

## AC9300 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Pohick Estates
<b>Land Owner:</b>	Private-Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	74 acres
<b>Receiving Waters</b>	Unknown Tributary of Accotink Creek

**Description:** AC-AC-0080 is a medium density residential area with no stormwater management. The water quality downstream of this subwatershed is impaired with opportunities for retrofits. This area-wide improvement would instead treat the runoff at the inlets, before it enters the conveyance system. This project involves the installation of tree box filters at curb inlets and rain gardens at yard inlets.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration, uptake by vegetation, and infiltration. The amount of nutrients, suspended solids, and other harmful pollutants will be reduced, thus improving in-stream habitat. It is estimated that 5,034 lbs of sediment, 14 lbs of nitrogen and eight lbs of phosphorus would be reduced each year by this project. There may also be some improvement in the peak flow attenuation due to increased infiltration.

**Project Design Considerations:** Environmental constraints, if any, will be small as the disturbance will only be in the immediate vicinity of the project. Rain gardens would require utility research to ensure there are no conflicts. Some modification of the storm drain system may be required. Projects located on private property need to be coordinated with and approved by the property owner.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	32	EA	\$10,000.00	\$320,000
Rain Garden	595	SY	\$50.00	\$29,750
			Initial Project Cost	<b>\$349,750</b>
Plantings	1	LS	5% of project	\$17,488
Ancillary Items	1	LS	5% of project	\$17,488
Erosion and Sediment Control	1	LS	10% of project	\$34,975
			Base Construction Cost	<b>\$419,701</b>
			Mobilization (5%)	\$20,985
			<b>Subtotal 1</b>	\$440,686
			Contingency (25%)	\$110,172
			<b>Subtotal 2</b>	\$550,858
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$247,886
			<b>Estimated Project Cost</b>	<b>\$799,000</b>

**AC9301 – Area-Wide Drainage Improvement**



<b>Address:</b>	Various
<b>Location:</b>	Windsor Park
<b>Land Owner:</b>	Private–Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	46 acres
<b>Receiving Waters</b>	Unknown Tributary of Long Branch

**Description:** AC-LA-0055 is a high density residential area which was developed without stormwater management. The water quality downstream of this subwatershed is impaired with few opportunities for treatment. This area-wide improvement would treat the runoff before it enters the conveyance system, with installation of tree box filters and rain gardens at storm drain inlets.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration, infiltration, and uptake from vegetation. It is estimated that 7,578 lbs of sediment, 89 lbs of nitrogen and 18 lbs of phosphorus would be reduced each year by this project. There will also be some improvement in the peak flow attenuation due to attenuation through filter media and increased infiltration.

**Project Design Considerations:** Environmental constraints will be minimal as the disturbance will only be in the immediate vicinity of the project. Installation of rain gardens will require utility research to ensure there are no conflicts. Some modification of the storm drain system may be required. Projects located on private property need to be coordinated with and approved by the property owner.

**Costs:**

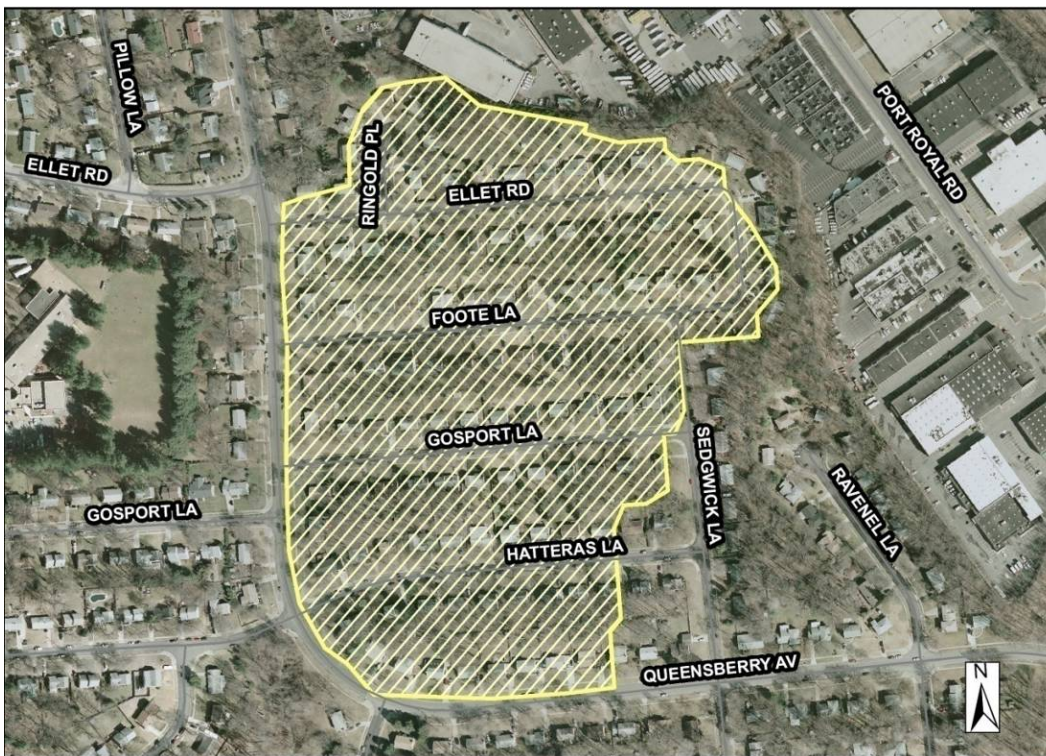
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	42	EA	\$10,000.00	\$420,000
Rain Garden	702	SY	\$50.00	\$35,100
			Initial Project Cost	<b>\$455,100</b>
Plantings	1	LS	5% of project	\$22,755
Ancillary Items	1	LS	5% of project	\$22,755
Erosion and Sediment Control	1	LS	10% of project	\$45,510
			Base Construction Cost	<b>\$546,120</b>
			Mobilization (5%)	\$27,306
			<b>Subtotal 1</b>	\$573,426
			Contingency (25%)	\$143,357
			<b>Subtotal 2</b>	\$716,783
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$322,552
			<b>Estimated Project Cost</b>	<b>\$1,040,000</b>

## AC9302 Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Ravensworth
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	35 acres
<b>Receiving Waters</b>	Unknown tributary of Lake Accotink

**Description:** This subwatershed, AC-AC-0240, consists of medium density residential land use with no existing stormwater management facilities. This area-wide project is intended to treat runoff in the stormwater conveyance system before it reaches the streams. This project will include installation of tree box filters at curb inlets throughout the neighborhood.



*Project Area Map*

**Project Benefits:** This project will provide water quality treatment for stormwater runoff through the removal of pollutants and increased infiltration. This will improve instream water quality and instream habitat. It is estimated that project implementation will reduce annual pollutant loads by approximately 2,976 lbs of sediment, 39 lbs of total nitrogen and seven lbs of total phosphorus.

