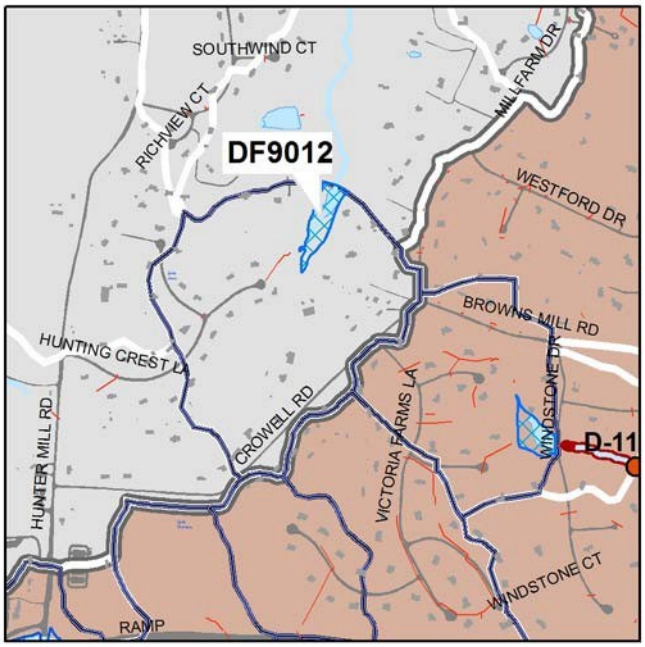
Project Number: DF9012
Catchment Code: DFCR8801
Candidate Site: D-12

Project Type: Pond Retrofit
Project Size: 2.4 acres
Treated Area: 79 acres



Project Location: This project is located on Crowell Road.

Project Description: This project is a retrofit to an existing farm pond. It is unclear whether or not there is an existing control structure in this facility. If a control structure exists, it is recommended to install a multi-stage riser designed to provide extended detention of smaller storms. Assuming the pond is at least 4 ft deep, the water quality volume is met the existing wet storage, with space to create an aquatic bench component around 75% of the perimeter of the pond. The proximity of the residence to this pond may become a public safety issue, so careful analysis of water surface elevations of various storm events is required.

Potential Project Benefits:

Streamflow	The pond will provide storage for 50% of the channel protection volume.
Water Quality	The water quality volume is met within the wet storage of this pond. The aquatic bench will provide additional vegetative uptake of nutrients.

Potential Project Constraints:

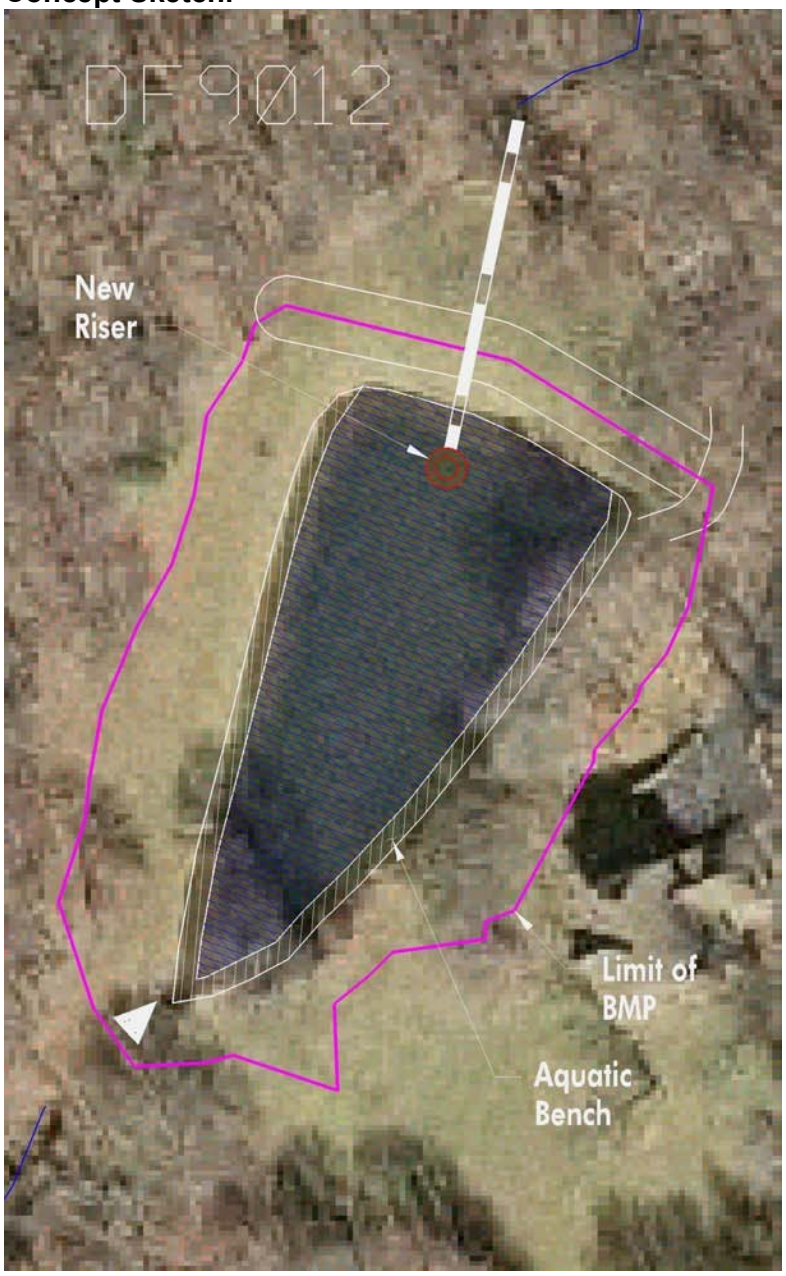
Environmental	Environmental permitting should not be an issue for this retrofit project. Projects in RPAs may require exceptions or waivers.
Facility Access	Facility access and construction may require easements on private property.
Design / Construction	The existing facility is close to the residence on the property. 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
Excavation/Grading (aquatic bench)	562	CY	$30.00	$16,860
Riser	1	LS	$10,000.00	$10,000
Wetland Planting (aquatic planting)	446	SY	$2.00	$892
			Base Construction Cost	**$28,252**
			Mobilization (5%)	$1,413
			Subtotal 1	**$29,665**
			Contingency (25%)	$7,416
			Subtotal 2	**$37,081**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$16,686
			Estimated Project Cost	**$54,000**

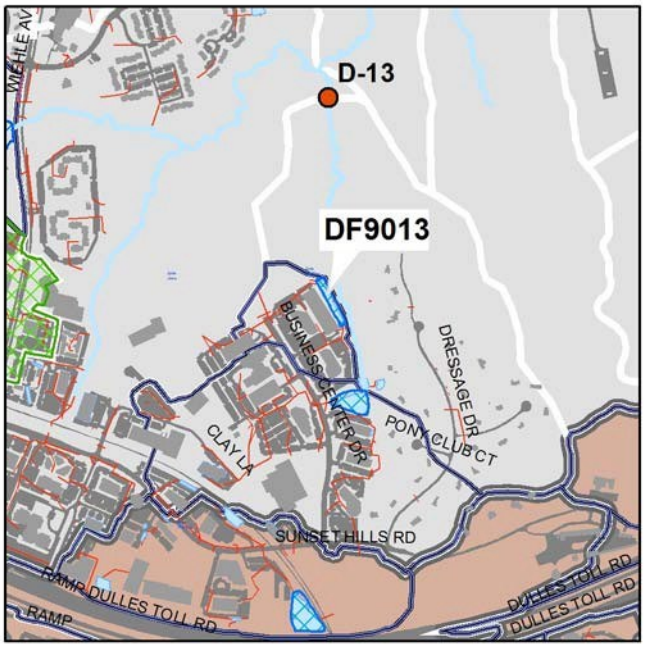
This project is part of the alternative project group for Regional Pond D-12. See Table 5-2 for the recommended disposition.

Concept Sketch:



Project Number: DF9013
Catchment Code: DFCR9301
Candidate Site: D-13

Project Type: Pond Retrofit
Project Size: 0.6 acres
Treated Area: 13.8 acres



Project Location: This project is located on Business Center Drive behind a parking garage.

Project Description: This facility receives runoff from the parking garage and nearby parking lot areas. Due to conditions surrounding this dry pond, excavation beyond the pond boundaries is not possible. Reduction of peak flow velocities can be improved significantly by modifying the riser. Further analysis of existing conditions during final design will determine the maximum potential of this project. Water quality treatment can be provided at this location by converting the dry pond to a wetland by removing the existing concrete channels and excavating the bottom area of the pond. Replacing the concrete channels with meandering flow paths through wetland areas will increase detention time, promote uptake of nutrients, removal of pollutants, and settling of sediment.

Potential Project Benefits:

Streamflow	100% of the channel protection volume can be met by modifying the riser.
Water Quality	30% of the required wet storage volume will be created by excavating. Adding water quality components will improve the pond's performance.

Potential Project Constraints:

Environmental	No environmental permitting issues or constraints are anticipated. Projects in RPAs may require exceptions or waivers.
Facility Access	Current federal government occupancy restricts access to some degree.
Design / Construction	No design or construction issues were identified. County staff will coordinate with the facility owner to implement the project.

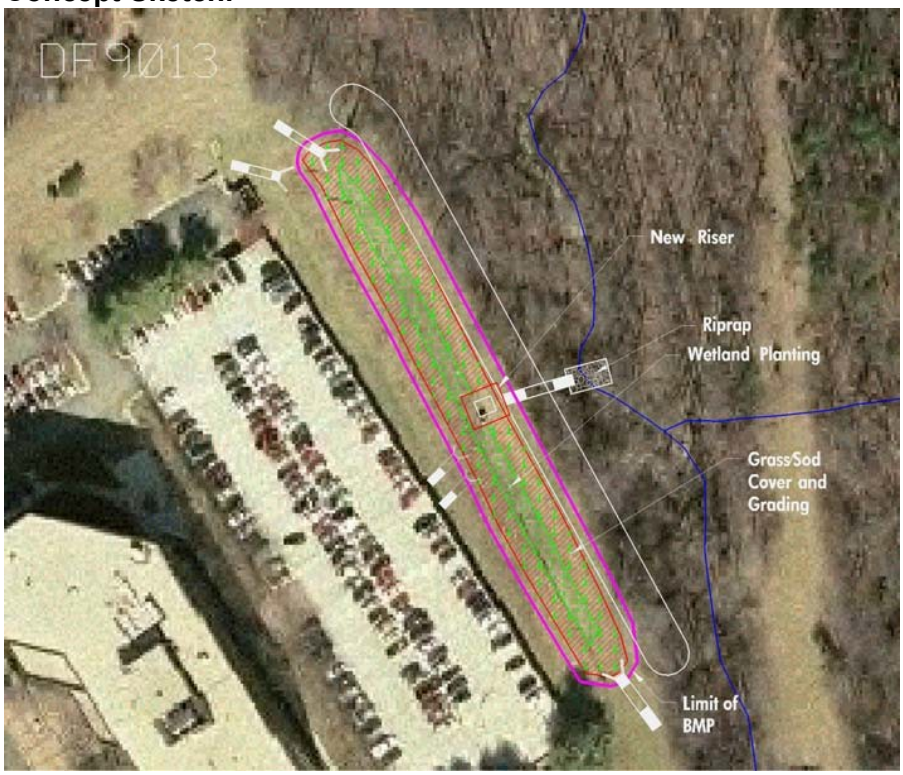
Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.4	AC	$5,000.00	$2,000
Remove Pilot Channels	425	LF	$6.00	$2,550
Grading and Excavation	1300	CY	$30.00	$39,000
Riser	1	LS	$10,000.00	$10,000
Rip Rap Stabilization	25	LF	$50.00	$1,250
Wetland Planting	889	SY	$2.00	$1,778
Dry Landscaping	784	SY	$2.50	$1,960
			Base Construction Cost	**$58,538**
			Mobilization (5%)	$2,927
			Subtotal 1	**$61,465**
			Contingency (25%)	$15,366
			Subtotal 2	**$76,831**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$34,574
			Estimated Project Cost	**$111,000**

This project is part of the alternative project group for Regional Pond D-13. See Table 5-2 for the recommended disposition.

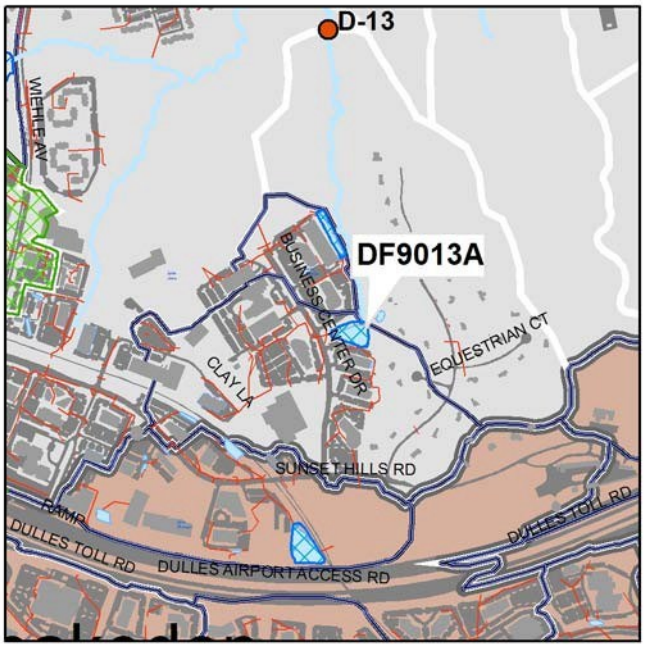
Site Photo:

Concept Sketch:



Project Number: DF9013A
Catchment Code: DFCR9301
Candidate Site: D-13

Project Type: Pond Retrofit
Project Size: 1.0 acres
Treated Area: 69.9 acres



Project Location: This project is located off of Business Center Drive.

Project Description: This dry pond treats runoff from two large storm drain systems. Space limitations require that all improvements be contained within the existing pond boundaries. By excavating to convert this dry pond to a wetland and modifying the riser to improve treatment of smaller storms, the facility will be used to its full potential. Existing sediment forebays will work in conjunction with newly created wetland areas to increase detention time, promote nutrient uptake, and sediment removal.

Potential Project Benefits:

Peak Flow	Modifying the control structure and excavating will provide 60% of the channel protection volume.
Water Quality	Multiple water quality features will provide approximately 30% of the required wet storage volume.

Potential Project Constraints:

Environmental	No environmental permitting issues are anticipated for this project. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is available through adjacent roads and parking lots, but easements or agreements may be required.
Design / Construction	Stabilization of the downstream channel is required. 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
Remove Pilot Channels	350	LF	$6.00	$2,100.00
Grading and Excavation	3963	CY	$30.00	$118,890.00
Riser	1	LS	$10,000.00	$10,000.00
Rip Rap Stabilization	25	LF	$50.00	$1,250.00
Wetland Planting	2282	SY	$2.00	$4,564.00
Dry Landscaping	1334	SY	$2.50	$3,335.00
			Base Construction Cost	**$140,889**
			Mobilization (5%)	$7,044
			Subtotal 1	**$147,933**
			Contingency (25%)	$36,983
			Subtotal 2	**$184,917**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$83,213
			Estimated Project Cost	**$268,000**

This project is part of the alternative project group for Regional Pond D-13. See Table 5-2 for the recommended disposition.

Site Photo:

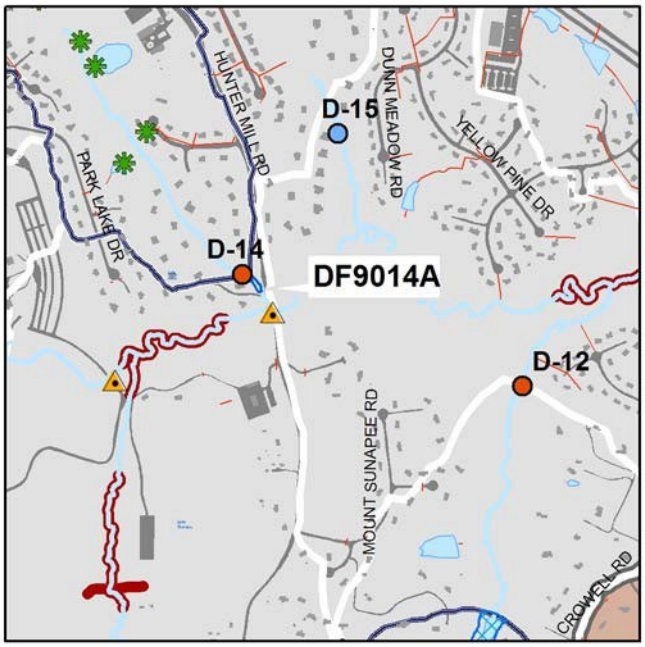
Concept Sketch:

Project Number: DF9014A
Catchment Code: DFCR9001
Candidate Site: D-14

Project Type: Culvert Retrofit
Project Size: 0.2 acres
Treated Area: 123.2 acres

Project Location: This project is located on the upstream side of the culvert under Little Run Court.

Project Description: The culvert retrofit is designed to provide some water quality treatment for this catchment. Because of steep valley walls and restricted space, it is difficult to provide additional detention at this site, and as a result no channel protection storage is provided.



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 about 30% of the water quality volume. Sedimentation and nutrient uptake will also provide treatment.

Potential Project Constraints:

Environmental	Environmental permitting issues would be anticipated for any activity in and around a stream corridor. There are no significant forest or wetland impacts anticipated. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is very good from the roadway
Design / Construction	No significant design or construction issues were noted.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Excavation	220	CY	$35.00	$7,700
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	140	SY	$2.50	$350
Wetland Planting	50	SY	$2.00	$100
			Base Construction Cost	**$13,650**
			Mobilization (5%)	$683
			Subtotal 1	**$14,333**
			Contingency (25%)	$3,583
			Subtotal 2	**$17,916**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$8,062
			Estimated Project Cost	**$26,000**

This project is part of the alternative project group for Regional Pond D-14. See Table 5-2 for the recommended disposition.

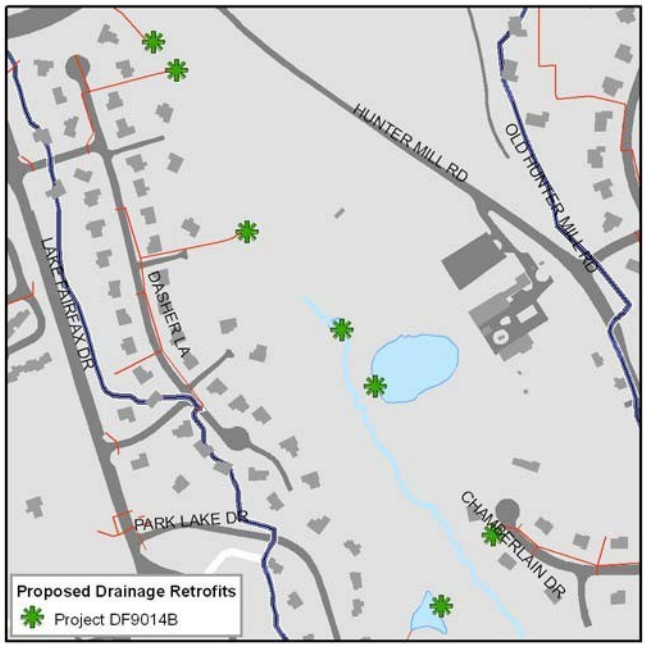
Concept Sketch:

Project Number: DF9014B
Catchment Code: DFCR9001
Candidate Site: D-14

Project Type: Drainage Retrofit
Project Size: 7 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	7	EA	$8,000.00	$56,000
			Base Construction Cost	**$56,000**
			Mobilization (5%)	$2,800
			Subtotal 1	**$58,800**
			Contingency (25%)	$14,700
			Subtotal 2	**$73,500**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$33,075
			Estimated Project Cost	**$107,000**

This project is part of the alternative project group for Regional Pond D-14. See Table 5-2 for the recommended disposition.

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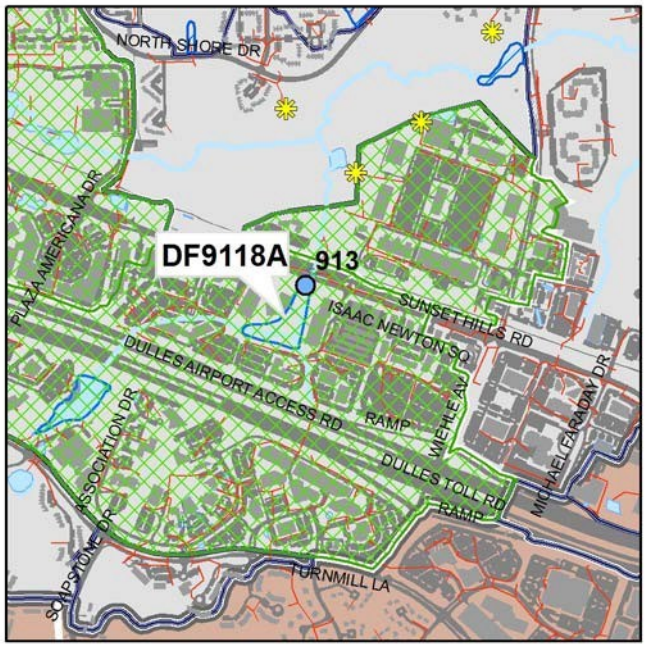
Project Number: DF9118A
Catchment Code: DFCR9401
Candidate Site: C18

Project Type: Pond Retrofit
Project Size: 2.8 acres
Treated Area: 18.8 acres



Project Location: This project is located at the regional pond site upstream of Sunset Hills Road.

Project Description: This large, in-stream facility receives runoff from several surrounding parking lots. Although design options are limited, improvements to reduce peak flow velocities and pollutant loading can be made. There is some permanent wet storage volume outside of the stream channel, where both wet and dry vegetation can be added to the natural channels and surrounding banks. In addition, sediment forebays where storm drains discharge into the pond will provide additional water quality treatment. For channel protection, the outlet culvert can be replaced with a multi-stage control structure designed to reduce erosive velocities of high frequency storms.

Potential Project Benefits:

Streamflow	Modification of the riser structure will provide 20% of the channel protection volume at this site.
Water Quality	A variety of water quality components are proposed to improve pollutant removal performance through sediment removal and nutrient uptake by vegetation.

Potential Project Constraints:

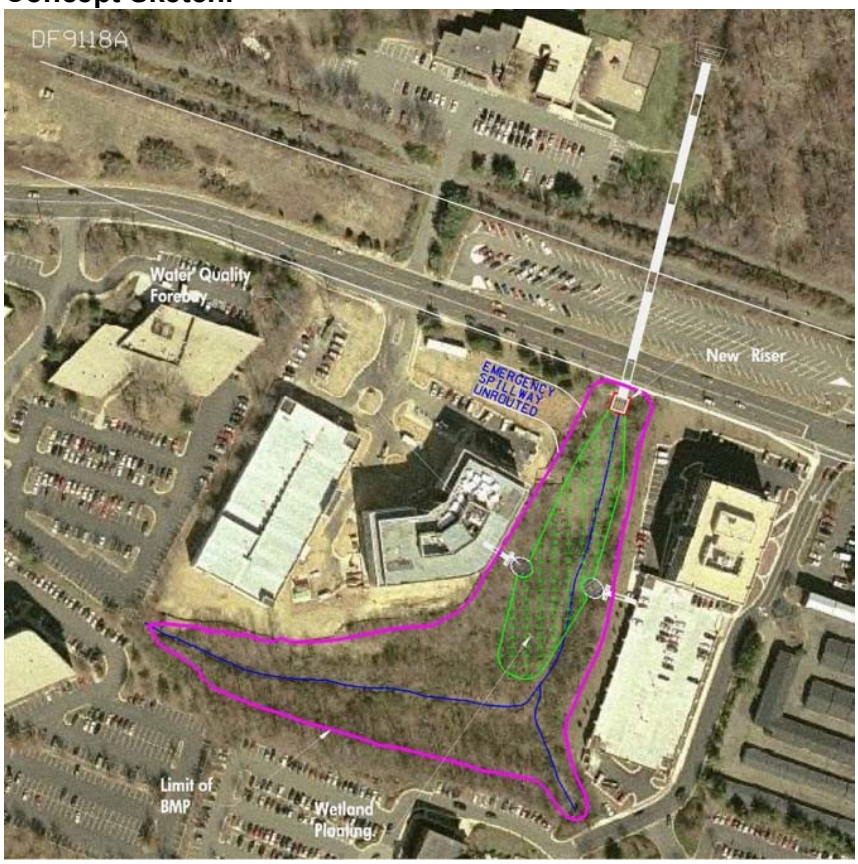
Environmental	Environmental permitting issues are not anticipated for this retrofit project. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this area is very good.
Design / Construction	No specific design or construction issues were noted for this project. County staff will coordinate with the facility owner to implement the project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Forebays (2 locations)	1556	CY	$45.00	$70,020
Riser	1	LS	$10,000.00	$10,000
Wetland Planting	3263	SY	$2.00	$6,526
			Base Construction Cost	**$87,046**
			Mobilization (5%)	$4,352
			Subtotal 1	**$91,398**
			Contingency (25%)	$22,850
			Subtotal 2	**$114,248**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$51,412
			Estimated Project Cost	**$166,000**

Site Photo:

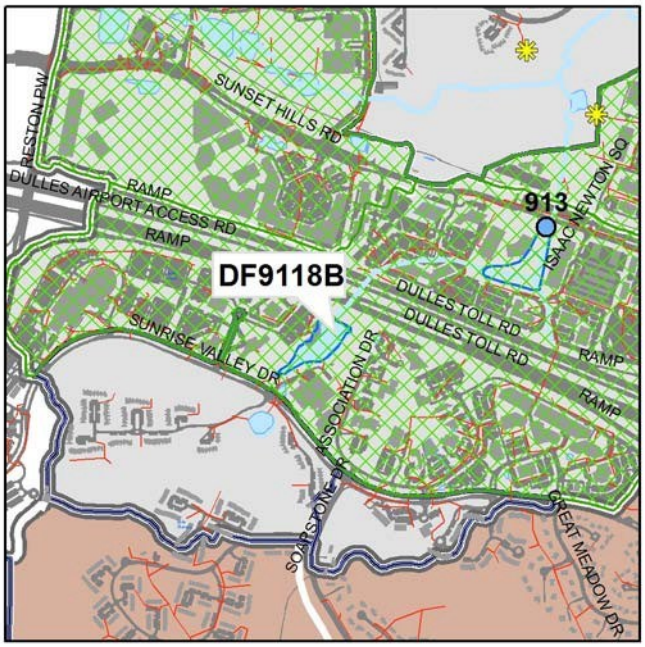
Concept Sketch:



Project Number: DF9118B
Catchment Code: DFCR9401
Candidate Site: C18

Project Type: Pond Retrofit
Project Size: 2.4 acres
Treated Area: 70.3 acres

Project Location: Upstream side of the Dulles Toll Road off of Sunrise Valley Drive



Project Description: This wet pond is located in an industrial park and discharges into a concrete ditch that drops down to a riprap channel. The existing single-stage riser can be replaced with a multi-stage riser designed for increased management of smaller storms. The permanent wet storage volume within this pond meets the calculated water quality volume. There is sufficient volume to construct an aquatic bench to improve vegetative uptake.

Potential Project Benefits:

Streamflow	Peak flow rates would be reduced by this project. Approximately 80% of the channel protection volume can be met by replacing the riser.
Water Quality	100% of the water quality volume is met at this location

Potential Project Constraints:

Environmental	Environmental permitting should not be an issue at this facility. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to the facility is good from surrounding parking lots. Easements will be required.
Design / Construction	No design or construction constraints are anticipated. 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
Sidewalk Removal	120	SF	$13.50	$1,620
Excavation/Grading (aquatic bench)	4720	CY	$30.00	$141,600
Outlet Protection	1	EA	$8,000.00	$8,000
Construct Sidewalk	120	SF	$5.00	$600
Riser	1	LS	$10,000.00	$10,000
Wetland Planting (aquatic bench)	1567	SY	$2.00	$3,134
			Base Construction Cost	**$166,454**
			Mobilization (5%)	$8,323
			Subtotal 1	**$174,777**
			Contingency (25%)	$43,694
			Subtotal 2	**$218,471**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$98,312
			Estimated Project Cost	**$317,000**

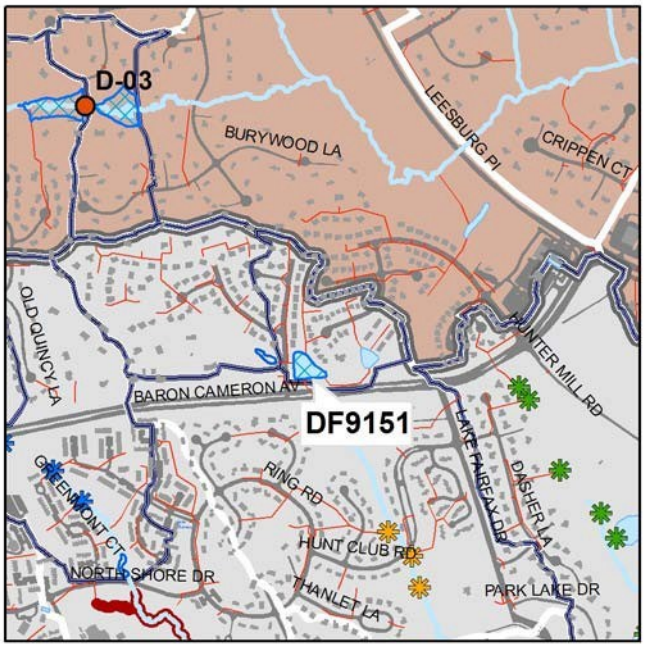
Site Photo:

Concept Sketch:

Project Number: DF9151
Catchment Code: DFCR9501
Candidate Site: C51

Project Type: Pond Retrofit
Project Size: 0.9 acres
Treated Area: 21.6 acres

Project Location: North of Baron Cameron Avenue and east of Gates Meadow Way



Project Description: This wet pond treats the drainage from a single-family residential area. The existing single-stage riser can be replaced with a multi-stage riser designed for increased management of smaller storms. The permanent wet storage volume within this pond meets the calculated water quality volume. There is sufficient storage to construct an aquatic bench to improve vegetative uptake.

Potential Project Benefits:

Streamflow	Peak flow rates would be reduced by this project. 100% of the channel protection volume can be met by replacing the riser.
Water Quality	100% of the water quality volume is met at this location. An aquatic bench with wetland vegetation will improve performance.

Potential Project Constraints:

Environmental	Environmental permitting should not be an issue at this facility. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to the facility is good from surrounding parking lots.
Design / Construction	No design or construction constraints are anticipated. County staff will coordinate with the facility owner to implement the project.

Costs:

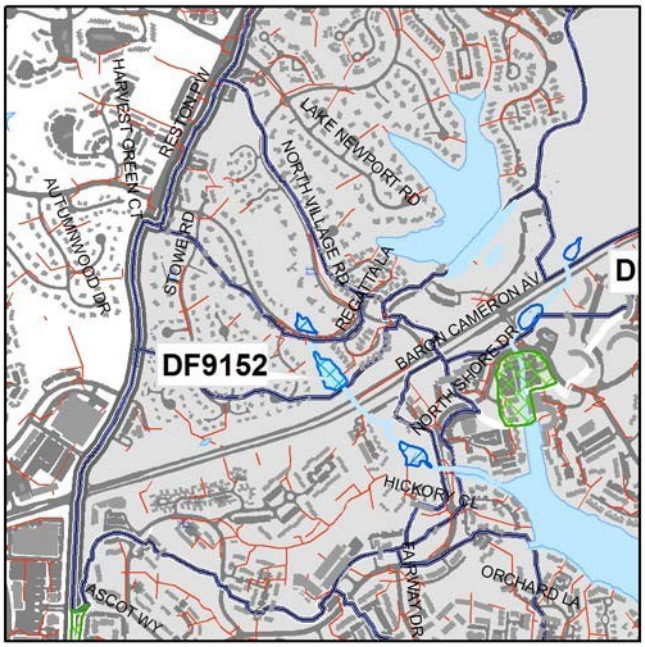
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Riser Structure	1	LS	$10,000.00	$10,000
Grading (aquatic bench)	920	CY	$30.00	$27,600
Wetland Planting	550	SY	$2.00	$1,100
			Base Construction Cost	**$39,200**
			Mobilization (5%)	$1,960
			Subtotal 1	**$41,160**
			Contingency (25%)	$10,290
			Subtotal 2	**$51,450**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$23,153
			Estimated Project Cost	**$75,000**

Concept Sketch

Project Number: DF9152
Catchment Code: DFCR9902
Candidate Site: C52

Project Type: Pond Retrofit
Project Size: 0.9 acres
Treated Area: 35.2 acres

Project Location: This project is along Baron Cameron Avenue



Project Description: This facility has experienced significant aggradation of sediment. Channel protection volume can be created by constructing a weir in front of the existing culvert with an orifice sized to detain the 1-year event. Since this pond is located in-stream in a well-forested area, it is not recommended to clear established vegetation. Small pockets of wetland areas currently function as water quality components with some settling of sediment taking place. A forebay can be installed at the storm drain outfall to treat runoff before entering the stream, and rip rap stabilization at the pond outfall will slow the discharge to protect the downstream channel. .

