Accotink Tributary @ Danbury Forest Stream Restoration Project







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Project Area





Stream Restoration Functions

Stream Functions Pyramid

A Guide for Assessing & Restoring Stream Functions » OVERVIEW







Stream Restoration Functions

Stream Functions Pyramid

A Guide for Assessing & Restoring Stream Functions » FUNCTIONS & PARAMETERS

	5	BIOLOGY » FUNCTION: Biodiversity and riparian life » PARAMETERS: Micro Communities, Benthic Macroinvertebrate Landscape Connectivity	and the life histories of aquatic obial Communities, Macrophyte Communities, Fish Communities,	
	4 PHYSIC of organic	COCHEMICAL » FUNCTION: Tempe matter and nutrients » PARAMETERS: 1	rature and oxygen regulation; processing Nater Quality, Nutrients, Organic Carbon	
	3 GEOMORPHOL equilibrium » PARA Transport and Storag Bed Material Charac	OGY » FUNCTION: Transport of wood a METERS: Sediment Transport Competency e, Channel Evolution, Bank Migration/Later terization	and sediment to create diverse bed forms and dynamic , Sediment Transport Capacity, Large Woody Debris ral Stability, Riparian Vegetation, Bed Form Diversity,	
$\stackrel{\frown}{\approx}$	2 HYDRAULIC » FUNCTION Connectivity, Flow Dynamics, Gr	: Transport of water in the channel, on the oundwater/Surface Water Exchange	floodplain, and through sediments » PARAMETERS : Floodplain	
1	HYDROLOGY » FUNCTION: Transpo Relationship, Flood Frequency, Flow Duratio	t of water from the watershed to the chan	nel » PARAMETERS: Channel-Forming Discharge, Precipitation,	
	<u>^</u>		1	
	Geolog	у	Climate	
			Stormwater Planning	Division 🖥



Hydrology and Hydraulic





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Geomorphology



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Coordination Goals

Goal: Restore ~4,000 feet by returning the form and function of the channel to dynamic equilibrium and improve the ecological processes of the riparian corridor.

Objectives:

- ➤Water quality improvement
- ➤Sustainability
- ➢Infrastructure protection
- ➤Habitat Improvement
- Stakeholder coordination



Restoration Strategies Example, Crook Branch

- Floodplain Reconnection
- Grade control
- Enhance hyporheic zone
- Stable vegetated banks







Water Quality Benefits

- Annual Pollutant Load Reductions via erosion prevention, hyporheic zone bio-chemical processes and floodplain connectivity/storage:
 - Phosphorous: <u>586.27 lbs./yr.</u>
 - Nitrogen: <u>1,432.78 lbs./yr.</u>
 - Total Suspended Solids: <u>188,265 lbs/yr.</u>



Social Goals

- 1. Maintain open communication and share information.
- 2. Coordinate design and construction with property owners, community and stakeholders.
- 3. Build partnerships with local organizations such as HOAs and Friends Of groups.
- 4. Design Team:
 - Stormwater Planning Division
 - Danbury Forest Community Association
 - AMT Engineering
 - Urban Forest Management Division
 - Park Authority
 - Wastewater Collection Division
 - Utilities Design and Construction Division
 - Maintenance and Stormwater Management Division



Stormwater Program Drivers

- Clean Water Act, 1972
 - Municipal Separate Storm Sewer Permit (MS-4)
 - Chesapeake Bay Total Maximum Daily Loads (TMDL)
 - Regulates amount of pollutants in waterways (Nitrogen, Phosphorus, and Total Suspended Solids)
 - Local TMDLs (sediment, bacteria, and PCBs)
 - Erosion and Sediment Control
- Inspection and maintenance of conveyance systems (pipes and appurtenances)
- Inspection, maintenance, and rehabilitation of stormwater management facilities
- Dam Safety
- FEMA/NFIP/CRS programs
- Emergency and Flood Response
- Watershed planning and monitoring
- Design and implementation of capital improvement projects , including stream restoration and other water quality improvement projects





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Design Development

Stream Functions Pyramid

A Guide for Assessing & Restoring Stream Functions » OVERVIEW

BIOLOGY »