**Project Design Considerations:** No other projects are recommended in this subwatershed. No environmental constraints are anticipated since the disturbance would be limited to the area immediately around the projects. Projects located on private property need to be coordinated with the property owner.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	32	EA	\$10,000.00	\$320,000
			Initial Project Cost	<b>\$320,000</b>
Plantings	1	LS	5% of project	\$16,000
Ancillary Items	1	LS	5% of project	\$16,000
Erosion and Sediment Control	1	LS	10% of project	\$32,000
			Base Construction Cost	<b>\$384,000</b>
			Mobilization (5%)	\$19,200
			<b>Subtotal 1</b>	<b>\$403,200</b>
			Contingency (25%)	\$100,800
			<b>Subtotal 2</b>	<b>\$504,000</b>
Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)				\$226,800
			<b>Estimated Project Cost</b>	<b>\$731,000</b>

# AC9303 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Kings Park
<b>Land Owner:</b>	Private–Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	114 acres
<b>Receiving Waters</b>	Unknown Tributary of Accotink Creek

**Description:** Most of land use in this subwatershed is medium density residential, developed without stormwater management. The water quality downstream of this subwatershed is impaired. This area-wide improvement would treat the runoff before it enters the storm drain system, by installing tree box filters at curb inlets and rain gardens at yard inlets.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration, infiltration and uptake by vegetation. Nutrients, suspended solids, and other pollutants will be reduced, thus improving in-stream habitat. It is estimated that project implementation will reduce annual pollutant loads by approximately 8,679 lbs of sediment, 116 lbs of nitrogen and 21 lbs of phosphorus. There will also be some improvement in the peak flow attenuation due to the disconnection of impervious surfaces and increased infiltration.

**Project Design Considerations:** If there are any environmental constraints, they will be limited as the disturbance will only be in the immediate vicinity of the project. Rain gardens would require utility research to ensure there are no conflicts. Some modification of the storm drain system may be required. Projects located on private property need to be coordinated with and approved by the property owner.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	59	EA	\$10,000.00	\$590,000
Rain Garden	1117	SY	\$50.00	\$55,850
			Initial Project Cost	<b>\$645,850</b>
Plantings	1	LS	5% of project	\$32,293
Ancillary Items	1	LS	5% of project	\$32,293
Erosion and Sediment Control	1	LS	10% of project	\$64,585
			Base Construction Cost	<b>\$775,021</b>
			Mobilization (5%)	\$38,751
			<b>Subtotal 1</b>	\$813,772
			Contingency (25%)	\$203,443
			<b>Subtotal 2</b>	\$1,017,215
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$457,747
			<b>Estimated Project Cost</b>	<b>\$1,475,000</b>

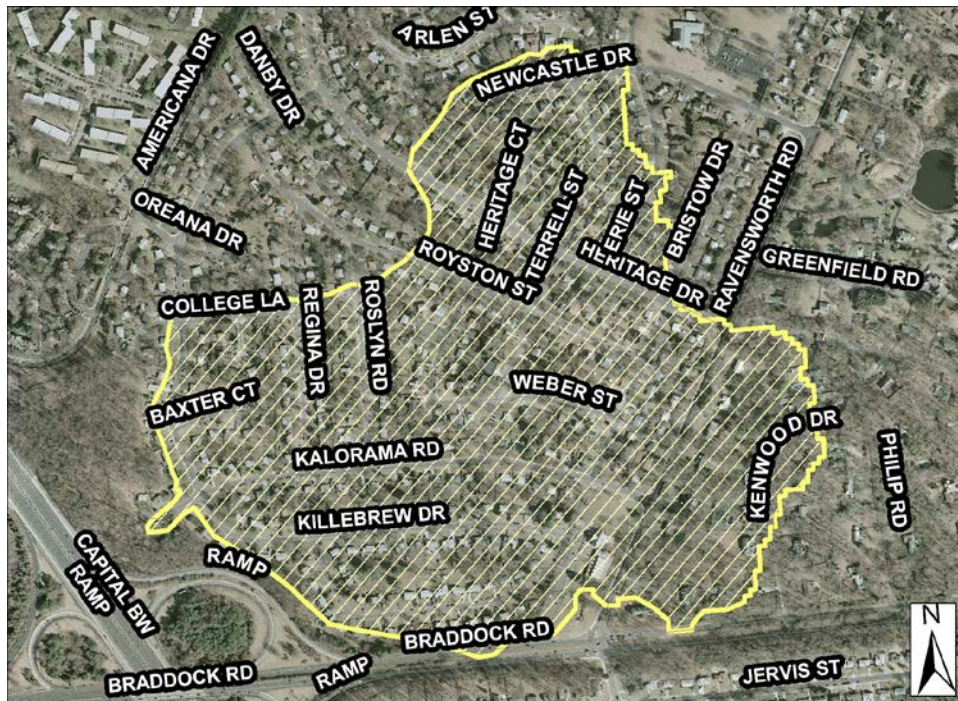


## AC9304 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Ravensworth Park, Bristow,
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	139 acres
<b>Receiving Waters</b>	Unknown Tributary of Accotink Creek

**Description:** This low and medium density residential area has no stormwater management. This project will cover about half of the subwatershed northeast of the intersection of I-66 and I-495. The water quality downstream of this subwatershed is impaired. This area-wide improvement would treat the runoff at the source, before it enters the conveyance system in three ways: installation of tree box filters at curb inlets, rain gardens at yard inlets, and retrofit of paved ditches as vegetated swales.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration, infiltration, and uptake by vegetation in all three types of improvements. The amount of nutrients and suspended solids will be reduced within the stream, thus improving in-stream habitat. . It is estimated that project implementation will reduce annual pollutant loads by approximately 10,571 lbs of sediment, 137 lbs of nitrogen and 26 lbs of phosphorus. There will also be some peak flow reduction due to increased infiltration and attenuation.

**Project Design Considerations:** Environmental constraints will be minimal as the disturbance will only be in the immediate vicinity of the project. Utility research may be required to ensure there are no conflicts. Any project located outside of the right-of-way and on private property will need to be coordinated with and approved by the property owner.

**Costs:**

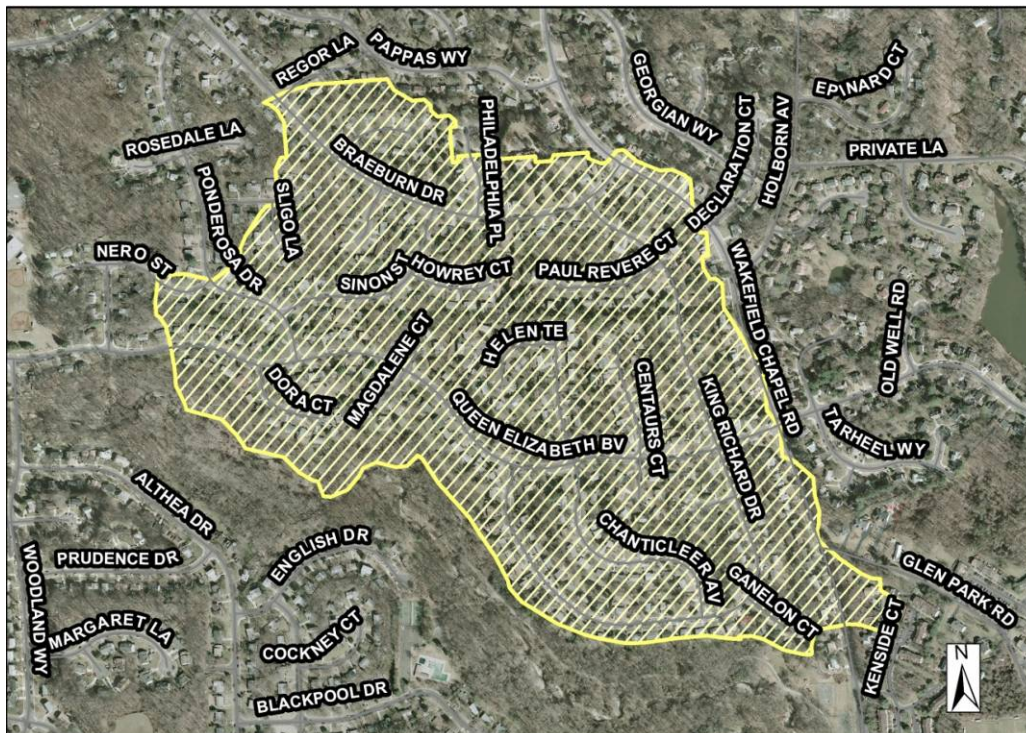
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	67	EA	\$10,000.00	\$670,000
Vegetated Swale	144	SY	\$50.00	\$7,200
Rain Garden	1177	SY	\$50.00	\$58,850
			Initial Project Cost	<b>\$736,050</b>
Plantings	1	LS	5% of project	\$36,803
Ancillary Items	1	LS	5% of project	\$36,803
Erosion and Sediment Control	1	LS	10% of project	\$73,605
			Base Construction Cost	<b>\$883,261</b>
			Mobilization (5%)	\$44,163
			<b>Subtotal 1</b>	<b>\$927,424</b>
			Contingency (25%)	\$231,856
			<b>Subtotal 2</b>	<b>\$1,159,280</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$521,676
			<b>Estimated Project Cost</b>	<b>\$1,681,000</b>

## AC9305 Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Canterbury Woods
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	138 acres
<b>Receiving Waters</b>	Unknown tributary of Long Branch

**Description:** The majority of the subwatershed has been developed with medium density residential land use, without stormwater management facilities. The water quality downstream of this subwatershed is impaired with few opportunities for retrofits. This area-wide improvement would treat the stormwater runoff before it enters the conveyance system through installation of tree box filters at curb inlets and rain gardens around yard inlets.



Project Area Map

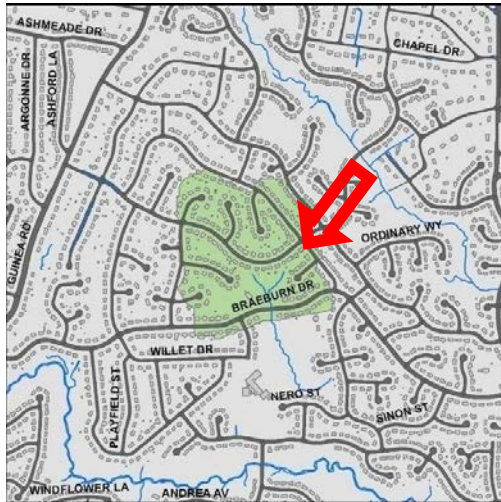
**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration, infiltration, and uptake by vegetation. The amount of nutrients, suspended solids, and other harmful pollutants will be reduced before reaching stream, thus improving instream habitat. It is estimated that project implementation will reduce annual pollutant loads by approximately 10,368 lbs of sediment, 137 lbs of nitrogen and 25 lbs of phosphorus. There will also be a slight improvement in the peak flow attenuation due to increased infiltration.

**Project Design Considerations:** Environmental constraints will be minimal as the disturbance will only be in the immediate vicinity of the existing storm drain system. Rain gardens may require utility research to ensure there are no conflicts. Some modification of the storm drainage system may be required. Projects located on private property need to be coordinated with the property owner. Easements would be required for rain gardens on private property.

**Costs:**

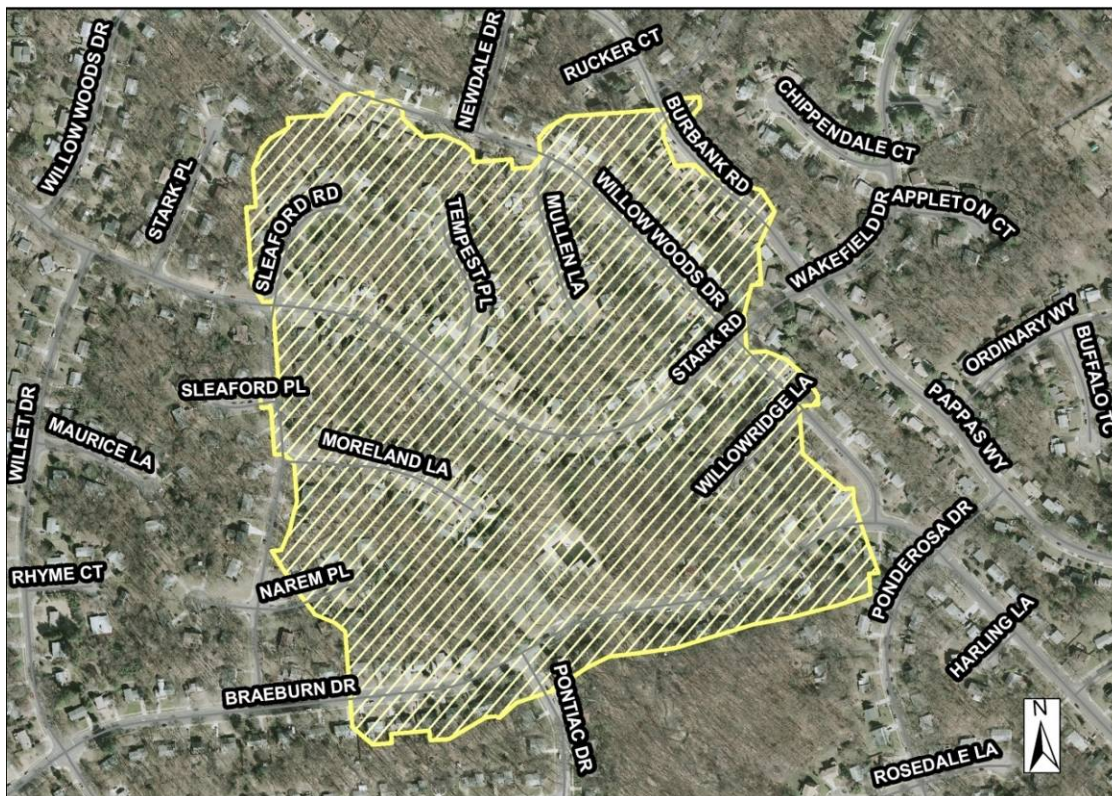
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	65	EA	\$10,000.00	\$650,000
Rain Garden	1415	SY	\$50.00	\$70,750
			Initial Project Cost	<b>\$720,750</b>
Plantings	1	LS	5% of project	\$36,038
Ancillary Items	1	LS	5% of project	\$36,038
Erosion and Sediment Control	1	LS	10% of project	\$72,075
			Base Construction Cost	<b>\$864,901</b>
			Mobilization (5%)	\$43,245
			<b>Subtotal 1</b>	\$908,146
			Contingency (25%)	\$227,037
			<b>Subtotal 2</b>	\$1,135,183
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$510,832
			<b>Estimated Project Cost</b>	<b>\$1,647,000</b>

## AC9306 Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Willow Woods
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	64 acres
<b>Receiving Waters</b>	Unknown tributary of Long Branch Creek

**Description:** In this medium density residential neighborhood, there are no stormwater management facilities to treat runoff. Water quality downstream of the area is impaired. This project will treat stormwater before it enters the conveyance system. Rain gardens will be placed around yard inlets and tree box filters will be placed at curb inlets throughout the neighborhood.



Project Area Map

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through infiltration, filtration, and uptake by vegetation. The amount of nutrients, suspended solids, and other harmful pollutants will be reduced before reaching stream, thus improving instream habitat. It is estimated that project implementation will reduce annual pollutant loads by approximately 4,775 lbs of sediment, 64 lbs of nitrogen and 12 lbs of phosphorus. There may also be some improvements in peak flow attenuation due to increased infiltration throughout the subwatershed.

**Project Design Considerations:** Environmental constraints, if any, are expected to be minor as the disturbance will only be in the immediate vicinity of the existing storm drains. Some sites may require utility research to ensure there are no conflicts or modification of the storm drain system. Projects located on private property need to be coordinated with property owners.

**Costs:**

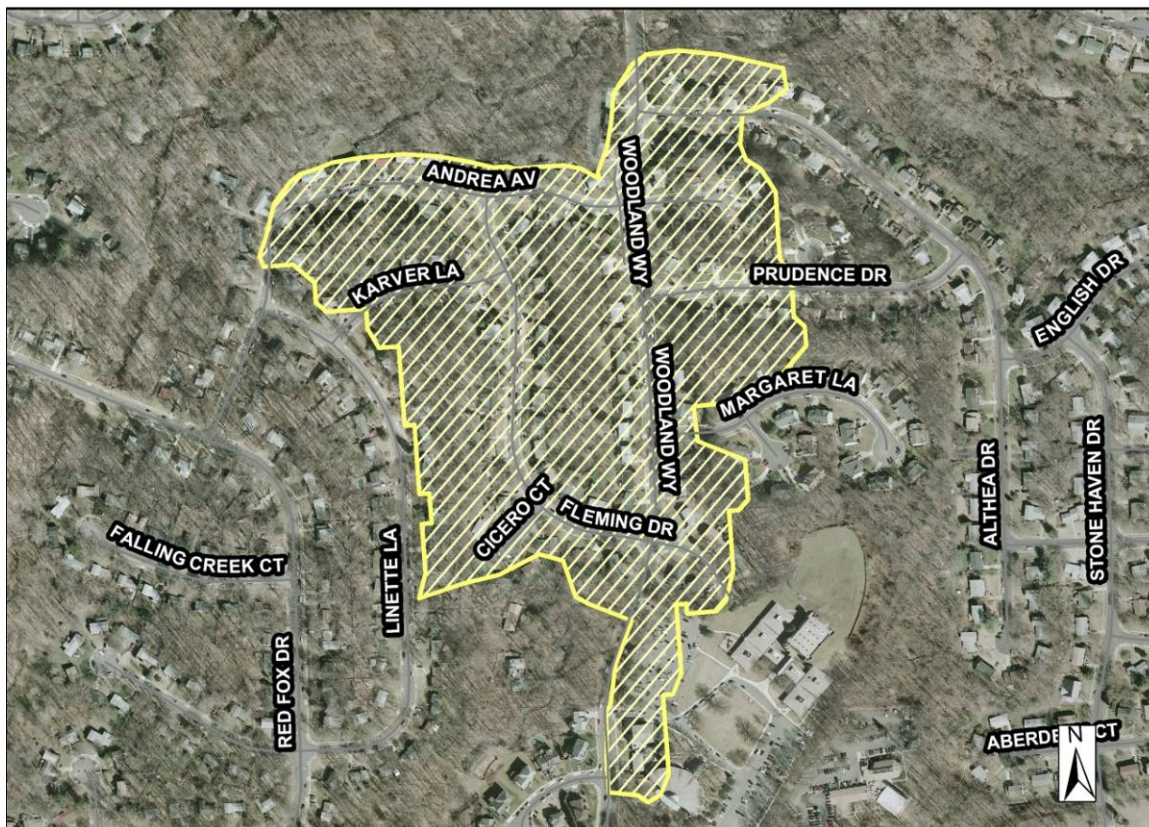
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	30	EA	\$10,000.00	\$300,000
Rain Garden	626	SY	\$50.00	\$31,300
			Initial Project Cost	<b>\$331,300</b>
Plantings	1	LS	5% of project	\$16,565
Ancillary Items	1	LS	5% of project	\$16,565
Erosion and Sediment Control	1	LS	10% of project	\$33,130
			Base Construction Cost	<b>\$397,560</b>
			Mobilization (5%)	\$19,878
			<b>Subtotal 1</b>	<b>\$417,438</b>
			Contingency (25%)	\$104,360
			<b>Subtotal 2</b>	<b>\$521,798</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$234,809
			<b>Estimated Project Cost</b>	<b>\$757,000</b>

**AC9307 Area-Wide Drainage Improvement**



<b>Address:</b>	Various
<b>Location:</b>	Woodland Forest
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	41 acres
<b>Receiving Waters</b>	Unknown tributary of Long Branch Creek

**Description:** This area is a medium density residential neighborhood downstream of instream detention pond 1022DP. This project is located in a headwater subwatershed and would improve the water quality of stormwater runoff before it enters the Long Branch Central tributary. Water quality improvements would consist of tree box filters placed at curb inlets and rain gardens installed adjacent to yard inlets.



*Project Area Map*

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration, infiltration, and uptake by vegetation. It is estimated that project implementation will reduce annual pollutant loads by approximately 3,374 lbs of sediment, 44 lbs of nitrogen and eight lbs of phosphorus. There may also be some improvement in peak flow attenuation due to increased infiltration.

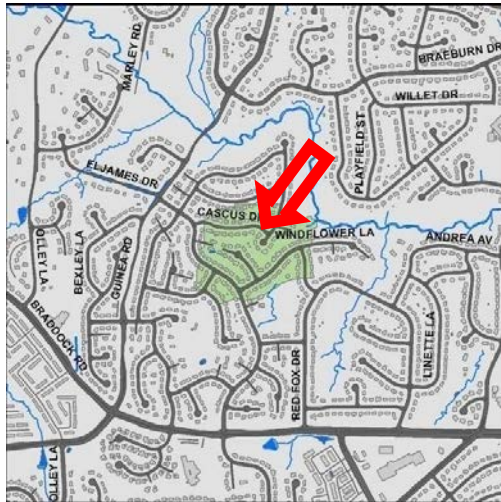
**Project Design Considerations:** There are no environmental constraints as the disturbance will be limited to the area immediately around the existing storm drains. Projects located on private property need to be coordinated with the property owner. For rain gardens located on private property, an easement will be required for installation and maintenance.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	20	EA	\$10,000.00	\$200,000
Vegetated Swale	157	SY	\$50.00	\$7,850
Rain Garden	465	SY	\$50.00	\$23,250
			Initial Project Cost	<b>\$231,100</b>
Plantings	1	LS	5% of project	\$11,555
Ancillary Items	1	LS	5% of project	\$11,555
Erosion and Sediment Control	1	LS	10% of project	\$23,110
			Base Construction Cost	<b>\$277,320</b>
			Mobilization (5%)	\$13,866
			<b>Subtotal 1</b>	<b>\$291,186</b>
			Contingency (25%)	\$72,797
			<b>Subtotal 2</b>	<b>\$363,983</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$163,792
			<b>Estimated Project Cost</b>	<b>\$528,000</b>

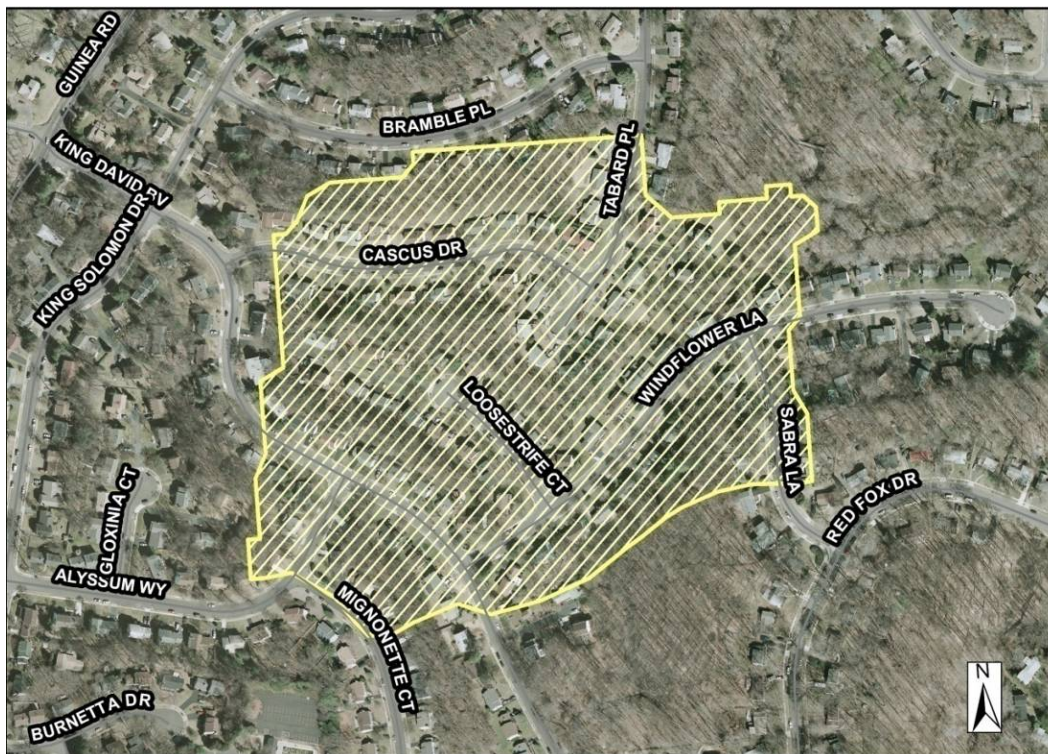


## AC9308 Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Canterbury Woods, Long Branch
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	30 acres
<b>Receiving Waters</b>	Unknown tributary of Long Branch Creek

**Description:** The subwatershed encompassing the project area is medium density residential area with no stormwater management facilities. The water quality downstream of this subwatershed is impaired. This area-wide improvement would treat runoff at the source, before it enters the stream. This project involves the installation of tree box filters at curb inlets and rain gardens adjacent to yard inlets.



*Project Area Map*

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through various methods of treatment. The amount of nutrients, suspended solids, and other harmful pollutants will be reduced before reaching stream, thus improving instream habitat. Project implementation is expected to reduce annual pollutant loads by approximately 3,440 lbs of sediment, 32 lbs of nitrogen and six lbs of phosphorus. There will also be a slight improvement in the peak flow attenuation due to the disconnection of rooftops and increased infiltration.

**Project Design Considerations:** Environmental constraints will be minor as the disturbance will only be in the immediate vicinity of the existing storm drain system. Rain gardens may require utility research to ensure there are no conflicts. Some modification of the storm drainage system may be required. Projects located on private property need to be coordinated with the property owner.

**Costs:**

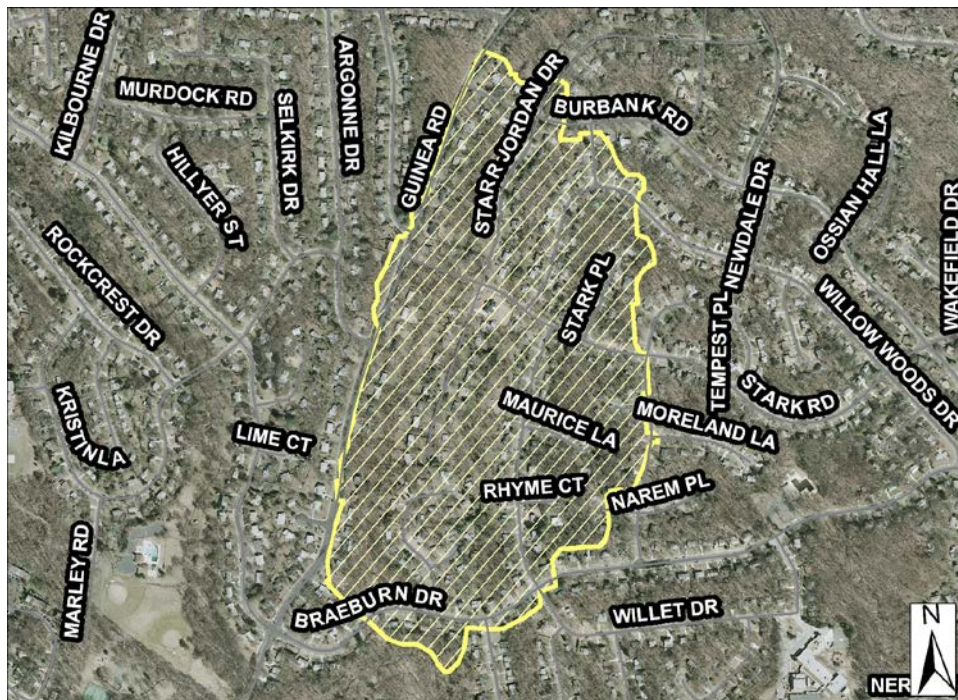
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	14	EA	\$10,000.00	\$140,000
Rain Garden	329	SY	\$50.00	\$16,450
			Initial Project Cost	<b>\$156,450</b>
Plantings	1	LS	5% of project	\$7,823
Ancillary Items	1	LS	5% of project	\$7,823
Erosion and Sediment Control	1	LS	10% of project	\$15,645
			Base Construction Cost	<b>\$187,741</b>
			Mobilization (5%)	\$9,387
			<b>Subtotal 1</b>	\$197,128
			Contingency (25%)	\$49,282
			<b>Subtotal 2</b>	\$246,410
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$110,885
			<b>Estimated Project Cost</b>	<b>\$358,000</b>

## AC9309 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Springbook Forest, Willow Woods and Woods of Ilda
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	110 acres
<b>Receiving Waters</b>	Unknown Tributary of Long Branch

**Description:** This low and medium density residential area was developed without stormwater management. The stream assessment showed impaired conditions downstream of this subwatershed. This area-wide project would treat the runoff before it enters the storm drain system. It would be the installation of tree box filters at curb inlets and rain gardens at yard inlets.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through various filtration, infiltration, and uptake by vegetation associated with the tree box filters and rain gardens. It is estimated that project implementation will reduce annual pollutant loads by 7,859 lbs of sediment, 106 lbs of nitrogen and 20 lbs of phosphorus, which would help improve in-stream habitat. There may also be some peak flow reduction due to the disconnection of impervious surfaces and increased infiltration.

**Project Design Considerations:** Environmental constraints will be minimized as the disturbance will only be in the immediate vicinity of the project. Rain gardens may require utility research to ensure there are no conflicts. Some modification of the storm drain system would be required. Any project located outside of the right-of-way and on private property needs to be coordinated with and approved by the property owner.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	45	EA	\$10,000.00	\$450,000
Rain Garden	778	SY	\$50.00	\$38,900
			Initial Project Cost	<b>\$488,900</b>
Plantings	1	LS	5% of project	\$24,445
Ancillary Items	1	LS	5% of project	\$24,445
Erosion and Sediment Control	1	LS	10% of project	\$48,890
			Base Construction Cost	<b>\$586,680</b>
			Mobilization (5%)	\$29,334
			<b>Subtotal 1</b>	\$616,014
			Contingency (25%)	\$154,004
			<b>Subtotal 2</b>	\$770,018
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$346,508
			<b>Estimated Project Cost</b>	<b>\$1,117,000</b>



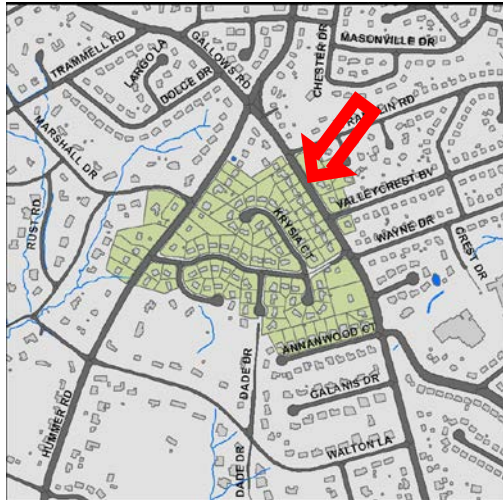
**Project Benefits:** This project will provide water quality treatment for stormwater runoff through the removal of pollutants and increased infiltration. Project implementation is estimated to reduce annual pollutant loads by approximately 13,774 lbs of sediment, 182 lbs of nitrogen and 34 lbs of phosphorus. This is expected to help improve instream water quality and instream habitat.

**Project Design Considerations:** No environmental constraints are anticipated as the disturbance would be limited to the area immediately around the projects. Projects located on private property will need to be coordinated with property owners.

**Costs:**

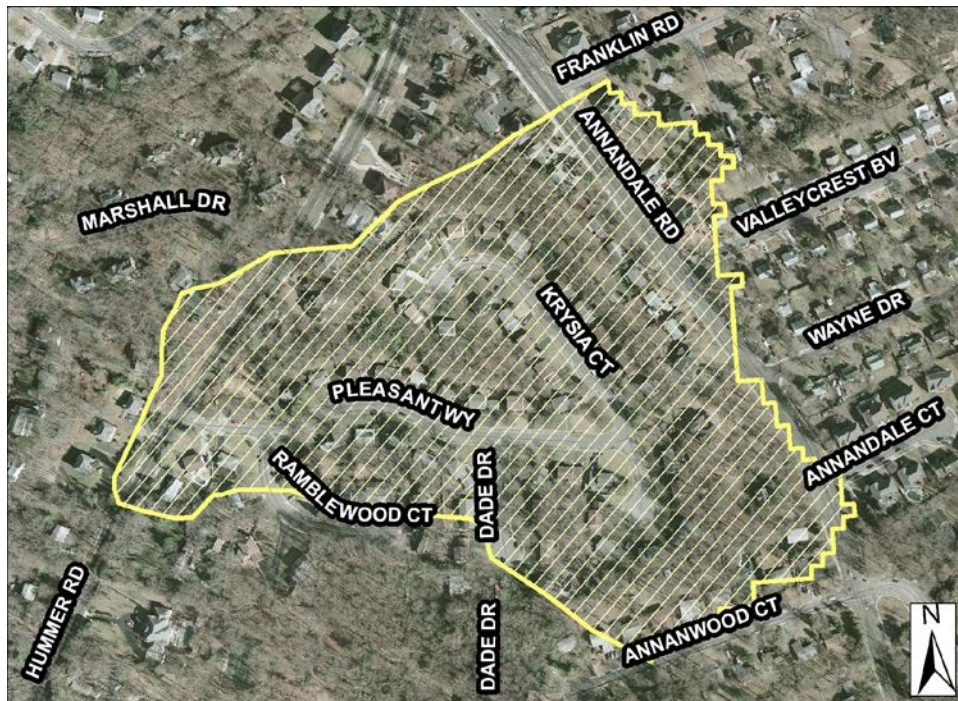
ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	74	EA	\$10,000.00	\$740,000
Rain Garden	1705	SY	\$50.00	\$85,250
			Initial Project Cost	<b>\$825,250</b>
Plantings	1	LS	5% of project	\$41,263
Ancillary Items	1	LS	5% of project	\$41,263
Erosion and Sediment Control	1	LS	10% of project	\$82,525
			Base Construction Cost	<b>\$990,301</b>
			Mobilization (5%)	\$49,515
			<b>Subtotal 1</b>	\$1,039,816
			Contingency (25%)	\$259,954
			<b>Subtotal 2</b>	\$1,299,770
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$584,897
			<b>Estimated Project Cost</b>	<b>\$1,885,000</b>

## AC9311 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Ramblewood
<b>Land Owner:</b>	Private - Residential
<b>Pin:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	33 acres
<b>Receiving Waters</b>	Unknown Tributary of Coon Branch

**Description:** This project is located in a medium density residential area with no stormwater management. Earlier stream assessments showed that the water quality downstream of this subwatershed is impaired. This area-wide improvement would treat the runoff at the source, before it enters the stream. This project involves the installation of tree box filters and rain gardens at storm drain inlets.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration, infiltration, and uptake by vegetation. Nutrients and suspended solids will be reduced within the stream, which will help to improve instream habitat. It is estimated that project implementation will reduce annual pollutant loads by approximately 2,369 lbs of sediment, 33 lbs of nitrogen and six lbs of phosphorus. There will also be some improvement in the peak flow attenuation due increased infiltration.

**Project Design Considerations:** Environmental constraints, if any, will be limited as the disturbance will only be in the immediate vicinity of the projects. Rain gardens may require utility research to ensure there are no conflicts. Some modification of the storm drain system may be required. Projects located on private property need to be coordinated with and approved by the property owner.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	17	EA	\$10,000.00	\$170,000
Rain Garden	295	SY	\$50.00	\$14,750
			Initial Project Cost	<b>\$184,750</b>
Plantings	1	LS	5% of project	\$9,238
Ancillary Items	1	LS	5% of project	\$9,238
Erosion and Sediment Control	1	LS	10% of project	\$18,475
			Base Construction Cost	<b>\$221,701</b>
			Mobilization (5%)	\$11,085
			<b>Subtotal 1</b>	<b>\$232,786</b>
			Contingency (25%)	\$58,197
			<b>Subtotal 2</b>	<b>\$290,983</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$130,942
			<b>Estimated Project Cost</b>	<b>\$422,000</b>

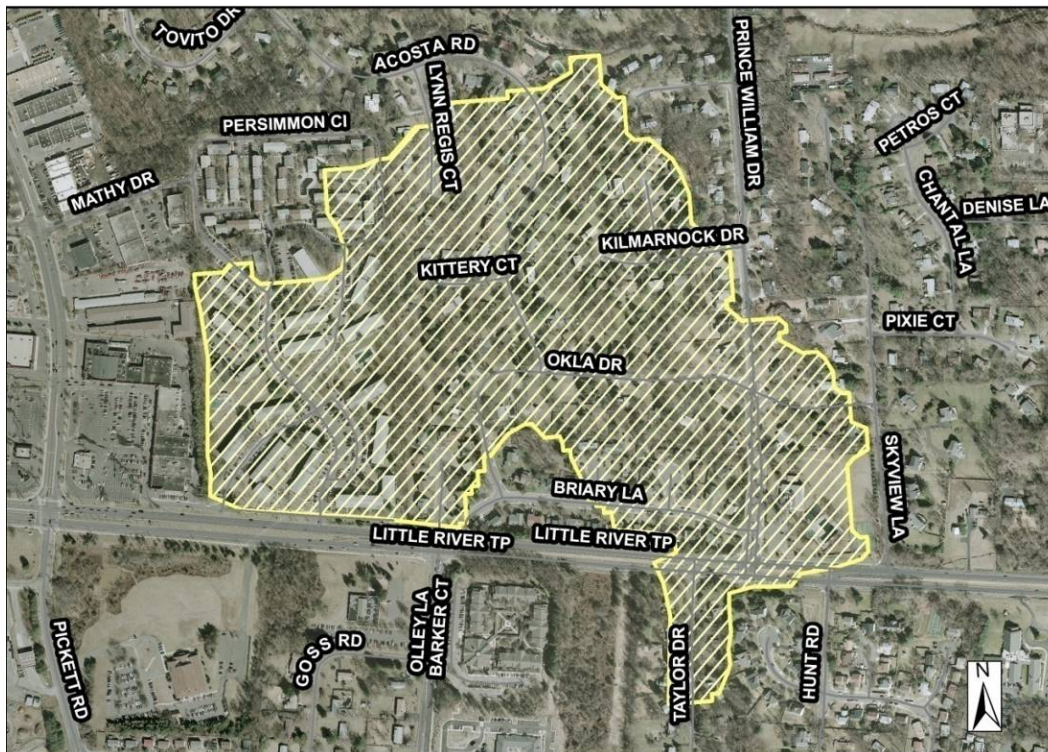


## AC9312 Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Westchester, Briars of Westchester
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	85 acres
<b>Receiving Waters</b>	Unknown tributary of Crook Branch

**Description:** This is a low and medium density residential neighborhood downstream of dry pond 0200DP. This project is located in a headwater subwatershed and would improve the water quality of the runoff after it flows through the dry pond and before it enters the tributary of Crook Branch. Tree box filters will be installed at curb inlets, rain gardens will be installed at yard inlets and vegetated swales will be installed in place of paved ditches.



*Project Area Map*

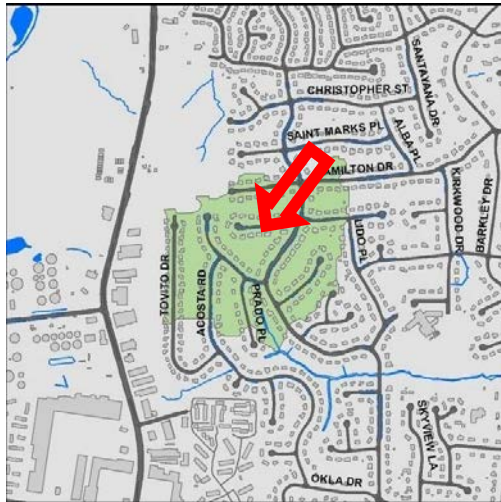
**Project Benefits:** While there may be some improvement in peak flow attenuation due to increased infiltration and removal of the paved ditches, the project is primarily intended to provide water quality treatment of stormwater runoff. Project implementation is expected to reduce annual pollutant loads by 7,497 lbs of sediment, 96 lbs of nitrogen and 18 lbs of phosphorus.

**Project Design Considerations:** There are no environmental constraints as the disturbance will be limited to the area immediately around existing storm drains. Projects located on private property need to be coordinated with property owners.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	48	EA	\$10,000.00	\$480,000
Rain Garden	823	SY	\$50.00	\$41,150
			Initial Project Cost	<b>\$521,150</b>
Plantings	1	LS	5% of project	\$26,058
Ancillary Items	1	LS	5% of project	\$26,058
Erosion and Sediment Control	1	LS	10% of project	\$52,115
			Base Construction Cost	<b>\$625,381</b>
			Mobilization (5%)	\$31,269
			<b>Subtotal 1</b>	\$656,650
			Contingency (25%)	\$164,163
			<b>Subtotal 2</b>	\$820,813
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$369,366
			<b>Estimated Project Cost</b>	<b>\$1,191,000</b>

## AC9313 Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Langhorne Acres
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	80 acres
<b>Receiving Waters</b>	Unknown tributary of Crook Branch

**Description:** The project area is a low and medium density residential neighborhood which was developed with no stormwater management facilities. It is located in a headwater subwatershed, which is an ideal location to implement runoff treatment to improve water quality before it flows to Crook Branch. Proposed treatment systems include tree box filters installed at various street inlets and rain gardens installed at yard inlets.



*Project Area Map*

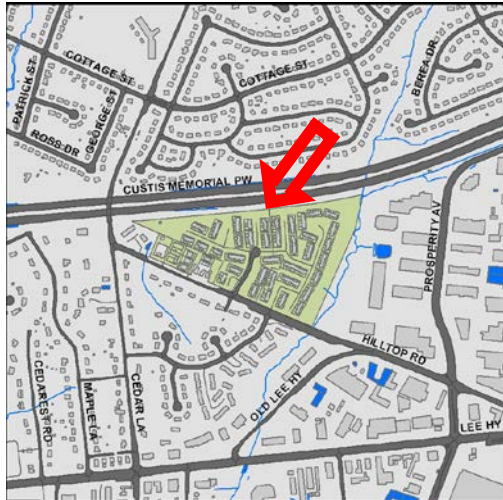
**Project Benefits:** This project will provide water quality treatment of stormwater runoff. It is estimated that project implementation will reduce annual pollutant loads by 6,315 lbs of sediment, 84 lbs of nitrogen and 16 lbs of phosphorus. There will also be a small amount of improvement in peak flow attenuation due to increased infiltration and removal of the paved ditches.

**Project Design Considerations:** There are no environmental constraints anticipated as the disturbance will be limited to immediately around the project. Projects located on private property need to be coordinated with property owners. An easement will be required for projects on private property.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	28	EA	\$10,000.00	\$280,000
Rain Garden	683	SY	\$50.00	\$34,150
			Initial Project Cost	<b>\$314,150</b>
Plantings	1	LS	5% of project	\$15,708
Ancillary Items	1	LS	5% of project	\$15,708
Erosion and Sediment Control	1	LS	10% of project	\$31,415
			Base Construction Cost	<b>\$376,981</b>
			Mobilization (5%)	\$18,849
			<b>Subtotal 1</b>	<b>\$395,830</b>
			Contingency (25%)	\$98,958
			<b>Subtotal 2</b>	<b>\$494,788</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$222,655
			<b>Estimated Project Cost</b>	<b>\$718,000</b>

## AC9314 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Dunn Loring Village
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	28 acres
<b>Receiving Waters</b>	Unknown Tributary of Long Branch

**Description:** The project site is located in a high density residential area south of I-66 with no stormwater management. Stream assessments showed that the water quality downstream of this subwatershed is impaired. This project involves the installation of tree box filters and rain gardens to treat the runoff at the source, before it enters the storm drain system.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through various filtration, infiltration, and uptake by vegetation. It is estimated that project implementation will reduce pollutant loads by approximately 4,802 lbs of sediment, 56 lbs of nitrogen and 11 lbs of phosphorus each year. There may also be some improvement in the peak flow attenuation due to increased infiltration.

**Project Design Considerations:** Environmental constraints are not anticipated as the disturbance will only be in the immediate vicinity of the project. Rain gardens would require utility research to ensure there are no conflicts. Some modification of the storm drain system may be required. Projects located on private property need to be coordinated with property owners.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	19	EA	\$10,000.00	\$190,000
Rain Garden	286	SY	\$50.00	\$14,300
			Initial Project Cost	<b>\$204,300</b>
Plantings	1	LS	5% of project	\$10,215
Ancillary Items	1	LS	5% of project	\$10,215
Erosion and Sediment Control	1	LS	10% of project	\$20,430
			Base Construction Cost	<b>\$245,160</b>
			Mobilization (5%)	\$12,258
			<b>Subtotal 1</b>	<b>\$257,418</b>
			Contingency (25%)	\$64,355
			<b>Subtotal 2</b>	<b>\$321,773</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$144,798
			<b>Estimated Project Cost</b>	<b>\$467,000</b>

## AC9315 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Hideaway Park
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	33 acres
<b>Receiving Waters</b>	Bear Branch

**Description:** The project site lies within a subwatershed which is developed primarily with medium density residential housing with no stormwater management. This project is located south of I-66 and involves the installation of tree box filters and rain gardens at the existing stormwater inlets. The area-wide improvement would treat the runoff as it enters the storm drain system, before it enters the stream.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff through filtration and vegetative uptake. The amount of nutrients and suspended solids will be reduced within the stream, thus improving in-stream habitat. Implementing this project is expected to reduce pollutant loads by approximately 2,368 lbs of sediment, 32 lbs of nitrogen and six lbs of phosphorus annually. There will also be some peak flow reduction due to the increased infiltration.

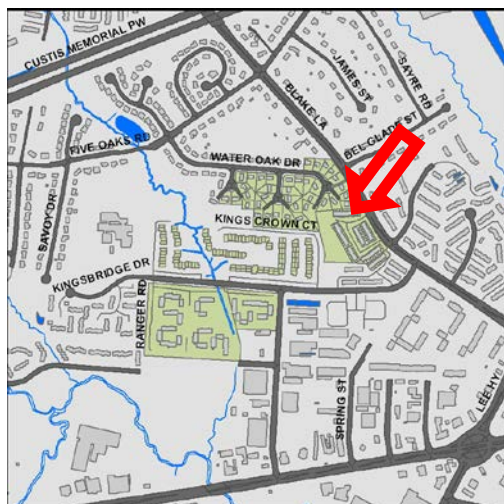
**Project Design Considerations:** No environmental constraints are anticipated as the disturbance will only be in the immediate vicinity of the project. Utility research would be required to ensure there are no conflicts. Some modification of the storm drain system would be required. While most of the improvements should be located inside of right-of-way; however, coordination with private property owners will be needed for work done on privately-owned property.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	11	EA	\$10,000.00	\$110,000
Rain Garden	271	SY	\$50.00	\$13,550
			Initial Project Cost	<b>\$123,550</b>
Plantings	1	LS	5% of project	\$6,178
Ancillary Items	1	LS	5% of project	\$6,178
Erosion and Sediment Control	1	LS	10% of project	\$12,355
			Base Construction Cost	<b>\$148,261</b>
			Mobilization (5%)	\$7,413
			<b>Subtotal 1</b>	\$155,674
			Contingency (25%)	\$38,919
			<b>Subtotal 2</b>	\$194,593
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$87,567
			<b>Estimated Project Cost</b>	<b>\$283,000</b>



## AC9316 – Area-Wide Drainage Improvement



<b>Address:</b>	Various
<b>Location:</b>	Hawthorne Village Apts, Five Oaks Place Cedar Grove Park
<b>Land Owner:</b>	Private - Residential
<b>PIN:</b>	Multiple
<b>Control Type</b>	Water Quality
<b>Drainage Area</b>	49 acres
<b>Receiving Waters</b>	Unknown Tributary of Accotink Creek

**Description:** The project will be implemented in an area which has been developed as a medium and high density residential neighborhood with no stormwater management. This headwater subwatershed is a location where runoff treatment would improve the water quality before it enters Crook Branch instead of downstream of the impairment. The project consists of retrofitting tree box filters at curb and street inlets, and rain gardens adjacent to yard inlets.



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

**Project Benefits:** This project will provide water quality treatment of stormwater runoff. Nutrients, suspended solids, and other harmful pollutants will be removed at the source, and thus within the stream, which will improve in-stream habitat. It is estimated that project implementation will reduce annual pollutant loads by 5,278 lbs of sediment, 62 lbs of nitrogen and 12 lbs of phosphorus. There will also be a small amount of improvement in peak flow attenuation due to increased infiltration.

**Project Design Considerations:** There are no environmental constraints anticipated as the disturbance will be limited to immediately around the project. Projects located on private property need to be coordinated with the property owner.

**Costs:**

ITEM	QUANTITY	UNITS	UNIT COST	TOTAL
Tree Box Filters	42	EA	\$10,000.00	\$420,000
Rain Garden	691	SY	\$50.00	\$34,550
			Initial Project Cost	<b>\$454,550</b>
Plantings	1	LS	5% of project	\$22,728
Ancillary Items	1	LS	5% of project	\$22,728
Erosion and Sediment Control	1	LS	10% of project	\$45,455
			Base Construction Cost	<b>\$545,461</b>
			Mobilization (5%)	\$27,273
			<b>Subtotal 1</b>	<b>\$572,734</b>
			Contingency (25%)	\$143,184
			<b>Subtotal 2</b>	<b>\$715,918</b>
			Engineering Design, Surveys, Land Acquisition, Utility Relocations, and Permits (45%)	\$322,163
			<b>Estimated Project Cost</b>	<b>\$1,039,000</b>