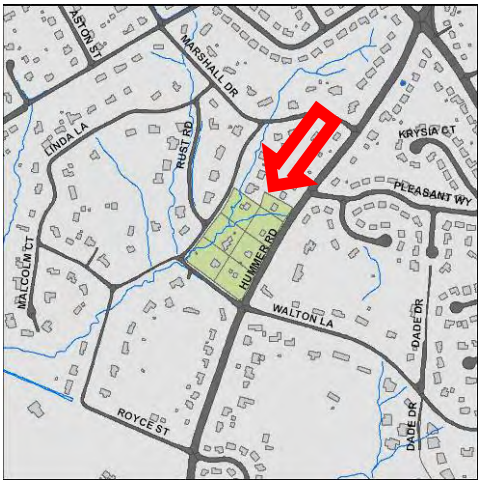
AC9218 - Stream Restoration



Address:	3700 block of Hummer Road and Pleasant Ridge Road
Location:	Pleasant Ridge neighborhood
Land Owner:	Private - Residential
PIN:	0603 02 0024D, 0603 02 0025, 0603 02 0030, 29, 28
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Coon Branch

Description: This project is located between Hummer Road and Pleasant Ridge Road and extends from a culvert under Hummer Road downstream to a culvert under Walton Lane. The existing stream channel parallels several homes along Pleasant Ridge Road and in some cases is located within close proximity to buildings and homes. This channel is actively incising and widening especially on outer meander bends.

Restoring this channel will involve regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, installing grade controls to dissipate energy and prevent further bed incision, and restoring the riparian buffer in areas where vegetation is not present. Reconnecting this channel back to the original floodplain is not advised due to the location of driveway culverts and personal property, including homes and landscaping that may be impacted during storm events.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to receiving stream channels by reducing bank scour and stream bed incision. Overall, stream habitat and water quality will be improved due to stable habitat creation and reductions in available sediment supply. Restoring the existing riparian buffer will also provide additional channel stability and ecological benefits. It is estimated that a total of 70,687 lbs of sediment, 57 lbs of total nitrogen and 22 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 property owners for access and construction. In some cases, property owners have landscaped and placed structures within close proximity to the existing channel. Access to this project could occur from the upstream limit at Hummer Road and the downstream limit at Walton Lane. Both of these access points will require some tree removal and will disturb residential lawns. This project will require environmental permitting to allow for construction and modifications to a perennial stream channel. Existing utility impacts are not anticipated with this restoration.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	850	LF	$200	$170,000
Clear and Grub	0.78	AC	$10,000	$7,800
Plantings	0.78	AC	$25,000	$19,500
Additional Cost, First 500 LF	500	LF	$200	$100,000
			Initial Project Cost	**$297,300**
Ancillary Items	1	LS	5% of project	$14,865
Erosion and Sediment Control	1	LS	10% of project	$29,730
			Base Construction Cost	**$341,895**
			Mobilization (5%)	$17,095
			Subtotal 1	$358,990
			Contingency (25%)	$89,748
			Subtotal 2	$448,738
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$201,932
			Estimated Project Cost	**$651,000**

Figure 1: Eroded banks near the intersection of Pleasant Ridge Road and Walton Lane

Figure 2: Channel is actively incising with eroded banks

This page intentionally left blank.

AC9219 - Stream Restoration

Address:	3401 Woodburn Road
Location:	Pine Ridge Park
Land Owner:	County - FCPA
PIN:	0591 01 0020, 0591 01 0018
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Accotink Creek

Description: This project would restore two existing stream channels and a ditch located within Pine Ridge Park as well as a third stream channel within Accotink Stream Valley Park. The two channels located within Pine Ridge Park drain most of the runoff from the park, a large portion of the hospital property along Gallows Road and a residential community along Collins Street. All three channels are currently incised and over-widened with moderate to severe erosion occurring on meander bends and along straight sections. There is severe erosion exposing a sanitary sewer line and creating a scour pool.

Restoration will focus on reducing channel dimensions and raising bed elevations to reconnect each channel to its floodplain, which will help to prevent further incision and over-widening. The two areas with severe erosion should be stabilized with using armor-in-place or bioengineering techniques.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will reduce the sediment supply to receiving stream channels by reducing bank scour and stream bed incision. Reconnecting these channels to the original floodplain will also help to dissipate energy within the channel, resulting in suspended sediment being deposited on the floodplain. It is estimated that a total of 249,803 lbs of sediment, 200 lbs of total nitrogen and 77 lbs of total phosphorus would be reduced annually by this project.

Restoring and stabilizing these channels will also protect infrastructure, including an exposed sanitary sewer line, several storm drain outfalls, culvert structures, and a park trail near the intersection of Guinevere Drive and Launcelot Way. This project could provide an educational opportunity for residents using park trails.

Project Design Considerations: This project will require environmental permitting as construction and modification within a perennial stream channels is required. All of these channels are buffered by forest, so access and construction for this project will cause a significant amount of tree loss. In similar projects, however, experience has shown that restoration benefits will outweigh construction impacts.

Access to the channels upstream of Chivalry Road can be gained from multiple locations including an access area off of Chivalry Road and Launcelot Way, off of Bannerwood Drive and Collins Street, or off the parking lot of Pine Ridge High School Site Park. Access to the downstream channel can be gained from an access area off of Guinevere Road or at the end of Robey Avenue. An existing sanitary sewer line is currently exposed, but no impacts are expected during design or construction. Changes in the upstream floodplain from Chivalry Road will be analyzed during channel design to determine if modifications will cause any adverse impacts.

The project site is adjacent to and crosses through Native American site 44FX1367, The Sons and Daughters of Liberty, Cemetery #2. In addition, the stream bed contains large boulders of high quality stone, and may have been quarried to make stone tools by Native Americans. An archaeological survey is recommended with subsequent archaeological testing for eligibility for inclusion into the National Register of Historic Places. If sites are found eligible, they would require avoidance or data recovery.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	2060	LF	$200	$412,000
Clear and Grub	7.09	AC	$10,000	$70,937
Plantings	7.09	AC	$25,000	$177,342
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$760,279
Ancillary Items	1	LS	5% of project	$38,014
Erosion and Sediment Control	1	LS	10% of project	$76,028
			Base Construction Cost	**$874,321**
			Mobilization (5%)	$43,716
			Subtotal 1	$918,037
			Contingency (25%)	$229,509
			Subtotal 2	$1,147,546
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$516,396
			Estimated Project Cost	**$1,664,000**

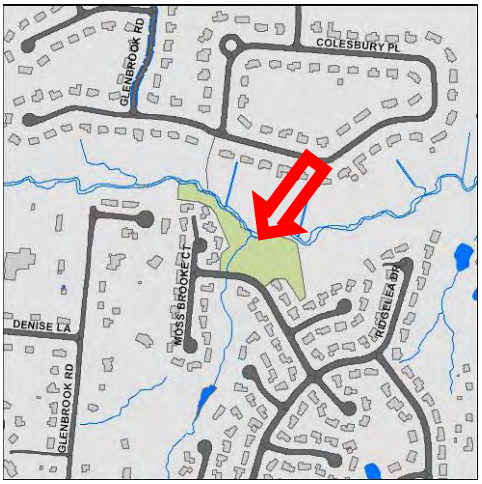
Site Photo: Incising and over-widening channel in Pine Ridge High School Site Park

Site Photo: Severe bank erosion in channel near Collins Street

Site Photo: Eroded downstream channel starts at culvert near Guinevere Drive and Launcelot Way

This page intentionally left blank.

AC9220 - Stream Restoration



Address:	Behind Glade Hill Road
Location:	Ridgelea Hills neighborhood
Land Owner:	Private
PIN:	0584 28 C
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Crook Branch

Description: This project is located between Glade Hill Road and Colesbury Place and extends from the a culvert under Glade Hill Road to the confluence with Crook Branch. The existing stream channel is very incised and over-widened with severe erosion occurring along the downstream portion. The downstream confluence with Crook Branch also corresponds with Project AC9221, which is proposed to restore a portion of the mainstem of Crook Branch. These two projects should be coordinated with Project AC9221 designed and constructed before this project.

Restoring this channel will include regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques, raising the bed elevation to meet the confluence elevation with Project AC9221, and installing grade controls or step pools to dissipate energy and prevent further bed incision.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will decrease sediment supply to receiving stream channels by reducing bank scour and channel bed incision. Additionally, by reducing sedimentation and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. It is estimated that a total of 33,592 lbs of sediment, 27 lbs of total nitrogen and ten lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: This project is entirely contained on private property along Glade Hill Road and will require significant coordination with the property owners for access and construction. Access to this project would need to occur off of Glade Hill Drive and will require some tree removal. This project will require environmental permitting due to construction and modifications to a perennial stream channel. Existing utility impacts are not anticipated with this restoration. This project should be designed and constructed during the implementation of Project AC9221 to ensure proper channel elevations and alignment.

Costs:

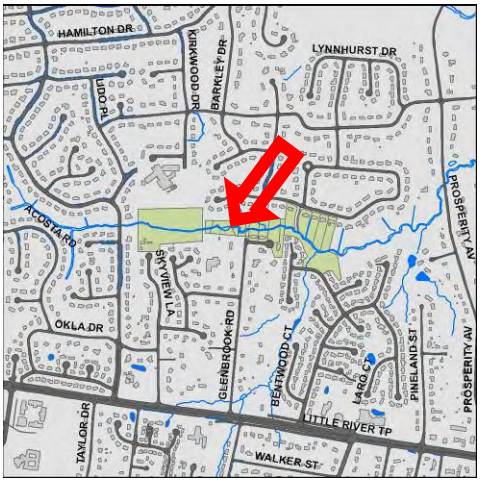
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	247	LF	$200	$49,400
Clear and Grub	0.22	AC	$10,000	$2,200
Plantings	0.22	AC	$25,000	$5,500
Additional Cost, First 500 LF	247	LF	$200	$49,400
			Initial Project Cost	**$106,500**
Ancillary Items	1	LS	5% of project	$5,325
Erosion and Sediment Control	1	LS	10% of project	$10,650
			Base Construction Cost	**$122,475**
			Mobilization (5%)	$6,124
			Subtotal 1	$128,599
			Contingency (25%)	$32,150
			Subtotal 2	$160,749
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$72,337
			Estimated Project Cost	**$234,000**

Figure 1: Eroded banks downstream of Glade Hill Drive.

Figure 2: Eroded and incised confluence with Crook Branch

This page intentionally left blank.

AC9221 - Stream Restoration



Address:	Along Colesbury Place
Location:	Mantua and Ridgelea Hills neighborhoods
Land Owner:	Private
PIN:	0584 01 0054; 0584 14 0015-0024; 0584 16 0020-0024; 0584 14 E1, F, G, H, J
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Crook Branch

Description: This project involves the restoration of a portion of Crook Branch flowing west to east along Colesbury Place and extending just downstream of Prince William Drive to a confluence with a channel that originates upstream of Glade Hill Road. A small portion of this confluence channel is also included in this restoration project. Most of the project site is over-widened, unstable, and incised with eroded banks. The upstream portion of the channel has been partially reinforced with concrete debris and there is no riparian buffer. Additionally, several small sections have been armored previously with rip-rap, specifically near a recently installed footbridge at the end of Moss Brooke Court.

Restoring this channel will focus on creating a nested channel, where the floodplain and banks of the current channel will be regraded to allow for a new floodplain at an elevation lower than the current one. Other restoration components include installing grade controls and restoring areas of deficient riparian buffers. The asphalt walking trail behind the houses along Moss Brooke Court is currently being undermined by stream bank erosion and may need to be stabilized. Channels from storm drain outfalls should also be incorporated into this project to provide stability.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Stabilizing existing banks and creating a new channel geometry will result in reduced sediment loads. By reconnecting this channel to its floodplain, erosive flows will dissipate and downstream sediment loads can be reduced as suspended sediment will be deposited on the floodplain. This project will also stabilize storm drain outfalls and conveyances as well as protect walking trails and other infrastructure. Enhancing riparian buffers, especially in the upstream portion of this project, will improve the overall ecological function of this area. It is estimated that a total of 377,726 lbs of sediment, 302 lbs of total nitrogen and 117 lbs of total phosphorus would be reduced by the restoration.

Project Design Considerations: The project lies entirely on private property and will require significant coordination with property owners for access and construction. Structures along Glenbrook Court and Moss Brooke Court are within close proximity to the existing stream channel. Sanitary sewer manholes, pipes, and stream crossings, as well as a walking trail and pedestrian bridge, may constrain design and construction. Access may need to occur from several locations to reach all portions of the channel. Several possible points of access include: the end of Glenbrooke Road or Glenbrooke Court, off of Glade Hill Road, off of Colesbury Place in a road easement between properties, and off of the Mantua Elementary School property. This project will require environmental permitting as construction and modifications within a perennial stream channel and floodplain are needed. Significant tree loss is expected, however, in similar projects, experience has shown that restoration benefits will outweigh overall construction impacts.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	2578	LF	$200	$515,600
Clear and Grub	5.92	AC	$10,000	$59,183
Plantings	5.92	AC	$25,000	$147,957
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$822,740
Ancillary Items	1	LS	5% of project	$41,137
Erosion and Sediment Control	1	LS	10% of project	$82,274
			Base Construction Cost	**$946,151**
			Mobilization (5%)	$47,308
			Subtotal 1	$993,459
			Contingency (25%)	$248,365
			Subtotal 2	$1,241,824
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$558,821
			Estimated Project Cost	**$1,801,000**

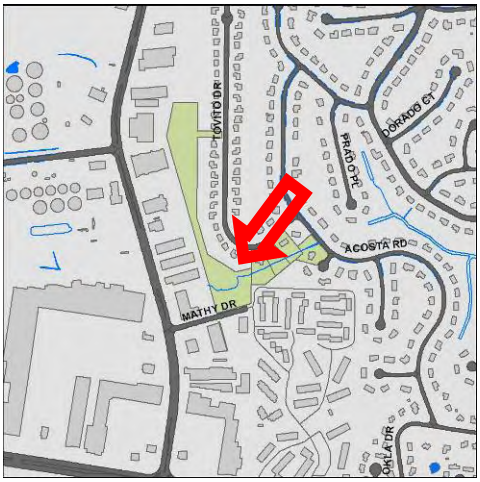
Site Photo: Downstream end with severe erosion and impacts to walking trail/storm drain inflow

Site Photo: Over-widened channel with severe bank erosion

Site Photo: Upstream end with moderate erosion and no riparian buffer

This page intentionally left blank.

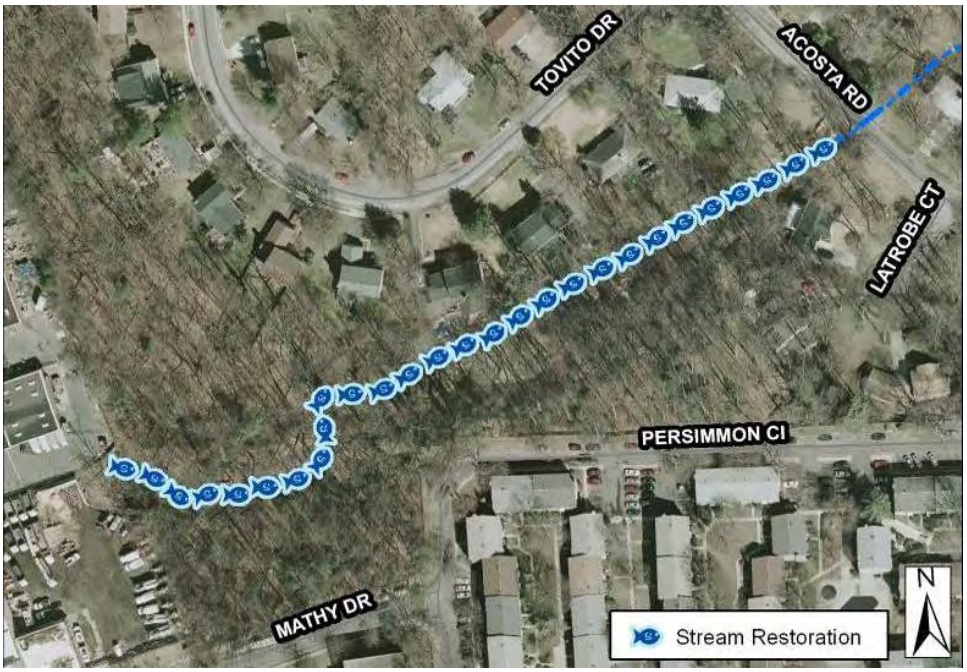
AC9222 - Stream Restoration



Address:	Along Tovito Drive
Location:	Mantua Hills and Stockbridge neighborhoods
Land Owner:	Private - Residential
PIN:	0584 26 A, 0584 18 0004
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Crook Branch

Description: This project extends from a storm drain outfall behind a commercial area off of Pickett Road to the culvert under Acosta Road. The upstream portion of the project is severely eroded with high, unstable banks. The downstream portion is channelized and contains areas of rip-rap and failing v-shaped concrete channel.

Restoring the upstream portion of this channel will include regrading and stabilizing eroded stream banks with armor-in-place techniques on the outer meander bends and using bioengineering techniques along straight portions to create a stable channel. Restoration will include grade controls to dissipate energy and will require some installation of stone-toe protection to ensure future bank stability. One storm drain outfall that drains to this channel from Persimmon Circle should also be stabilized. Restoring the downstream portion of the channel will include removing the existing rip-rap and concrete channel and replacing it with a natural channel designed to withstand urban peak flows and provide habitat.



Project Area Map: Conceptual plan showing potential project location

Project Benefits: This project will effectively reduce erosion and downstream sediment transport by reducing bank instability, scour, and meander bend migration. Removing concrete and rip rap in the downstream portion and creating stable habitat along restored banks in the upstream portion will also allow for improvements in water quality and instream habitat. Property owners along the downstream portion of this project might welcome the aesthetic changes of the current channel to a natural, restored channel. It is estimated that a total of 146,737 lbs of sediment, 117 lbs of total nitrogen and 46 lbs of total phosphorus would be reduced by the restoration.

Project Design Considerations: This project is entirely contained within private residential properties along Tovito Drive and will require significant coordination with property owners for access and construction. In some cases, property owners along Tovito Drive have landscaped and placed structures close to the existing channel that may constrain new channel design. Access to this project may need to occur from several locations: off of Acosta Road, Persimmon Circle, and from behind the commercial area off of Pickett Road. All of these access points will require tree removal. Access from Acosta Road will also require the use of residential yards. Significant tree loss is expected, however, in similar projects, experience has shown that restoration benefits will outweigh overall construction impacts. This project will require environmental permitting as construction and modifications within a perennial stream channel are needed. Existing utility impacts are not anticipated.

Costs:

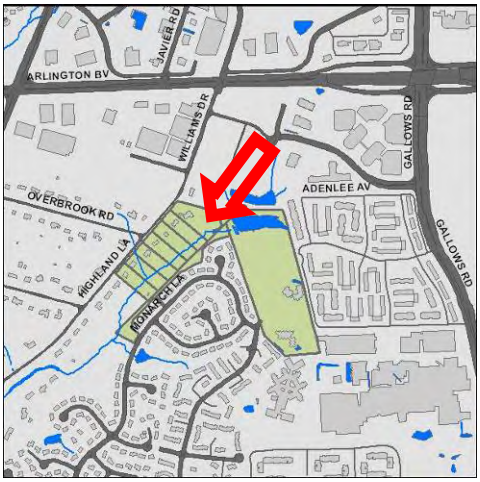
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	993	LF	$200	$198,600
Clear and Grub	2.28	AC	$10,000	$22,796
Plantings	2.28	AC	$25,000	$56,990
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$378,386
Ancillary Items	1	LS	5% of project	$18,919
Erosion and Sediment Control	1	LS	10% of project	$37,839
			Base Construction Cost	**$435,144**
			Mobilization (5%)	$21,757
			Subtotal 1	$456,901
			Contingency (25%)	$114,225
			Subtotal 2	$571,126
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$257,007
			Estimated Project Cost	**$829,000**

Site Photo: Severe bank erosion in upstream portion

Site Photo: Concrete/rip rap in downstream portion

This page intentionally left blank.

AC9223 - Stream Restoration



Address:	Behind the 3100/3200 blocks of Highland Lane
Location:	Pine Ridge neighborhood
Land Owner:	Private-Residential
PIN:	0493 08 0039, 0493 08 0040, 0493 08 0041, 0493 08 0042, 0493 08 0043, 0493 08 0044,0493 08 0039A, 0591 27 F
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Accotink Creek

Description: This project is located between Monarch and Highland Lanes, extending from the outlet of Detention Pond DP0384 to the rear of 3225 Highland Lane. The channel is predominately straight, incised, over-widened, and is lacking a riparian buffer in several areas along the right bank. The dry detention facility has a large, low-flow orifice that may be contributing to the eroded conditions in the receiving channel. Restoring this channel will include regrading and stabilizing eroded stream banks with armor-in-place techniques on outer meander bends and bioengineering techniques on straight portions.

Grade controls will be used to dissipate energy and installing stone toe protection will ensure future bank stability. One storm drain outfall and two ditches that flow to this channel should also be stabilized. Buffer restoration in various locations along the right bank will be necessary to further improve restored areas. Since this restoration is entirely contained within private residential property, raising the bed elevation to reconnect 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 help to protect adjacent private properties and structures. Stabilizing the channel will reduce downstream sediment loads by preventing bank scour and channel incision. By reducing sediment transport within the channel and providing stable habitat along restored banks, overall instream water quality and habitat may be improved. Restoring the riparian buffer will also provide future channel stability and ecological benefits. It is estimated that a total of 122,808 lbs of sediment, 98 lbs of total nitrogen and 38 lbs of total phosphorus would be reduced by the restoration.

Project Design Considerations: This project is entirely contained within private residential properties along Highland Lane and will require significant coordination with property owners for access and construction. Access to the project will need to occur from the access road that extends off of Willow Oaks Corporate Drive. This access road appears to be used to access existing ponds DP0374 and DP0384. The access road leads to the upstream end of this project. Moderate tree loss is expected with this restoration, however, in similar projects, experience has shown that restoration benefits and proposed buffer enhancements may outweigh overall construction impacts. This project will require environmental permitting as construction and modifications within a perennial stream channel are needed. Overhead power lines and a sanitary sewer line were noted near the DP0384 facility embankment but existing utilities are not anticipated to impact the design or construction of this restoration.

Costs:

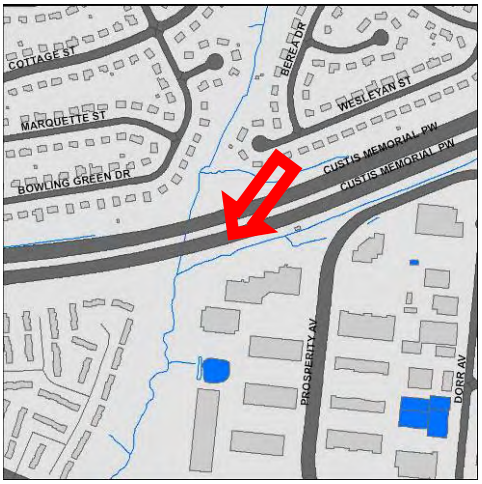
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	1204	LF	$200	$240,800
Clear and Grub	2.76	AC	$10,000	$27,640
Plantings	2.76	AC	$25,000	$69,100
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$437,540
Ancillary Items	1	LS	5% of project	$21,877
Erosion and Sediment Control	1	LS	10% of project	$43,754
			Base Construction Cost	**$503,171**
			Mobilization (5%)	$25,159
			Subtotal 1	$528,330
			Contingency (25%)	$132,083
			Subtotal 2	$660,413
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$297,186
			Estimated Project Cost	**$958,000**

Site Photo: Over-widened channel with moderate to severe erosion

Site Photo: Erosion with no riparian buffer

This page intentionally left blank.

AC9224 - Stream Restoration



Address:	Unknown
Location:	I-66 and Prosperity Ave
Land Owner:	State – VDOT
PIN:	N/A
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Long Branch North

Description: This project is located between I-66 and Prosperity Avenue and extends from a culvert under an I-66 access road downstream toward the confluence with Long Branch. This project represents a short section of existing stream channel that parallels I-66 and drains outfalls from I-66, commercial parking lots, and residential areas. The existing stream channel is incised and over-widened with severe erosion occurring on both banks. There is a headcut located downstream of the culvert under the I-66 access road culvert that is migrating upstream toward the culvert.

Restoring this channel will include regrading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques. Raising the bed elevation and installing grade controls or step pools may be necessary to dissipate energy and prevent future channel incision.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Stabilizing this channel will help to decrease sediment loads to downstream channels by preventing bank scour and stream bed incision. Restoration will help to protect the VDOT culvert under the access road by preventing future headcut migration. Overall, stream habitat and water quality may be improved due to stable habitat creation and reductions in available sediment supply. It is estimated that a total of 21,165 lbs of sediment, 17 lbs of total nitrogen and seven lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: This project will require significant coordination with VDOT for access and construction. Access to this project could occur from Prosperity Avenue or the I-66 access road and will require significant tree removal and manipulation of steep slopes. Tree loss is expected with this restoration; 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:

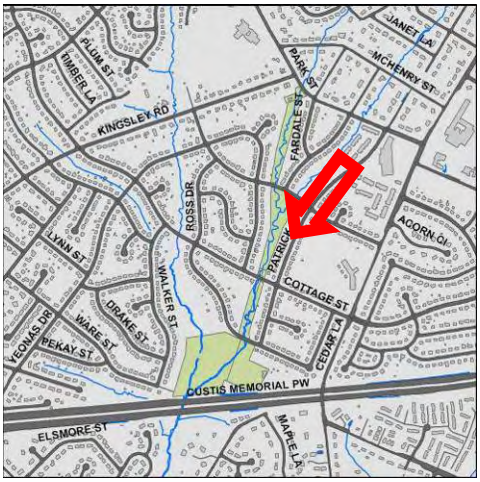
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	249	LF	$200	$49,800
Clear and Grub	0.50	AC	$10,000	$5,000
Plantings	0.50	AC	$25,000	$12,500
Additional Cost, First 500 LF	249	LF	$200	$49,800
			Initial Project Cost	**$117,100**
Ancillary Items	1	LS	5% of project	$5,855
Erosion and Sediment Control	1	LS	10% of project	$11,710
			Base Construction Cost	**$134,665**
			Mobilization (5%)	$6,733
			Subtotal 1	$141,398
			Contingency (25%)	$35,350
			Subtotal 2	$176,748
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$79,537
			Estimated Project Cost	**$257,000**

Figure 1: Severe bank erosion

Figure 2: Incised and eroded stream channel along I-66

This page intentionally left blank.

AC9225 - Stream Restoration



Address:	Between Desale and I-66
Location:	South Side Park
Land Owner:	Private / Town of Vienna
PIN:	0393 04 0004B, 0482 02 0013B, 0482 03 2360A, 0491 02 0004, 0491 08 2380A, 0491 08 2498P, 0491 08 2513A, 0491 08 2629P
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Bear Branch

Description: This stream restoration project is primarily within the Town of Vienna's South Side Park, with the upstream limit of this located at Park Street. The downstream limit is located at the culvert under I-66 in South Side Park. Several road crossings including Desale Street, Cottage Street, and Ross Drive and many storm drain outfalls are located along the project length. Most of the existing channel within the project limits is over-widened and incised, with moderate to severe erosion occurring on outside meanders and straight sections. While areas of the channel are sinuous, most of the channel is relatively straight.

Restoring the channel will focus on reducing the current channel dimensions and raising the bed elevation to reconnect the channel to the floodplain. The existing channel in South Side Park is constrained and reconnecting this portion of the channel to the floodplain does not appear to be feasible. In areas such as this, regrading and stabilization may be required using armor-in-place or bioengineering techniques.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will effectively reduce the sediment supply to receiving stream channels by reducing bank scour and stream bed incision. Reconnecting the channel to the floodplain will also reduce the amount of sediment in downstream channels as suspended sediment will be deposited on the floodplain.. Restoring and stabilizing this channel will also help to protect storm drain, road crossing, and utility infrastructure located in the channel and floodplain. This project could provide an educational opportunity for residents using South Side Park. It is estimated that a total of 551,504 lbs of sediment, 441 lbs of total nitrogen and 171 lbs of total phosphorus would be reduced by the restoration.

Project Design Considerations: Coordination with private residential owners will be necessary where the existing channel and floodplain are within close proximity to private properties. Several road crossings, storm drain outfalls and underground utilities may constrain design and construction. Access to the floodplain will need to occur off of Park Street, Desale Street, Cottage Street, and Ross Drive. Since this stream is buffered by forest, access along the channel and grading of the existing channel and floodplain will require significant tree removal. In similar projects, experience has shown that restoration benefits will outweigh overall construction impacts. This project will require environmental permitting as construction and modifications within a perennial stream channel is needed.

Costs:

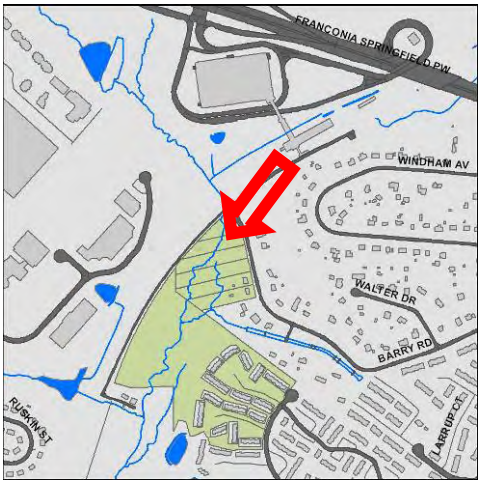
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	4977	LF	$200	$995,400
Clear and Grub	11.43	AC	$10,000	$114,256
Plantings	11.43	AC	$25,000	$285,640
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$1,495,296
Ancillary Items	1	LS	5% of project	$74,765
Erosion and Sediment Control	1	LS	10% of project	$149,530
			Base Construction Cost	**$1,719,591**
			Mobilization (5%)	$85,980
			Subtotal 1	$1,805,571
			Contingency (25%)	$451,393
			Subtotal 2	$2,256,964
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$1,015,634
			Estimated Project Cost	**$3,273,000**

Site Photo: Over-widened channel with moderate bank erosion

Site Photo: Incised channel with moderate to severe bank erosion

This page intentionally left blank.

AC9226 - Stream Restoration



Address:	7124 Barry Road
Location:	Windsor Estates
Land Owner:	Private - Residential
PIN:	0902 08 0036, 0902 08 0037, 0904 08 0038, 0904 08 0039, 0904 08 0040, 0904 08 0041, 0904 10 M
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Long Branch South

Description: This project is intended to repair an eroding stream at a sanitary sewer manhole located within the active channel, restore the actively widening stream, and remove a debris jam. The project is located between Barry Road and the Washington Metropolitan Area Transit Authority (WMATA) metro tracks.

Restoring this channel will include regrading and stabilizing eroded stream banks with armor-in-place and/or bioengineering techniques, removing the debris jam, and adjusting the channel to protect the manhole. This project is located within forested conditions.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will reduce sediment supply to receiving stream channels by reducing erosion related to an existing debris jam. Overall stream habitat and water quality may be improved due to stable habitat creation and reductions in available sediment supply. Restoring and stabilizing the channel will help to protect an exposed utility located within the channel and floodplain. It is estimated that a total load of 29,589 lbs of sediment, 24 lbs of total nitrogen and nine lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: This area is wooded with private residential properties near the access points to the stream. Coordination with these property owners will be necessary for access and construction. The WMATA Metro tracks are located to the west of the stream. Access to the project site could occur through residential properties located on Barry Street. Tree loss is expected with this restoration; however, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting due to construction and modifications to a perennial stream channel and forest impacts. Existing utility impacts are possible as well as a sewer line parallels the stream.

Costs:

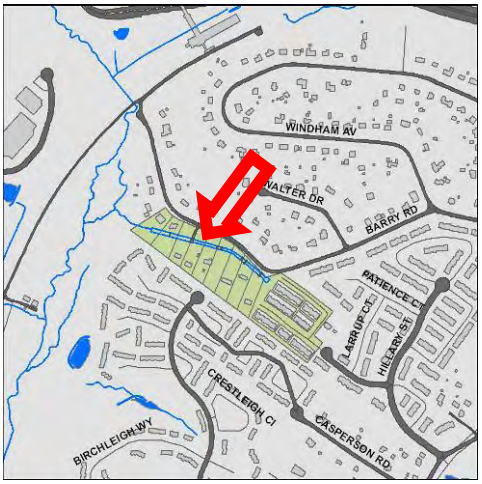
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	765	LF	$200	$153,000
Clear and Grub	0.70	AC	$10,000	$7,000
Plantings	0.70	AC	$25,000	$17,500
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$277,500
Ancillary Items	1	LS	5% of project	$13,875
Erosion and Sediment Control	1	LS	10% of project	$27,750
			Base Construction Cost	**$319,125**
			Mobilization (5%)	$15,956
			Subtotal 1	$335,081
			Contingency (25%)	$83,770
			Subtotal 2	$418,851
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$188,483
			Estimated Project Cost	**$608,000**

Figure 1: Exposed sanitary sewer manhole on streambank

Figure 2: Debris jam and active channel widening

This page intentionally left blank.

AC9227 - Stream Restoration



Address:	Along 7100 block of Barry Road
Location:	Windsor Estates
Land Owner:	Private - Residential
PIN:	0904 09 G, 0904 08 0043, 44, 45, 46, 47, 48, 49, 50, 51
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Unknown Tributary of Long Branch South

Description: This project starts at a large stormdrain outfall located off of Barry Road at the end of Rockshire Court and extends downstream to the end of Rockleigh Way. Currently, the existing stream channel is concrete-lined with several private residential driveway bridges crossing the channel. The riparian buffer is a mix of trees and lawn.

This project is proposed to remove the concrete from the channel and restore it using natural channel design. The alignment of the proposed channel and the existing driveway bridges will likely need to be altered during restoration. Creating a riparian buffer is also proposed along the newly created channel.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Removing the existing concrete channel and creating stable habitat along the restored banks in the upstream portion will allow for improvements in water quality and instream habitat. Property owners along the proposed project might welcome the aesthetic changes of the current channel to a natural, restored channel. There are no estimated pollutant removal benefits at the site, since the project will replace a stable concrete channel with a stable natural channel. The primary benefits of the project will be to extend habitat further upstream.

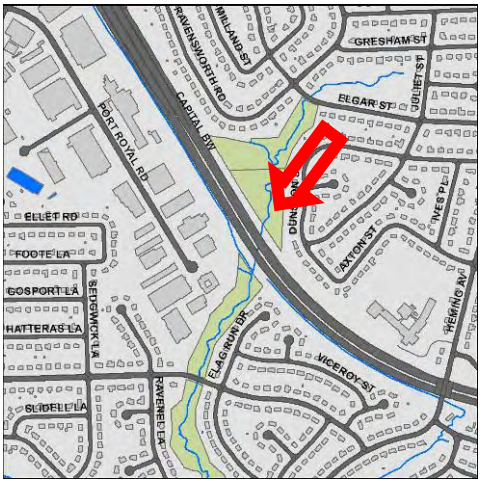
Project Design Considerations: Since this project is contained within private residential properties, many with driveway bridges over the channel, coordinating with property owners will be necessary for access and construction. Access to this site is good from Barry Road. Impacts to homeowner driveways and property will occur and should be assessed before design and construction. This project will require environmental permitting due to construction and modifications to a perennial stream channel.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	930	LF	$200	$186,000
Clear and Grub	0.64	AC	$10,000	$6,400
Plantings	0.64	AC	$25,000	$16,000
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$308,400
Ancillary Items	1	LS	5% of project	$15,420
Erosion and Sediment Control	1	LS	10% of project	$30,840
			Base Construction Cost	**$354,660**
			Mobilization (5%)	$17,733
			Subtotal 1	$372,393
			Contingency (25%)	$93,098
			Subtotal 2	$465,491
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$209,471
			Estimated Project Cost	**$675,000**

Figure 1: Existing concrete lined stream channel with private driveway bridge

AC9229 - Stream Restoration



Address:	Behind 5500 block of Flag Run Drive and behind 7600 block of Dunston St
Location:	Flag Run Park, Lake Accotink Park / I-495
Land Owner:	County - FCPA / State - VDOT
PIN:	0792 01 0001A, 0792 01 0002, 0704 01 0006
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Flag Run

Description: This project is intended to restore an eroded section of Flag Run located between the north side of the Capital beltway (I-495) and the south side of Queensberry Avenue. Currently, this channel is experiencing severe bank and bed erosion. An existing pipeline south of I-495 is exposed and the channel is continuing to degrade threatening the integrity of the pipe. Culverts and storm drains along the reach are also experiencing erosion.

Restoring the channel will include re-grading and stabilizing eroded stream banks with armor-in-place and bioengineering techniques and installing grade controls to dissipate energy. Fill, grading and scour protection will also be necessary for protection of all storm drain outfalls discharging to the stream. Replacing the existing culvert with a bottomless arch culvert would greatly improve hydraulic and hydrologic processes through this stream reach providing a natural stream substrate with grade control structures.

Project Area Map: Conceptual plan showing potential project location

Project Benefits: Implementing this project will reduce sediment supply to receiving stream channels by reducing bank scour and stream bed incision. Other benefits include improving fish and aquatic passage and improving overall stream quality by creating stable habitat and reducing sediment supply. Restoring and stabilizing this channel will help to protect storm drain, road crossing, and utility infrastructure located in the channel and on the floodplain. It is estimated that a total of 194,738 lbs of sediment, 156 lbs of total nitrogen and 60 lbs of total phosphorus would be reduced annually by this project.

Project Design Considerations: Access to the proposed restoration north of I-495 will require use of the easement along the noise wall. This is a narrow and steep slope between the newly constructed noise wall and existing development and forest. Access on the south side of I-495 may be obtained from Queensberry Road. Some tree removal and manipulation of steep slopes may be required. Restoration benefits will outweigh overall construction impacts. This project will require environmental permitting due to construction and modifications to a perennial stream channel and forest impacts.

The project is located upstream of culvert retrofit AC9400 and on either side of culvert retrofit AC9401. Design of all three projects should be performed concurrently.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	2291	LF	$200	$458,200
Clear and Grub	2.10	AC	$10,000	$21,000
Plantings	2.10	AC	$25,000	$52,500
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$631,700
Ancillary Items	1	LS	5% of project	$31,585
Erosion and Sediment Control	1	LS	10% of project	$63,170
			Base Construction Cost	**$726,455**
			Mobilization (5%)	$36,323
			Subtotal 1	$762,778
			Contingency (25%)	$190,695
			Subtotal 2	$953,473
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$429,063
			Estimated Project Cost	**$1,383,000**

Figure 1: Severe bank erosion just upstream of I-495

Figure 2: Severe erosion and downcutting at a stormdrain outfall

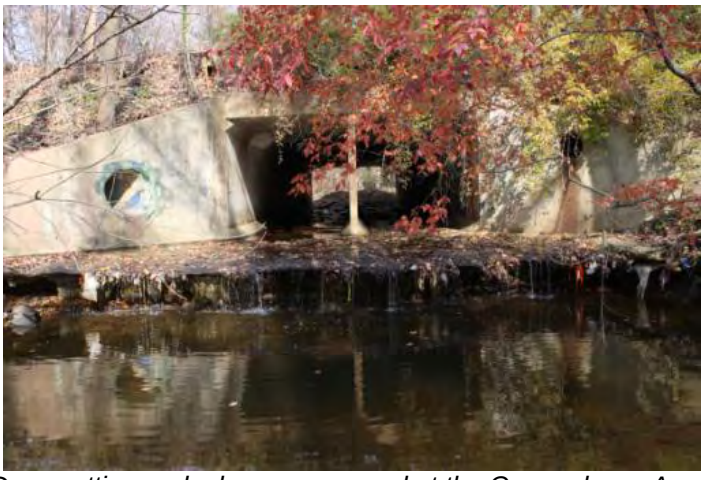


Figure 3: Downcutting and a large scour pool at the Queensberry Avenue culvert

This page intentionally left blank.

AC9230 - Stream Restoration

Address:	Behind 8300 block of Queen Elizabeth Blvd
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 in Wakefield Park between I-495 and Queen Elizabeth Boulevard. The project extends from an overhead power line clearing downstream to the confluence with Accotink Creek. Currently, this channel is deeply incised and experiencing severe bank and bed erosion.

Restoring the channel 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 within forested conditions except for an overhead power line utility clearing.

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 reductions in available sediment supply. It is estimated that the project will reduce pollutants by 66,319 lbs of sediment, 53 lbs of nitrogen and 21 lbs of tot phosphorus annually.

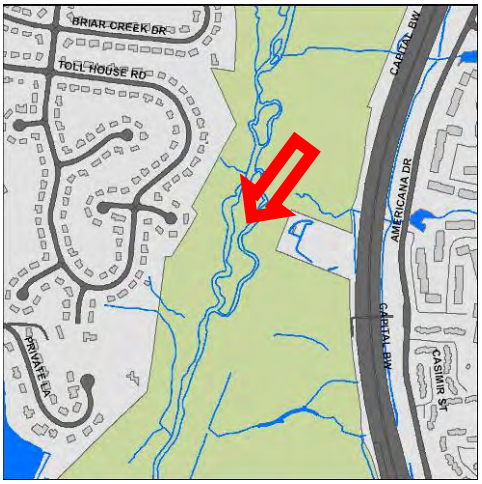
Project Design Considerations: Coordination with the appropriate utility agencies will be necessary for access and construction. Access to this project could occur from the utility easement, if permittable. Minor to moderate tree loss is expected with this restoration; however, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting due to construction and modifications to a perennial stream channel and forest impacts.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	1040	LF	$200	$208,000
Clear and Grub	0.96	AC	$10,000	$9,600
Plantings	0.96	AC	$25,000	$24,000
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$341,600
Ancillary Items	1	LS	5% of project	$17,080
Erosion and Sediment Control	1	LS	10% of project	$34,160
			Base Construction Cost	**$392,840**
			Mobilization (5%)	$19,642
			Subtotal 1	$412,482
			Contingency (25%)	$103,121
			Subtotal 2	$515,603
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$232,021
			Estimated Project Cost	**$748,000**

Figure 1: Deeply incised channel with severe erosion

AC9231 - Stream Restoration



Address:	Behind 8200 block of Strong Spring Ct
Location:	Wakefield Park
Land Owner:	County - FCPA
PIN:	0704 01 0002
Control Type	Water Quality
Drainage Area	N/A
Receiving Waters	Accotink Creek

Description: This project entails restoring overflow stream channels located within the eastern floodplain of Accotink Creek between I-495 and Toll House Road in Wakefield Park. Currently, these channels are deeply incised with bank and bed erosion. Each of the overflow channels convey heavy loads of sand and other sediment to Accotink Creek during large precipitation events.

Restoring these channels 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.

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 reductions in available sediment supply. It is estimated that a total of 39,948 lbs of sediment, 32 lbs of nitrogen and 12 lbs of tol 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 permittable, but will require some tree removal. Tree loss is expected with the restoration; however, restoration benefits will outweigh overall construction impacts. This project will require environmental permitting due to construction and modifications to a perennial stream channel and forest impacts. Other than the overhead power line utility, no other utility conflicts are anticipated with this restoration.

Costs:

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Construct New Channel	904	LF	$200	$180,800
Clear and Grub	2.17	AC	$10,000	$21,700
Plantings	2.17	AC	$25,000	$54,250
Additional Cost, First 500 LF	500	LF	$200	**$100,000**
			Initial Project Cost	$356,750
Ancillary Items	1	LS	5% of project	$17,838
Erosion and Sediment Control	1	LS	10% of project	$35,675
			Base Construction Cost	**$410,263**
			Mobilization (5%)	$20,513
			Subtotal 1	$430,776
			Contingency (25%)	$107,694
			Subtotal 2	$538,470
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				$242,312
			Estimated Project Cost	**$781,000**

Figure 1: Overflow channel with erosion and large deposits of sand

Figure 2: Overflow channel with large sand deposits

This page intentionally left blank.