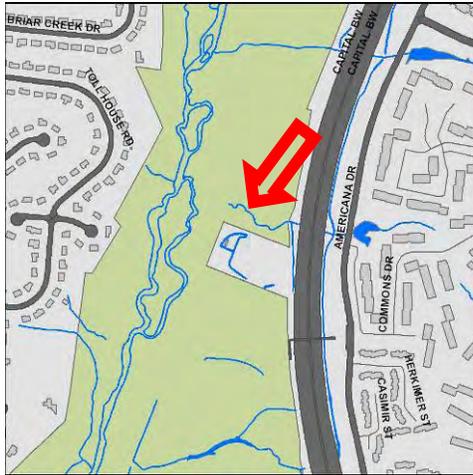


AC9232 - Stream Restoration



Address: Between 8200 block of Toll House Road and I-495 (Capitol Beltway)
Location: Wakefield Park
Land Owner: County - FCPA
PIN: 0704 01 0002
Control Type: Water Quality
Drainage Area: N/A
Receiving Waters: Unknown Tributary of Accotink Creek

Description: This project entails restoring the existing stream channel located within Wakefield Park that is located between I-495 and Toll House Road which extends from the culvert under I-495 downstream to the confluence with Accotink Creek. Currently, this channel is experiencing severe bank and bed erosion and the channel is deeply incised.

Restoration will include regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, and installing grade controls to dissipate energy. Since this project is located within a park, the floodplain and project limits are all within forested conditions except for an overhead power line utility.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to Accotink Creek by reducing bank scour and stream bed incision. Overall, stream habitat and water quality may be improved due to stable habitat creation and reducing the available sediment supply. It is estimated that a total of 147,421 lbs of sediment, 118 lbs of nitrogen and 46 lbs of phosphorus would be reduced annually by this project.

Project Design Considerations: A power line easement is within the vicinity of the stream; therefore, coordination with the appropriate utility agencies will be necessary for access and construction. Access to the project site could occur from the utility easement if permissible, but will require significant tree removal. Although tree loss is expected with this restoration, restoration benefits will outweigh overall construction impacts. Environmental permitting will be required to allow for construction and modifications to a perennial stream channel and for forest impacts. Other than the overhead power line utility, no utility conflicts are anticipated with this restoration.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	940	LF	\$200	\$188,000
Clear and Grub	0.86	AC	\$10,000	\$8,600
Plantings	0.86	AC	\$25,000	\$21,500
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$318,100
Ancillary Items	1	LS	5% of project	\$15,905
Erosion and Sediment Control	1	LS	10% of project	\$31,810
			Base Construction Cost	\$365,815
			Mobilization (5%)	\$18,291
			Subtotal 1	\$384,106
			Contingency (25%)	\$96,027
			Subtotal 2	\$480,133
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$216,060
			Estimated Project Cost	\$697,000



Figure 1: Incised channel with severe bank erosion

AC9233 - Stream Restoration



Address: Between 8100 Briar Creek Drive and I-495 (Capitol Beltway)
Location: Wakefield Park
Land Owner: County - FCPA
PIN: 0704 01 0002
Control Type: Water Quality
Drainage Area: N/A
Receiving Waters: Unknown Tributary of Accotink Creek

Description: This project entails restoring an existing stream channel located within Wakefield Park located between I-495 and Briar Creek Drive. The channel extends from the downstream side of the culvert under I-495 downstream to the confluence with Accotink Creek. Currently, this channel is experiencing severe bank and bed erosion and is deeply incised.

Restoring this channel will include regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, and installing grade controls to dissipate energy. The floodplain and project limits are all within forested conditions except for an overhead power line utility.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will reduce sediment supply to Accotink Creek by reducing bank scour and stream bed incision. Overall, stream habitat and water quality may be improved due to stable habitat creation and reductions in available sediment supply. It is estimated that 35,489 lbs of sediment, 28 lbs of nitrogen and 11 lbs of phosphorus would be reduced annually by this project.

Project Design Considerations: A power line easement is within the vicinity of the stream; therefore, coordination with the appropriate utility agencies will be necessary for access and construction. Access to the project site could occur from the utility easement, if allowed. Access to the proposed restoration will require significant tree removal and manipulation of steep slopes; however, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and forest impacts.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	953	LF	\$200	\$190,600
Clear and Grub	0.87	AC	\$10,000	\$8,700
Plantings	0.87	AC	\$25,000	\$21,750
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$321,050
Ancillary Items	1	LS	5% of project	\$16,053
Erosion and Sediment Control	1	LS	10% of project	\$32,105
			Base Construction Cost	\$369,208
			Mobilization (5%)	\$18,460
			Subtotal 1	\$387,668
			Contingency (25%)	\$96,917
			Subtotal 2	\$484,585
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$218,063
			Estimated Project Cost	\$703,000



Figure 1: Incised channel with severe bank erosion

AC9234 - Stream Restoration



Address: Behind 3200 block of Wynford Drive and Amberley Lane, and behind 3300 block of Mantua Drive

Location: Sutton Place and Mantua Woods neighborhoods

Land Owner: Private - Residential

PIN: 0591 18 0079, 80, 81, 82, 83, 0591 24 0019, 18, 17, 16, 15, 14, 13, 0591 18 0046, 0591 18 0045

Control Type Water Quality

Drainage Area N/A

Receiving Waters Long Branch North

Description: This project is intended to restore an eroded and over-widened section of Long Branch North located between Wynford Drive, Amberley Lane and Mantua Drive. Restoring the channel will include raising the bed elevation and reducing channel dimensions to reconnect the channel with the floodplain, installing grade control structures, re-grading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques and stabilizing all stormdrain outfalls and tributary channel connections along the channel. Buffer restoration along re-graded areas and where extensive amounts of invasive vegetation are present will be necessary to promote future stability and to restore ecological function. Coordinating between Project AC9235, which is just upstream of this project, and this project will be necessary during design and construction to ensure compatibility between the two projects. The floodplain and project limits are all forested.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: This project will help to reduce sediment loads to Long Branch North and Accotink Creek. New channel geometry and stabilizing existing banks and eroded connections to this channel will allow for reduced sediment loads to downstream channels. Reconnecting this channel to the floodplain will also reduce downstream sediment loads allowing suspended sediment to deposit on the floodplain. By reducing sedimentation and providing stable habitat along restored banks, overall water quality and habitat may be improved. This project will also remove the invasive bamboo along the stream banks. It is estimated that a total of 185,997 lbs of sediment, 149 lbs of total nitrogen and 58 lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: Since private residential properties adjoin the stream, coordination with these property owners will be necessary for access and construction. Access to this project will be difficult and may need to occur from Copeland Pond Court using the existing access to the stormwater pond located adjacent to the stream. Access may also be possible along Wynford Drive using existing utility easements; however, this access would require going through private residences. Access from either of these points will require some tree removal. Although tree loss is expected, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and for forest impacts. Existing utility impacts are possible as a sewer line parallels the stream. This project should be designed and constructed in conjunction with Project AC9235 to ensure proper channel elevations and alignment.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	1563	LF	\$200	\$312,600
Clear and Grub	1.60	AC	\$10,000	\$16,000
Plantings	1.60	AC	\$25,000	\$40,000
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$468,600
Ancillary Items	1	LS	5% of project	\$23,430
Erosion and Sediment Control	1	LS	10% of project	\$46,860
			Base Construction Cost	\$538,890
			Mobilization (5%)	\$26,945
			Subtotal 1	\$565,835
			Contingency (25%)	\$141,459
			Subtotal 2	\$707,294
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$318,282
			Estimated Project Cost	\$1,026,000



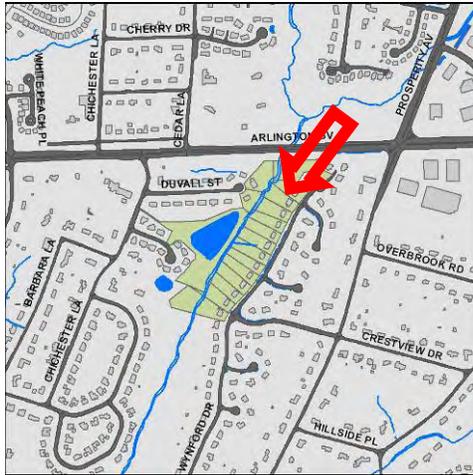
Figure 1: Over-widened channel with severe bank erosion and large depositional features



Figure 2: Over-widened channel with bank erosion and large depositional features

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AC9235 - Stream Restoration



Address: Behind 3100 block of Wynford Drive and behind 8700 block of Duvall St

Location: Sutton Place and Copeland Pond neighborhoods

Land Owner: Private - Residential

PIN: 0493 18 0062A, 0493 18 0063, 0493 18 0065, 66, 67, 68, 69, 70, 71, 72, 73, 74, 0493 25 A, 0493 07 0010, 0493 07 0009, 0493 31 A

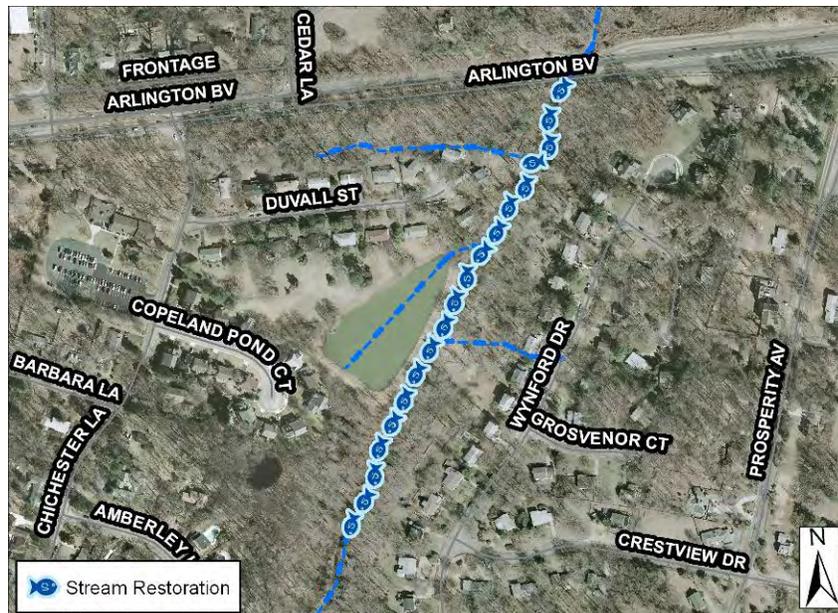
Control Type Water Quality

Drainage Area N/A

Receiving Waters Long Branch North

Description: This project proposes to restore an eroded and previously stabilized section of Long Branch North. The proposed restoration starts downstream of the culvert under Arlington Boulevard to approximately the end of Copeland Pond Court. The upstream portion of this channel has been stabilized with large rip rap around a manhole and a utility. Downstream of this utility there is severe bank erosion and overwidening. The downstream portion parallels a large wet pond and contains gabion baskets within and along the banks as well as grade control structures to control the slope of the existing channel.

Restoration would include re-shaping the channel to provide more protection for the manhole, bank protection measures and channel adjustment, replacing outdated engineered features with natural channel design structures to prevent downstream scouring. Reconnecting this channel to the floodplain in the downstream portion of this restoration may also be possible. Coordination between Project AC9234, which is just downstream of this project, will be necessary during design and construction.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to Long Branch and Accotink Creek by reducing bank scour and channel bed incision. By reducing sedimentation within the channel and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. Restoring and stabilizing this channel will also help to protect infrastructure located within the channel and on the floodplain. The riparian buffer will also be improved providing additional channel stability and ecological benefits. It is estimated that a total of 191,233 lbs of sediment, 153 lbs of total nitrogen and 59 lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: This project is entirely contained within private residential properties and will require significant coordination with the property owners for access and construction. A portion of this reach parallels a wet pond embankment, where it may not be desirable to remove the existing stabilization measures or promote a riparian buffer. Access to this project could occur from Copeland Pond Court using the existing access to the stormwater pond located adjacent to the stream. Tree loss is expected with this restoration; however, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting due to the need for construction and modifications to a perennial stream channel and impacting forested area. Existing utility impacts are possible with this restoration as a sewer line parallels the stream. This project should be designed and constructed in conjunction with Project AC9234 to ensure proper channel elevations and alignment.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	1607	LF	\$200	\$321,400
Clear and Grub	1.47	AC	\$10,000	\$14,700
Plantings	1.47	AC	\$25,000	\$36,750
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$472,850
Ancillary Items	1	LS	5% of project	\$23,643
Erosion and Sediment Control	1	LS	10% of project	\$47,285
			Base Construction Cost	\$543,778
			Mobilization (5%)	\$27,189
			Subtotal 1	\$570,967
			Contingency (25%)	\$142,742
			Subtotal 2	\$713,709
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$321,169
			Estimated Project Cost	\$1,035,000



Figure 1: Severe channel incision and erosion



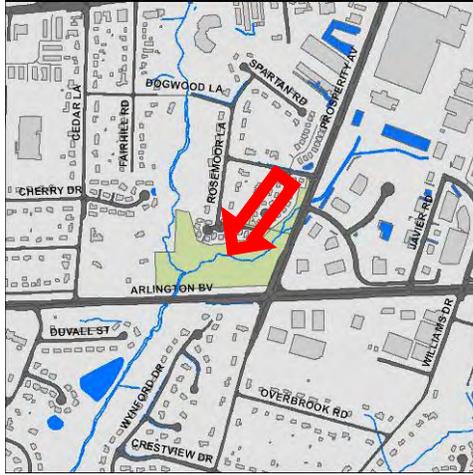
Figure 2: Existing gabion baskets within the channel



Figure 3: Existing stabilized channel with gabion banks

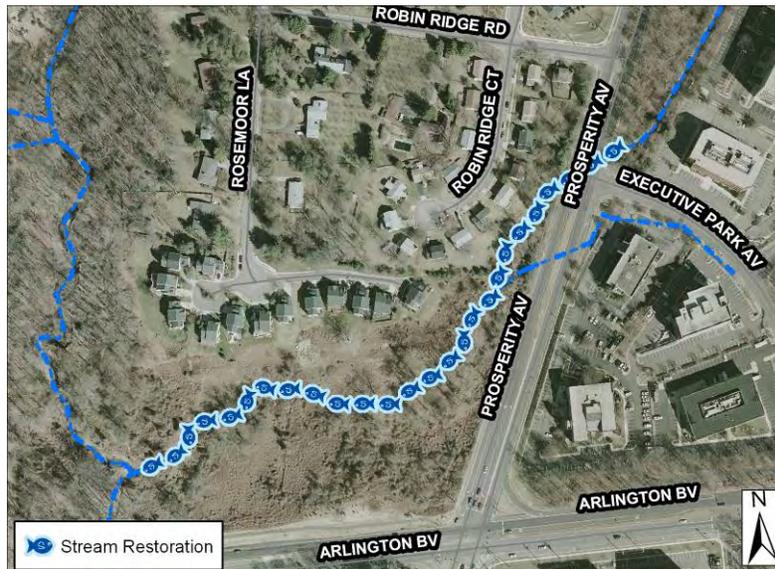
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AC9236 - Stream Restoration



Address: Behind 3000 block of Robin Ridge Court and Rosemoor Lane
Location: Merrified View neighborhood
Land Owner: Private - Residential
PIN: 0493 24 A, 0493 30 A
Control Type Water Quality
Drainage Area N/A
Receiving Waters Unknown Tributary of Long Branch North

Description: This project starts at the downstream side of the culvert under Prosperity Avenue and extends downstream to the confluence with Long Branch North. Upstream portions of the channel are concrete-lined. The channel downstream of Prosperity Avenue is deeply incised with scoured banks and several stands of invasive bamboo. Restoring this channel will include raising the bed elevation and reducing channel dimensions to reconnect the channel with the floodplain, installing grade control structures, re-grading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, and retrofitting all storm drain outlet structures along the restoration reach. Buffer restoration along re-graded areas and where extensive amounts of invasive vegetation are present will be necessary to promote future stability and to restore ecological function. The floodplain and project limits are all forested.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: This project will help to decrease sediment loads to downstream portions of the watershed, especially Long Branch. This will be accomplished by creating a new channel geometry and stabilizing existing banks and eroded connections to the channel. Reconnecting the channel to the floodplain will also reduce downstream sediment loads by allowing suspended sediment to deposit on the floodplain. By reducing sedimentation within the channel and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. Restoring the existing riparian buffer will also provide additional channel stability and ecological benefits. It is estimated that a total of 208,510 lbs of sediment, 167 lbs of total nitrogen and 65 lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: This project lies entirely within private property and will require significant coordination with property owners for access and construction. Access will need to occur from Prosperity Avenue and will require tree removal and manipulation of slopes. Confluences with other stream channels and storm drain outfalls with their associated conveyances should also be addressed during this restoration. Although tree loss is expected, restoration benefits and proposed buffer enhancements will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and forest impacts.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	1568	LF	\$200	\$313,600
Clear and Grub	1.44	AC	\$10,000	\$14,400
Plantings	1.44	AC	\$25,000	\$36,000
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$464,000
Ancillary Items	1	LS	5% of project	\$23,200
Erosion and Sediment Control	1	LS	10% of project	\$46,400
			Base Construction Cost	\$533,600
			Mobilization (5%)	\$26,680
			Subtotal 1	\$560,280
			Contingency (25%)	\$140,070
			Subtotal 2	\$700,350
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$315,158
			Estimated Project Cost	\$1,016,000



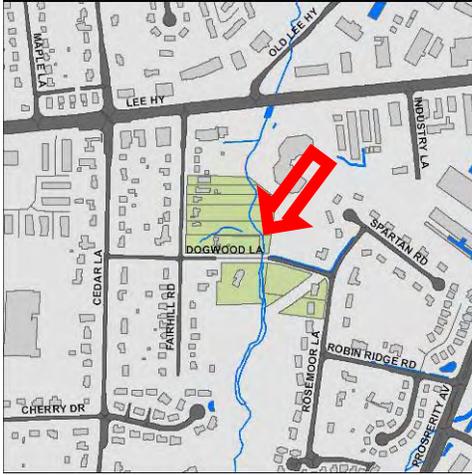
Figure 1: Severly eroded banks with invasive bamboo



Figure 2: Severly eroded banks at a confluence

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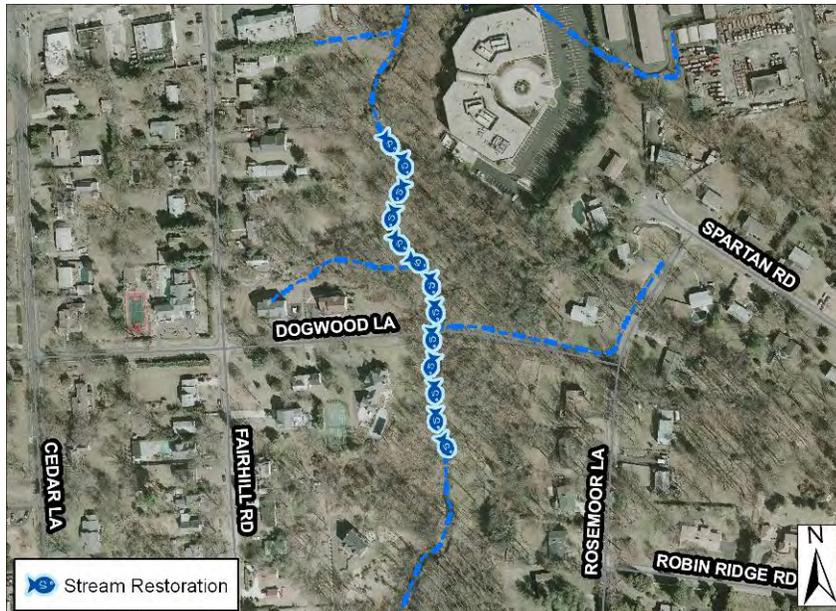
AC9237 - Stream Restoration



Address:	Behind 2900 block of Fairhill Road and Rosemoor Lane
Location:	Fairhill on the Boulevard neighborhood
Land Owner:	Private – Residential
PIN:	0493 06 0023, 24, 25, 26, 28, 29A, 0493 01 0028A, 0493 16 0010
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Long Branch North

Description: This project is designed to restore an eroded section of Long Branch North that originates north of Cherry Drive and extends to approximately 400 feet south of culvert under Lee Highway. Currently the channel banks are eroding severely, with undercutting, large channel bars, channel bed incision and no access to the floodplain. The channel has also eroded around a sanitary sewer manhole. One pedestrian bridge is also present and efforts to protect the bridge abutments and trees within the bridge vicinity are failing.

Restoring this channel will include regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, adjusting the channel to protect the sanitary sewer manhole, removing concrete and riprap from the pedestrian bridge area and replacing it with bioengineering techniques to preserve the trees. Additionally, grade controls will be installed to dissipate energy and some stone toe protection will be placed to ensure future bank stability. The current floodplain is forested on both sides of the existing channel.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to Long Branch North and Accotink Creek by reducing bank scour and stream bed incision. By reducing sedimentation within these channels and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. It is estimated that 169,271 lbs of sediment, 135 lbs of nitrogen and 53 lbs of phosphorus would be reduced annually by this project. Restoring and stabilizing this channel will help to protect infrastructure located within the channel and on the floodplain. Restoring the riparian buffer will also provide additional channel stability and ecological benefits.

Project Design Considerations: Since this project is contained within private residential properties, coordination with property owners will be necessary for access and construction. The pedestrian bridge as well as the exposed sanitary sewer may constrain restoration design and construction. Confluences with other stream channels and storm drain outfalls with their associated conveyances should also be addressed during the restoration. Access to this project will need to occur from Dogwood Lane or Cherry Drive which will require tree removal and manipulation of slopes. Although tree loss is expected, restoration benefits and proposed buffer enhancements will outweigh overall construction impacts. This project will also require environmental permitting to allow for construction and modifications to a perennial stream channel and impacts to forests.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	797	LF	\$200	\$159,400
Clear and Grub	0.73	AC	\$10,000	\$7,300
Plantings	0.73	AC	\$25,000	\$18,250
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$284,950
Ancillary Items	1	LS	5% of project	\$14,248
Erosion and Sediment Control	1	LS	10% of project	\$28,495
			Base Construction Cost	\$327,693
			Mobilization (5%)	\$16,385
			Subtotal 1	\$344,078
			Contingency (25%)	\$86,020
			Subtotal 2	\$430,098
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$193,544
			Estimated Project Cost	\$624,000



Figure 1: Existing incised and severely eroded channel causing trees to fall



Figure 2: Exposed sanitary sewer manhole along the eroded streambank

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AC9238 - Stream Restoration



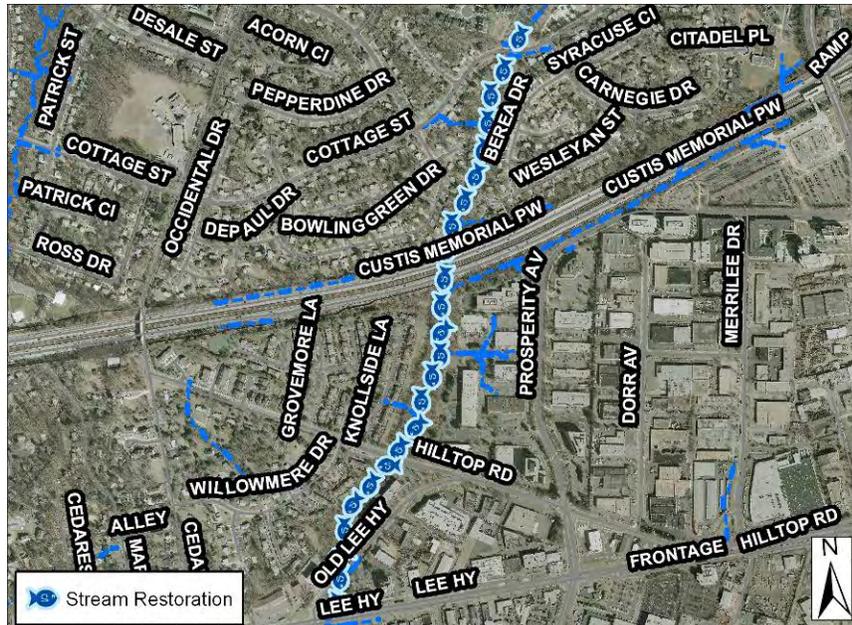
Address: Behind 8400 Block Berea Dr
Location: Dunn Loring Woods neighborhood and Prosperity Business Campus

Land Owner: Private
PIN: 0493 05 0001, 0491 15 A1, 0491 19 H, 0491 18 A2, 0491 01 0008, 0491 09K 0069, 68, 67, 66, 65, 62, 61, 60, 52, 51, 50, 49, 48, 39, 38, 37, 36, 35, 32, 31, 30, 0491 09I A

Control Type Water Quality
Drainage Area N/A
Receiving Waters Long Branch North

Description: This project is intended to restore an eroded section of Long Branch North that originates north of Cottage Street and extends downstream to Lee Highway. There are several road crossings and many storm drain outfalls along the project length. Currently, this channel is over-widened and incised with scoured banks with many stands of invasive species of bamboo.

Restoring this channel will include raising the bed elevation to address an existing headcut, installing grade control structures, stabilizing eroded stream banks, and moving a utility pole currently in the stream channel. Stone toe protection will also need to be installed to ensure future bank stability. Buffer restoration along re-graded areas and where extensive amounts of invasive vegetation are present is recommended to promote additional stability and to restore ecological function. All tributary and stormdrain conveyances to the restoration reach should also be stabilized as necessary. Due to a constrained floodplain and infrastructure constraints, raising the bed elevation to reconnect it to the floodplain or regrading the floodplain to create a new bench is not desirable.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to Long Branch and ultimately Accotink Creek by reducing bank scour and stream bed incision. By reducing sedimentation within these channels and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. It is estimated that a total of 587,423 lbs of sediment, 470 lbs of total nitrogen and 182 lbs of total phosphorus would be reduced annually by this project. Restoring and stabilizing this channel will help to protect storm drain, road crossing, and utility infrastructure located within the channel and floodplain. Restoring the existing riparian buffer along this reach will also provide future channel stability and ecological benefits.

Project Design Considerations: Since this project is contained within private residential and commercial properties, coordination with these property owners will be necessary for access and construction. Several road crossings and storm drain outfalls as well as underground utilities may constrain design and construction. Confluences with other stream channels and storm drain outfalls with their associated conveyances should also be addressed during restoration. Access to the project site will need to occur from either from Cottage Street, Hilltop Road or Lee Highway. Access from these points along the proposed restoration may require tree removal and manipulation of slopes. Although tree loss is expected, restoration benefits and proposed buffer enhancements will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and impacts to forests.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	4953	LF	\$200	\$990,600
Clear and Grub	4.55	AC	\$10,000	\$45,500
Plantings	4.55	AC	\$25,000	\$113,750
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$1,249,850
Ancillary Items	1	LS	5% of project	\$62,493
Erosion and Sediment Control	1	LS	10% of project	\$124,985
			Base Construction Cost	\$1,437,328
			Mobilization (5%)	\$71,866
			Subtotal 1	\$1,509,194
			Contingency (25%)	\$377,299
			Subtotal 2	\$1,886,493
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$848,922
			Estimated Project Cost	\$2,736,000



Figure 1: Severe headcut just downstream of the culvert under CottageStreet



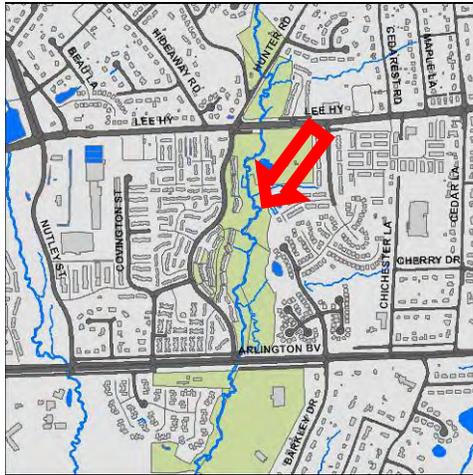
Figure 2: Severe bank erosion and channel incision



Figure 3: Severe meander bend erosion with large depositional feature

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AC9239 - Stream Restoration



Address: Various along Hunter Road and Ellenwood Dr
Location: Covington / Villa Lee Park, Arrowhead Park
Land Owner: Private / County - FCPA
PIN: 0484 01 0042A, 0484 18 D, 0484 01 0044, 0484 17 D, 0484 21 E, 0484 21 I, 0484 17 F, 0484 01 0054B, 0484 13 E, 0484 0340 E1, 0482 0744 D
Control Type Water Quality
Drainage Area N/A
Receiving Waters Bear Branch

Description: This project is intended to restore an eroded section of Bear Branch that originates north of Lee Highway and extends downstream to the end of Readsborough Court. There are several road crossings including Lee Highway and Arlington Boulevard as well as many storm drain outfalls within the project limits. Currently, this channel is experiencing severe bank and bed erosion. Two metal beams are located parallel to the stream north of Lee Highway that are starting to cause downcutting and scour pools in the downstream reach.

Restoring this channel would include stabilizing outfalls, regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, installing grade controls to dissipate energy, removing the metal beams, and reconnecting the stream to the floodplain by raising bed elevations and reducing channel dimensions. All tributary channel connections to this project should also be stabilized as necessary. The floodplain and project limits are all within forested conditions.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to Accotink Creek by reducing bank scour and stream bed incision. By reducing sedimentation within these channels and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. It is estimated that a total of 735,368 lbs of sediment, 588 lbs of total nitrogen and 228 lbs of total phosphorus would be reduced annually by this project. Restoring and stabilizing this channel will help to protect storm drain, road crossing, and utility infrastructure located within the channel and floodplain. This project could provide an educational opportunity for residents using parkland for recreation.

Project Design Considerations: Since private residential and commercial properties adjoin the stream, coordination with these property owners will be necessary for access and construction. Several road crossings and storm drain outfalls as well as underground utilities may constrain design and construction. Confluences with other stream channels and storm drain outfalls with their associated conveyances should also be addressed during this restoration. Access to the upstream portion of this project could occur from Hunter Road and access to the downstream portion could occur from Arlington Boulevard. Access from either point along the proposed restoration will require tree removal and manipulation of steep slopes. Tree loss is expected; however, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and for forest impacts.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	5916	LF	\$200	\$1,183,200
Clear and Grub	5.43	AC	\$10,000	\$54,300
Plantings	5.43	AC	\$25,000	\$135,750
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$1,473,250
Ancillary Items	1	LS	5% of project	\$73,663
Erosion and Sediment Control	1	LS	10% of project	\$147,325
			Base Construction Cost	\$1,694,238
			Mobilization (5%)	\$84,712
			Subtotal 1	\$1,778,950
			Contingency (25%)	\$444,738
			Subtotal 2	\$2,223,688
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				\$1,000,660
			Estimated Project Cost	\$3,225,000



Figure 1: Severe bank erosion, exposed roots, and deposition south of Lee Highway



Figure 2: Severe bank erosion and channel incision south of Lee Highway



Figure 3: Channel is over-widened with large depositional features south of Arlington Boulevard

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AC9240 - Stream Restoration



Address:	Yeonas Drive
Location:	South Side Park neighborhood
Land Owner:	Town of Vienna
PIN:	0482 03 2585B, 0482 03 2567A, 0482 03 2350A, 0482 02 0013B, 0482 01 0003, 0482 31 0004, 0482 31 D
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Bear Branch

Description: This stream restoration project along Bear Branch is primarily within Town of Vienna's South Side Park. The upstream limit is located at Yeonas Drive and extends to I-66. Several road crossings including Yeonas Drive, Cottage Street, and I-66 as well as many storm drain outfalls exist within the project limits. Currently, this channel is experiencing severe bank and bed erosion. The condition of many of the road culverts are preventing fish passage. Additionally, there are stands of invasive bamboo along the stream channel.

Restoring this channel would include repairing broken outfalls, regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, installing grade controls to dissipate energy, and removing invasive species. Due to a fairly constrained floodplain and close proximity to private residential properties, raising the bed elevation to reconnect it to the floodplain or regrading the floodplain to create a new bench is not desirable. This project should be coordinated with Project AC9225, in which these channels flow together just upstream of the culvert under I-66 in South Side Park.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to Accotink Creek by reducing bank scour and stream bed incision. By reducing sedimentation within these channels and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. It is estimated that a total of 481,365 lbs of sediment, 385 lbs of total nitrogen and 149 lbs of total phosphorus would be reduced annually by this project. Restoring and stabilizing this channel will help to protect storm drain, road crossing, and utility infrastructure located within the channel and floodplain. This project could also provide an educational opportunity for residents using parkland for recreation.

Project Design Considerations: Even though this project is mostly within park land, the existing channel and floodplain is surrounded by residential properties. Coordination with private owners will be necessary where the existing channel is within close proximity to these properties. Several road crossings and storm drain outfalls as well as underground utilities may constrain design and construction. Access to the upstream portion of this project could occur from Cottage Street or from Yeonas Drive and access to the downstream portion could occur from local parks. Access from any of these points along the proposed restoration will require significant tree removal and manipulation of steep slopes. Although tree loss is expected, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and for forest impacts. The project should be coordinated with Culvert Retrofit project AC9408, a 25-year project within the same stream reach.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	3980	LF	\$200	\$796,000
Clear and Grub	3.65	AC	\$10,000	\$36,500
Plantings	3.65	AC	\$25,000	\$91,250
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$1,023,750
Ancillary Items	1	LS	5% of project	\$51,188
Erosion and Sediment Control	1	LS	10% of project	\$102,375
			Base Construction Cost	\$1,177,313
			Mobilization (5%)	\$58,866
			Subtotal 1	\$1,236,179
			Contingency (25%)	\$309,045
			Subtotal 2	\$1,545,224
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$695,351
			Estimated Project Cost	\$2,241,000



Figure 1: Eroded and incised channel near Yeonas Drive



Figure 2: Eroded and undermined storm drain outfall south of Yeonas Drive



Figure 3: Existing concrete utility casing within the channel near the culvert under I-66

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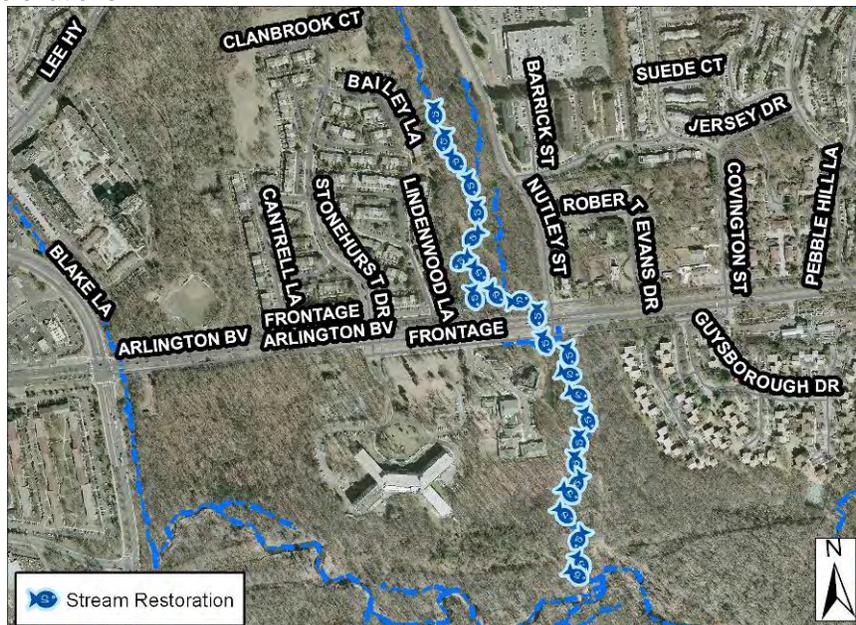
AC9241 - Stream Restoration



Address: Various along Nutley Street
Location: Stonehurst neighborhood and Eakin Community Park
Land Owner: Private / County - FCPA
PIN: 0484 18 A, 0582 10 A, 0582 01 0012, 0484 01 0010, 0484 01 0049B, 0484 01 0012B, 0484 11 A1, 0484 01 0012C, 0484 11 B
Control Type Water Quality
Drainage Area N/A
Receiving Waters Hunters Branch

Description: This project is proposed to restore an eroded section of Hunters Branch that originates at the confluence of Hunters Branch with Accotink Creek and extends upstream approximately 3,700 feet to near the intersection of Bailey Lane and Stonehurst Drive. Most of the downstream portion of this project is within County park property; however, the upstream portion is privately-owned residential and commercial properties. Currently, this channel is experiencing severe bank and bed erosion. Several utility crossings within the stream channel are stabilized with large riprap, which is leading to downstream scour pools and erosion.

Restoring this channel would include removing riprap and creating more stable stream crossings, repairing scour pools, regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, installing grade controls to dissipate energy and removing invasive plant species. Restoration efforts should also focus on reconnecting this channel to the floodplain by reducing channel dimensions and raising bed elevations.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Restoring this channel will help to reduce sediment loads to Accotink Creek by reducing bed scour, bank scour, over-widening, and meander bend migration. Reconnecting the channel to the original floodplain will dissipate high flows that could cause erosion and can reduce downstream sediment loads by allowing suspended sediment to be deposited on the floodplain. This project will also improve instream habitat by limiting the amount of sedimentation due to bank and bed erosion and creating stable habitat within the newly constructed channel. It is estimated that a total of 369,145 lbs of sediment, 295 lbs of total nitrogen and 114 lbs of total phosphorus would be reduced annually by this project. Paved walking paths parallel this project and may be used for access during construction to limit forest impacts and to provide an educational opportunity for residents.

Project Design Considerations: Since private residential and commercial properties adjoin the stream, coordination with these property owners will be necessary for access and construction. Access to the upstream portion of this project could occur from Nutley Street or from adjoining condominium properties and access to the downstream portion could occur from existing paved walking paths that adjoin the stream channel. Access from any of these points along the proposed restoration will require significant tree removal. Although tree loss is expected, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and for forest impacts. Existing utility impacts are also possible as a sewer line parallels the stream and several utility crossings were noted within the existing channel.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	3722	LF	\$200	\$744,400
Clear and Grub	4.27	AC	\$10,000	\$42,700
Plantings	4.27	AC	\$25,000	\$106,750
Additional Cost, First 500 LF	500	LF	\$200	\$100,000
			Initial Project Cost	\$993,850
Ancillary Items	1	LS	5% of project	\$49,693
Erosion and Sediment Control	1	LS	10% of project	\$99,385
			Base Construction Cost	\$1,142,928
			Mobilization (5%)	\$57,146
			Subtotal 1	\$1,200,074
			Contingency (25%)	\$300,019
			Subtotal 2	\$1,500,093
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$675,042
			Estimated Project Cost	\$2,176,000



Figure 1: Severe bed and bank erosion just downstream of a utility covered by riprap near the confluence with Accotink Creek



Figure 2: Large debris and severely eroded banks south of Arlington Boulevard

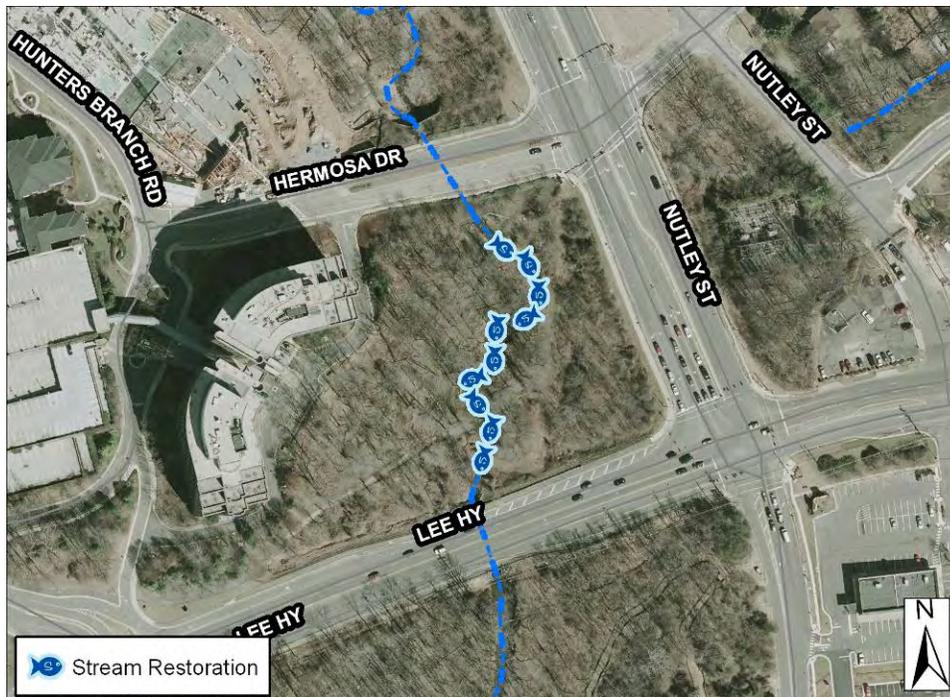
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AC9242 - Stream Restoration



Address: 9302 Lee Highway
Location: Lee Hwy and Hermosa Dr
Land Owner: Private
PIN: 0484 01 0001G, 0484 01 0001E
Control Type: Water Quality
Drainage Area: N/A
Receiving Waters: Hunters Branch

Description: This project is designed to restore an eroded section of Hunters Branch immediately upstream and downstream of a pedestrian bridge between Hermosa Drive and Lee Highway. The streambank in this location is eroding around the bridge, leading to severe scour at the edges of the bridge and possible future bridge failure. Restoring this channel would include regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques and repairing the existing pedestrian bridge.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will stabilize the streambank and improve pedestrian safety as local residents use this bridge and its associated walking paths. This project will address bank instability and scour and overwidening, which all produce excessive sediment loads to downstream channels. Reduced sediment loads and new channel creation with stable habitat along restored banks will all help to improve instream water quality and aquatic habitat. It is estimated that a total of 41,752 lbs of sediment, 33 lbs of total nitrogen and 13 lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: Since private residential and commercial properties adjoin the stream, coordination with these property owners will be necessary for access and construction. Access to this project could occur from Nutley Street or from adjoining condominium properties. Access from any of these points along the proposed restoration will require significant tree removal and manipulation of steep slopes. Although tree loss is expected, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel and for forest impacts. Existing utility impacts are possible with this restoration as a sewer line parallels the stream.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	409	LF	\$200	\$81,800
Clear and Grub	0.40	AC	\$10,000	\$4,000
Plantings	0.40	AC	\$25,000	\$10,000
Additional Cost, First 500 LF	409	LF	\$200	\$81,800
			Initial Project Cost	\$177,600
Ancillary Items	1	LS	5% of project	\$8,880
Erosion and Sediment Control	1	LS	10% of project	\$17,760
			Base Construction Cost	\$204,240
			Mobilization (5%)	\$10,212
			Subtotal 1	\$214,452
			Contingency (25%)	\$53,613
			Subtotal 2	\$268,065
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$120,629
			Estimated Project Cost	\$389,000



Figure 1: Eroded banks and scour at a footbridge near Lee Highway

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