Potential Project Benefits:

Streamflow	100% of the channel protection requirement can be achieved by modifying the control structure.
Water Quality	A reduction in sediment loads will result from reducing erosive peak flow velocities downstream.

Potential Project Constraints:

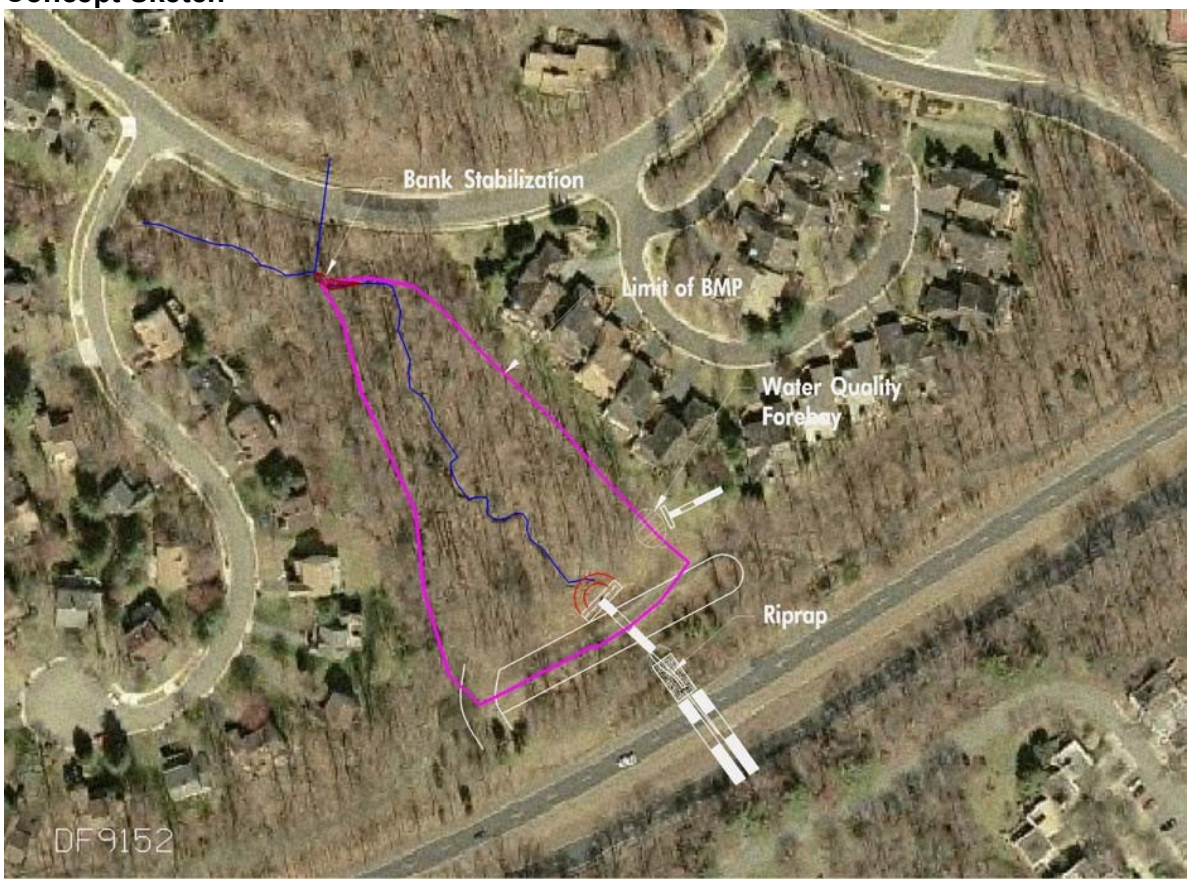
Environmental	Environmental permitting issues are not anticipated for this retrofit project. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is good from public roads.
Design / Construction	Maintenance is required to remove sediment accumulated in the basin of this facility. 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
Forebay	96	CY	$45.00	$4,320
Outlet Protection	1	EA	$8,000.00	$8,000
Riser	1	LS	$10,000.00	$10,000
Rip Rap Stabilization	30	LF	$50.00	$1,500
			Base Construction Cost	**$24,320**
			Mobilization (5%)	$1,216
			Subtotal 1	**$25,536**
			Contingency (25%)	$6,384
			Subtotal 2	**$31,920**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$14,364
			Estimated Project Cost	**$46,000**

Site Photo:

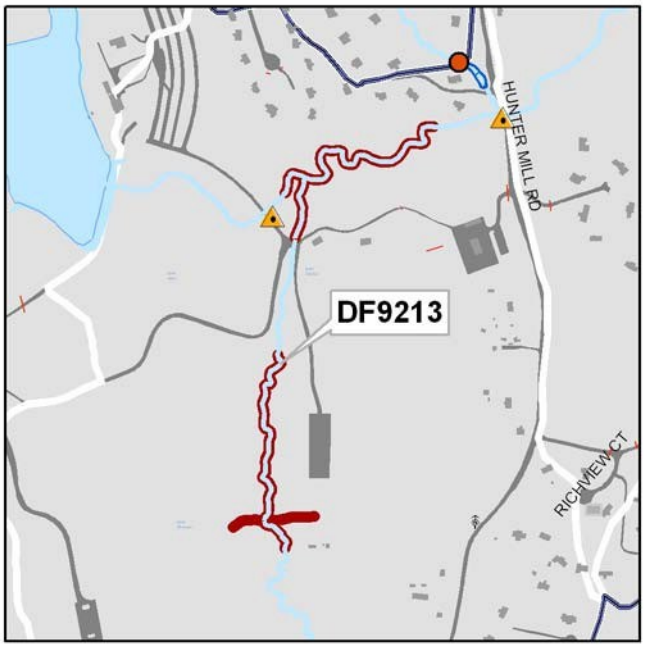
Concept Sketch



Project Number: DF9213
Catchment Code: DFCR0007
Candidate Site: S13

Project Type: Stream Restoration
Project Size: 2200 Linear Feet

Project Location: This project is located in Lake Fairfax Park west of Hunter Mill Rd.



Project Description:
The stream is eroding its banks and is incised. The riparian zone is non-forested for significant portions of the reach. An unstable dam structure is located directly downstream of the confluence of the reach and Colvin Run. The stream is located along a park road in Lake Fairfax Park. A pattern, dimension, and profile will be created that more closely resembles a natural stream. Native trees and shrubs will be planted in the riparian zone.

Potential Project Benefits:

Stream Stability	Restoring the pattern, dimension, and profile of the stream will reduce stress on the banks and reduce erosion.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction 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. It will require a permit from the U.S. Army Corps of Engineers.
Facility Access	Access to this facility is good via existing park roads and open areas.
Design / Construction	Design efforts are moderate compared to other stream restoration projects. General constructability is good.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	718	LF	$250.00	$179,500
Stabilize in place -- grading	796	LF	$175.00	$139,300
Stabilize in place -- armoring	750	LF	$225.00	$168,750
Buffer restoration	included	LF	$25.00	$0
Add'l cost, first 500 LF	500	LF	$200.00	$100,000
			Base Construction Cost	**$587,550**
			Mobilization (5%)	$29,378
			Subtotal 1	**$616,928**
			Contingency (25%)	$154,232
			Subtotal 2	**$771,159**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$347,022
			Estimated Project Cost	**$1,118,000**

Concept Sketch

Project Number: DF9249
Catchment Code: DFCR9701
Candidate Site: S49

Project Type: Stream Restoration
Project Size: 701 Linear Feet

Project Location: This project is located within the Westbriar Country Club Estates, south of Fairway Drive and west of Hook Road.

Project Description: The stream is eroding both its banks and is severely incised. It is straight and has cut down to bedrock. A majority of the riparian zone is not forested. The reach is located on a golf course. The bed will be reworked to promote stable, diverse bend features. The banks will be reshaped and stabilized and a floodplain bench will be excavated. Native trees and shrubs will be planted in the riparian zone to the maximum extent possible.

Potential Project Benefits:

Stream Stability	The pattern, dimension, and profile of the stream will be corrected.
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. It will require a permit from both the U.S. Army Corps of Engineers and VDEQ.
Facility Access	Access to this facility will require an easement through the golf course but is open and unconstrained adjacent to the stream.
Design / Construction	Design efforts are moderate compared to other stream restoration projects. Constructability may be constrained by managing the continuing us of the golf course while completing the stream restoration.

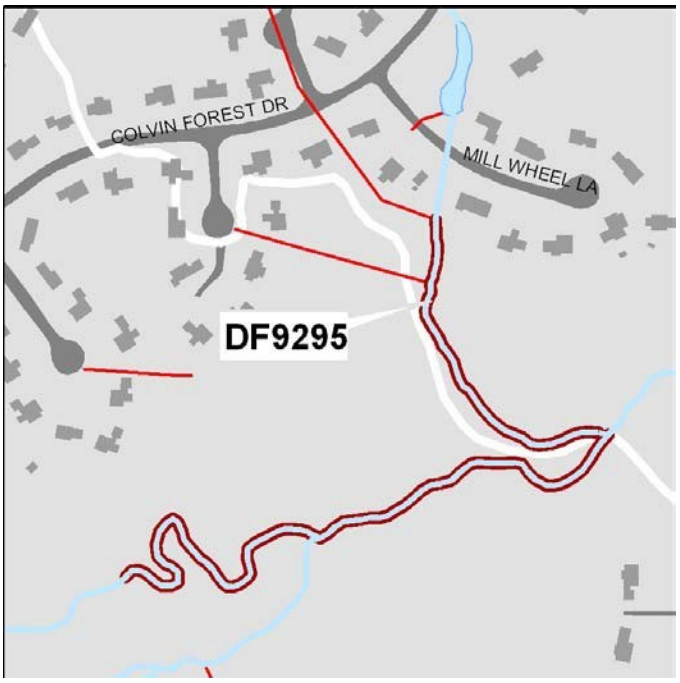
Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Stabilize in place -- grading	701	LF	$175.00	$122,675
Buffer restoration	included	LF	$25.00	$0
Add'l cost, first 500 LF	500	LF	$200.00	$100,000
			Base Construction Cost	**$222,675**
			Mobilization (5%)	$11,134
			Subtotal 1	**$233,809**
			Contingency (25%)	$58,452
			Subtotal 2	**$292,261**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$131,517
			Estimated Project Cost	**$424,000**

Concept Sketch

Project Number: DF9295
Catchment Code: DFCR0008
Candidate Site: S95

Project Type: Stream Restoration
Project Size: 2508 Linear Feet
Project Location: This project is located on the mainstem and one tributary of Colvin Run south of Mill Wheel Lane.



Project Description: The stream has become incised and developed a meander pattern that does not match the current flow regime, and as a result the streambanks are eroding and unstable. The restoration approach will be to adjust the pattern and profile to a more stable configuration, raising the streambed and armoring the banks in some locations. Stream buffers will be restored. **Portions of this project may be constructed or superseded by Reston Association work in this stream channel.**

Potential Project Benefits:

Stream Stability	Regrading and armoring 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 establishing 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 Corps of Engineers and VDEQ.
Facility Access	Access is available through public property or easements.
Design / Construction	Design efforts are less complex than other projects. The size of the mainstem channel will present some constraints to construction.

Costs

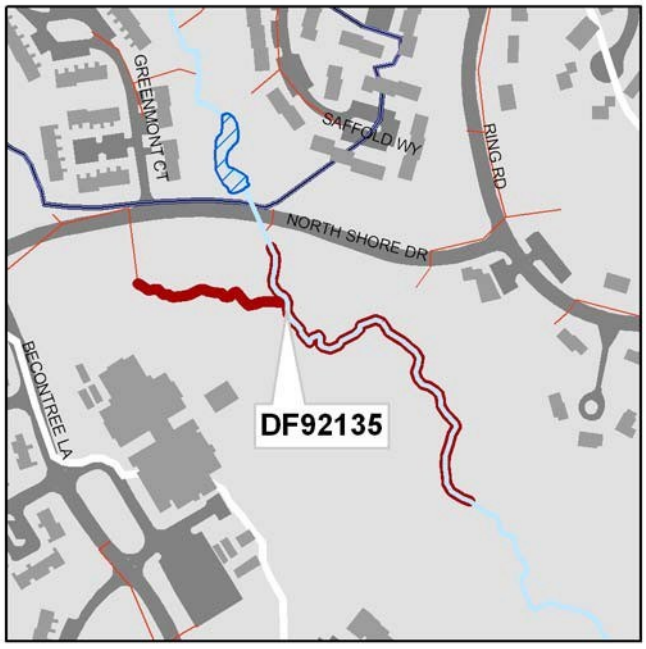
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	2508	LF	$250.00	$627,000
Buffer restoration	included	LF	$25.00	$0
Add'l cost, first 500 LF	500	LF	$200.00	$100,000
			Base Construction Cost	**$727,000**
			Mobilization (5%)	$36,350
			Subtotal 1	**$763,350**
			Contingency (25%)	$190,838
			Subtotal 2	**$954,188**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$429,384
			Estimated Project Cost	**$1,384,000**

Concept Sketch

Site Photo:

Number: DF92135
Catchment Code: DFCR9601
Candidate Site: S135

Project Type: Stream Restoration
Project Size: 1600 Linear Feet



Project Location: This project is located south of North Shore Drive near Forest Edge Elementary School.

Project Description: A failing stormwater outfall has been undermined by erosion. The banks and bed are eroding and have caused the end of the concrete outfall structure to fall into the stream, which may cause more erosion, and is creating a potentially unsafe condition. The outfall should be relocated back and a new outlet structure installed with an energy reduction device that will inhibit the erosive forces of the stormwater. The upstream and downstream banks will be stabilized. Native trees and shrubs can be planted in the along the stream banks to provide increased bank protection. A dry pond facility has also been recommended for this site, project DF9150.

Potential Project Benefits:

Stream Stability	The stream banks will be stabilized and the outfall corrected.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction will improve physical habitat conditions by reducing downstream sedimentation.

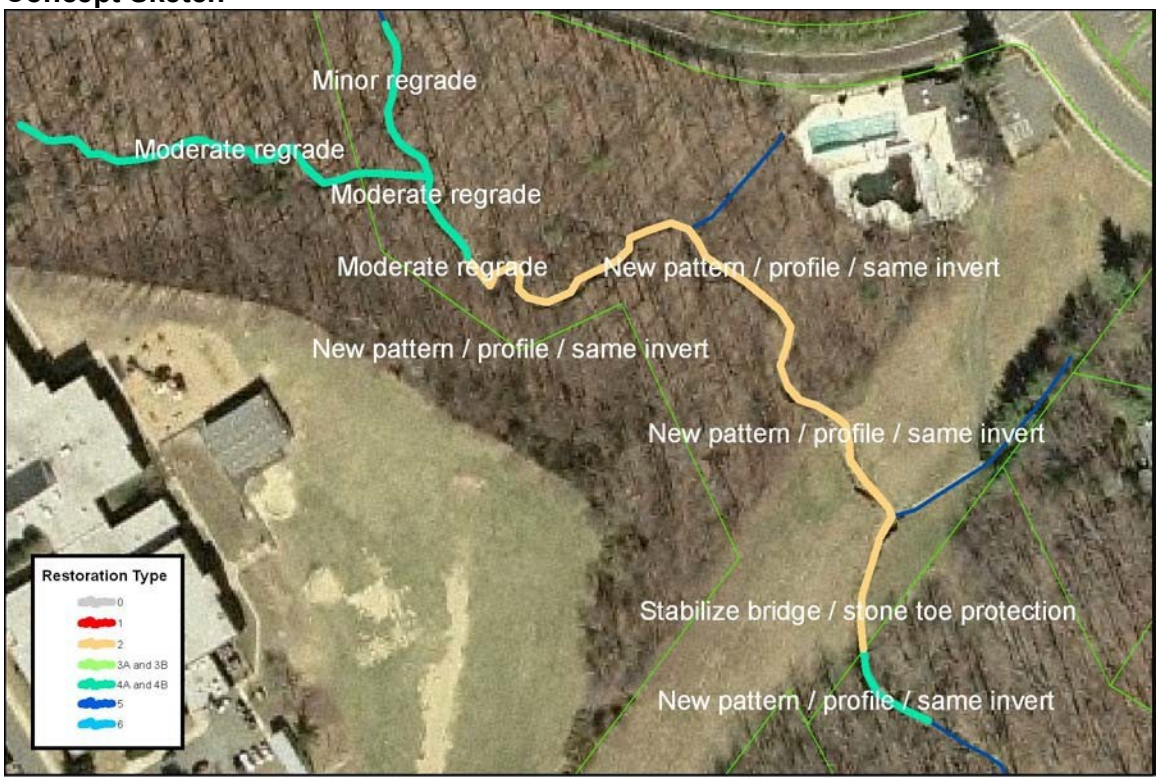
Potential Project Constraints:

Environmental	The site will require some forest clearing. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this facility will either be via North Shore Drive or from the Forest Edge property.
Design / Construction	Design efforts will be minimal compared to other stream restoration projects. General constructability is good.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Reconstruct new pattern and profile	889	LF	$250.00	$222,250
Stabilize in place -- grading	626	LF	$175.00	$109,550
Stabilize in place -- armoring	92	LF	$225.00	$20,700
Buffer restoration	included	LF	$25.00	$0
Add'l cost, first 500 LF	500	LF	$200.00	$100,000
			Base Construction Cost	**$452,500**
			Mobilization (5%)	$22,625
			Subtotal 1	**$475,125**
			Contingency (25%)	$118,781
			Subtotal 2	**$593,906**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$267,258
			Estimated Project Cost	**$861,000**

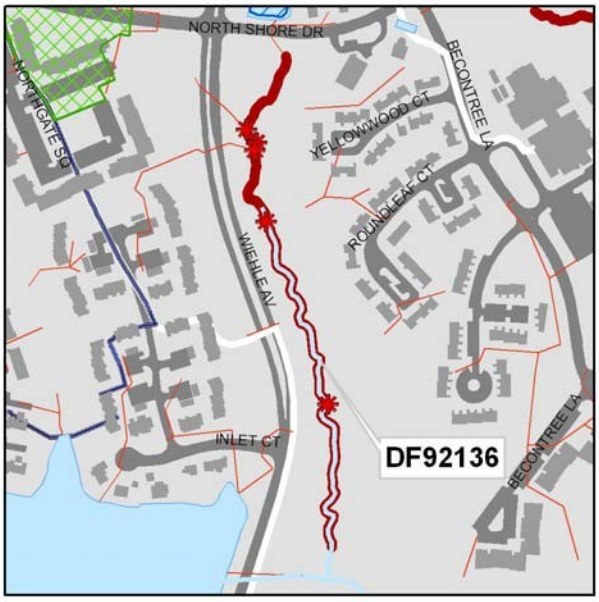
Concept Sketch



Project Number: DF92136
Catchment Code: DFCR9904
Candidate Site: S136

Project Type: Stream Restoration
Project Size: 1850 Linear Feet

Project Location: This project is east of Wiehle Ave and south of Yellowwood Ct.



Project Description: The outfall at the headwater is being undermined and will likely fail if left untreated. Several pipes are exposed above the streambed. A severe obstruction is located at the downstream end of the channel, which is likely blocking fish passage to upstream habitat. Bed and bank erosion occurs throughout the reach and the channel appears overwidened. A pattern, dimension, and profile will be created that more closely resembles a natural stream. The outfalls will need to be replaced and the blockage removed. Banks will be stabilized and bed morphology will be improved. Native trees and shrubs will be replaced along the stream banks to provide stability. **Portions of this project may be constructed or superseded by Reston Association work in this stream channel.**

Potential Project Benefits:

Stream Stability	The pattern, dimension, and profile of the stream will be corrected.
Water Quality	Water quality will be improved by a significant reduction in current and future bank and bed erosion.
Instream Habitat	Erosion reduction will improve physical habitat conditions by reducing downstream sedimentation. By resizing the channel, a deeper baseflow channel will result, which provides better instream habitat.

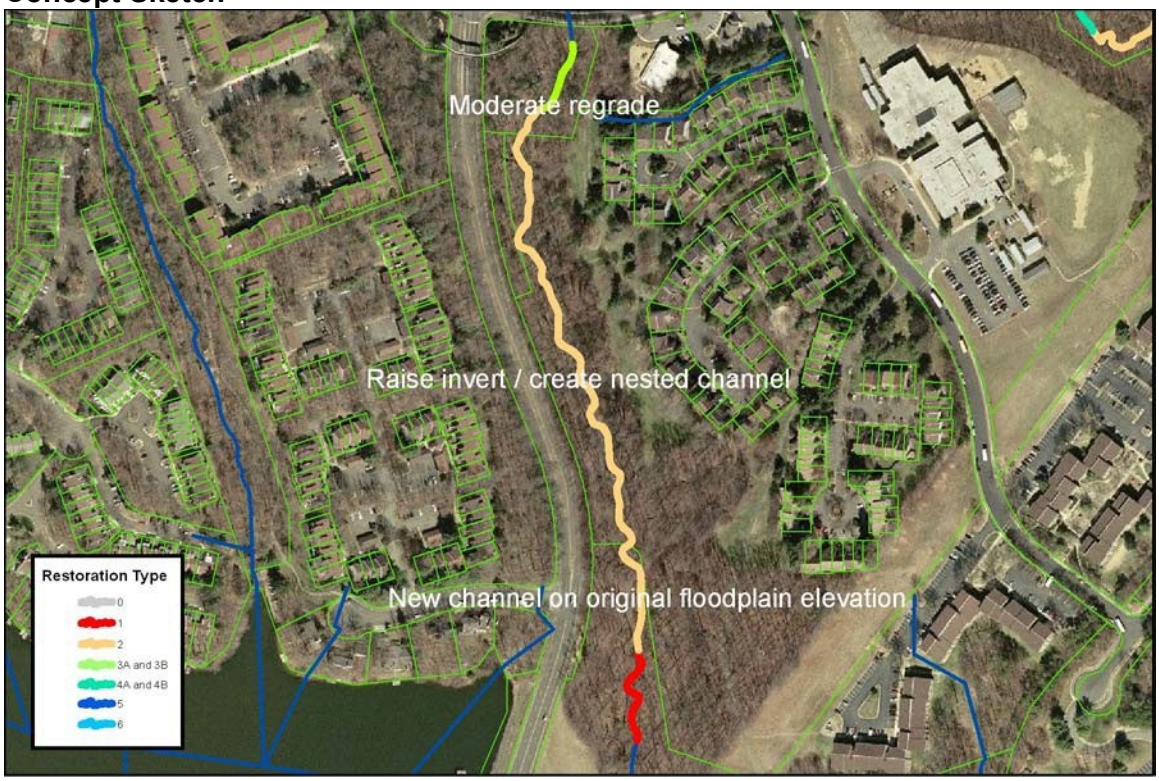
Potential Project Constraints:

Environmental	The site will require some forest clearing. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this facility is very good from Wiehle Avenue.
Design / Construction	Design efforts will be moderate compared to other stream restoration projects. General constructability is good.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct new channel	246	LF	$200.00	$49,200
Reconstruct new pattern and profile	1437	LF	$250.00	$359,250
Change channel type -- nested channel	185	LF	$200.00	$37,000
Buffer restoration	included	LF	$25.00	$0
Add'l cost, first 500 LF	500	LF	$200.00	$100,000
			Base Construction Cost	**$545,450**
			Mobilization (5%)	$27,273
			Subtotal 1	**$572,723**
			Contingency (25%)	$143,181
			Subtotal 2	**$715,903**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$322,156
			Estimated Project Cost	**$1,038,000**

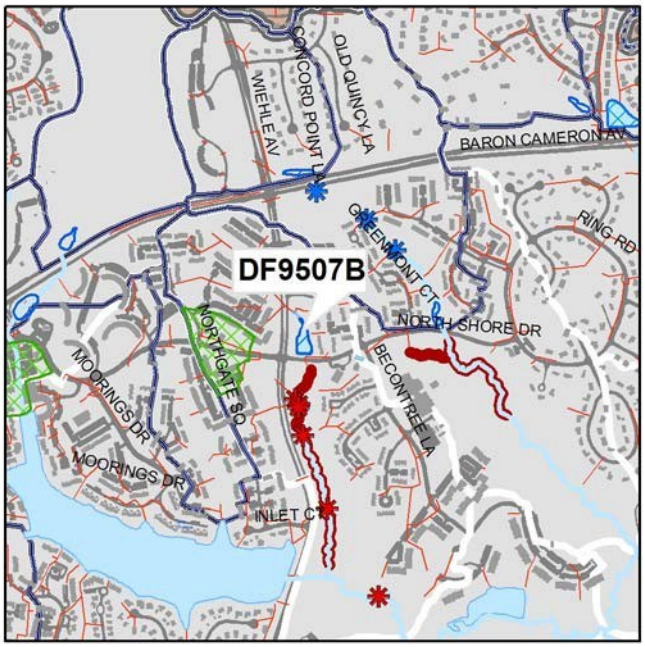
Concept Sketch



Project Number: DF9507B
Catchment Code: DFCR9904
Candidate Site: C07

Project Type: Culvert Retrofit
Project Size: 0.5 acres
Treated Area: 31 acres

Project Location: Northeast corner of the intersection of North Shore Drive and Wiehle Avenue.



Project Description: The intent of this project is to improve channel protection for the degraded stream below North Shore Drive. This catchment has large areas of high-density residential land use with little stormwater management. The culvert retrofit will consist of an impoundment structure with a maximum depth of 10 feet, excavation of the incised stream and creation of a low flow channel.

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 extended detention, along with vegetative uptake on the floodplain.

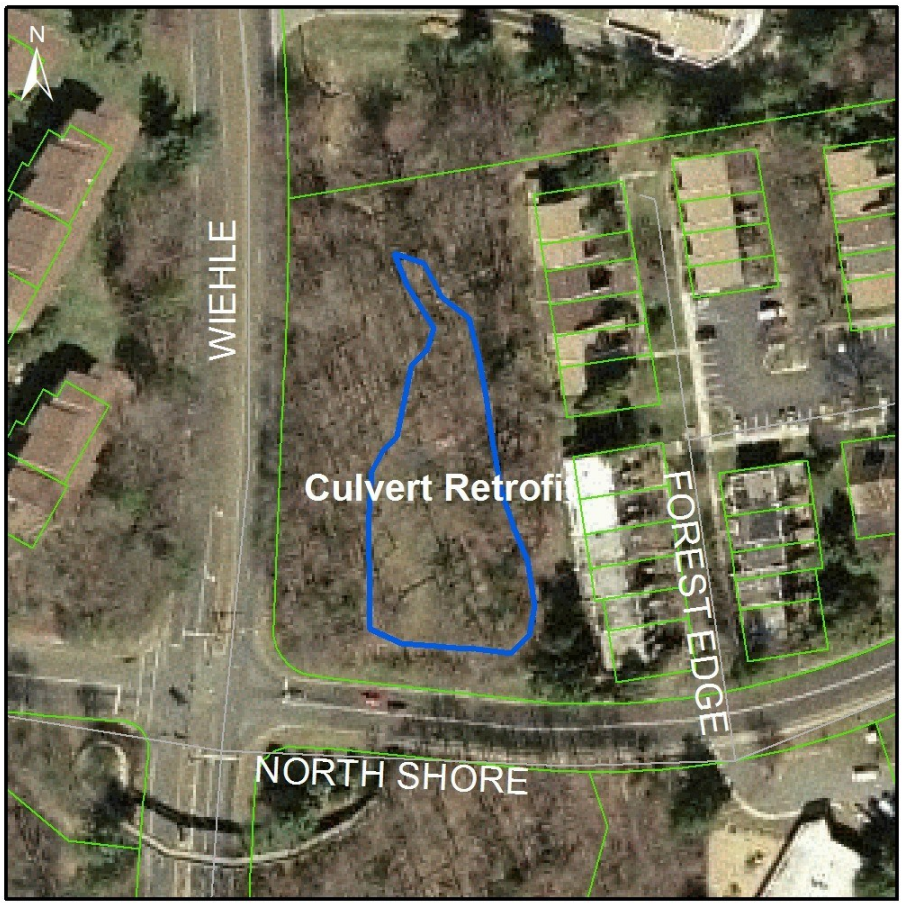
Potential Project Constraints:

Environmental	Environmental permitting issues would be anticipated for any activity in and around a stream corridor. Forest and wetland impacts are anticipated during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is very good from the roadway
Design / Construction	No significant design or construction issues were noted.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.3	AC	$5,000.00	$1,500
Excavation	1,760	CY	$35.00	$61,600
Impoundment Structure	1	LS	$10,000.00	$10,000
Landscaping	1,220	SY	$2.50	$3,050
Wetland Planting	310	SY	$2.00	$620
			Base Construction Cost	**$76,770**
			Mobilization (5%)	$3,839
			Subtotal 1	**$80,609**
			Contingency (25%)	$20,152
			Subtotal 2	**$100,761**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$45,342
			Estimated Project Cost	**$146,000**

Concept Sketch

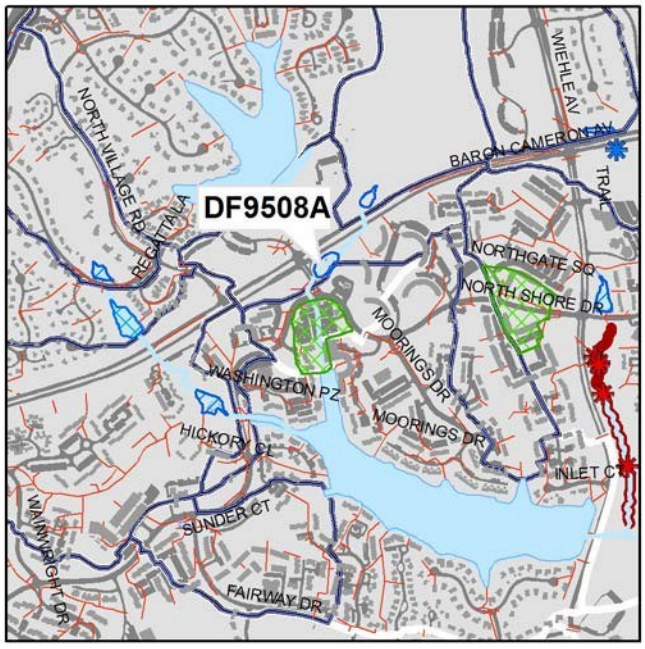


Project Number: DF9508A
Catchment Code: DFCR9802
Candidate Site: C08

Project Type: Culvert Retrofit
Project Size: 0.6 acres
Treated Area: 34.3 acres

Project Location: Along Village Road and Baron Cameron Avenue.

Project Description: This project is a small culvert retrofit designed to improve water quality. There are no natural streams between the site and Lake Anne, so channel protection is not needed. The flow to the culvert is steep and the channel is armored with approximately 100 feet of concrete channel. Removal of the channel would be incorporated into the design.



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 about 25% of the water quality volume as extended detention. Sedimentation and nutrient uptake will also provide treatment.

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 would occur during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	No unusual design or construction issues were found.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.2	AC	$5,000.00	$1,000
Remove Pilot Channels	100	LF	$6.00	$600
Excavation	330	CY	$35.00	$11,550
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	530	SY	$2.50	$1,325
Wetland Planting	180	SY	$2.00	$360
			Base Construction Cost	**$19,835**
			Mobilization (5%)	$992
			Subtotal 1	**$20,827**
			Contingency (25%)	$5,207
			Subtotal 2	**$26,033**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$11,715
			Estimated Project Cost	**$38,000**

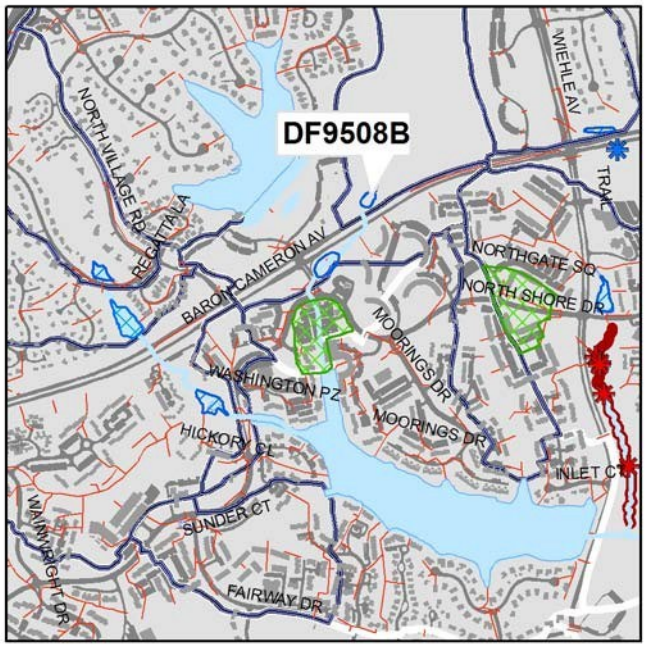
Concept Sketch

Project Number: DF9508B
Catchment Code: DFCR9802
Candidate Site: C08

Project Type: Culvert Retrofit
Project Size: 0.3 acres
Treated Area: 46 acres

Project Location: Along Baron Cameron Avenue

Project Description: This project is a culvert retrofit at Baron Cameron Avenue. The drainage area to this point is approximately 50 percent wooded cover and 50 percent recreational use. There are no natural streams between the site and Lake Anne, therefore this project's focus is on water quality improvement by constructing a wetland detention area.



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 about 80% of the water quality volume. Sedimentation and nutrient uptake will also provide treatment.

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 would occur during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	The design will have to take into account the recreational trail and other uses fairly close to the site.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Excavation	80	CY	$35.00	$2,800
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	260	SY	$2.50	$650
Wetland Planting	90	SY	$2.00	$180
			Base Construction Cost	**$9,130**
			Mobilization (5%)	$457
			Subtotal 1	**$9,587**
			Contingency (25%)	$2,397
			Subtotal 2	**$11,983**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$5,392
			Estimated Project Cost	**$17,000**

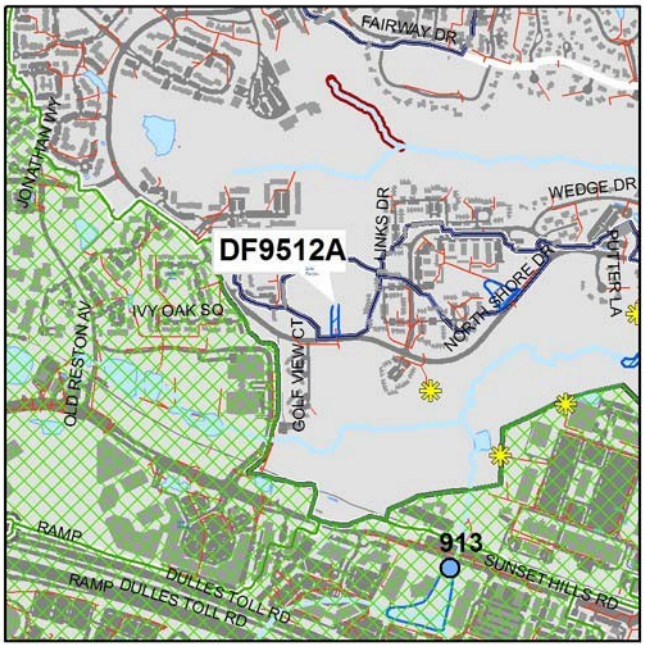
Concept Sketch

Project Number: DF9512A
Catchment Code: DFCR0003
Candidate Site: C12

Project Type: Culvert Retrofit
Project Size: 0.3 acres
Treated Area: 8.5 acres

Project Location: Upstream of North Shore Drive

Project Description: This project is a culvert retrofit to a culvert under North Shore Drive. The drainage area to this culvert is a small section of a golf course. The primary focus of this culvert retrofit should be to provide some detention of storm runoff and a water quality treatment area where natural processes can remove potential nutrient and other contaminants.



Potential Project Benefits:

Streamflow	This retrofit would provide 100% of the channel storage volume and help to reduce erosive flows downstream.
Water Quality	The project has sufficient storage to treat 100% of the water quality volume. Sedimentation and nutrient uptake will also provide treatment.

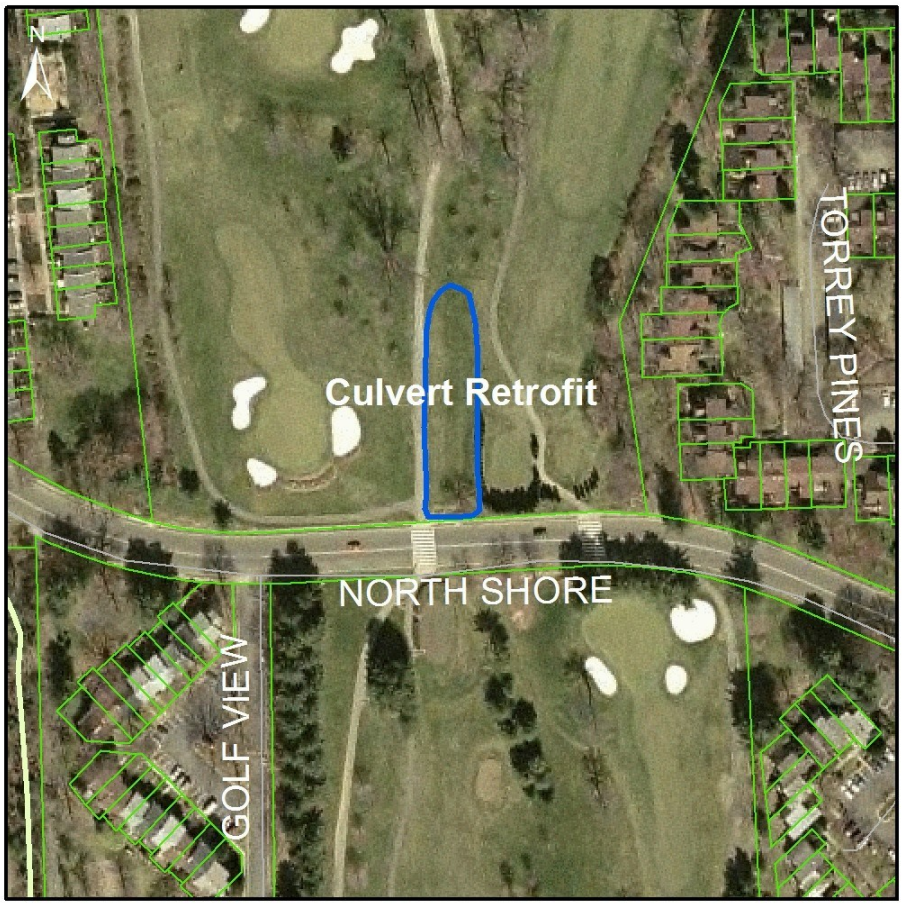
Potential Project Constraints:

Environmental	Environmental permits and constraints are not anticipated at this site. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is very good from public roads.
Design / Construction	This appears to be located on a golf course.

Costs:

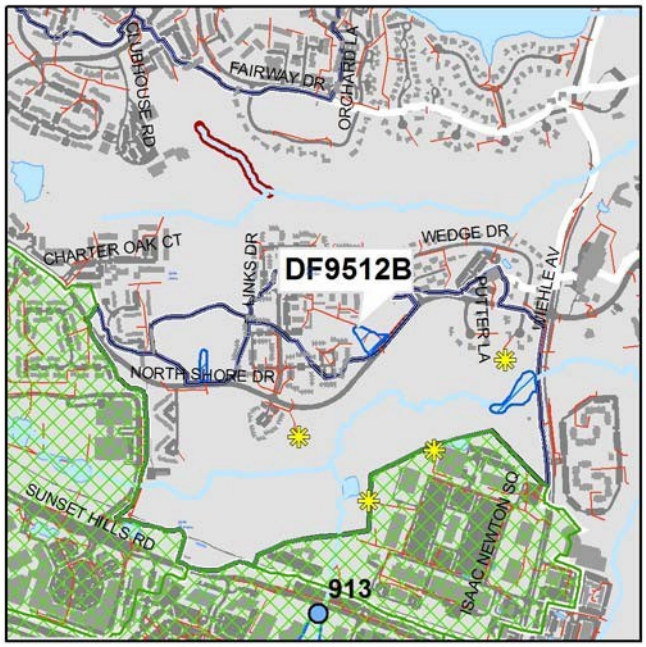
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Excavation	190	CY	$35.00	$6,650
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	300	SY	$2.50	$750
Wetland Planting	100	SY	$2.00	$200
			Base Construction Cost	**$13,100**
			Mobilization (5%)	$655
			Subtotal 1	**$13,755**
			Contingency (25%)	$3,439
			Subtotal 2	**$17,194**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$7,737
			Estimated Project Cost	**$25,000**

Concept Sketch



Project Number: DF9512B
Catchment Code: DFCR0003
Candidate Site: C12

Project Type: Culvert Retrofit
Project Size: 0.7 acres
Treated Area: 16 acres



Project Location: Upstream of North Shore Drive, east of project DF9512A.

Project Description: This project is a retrofit to a culvert at North Shore Avenue. The drainage area to this culvert is highly commercial. The primary focus of this culvert retrofit should be to provide channel protection storage to release the discharge at a lower rate. This would reduce erosive impacts on the stream and sediment loads. The outfall on the opposite side of North Shore Drive needs to be reinforced as stormwater is scouring and eroding the downstream channel.

Potential Project Benefits:

Streamflow	This retrofit would provide 100% of the channel storage volume and help to reduce erosive flows downstream.
Water Quality	Some improvements to water quality would be obtained through the reduction in scour forming discharges downstream, and sedimentation and vegetative uptake at the site.

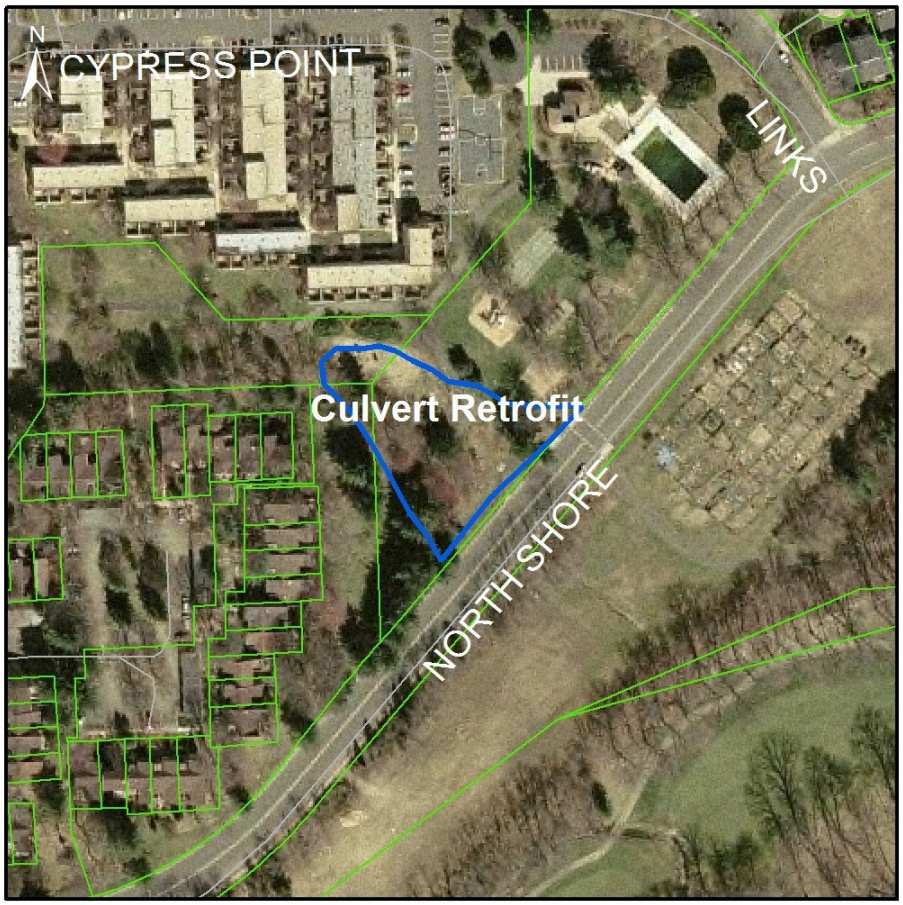
Potential Project Constraints:

Environmental	Environmental constraints are not anticipated at this site. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is very good from public roads.
Design / Construction	No specific design or construction issues were noted for this project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.2	AC	$5,000.00	$1,000
Excavation	300	CY	$35.00	$10,500
Embankment	1,600	CY	$60.00	$96,000
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	640	SY	$2.50	$1,600
Wetland Planting	220	SY	$2.00	$440
			Base Construction Cost	**$114,540**
			Mobilization (5%)	$5,727
			Subtotal 1	**$120,267**
			Contingency (25%)	$30,067
			Subtotal 2	**$150,334**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$67,650
			Estimated Project Cost	**$218,000**

Concept Sketch

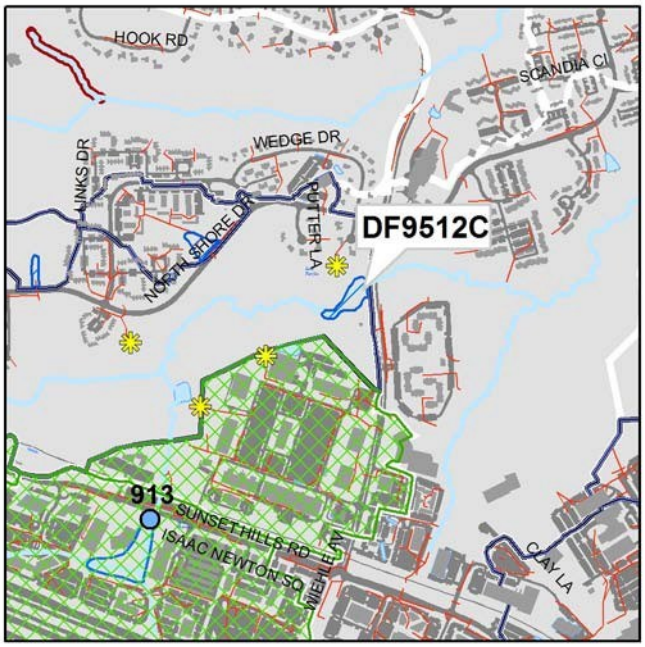


Project Number: DF9512C
Catchment Code: DFCR0003
Candidate Site: C12

Project Type: Culvert Retrofit
Project Size: 1.1 acres
Treated Area: 108.4 acres

Project Location: On the mainstem of Colvin Run under Wiehle Avenue

Project Description: This project is a retrofit to the culvert at Wiehle Avenue. The drainage area to this culvert consists of commercial, residential and recreational land uses. The primary focus of this culvert retrofit should be to provide some channel protection and detention for the runoff from smaller storms. **Portions of this project may be constructed or superseded by Reston Association work in this stream channel.**



Potential Project Benefits:

Streamflow	The project will provide approximately 15% of the channel protection volume.
Water Quality	Some reduction of pollutants will occur with increased settling associated with extended detention, along with vegetative uptake on the site.

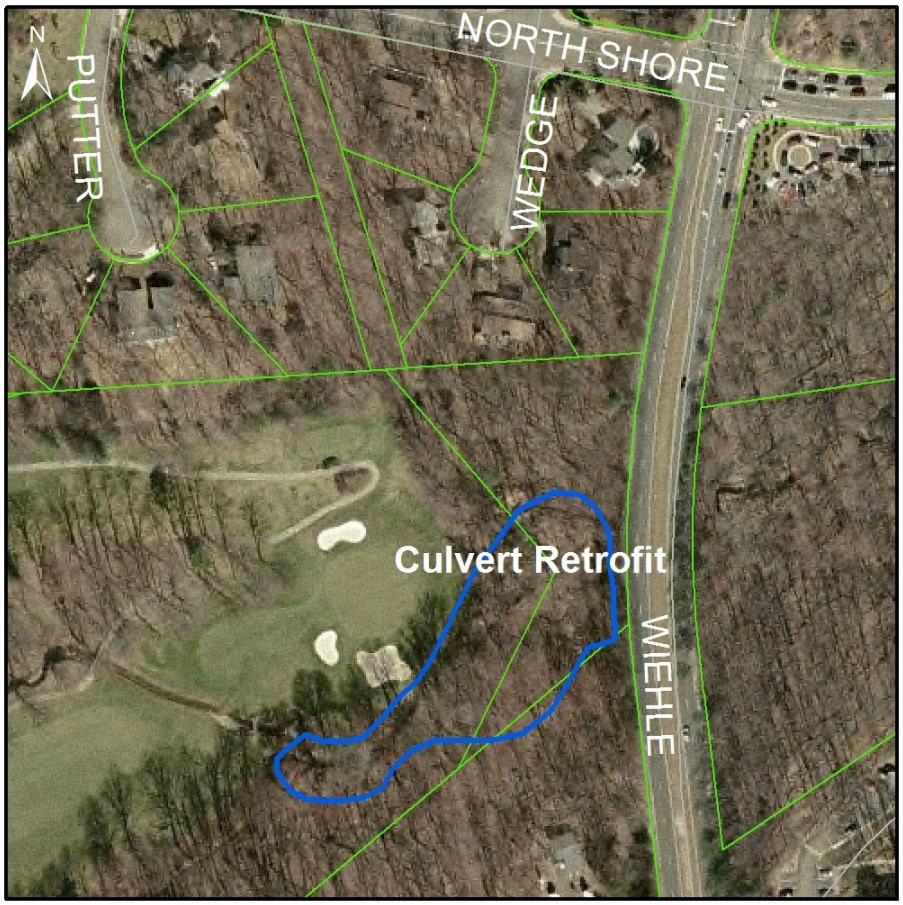
Potential Project Constraints:

Environmental	Environmental permitting issues would be anticipated for any activity in and around a stream corridor. Forest and wetland impacts are anticipated during construction and may require a permit from the U.S. Army Corps of Engineers or VDEQ. Projects in RPAs may require exceptions or waivers.
Facility Access	Access is very good from the roadway
Design / Construction	No significant design or construction issues were noted.

Costs:

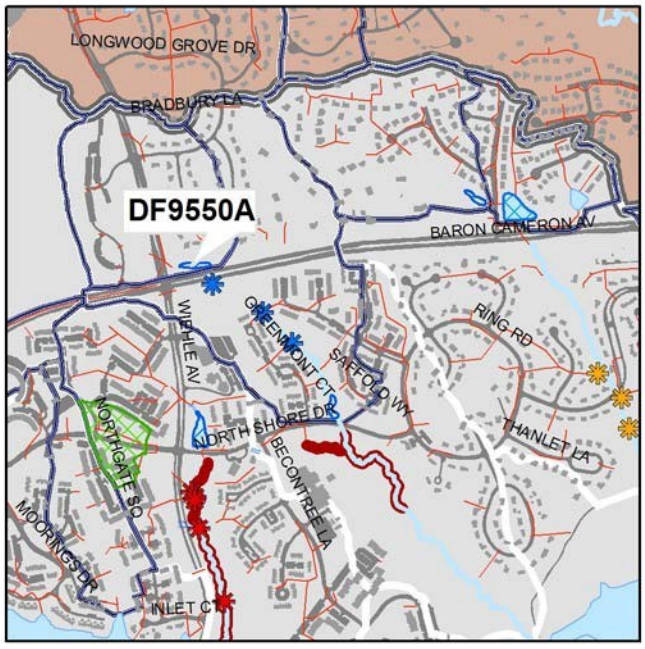
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.3	AC	$5,000.00	$1,500
Excavation	1,130	CY	$35.00	$39,550
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	1,050	SY	$2.50	$2,625
Wetland Planting	350	SY	$2.00	$700
			Base Construction Cost	**$49,375**
			Mobilization (5%)	$2,469
			Subtotal 1	**$51,844**
			Contingency (25%)	$12,961
			Subtotal 2	**$64,805**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$29,162
			Estimated Project Cost	**$94,000**

Concept Sketch



Project Number: DF9550A
Catchment Code: DFCR9601
Candidate Site: C50

Project Type: Culvert Retrofit
Project Size: 0.2 acres
Treated Area: 37.7 acres



Project Location: Between Concord Point Lane and Baron Cameron Avenue.

Project Description: This project is a retrofit to the culvert under Baron Cameron Avenue. The drainage area to this catchment is mostly medium density detached housing along with parking areas from the recreational facilities on the other side of Wiehle Avenue. The primary focus of this culvert retrofit is to provide channel protection storage for the reach immediately downstream. There is a buried cable that is flagged at this site that may need to be relocated for this project.

Potential Project Benefits:

Streamflow	The project will provide approximately 25% of the channel protection volume and will provide some reduction in downstream erosion.
Water Quality	Some reduction of pollutants will occur with increased settling associated with extended detention, along with vegetative uptake on the site.

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 would occur during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	No unusual design or construction issues were found.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Excavation	150	CY	$35.00	$5,250
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	190	SY	$2.50	$475
Wetland Planting	70	SY	$2.00	$140
			Base Construction Cost	**$11,365**
			Mobilization (5%)	$568
			Subtotal 1	**$11,933**
			Contingency (25%)	$2,983
			Subtotal 2	**$14,917**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$6,712
			Estimated Project Cost	**$22,000**

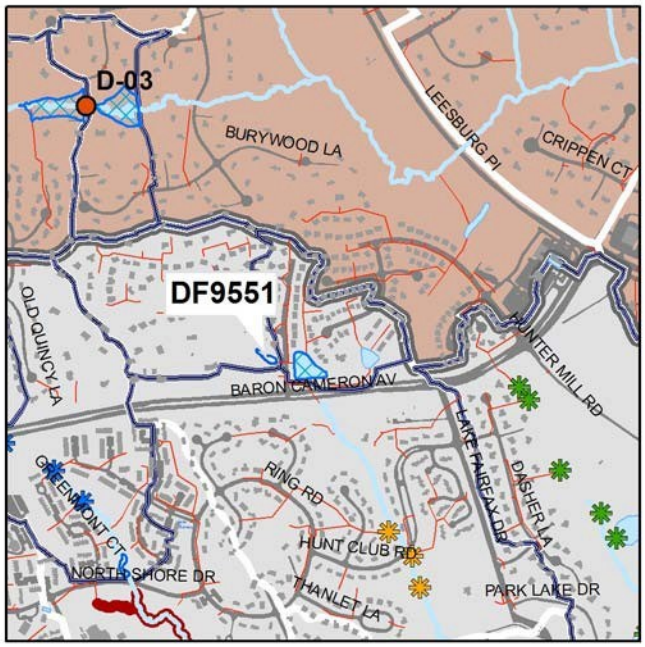
Concept Sketch

Project Number: DF9551
Catchment Code: DFCR9501
Candidate Site: C51

Project Type: Culvert Retrofit
Project Size: 0.2 acres
Treated Area: 40 acres

Project Location: On the west side of Gates Meadow Way.

Project Description: A culvert retrofit at this location will settle out solids that would otherwise end up in the stormwater wetland on the downstream side of Gates Meadow Way. The primary objective for this project is to provide water quality treatment, in particular, a pre-treatment area that allows sedimentation.



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 70% of the water quality volume, which is sufficient as a pre-treatment system.

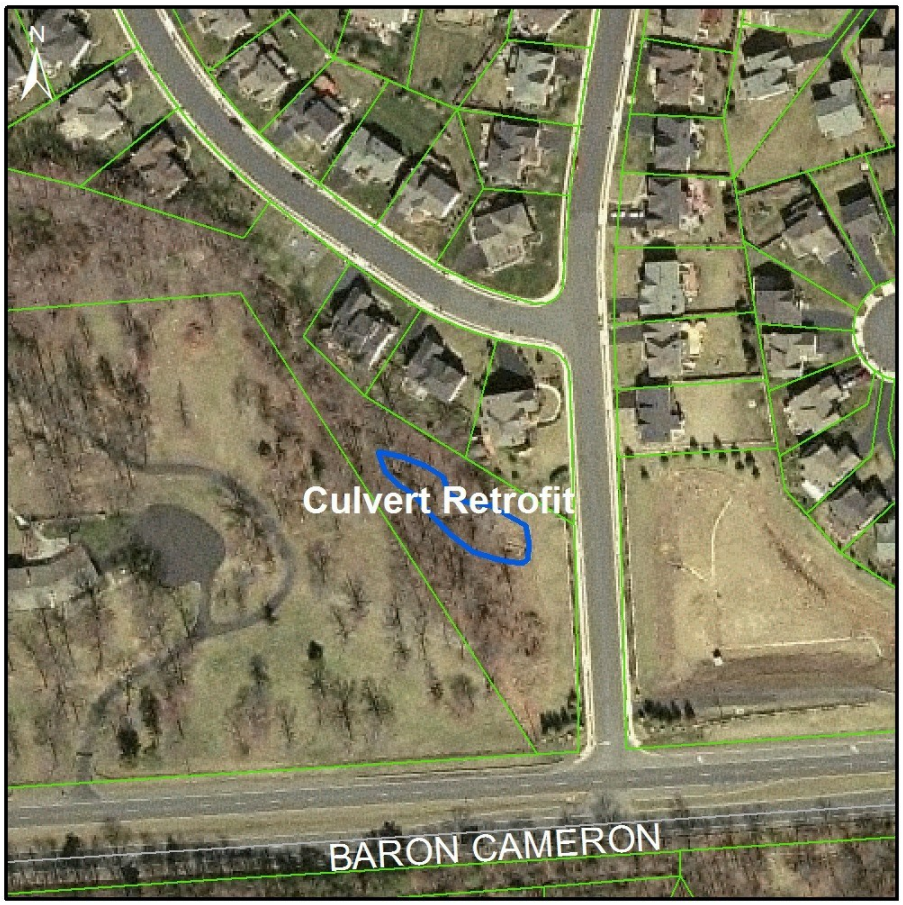
Potential Project Constraints:

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

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Excavation	120	CY	$35.00	$4,200
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	160	SY	$2.50	$400
Wetland Planting	60	SY	$2.00	$120
			Base Construction Cost	**$10,220**
			Mobilization (5%)	$511
			Subtotal 1	**$10,731**
			Contingency (25%)	$2,683
			Subtotal 2	**$13,414**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$6,036
			Estimated Project Cost	**$19,000**

Concept Sketch



Project Number: DF9552A
Catchment Code: DFCR9902
Candidate Site: C52

Project Type: Culvert Retrofit
Project Size: 0.3 acres
Treated Area: 37.4 acres

Project Location: On the upstream side of Bennington Woods Road.

Project Description: This culvert retrofit should be constructed to work as a treatment train with the pond to be retrofitted downstream with project DF9152. The goal for the project would be to reduce the velocity of the stormwater runoff and provide sedimentation to extend the life of the downstream pond.

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 60% of the water quality volume, which is sufficient to provide pretreatment.

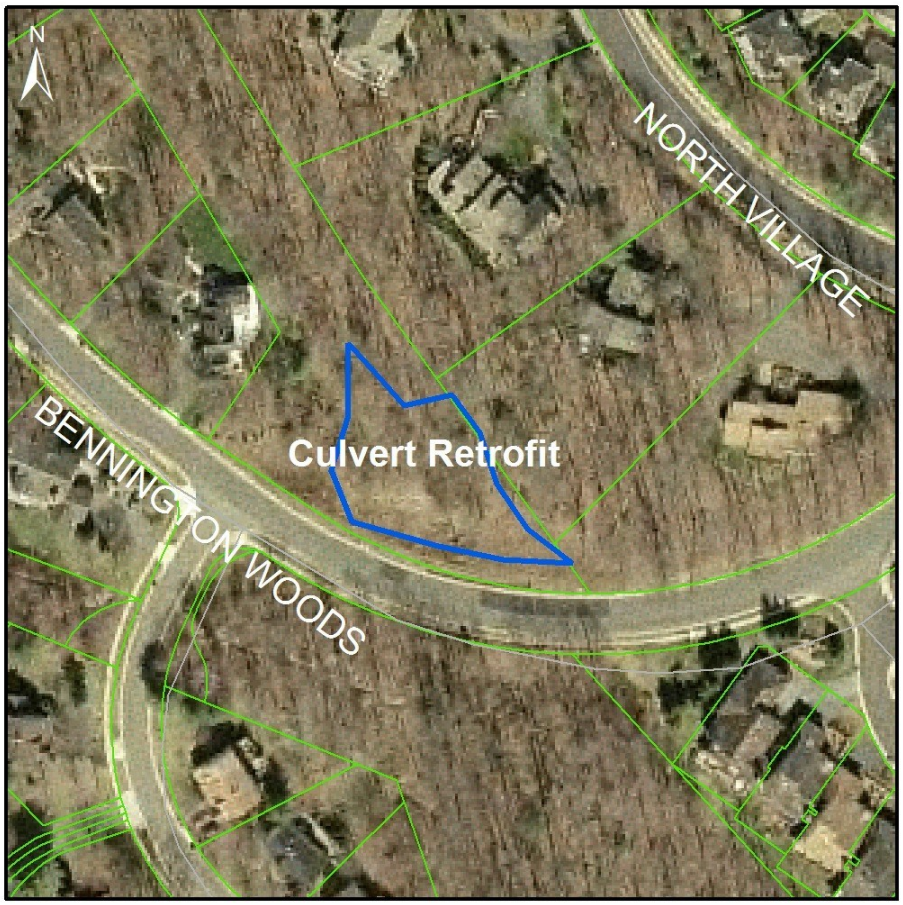
Potential Project Constraints:

Environmental	There may be some permitting issues associated with the temporary impoundment of runoff in the floodplain above this culvert. Some forest impacts would occur during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	There is a telephone utility at the upstream end of this project site that may need to be relocated.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000.00	$500
Excavation	170	CY	$35.00	$5,950
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	280	SY	$2.50	$700
Wetland Planting	100	SY	$2.00	$200
			Base Construction Cost	**$12,350**
			Mobilization (5%)	$618
			Subtotal 1	**$12,968**
			Contingency (25%)	$3,242
			Subtotal 2	**$16,209**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$7,294
			Estimated Project Cost	**$24,000**

Concept Sketch

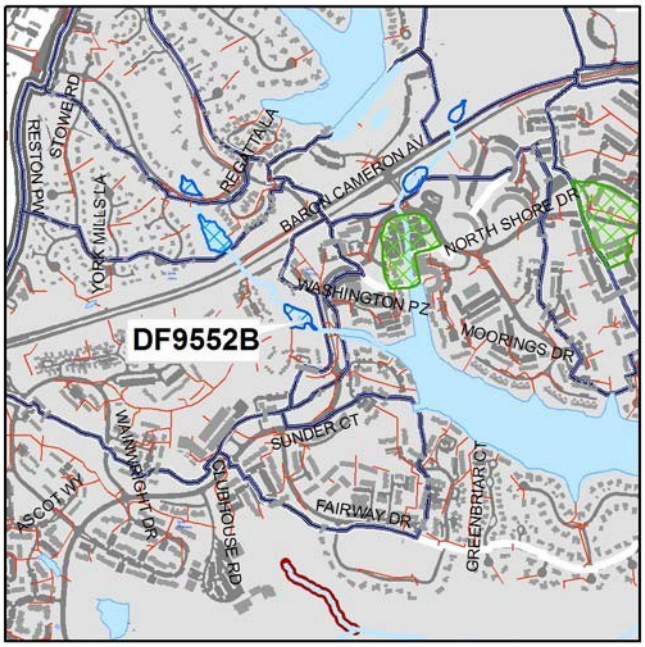


Project Number: DF9552B
Catchment Code: DFCR9902
Candidate Site: C52

Project Type: Culvert Retrofit
Project Size: 0.6 acres
Treated Area: 101.4 acres

Project Location: This project is located upstream of North Shore Drive.

Project Description: A culvert retrofit at this site should be created to as the final step in a pre-treatment system to protect Lake Anne. The primary objective for this project should be to create a wetland area for vegetative uptake of nutrients.



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 45% of the water quality volume. Sedimentation and nutrient uptake will also provide treatment.

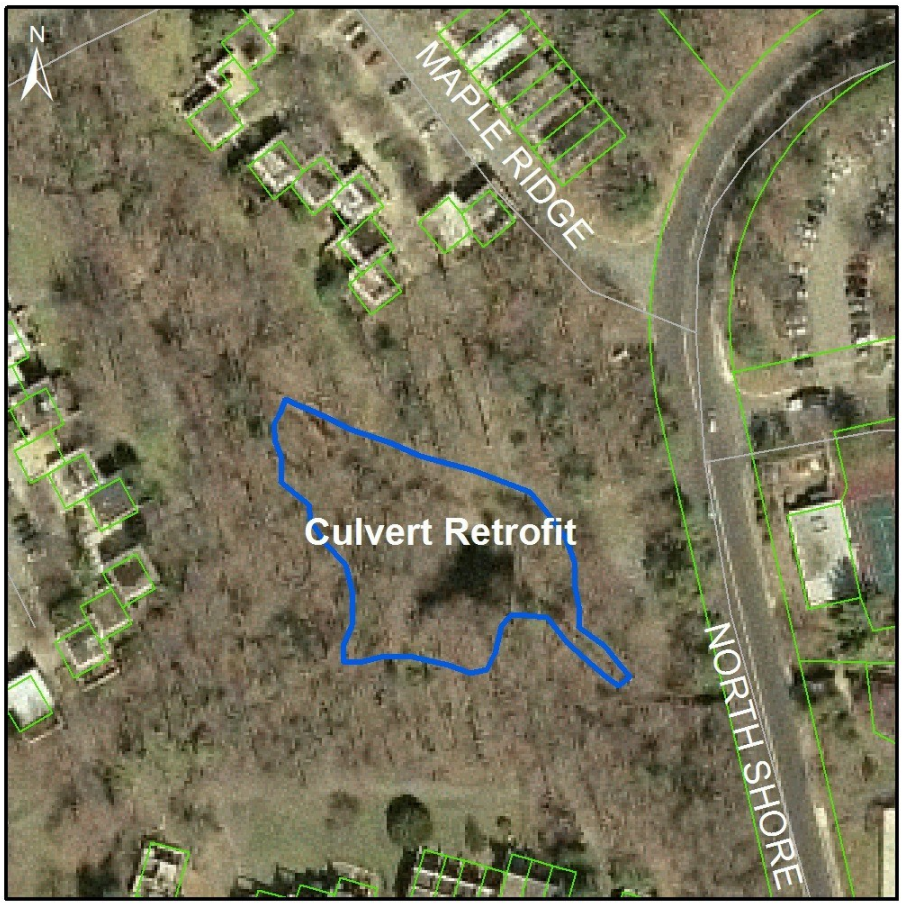
Potential Project Constraints:

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

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.2	AC	$5,000.00	$1,000
Excavation	440	CY	$35.00	$15,400
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	190	SY	$2.50	$475
Wetland Planting	570	SY	$2.00	$1,140
			Base Construction Cost	**$23,015**
			Mobilization (5%)	$1,151
			Subtotal 1	**$24,166**
			Contingency (25%)	$6,041
			Subtotal 2	**$30,207**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$13,593
			Estimated Project Cost	**$44,000**

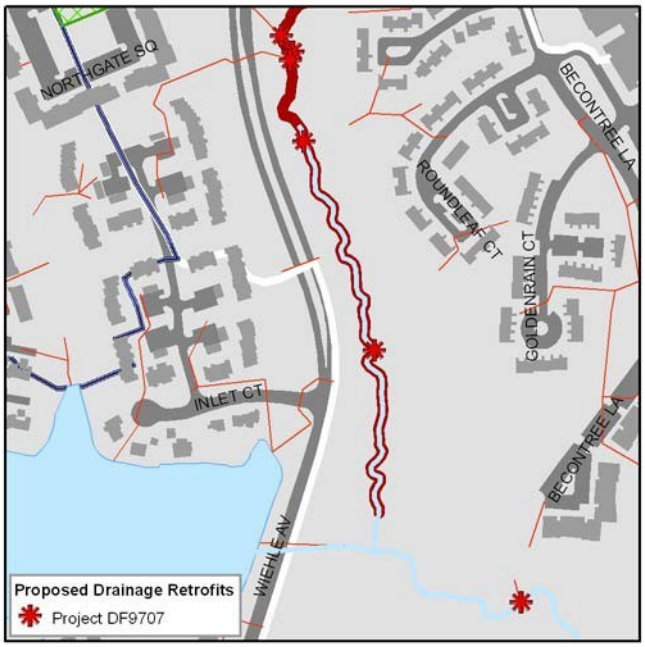
Concept Sketch



Project Number: DF9707
Catchment Code: DFCR9904
Candidate Site: C07

Project Type: Drainage Retrofit
Project Size: 6 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	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**

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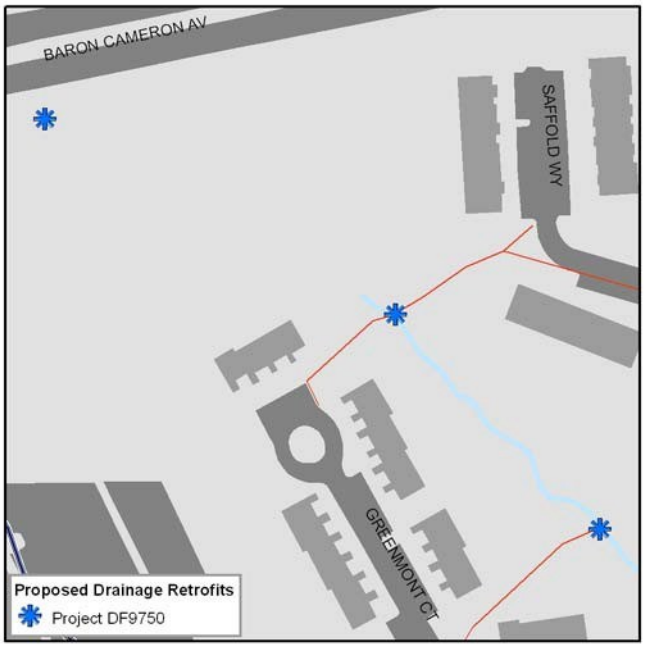
Project Number: DF9750
Catchment Code: DFCR9601
Candidate Site: C50

Project Type: Drainage Retrofit
Project Size: 3 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	3	EA	$8,000.00	$24,000
			Base Construction Cost	**$24,000**
			Mobilization (5%)	$1,200
			Subtotal 1	**$25,200**
			Contingency (25%)	$6,300
			Subtotal 2	**$31,500**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$14,175
			Estimated Project Cost	**$46,000**

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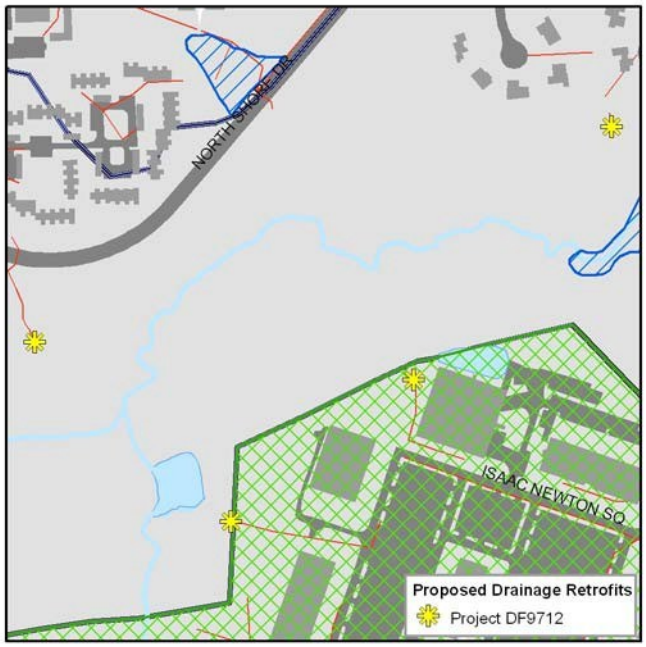
Project Number: DF9712
Catchment Code: DFCR0003
Candidate Site: C12

Project Type: Drainage Retrofit
Project Size: 4 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	4	EA	$8,000.00	$32,000
			Base Construction Cost	**$32,000**
			Mobilization (5%)	$1,600
			Subtotal 1	**$33,600**
			Contingency (25%)	$8,400
			Subtotal 2	**$42,000**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$18,900
			Estimated Project Cost	**$61,000**

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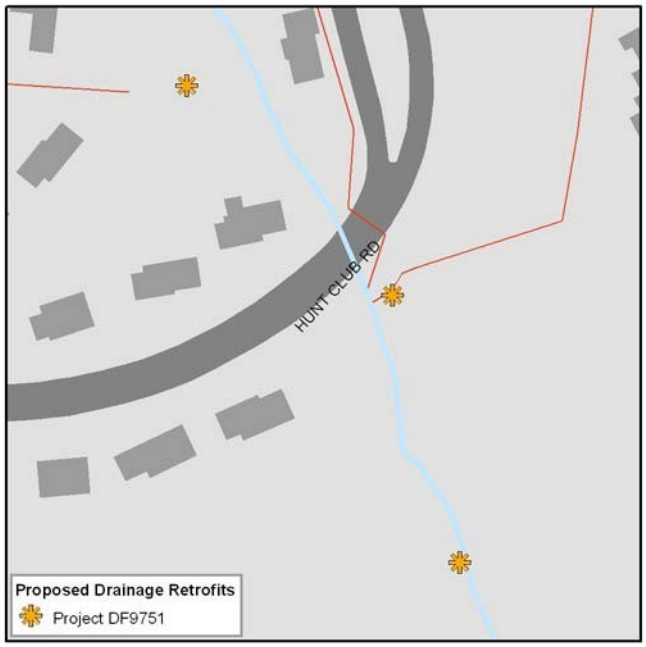
Project Number: DF9751
Catchment Code: DFCR9501
Candidate Site: C51

Project Type: Drainage Retrofit
Project Size: 3 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	3	EA	$8,000.00	$24,000
			Base Construction Cost	**$24,000**
			Mobilization (5%)	$1,200
			Subtotal 1	**$25,200**
			Contingency (25%)	$6,300
			Subtotal 2	**$31,500**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$14,175
			Estimated Project Cost	**$46,000**

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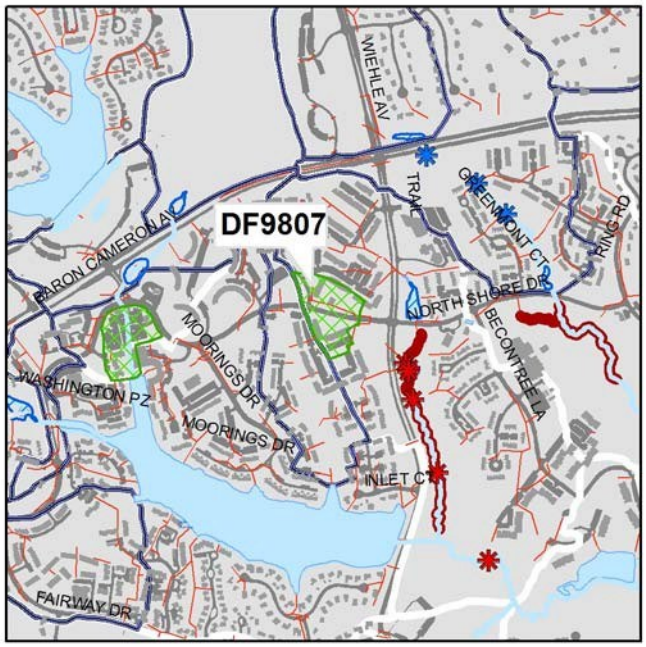
Project Number: DF9807
Catchment Code: DFCR9904
Candidate Site: C07

Project Type: LID Retrofit
Project Size: 0.05 acres
Treated Area: 4.5 acres

Project Location: This project is a rain garden on the south side of North Shore Drive west of Wiehle Avenue.

Project Description: The storm drains for the residential buildings in this area converge on a manhole at a low point in the topography of the land. The project would retrofit the low area as a rain garden which would receive direct flow from roofs and gutters and provide water quality treatment before discharging to the stream on the east side of Wiehle Ave.



Potential Project Benefits:

Streamflow	While designed primarily for water quality, this project would reduce the amount of runoff through infiltration and evapotranspiration.
Water Quality	This project has been designed to treat 100% of the water quality volume for the site.

Potential Project Constraints:

Environmental	No environmental constraints or permitting issues are anticipated.
Facility Access	Access to the site is excellent by public roads and parking areas.
Design / Construction	Potential utility conflicts would have to be investigated during design.

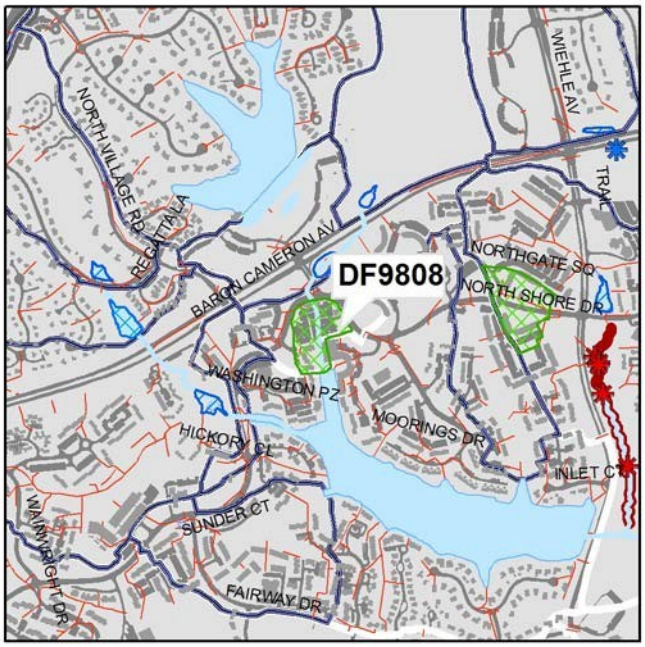
Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	187.0	SY	$120.00	$22,440
			Base Construction Cost	**$22,440**
			Mobilization (5%)	$1,122
			Subtotal 1	**$23,562**
			Contingency (25%)	$5,891
			Subtotal 2	**$29,453**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$13,254
			Estimated Project Cost	**$43,000**

Concept Sketch

Project Number: DF9808
Catchment Code: DFCR9802
Candidate Site: C08

Project Type: LID Retrofit
Project Size: 0.05 acres
Treated Area: 4.5 acres



Project Location: This project is located on the commercial property south of the intersection of Village Drive and North Shore Drive.

Project Description: This project would be a LID retrofit to include elements such as disconnection of impervious area, pervious pavers, inlet filters, or bioretention systems. This area is highly impervious, with no current stormwater management. The primary goal in this area is to reduce runoff impacts and improve the quality of the runoff that flows into the stream and then into Lake Anne.

Potential Project Benefits:

Streamflow	Some improvement would occur in runoff volume from reduction of impervious area and the detention and infiltration components of the LID systems.
Water Quality	Water quality will be improved from infiltration, filtration and nutrient uptake in the bioretention facility.

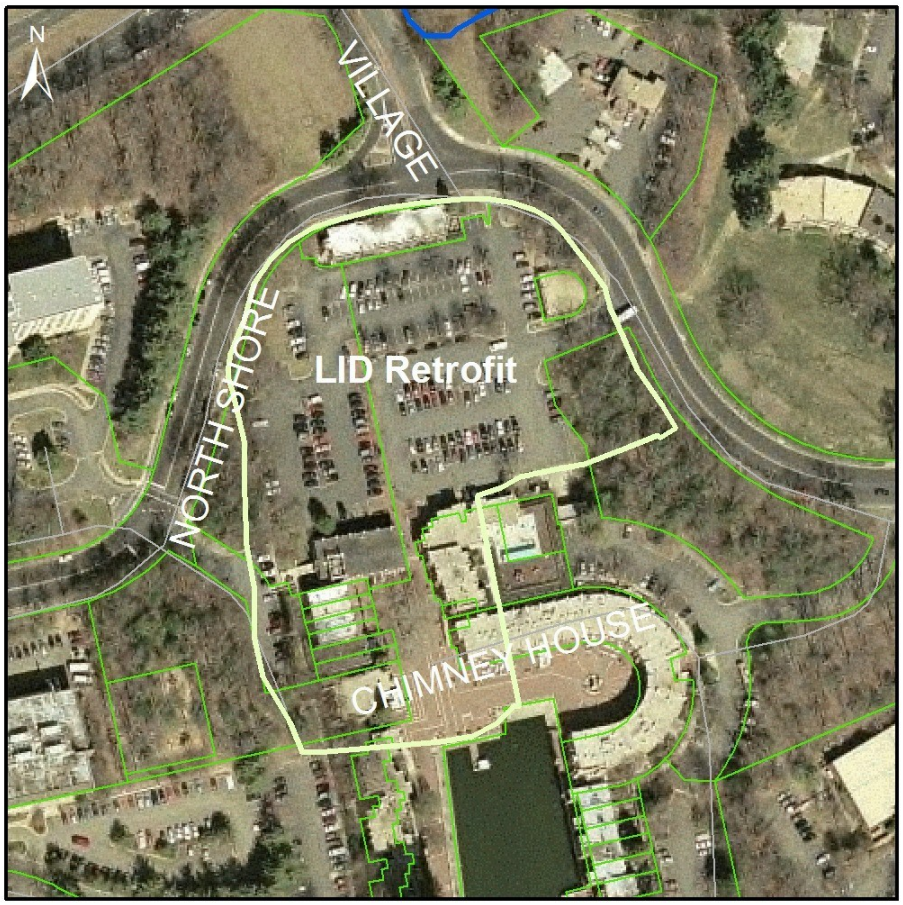
Potential Project Constraints:

Environmental	No environmental constraints or permitting issues are anticipated.
Facility Access	Access to the site is excellent by public roads and parking areas.
Design / Construction	No significant design or construction issues were noted.

Costs:

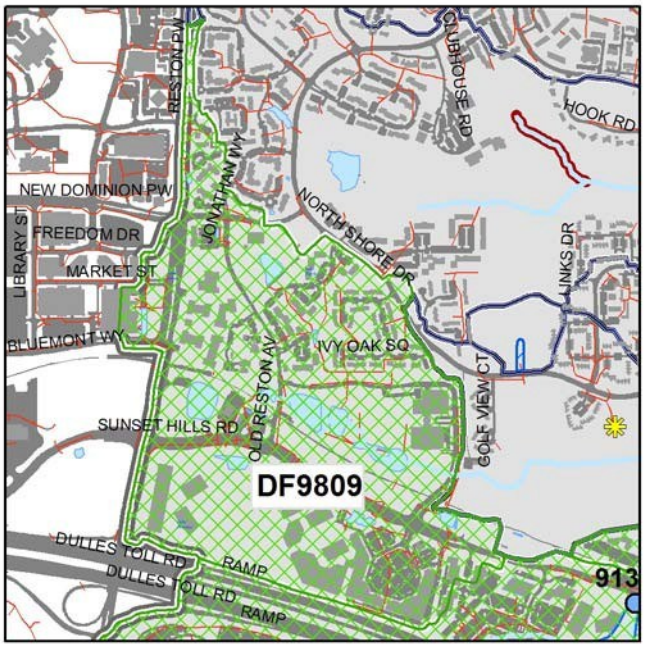
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	263.0	SY	$120.00	$31,560
			Base Construction Cost	**$31,560**
			Mobilization (5%)	$1,578
			Subtotal 1	**$33,138**
			Contingency (25%)	$8,285
			Subtotal 2	**$41,423**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$18,640
			Estimated Project Cost	**$60,000**

Concept Sketch



Project Number: DF9809
Catchment Code: DFCR0001
Candidate Site: C09

Project Type: LID Retrofit
Project Size: 1.4 acres
Treated Area: 175.5 acres



Project Location: This project is located on the commercial property south of the intersection of Village Drive and North Shore Drive.

Project Description: This catchment consists of highly developed commercial development. There is a substantial system of in-stream ponds that appear to be in excellent condition, but it is unclear what design standards they are based upon. This project would include a property-by-property assessment of opportunities to reduce imperviousness, increase the flow path, infiltrate surface runoff, and use vegetation to improve the quantity and quality of the runoff.

Potential Project Benefits:

Streamflow	While designed primarily for water quality, this project would reduce the amount of runoff through reduction of impervious area, infiltration and evapotranspiration.
Water Quality	This project has been designed to treat 100% of the water quality volume for the site.

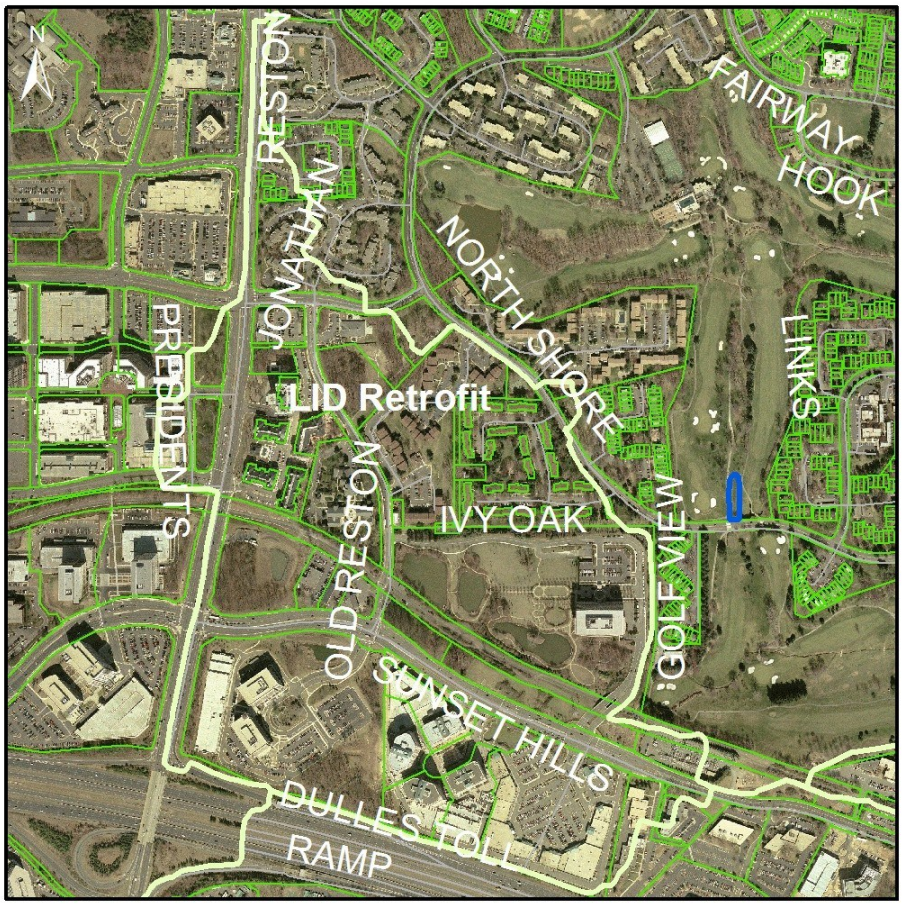
Potential Project Constraints:

Environmental	No environmental constraints are anticipated.
Facility Access	Access to this area is very good by way of public roads.
Design / Construction	A holistic LID approach is recommended, rather than a structural LID approach. Since space may be a limiting factor for structural solutions, minimization, conservation and disconnection would be significant part of this design.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	6,769.0	SY	$120.00	$812,280
			Base Construction Cost	**$812,280**
			Mobilization (5%)	$40,614
			Subtotal 1	**$852,894**
			Contingency (25%)	$213,224
			Subtotal 2	**$1,066,118**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$479,753
			Estimated Project Cost	**$1,546,000**

Concept Sketch

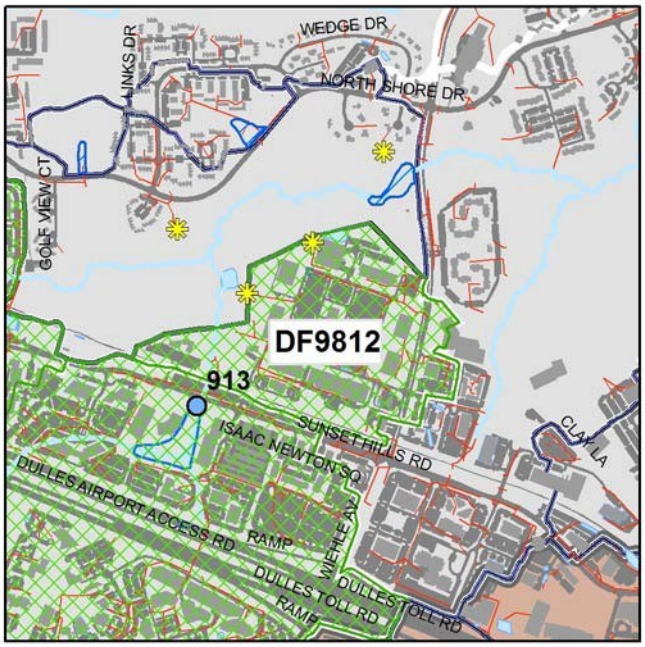


Project Number: DF9812
Catchment Code: DFCR0003
Candidate Site: C12

Project Type: LID Retrofit
Project Size: 0.6 acres
Treated Area: 60.2 acres

Project Location: Between Isaac Newton Square and Wiehle Avenue

Project Description: This area, which is mostly on the north side of Sunset Hills Road, consists of almost total impervious area, much of which is parking lot. This project would include an assessment of opportunities to reduce imperviousness, increase the flow path, infiltrate surface runoff and strategically use vegetation to improve the quantity and quality of the runoff before discharging to the adjacent golf course and stream.



Potential Project Benefits:

Streamflow	While designed primarily for water quality, this project would reduce the amount of runoff through reduction of impervious area, infiltration and evapotranspiration.
Water Quality	This project has been designed to treat 100% of the water quality volume for the site.

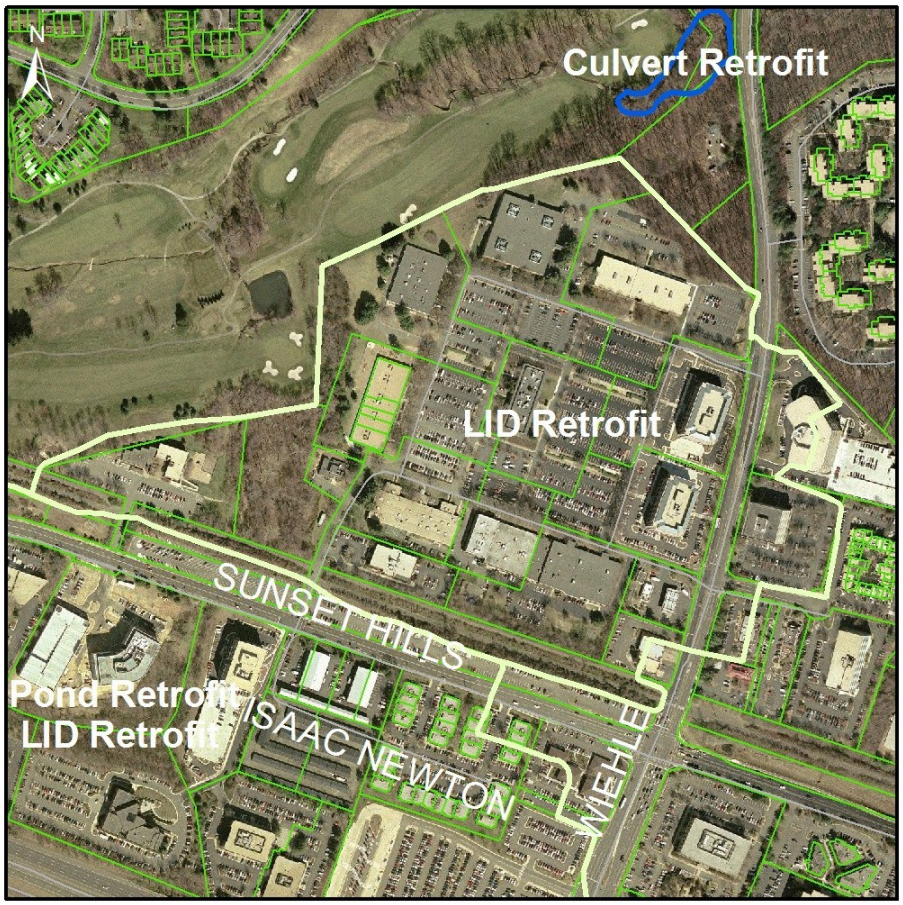
Potential Project Constraints:

Environmental	No environmental constraints or permit issues are anticipated. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this area is very good by way of public roads.
Design / Construction	There are no significant design and construction issues.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	2,749.0	SY	$120.00	$329,880
			Base Construction Cost	**$329,880**
			Mobilization (5%)	$16,494
			Subtotal 1	**$346,374**
			Contingency (25%)	$86,594
			Subtotal 2	**$432,968**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$194,835
			Estimated Project Cost	**$628,000**

Concept Sketch

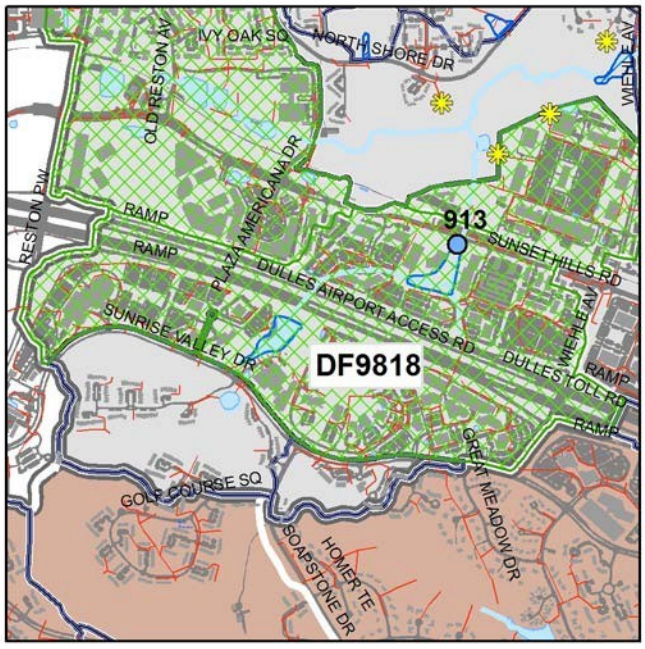


Project Number: DF9818
Catchment Code: DFCR9401
Candidate Site: C18

Project Type: LID Retrofit
Project Size: 2.3 acres
Treated Area: 231.5 acres

Project Location: This project is distributed throughout most of the catchment north of the Dulles Toll Road.

Project Description: This project would include developing LID approaches to stormwater management throughout most of the catchment. These opportunities may include reducing imperviousness, increasing the flow path, infiltrating surface runoff and strategically using vegetation to improve the quantity and quality of the runoff throughout the area.



Potential Project Benefits:

Streamflow	While designed primarily for water quality, this project would reduce the amount of runoff through reduction of impervious area, infiltration and evapotranspiration.
Water Quality	This project has been designed to treat 100% of the water quality volume for the site.

Potential Project Constraints:

Environmental	No environmental constraints or permitting issues are anticipated.
Facility Access	Access to the site is excellent by public roads and parking areas.
Design / Construction	A holistic LID approach is recommended, rather than a structural LID approach. Minimization, conservation and disconnection of runoff would be significant part of this design.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	11,033	SY	$120.00	$1,323,960
			Base Construction Cost	**$1,323,960**
			Mobilization (5%)	$66,198
			Subtotal 1	**$1,390,158**
			Contingency (25%)	$347,540
			Subtotal 2	**$1,737,698**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$781,964
			Estimated Project Cost	**$2,520,000**

Concept Sketch