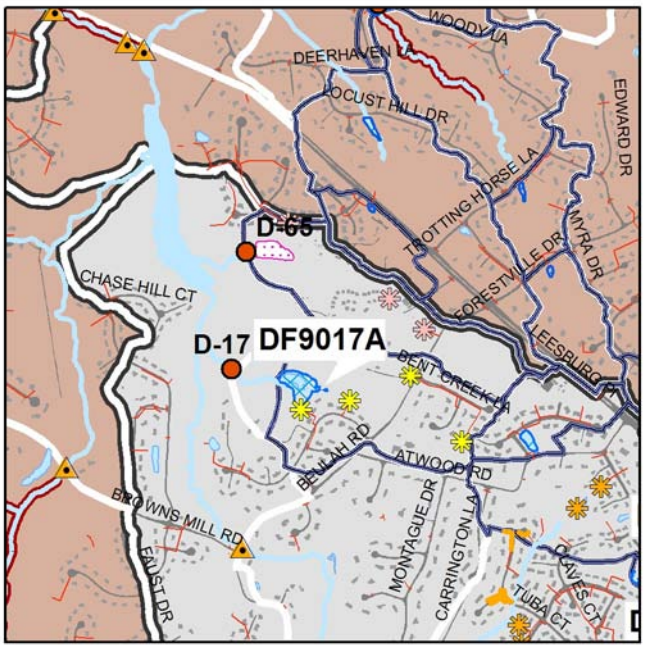
Project Number: DF9017A
Catchment Code: DFWC8901
Candidate Site: D-17

Project Type: Pond Retrofit
Project Size: 2.2 acres
Treated Area: 62.7 acres

Project Location: This project is behind private lots along Spring Ridge Lane.

Project Description: The water quality volume is completely met within the wet storage of this pond. Additional improvements in water quality can be created by planting wetland vegetation in shallow areas and constructing an aquatic bench around part of the pond perimeter. A control structure could not be located upon field visiting this pond, so it is assumed that a simple outfall pipe exists. Installing a multi-stage riser structure can significantly improve peak flow management.



Potential Project Benefits:

Streamflow	A multi-stage riser can improve the peak flow reduction function of this pond to approximately 90% of the channel protection volume.
Water Quality	100% of the water quality volume is present in this pond.

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	Access will need to be obtained from adjacent property owners.
Design / Construction	Further investigation of existing conditions is required to determine if reconstruction of the embankment and barrel pipe is necessary.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000	$500
Excavation/Grading (aquatic bench)	853	CY	$30.00	$25,590
Outlet Protection	1	EA	$8,000.00	$8,000
Reconstruct Embankment	1100	CY	$60.00	$66,000
Riser	1	LS	$10,000.00	$10,000
Outflow Pipe	75	LF	$35.00	$2,625
Wetland Planting	278	SY	$2.00	$556
Wetland Planting (aquatic bench)	490	SY	$2.00	$980
			Base Construction Cost	**$114,251**
			Mobilization (5%)	$5,713
			Subtotal 1	**$119,964**
			Contingency (25%)	$29,991
			Subtotal 2	**$149,954**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$67,479
			Estimated Project Cost	**$217,000**

This project is part of the alternative project group for Regional Pond D-17. See Table 5-2 for the recommended disposition.

Site Photo:

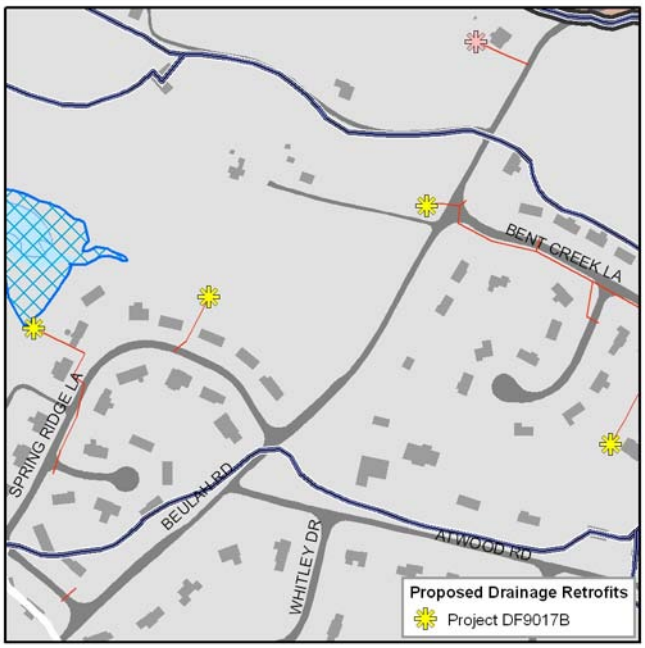
Concept Sketch:

Project Number: DF9017B
Catchment Code: DFWC8901
Candidate Site: D-17

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**

This project is part of the alternative project group for Regional Pond D-17. See Table 5-2 for the recommended disposition.

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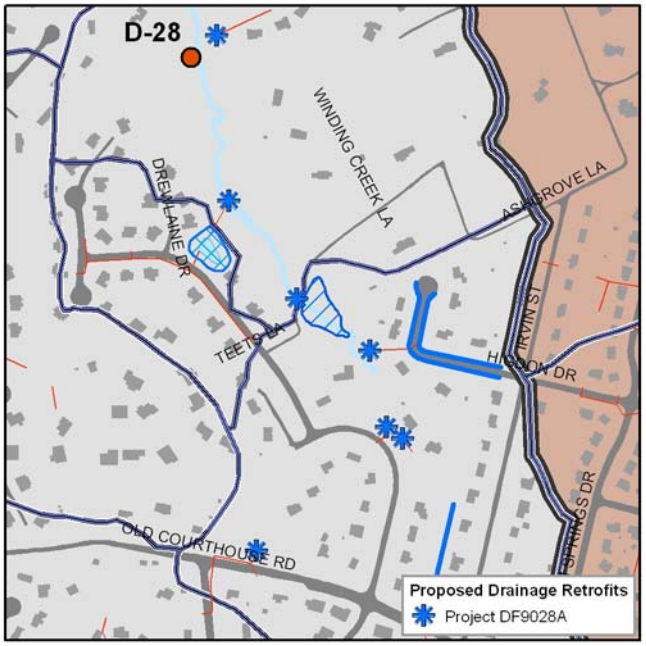
Project Number: DF9028A
Catchment Code: DFWC9401
Candidate Site: D-28

Project Type: Drainage Retrofit
Project Size: 1685 feet of paved ditches, 10 Outfalls



Project Location: This project is distributed throughout the catchment where piped drainage systems discharge into natural channels, and where surface runoff is conveyed by concrete ditches.

Project Description: This project will consist of two major phases of drainage retrofit. The first phase will be the elimination of paved roadside ditches widely found throughout the catchment and replacement with dry swale systems with an underdrain, which will increase filtration and infiltration. The second phase of this project will be the improvement of outlet protection at outfalls throughout the catchment.

Potential Project Benefits:

Streamflow	Peak flow rates will see significant attenuation for this catchment through the increase in time of concentration for the catchment as a whole that results from the removal of paved channel sections.
Water Quality	Water quality will see substantial improvements due to the reduction in sediment loading that would occur with this project.

Potential Project Constraints:

Environmental	No environmental permitting issues are anticipated for this project. Projects in RPAs may require exceptions or waivers
Facility Access	Access to locations where this project would be applied can, for the most part, be obtained from the roadways.
Design / Construction	No unusual design or construction issues were identified. 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)	1685	LF	$18.00	$30,330
Dry Swale w/ Underdrain	1685	LF	$50.00	$84,250
Outfall Protection	10	EA	$8,000.00	$80,000
			Base Construction Cost	**$194,580**
			Mobilization (5%)	$9,729
			Subtotal 1	**$204,309**
			Contingency (25%)	$51,077
			Subtotal 2	**$255,386**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$114,924
			Estimated Project Cost	**$370,000**

This project is part of the alternative project group for Regional Pond D-28. See Table 5-2 for the recommended disposition.

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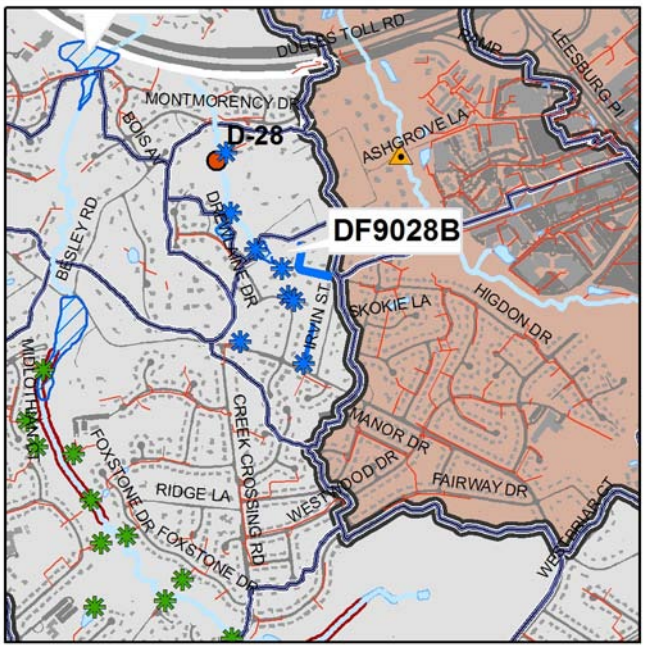
Project Number: DF9028B
Catchment Code: DFWC9401
Candidate Site: D-28

Project Type: Culvert Retrofit
Project Size: 0.5 acres
Treated Area: 58.7 acres

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

Project Description: This project is focused on the extended detention of storm flows for the purpose of providing channel protection. Water quality features, such as micro-pools, vegetation, etc., would be incorporated into this design to the greatest extent practicable. The retrofit would involve raising the path at the crossing with a low embankment, minor excavation, and revegetating with wetland plants.



Potential Project Benefits:

Streamflow	The project will provide approximately 50% 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:

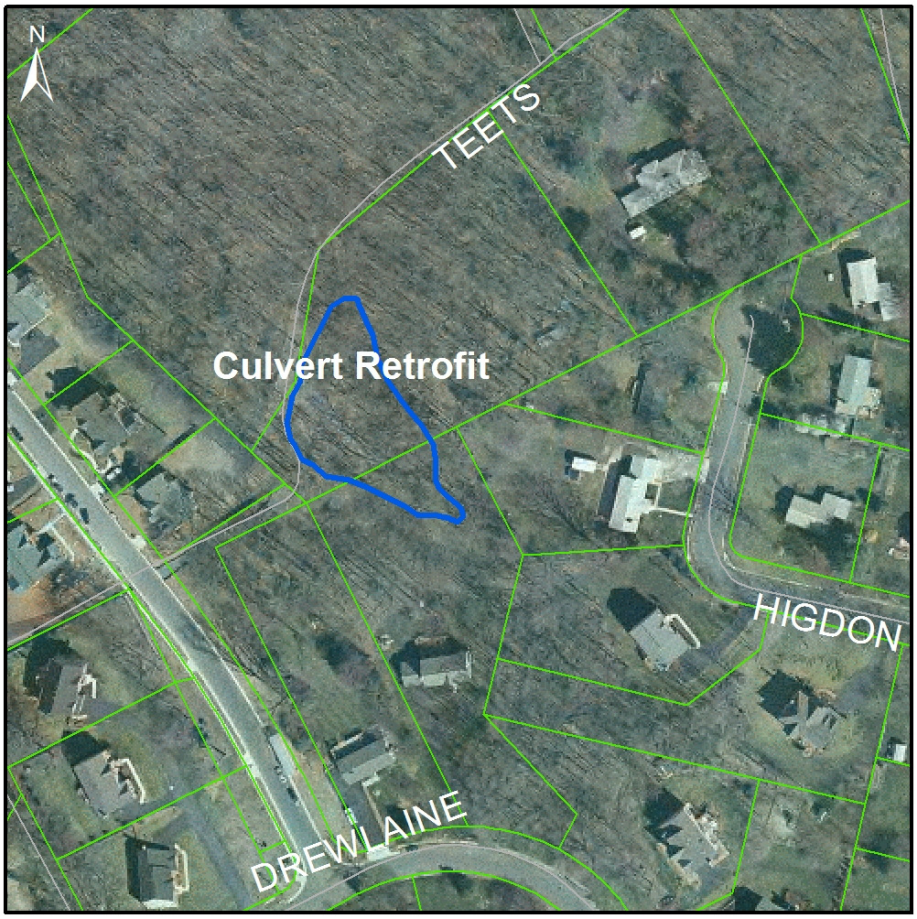
Environmental	Environmental permitting issues would be anticipated for any activity in and around a stream corridor. Forest and wetland impacts are anticipated during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	The site is accessible through an easement from the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