5 Biodiversity and the life histories of aquatic and riparian life

PHYSICOCHEMICAL » 4

Temperature and oxygen regulation; processing of organic matter and nutrients

GEOMORPHOLOGY »

Transport of wood and sediment to create diverse bed forms and dynamic equilibrium

HYDRAULIC »

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Transport of water in the channel, on the floodplain, and through sediments

HYDROLOGY »

Geology



Climate

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Final Design - Grading Plan Sheet 1 of 7







Final Design - Grading Plan Sheet 2 of 7



Final Design - Grading Plan Sheet 3 of 7



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Final Design - Grading Plan Sheet 4 of 7





Final Design - Grading Plan Sheet 5 of 7



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Final Design - Grading Plan Sheet 6 of 7



Final Design - Tree Management Plan Sheet 1 of 5





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Final Design - Tree Management Plan Sheet 2 of 5



Danbury Stream Restoration - Tree List (Continued)									
			Diameter						
			Breast		Critical	General			
			Height	Number	Root	Health			
Tree			DBH	of	Zone	Rating	Common	Tree	To Be
Tag No.	Northing	Easting	(Inch)	Trunks	(Foot)	(1 to 4)	Name	Size	Removed
922	6977653.4096	11843056.6373	29	1	29	1	Tulip Poplar	Medium	
923	6977657.9474	11843054.0760	23	1	23	1	Tulip Poplar	Medium	
924	6977671.6634	11843037.9951	12	1	12	1	Tulip Poplar	Small	
925	6977644.3336	11843029.2979	14	1	14	1	Tulip Poplar	Small	
926	6977641.2185	11843033.4328	15	1	15	1	Tulip Poplar	Small	
927	6977653.9815	11843014.4506	15	1	15	1	Green Ash	Small	
928	6977653.7578	11843000.7718	15	1	15	1	Tulip Poplar	Small	
929	6977667.6493	11842985.2682	21	1	21	1	Tulip Poplar	Medium	
930	6977673.4215	11842972.3715	22	1	22	1	Northern Red Oak	Medium	

Tree Size	DBH Range	
Small	< 18"	
Medium	18" to < 30"	
Large	30" and Larger	

Health
Condition
Excellent
Good
Fair
Poor

Summary of Trees Removed Tree Size Trees Removed Small 74 Medium 82 Large 8		oved
Tree Size	Trees Removed	Total
Small	74	
Medium	82	164
Large	8	
Snag	3	3

Tree Size	Tree Health Rating					
Tree Size	1	2	3	4	Totals	
Small	112	174	66	4	356	
Medium	123	210	60	8	401	
Large	13	16	0	8	37	



Final Design - Tree Management Plan Sheet 3 of 5







Final Design - Tree Management Plan Sheet 4 of 5





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Final Design - Tree Management Plan Sheet 5 of 5



Natural Channel Design Features

Step Pools



Reinforced Bed & Riffle Grade Control



Cross Vanes



Native Vegetation



Construction Access





Construction Example





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Restoration Example – During Construction





Restoration Example – 6 Weeks After Construction





Restoration Example – One Year After Construction







Restoration Example – Three Years After Construction



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Government Center Stream Restoration Before & After

• Restoration of 1,000 LF of an unnamed tributary of Difficult Run for improvements to water quality and ecological function of the stream corridor.



Before and After Example

Big Rocky Run II



Before

After



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Before and After Example

Rabbit Branch Stream Restoration



Before



Construction Timeline

- Pre-Construction Community meeting in August 2022
- Construction is scheduled to begin in September 2022
- Construction duration = approximately 16.5 months
- Mid-Construction Community meetings as needed/requested
- Post-Construction Community meeting
- Warranty Inspections
- Ongoing monitoring of the channel after significant storm events for potential maintenance needs.
- Ongoing monitoring of the installed vegetation for potential maintenance needs.



Contact Information

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Stormwater Planning Division Website http://www.fairfaxcounty.gov/dpwes/stormwater/

Fairfax County Watershed Planning https://www.fairfaxcounty.gov/publicworks/stormwater/watersheds

Accotink Creek Watershed Plan https://www.fairfaxcounty.gov/publicworks/stormwater/accotink-creek-watershed

EPA Water Quality Laws & Regulations https://www.epa.gov/environmental-topics/water-topics

