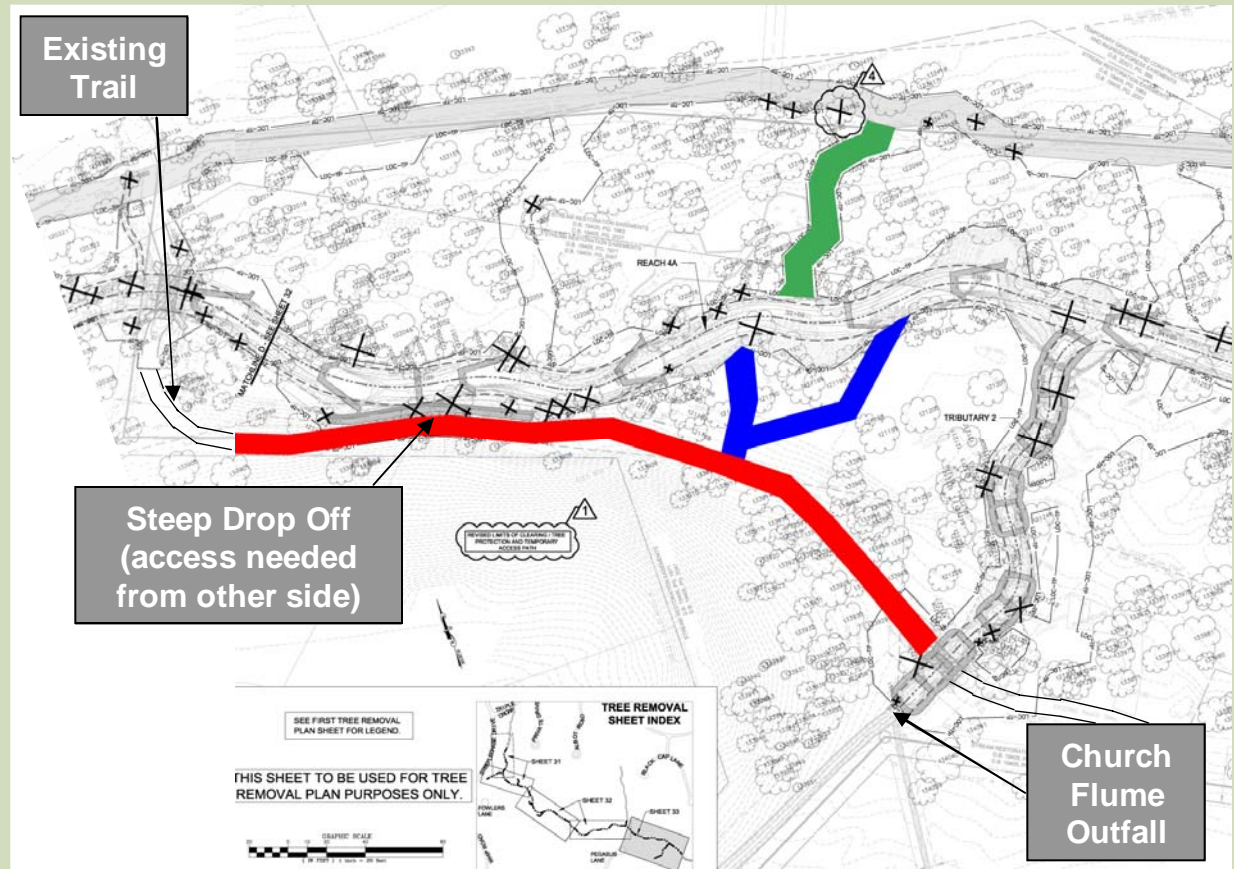
## **Resolution of the Culvert Problems by the County and RA:**

- Stream designed to accommodate the flows from the “culverts”
- Church Culverts:
  - Replace with 10’x22’ Bridge
- Concrete Flumes (mistakenly referred to as “culverts”):
  - Proposed step pools provide energy dissipation at outfalls
  - WSSI prepared a memo dated 3/17/09 for Save the Glade and offered to meet with them and Fairfax County to discuss. Unfortunately, we have not received a response to this offer.

# OTHER SAVE THE GLADE EXPRESSED CONCERNS (CONT.)

## ALTERNATE ACCESS PATH FROM STATION 29+10 TO 34+10

- Use of the paved trail, as suggested, would still require a cut-in on the low side to access stream due to the elevation difference near the proposed wall.
- Additional cut-ins would be required for reasonable construction access.
- No reduction in land disturbance.
- More paved trail usage restrictions.
- The proposed access was previously discussed at preliminary meetings and approved by DRB during the Preliminary Plan review in April.