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.2	AC	$5,000.00	$1,000
Excavation	520	CY	$35.00	$18,200
Embankment	840	CY	$35.00	$29,400
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	480	SY	$2.50	$1,200
Wetland Planting	160	SY	$2.00	$320
			Base Construction Cost	**$55,120**
			Mobilization (5%)	$2,756
			Subtotal 1	**$57,876**
			Contingency (25%)	$14,469
			Subtotal 2	**$72,345**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$32,555
			Estimated Project Cost	**$105,000**

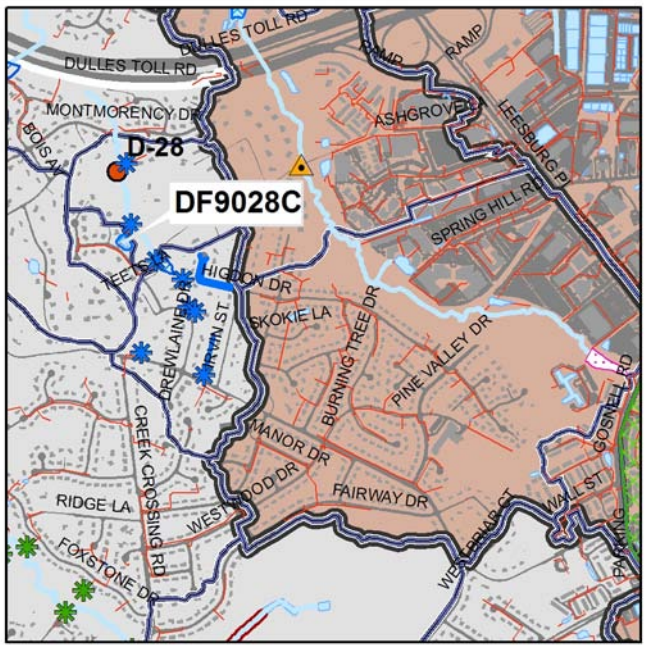
This project is part of the alternative project group for Regional Pond D-28. See Table 5-2 for the recommended disposition.

Concept Sketch



Project Number: DF9028C
Catchment Code: DFWC9401
Candidate Site: D-28

Project Type: Pond Retrofit
Project Size: 0.4 acres
Treated Area: 11.6 acres



Project Location: This project is located along Lupine Den Drive.

Project Description: The conditions surrounding this facility prevent any excavation beyond the existing pond boundaries. However, by excavating to maximize the available space within this facility and modifying the riser to convert this dry pond to a marsh system, significant improvement in peak flow reduction and water quality treatment will take place. Excavating the area between the riser and the inflow pipe will create a flat pond bottom suitable for wetland planting. This wetland area will increase the detention time of runoff entering the pond. Riprap can also be added at the storm drain outfall to reduce flow velocities of runoff exiting the facility.

Potential Project Benefits:

Streamflow	100% of the calculated channel protection volume can be achieved.
Water Quality	Excavating to create a wetland area at the base of the riser will provide 45% of the required wet storage volume.

Potential Project Constraints:

Environmental	Environmental permitting issues are not anticipated for this project. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	There are no design or construction issues noted.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.2	AC	$5,000	$1,000
Remove Pilot Channels	60	LF	$6.00	$360
Grading and Excavation	321	CY	$30.00	$9,630
Riser	1	LS	$10,000.00	$10,000
Rip Rap Stabilization	40	LF	$50.00	$2,000
Wetland Planting	310	SY	$2.00	$620
Dry Landscaping	263	SY	$2.50	$658
			Base Construction Cost	**$24,268**
			Mobilization (5%)	$1,213
			Subtotal 1	**$25,481**
			Contingency (25%)	$6,370
			Subtotal 2	**$31,851**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$14,333
			Estimated Project Cost	**$46,000**

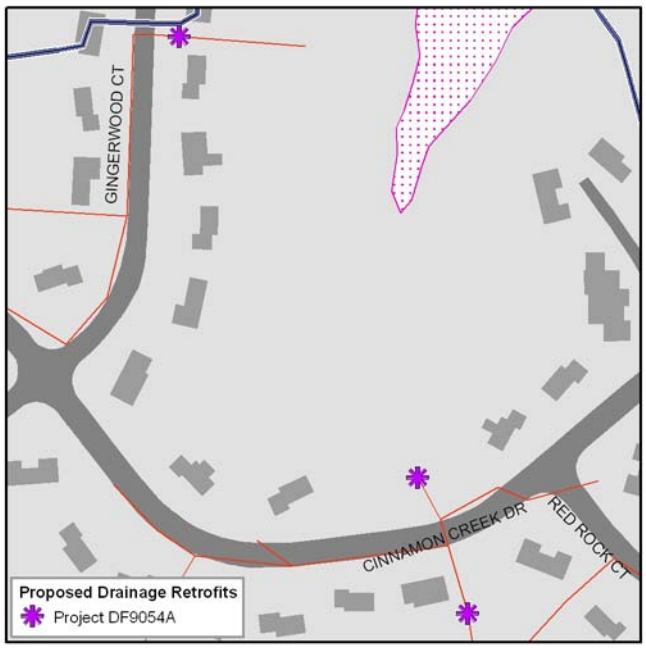
This project is part of the alternative project group for Regional Pond D-28. See Table 5-2 for the recommended disposition.

Site Photo:

Concept Sketch:

Project Number: DF9054A
Catchment Code: DFWC9101
Candidate Site: D-54

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 be obtained from the roadway or park access trail.
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**

This project is part of the alternative project group for Regional Pond D-54. See Table 5-2 for the recommended disposition.

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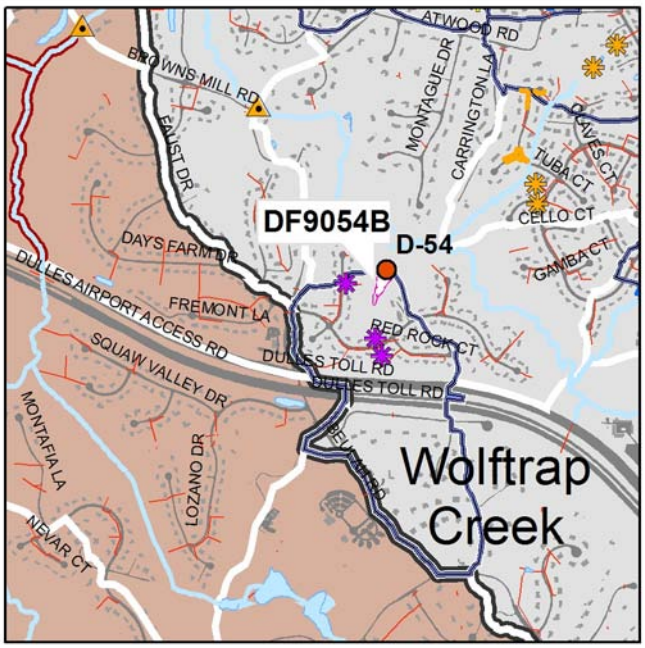
Project Number: DF9054B
Catchment Code: DFWC9101
Candidate Site: D-54

Project Type: New Pond
Project Size: 0.8 acres
Treated Area: 93.6 acres

Project Location: This project is east of Gingerwood Court.

Project Description: This project is the implementation of a reduced-size version of planned regional pond D-54. The location has been refined to provide maximum benefit with the least amount of impact to the natural system. This facility should be designed to capture and detain as much drainage area as is feasible to ensure the peak flow rates are reduced to channel protection rates.



Potential Project Benefits:

Streamflow	The project will provide 80% of the channel protection volume estimated for this location.
Water Quality	The pond is planned as a dry facility and water quality improvements will be minor.

Potential Project Constraints:

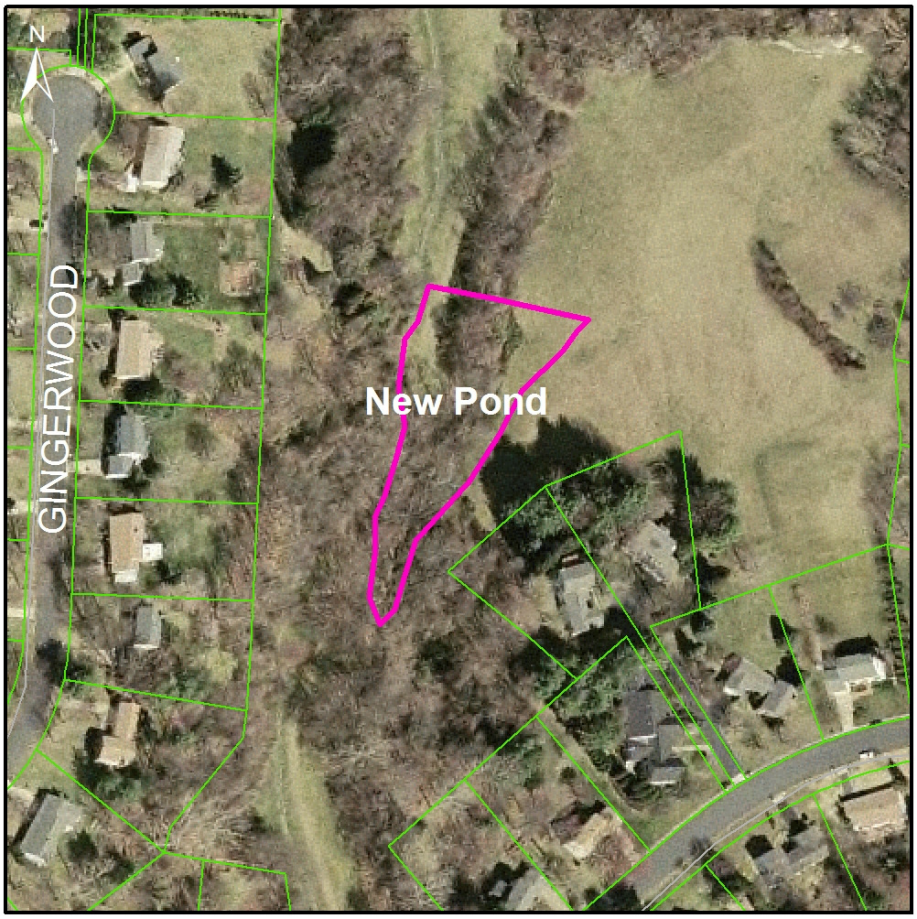
Environmental	Environmental permitting issues would be anticipated for any activity in and around a stream corridor. Forest and wetland impacts are anticipated during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access can be obtained from a nearby maintenance road.
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
Embankment	2,670	CY	$60.00	$160,200
Riser Structure	1	LS	$10,000.00	$10,000
Landscaping	1,400	SY	$2.50	$3,500
			Base Construction Cost	**$175,200**
			Mobilization (5%)	$8,760
			Subtotal 1	**$183,960**
			Contingency (25%)	$45,990
			Subtotal 2	**$229,950**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$103,478
			Estimated Project Cost	**$333,000**

This project is part of the alternative project group for Regional Pond D-54. See Table 5-2 for the recommended disposition.

Concept Sketch

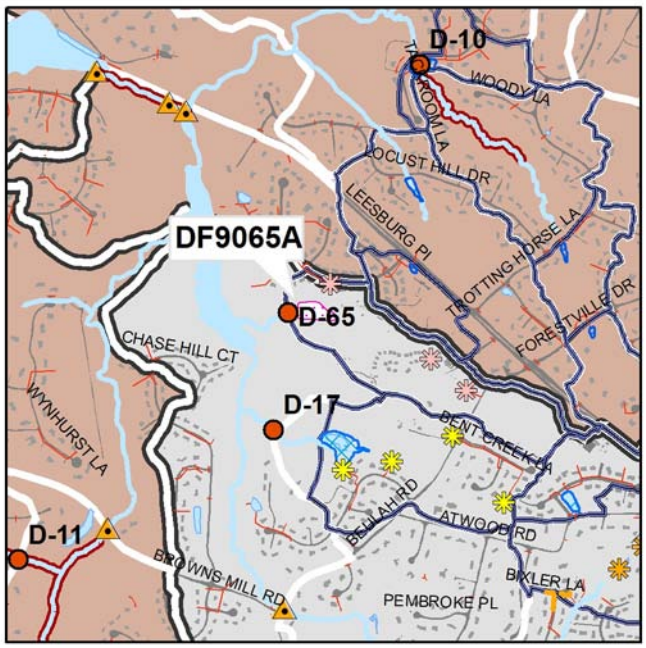


Project Number: DF9065A
Catchment Code: DFWC8901
Candidate Site: D-65

Project Type: New Pond
Project Size: 1.5 acres
Treated Area: 53.4 acres

Project Location: In line with the easement from Middleton Ridge Road

Project Description: This project is the implementation of a reduced-size version of planned regional pond D-65. The location has been refined to provide greater detention volume. This facility is proposed as an in-stream facility designed to capture as much runoff from the catchment as is feasible. There is no existing stormwater management in the drainage area to this facility.



Potential Project Benefits:

Streamflow	The project will provide about 50% 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:

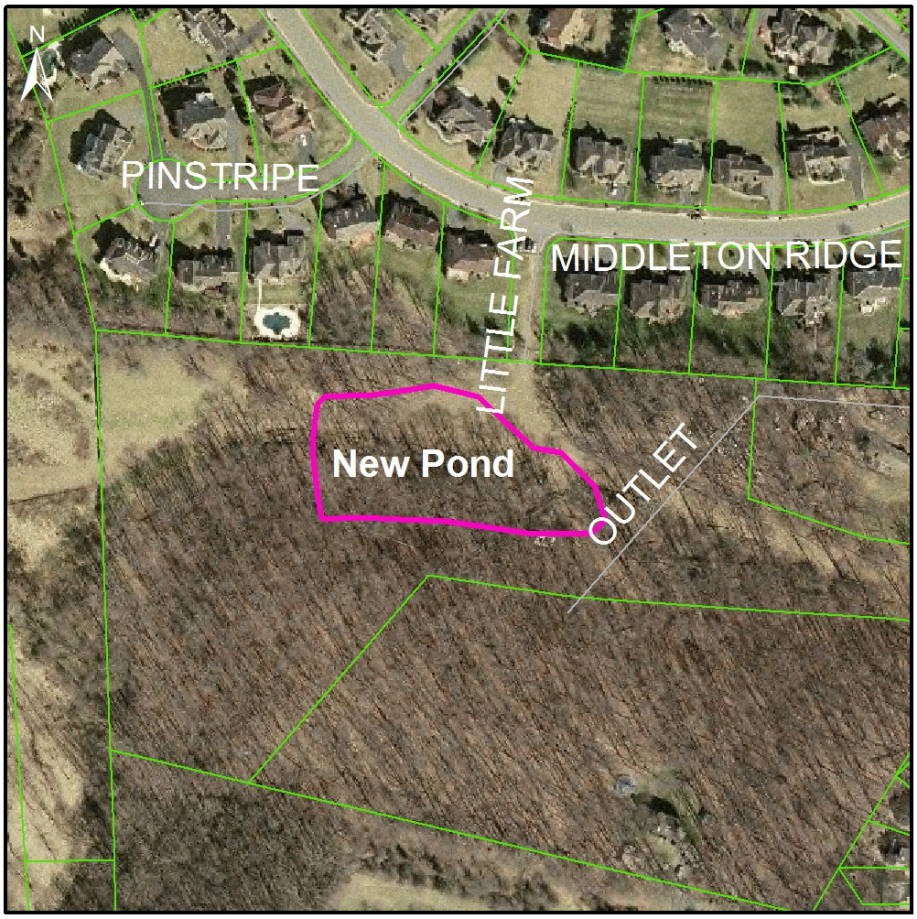
Environmental	Environmental permitting issues would be anticipated for any activity in and around a stream corridor. Forest and wetland impacts are anticipated during construction. Projects in RPAs may require exceptions or waivers.
Facility Access	Access can be obtained from a nearby maintenance road.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

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.7	AC	$5,000.00	$3,500
Embankment	12,390	CY	$60.00	$743,400
Riser Structure	1	LS	$10,000.00	$10,000
Landscaping	3,160	SY	$2.50	$7,900
			Base Construction Cost	**$764,800**
			Mobilization (5%)	$38,240
			Subtotal 1	**$803,040**
			Contingency (25%)	$200,760
			Subtotal 2	**$1,003,800**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$451,710
			Estimated Project Cost	**$1,456,000**

This project is part of the alternative project group for Regional Pond D-65. See Table 5-2 for the recommended disposition.

Concept Sketch:

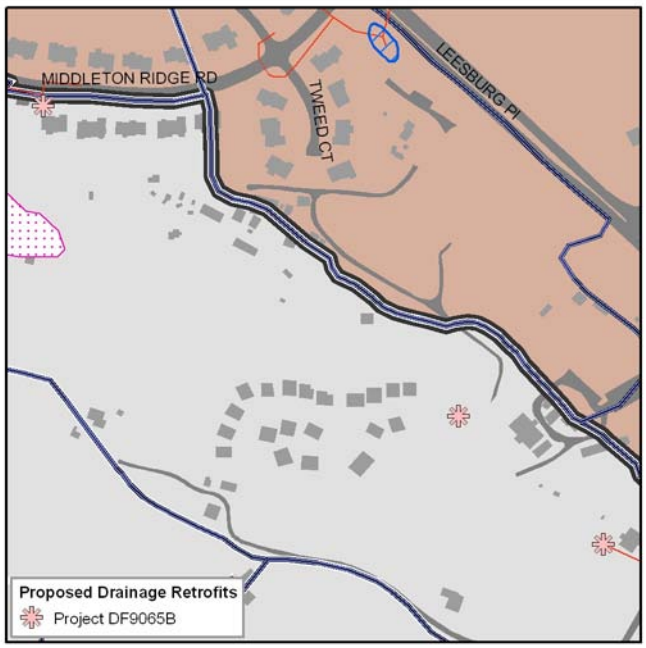


Project Number: DF9065B
Catchment Code: DFWC8901
Candidate Site: D-65

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**

This project is part of the alternative project group for Regional Pond D-65. See Table 5-2 for the recommended disposition.

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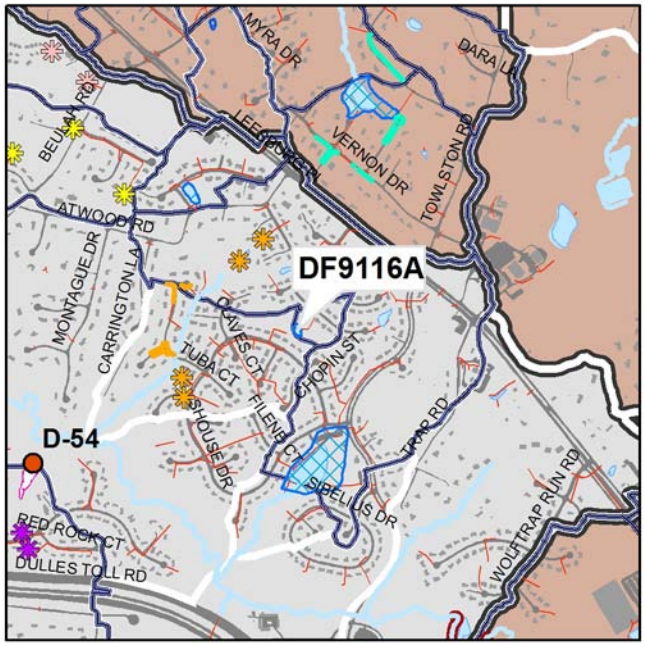
Project Number: DF9116A
Catchment Code: DFWC9201
Candidate Site: C16

Project Type: Pond Retrofit
Project Size: 0.2 acres
Treated Area: 5.2 acres

Project Location: Between Kilby Glen Drive and Shouse Drive.



Project Description: Excavation of this dry pond to provide additional storage is recommended because this area is relatively flat and clear. By excavating part of the existing clear area in front of the outlet and installing a new multi-stage riser, significant reduction in peak flow can be achieved. Further excavation below the channel at the base of the riser will create a permanent wetland component that will provide treatment in the form of vegetative uptake of nutrients and settling of sediment.

Potential Project Benefits:

Streamflow	100% of the channel protection requirement for this facility will be met.
Water Quality	Further excavation and planting to create a permanent wetland component will provide 100% of the required water quality treatment volume.

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 to this project is good from the roadway.
Design / Construction	No design or construction issues were identified for this project.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.2	AC	$5,000	$1,000.00
Grading and Excavation	335	CY	$30.00	$10,050.00
Riser	1	LS	$10,000.00	$10,000.00
Rip Rap Stabilization	25	LF	$50.00	$1,250.00
Wetland Planting	256	SY	$2.00	$512.00
Dry Landscaping	434	SY	$2.50	$1,085.00
			Base Construction Cost	**$23,897**
			Mobilization (5%)	$1,195
			Subtotal 1	**$25,092**
			Contingency (25%)	$6,273
			Subtotal 2	**$31,365**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$14,114
			Estimated Project Cost	**$45,000**

Site Photo:

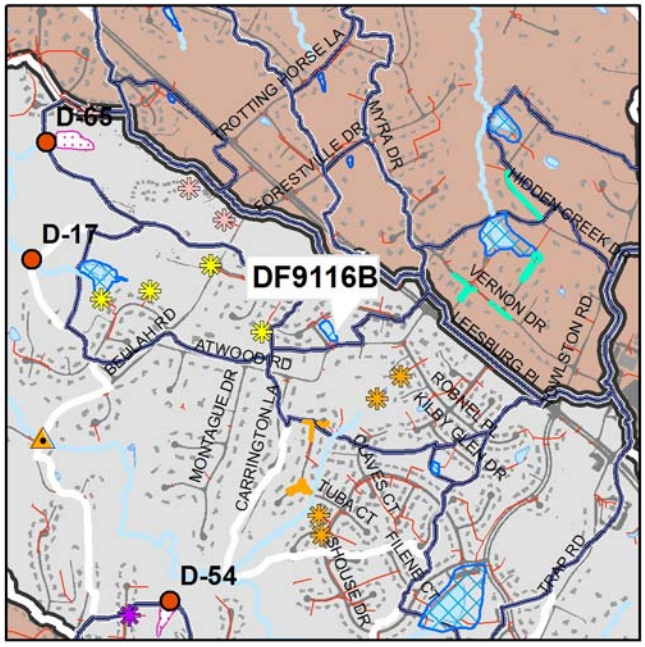
Concept Sketch:

Project Number: DF9116B
Catchment Code: DFWC9201
Candidate Site: C16

Project Type: Pond Retrofit
Project Size: 0.5 acres
Treated Area: 23.6 acres

Project Location: Along Deramus Farm Drive

Project Description: The facility has existing volume within it and is adequate to be retrofitted for both water quality treatment and channel protection without excavating. A new multi-stage riser will be installed to change outflow characteristics. The proposed retrofit will create a wetland area.



Potential Project Benefits:

Streamflow	Installing a new multi-stage riser can likely meet 100% of the channel protection volume.
Water Quality	100% of the water quality volume requirement can be met within the pond.

Potential Project Constraints:

Environmental	No environmental constraints are anticipated. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this project is very good from the roadway.
Design / Construction	Any retrofit improvement will likely require approval by the homeowners.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000	$500
Remove Pilot Channels	300	LF	$6.00	$1,800
Riser	1	LS	$10,000.00	$10,000
Fencing	767	LF	$20.00	$15,340
Rip Rap Stabilization	40	LF	$50.00	$2,000
Wetland Planting	806	SY	$2.00	$1,612
			Base Construction Cost	**$31,252**
			Mobilization (5%)	$1,563
			Subtotal 1	**$32,815**
			Contingency (25%)	$8,204
			Subtotal 2	**$41,018**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$18,458
			Estimated Project Cost	**$59,000**

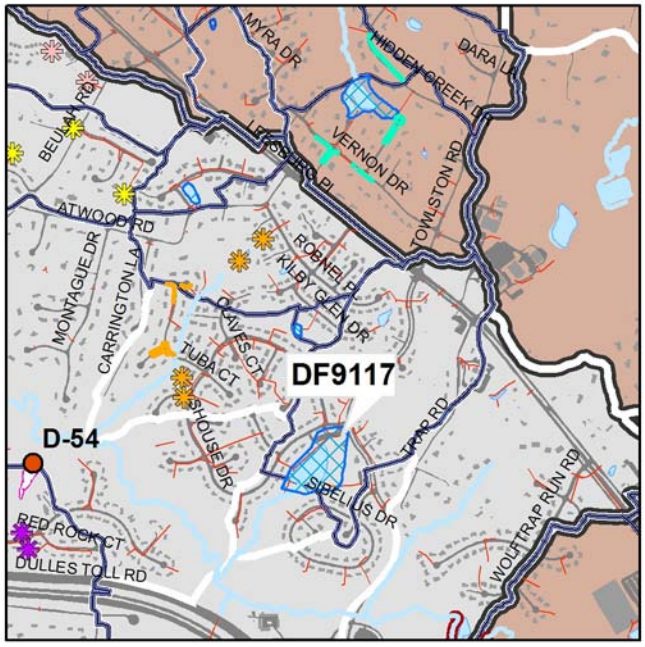
Site Photo:

Concept Sketch:

Project Number: DF9117
Catchment Code: DFWC9301
Candidate Site: C17

Project Type: Pond Retrofit
Project Size: 7.9 acres
Treated Area: 94.6 acres

Project Location: This project is located at the corner of Shouse Drive and Towlston Road.



Project Description: This facility can be retrofit for channel protection by installing a multistage riser on the outlet. The water quality volume is met within the existing wet storage of this pond. There is also enough excess wet storage volume to construct a vegetated aquatic bench around the entire perimeter of the facility. Repairs of the moderate erosion and bent outlet pipe on the downstream side of the embankment is needed.

Potential Project Benefits:

Streamflow	100% of the required channel protection volume can be created.
Water Quality	100% of the water quality volume requirement exists as wet storage.

Potential Project Constraints:

Environmental	No environmental constraints are anticipated. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this area is good by way of public roads.
Design / Construction	Improvements will likely require the approval of the homeowners.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.3	AC	$5,000	$1,500.00
Excavation/Grading (aquatic bench)	1880	CY	$30.00	$56,400.00
Outlet Protection	1	EA	$8,000.00	$8,000.00
Riser	1	LS	$10,000.00	$10,000.00
Wetland Planting (aquatic bench)	1128	SY	$2.00	$2,256.00
			Base Construction Cost	**$78,156**
			Mobilization (5%)	$3,908
			Subtotal 1	**$82,064**
			Contingency (25%)	$20,516
			Subtotal 2	**$102,580**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$46,161
			Estimated Project Cost	**$149,000**

Site Photo:

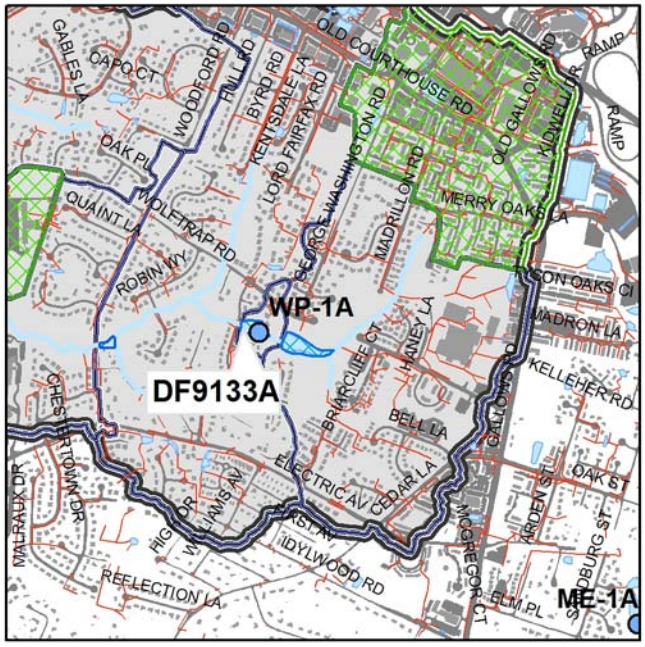
Concept Sketch:

Project Number: DF9133A
Catchment Code: DFWC0001
Candidate Site: C33

Project Type: Pond Retrofit
Project Size: 1.0 acres
Treated Area: 6.4 acres

Project Location: This site is located at the upstream side of Silentree Drive.

Project Description: Management of higher frequency storms can be improved at this facility by installing a multi-stage weir in front of the headwall. Although there is no wet storage at this location, extended detention time of runoff from storm events will provide some treatment for water quality. Also, forebay(s) should be added at the inflow structures to the facility to treat runoff before flow enters the stream channel.



Potential Project Benefits:

Streamflow	Approximately 90% of the channel protection volume for this facility can be met.
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	No environmental constraints 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	No specific design or construction issues were noted for this project.

Costs:

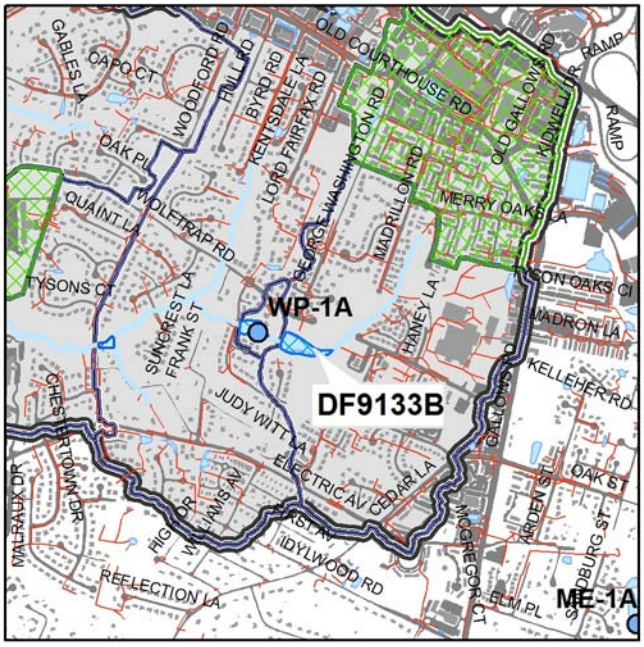
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.1	AC	$5,000	$500
Riser	1	LS	$20,000.00	$20,000
Rip Rap Stabilization	40	LF	$50.00	$2,000
			Base Construction Cost	**$22,500**
			Mobilization (5%)	$1,125
			Subtotal 1	**$23,625**
			Contingency (25%)	$5,906
			Subtotal 2	**$29,531**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$13,289
			Estimated Project Cost	**$43,000**

Site Photo:

Concept Sketch:

Project Number: DF9133B
Catchment Code: DFWC0001
Candidate Site: C33

Project Type: Pond Retrofit
Project Size: 1.7 acres
Treated Area: 180.2 acres



Project Location: This site is located at the upstream side of Silentree Drive.

Project Description: The combination of a stream channel, multiple ditches, and a closed storm drain system converging at this location direct a significant amount of flow to this area. Although the large drainage area and shallow embankment height limits the facility's potential, significant improvement in peak flow attenuation and pollutant load reduction can be made by replacing the existing weir with a multi-stage control structure and excavating to maximize the available storage volume. Also, anti-clogging design components should be considered, as this facility appears to be prone to accumulation of debris. The existing control structure has blocked fish passage and impounded water to convert this area into an established wet marsh. Excavation taking place within the basin of this facility will serve to maximize the storage volume. Additional wetland planting in this area will provide some of the required wet storage volume while also improving uptake of nutrients, pollutant removal, and settling of sediments.

Potential Project Benefits:

Streamflow	This project will achieve around 50% of the channel protection requirement.
Water Quality	25% of the wet storage volume is created through this project.

Potential Project Constraints:

Environmental	No environmental constraints 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	No specific design or construction issues were noted for this project.

Costs:

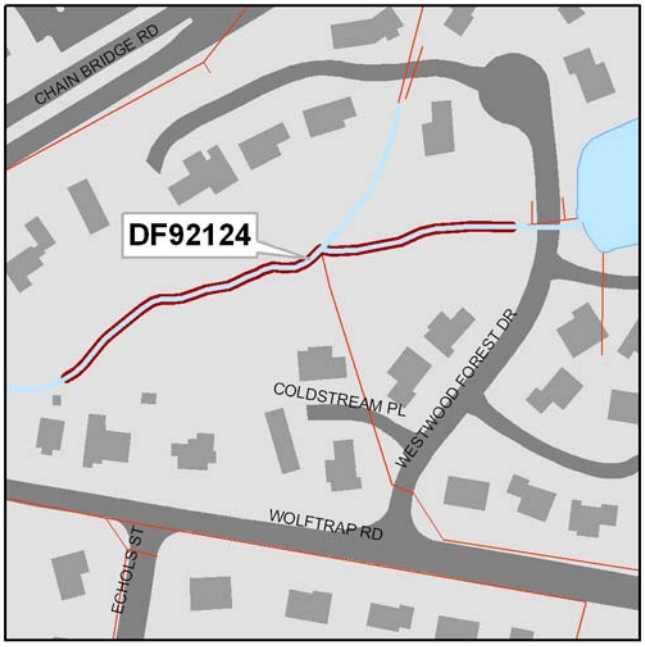
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	2.4	AC	$5,000	$12,000
Grading and Excavation	7602	CY	$30.00	$228,060
Riser	1	LS	$10,000.00	$10,000
Rip Rap Stabilization	100	LF	$50.00	$5,000
Wetland Planting	7841	SY	$2.00	$15,682
Dry Landscaping	3947	SY	$2.50	$9,867
			Base Construction Cost	**$280,610**
			Mobilization (5%)	$14,030
			Subtotal 1	**$294,640**
			Contingency (25%)	$73,660
			Subtotal 2	**$368,300**
			Engineering Design, Surveys, Land Acquisition, Utility Relocations and Permits (45%)	$165,735
			Estimated Project Cost	**$534,000**

Site Photo:

Concept Sketch:

Project Number: DF92124
Catchment Code: DFWC0005
Candidate Site: S124

Project Type: Stream Restoration
Project Size: 596 feet



Project Location: This project is located south of Chain Bridge Road and west of Westwood Forest Drive.

Project Description: The upper reaches of the stream are incised and actively eroding. The proposed restoration would involve regrading and creating a nested channel with a bench to restore habitat and floodplain access. The lower reach of the stream has stable bed and bank features but two of the adjacent property owners are maintaining the riparian buffer as lawn. The proposed buffer restoration will involve planting native trees and shrubs in areas of the riparian that are currently maintained as lawn and establishing an agreement with the homeowners to preserve the riparian buffer.

Potential Project Benefits:

Stream Stability	Regrading the stream with a floodplain bench will result in lower stress on streambanks and better stability thus reducing erosion potential.
Water Quality	Water quality may be improved by the nutrient uptake potential of the forested buffer.
Instream Habitat	The buffer will provide thermal shading and decrease the amount of nutrients in the waterway by vegetative uptake.

Potential Project Constraints:

Environmental	The site will not require forest clearing or impacts to jurisdictional wetlands. It will not require a permit from the U.S. Army Corps of Engineers or 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 adjacent to the stream.
Design / Construction	Design efforts are minimal compared to other stream restoration projects. General constructability is good.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Change channel type -- nested channel	430	LF	$200.00	$86,000
Stabilize in place -- grading	166	LF	$175.00	$29,050
Add'l cost, first 500 LF	500	LF	$200.00	$100,000
			Base Construction Cost	**$215,050**
			Mobilization (5%)	$10,753
			Subtotal 1	**$225,803**
			Contingency (25%)	$56,451
			Subtotal 2	**$282,253**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$127,014
			Estimated Project Cost	**$409,000**

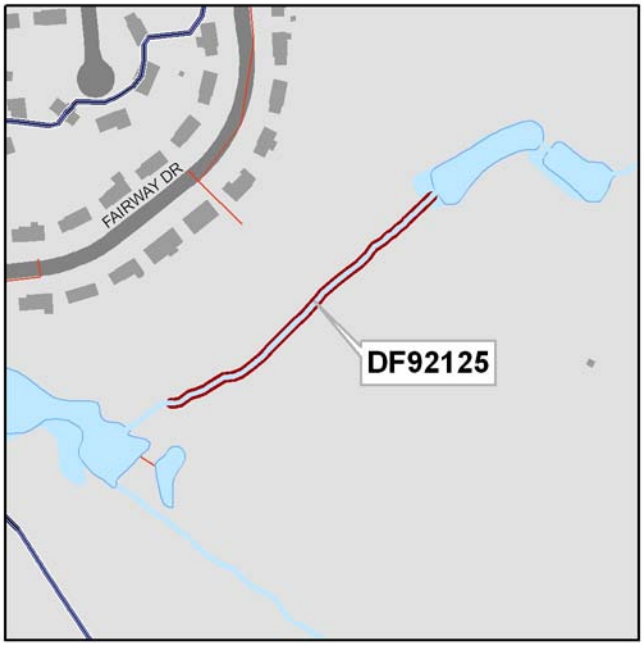
Concept Sketch

Project Number: DF92125
Catchment Code: DFWC9802
Candidate Site: S125

Project Type: Buffer Restoration
Project Size: 759 feet

Project Location: This project is located within the Westbriar Country Club golf course.

Project Description: The stream is located on a golf course and lacks a forested riparian buffer. The proposed restoration will seek, to the maximum extent practicable, to plant the riparian zone with woody trees and shrubs



Potential Project Benefits:

Stream Stability	The project will not significantly affect stream stability.
Water Quality	Water quality may be improved by the nutrient uptake potential of the forested buffer.
Instream Habitat	The buffer will provide thermal shading and decrease the amount of nutrients in the waterway by vegetative uptake.

Potential Project Constraints:

Environmental	The site will not require forest clearing or impacts to jurisdictional wetlands. The project will not require a permit. Projects in RPAs may require exceptions or waivers.
Facility Access	Access to this facility will require an easement on the golf course 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.

Costs:

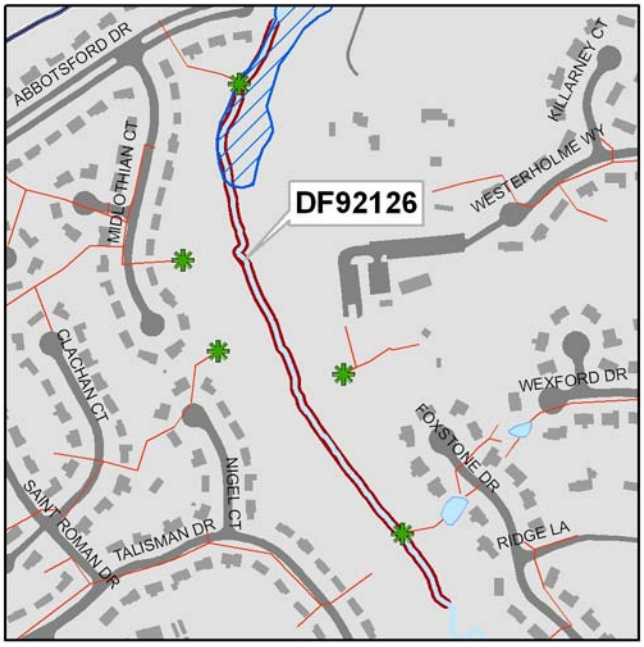
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Buffer restoration	759	LF	$25.00	$18,975
			Base Construction Cost	**$18,975**
			Mobilization (5%)	$949
			Subtotal 1	**$19,924**
			Contingency (25%)	$4,981
			Subtotal 2	**$24,905**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$11,207
			Estimated Project Cost	**$36,000**

Concept Sketch

Project Number: DF92126
Catchment Code: DFWC9801
Candidate Site: S126

Project Type: Stream Restoration
Project Size: 2122 Linear Feet

Project Location: This project is located to the west of Foxstone Drive.



Project Description: The stream's riparian zone lacks woody vegetation. The stream banks are raw and eroding. However the streambed appears to be stable. The stream is located in the Wolftrap Stream Valley Park. The banks will be regraded and stabilized. The riparian areas will be planted with native trees and shrubs. A floodplain bench will be excavated and planted with native tree and shrubs. Several stormwater outfalls will be retrofitted to reduce stream scour and one section of the stream will be restored to reflect natural stream morphology patterns. An existing sanitary sewer running along the stream must be considered in the design.

Potential Project Benefits:

Stream Stability	The stream banks will be stabilized and a floodplain bench will be created to reduce future 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 require forest clearing 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 to this facility is available from the adjacent paved park trail.
Design / Construction	Design efforts are moderate compared to other stream restoration projects. General constructability is good. A parallel sanitary sewer line will have to be factored into the design and construction efforts.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Stabilize in place -- grading	1528	LF	$175.00	$267,400
Stabilize in place -- armoring	34	LF	$225.00	$7,650
Excavate and create low-flow channel	560	LF	$150.00	$84,000
Add'l cost, first 500 LF	500	LF	$200.00	$100,000
			Base Construction Cost	**$459,050**
			Mobilization (5%)	$22,953
			Subtotal 1	**$482,003**
			Contingency (25%)	$120,501
			Subtotal 2	**$602,503**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$271,126
			Estimated Project Cost	**$874,000**

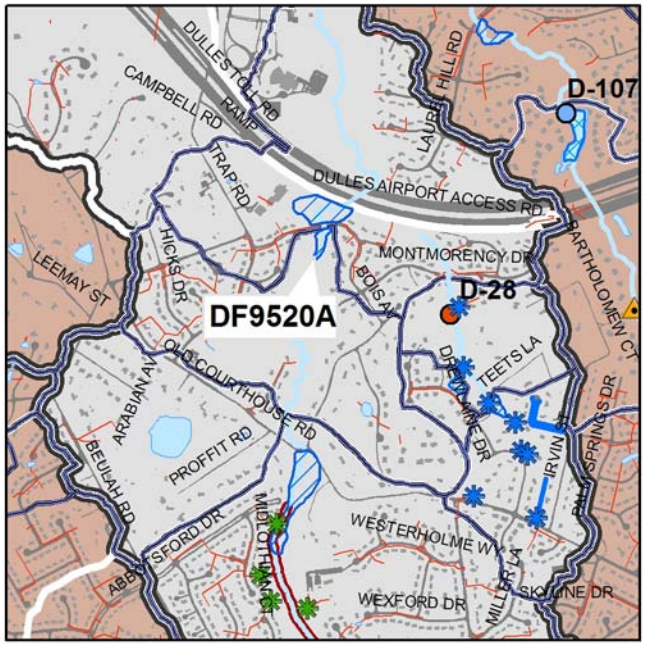
Concept Sketch

Project Number: DF9520A
Catchment Code: DFWC0009
Candidate Site: C20

Project Type: Culvert Retrofit
Project Size: 0.7 acres
Treated Area: 216 acres

Project Location: This project is located upstream of the culvert under Bois Avenue.

Project Description: The goal of this project is to use the wooded floodplain as storage to reduce peak flows, increase vegetative uptake, and settle solids out of the water column. This culvert retrofit would include improvements to enhance the water quality treatment at this site.



Potential Project Benefits:

Streamflow	This project would provide about 25% of the channel protection volume and could result in some reduction of the peak discharge.
Water Quality	Some reduction of pollutants will occur with increased settling associated with extended detention, along with vegetative uptake on the site.

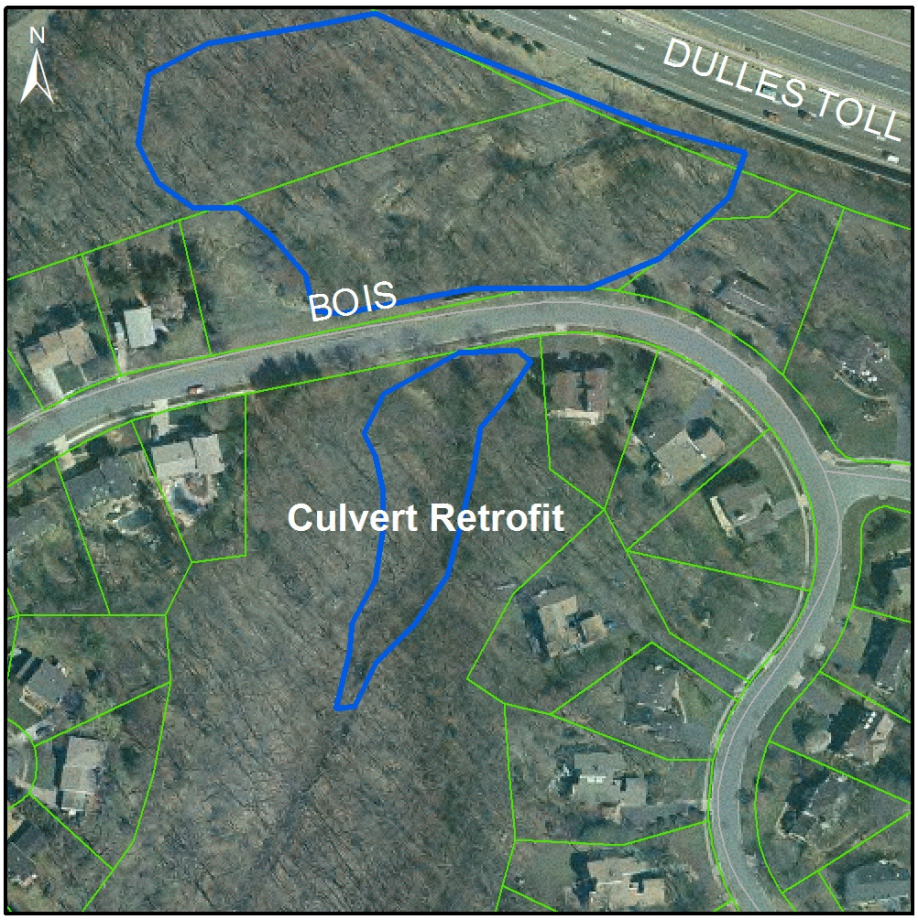
Potential Project Constraints:

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 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	1,080	CY	$35.00	$37,800
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	700	SY	$2.50	$1,750
Wetland Planting	240	SY	$2.00	$480
			Base Construction Cost	**$46,030**
			Mobilization (5%)	$2,302
			Subtotal 1	**$48,332**
			Contingency (25%)	$12,083
			Subtotal 2	**$60,414**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$27,186
			Estimated Project Cost	**$88,000**

Concept Sketch

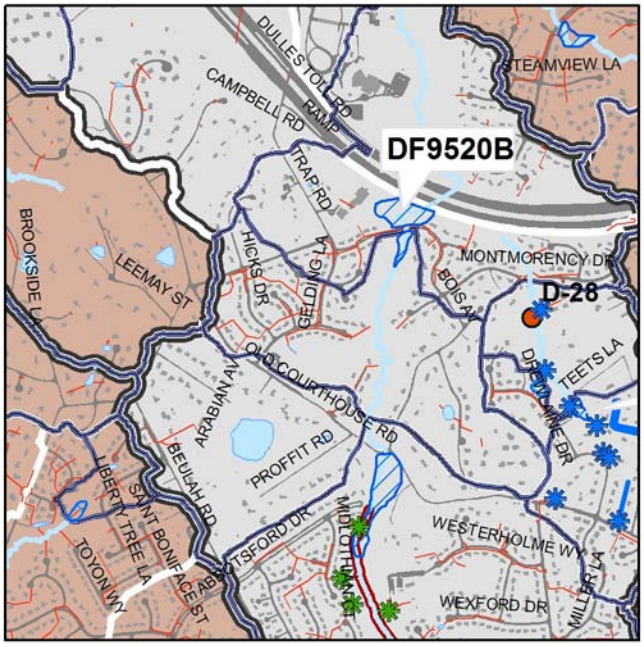


Project Number: DF9520B
Catchment Code: DFWC0009
Candidate Site: C20

Project Type: Culvert Retrofit
Project Size: 3.2 acres
Treated Area: 42.9 acres

Project Location: This project is located upstream of the culvert under the Dulles Toll Road north from Bois Avenue.

Project Description: The culvert retrofit is designed to store runoff on the floodplain during frequent, smaller events. Water quality improvements would not be part of the design, but some benefits would be provided through extended detention and settling. This project should be designed in conjunction with upstream project DF9520A as a series system.



Potential Project Benefits:

Streamflow	The project will provide approximately 60% of the channel protection volume.
Water Quality	Some reduction of pollutants will occur with increased settling associated with extended detention on the floodplain, along with vegetative uptake on the site.

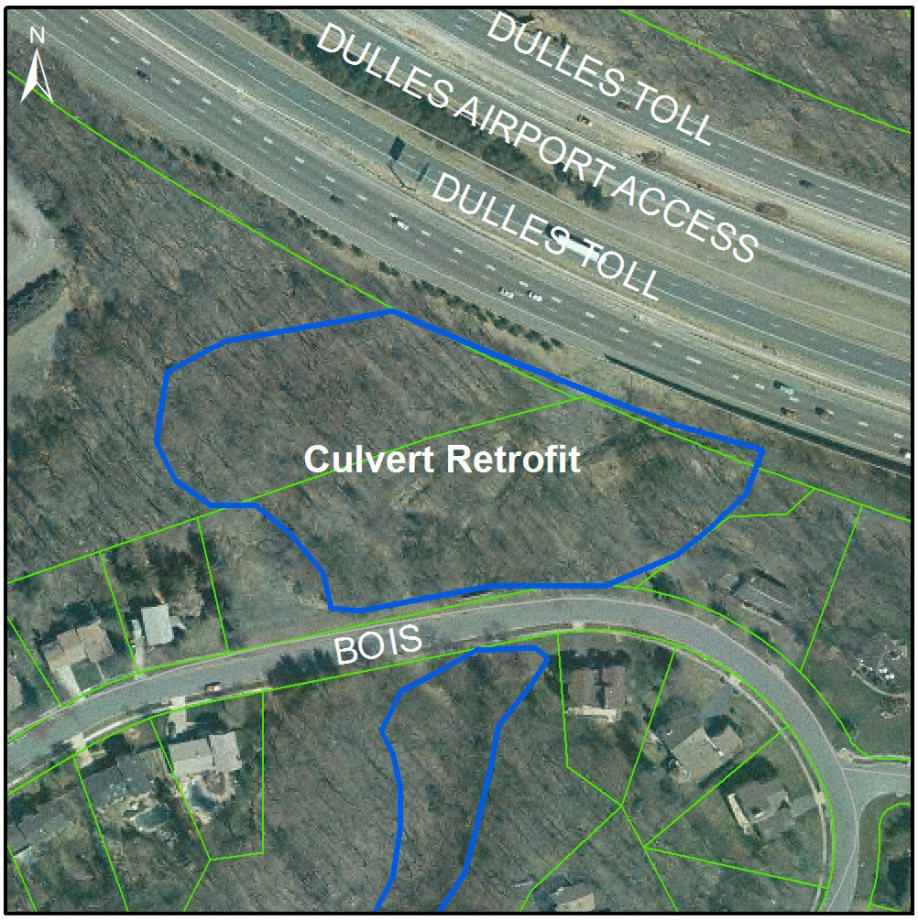
Potential Project Constraints:

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	The project is accessible from Bois Avenue.
Design / Construction	No unusual design or construction issues were found.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	0.4	AC	$5,000.00	$2,000
Excavation	2,470	CY	$35.00	$86,450
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	1,600	SY	$2.50	$4,000
Wetland Planting	540	SY	$2.00	$1,080
			Base Construction Cost	**$98,530**
			Mobilization (5%)	$4,927
			Subtotal 1	**$103,457**
			Contingency (25%)	$25,864
			Subtotal 2	**$129,321**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$58,194
			Estimated Project Cost	**$188,000**

Concept Sketch

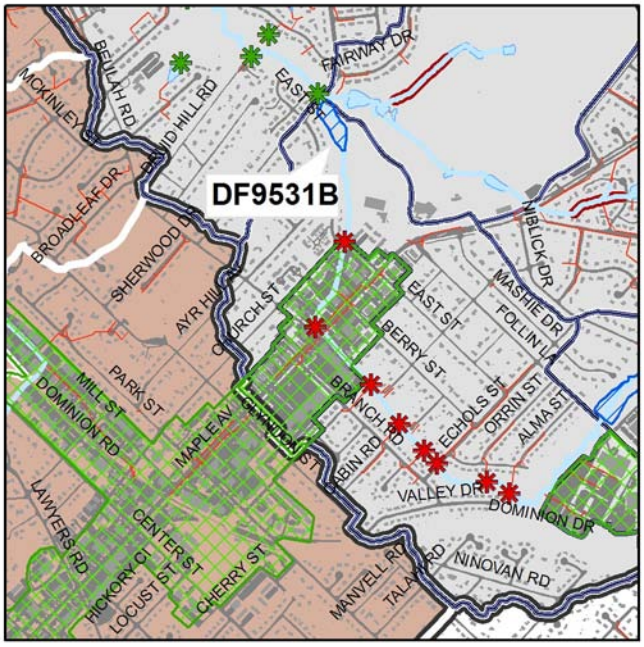


Project Number: DF9531B
Catchment Code: DFWC0004
Candidate Site: C31

Project Type: Culvert Retrofit
Project Size: 1.9 acres
Treated Area: 699.4 acres

Project Location: This site is located above Creek Crossing Road, at the Westwood Country Club.

Project Description: The goal of this project is to provide extended detention for channel protection and water quality improvements. The double culvert crossing can be used to develop the project and has the possibility of peak flow attenuation as well as detention of higher frequency storms



Potential Project Benefits:

Streamflow	This project would result in some reduction of the peak discharge for small stormflows.
Water Quality	Some reduction of pollutants will occur with increased settling associated with increased detention.

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	0.4	AC	$5,000.00	$2,000
Excavation	1,360	CY	$35.00	$47,600
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	1,760	SY	$2.50	$4,400
Wetland Planting	590	SY	$2.00	$1,180
			Base Construction Cost	**$60,180**
			Mobilization (5%)	$3,009
			Subtotal 1	**$63,189**
			Contingency (25%)	$15,797
			Subtotal 2	**$78,986**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$35,544
			Estimated Project Cost	**$115,000**

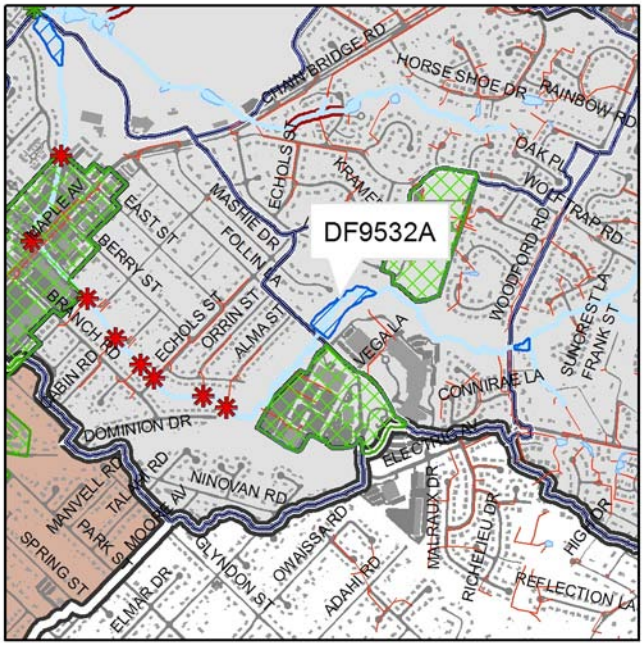
Concept Sketch

Project Number: DF9532A
Catchment Code: DFWC0003
Candidate Site: C32

Project Type: Culvert Retrofit
Project Size: 3.2 acres
Treated Area: 114.8 acres

Project Location: This site is located at the upstream side of the crossing at Follin Lane.

Project Description: The goal of this project is to place an impoundment structure to increase the detention time within this drainage area and protect channels downstream from high flow. This project would also provide some pollutant removal by means of vegetative uptake from the wooded floodplain.



Potential Project Benefits:

Streamflow	The project will provide 100% 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. There may be some improvements to water quality through the reduction in scour forming discharges, and sedimentation and vegetative uptake on the floodplain.

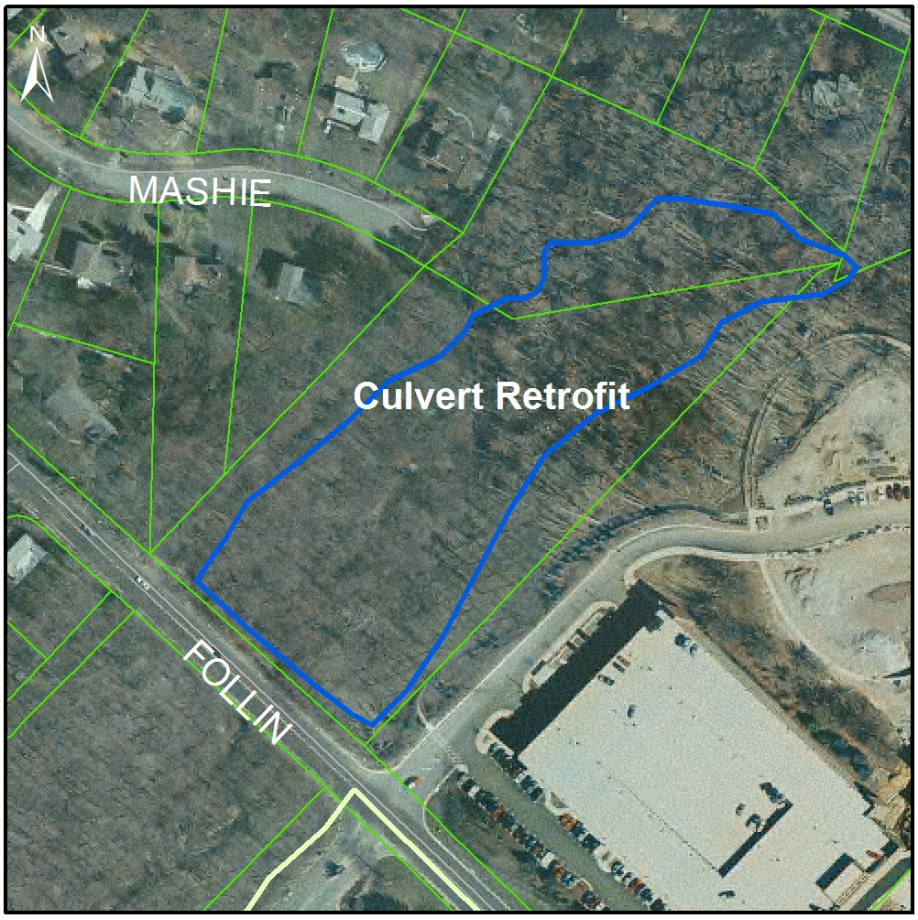
Potential Project Constraints:

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	0.7	AC	$5,000.00	$3,500
Excavation	960	CY	$35.00	$33,600
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	2,910	SY	$2.50	$7,275
Wetland Planting	970	SY	$2.00	$1,940
			Base Construction Cost	**$51,315**
			Mobilization (5%)	$2,566
			Subtotal 1	**$53,881**
			Contingency (25%)	$13,470
			Subtotal 2	**$67,351**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$30,308
			Estimated Project Cost	**$98,000**

Concept Sketch

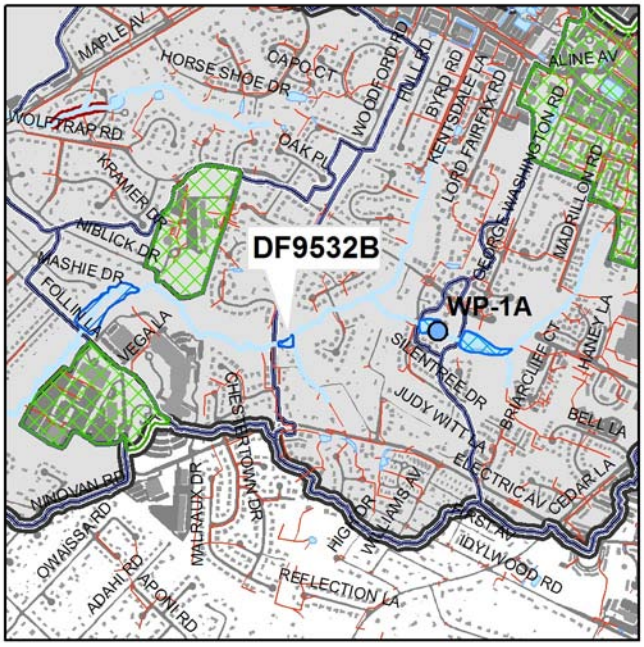


Project Number: DF9532B
Catchment Code: DFWC0003
Candidate Site: C32

Project Type: Culvert Retrofit
Project Size: 0.3 acres
Treated Area: 254 acres

Project Location: This site is located on the upstream side of Woodford Road.

Project Description: The goal is to create an extended detention structure that will use the wooded floodplain for storage to reduce erosion potential in the stream, increase the uptake of nutrients by plants, and allow sediment to settle.



Potential Project Benefits:

Streamflow	The project would result in minor reductions in peak discharge.
Water Quality	Reduction of pollutants would occur by vegetative uptake and the settling of solids.

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 to this area is very good by way of 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	0.1	AC	$5,000.00	$500
Excavation	220	CY	$35.00	$7,700
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	290	SY	$2.50	$725
Wetland Planting	100	SY	$2.00	$200
			Base Construction Cost	**$14,125**
			Mobilization (5%)	$706
			Subtotal 1	**$14,831**
			Contingency (25%)	$3,708
			Subtotal 2	**$18,539**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$8,343
			Estimated Project Cost	**$27,000**

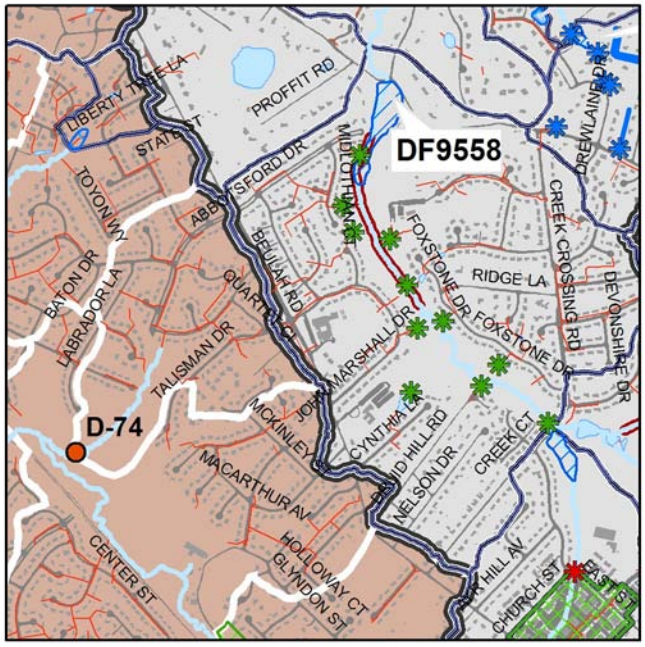
Concept Sketch

Project Number: DF9558
Catchment Code: DFWC0005
Candidate Site: C58

Project Type: Culvert Retrofit
Project Size: 5.0 acres
Treated Area: 354.9 acres

Project Location: This site is located at the upstream side of the crossing under Old Courthouse Road.

Project Description: The goal of this project is to provide water quality treatment through extended detention on to the floodplain in this area. This will be achieved as part of the several other projects in this catchment by improving the outfall of the culvert by reducing scour-inducing peak flows. This will decrease the scour at the crossing and reduce the amount of sediment carried downstream.



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.

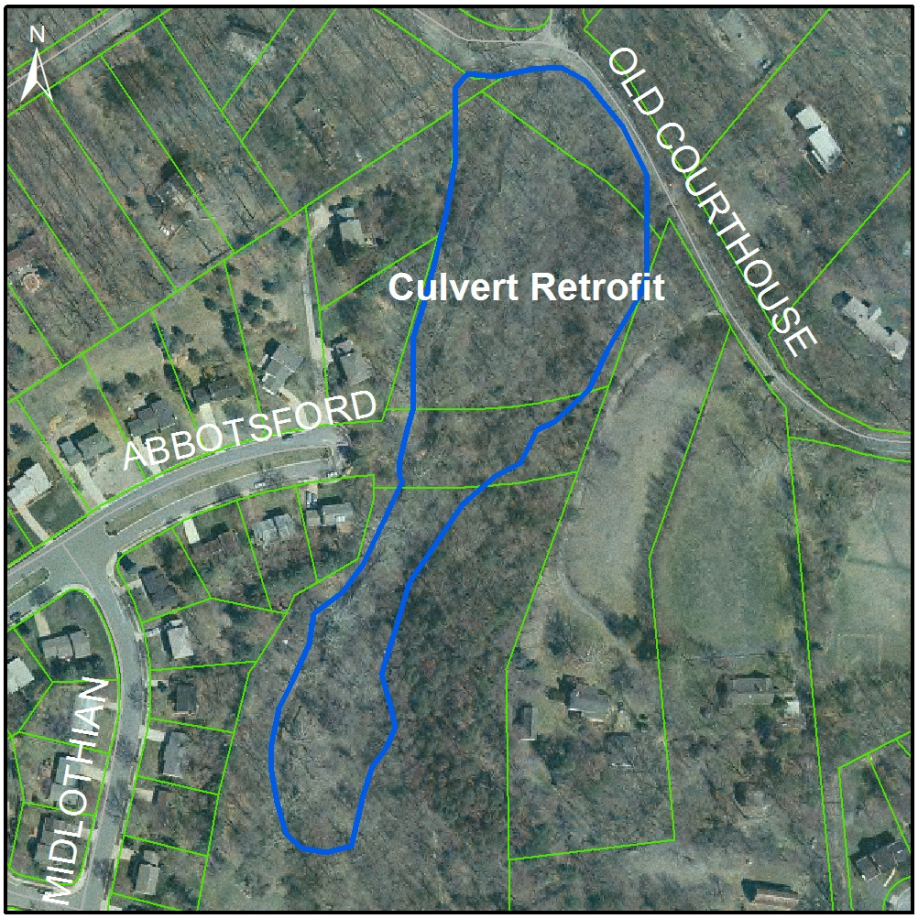
Potential Project Constraints:

Environmental	Environmental permitting 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	1.1	AC	$5,000.00	$5,500
Excavation	2,470	CY	$35.00	$86,450
Impoundment Structure	1	LS	$5,000.00	$5,000
Landscaping	4,550	SY	$2.50	$11,375
Wetland Planting	1,520	SY	$2.00	$3,040
			Base Construction Cost	**$111,365**
			Mobilization (5%)	$5,568
			Subtotal 1	**$116,933**
			Contingency (25%)	$29,233
			Subtotal 2	**$146,167**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$65,775
			Estimated Project Cost	**$212,000**

Concept Sketch

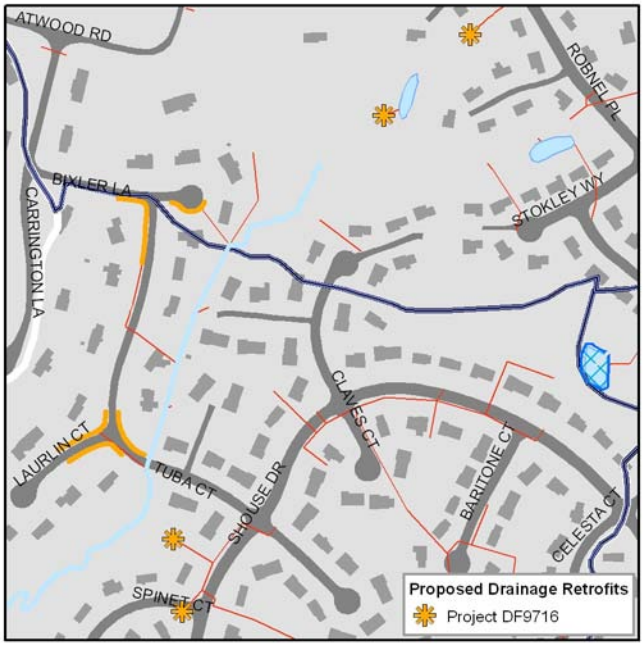


Project Number: DF9716
Catchment Code: DFWC9201
Candidate Site: C16

Project Type: Drainage Retrofit
Project Size: 944 feet of ditch

Project Location: Along Tuba and Laurlin Courts.

Project Description: This project involves replacing the concrete drainage ditches throughout the catchment, such as those along Tuba Court and Laurlin Court, with dry swales with an underdrain.



Potential Project Benefits:

Streamflow	Replacing the paved ditches with dry 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	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. 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)	944	LF	$18.00	$16,992
Dry Swale w/ Underdrain	944	LF	$50.00	$47,200
Outfall Protection	4	EA	$8,000.00	$32,000
			Base Construction Cost	**$96,192**
			Mobilization (5%)	$4,810
			Subtotal 1	**$101,002**
			Contingency (25%)	$25,250
			Subtotal 2	**$126,252**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$56,813
			Estimated Project Cost	**$183,000**

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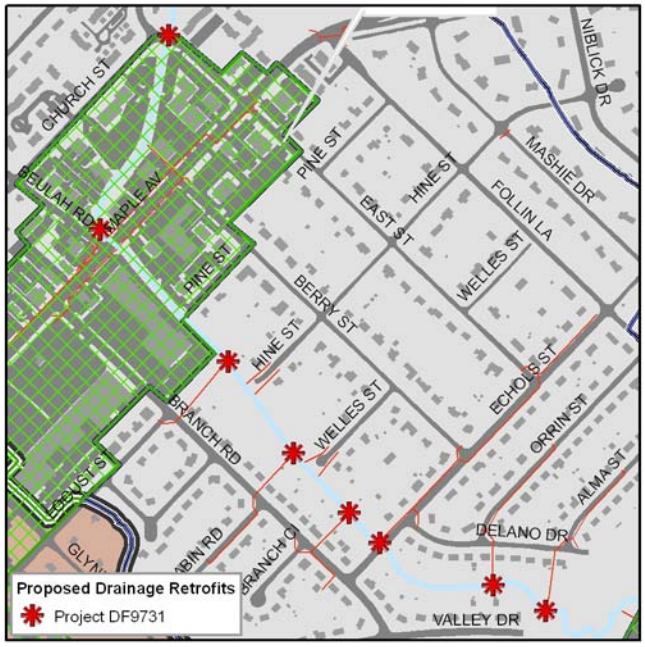
Project Number: DF9731
Catchment Code: DFWC0004
Candidate Site: C31

Project Type: Drainage Retrofit.
Project Size: 8 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	8	EA	$8,000.00	$64,000.00
			Base Construction Cost	**$64,000**
			Mobilization (5%)	$3,200
			Subtotal 1	**$67,200**
			Contingency (25%)	$16,800
			Subtotal 2	**$84,000**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$37,800
			Estimated Project Cost	**$122,000**

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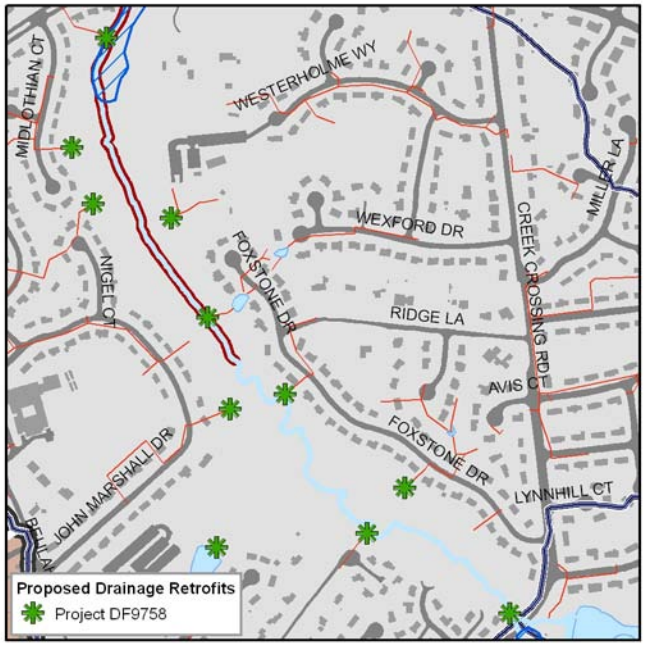
Project Number: DF9758
Catchment Code: DFWC0005
Candidate Site: C58

Project Type: Drainage Retrofit
Project Size: 11 Outfalls



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

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

Potential Project Benefits:

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

Potential Project Constraints:

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

Costs:

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

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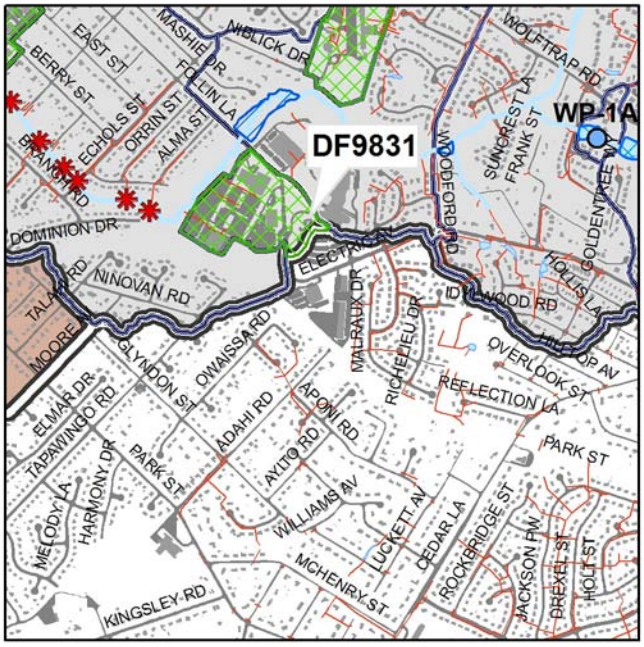
Project Number: DF9831
Catchment Code: DFWC0004
Candidate Site: C31

Project Type: LID Retrofit
Project Size: 0.3 acres
Treated Area: 25.2 acres

Project Location: This project would retrofit the existing rear parking lot of the southwestern parcel associated with the Navy Federal Credit Union Complex on Follin Lane with LID porous pavers and/or structural controls.

