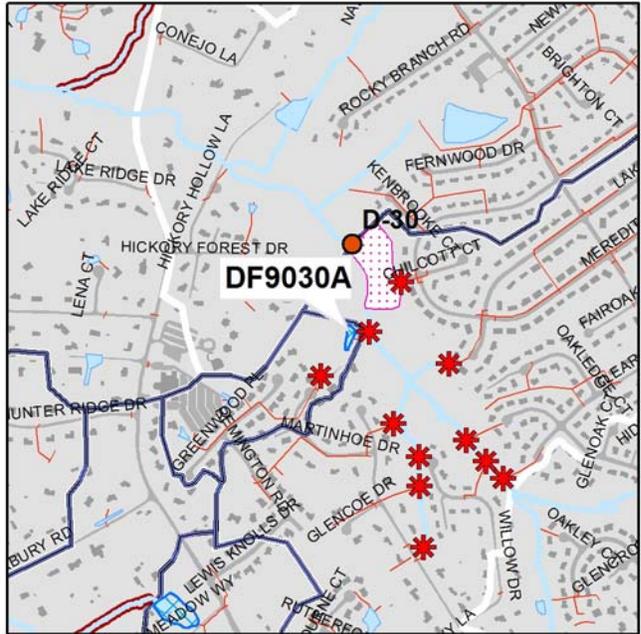


Project Number: DF9030A
Catchment Code: DFRB0005
Candidate Site: D-30

Project Type: Pond Retrofit
Project Size: 0.2 acres
Treated Area: 20.1 acres

Project Location: At the end of the cul-de-sac on Martinhoe Drive.

Project Description: To improve water quality treatment, this existing dry facility would be converted into a shallow wetland incorporating deeper micropool areas at the two concentrated inflow locations and vegetated marsh areas throughout. A dry swale would replace the long ditch directing impervious runoff into this facility. The channel protection volume can be met by excavating within the pond boundaries and installing a multistage riser structure. Additionally, there is a channel carved out by erosion that connects the cul-de-sac at the end of Martinhoe Drive to the pond outfall that should be redirected and stabilized to ensure that runoff from the residential area upstream does not bypass the facility.



Potential Project Benefits:

Streamflow	Approximately 90% of the channel protection volume can be met.
Water Quality	Converting the existing dry pond to a wetland and installing a dry swale in the long channel conveying runoff to this facility will improve water quality..

Potential Project Constraints:

Environmental	There are no significant environmental constraints or permit issues. Projects in RPAs may require exceptions or waivers.
Facility Access	An existing maintenance road provides excellent access exists to the facility.
Design/Construction	No significant design or construction constraints have been identified. County staff will coordinate with the facility owner to implement the project.

Costs:

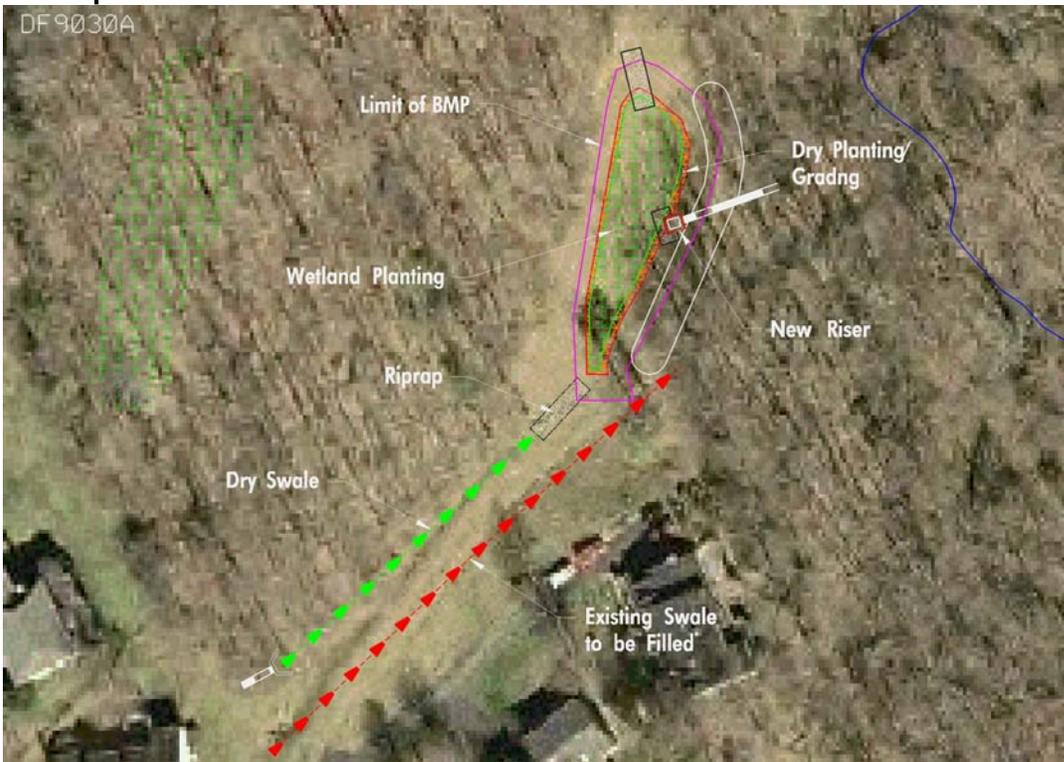
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	\$5,000.00	\$500
Remove Pilot Channels	150	LF	\$6.00	\$900
Grading and Excavation	317	CY	\$30.00	\$9,510
Dry Swale	195	LF	\$35.00	\$6,825
Riser	1	LS	\$10,000.00	\$10,000
Wetland Planting	420	SY	\$2.00	\$840
Dry Landscaping	123	SY	\$2.50	\$307
Base Construction Cost				\$28,883
Mobilization (5%)				\$1,444
Subtotal 1				\$30,327
Contingency (25%)				\$7,582
Subtotal 2				\$37,908
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)				\$17,059
Estimated Project Cost				\$55,000

This project is part of the alternative project group for Regional Pond D-30. See Table 5-2 for the recommended disposition.

Site Photo:



Concept Sketch:

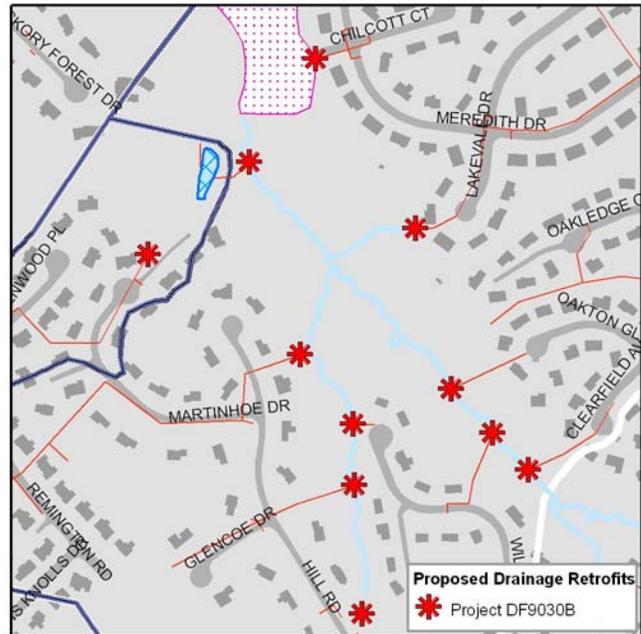


Project Number: DF9030B
Catchment Code: DFRB0005
Candidate Site: D-30

Project Type: Drainage Retrofit
Project Size: 11 Outfalls

Project Location: This project is distributed throughout the catchment where piped drainage systems discharge into natural channels.

Project Description: This project consists of reconfiguring outfalls or retrofitting energy dissipation structures to reduce scour and erosion where flows from the storm drainage system enter the stream. Reduction of erosive velocities will reduce the amount of sediment transported downstream.



Potential Project Benefits:

Streamflow	The project will reduce velocity from the outfalls and help reduce erosive potential immediately downstream.
Water Quality	Water quality improvements would be associated with the reduction of scour at outfall locations and within the downstream channels. Habitat would be improved by reducing sediment loads from erosion.

Potential Project Constraints:

Environmental	Environmental impacts and permit requirements are not anticipated for this project; however, projects in RPAs may require exceptions or waivers
Facility Access	Access to these sites can usually be obtained from the roadway and driveways.
Design / Construction	No unusual design or construction issues were identified.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Outfall Protection	11	EA	\$8,000.00	\$88,000
Base Construction Cost				\$88,000
Mobilization (5%)				\$4,400
Subtotal 1				\$92,400
Contingency (25%)				\$23,100
Subtotal 2				\$115,500
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$51,975
Estimated Project Cost				\$167,000

*This project is part of the alternative project group for Regional Pond D-30.
See Table 5-2 for the recommended disposition.*

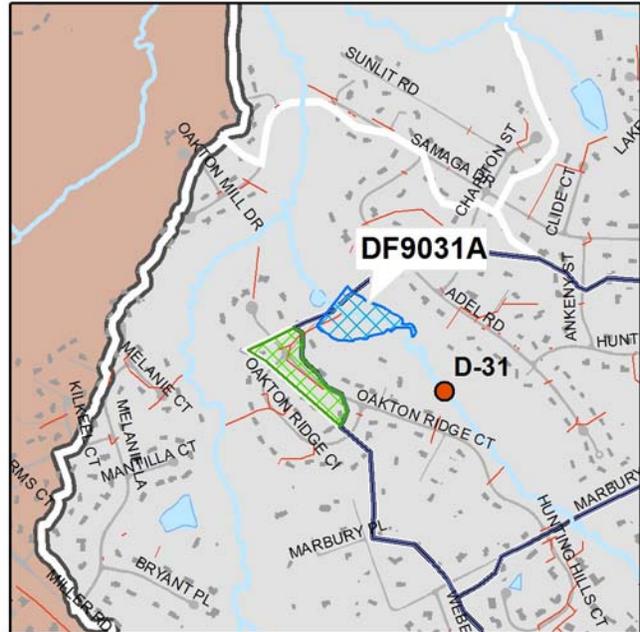
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Project Number: DF9031A
Catchment Code: DFRB9802
Candidate Site: D-31

Project Type: Pond Retrofit
Project Size: 3.5 acres
Treated Area: 110.4 acres

Project Location: At the northernmost intersection of Oakton Ridge Circle and Oakton Ridge Court

Project Description: This facility is an in-stream triple culvert that allows uninterrupted baseflow through an embankment, with detention provided to manage the 2, 10, and 100-year events. The floodplain directly upstream of the culvert is densely wooded. The stream channel at the outfall appears stable with riprap and established grasses in and along its banks. This site has potential to provide extended detention for higher frequency, smaller storm events. However, due to the 250+ acre drainage area to this location, complete 24-hour detention of the 1-year rainfall volume does not appear to be feasible. Consideration should be given to extended detention of a portion of the 1-year storm. Peak flow attenuation can be improved by constructing a weir across the upstream side of all three 60" culverts with a low-flow orifice sized to allow passage of base flow while raising the water surface elevation during the 1 year storm event.



Constructing a dry swale at the outfall of a closed storm drain system on the upstream side of the embankment will provide treatment of the runoff from the surrounding residential area prior to entering the stream.

Potential Project Benefits:

Streamflow	This project will provide about 30% of the channel protection volume.
Water Quality	A dry swale constructed at a nearby storm drain outfall will improve water quality before it enters the stream. Downstream water quality will be improved by reducing stream erosion.

Potential Project Constraints:

Environmental	Since there is an existing impoundment in the stream, environmental permitting would be minimal. Projects in RPAs may require exceptions or waivers
Facility Access	This facility has a paved maintenance access road to the embankment.
Design / Construction	The existence of a stable, uninterrupted stream channel as well as dense woods located directly upstream of this facility prevent clearing and excavation to create additional storage volume. County staff will coordinate with the facility owner to implement the project.

This project is part of the alternative project group for Regional Pond D-31. See Table 5-2 for the recommended disposition.

Difficult Run Watershed Management Plan
 Concept Plans
 Rocky Branch

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	\$5,000.00	\$500
Dry Swale	175	LF	\$35.00	\$6,125
Riser	1	LS	\$10,000.00	\$10,000
Base Construction Cost				\$16,625
Mobilization (5%)				\$831
Subtotal 1				\$17,456
Contingency (25%)				\$4,364
Subtotal 2				\$21,820
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)				\$9,819
Estimated Project Cost				\$32,000

Site Photo:



Concept Sketch:

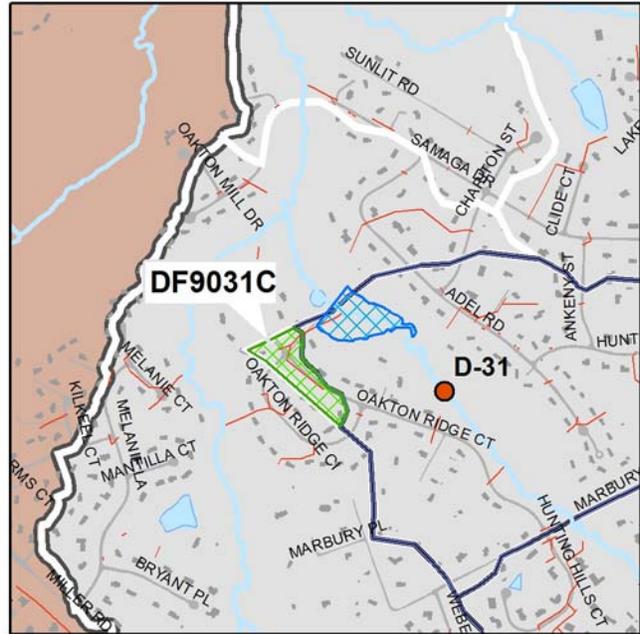


Project Number: DF9031C
Catchment Code: DFRB9802
Candidate Site: D-31

Project Type: LID Retrofit
Project Size: 0.01 acres
Treated Area: 3.9 acres

Project Location: Northernmost intersection of Oakton Ridge Circle and Oakton Ridge Court, adjacent to pond access road.

Project Description: This project would consist of replacing a grassed swale that receives runoff from the roadway and private property with a bioswale, engineered to provide filtration and vegetative uptake of pollutants. The existing modified yard inlet could remain in place to collect flow from an underdrain system and provide overflow protection to the adjacent residence.



Potential Project Benefits:

Streamflow	This project would provide peak flow reduction through infiltration and evapotranspiration. The amount of peak flow reduction that could be achieved would be minimal with respect to the overall catchment, but could serve as a neighborhood educational facility.
Water Quality	This project could provide significant treatment to the managed lawns and roadway runoff that drain to it. Overall improvements to the catchment would not be as noticeable because of the relatively small drainage area.

Potential Project Constraints:

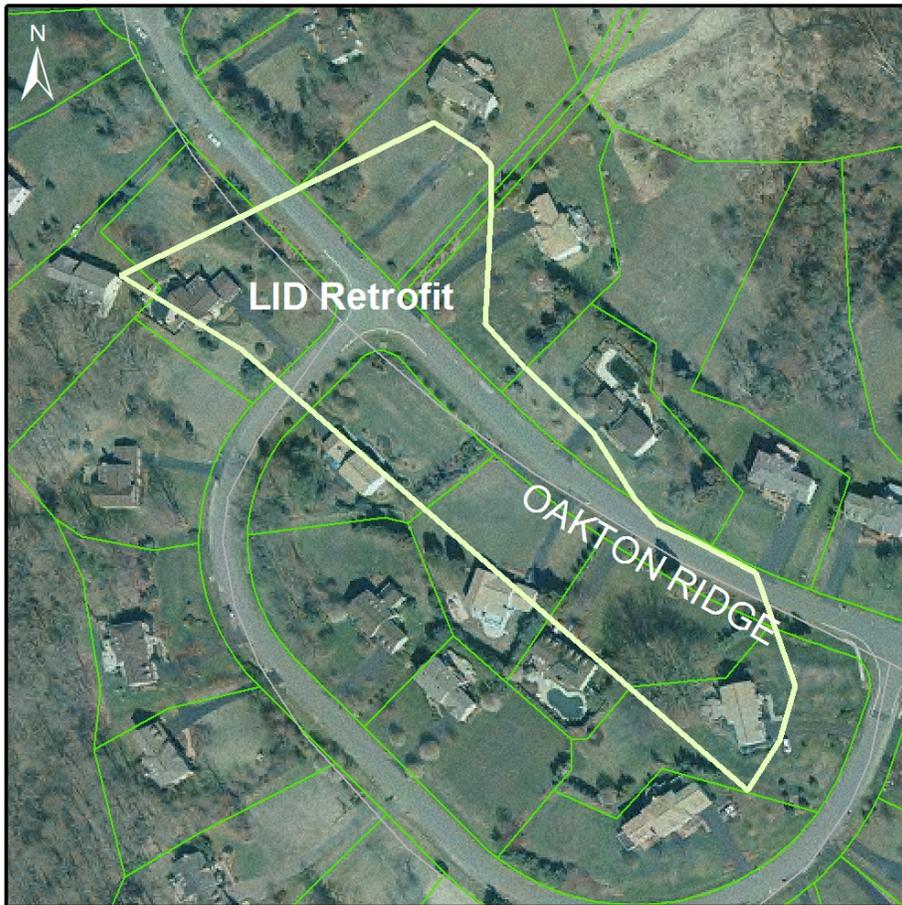
Environmental	No environmental permitting issues would be anticipated for this project.
Facility Access	There is a paved maintenance road adjacent to this project.
Design / Construction	No significant design or construction constraints are anticipated.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	63.0	SY	\$120.00	\$7,560
Base Construction Cost				\$7,560
Mobilization (5%)				\$378
Subtotal 1				\$7,938
Contingency (25%)				\$1,985
Subtotal 2				\$9,923
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$4,465
Estimated Project Cost				\$14,000

This project is part of the alternative project group for Regional Pond D-31. See Table 5-2 for the recommended disposition.

Project Site:

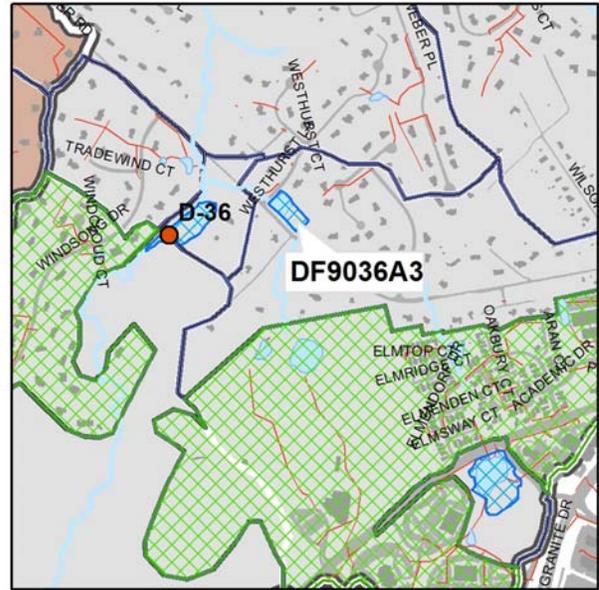


Project Number: DF9036A3
Catchment Code: DFRB0001
Candidate Site: D-36

Project Type: Pond Retrofit
Project Size: 1.1 acres
Treated Area: 80.6 acres

Project Location: This project is along Westhurst Lane and Miller Road

Project Description: This dry pond has lost a significant amount of volume due to aggradation and is currently vegetated with grasses, small shrubs, and scattered trees. A riprap ditch along Westhurst Lane directs runoff from a residential neighborhood into the pond. Work should be performed to return the basin to its original design storage. By modifying the existing weir, the ability of this facility to provide attenuation of higher frequency, lower intensity storm events can be improved. There is space available to construct a forebay at the concentrated inflow into the pond from Westhurst Lane which would be effective in filtering out sediment prior to entering the stream. Woody vegetation larger than 6 inches in diameter was noticed along the embankment bordering Miller Road. All woody vegetation should be removed and/or monitored to prevent seepage through the embankment and under the roadway.



Potential Project Benefits:

Streamflow	Peak discharge reduction of smaller storms can be improved at this location; however, only 20% of the calculated channel protection volume can be provided.
Water Quality	Although creating wet storage volume is not feasible, water quality treatment can be improved with the addition of a forebay.

Potential Project Constraints:

Environmental	Environmental permitting issues should be minimal. Projects in RPAs may require exceptions or waivers
Facility Access	Access is excellent from public roads.
Design / Construction	Grading and excavation of aggraded material is necessary to return this basin to its original storage volume. County staff will coordinate with the facility owner to implement the project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.5	AC	\$5,000.00	\$2,500
Forebay	489	CY	\$45.00	\$22,005
Riser	1	LS	\$10,000.00	\$10,000
Dry Landscaping	2425	SY	\$2.50	\$6,062
Base Construction Cost				\$40,568
Mobilization (5%)				\$2,028
Subtotal 1				\$42,596
Contingency (25%)				\$10,649
Subtotal 2				\$53,245
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)				\$23,960
Estimated Project Cost				\$77,000

This project is part of the alternative project group for Regional Pond D-36. See Table 5-2 for the recommended disposition.

Site Photo:



Concept Sketch:

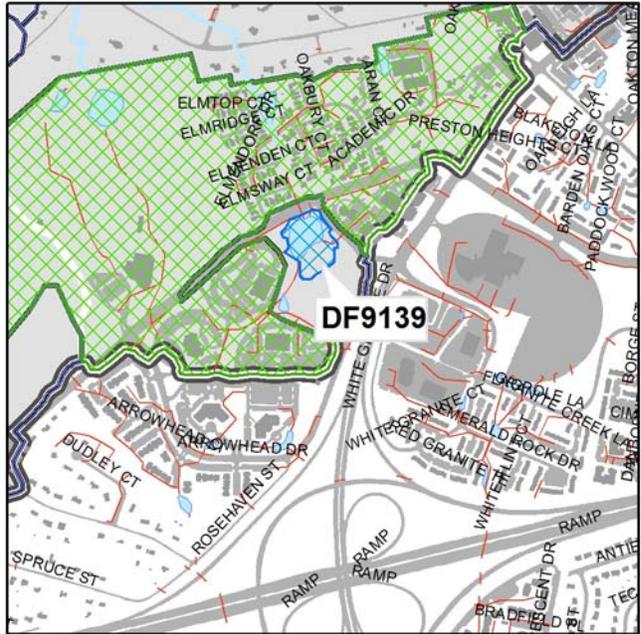


Project Number: DF9139
Catchment Code: DFRB9901
Candidate Site: C39

Project Type: Pond Retrofit
Project Size: 3.2 acres
Treated Area: 14.1 acres

Project Location: This project is located near the intersection of Rosehaven Street and Jermantown Road

Project Description: The existing wet pond collects flow from several storm drainage systems. Expansion of the pond is constrained by roadways and buildings bordering three sides of the property. The wooded area along the back side of the pond is currently being used as a recreational area. In addition, any excavation within the facility will require clearing of the dense forest and therefore is not recommended. Extended detention of the 1 year storm event can be achieved at this location by installing a multistage riser on the existing pipe outlet, optimizing the existing storage volume to meet the channel protection volume. Due to the proximity of this facility to an existing wet pond downstream, water quality treatment at this location is not necessary.



Potential Project Benefits:

Streamflow	100% of the calculated channel protection volume can be achieved by installing a multistage riser.
Water Quality	The water quality volume requirement for this facility can be met in the available wet storage of a wet pond located approximately 500 feet downstream.

Potential Project Constraints:

Environmental	Environmental permitting issues should be manageable for this project. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this area is very good.
Design / Construction	Dense woods throughout this facility prevent excavation to create additional storage volume. County staff will coordinate with the facility owner to implement the project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	\$5,000.00	\$2500
Riser	1	LS	\$10,000.00	\$10,000
Base Construction Cost				\$10,500
Mobilization (5%)				\$525
Subtotal 1				\$11,025
Contingency (25%)				\$3,756
Subtotal 2				\$13,781
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)				\$6,202
Estimated Project Cost				\$20,000

Site Photo:



Concept Sketch:

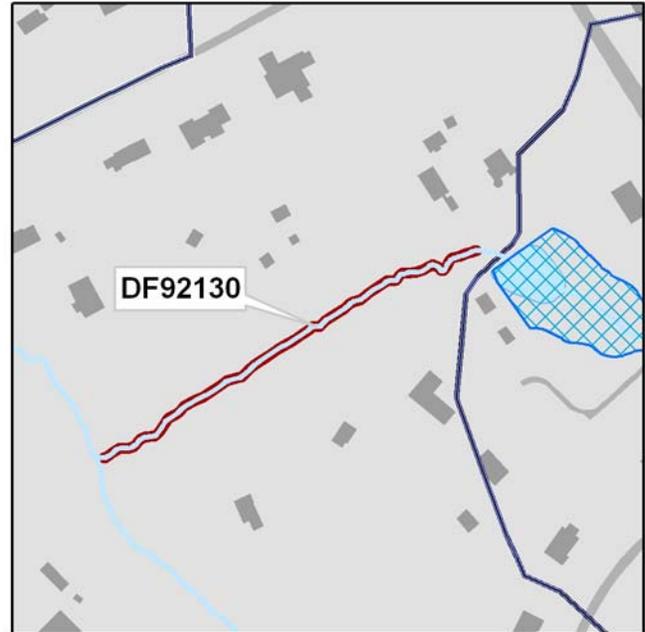


Project Number: DF92130
Catchment Code: DFRB9801
Candidate Site: S130

Project Type: Stream Restoration
Project Size: 918 Linear Feet

Project Location: This project is located west of Mystic Meadow Road and south of Hunter Mill Road.

Project Description: This stream has raw, eroding, near-vertical banks and is moderately to severely incised. The bed has eroded to weathered rock and there is no well-defined riffle pool sequence. The stream is located between several private residences. The proposed restoration would involve reconstruction to provide a pattern, dimension, and profile more consistent with a natural stream. The riparian buffer will be restored. This will prevent further erosion from channel widening and bank failure, improve instream habitat, and provide access to a functional floodplain.



Potential Project Benefits:

Stream Stability	Reconstructing the stream to more natural dimensions and improving the connection to the floodplain should restore stability.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction, improved bed morphology, and establishing a riparian buffer will improve physical habitat conditions.

Potential Project Constraints:

Environmental	The site will not require forest clearing or impacts to jurisdictional wetlands. However, it will require a permit from both the U.S. Army Corps of Engineers and VDEQ. Projects in RPAs may require exceptions or waivers
Facility Access	Access to this facility will require an easement on private property. Modifications to existing fences will be required.
Design / Construction	Design efforts are moderate compared to other stream restoration projects. General constructability is good. Fences on private property will have to be set back to accommodate the proposed project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	918	LF	\$250.00	\$229,500
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$329,500
Mobilization (5%)				\$16,475
Subtotal 1				\$345,975
Contingency (25%)				\$86,494
Subtotal 2				\$432,469
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$194,611
Estimated Project Cost				\$627,000

Concept Sketch

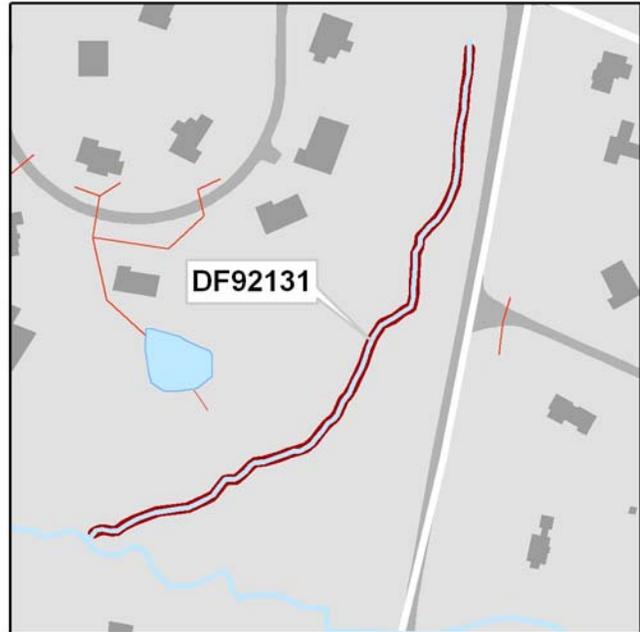


Project Number: DF92131
Catchment Code: DFRB0007
Candidate Site: S131

Project Type: Stream Restoration
Project Size: 1265 Linear Feet

Project Location: This project is located west of Hunter Mill Road just before the intersection with Vale Road.

Project Description: This stream has raw, eroding, near-vertical banks and is moderately to severely incised. The bed has eroded to weathered rock and a well-defined riffle pool sequence is absent. The stream is located primarily on community property. The proposed restoration will provide a pattern, dimension, and profile more consistent with a natural stream. This will prevent further erosion from channel widening and bank failure, improve instream habitat, and provide access to a functional floodplain.



Potential Project Benefits:

Stream Stability	Reconstructing the stream to more natural dimensions and improving the connection to the floodplain should restore stability.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction, created bed features, and establishing a riparian buffer will improve physical habitat conditions.

Potential Project Constraints:

Environmental	The site will not require forest clearing or impacts to jurisdictional wetlands. However, it will require a permit from both the U.S. Army Corps of Engineers and VDEQ. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this facility is open and unconstrained adjacent to the stream.
Design / Construction	Design efforts are moderate compared to other stream restoration projects. General constructability is good. Some landscaping adjacent to the stream will have to be removed.

Difficult Run Watershed Management Plan
 Concept Plans
 Rocky Branch

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	1265	LF	\$250.00	\$316,250
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$416,250
Mobilization (5%)				\$20,813
Subtotal 1				\$437,063
Contingency (25%)				\$109,266
Subtotal 2				\$546,328
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$245,848
Estimated Project Cost				\$792,000

Concept Sketch



Concept Sketch