# BRIDGE COPPER CAPS WEATHERING

All copper caps have been replaced with unprotected copper.



Without Coating  
(weathering/patina process  
starts in 2-3 weeks)



With Protective Coating  
(weathering/patina process  
starts in 1-2 years)

# MONTHLY STATUS REPORT

## THE GLADE HYDROLOGY COMPARISON

### Jon Clarke's Hydrology Concerns

- Jon Clarke obtained flow data from Fairfax County – Storm Water Management Model (SWMM) output used in development of the Difficult Run Watershed Management Plan
- Provided the following table and asked us to explain the differences



# MONTHLY STATUS REPORT

## THE GLADE HYDROLOGY COMPARISON

### Clarke Hydrology Comparison Table – Design Flows

1-YEAR MODEL FLOW RATES

At End of Glade Design Reach No.	FXCO HEC-RAS Stormwater Flow Model, 1-Year Probability					WSSI Design		Percent WSSI Design Flow > FXCO Existing Flow	Percent WSSI Design Flow > FXCO Future Flow	Design Bank-Full Depth, Ft.
	River Station ID No.	Existing Flow, CFS	Existing Top Width, Ft.	Future Flow, CFS	Future Top Width, Ft.	Bankful Design Flow, CFS	Bank-Full Width, Ft.			
1	--	--	--	--	--	22.4	10.0	--	--	1.0
3	--	--	--	--	--	30.9	11.2	--	--	1.1
2	--	--	--	--	--	64.7	18.0	--	--	1.5
4	10328.99	66.6	13.9	66.5	14.1	115.5	20.0	73.4%	73.7%	2.1
5	6151.985	108.0	11.4	123.0	11.9	137.4	--	27.2%	11.7%	--
6	1632.159	98.4	35.8	113.0	37.4	155.2	--	57.7%	37.3%	--

# MONTHLY STATUS REPORT

## THE GLADE HYDROLOGY COMPARISON

### Clarke Hydrology Comparison Table – 100-yr Flows

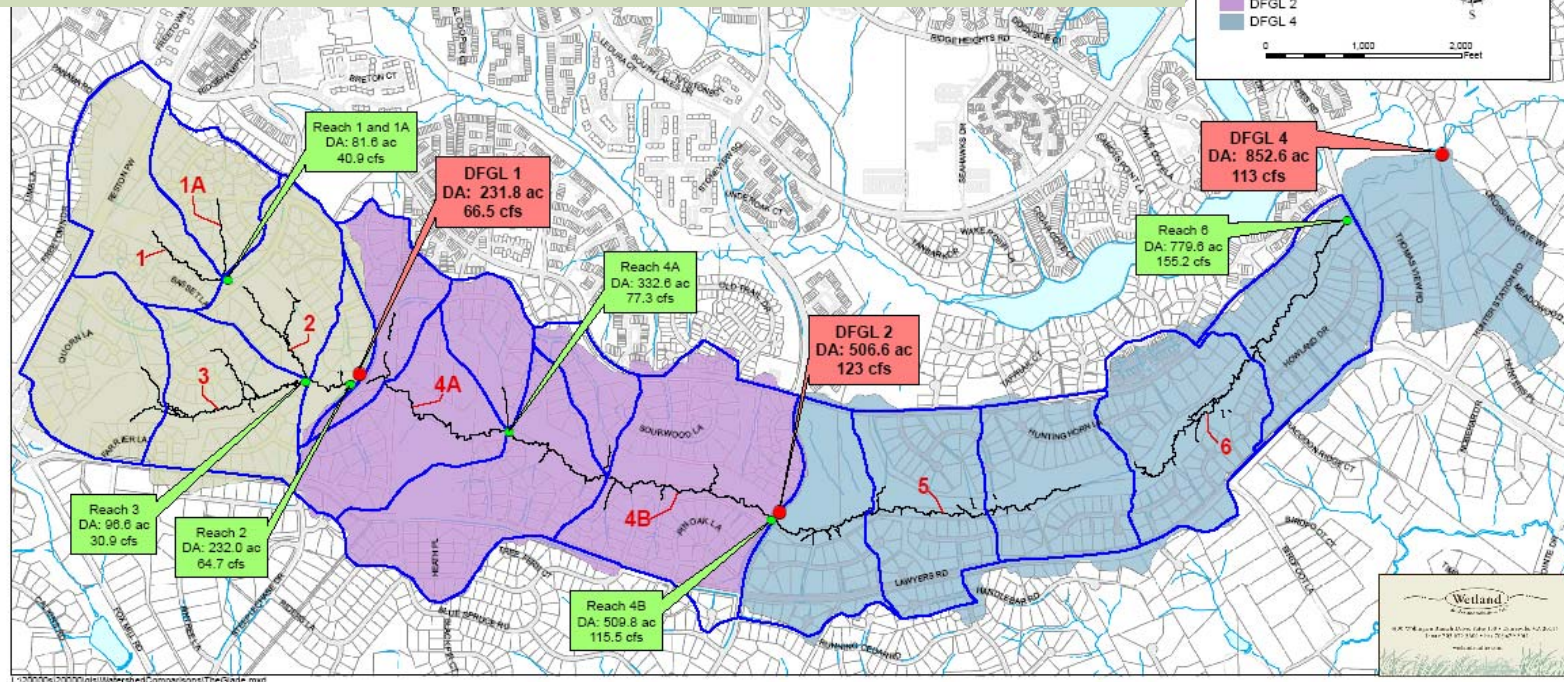
100-YEAR MODEL FLOW RATES											
At End of Glade Design Reach No.	FXCO HEC-RAS Stormwater Flow Model, 100-Year Probability					WSSI 100-Year Flow		Percent WSSI Flow > FXCO Existing Flow	Percent WSSI Flow > FXCO Future Flow	WSSI HEC -RAS Model 100-Year Flow	Top Width, Ft.
	River Station ID No.	Existing Flow, CFS	Existing Top Width, Ft.	Future Flow, CFS	Future Top Width, Ft.	Flow, CFS	Top Width , Ft.				
1	--	--	--	--	--	309	--	--	--	--	--
3	--	--	--	--	--	386	--	--	--	386	154.1
2	--	--	--	--	--	873	--	--	--	828	95.0
4	10328.99	432.0	228.0	432.0	229.5	1744	--	<b>303.7%</b>	<b>303.7%</b>	--	--
5	6151.985	866.0	357.5	885.0	358.0	2062	--	<b>138.1%</b>	<b>133.0%</b>	--	--
6	1632.159	813.0	105.3	826.0	106.0	2275	--	<b>179.8%</b>	<b>175.4%</b>	--	--



# MONTHLY STATUS REPORT

## THE GLADE HYDROLOGY COMPARISON

- Biggest reason for difference – incorrect correlation of watersheds between models
- DFGL 1 vs Glade 4 – Corrected: DFGL 1 vs Glade 2
- DFGL 2 vs Glade 5 – Corrected: DFGL 2 vs Glade 4
- DFGL 3 vs Glade 6 – Correctly correlated by Clarke



# MONTHLY STATUS REPORT

## THE GLADE HYDROLOGY COMPARISON

**Table 1. Comparison of Fairfax County SWMM Model Output for 1-yr Storm and WSSI Design Data**

Reach Name	FXCO Model Data: 1-yr, 24-hr Storm		WSSI Design Data			% Difference in Flow: WSSI to County Data
	Existing Top Width (ft)	Future Flow (cfs)	Existing Top Width (ft)	Bankfull Design Flow (cfs)	Proposed Bankfull Width (ft)	
2	13.9	66.5	10-22	64.7	18.0	-3%
4	11.4	123.0	21-38	115.5	20.0	-6%
6	35.8	113.0	18-25	155.2	---	37%

- Close agreement at outlet of Reaches 2 and 4
- Decrease in flow from Reach 4 to Reach 6 unlikely in “flashy” urban system.
- Difference for Reach 6 likely due to tendency of Storm Water Management Model (SWMM) to over attenuate (dampen) peak flows.
- Resolution of Data – Gross vs Detailed:
  - 5’ (Fairfax County) vs 0.5’ (WSSI) Contour Interval data
  - 3 (Fairfax County) vs 17 (WSSI) subwatersheds



# MONTHLY STATUS REPORT

## THE GLADE HYDROLOGY COMPARISON

Table 2. Comparison of Fairfax County and WSSI HEC HMS Output: 100-yr Storm			
Reach Name	FXCO SWMM Model Data	USGS Anderson Model (Fairfax BOS Approved)	WSSI HEC- HMS Model Data
	Flow (cfs)	Flow (cfs)	Flow (cfs)
2	432.0	1900	873.0
4	885.0		1744.0
6	826.0		2275.0

- Close agreement between Fairfax County Board approved USGS model and WSSI flows
- SWMM model flows significantly less than both Fairfax County USGS approved floodplain data and WSSI predictions – SWMM results are not reasonable in this situation
- Reach 6 flow again shows over-attenuation – added effect possible from Twin Branches Road culvert

# QUESTIONS?