Project Description: Replacing or renovating this parking lot would reduce the effects of imperviousness, with the benefit of lower velocities and volume of runoff into the stream.



Potential Project Benefits:

Streamflow	While designed primarily for water quality, this project would reduce the amount of runoff through infiltration and reduction of impervious area.
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	No significant design or construction issues were noted.

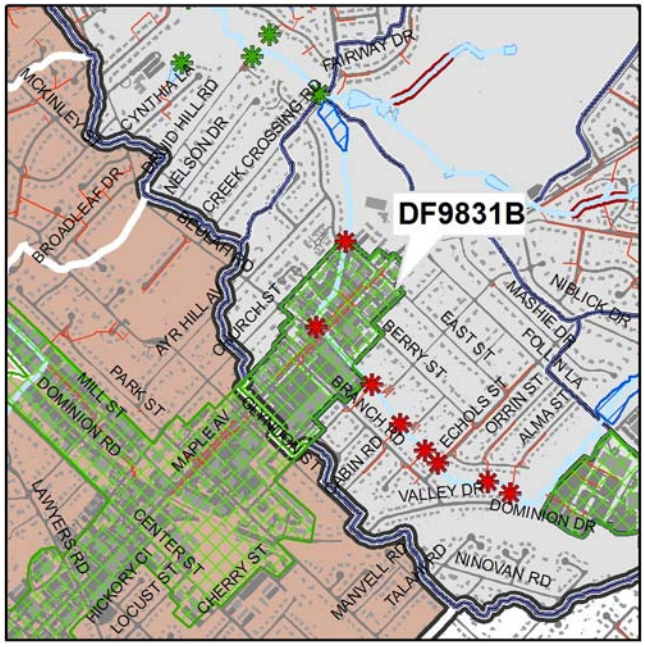
Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	1,352.0	SY	$120.00	$162,240
			Base Construction Cost	**$162,240**
			Mobilization (5%)	$8,112
			Subtotal 1	**$170,352**
			Contingency (25%)	$42,588
			Subtotal 2	**$212,940**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$95,823
			Estimated Project Cost	**$309,000**

Concept Sketch

Project Number: DF9831B
Catchment Code: DFWC0004
Candidate Site: C31

Project Type: LID Retrofit
Project Size: 0.1 acres
Treated Area: 48.3 acres



Project Location: The area within 1 to 2 blocks on either side of Maple Avenue in Vienna and within 1 to 2 blocks of the W&OD Trail.

Project Description: This project requires a holistic LID approach to be retrofitted into the business corridor along Maple Street (Rte. 123), which is built out with commercial properties. The entire area is almost entirely impervious, and therefore results in high rates of runoff high concentrations of contaminants to the downstream waters. LID systems could include reduction of imperviousness, inlet filtration, bioretention, rooftop detention, or green roofs. Management practices could be implemented as a public project(s) or by individual sites as redevelopment occurs.

Potential Project Benefits:

Streamflow	The LID approach is expected to reduce runoff volume through infiltration. Minor reductions in peak flow rates could be expected.
Water Quality	The project would treat 100% of the water quality volume, which would provide significant improvements for this drainage area.

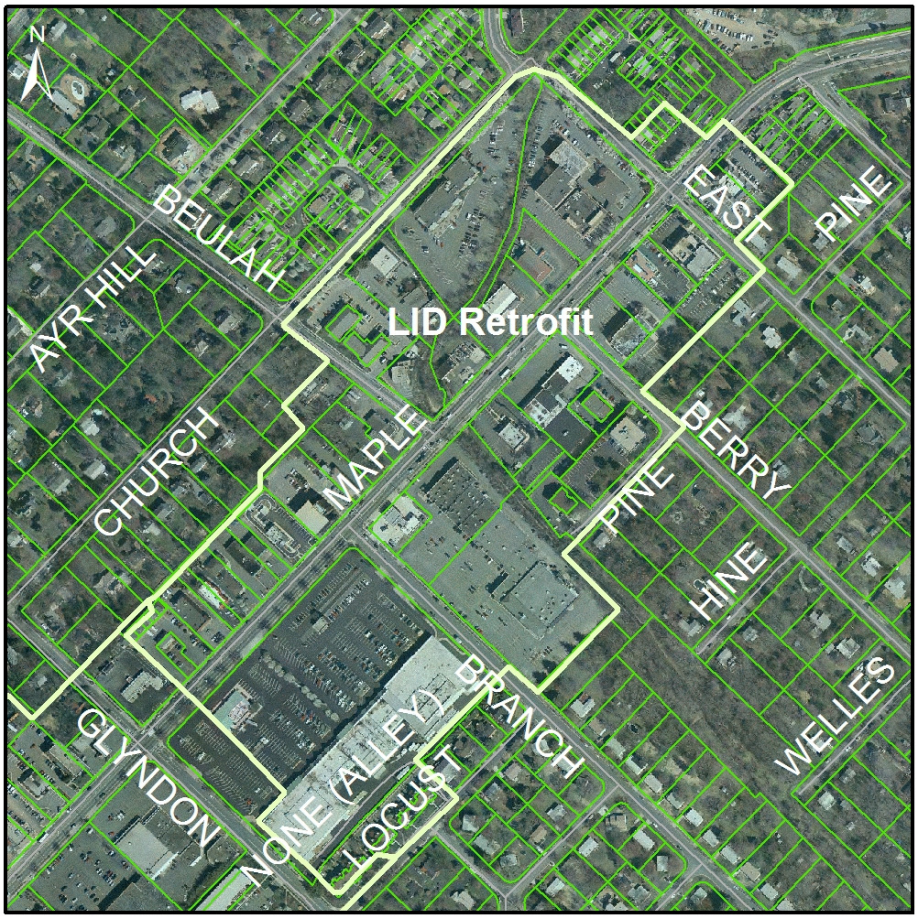
Potential Project Constraints:

Environmental	No environmental permitting issues or impacts are anticipated for this project.
Facility Access	For the most part, access in this area is excellent from roads and parking lots.
Design / Construction	This project would require detailed survey and mapping of all utilities, drainage appurtenances and structures. Coordination with private property owners would be necessary in some of the areas.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	3,165.0	SY	$120.00	$379,800
			Base Construction Cost	**$379,800**
			Mobilization (5%)	$18,990
			Subtotal 1	**$398,790**
			Contingency (25%)	$99,698
			Subtotal 2	**$498,488**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$224,319
			Estimated Project Cost	**$723,000**

Concept Sketch:

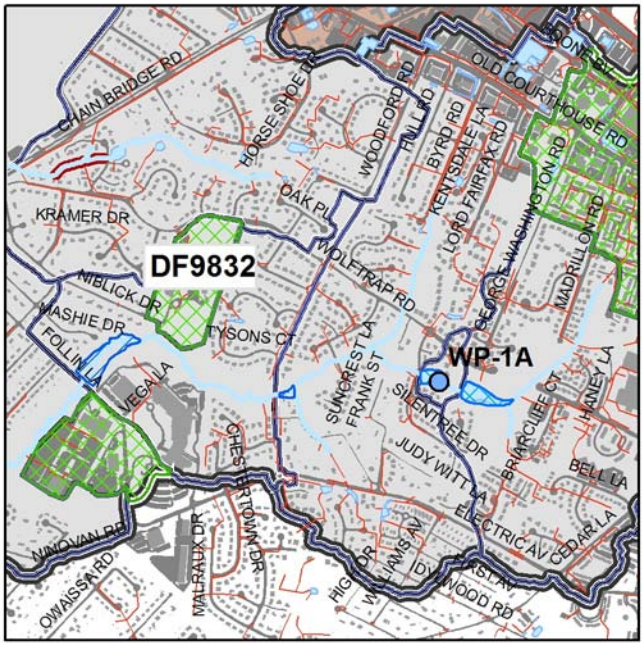


Project Number: DF9832
Catchment Code: DFWC0003
Candidate Site: C32

Project Type: LID Retrofit
Project Size: 0.1 acres
Treated Area: 21 acres

Project Location: This project would be located at the parcel occupied by Notre Dame and Our Lady of Good Counsel Catholic Church.

Project Description: The existing development results in a high impervious area. The goal is to reduce the imperviousness by strategically adding pervious areas across the site and by redirecting impervious runoff to the pervious sections. The LID retrofit would reduce the runoff volume and improve water quality from these properties.



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 structural LID only. Conservation and disconnection would be significant part of this design.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	526.0	SY	$120.00	$63,120
			Base Construction Cost	**$63,120**
			Mobilization (5%)	$3,156
			Subtotal 1	**$66,276**
			Contingency (25%)	$16,569
			Subtotal 2	**$82,845**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$37,280
			Estimated Project Cost	**$120,000**

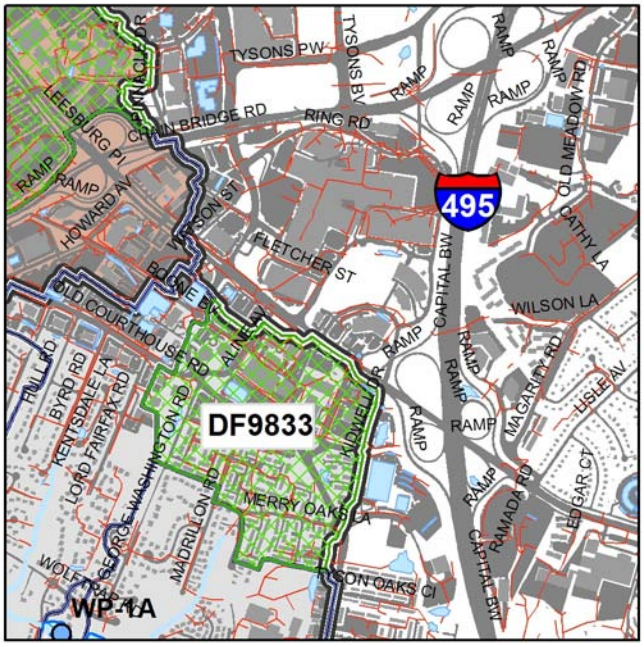
Concept Sketch:

Project Number: DF9833
Catchment Code: DFWC0001
Candidate Site: C33

Project Type: LID Retrofit
Project Size: 1.1 acres
Treated Area: 109.9 acres

Project Location: This site is located in the upper third of the catchment.

Project Description: The goal is look for places where the impervious surface of this highly developed area could be broken and pervious areas created. The pervious areas will receive water from the impervious areas, reducing the water velocity and volume while increasing the infiltration rate.



Potential Project Benefits:

Streamflow	While designed primarily for water quality, this project would reduce the amount of runoff through reduction of impervious area and improve 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	Minimization of runoff through use of pervious pavement and rooftop disconnection would be significant part of this design

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
LID Structural Control	5,500.0	SY	$120.00	$660,000
			Base Construction Cost	**$660,000**
			Mobilization (5%)	$33,000
			Subtotal 1	**$693,000**
			Contingency (25%)	$173,250
			Subtotal 2	**$866,250**
			Engineering, Survey, Land Acquisition, Utility Relocations and Permits (45%)	$389,813
			Estimated Project Cost	**$1,256,000**

Concept Sketch: