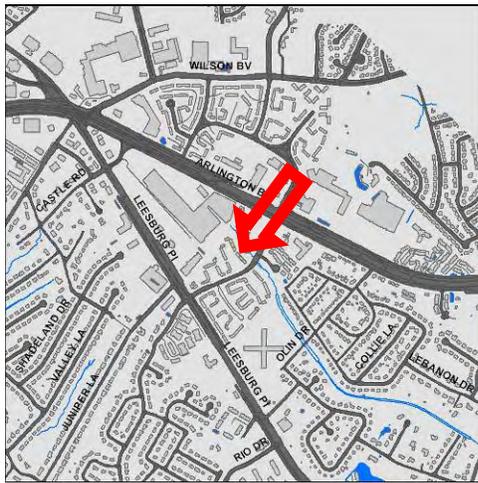
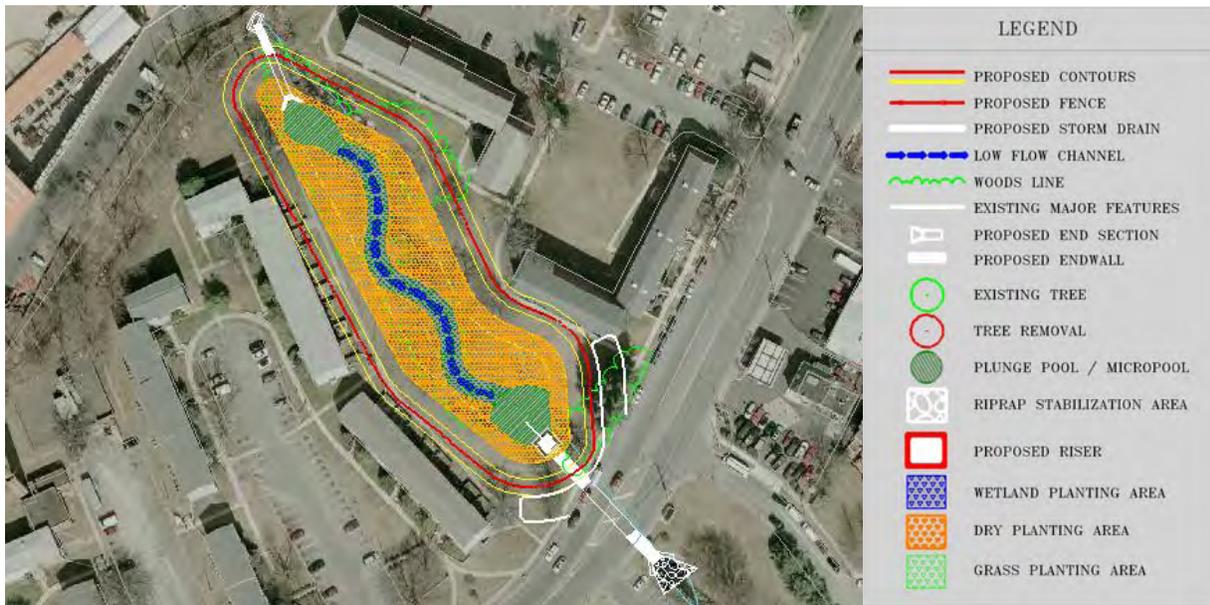


## FM9102 New Stormwater Pond



<b>Address:</b>	Patrick Henry Dr and Brook Rd
<b>Location:</b>	Hollybrook II Condos
<b>Land Owner:</b>	Private – Residential
<b>PIN:</b>	NA
<b>Control Type</b>	Water Quality and Quantity
<b>Drainage Area</b>	134.09 acres
<b>Receiving Waters</b>	Upper Long Branch

**Description:** This project proposes creating a stormwater management facility upstream of the culvert on Patrick Henry Drive. Stream banks downstream of the proposed facility are eroded. The proposed project will treat runoff from a large drainage area consisting of commercial and high density residential areas. The runoff will be treated by the proposed project for pollutants nitrogen, phosphorus and total suspended solids.



*Project Area Map*

**Project Benefits:** This facility has the potential to meet the water quality treatment requirement for the contributing drainage area via extended detention and also meet the peak flow management requirements of the 2-year storm. Constructing this facility will promote the uptake of nutrients, removal of pollutants, suspension of floatables, and overall increases in water quality and habitat. It is estimated that a total of 20,810 lbs of sediment, 221.0 lbs of nitrogen and 35.3 lbs of phosphorus would be reduced annually. Peak flow rates, erosive velocities, and channel sediment loads can also be reduced by this project. The proposed location of this facility is in the middle of a large apartment complex, which provides an environmental education/stewardship opportunity for residents of this community.

**Project Design Considerations:** The maximum storage volume in this facility is not capable of reducing 10-year discharge volumes to pre-development conditions. A fence around the proposed facility would be necessary to ensure public safety. A loss of potential recreation area for residents in the apartment complex may result from construction of this facility. Tree removal will be required. Environmental permitting issues are anticipated due to the in-stream nature of the location. Access to the proposed facility is good. Existing utility conflicts are not anticipated.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Clear and Grub	1.53	AC	\$8,500.00	\$13,005
New Inlet	1	EA	\$2,500.00	\$2,500
New Endwall	2	EA	\$2,500.00	\$5,000
Plungepool / Micropool	2	EA	\$500.00	\$1,000
New Riser	1	LS	\$8,000.00	\$8,000
Embedded Dewatering Pipe	1	EA	\$500.00	\$500
Drainage Pipe	215	LF	\$125.00	\$26,875
Rip Rap Stabilization	111	SY	\$100.00	\$11,100
Excavate to create low-flow channel	291	LF	\$25.00	\$7,275
Grading and Excavation	19650	CY	\$35.00	\$687,750
Embankment	4913	CY	\$50.00	\$245,650
Soil Borings	1	LS	\$10,000.00	\$10,000
			Initial Project Costs	<b>\$1,018,655</b>
Plantings	1	LS	5% of Project	\$50,933
Ancillary Items	1	LS	5% of Project	\$50,933
Erosion and Sediment Control	1	LS	10% of Project	\$101,866
			<b>Base Construction Cost</b>	<b>\$1,222,387</b>
			Mobilization (5%)	\$61,119
			<b>Subtotal 1</b>	<b>\$1,283,506</b>
			Contingency (25%)	\$320,877
			<b>Subtotal 2</b>	<b>\$1,604,383</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$721,972
			<b>Estimated Project Cost</b>	<b>\$2,326,000</b>



**FM9102\_1.jpg: View of the proposed project site**

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**FM9104 Stormwater Pond Retrofit**



**Address:** 4800 Leesburg Pike  
**Location:** Hampton Inn off 14th Street and Leesburg Pike  
**Land Owner:** Private - Commercial  
**PIN:** 0623 01 0025A  
**Control Type** Water Quality and Quantity  
**Drainage Area** 2.17 acres  
**Receiving Waters** Unknown tributary of Four Mile Run

**Description:** The existing detention basin located adjacent to the hotel parking lot will be converted to an extended detention basin by removing the existing concrete low flow channels, excavating the existing bottom to incorporate wetland planting zones and meandering flow channels, and installing a new control structure on the existing barrel pipe. The primary indicators are pollutants nitrogen, phosphorus and total suspended solids.



*Project Area Map*

**Project Benefits:** This facility has the potential to meet the water quality treatment requirement for the contributing drainage area by providing extended detention of the one half-inch, 48 hour storm and meets the peak flow management requirements of the 2 and 10-year storm. Retrofitting this facility would promote the removal of suspended solids and floatables to downstream channels thus improving water quality and habitat. It is estimated that a total of 819 lbs of sediment, 9.6 lbs of nitrogen and 1.8 lbs of phosphorus would be reduced annually by this project. These proposed improvements will also help prevent future downstream channel erosion.

**Project Design Considerations:** No environmental permitting issues are expected with this pond retrofit. Minimal tree loss will occur with this retrofit. Access to the existing facility is good from two adjacent parking lots; however, a wood fence will need to be removed prior to construction and replaced after construction. No design or construction issues were identified at this site.

**Costs:**

<b>ITEM</b>	<b>QUANTITY</b>	<b>UNITS</b>	<b>UNIT COST</b>	<b>TOTAL</b>
Clear and Grub	0.37	AC	\$8,500.00	\$3,145
Paved Ditch Demolition & Haul Away	235	LF	\$30.00	\$7,050
Plungepool / Micropool	3	EA	\$500.00	\$1,500
New Riser	1	LS	\$8,000.00	\$8,000
Embedded Dewatering Pipe	1	EA	\$500.00	\$500
Excavate to create low-flow channel	195	LF	\$25.00	\$4,875
Tree Removal	4	EA	\$2,000.00	\$8,000
Grading and Excavation	83	CY	\$35.00	\$2,905
Soil Borings	1	LS	\$7,500.00	\$7,500
			Initial Project Costs	<b>\$43,475</b>
Plantings	1	LS	5% of Project	\$2,174
Ancillary Items	1	LS	5% of Project	\$2,174
Erosion and Sediment Control	1	LS	10% of Project	\$4,348
			<b>Base Construction Cost</b>	<b>\$52,171</b>
			Mobilization (5%)	\$2,609
			<b>Subtotal 1</b>	\$54,780
			Contingency (25%)	\$13,695
			<b>Subtotal 2</b>	\$68,475
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$30,814
			<b>Estimated Project Cost</b>	<b>\$99,000</b>



**FM9104\_1.jpg: View of inflow to pond**

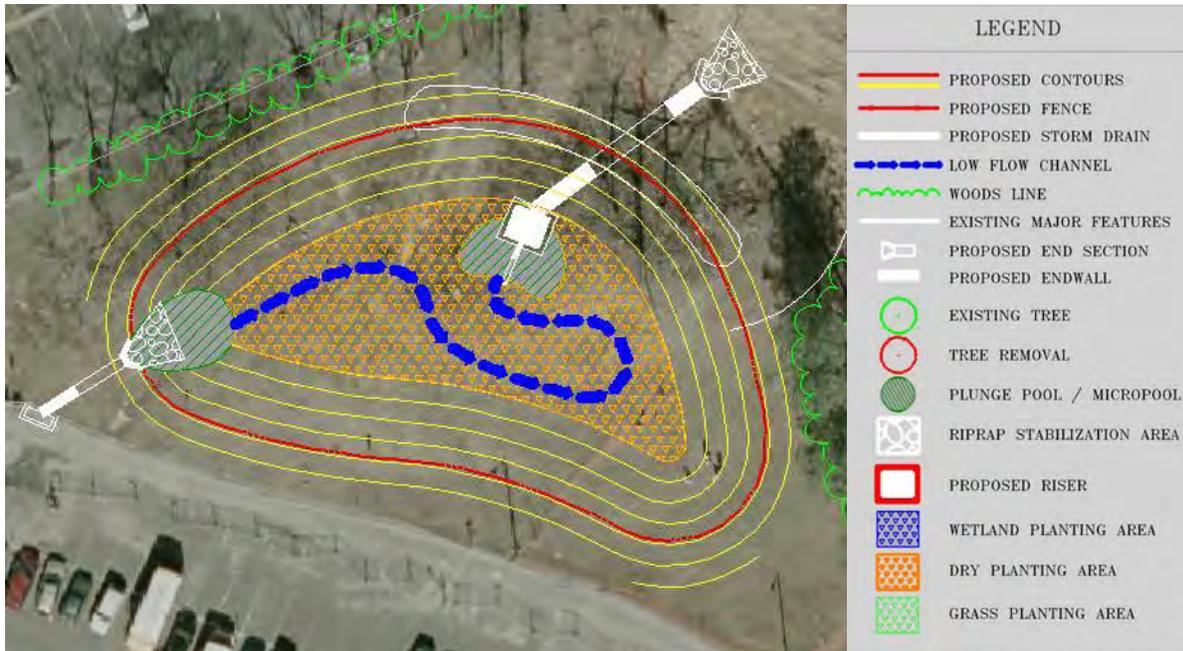
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**FM9105 New Stormwater Pond**



**Address:** 3400 Block, Carlin Springs Rd  
**Location:** Between Carlin Hill Apts and Leesburg Pike Plaza  
**Land Owner:** Private - Commercial  
**PIN:** 0621 01 0016F  
**Control Type:** Water Quality and Quantity  
**Drainage Area:** 16.93 acres  
**Receiving Waters:** Unknown tributary of Four Mile Run

**Description:** This project proposes creation of an extended detention dry pond with a sediment forebay at Leesburg Pike Plaza. The project will be sited in the open area adjacent to a parking lot. The pond will treat rooftop and parking lot runoff for water quantity control and water quality.



*Project Area Map*

**Project Benefits:** This facility has potential to meet the water quality treatment requirement for the contributing drainage area by providing extended detention of the half-inch, 48 hour storm and meet the peak flow management requirements for the 2-year storm. Constructing this facility would promote the removal of suspended solids and floatables to downstream channels thus improving water quality and habitat. It is estimated that a total of 5,880 lbs of sediment, 55.9 lbs of nitrogen and 8.4 lbs of phosphorus would be reduced annually by this project. This project can also help prevent future downstream channel erosion.

**Project Design Considerations:** The maximum storage volume in this facility is not capable of reducing 10-year discharge volumes to pre-development conditions. A fence around the proposed facility would be necessary to promote public safety due to adjacent residential properties. No environmental permitting issues are anticipated for this project. Access to the proposed facility is good. Existing utility conflicts are not anticipated. Existing stormdrain characteristics may affect the potential to provide stormwater management at this location.

**Costs:**

<b>ITEM</b>	<b>QUANTITY</b>	<b>UNITS</b>	<b>UNIT COST</b>	<b>TOTAL</b>
Clear and Grub	0.43	AC	\$8,500.00	\$3,655
New Inlet	1	EA	\$2,500.00	\$2,500
New Endwall	2	EA	\$2,500.00	\$5,000
Plungepool / Micropool	2	EA	\$500.00	\$1,000
New Riser	1	LS	\$8,000.00	\$8,000
Embedded Dewatering Pipe	1	EA	\$500.00	\$500
Drainage Pipe	90	LF	\$125.00	\$11,250
Rip Rap Stabilization	44	SY	\$100.00	\$4,400
Excavate to create low-flow channel	191	LF	\$25.00	\$4,775
Tree Removal	2	EA	\$2,000.00	\$4,000
Grading and Excavation	3433	CY	\$35.00	\$120,155
Embankment	858	CY	\$50.00	\$42,900
Soil Borings	1	LS	\$10,000.00	\$10,000
			Initial Project Costs	<b>\$218,135</b>
Plantings	1	LS	5% of Project	\$10,907
Ancillary Items	1	LS	5% of Project	\$10,907
Erosion and Sediment Control	1	LS	10% of Project	\$21,814
			<b>Base Construction Cost</b>	<b>\$261,763</b>
			Mobilization (5%)	\$13,088
			<b>Subtotal 1</b>	<b>\$274,851</b>
			Contingency (25%)	\$68,713
			<b>Subtotal 2</b>	<b>\$343,564</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$154,604
			<b>Estimated Project Cost</b>	<b>\$498,000</b>



**FM9105\_1.jpg: Proposed site for new pond**

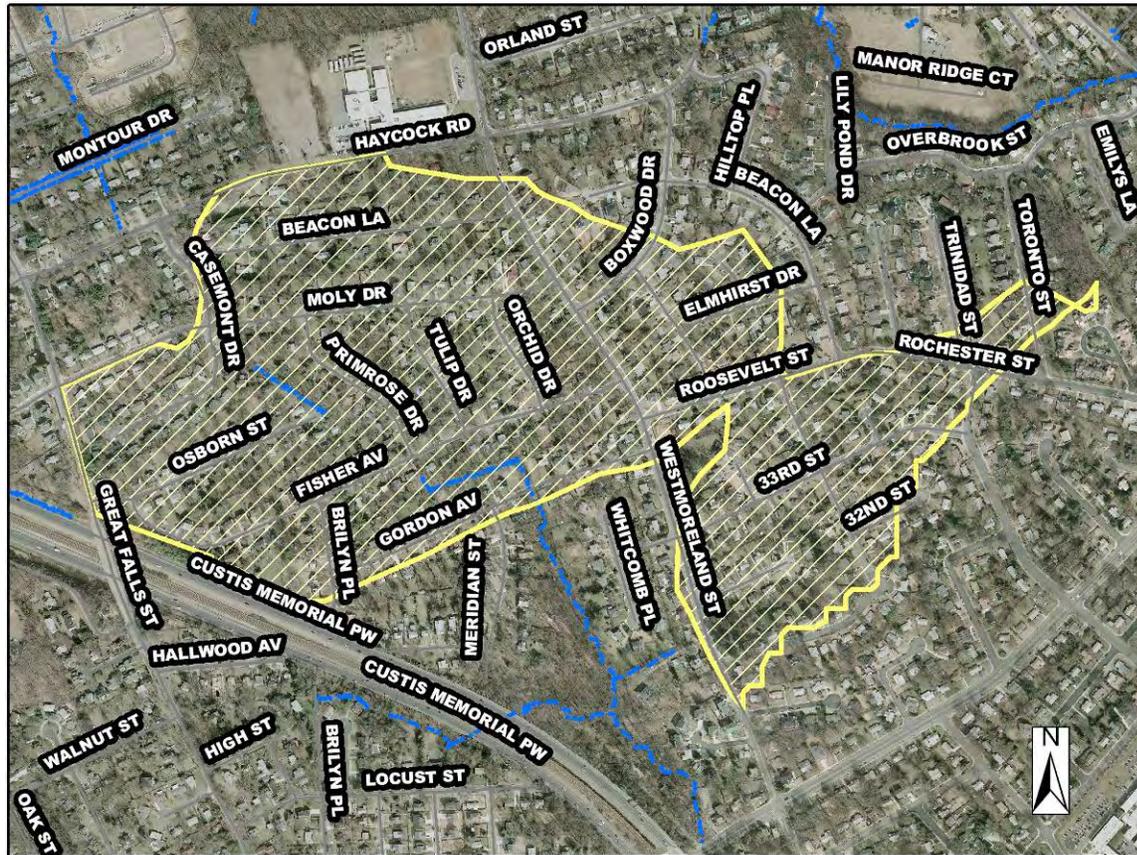
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## FM9300 Area Wide Drainage Improvement



**Address:** Various  
**Location:** North of Williamsburg Boulevard and Custis Memorial Parkway and south of Haycock Rd.  
**Land Owner:** Private – Residential, State - VDOT  
**PIN:**  
**Control Type** Water Quality  
**Drainage Area** 136 acres  
**Receiving Waters** Four Mile Run

**Description:** The entire subwatershed FM-FM-0035 has medium density residential area land use and there are no existing stormwater management facilities. This project is distributed throughout the watershed and involves replacing the existing inlets with tree box filters and adding localized facilities to treat the runoff for water quality.



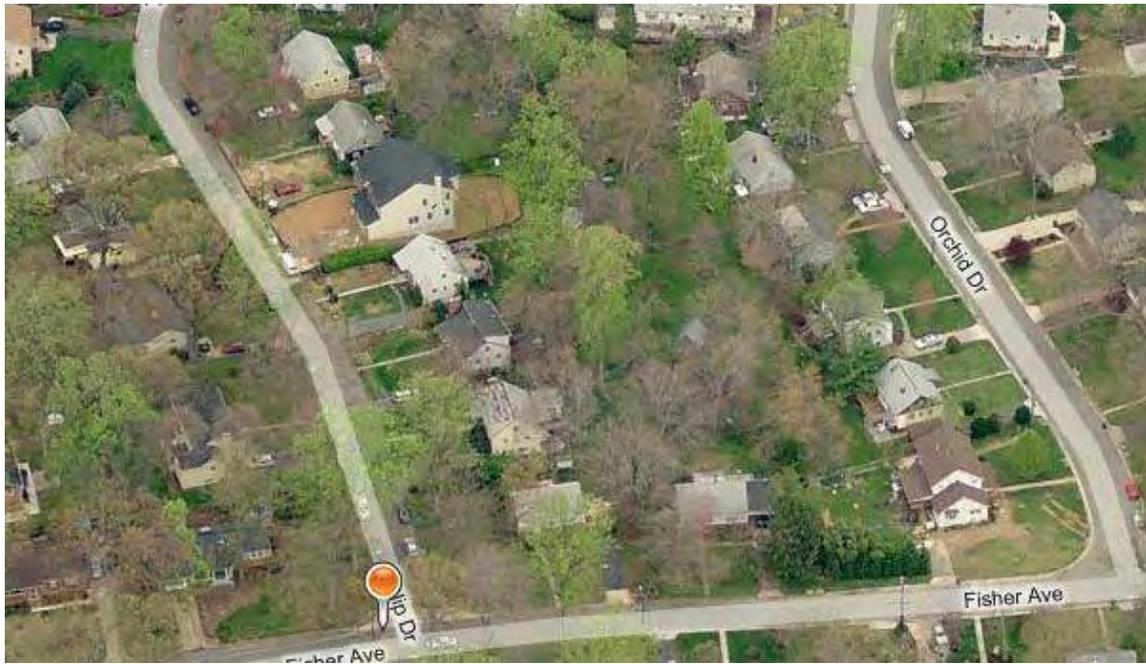
*Project Area Map: Conceptual plan showing project area*

**Project Benefits:** This project will provide water quality treatment for stormwater runoff by removing pollutants and promoting infiltration. Vegetative swales also provide runoff reduction for small events. It is estimated that a total of 9,700 lbs of sediment, 128.0 lbs of nitrogen and 24.0 lbs of phosphorus would be reduced annually by this project.

**Project Design Considerations:** No other projects are recommended in this subwatershed. There are no environmental constraints since the disturbance would be limited to the area immediately around the project location.

**Costs:**

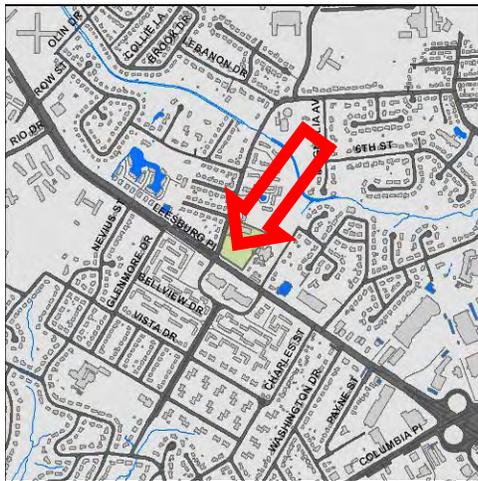
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	30	EA	\$10,000.00	\$300,000
Vegetated Swale	6700	SY	\$75.00	\$502,500
			Initial Project Cost	<b>\$802,500</b>
Plantings	1	LS	5% of project	\$40,125
Ancillary Items	1	LS	5% of project	\$40,125
Erosion and Sediment Control	1	LS	10% of project	\$80,250
			Base Construction Cost	<b>\$963,000</b>
			Mobilization (5%)	\$48,150
			<b>Subtotal 1</b>	\$1,011,150
			Contingency (25%)	\$252,788
			<b>Subtotal 2</b>	\$1,263,938
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$568,772
			<b>Estimated Project Cost</b>	<b>\$1,833,000</b>



**FM9300\_1.jpg: View of section of area proposed for area wide improvement**

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**FM9500 BMP/LID**



**Address:** 3301 Glen Carlyn Rd  
**Location:** St. Andrews Parish  
**Land Owner:** Private - Church  
**PIN:** 0612 01 0008A  
**Control Type** Water Quality  
**Drainage Area** 2.83 acres  
**Receiving Waters** Upper Long Branch

**Description:** This project proposes creation of bioretention areas to receive the runoff from roof top and parking lot at the St. Andrew Parish. The open area in front of the church and grassy area adjacent to the parking lots could be graded and used for bioretention areas.



*Project Area Map: Conceptual plan showing potential project location*

**Project Benefits:** Bioretention filters and basins remove oil and grease, heavy metals, nutrients including phosphorus and nitrogen, and suspended solids from storm water runoff. It is estimated that a total of 629 lbs of sediment, 6.8 lbs of nitrogen and 1.8 lbs of phosphorus would be reduced annually by this project. They also prevent trash and debris from entering the storm drain system and have the ability to cool down warm runoff. Since this site is located on school grounds, it provides an environmental education/stewardship opportunity for students and parents as well as residents within the watershed.

**Project Design Considerations:** No environmental constraints or permitting issues are anticipated. Signs promoting environmental education/stewardship could be used at this site to educate students, parents, and residents in the community. No tree removal is required for installation. Access to the proposed sites is excellent from the school/church parking lot; however, the property ownership is private and coordination will be necessary.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Bioretention Filters & Basin	268	SY	\$150.00	\$40,200
			<b>Initial Project Cost</b>	<b>\$40,200</b>
Plantings	1	LS	5% of project (excluding pervious pavement)	\$2,010
Ancillary Items	1	LS	5% of project	\$2,010
Erosion and Sediment Control	1	LS	10% of project	\$4,020
			Base Construction Cost	<b>\$48,240</b>
			Mobilization (5%)	\$2,412
			<b>Subtotal 1</b>	<b>\$50,652</b>
			Contingency (25%)	\$12,663
			<b>Subtotal 2</b>	<b>\$63,315</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$28,492
			<b>Estimated Project Cost</b>	<b>\$92,000</b>



**FM9500\_1.jpg: View of open areas in front of church to site bioretention filters**

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FOUR MILE RUN Watershed  
Four Mile Run Watershed Management Area

FM9501 BMP/LID



**Address:** 3149 Glen Carlyn Rd  
**Location:** St. Katherine's Greek Orthodox  
**Land Owner:** Private - Church  
**PIN:** 0612 01 0016  
**Control Type:** Water Quality  
**Drainage Area:** 1.13 acres  
**Receiving Waters:** Upper Long Branch

**Description:** Installation of bioretention filters and basins are proposed to treat runoff from St. Katherine's Greek Orthodox church parking lot. The southern portion of the parking lot presents the best opportunity for retrofit. The stormwater runoff will be treated primarily for nitrogen, phosphorus and total suspended solids.



*Project Area Map: Conceptual plan showing potential project location*

**Project Benefits:** The proposed facilities remove suspended solids, heavy metals, nutrients including phosphorus and nitrogen, and oil and grease from storm water runoff. It is estimated that a total of 576 lbs of sediment, 5.6 lbs of nitrogen and 1.4 lbs of phosphorus would be reduced annually by this project. They also prevent trash and debris from entering the storm drain system and have the ability to cool down warm runoff. Since this site is located on church grounds, an environmental education/stewardship opportunity exists for residents within the watershed.

**Project Design Considerations:** No environmental constraints or permitting issues are anticipated. Signs promoting environmental education/stewardship could be used at this site to educate residents in the community. No tree removal is required for the proposed sites. Access to the proposed sites is excellent from the church parking lot; however, the property ownership is private and coordination with the church will be necessary. Modifications to the existing storm drain system may be needed to create an underdrain for the proposed facilities.

**Costs:**

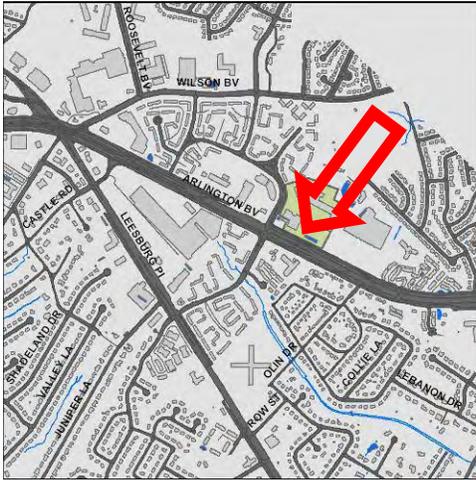
<b>ITEM</b>	<b>QUANTITY</b>	<b>UNITS</b>	<b>UNIT COST</b>	<b>TOTAL</b>
Bioretention Filters & Basin	151	SY	\$150.00	\$22,650
			<b>Initial Project Cost</b>	<b>\$22,650</b>
Plantings	1	LS	5% of project (excluding pervious pavement)	\$1,133
Ancillary Items	1	LS	5% of project	\$1,133
Erosion and Sediment Control	1	LS	10% of project	\$2,265
			<b>Base Construction Cost</b>	<b>\$27,181</b>
			Mobilization (5%)	\$1,359
			<b>Subtotal 1</b>	<b>\$28,540</b>
			Contingency (25%)	\$7,135
			<b>Subtotal 2</b>	<b>\$35,675</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$16,054
			<b>Estimated Project Cost</b>	<b>\$52,000</b>



**FM9501\_1.jpg: Potential areas to implement bioretention**

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**FM9502 BMP/LID**



**Address:** 6100 Block, Arlington Blvd  
**Location:** Target Greatland  
**Land Owner:** Private - Commercial  
**PIN:** 0514 01 0004  
**Control Type:** Water Quality  
**Drainage Area:** 10.18 acres  
**Receiving Waters:** Upper Long Branch

**Description:** This project would treat runoff from the strip mall parking lot (near Target) by implementing bioretention filters and basins in the southern portion of the parking lot where parking islands are located. Tree box filters are proposed on the edges of the strip mall parking lot. Portions of this site may already be treated by underground storage for quantity control.



*Project Area Map: Conceptual plan showing potential project location*

**Project Benefits:** Implementation of tree box filters and bioretention filters and basins will provide water quality treatment for this parking lot during storm events. These facilities remove suspended solids, heavy metals, nutrients including phosphorus and nitrogen, and oil and grease from storm water runoff. It is estimated that a total of 4,440 lbs of sediment, 50.7 lbs of nitrogen and 7.8 lbs of phosphorus would be reduced annually by this project. They also prevent trash and debris from entering the storm drain system and have the ability to cool down warm runoff.

**Project Design Considerations:** No environmental constraints or permitting issues are anticipated. Minimal tree impacts are expected with this project. Access to the proposed sites is excellent from roads and the commercial parking lot. Property ownership is private and coordination with the shopping center owner/management will be necessary for these sites. A temporary or permanent loss of parking spaces may occur with these sites.

**Costs:**

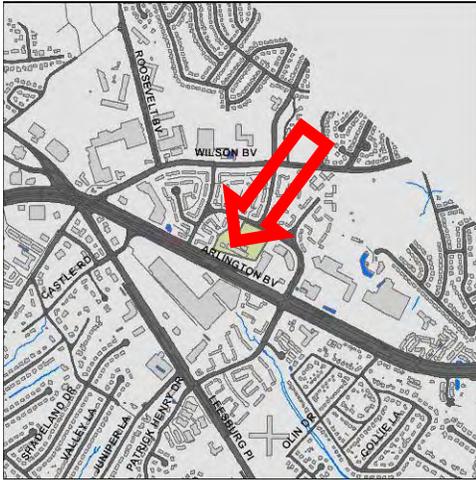
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	2	EA	\$10,000.00	\$20,000
Bioretention Filters & Basin	1265	SY	\$150.00	\$189,750
			<b>Initial Project Cost</b>	<b>\$209,750</b>
Plantings	1	LS	5% of project (excluding pervious pavement)	\$10,488
Ancillary Items	1	LS	5% of project	\$10,488
Erosion and Sediment Control	1	LS	10% of project	\$20,975
			Base Construction Cost	<b>\$251,701</b>
			Mobilization (5%)	\$12,585
			<b>Subtotal 1</b>	<b>\$264,286</b>
			Contingency (25%)	\$66,072
			<b>Subtotal 2</b>	<b>\$330,358</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$148,661
			<b>Estimated Project Cost</b>	<b>\$479,000</b>



**FM9502\_1.jpg: View of existing inlets in parking lot**

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FM9503 BMP/LID



**Address:** 6131 Willston Dr  
**Location:** Korean Cultural Center  
**Land Owner:** Private  
**PIN:** 0513 18 0001  
**Control Type:** Water Quality  
**Drainage Area:** 2.98 acres  
**Receiving Waters:** Upper Long Branch

**Description:** Runoff characteristics at this site can be improved by removing the concrete immediately adjacent to the Korean Cultural Center. The storm inlet next to playground could also be replaced with a rain garden. Bioretention filters and basins would be installed in the median and edges of the parking lot.



*Project Area Map: Conceptual plan showing potential project location*

**Project Benefits:** Bioretention filters and basins have the capability to remove oil and grease, heavy metals, nutrients including phosphorus and nitrogen, and suspended solids from parking lot runoff. It is estimated that a total of 2,080 lbs of sediment, 25.2 lbs of nitrogen and 4.3 lbs of phosphorus would be reduced annually by this project. They also prevent trash and debris from entering the storm drain system and have the ability to cool warm runoff.

**Project Design Considerations:** Since the site is currently fully developed, no permitting issues are anticipated and there are no impacts to trees. Its use as a cultural center would make it appropriate for signs to encourage environmental education and stewardship. Access to the proposed sites is excellent and Fairfax County ownership simplifies implementation. The only design consideration is potential modifications to the existing storm drain system.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Bioretention Filters & Basin	230	SY	\$150.00	\$34,500
			<b>Initial Project Cost</b>	<b>\$34,500</b>
Plantings	1	LS	5% of project (excluding pervious pavement)	\$1,725
Ancillary Items	1	LS	5% of project	\$1,725
Erosion and Sediment Control	1	LS	10% of project	\$3,450
			Base Construction Cost	<b>\$41,400</b>
			Mobilization (5%)	\$2,070
			<b>Subtotal 1</b>	<b>\$43,470</b>
			Contingency (25%)	\$10,868
			<b>Subtotal 2</b>	<b>\$54,338</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$24,452
			<b>Estimated Project Cost</b>	<b>\$79,000</b>



**FM9503\_1.jpg: View of existing inlet in parking lot**

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