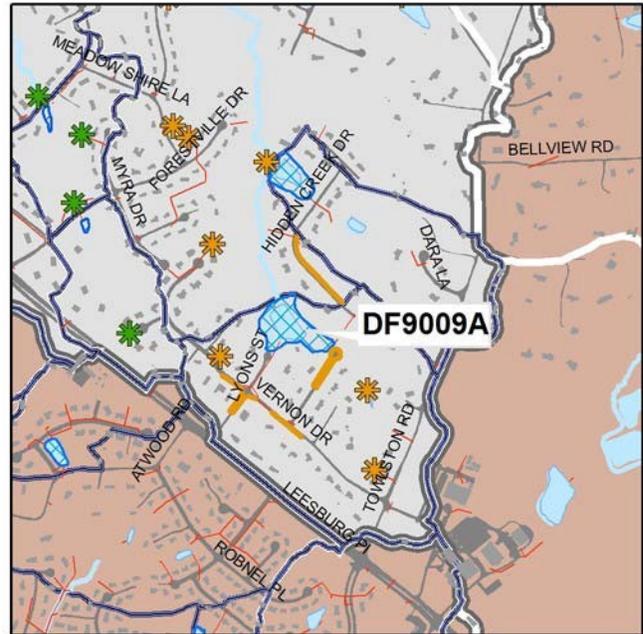


Project Number: DF9009A
Catchment Code: DFDF6102
Candidate Site: D-09

Project Type: Pond Retrofit
Project Size: 3.6 acres
Treated Area: 72.7 acres

Project Location: This project is located at the end of Lyons Street.

Project Description: The existing farm pond can be retrofitted for stormwater management. Modifications to convert the ditch on the south side to a dry swale and installing an aquatic bench around the pond perimeter will improve water quality. Due to the low embankment height, improvements in peak flow attenuation are limited, however, a new riser is proposed to provide increased detention.



Potential Project Benefits:

Streamflow	Approximately 30% of the channel protection volume can be met by installing a multi-stage riser.
Water Quality	This facility can treat 100% of the water quality volume.

Potential Project Constraints:

Environmental	Environmental permitting issues may exist, depending on the jurisdictional determinations at this point in the watershed. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is good from Lyons Road. Easement acquisition may be necessary.
Design / Construction	The existing pond elements have not been constructed to any formal design standards and will need to be reconstructed. County staff will coordinate with the facility owner to implement the project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.3	AC	\$5,000.00	\$1,500
Excavation/Grading (aquatic bench)	972	CY	\$30.00	\$29,160
Dry Swale	150	LF	\$35.00	\$5,250
Outlet Protection	1	EA	\$8,000.00	\$8,000
Riser	1	LS	\$10,000.00	\$10,000
Wetland Planting (aquatic bench)	729	SY	\$2.00	\$1,458
Base Construction Cost				\$55,368
Mobilization (5%)				\$2,768
Subtotal 1				\$58,136
Contingency (25%)				\$14,534
Subtotal 2				\$72,671
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)				\$32,702
Estimated Project Cost				\$105,000

This project is part of the alternative project group for Regional Pond D-09. See Table 5-2 for the recommended disposition.

Site Photo:



Concept Sketch:

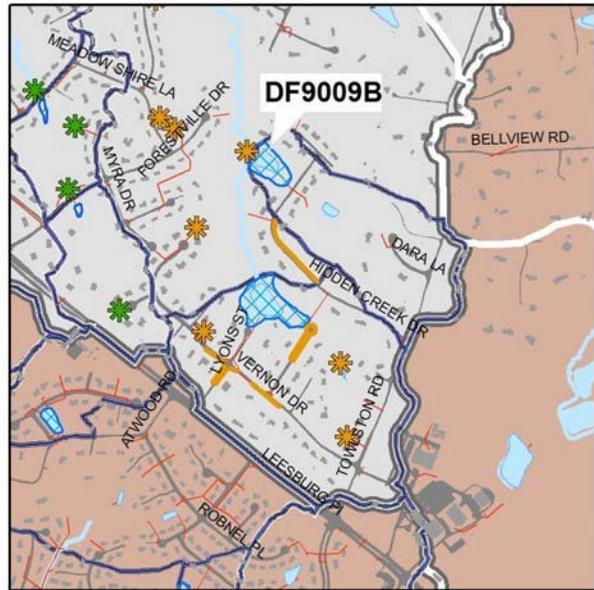


Project Number: DF9009B
Catchment Code: DFDF6102
Candidate Site: D-09

Project Type: Pond Retrofit
Project Size: 1.9 acres
Treated Area: 38.9 acres

Project Location: This project is located west of Hidden Creek Drive, near Wood Glade Drive.

Project Description: The wet storage within this pond is adequate to treat the water quality volume at this site. Additional pond features can be added to further improve treatment. There is space available in the downstream channel of the closed storm drain system entering this pond to construct a forebay to trap sediment and slow the incoming water. Also, there is enough excess wet storage volume to grade an aquatic bench around the perimeter of the pond banks. In addition, replacing the existing control structure with a multi-stage riser can improve management of high frequency storm events. Outlet protection is also required.



Potential Project Benefits:

Streamflow	50% of the channel protection volume can be met at this facility by installing a multistage riser.
Water Quality	100% of the water quality volume can be treated as wet storage within this pond.

Potential Project Constraints:

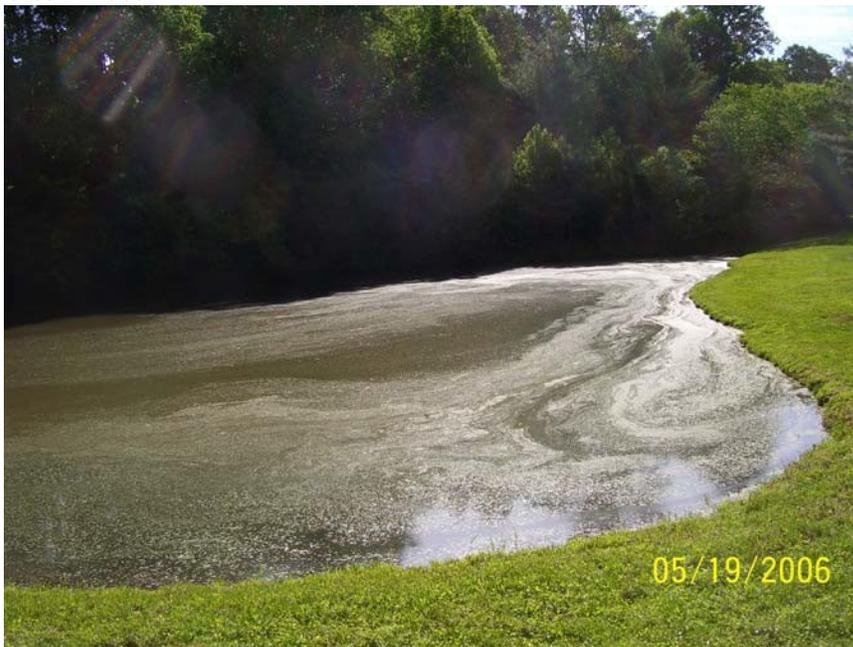
Environmental	Environmental permitting issues may exist, depending on the possible impacts to jurisdictional wetlands at this location. Because the project is a retrofit, the permitting issues should be minor, however, projects in RPAs may require exceptions or waivers.
Facility Access	Access is excellent from the roadway.
Design / Construction	Improvements to this facility may require approval by the property owners. 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	\$500.00
Excavation/Grading (aquatic bench)	1558	CY	\$30.00	\$46,740.00
Forebay	62	CY	\$45.00	\$2,790.00
Outlet Protection	1	EA	\$8,000.00	\$8,000.00
Riser	1	LS	\$10,000.00	\$10,000.00
Wetland Planting (aquatic bench)	559	SY	\$2.00	\$1,118.00
Base Construction Cost				\$69,148
Mobilization (5%)				\$3,457
Subtotal 1				\$72,605
Contingency (25%)				\$18,151
Subtotal 2				\$90,757
Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)				\$40,841
Estimated Project Cost				\$132,000

This project is part of the alternative project group for Regional Pond D-09. See Table 5-2 for the recommended disposition.

Site Photo:



Concept Sketch:

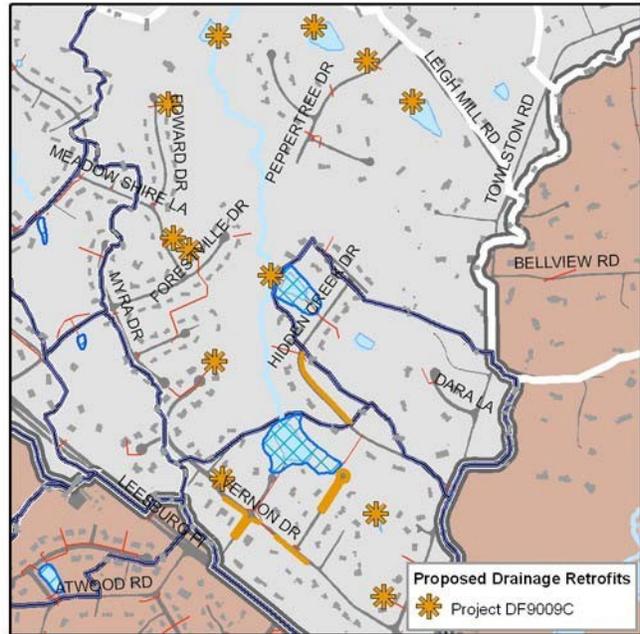


Project Number: DF9009C
Catchment Code: DFDF6102
Candidate Site: D-09

Project Type: Drainage Retrofit
Project Size: 2,424 linear feet of paved ditch, 12 Outfalls

Project Location: This project is located throughout the catchment.

Project Description: There are signs of erosion and scour at each location where the drainage network discharges into the floodplain. Outfall improvements throughout the catchment will provide energy dissipation at every interface from storm drain systems to natural channels. The paved ditches will be replaced with dry swales, which will allow for infiltration and filtering, and help to reduce excessive velocity.



Potential Project Benefits:

Streamflow	The project will reduce velocity from the outfalls and erosive potential immediately downstream. Swales will reduce both volume and velocity.
Water Quality	Replacing ditches with swales will provide treatment before stormwater reaches the stream system. Water quality will also benefit from the reduction of sediment loads associated from scour at the outfall locations.

Potential Project Constraints:

Environmental	No environmental constraints are anticipated. Projects in RPAs may require exceptions or waivers.
Facility Access	Generally, access can be obtained from adjacent roads or storm drain easements.
Design / Construction	Design should incorporate check dams or other features to ensure flow velocity is not erosive.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Paved Ditch Demolition (Haul Away)	2424	LF	\$18.00	\$43,632
Dry Swale w/ Underdrain	2424	LF	\$50.00	\$121,200
Outfall Protection	12	EA	\$8,000.00	\$96,000
Base Construction Cost				\$260,832
Mobilization (5%)				\$13,042
Subtotal 1				\$273,874
Contingency (25%)				\$68,468
Subtotal 2				\$342,342
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$154,054
Estimated Project Cost				\$496,000

This project is part of the alternative project group for Regional Pond D-09. See Table 5-2 for the recommended disposition.

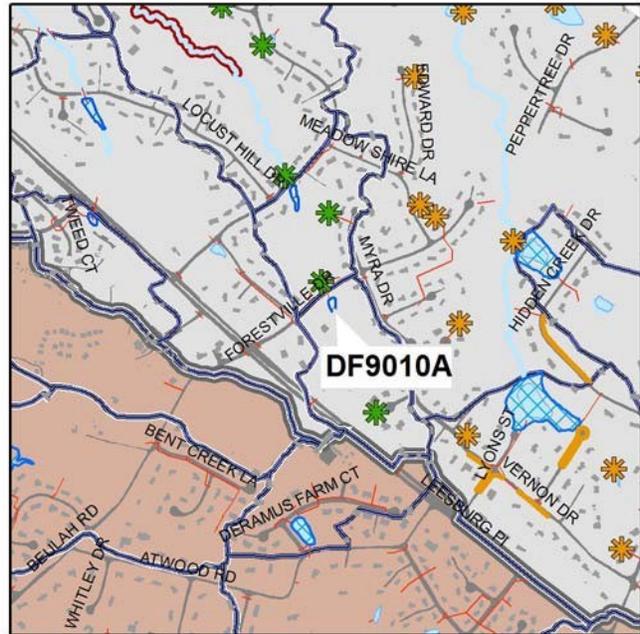
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Project Number: DF9010A
Catchment Code: DFDF6501
Candidate Site: D-10

Project Type: Culvert Retrofit
Project Size: 0.1 acres
Treated Area: 23.2 acres

Project Location: This project is located on the upstream side of Forestville Drive.

Project Description: This project consists of providing a hydraulic control to limit the discharge to pre-developed rates or less. In this application, the implementation plan should focus on maximizing the time of concentration within the catchment and reducing peak flow rates for a range of storm events.



Potential Project Benefits:

Streamflow	The project will provide approximately 40% of the channel protection volume.
Water Quality	Some reduction of pollutants will occur with increased settling associated with increased detention.

Potential Project Constraints:

Environmental	There may be some permitting issues associated with the temporary impoundment of runoff in the floodplain above this culvert. While most of the site will remain forested, some forest impacts may be incurred during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is excellent from the roadway.
Design / Construction	No unusual design or construction issues were noted.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	\$5,000.00	\$500
Excavation	110	CY	\$35.00	\$3,850
Impoundment Structure	1	LS	\$5,000.00	\$5,000
Landscaping	120	SY	\$2.50	\$300
Wetland Planting	40	SY	\$2.00	\$80
Base Construction Cost				\$9,730
Mobilization (5%)				\$487
Subtotal 1				\$10,217
Contingency (25%)				\$2,554
Subtotal 2				\$12,771
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$5,747
Estimated Project Cost				\$19,000

*This project is part of the alternative project group for Regional Pond D-10.
 See Table 5-2 for the recommended disposition.*

Concept Sketch:

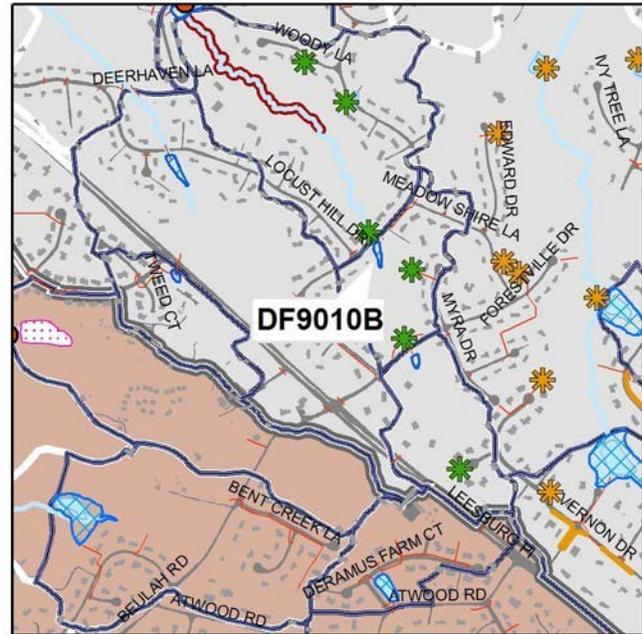


Project Number: DF9010B
Catchment Code: DFDF6501
Candidate Site: D-10

Project Type: Culvert Retrofit
Project Size: 0.2 acres
Treated Area: 20.8 acres

Project Location:
 This project is located on the upstream side of the culvert under Trotting Horse Lane.

Project Description:
 This project consists of providing a hydraulic control to the upstream side of this culvert to limit the discharge to pre-developed rates or less. The implementation plan should focus on maximizing the time of concentration within the catchment and reducing peak flow rates. This project will also encourage sediment and associated pollutants to settle out of the water column.



Potential Project Benefits:

Streamflow	The project will provide approximately 60% of the channel protection volume for this location.
Water Quality	Reduction of pollutants will occur with increased settling associated with increased detention.

Potential Project Constraints:

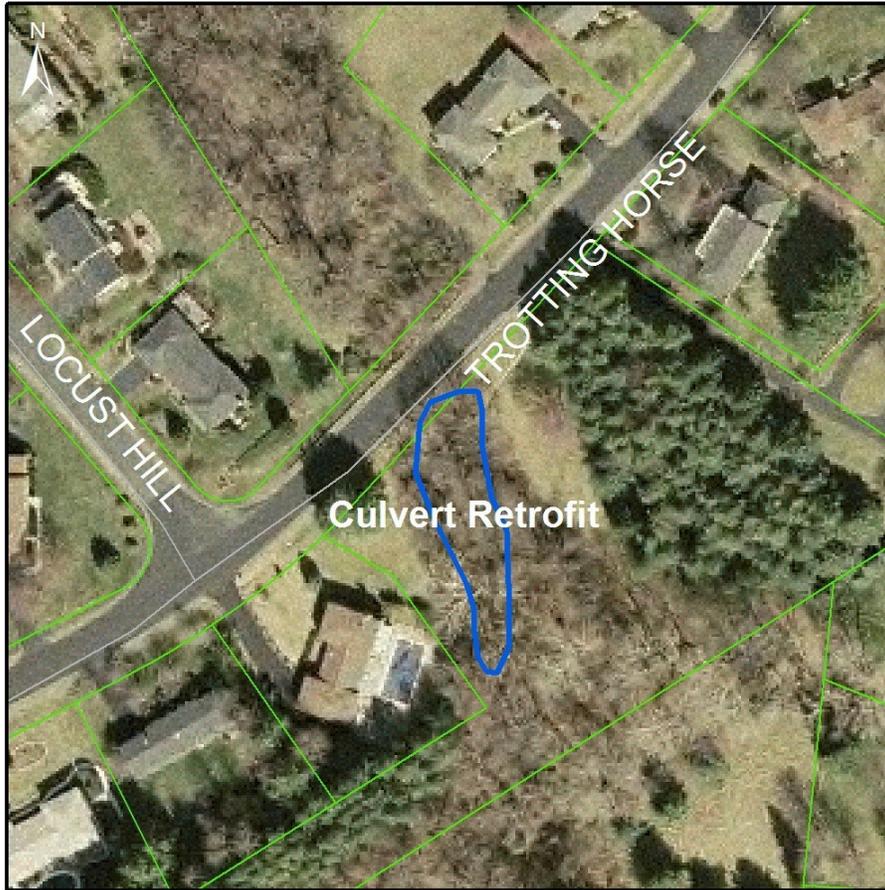
Environmental	There may be some permitting issues associated with the temporary impoundment of runoff in the floodplain above this culvert. Some forest impacts can be expected during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is excellent from the roadway.
Design / Construction	No unusual design or construction issues were noted.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	\$5,000.00	\$500
Excavation	160	CY	\$35.00	\$5,600
Impoundment Structure	1	LS	\$5,000.00	\$5,000
Landscaping	170	SY	\$2.50	\$425
Wetland Planting	60	SY	\$2.00	\$120
Base Construction Cost				\$11,645
Mobilization (5%)				\$582
Subtotal 1				\$12,227
Contingency (25%)				\$3,057
Subtotal 2				\$15,284
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$6,878
Estimated Project Cost				\$22,000

This project is part of the alternative project group for Regional Pond D-10. See Table 5-2 for the recommended disposition.

Concept Sketch:

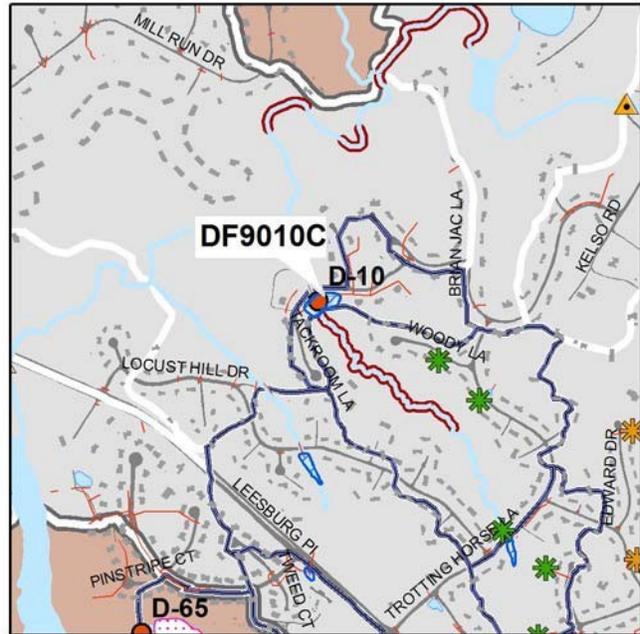


Project Number: DF9010C
Catchment Code: DDF6501
Candidate Site: D-10

Project Type: Culvert Retrofit
Project Size: 0.8 acres
Treated Area: 63.0 acres

Project Location: This project is located on the upstream side of Tackroom Lane.

Project Description: The culvert which flows under Tackroom Lane serves as the control structure for a stormwater management facility for the adjacent development. This project involves the redesign of this pond to treat runoff from the entire upstream drainage area, by reconstructing the detention structure and re-routing the stream through the pond.



Potential Project Benefits:

Streamflow	The project will provide 90% of the channel protection volume estimated for this location.
Water Quality	The pond will remain a dry facility and water quality improvements will be minor.

Potential Project Constraints:

Environmental	There may be some permitting issues associated with the temporary impoundment of runoff in the stream channel. However, since the stream will be daylighted through the pond, permitting should be manageable. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	Because the stream will be relocated from a culvert and redirected through the pond, construction will be more complex than the typical pond retrofit.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.9	AC	\$5,000.00	\$4,500
Excavation	2,660	CY	\$35.00	\$93,100
Remove Culvert	175	LF	\$77.00	\$13,475
Impoundment Structure	1	LS	\$10,000.00	\$10,000
Landscaping	5,100	SY	\$2.50	\$12,750
Base Construction Cost				\$133,825
Mobilization (5%)				\$6,691
Subtotal 1				\$140,516
Contingency (25%)				\$35,129
Subtotal 2				\$175,645
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$79,040
Estimated Project Cost				\$255,000

*This project is part of the alternative project group for Regional Pond D-10.
See Table 5-2 for the recommended disposition.*

Concept Sketch:

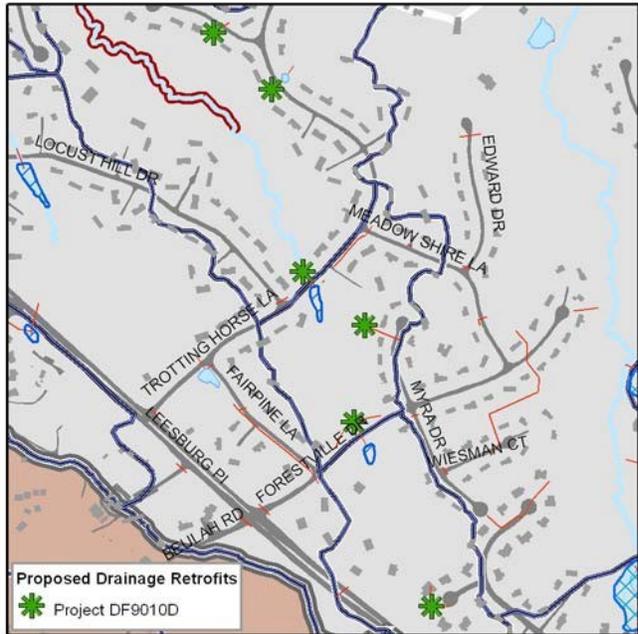


Project Number: DF9010D
Catchment Code: DFDF6501
Candidate Site: D-10

Project Type: Drainage Retrofit
Project Size: 6 Outfalls

Project Location: This project is located at various locations distributed throughout the catchment.

Project Description: In this catchment, there are signs of erosion and scour at each location where the drainage network discharges into the floodplain. Improvements are recommended throughout the catchment to provide adequate energy dissipation at every interface from storm drain systems to natural channels.



Potential Project Benefits:

Streamflow	The project will reduce velocity from the outfall and erosive potential immediately downstream.
Water Quality	The primary benefit to the water quality would come from the reduction of sediment loads associated with high velocity at the outfall locations.

Potential Project Constraints:

Environmental	No environmental constraints or permitting requirements are anticipated. Projects in RPAs may require exceptions or waivers.
Facility Access	Generally, access can be obtained from adjacent roads or storm drain easements.
Design / Construction	No significant design or construction issues were identified for this project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Outfall Protection	6	EA	\$8,000.00	\$48,000
Base Construction Cost				\$48,000
Mobilization (5%)				\$2,400
Subtotal 1				\$50,400
Contingency (25%)				\$12,600
Subtotal 2				\$63,000
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$28,350
Estimated Project Cost				\$91,000

This project is part of the alternative project group for Regional Pond D-10. See Table 5-2 for the recommended disposition.

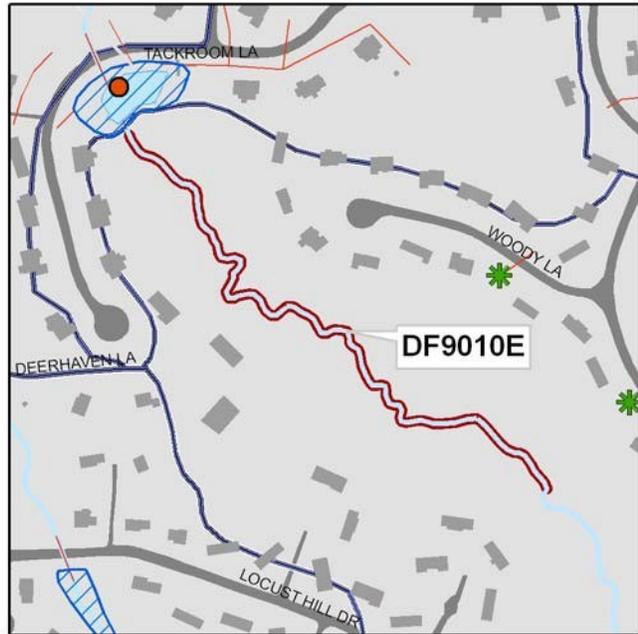
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Project Number: DF9010E
Catchment Code: DDF6501
Candidate Site: D-10

Project Type: Stream Restoration
Project Size: 1,765 Linear Feet

Project Location: This project is located southeast of Tackroom Lane, between Woody Lane and Locust Hill Drive.

Project Description:
 This stream reach is incised, and has eroded much more than the reaches upstream and downstream. It appears to have become unstable as a result of a headcut working upstream from the culvert under the pond at Tackroom Lane, rather than from excessive stormwater flows.



The project consists of restoration to stabilize the headcut, correcting the oversteepening of the channel with grade controls and a step pool system, and raising the invert to reestablish a connection with the floodplain in portions of the reach. Riparian buffers will be restored where they are deficient.

Potential Project Benefits:

Stream Stability	Reconstruction of the channel to reduce channel slope will restore stability in the over-steepened sections of the channel. Reconnection with the floodplain in the middle reach will also improve stability.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction, and recreated bed features will improve physical habitat conditions.

Potential Project Constraints:

Environmental	The site will require moderate forest clearing and possible impacts to jurisdictional wetlands. 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 project is available from public land and a paved streamside trail.
Design / Construction	Design efforts are average compared to other stream restoration projects. General constructability is good.

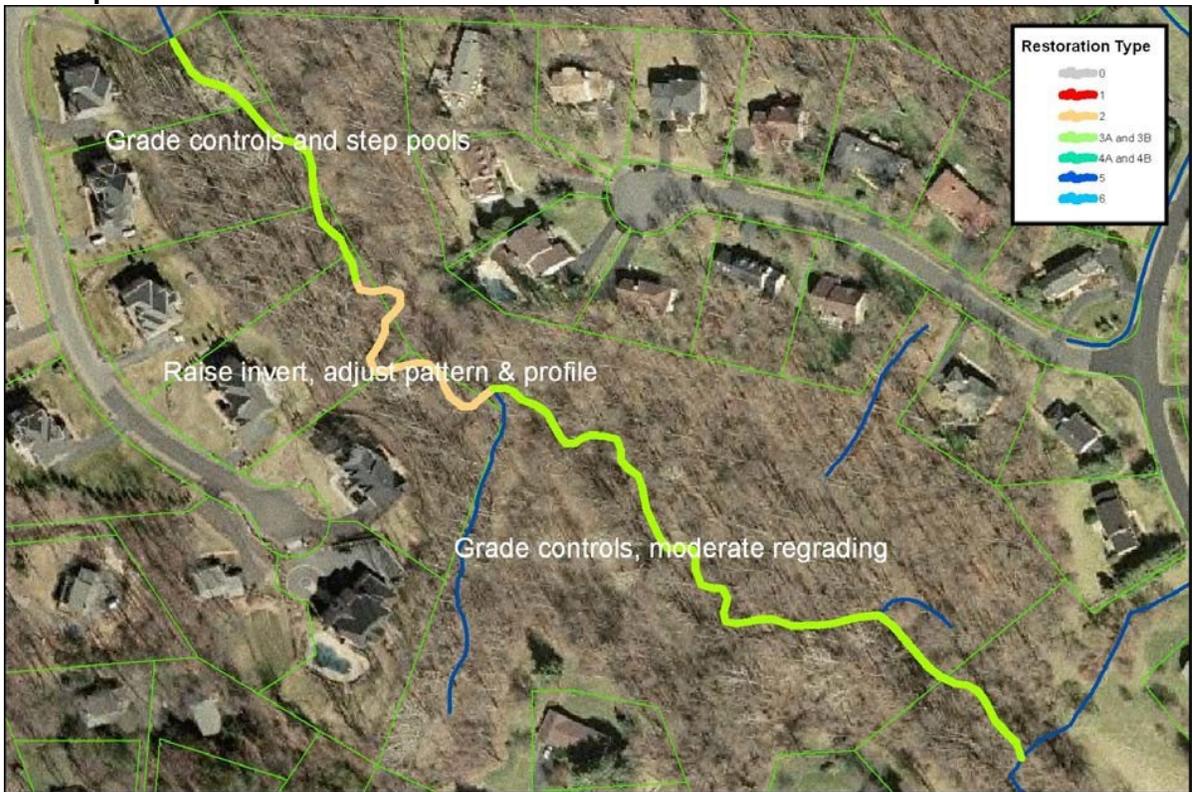
This project is part of the alternative project group for Regional Pond D-10. See Table 5-2 for the recommended disposition.

Difficult Run Watershed Management Plan
 Concept Plans
 Lower Difficult Run

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	374	LF	\$250.00	\$93,500
Change channel type -- step pools	1391	LF	\$225.00	\$312,975
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$506,475
Mobilization (5%)				\$25,324
Subtotal 1				\$531,799
Contingency (25%)				\$132,950
Subtotal 2				\$664,748
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$299,137
Estimated Project Cost				\$964,000

Concept Sketch

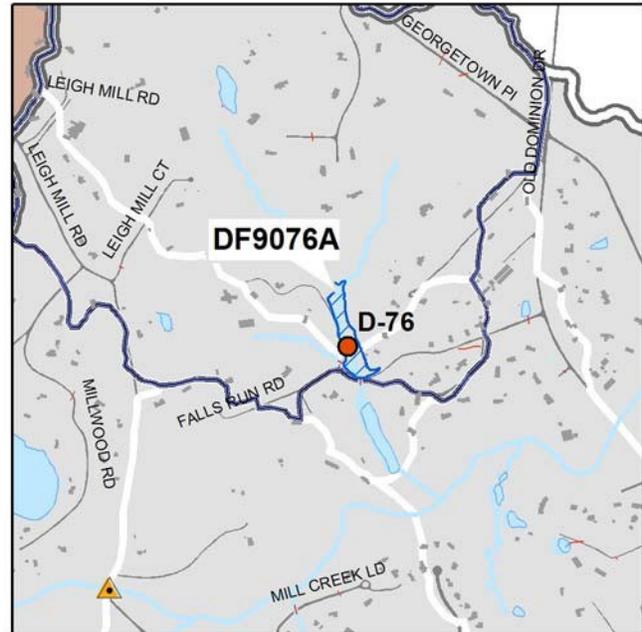


Project Number: DF9076A
Catchment Code: DFDF5901
Candidate Site: D-76

Project Type: Culvert Retrofit
Project Size: 2.4 acres
Treated Area: 243 acres

Project Location: This project is on the upstream side Falls Run Road.

Project Description: Because of the grade difference between the stream/floodplain and the roadway, there is a potential for storage at this location. The floodplain at this point is fairly wide and flat, thereby maximizing the benefit of this location. There is a significant amount of erosion upstream and within this site that supports this location for a facility to address the erosion.



Potential Project Benefits:

Streamflow	This project can provide 100% of the channel protection volume.
Water Quality	The project can provide 100% of the water quality volume.

Potential Project Constraints:

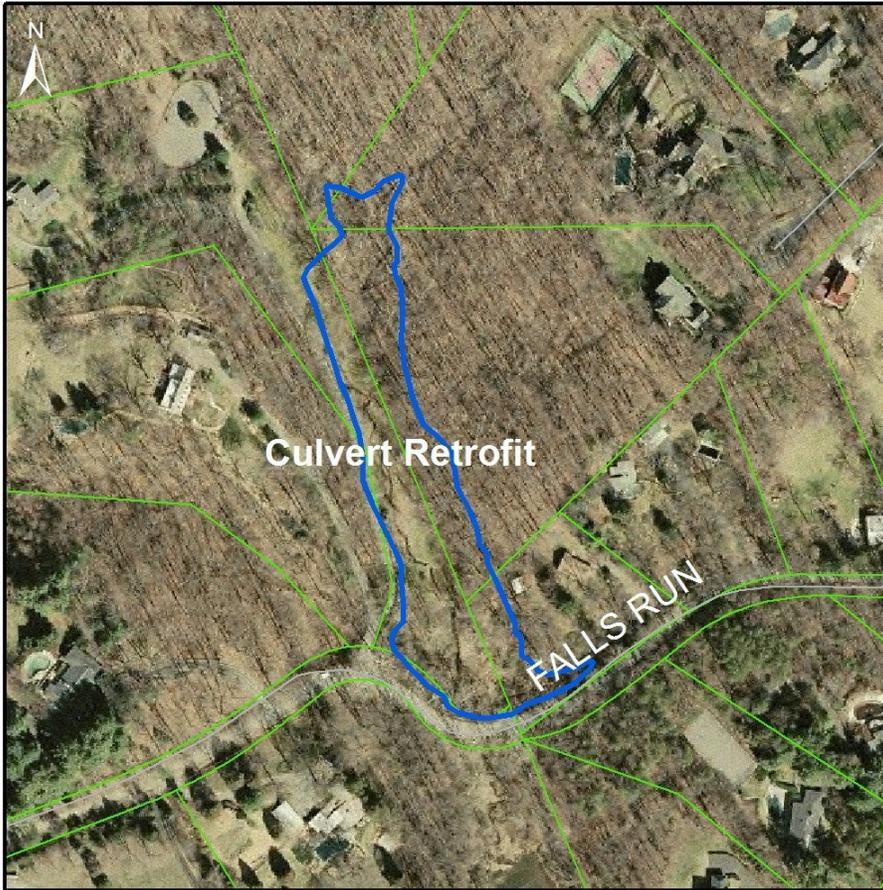
Environmental	There may be some permitting issues associated with the temporary impoundment of runoff in the floodplain above this culvert. Minor forest impacts can be expected during construction, and there may be wetland impacts. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is excellent from Falls Run Road.
Design / Construction	Allowance for sediment transport through the facility should be maintained. Residence time should be minimized to protect the integrity of the existing wetland ecosystem.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.5	AC	\$5,000.00	\$2,500
Excavation	4,000	CY	\$35.00	\$140,000
Impoundment Structure	1	LS	\$5,000.00	\$5,000
Landscaping	2,170	SY	\$2.50	\$5,425
Wetland Planting	730	SY	\$2.00	\$1,460
Base Construction Cost				\$154,385
Mobilization (5%)				\$7,719
Subtotal 1				\$162,104
Contingency (25%)				\$40,526
Subtotal 2				\$202,630
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$91,184
Estimated Project Cost				\$294,000

*This project is part of the alternative project group for Regional Pond D-76.
 See Table 5-2 for the recommended disposition.*

Concept Sketch:

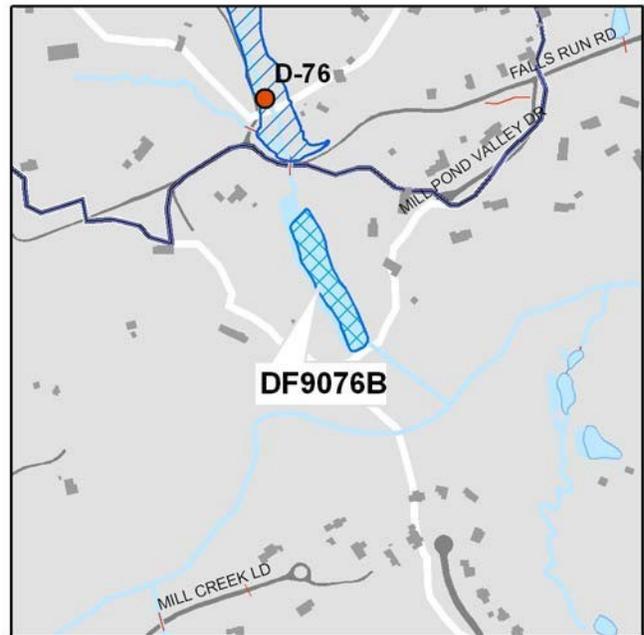


Project Number: DF9076B
Catchment Code: DFDF5902
Candidate Site: D-76

Project Type: Pond Retrofit
Project Size: 1.4 acres
Treated Area: 335 acres

Project Location: This project is a retrofit of the existing farm pond downstream of Falls Run Road.

Project Description: The project would consist of a new wet pond designed for water quality treatment. The work would include constructing a new embankment and riser, grading and planting 25% of the pond with wetland vegetation. This facility could be designed as a standalone pond retrofit or in conjunction with Project DF9076A as a series system.



Potential Project Benefits:

Streamflow	There may be minor reductions in peak flow during smaller storms.
Water Quality	The project can provide 100% of the water quality volume.

Potential Project Constraints:

Environmental	The project will likely require a permit from both the U.S. Army Corps of Engineers and VDEQ because of instream disturbances. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is excellent from Falls Run Road.
Design / Construction	There are no unusual design or construction issues. County staff will coordinate with the facility owner to implement the project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.68	AC	\$5,000	\$3,397
Grading and Excavation	3,178	CY	\$30	\$95,333
Outlet Protection	1	EA	\$8,000	\$8,000
Reconstruct Embankment	1070	CY	\$60	\$64,200
Riser	1	LS	\$10,000	\$10,000
Outflow Pipe	100	LF	\$35	\$3,500
Wetland Planting	2,055	SY	\$2	\$4,110
Dry Landscaping	2,055	SY	\$3	\$5,138
Base Construction Cost				\$193,678
Mobilization (5%)				\$9,684
Subtotal 1				\$203,362
Contingency (25%)				\$50,841
Subtotal 2				\$254,203
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$114,391
Estimated Project Cost				\$369,000

This project is part of the alternative project group for Regional Pond D-76. See Table 5-2 for the recommended disposition.

Concept Sketch



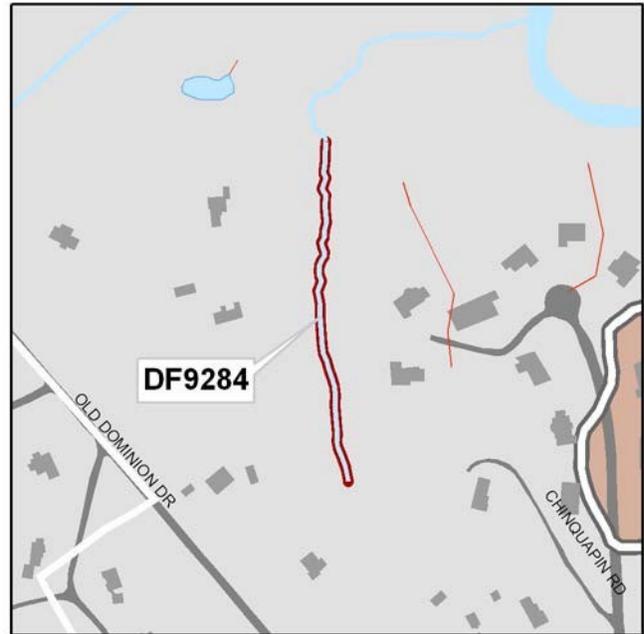
Project Number: DF9284
Catchment Code: DFDF0055
Candidate Site: S84

Project Type: Stream Restoration
Project Size: 918 Linear Feet

Project Location: This project is located to the east of Old Dominion Drive.

Project Description:

The reach is a highly erosive headwater stream that is severely incised. It has low sinuosity and appears to be steep with predominantly run streambed morphology, characterized by smooth, moderately fast flowing water. Several failing stone and concrete diversion structures are located in the lower end of the reach. The stream is located between residential properties that appear to be old homestead farms. The proposed stream restoration will create bed features that resemble stepped streambed morphology and the streambanks will be reshaped and stabilized. A floodplain bench will be excavated. The diversion structures will be removed. Riparian buffers will be restored where they are deficient.



Potential Project Benefits:

Stream Stability	The dimension, and profile of the stream will be corrected and a floodplain connection will be created.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction, and created bed features will improve physical habitat conditions.

Potential Project Constraints:

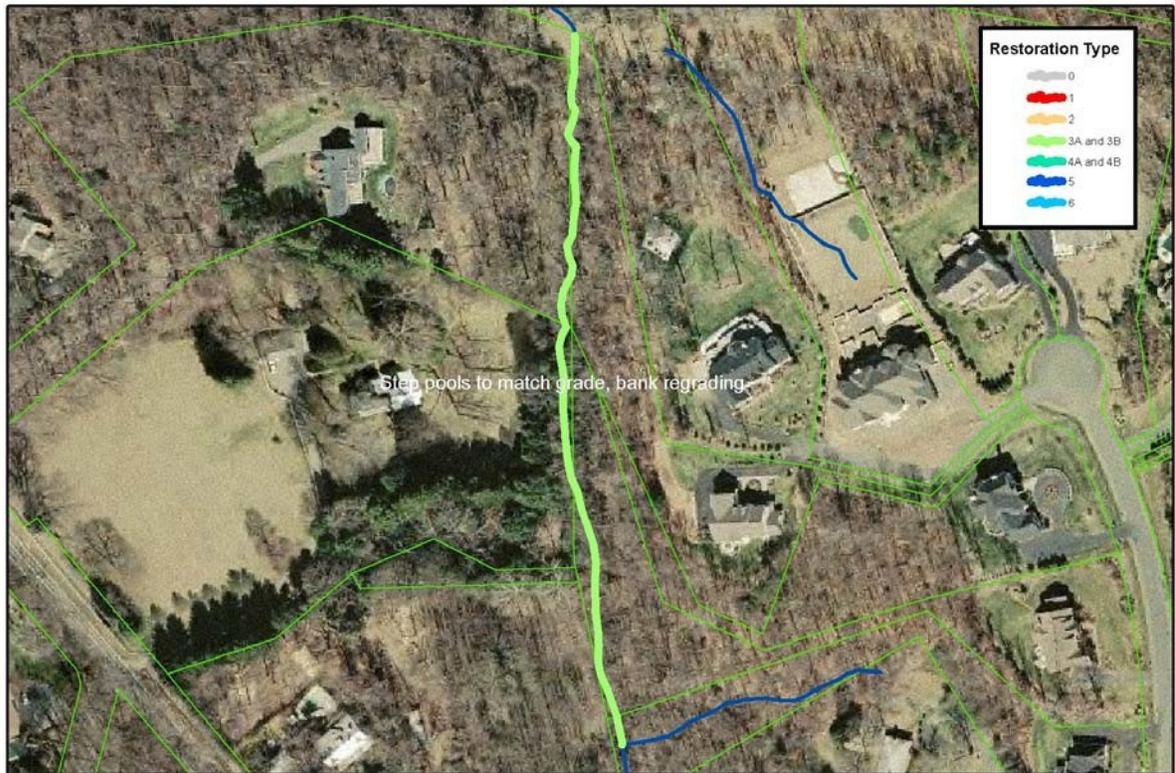
Environmental	The site will require moderate forest clearing and possible impacts to jurisdictional wetlands. It will require a permit from both the U.S. Army Corps of Engineers and VDEQ. Projects in RPAs will require exceptions or waivers.
Facility Access	Access to this facility will require an easement on private property and an improved access road.
Design / Construction	Design efforts are significant compared to other stream restoration projects. General constructability is challenging due to the steep valley walls and need for access.

Difficult Run Watershed Management Plan
 Concept Plans
 Lower Difficult Run

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Change channel type -- step pools	918	LF	\$225.00	\$206,550
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$306,550
Mobilization (5%)				\$15,328
Subtotal 1				\$321,878
Contingency (25%)				\$80,469
Subtotal 2				\$402,347
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$181,056
Estimated Project Cost				\$583,000

Concept Sketch:



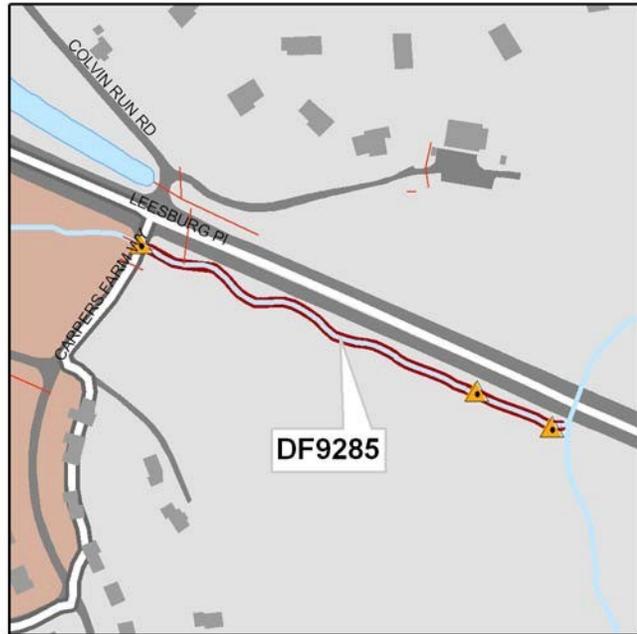
Project Number: DF9285
Catchment Code: DFDF0043
Candidate Site: S85

Project Type: Stream Restoration
Project Size: 1,101 Linear Feet

Project Location: This project is located to the south of Leesburg Pike where Colvin Run Road intersects Leesburg Pike.

Project Description:

The reach has been straightened and runs along the embankment of the Leesburg Pike. Streambanks are steep and the stream is severely incised. The streambed is embedded with fine sediments. The right side of the stream is in pasture. The stream will be relocated away from the road embankment with a stable pattern, dimension and profile utilizing the available pastureland to create a meandering stream. The proposed streambanks and bed will be stabilized using natural channel structures. A floodplain bench will be excavated, and riparian buffers will be restored.



Potential Project Benefits:

Stream Stability	The pattern, dimension, and profile of the stream will be corrected and a floodplain connection will be reestablished.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction, improved sediment transport conditions, and establishing a riparian buffer will improve physical habitat conditions.

Potential Project Constraints:

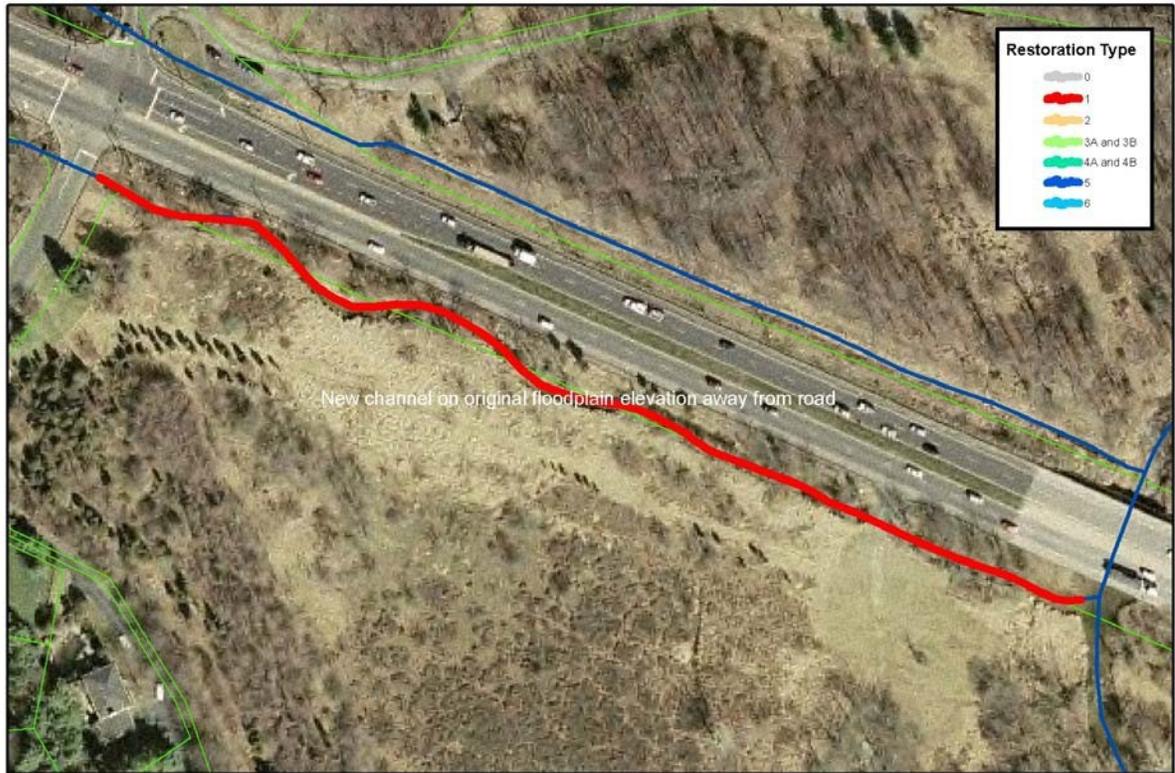
Environmental	The site will not require forest clearing or impacts to jurisdictional wetlands. However, it will require a permit from both the U.S. Army Corps of Engineers and VDEQ. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this facility will require an easement on private property but is open and unconstrained in the proposed relocation area.
Design / Construction	Design efforts are significant compared to other stream restoration projects. General constructability is good.

Difficult Run Watershed Management Plan
 Concept Plans
 Lower Difficult Run

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct new channel	1101	LF	\$200.00	\$220,200
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$320,200
Mobilization (5%)				\$16,010
Subtotal 1				\$336,210
Contingency (25%)				\$84,053
Subtotal 2				\$420,263
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$189,118
Estimated Project Cost				\$609,000

Concept Sketch:

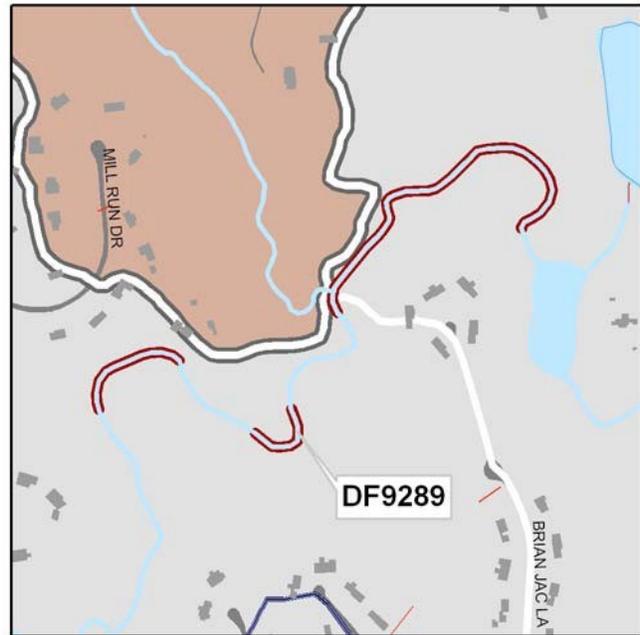


Project Number: DF9289
Catchment Code: DFDF0047
Candidate Site: S89

Project Type: Stream Restoration
Project Size: 2323 Linear Feet

Project Location: This project is located north of Leesburg Pike near Mill Run Dr.

Project Description: This stream reach is experiencing erosion on the outer bends of three meanders. The project consists of moderate regrading in place to stabilize vertical streambanks, with structural protection and rock vanes in spot locations as needed. The stream buffer will be restored where it is disturbed for construction.



Potential Project Benefits:

Stream Stability	Regrading the banks will reduce instability and erosion caused by failure of the vertical streambanks.
Water Quality	Water quality will be improved by a significant reduction in current and future streambank erosion.
Instream Habitat	Erosion reduction and reestablishing a riparian buffer will improve physical habitat conditions.

Potential Project Constraints:

Environmental	The site will require some tree removal and impacts to jurisdictional wetlands. 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 is available through public property or easements. Access will require improvements within the project area.
Design / Construction	Design efforts are average compared to other stream restoration projects. General constructability is good.

Costs

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Stabilize in place -- grading	2323	LF	\$175.00	\$406,525
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$506,525
Mobilization (5%)				\$25,326
Subtotal 1				\$531,851
Contingency (25%)				\$132,963
Subtotal 2				\$664,814
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$299,166
Estimated Project Cost				\$964,000

Concept Sketch

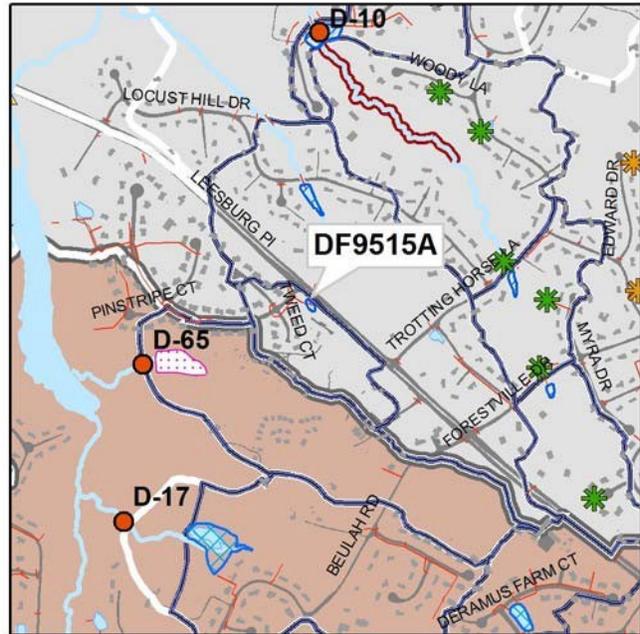


Project Number: DF9515A
Catchment Code: DFDF6701
Candidate Site: C15

Project Type: Culvert Retrofit
Project Size: 0.1 acres
Treated Area: 16.9 acres

Project Location: This project is located south of the crossing of Leesburg Pike and Middleton Ridge Road.

Project Description: This project consists of a culvert retrofit at Leesburg Pike to provide water quality treatment. Construction of a micropool and wetland plantings will provide sedimentation and nutrient uptake.



Potential Project Benefits:

Streamflow	The project is expected to result in minor reductions in peak flows.
Water Quality	The project has sufficient storage to treat 100% of the water quality volume. Sedimentation and nutrient uptake will also provide treatment.

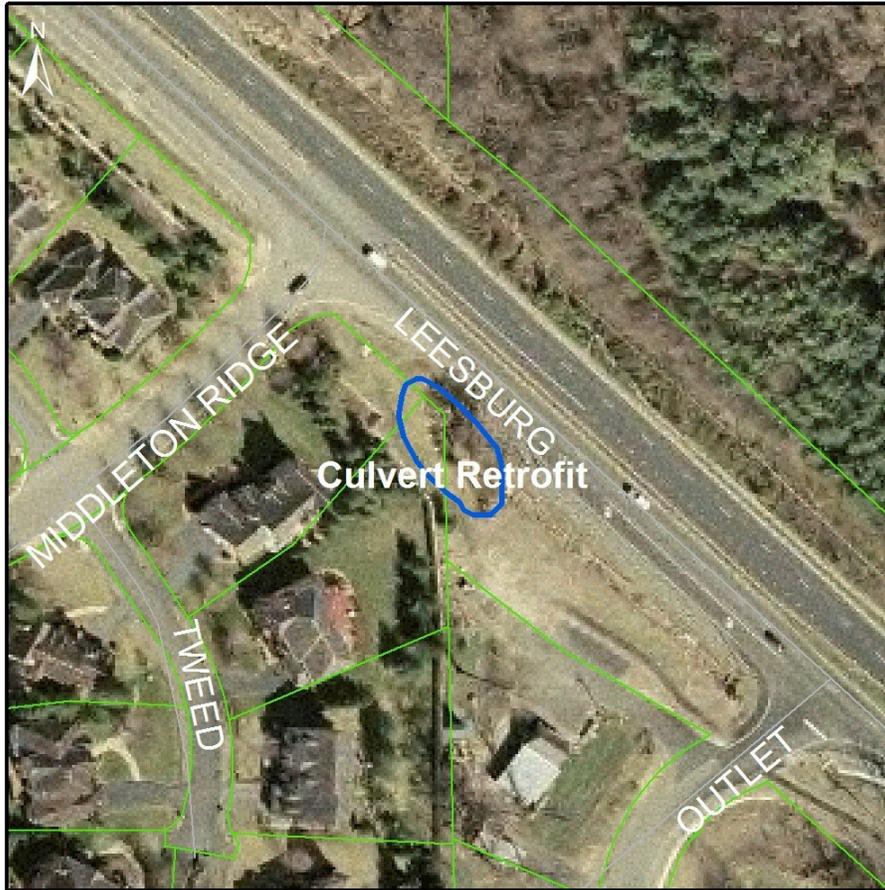
Potential Project Constraints:

Environmental	Environmental permitting should not be an issue for this project. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is available from adjacent roadways.
Design / Construction	No unusual design or construction issues were identified for this project

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	\$5,000.00	\$500
Excavation	130	CY	\$35.00	\$4,550
Impoundment Structure	1	LS	\$5,000.00	\$5,000
Landscaping	100	SY	\$2.50	\$250
Wetland Planting	40	SY	\$2.00	\$80
Base Construction Cost				\$10,380
Mobilization (5%)				\$519
Subtotal 1				\$10,899
Contingency (25%)				\$2,725
Subtotal 2				\$13,624
Engineering, Survey, Land Acquisition Utility Relocations and Permits (45%)				\$6,131
Estimated Project Cost				\$20,000

Concept Sketch:

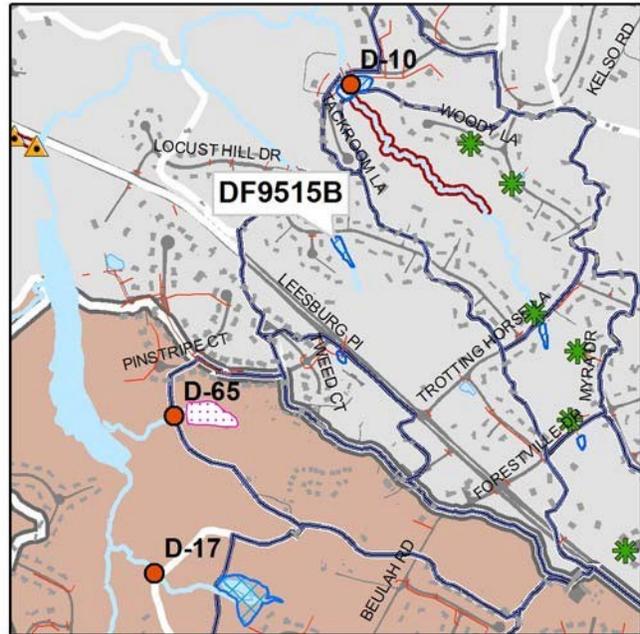


Project Number: DF9515B
Catchment Code: DFDF6701
Candidate Site: C15

Project Type: Culvert Retrofit
Project Size: 0.3 acres
Treated Area: 69.3 acres

Project Location: This project is located upstream of Locust Hill Drive near Saugus Court.

Project Description: This project is a culvert retrofit to the culvert under Locust Hill Drive. The primary focus is to use the upstream culvert area to provide water quality treatment for runoff, increasing the detention time and allowing settling of pollutants and sediment. A berm will be placed on the west side of the detention area to ensure local residences are not impacted.



Potential Project Benefits:

Streamflow	The project is expected to result in minor reductions in peak flows.
Water Quality	The project has sufficient storage to treat 19% of the water quality volume. Sedimentation and nutrient uptake will also provide treatment.

Potential Project Constraints:

Environmental	There may be permitting issues with the temporary impoundment of runoff in the floodplain above this culvert. Minor forest impacts can be expected during construction, and there may be wetland impacts.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	No unusual design or construction issues were identified for this project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	\$5,000.00	\$500
Excavation	100	CY	\$35.00	\$3,500
Impoundment Structure	1	LS	\$5,000.00	\$5,000
Berm	70	CY	\$60.00	\$4,200
Landscaping	310	SY	\$2.50	\$775
Wetland Planting	110	SY	\$2.00	\$220
Base Construction Cost				\$14,195
Mobilization (5%)				\$710
Subtotal 1				\$14,905
Contingency (25%)				\$3,726
Subtotal 2				\$18,631
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$8,384
Estimated Project Cost				\$27,000

Concept Sketch:

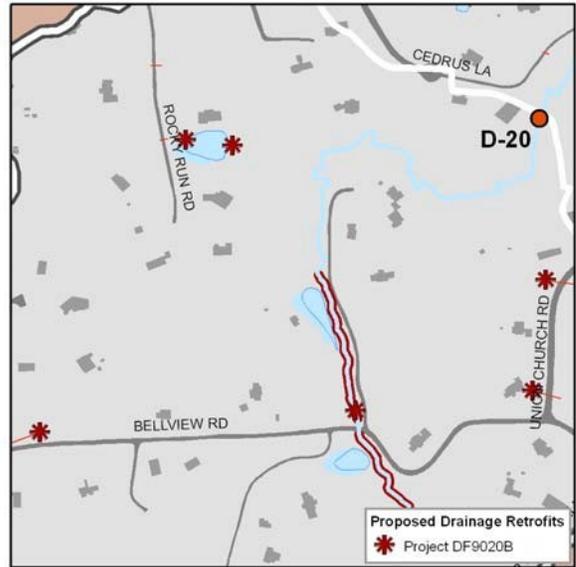


Project Number: DF9020B
Catchment Code: DFSP0002
Candidate Site: D-20

Project Type: Drainage Retrofit
Project Size: 6 Outfalls

Project Location:
 This project is distributed throughout the catchment.

Project Description:
 This project is intended to reduce scour and erosion at point outfalls where flows from the storm drain system enter the stream. Reduction of erosive velocities will reduce the amount of sediment transported downstream and may help prolong the life of the farm ponds throughout the catchment.



Potential Project Benefits:

Streamflow	The primary goal of this project is to reduce velocity from the storm drain outfalls and erosive potential downstream.
Water Quality	Water quality benefits would be achieved through the reduction of erosion and scour in the channel. 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	Generally, access can be obtained from adjacent roads.
Design / Construction	No design or construction issues were identified.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Outfall Protection	6	EA	\$8,000.00	\$48,000
Base Construction Cost				\$48,000
Mobilization (5%)				\$2,400
Subtotal 1				\$50,400
Contingency (25%)				\$12,600
Subtotal 2				\$63,000
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$28,350
Estimated Project Cost				\$91,000

This project is part of the alternative project group for Regional Pond D-20. See Table 5-2 for the recommended disposition.

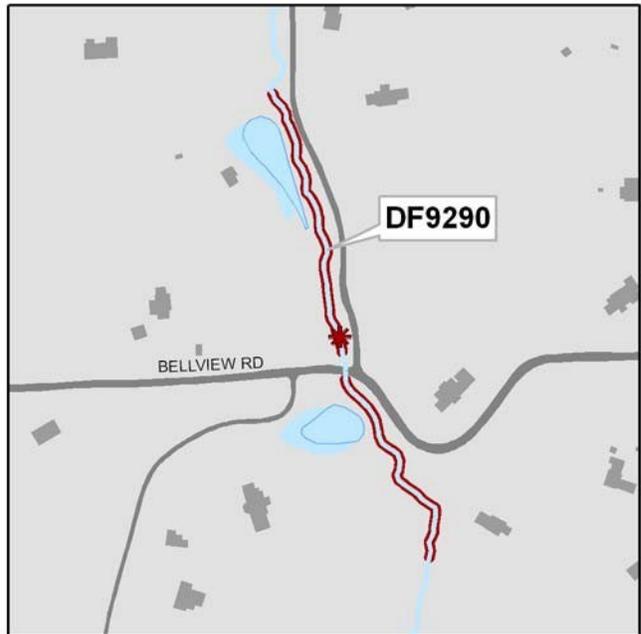
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Project Number: DF9290
Catchment Code: DFSP0001
Candidate Site: S90

Project Type: Stream Restoration
Project Size: 1,047 Linear Feet

Project Location:
 This project is located north and south of Bellview Road and west of Union Church Road.

Project Description:
 The right bank riparian zone lacks a healthy riparian buffer. The stream banks are raw and eroding; however, the streambed appears to be stable. The stream is located on private property between two residential driveways. The banks will be regraded and stabilized. The riparian area will be planted with native trees and shrubs. A floodplain bench will be created where space is available.



Potential Project Benefits:

Stream Stability	Moderate regrading will stabilize the streambanks. A nested channel with a floodplain bench will create a low-flow channel. A short reach will be reconstructed with a new pattern and profile.
Water Quality	Water quality will be improved by a significant reduction in stream erosion.
Instream Habitat	Erosion reduction, a low-flow channel, and a restored riparian buffer will improve physical habitat conditions.

Potential Project Constraints:

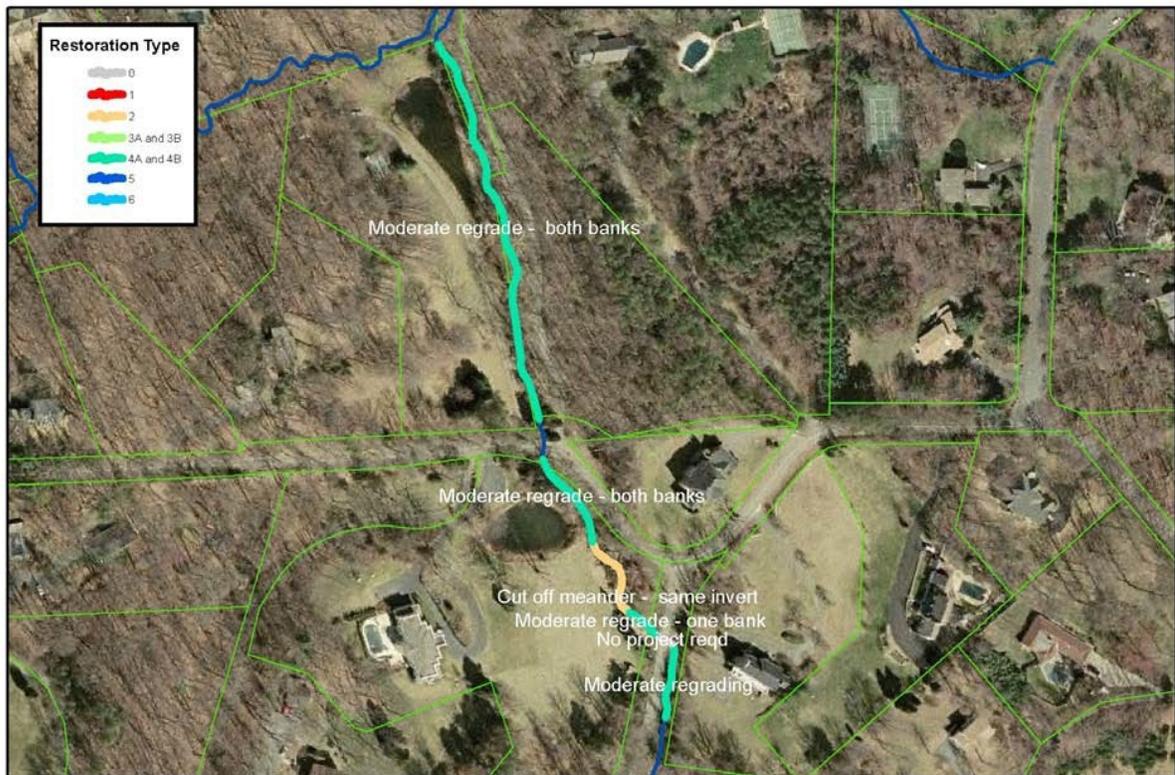
Environmental	Some forest impacts would occur during construction. The site will not impact jurisdictional wetlands. However, it will require a permit from both the U.S. Army Corps of Engineers and VDEQ. Projects in RPAs may require exceptions or waivers
Facility Access	Access to this site will be along the existing residential properties and will require an easement on private property but is open and unconstrained adjacent to the stream.
Design / Construction	Design efforts are minimal compared to other stream restoration projects. General constructability is good.

Difficult Run Watershed Management Plan
 Concept Plans
Sharpers Run

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	133	LF	\$250.00	\$33,250
Stabilize in place -- grading	914	LF	\$175.00	\$159,950
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$293,200
Mobilization (5%)				\$14,660
Subtotal 1				\$307,860
Contingency (25%)				\$76,965
Subtotal 2				\$384,825
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$173,171
Estimated Project Cost				\$558,000

Concept Sketch

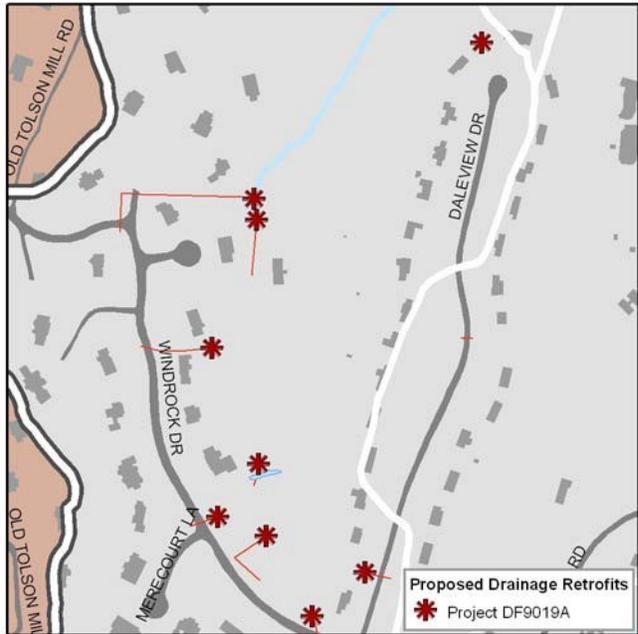


Project Number: DF9019A
Catchment Code: DFRR9501
Candidate Site: D-19

Project Type: Drainage Retrofit
Project Size: 9 Outfalls

Project Location:
This project is distributed throughout the catchment.

Project Description:
This project consists of providing additional outlet protection to locations where the man-made drainage systems discharge into the natural channel. Significant erosion and scour was noted in these areas.



Potential Project Benefits:

Streamflow	The project will reduce velocity from the outfall 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.

Potential Project Constraints:

Environmental	Projects in RPAs may require exceptions or waivers.
Facility Access	Access to these sites can be obtained from the roadway and driveways.
Design / Construction	No significant design or construction issues were identified for this project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Outfall Protection	9	EA	\$8,000.00	\$72,000
Base Construction Cost				\$72,000
Mobilization (5%)				\$3,600
Subtotal 1				\$75,600
Contingency (25%)				\$18,900
Subtotal 2				\$94,500
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$42,525
Estimated Project Cost				\$137,000

*This project is part of the alternative project group for Regional Pond D-19.
See Table 5-2 for the recommended disposition.*

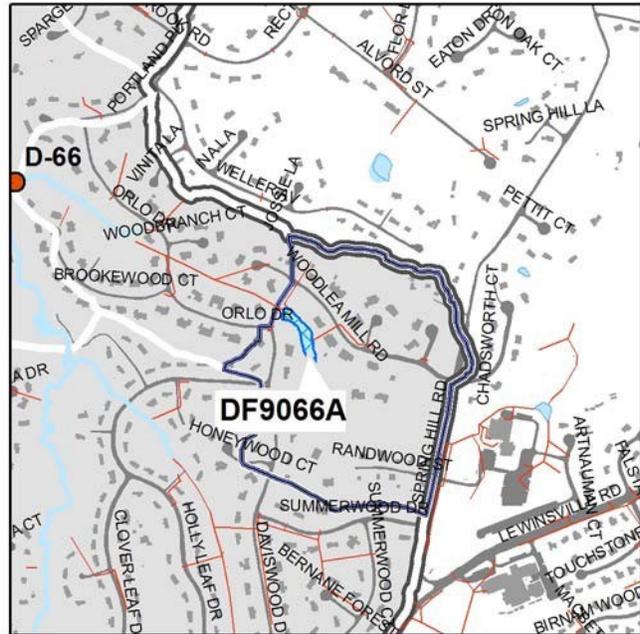
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Project Number: DF9066A
Catchment Code: DFRR9801
Candidate Site: D-66

Project Type: Pond Retrofit
Project Size: 0.9 acres
Treated Area: 58.0 acres

Project Location: This project is located upstream of Daviswood Drive.

Project Description: This wet pond is surrounded on all sides by private residences. There is little peak flow attenuation taking place. Installing a multi-stage control structure over the existing outlet will significantly improve peak flow attenuation and also meet the channel protection volume. The existing facility holds the necessary water quality volume to treat the full drainage area. To enhance the treatment function, the aquatic bench will be extended to encompass the entire perimeter of the facility.



Potential Project Benefits:

Streamflow	Installing a multistage riser will provide 100% of the channel protection volume.
Water Quality	100% of the water quality volume is met within the wet storage of this pond. The aquatic bench will provide wetland landscaping for nutrient uptake.

Potential Project Constraints:

Environmental	This project should not require significant environmental permitting efforts. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this facility can be obtained from the roadway.
Design / Construction	The design and construction of a new control structure would likely require coordination with property owner(s). County staff will coordinate with the facility owner to implement the project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.2	AC	\$5,000.00	\$1,000.00
Excavation/Grading (aquatic bench)	1245	CY	\$30.00	\$37,350.00
Riser	1	LS	\$10,000.00	\$10,000.00
Wetland Planting (aquatic bench)	934	SY	\$2.00	\$1,868.00
Base Construction Cost				\$50,218
Mobilization (5%)				\$2,511
Subtotal 1				\$52,729
Contingency (25%)				\$13,182
Subtotal 2				\$65,911
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$29,660
Estimated Project Cost				\$96,000

This project is part of the alternative project group for Regional Pond D-66. See Table 5-2 for the recommended disposition.

Concept Sketch:



Project Site:

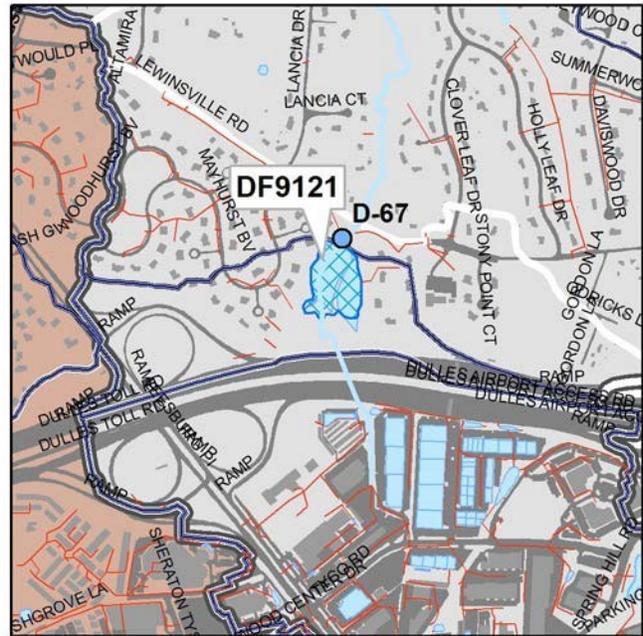


Project Number: DF9121
Catchment Code: DFRR0001
Candidate Site: C21

Project Type: Pond Retrofit
Project Size: 4.1 acres
Treated Area: 285 acres

Project Location: South of Lewinsville Road, west of Lewinsville Mews Court.

Project Description: This project consists of retrofits to the dry pond to provide improvements in peak flow and pollutant load reduction. Channel protection techniques in the natural channels upstream of the embankment will help reduce velocity and erosion. Water quality features exist in the form of ditches, settling pools, and small marshes within the basin. Instead of excavating and removing these features, their treatment function can be improved by adding both wet and dry vegetation to the natural channels and surrounding banks. In addition, a sediment forebay constructed in front of the closed storm drain outlet will further treat runoff.



Potential Project Benefits:

Streamflow	Approximately 40% of the channel protection volume can be achieved.
Water Quality	A variety of water quality components can be added to this facility to promote water quality improvement.

Potential Project Constraints:

Environmental	Environmental permitting issues would be anticipated for any activity around a stream corridor. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is available.
Design / Construction	No specific design or construction issues were noted for this project. County staff will coordinate with the facility owner to implement the project.

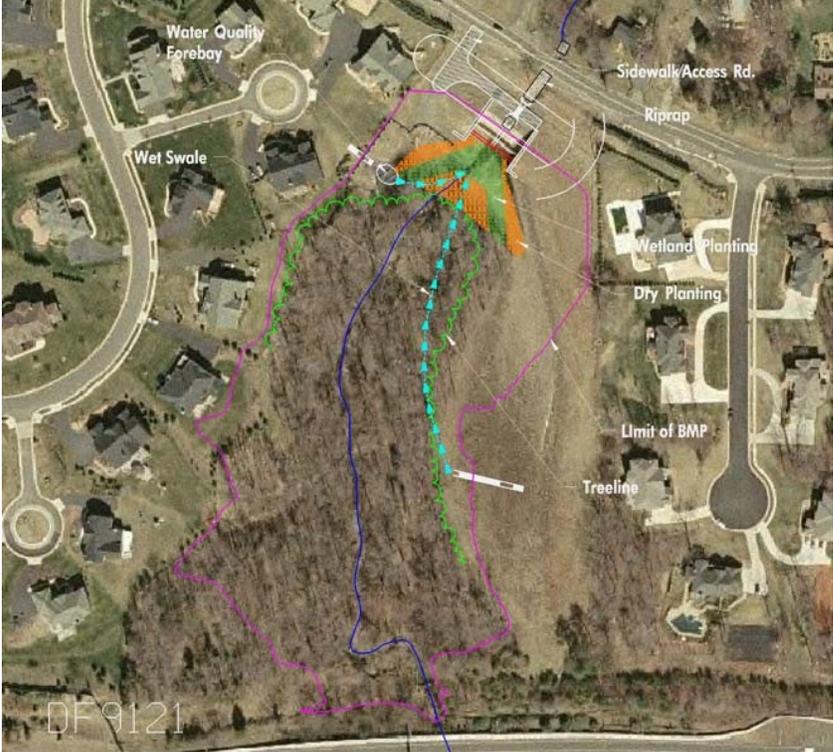
Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.4	AC	\$5,000.00	\$2,000.00
Dry Swale	440	LF	\$35.00	\$15,400.00
Forebay	988	CY	\$45.00	\$44,460.00
Riser	1	LS	\$10,000.00	\$10,000.00
Rip Rap Stabilization	75	LF	\$50.00	\$3,750.00
Wetland Planting	800	SY	\$2.00	\$1,600.00
Dry Landscaping	800	SY	\$2.50	\$2,000.00
Base Construction Cost				\$79,210
Mobilization (5%)				\$3,961
Subtotal 1				\$83,171
Contingency (25%)				\$20,793
Subtotal 2				\$103,963
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$46,783
Estimated Project Cost				\$151,000

Project Site:



Concept Sketch:

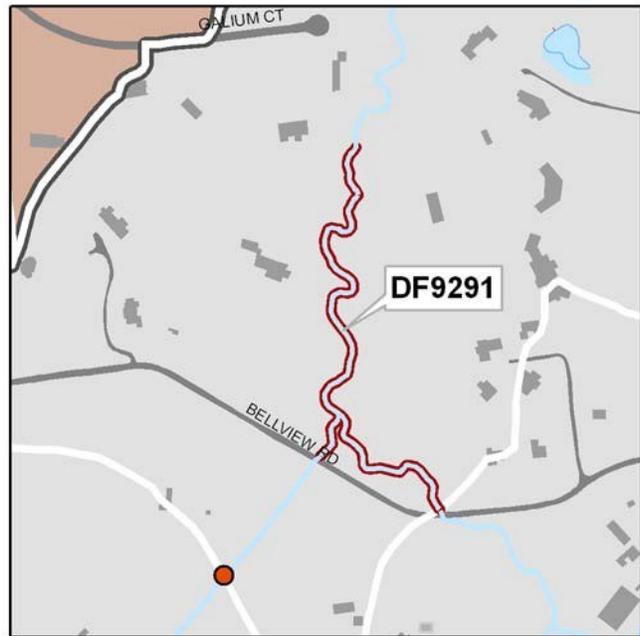


Project Number: DF9291
Catchment Code: DFRR0006 or DFRR0005
Candidate Site: S91

Project Type: Stream Restoration
Project Size: 1,760 Linear Feet

Project Location: This project is located in a wooded area to the north of Bellview Road and south of Galium Road.

Project Description:
 This stream reach is slightly incised with raw, eroding, stream banks. The stream is actively increasing its sinuosity. The streambed is affected by an excessive amount of fine sediments and the bedforms are poorly defined. The stream will be reconstructed with a more stable pattern and profile and a vegetated buffer will be restored in disturbed areas.



Potential Project Benefits:

Stream Stability	Stability will be improved with a pattern, dimension, and profile better suited to the existing flow regime.
Water Quality	Water quality will be improved by a reduction in future bank and streambed erosion.
Instream Habitat	Erosion reduction, and reconstructed streambed features will improve physical habitat conditions.

Potential Project Constraints:

Environmental	The site will require forest clearing and some impacts to jurisdictional wetlands. 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.
Design / Construction	Design efforts are significant compared to other stream restoration projects. General constructability is good.

Difficult Run Watershed Management Plan
 Concept Plans
Rocky Run

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	1607	LF	\$250.00	\$401,750
Stabilize in place -- grading	153	LF	\$175.00	\$26,775
Buffer restoration	included above	LF	\$25.00	\$0
Add'l cost, first 500 LF	500	LF	\$200.00	\$100,000
Base Construction Cost				\$528,525
Mobilization (5%)				\$26,426
Subtotal 1				\$554,951
Contingency (25%)				\$138,738
Subtotal 2				\$693,689
Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)				\$312,160
Estimated Project Cost				\$1,006,000

Concept Sketch:

