Chapter 5

Scotts Run Watershed

5.1 Watershed Condition

The Scotts Run Watershed has an area of approximately 3,860 acres. It is bounded to the west by Tysons Corner Shopping Center, Spring Hill Road and Canal Drive; to the east by Magarity Road, Balls Hill Road and portions of I-495; to the south by Leesburg Pike; and to the north by the Potomac River. This watershed drains significant commercial and medium-density residential areas located near Tysons Corner—the largest commercial shopping area in the county. The watershed is divided into two subwatersheds: Upper Scotts Run, which includes 1,982 acres, and Lower Scotts Run, which includes 1,353 acres. There are also 525 acres of land that drain directly to the Potomac River that have been included in this watershed for planning purposes. The watershed is shown on Maps 5.1 and 5.2. There are several major tributaries in the watershed including Bradley Branch, which is located in Lower Scotts Run.

The county initiated a Stream Physical Assessment (SPA), described in detail in Section 2.5.10, for all of its watersheds in August 2002 to systematically characterize the existing conditions of stream corridors. This data has provided invaluable details of the conditions of streams as a "snap-shot" in time. However, it is recognized that conditions are changing and in some cases, may have changed significantly since the initial SPA was conducted. Due to the dynamic nature of streams as they adjust to the continual impact of development, it is believed that reassessment of physical conditions will be needed to determine the exact need before the implementation of any recommended projects.

The overall condition of the watershed, as determined during the SPA, is summarized as follows.

Scotts Run Watershed Condition Summary

- **Current imperviousness = 30 percent with the majority being low density residential land use.**
- **Future imperviousness = 33 percent**
- **33 of 34 crossings have “minor to moderate” impacts, one has a “severe to extreme” impact.**
- **There are 52 BMPs in this watershed.**
- **The majority of the habitat quality is fair with inadequate buffers.**
- **Most of the stream is actively widening and the impact of erosion was observed as “minor to moderate” at 12 locations and “moderate to severe” at the other three locations.**
- **One obstruction had “minor to moderate” impact and the other five had**

"moderate to severe" impacts.

- **Two utility locations had "minor to moderate" impacts.**
- **No trash dumps were observed in the SPA.**

5.1.1 Watershed Characteristics

The headwaters of Scotts Run begin at a storm drain system outfall located on the east side of Interstate 495, just southeast of the Tysons Corner Shopping Center. The stream flows in a northerly direction through Scotts Run Stream Valley Park, Westgate Park, Timberly Park, and Scotts Run Nature Preserve until it discharges to the Potomac River. The length of Scotts Run from its headwaters to its confluence with the Potomac River is approximately 4.5 miles.

The Scotts Run Watershed consists of several major unnamed tributaries that contribute significant runoff and drainage area to Scotts Run. The only named tributary of Scotts Run is Bradley Branch, which has a length of approximately 3,750 feet. Numerous smaller tributaries emerge from storm drain outfall pipes and natural springs that convey flows into Scotts Run along its length. We have also included several small perennial streams that drain directly to the Potomac River, to facilitate planning. The terrain in the watershed is moderate with land elevations ranging from 300 to 330 feet in the southern part to elevations of 60 to 80 feet in the northern part.

5.1.2 Existing and Future Land Use

Land use in the watershed is predominantly low intensity commercial and low density residential. Commercial land uses, such as Tysons Corner, are to the southwest, and low-density residential and forested land uses are located in the northern portions of the watershed. The existing and future land uses in the Scotts Run Watershed are described in Table 5.1. It is important to note that the Tysons Corner Urban Center portion of the Comprehensive Plan is undergoing study at this time, and changes to the Plan may be pursued according to the recommendations of this study. Tysons Corner Stormwater Strategy SC9845 is a policy project to address providing additional stormwater management controls due to the redevelopment caused by the expansion of the metrorail in this area. This project is described in further detail in Chapter 9.

Road rights-of-way currently comprise 24 percent of the Scotts Run Watershed area. There are currently 554 acres of open space, parks, and recreational areas in the Scotts Run Watershed, which account for approximately 14 percent of the existing land use. The parks and recreational areas in the Scotts Run Watershed include McLean Hamlet Park, Scotts Run Stream Valley Park, Westgate Park, Timberly Park, and Scotts Run Nature Preserve. There are 165 acres that are currently vacant or undeveloped and 445 acres that are currently underutilized. Undeveloped and underutilized parcels comprise 12 percent of the watershed area. The U.S. Fish and Wildlife Service National Wetlands Inventory shows that there are 1.77 acres of wetlands in this watershed.

Table 5.1 Scotts Run Watershed Land Use

Land Use Description[1]	Land Use			
	Existing		Future	
	Area (Acres)	%	Area (Acres)	%
Upper Scotts Run[2]				
Open space, parks, and recreational areas	58	3%	67	3%
Estate residential	19	1%	2	0%
Low-density residential	33	2%	20	1%
Medium-density residential	266	13%	292	15%
High-density residential	254	13%	266	14%
Low-intensity commercial	481	24%	281	14%
High-intensity commercial	161	8%	375	19%
Industrial	8	1%	60	3%
Other	0	0%	0	0%
Unknown	0	0%	0	0%
Vacant/Undeveloped	83	4%	0	0%
Road right-of-way (including shoulder areas)	619	31%	619	31%
TOTAL	1,982	100%	1,982	100%
Lower Scotts Run				
Open space, parks, and recreational areas	255	19%	266	20%
Estate residential	172	13%	37	2%
Low-density residential	534	39%	677	50%
Medium-density residential	128	9%	174	13%
High-density residential	0	0%	0	0%
Low-intensity commercial	12	1%	12	1%
High-intensity commercial	0	0%	0	0%
Industrial	3	0%	3	0%
Other	0	0%	0	0%
Unknown	0	0%	0	0%
Vacant/Undeveloped	65	5%	0	0%
Road right-of-way (including shoulder areas)	184	14%	184	14%
TOTAL	1,353	100%	1,353	100%
Potomac Tributaries				
Open space, parks, and recreational areas	241	46%	243	46%
Estate residential	13	3%	0	0%
Low-density residential	132	25%	162	31%
Medium-density residential	5	1%	5	1%
High-density residential	0	0%	0	0%
Low-intensity commercial	6	1%	4	1%
High-intensity commercial	0	0%	0	0%
Industrial	0	0%	0	0%
Other	0	0%	0	0%
Unknown	0	0%	0	0%
Vacant/Undeveloped	17	3%	0	0%

Land Use Description[1]	Land Use			
	Existing		Future	
	Area (Acres)	%	Area (Acres)	%
Road right-of-way (including shoulder areas)	111	21%	111	21%
TOTAL	525	100%	525	100%
TOTAL Scotts Run	**3,860**	**100%**	**3,860**	**100%**

[1]The land use categories presented here are for watershed planning purposes only and are used to determine the impervious cover in the area.

[2] The Tysons Corner Urban Center portion of the Comprehensive Plan is undergoing study at this time, and there is a potential for mixed use and/or a variety of land use options in this area. The future land use presented here is representative of the impervious cover in the area and is for watershed planning purposes only.

The current impervious area in this watershed is 30 percent of the total area. In the future, under ultimate build out conditions in Lower Scotts Run, estate residential land use may be replaced by low-density residential development. For future build out conditions in Upper Scotts Run, the low intensity commercial land use may be replaced with high intensity commercial land use. Also, the future imperviousness may increase to 33 percent. The proposed land use for the vacant and underutilized parcels is low density residential in Lower Scotts Run and low intensity commercial for Upper Scotts Run. In addition to the predicted changes in land use, mansionization will increase the impervious area in the watershed by 11.5 acres.

Impervious area measures the amount of hard surfaces such as roofs, roadways and sidewalks which impede rainwater from percolating into the ground. Increases in impervious area allow runoff to flow directly into the streams in larger quantities, often causing downstream flooding and stream deterioration, including instream erosion. When watershed imperviousness reaches ten percent, stream quality begins to decline with poor water quality, alteration of the stream channel, and degraded plant and animal habitat becoming apparent.

The Fairfax County Comprehensive Plan for land use in the Scotts Run Watershed includes the installation of mass transit rail. The mass transit rail is a planned 23+ mile extension, which will originate from the Washington Metropolitan Area Transit Authority Orange Line between the East and West Falls Church Metro stations and will pass through the Tysons Corner area to Dulles Airport and into Loudoun County. The rail line will be located in the Upper Scotts Run Subwatershed along the Dulles Toll Road and Chain Bridge Road. Along Chain Bridge Road in the Upper Scotts Run Subwatershed, there are two proposed Metro stations, Tysons East and Tysons Central 123. They will be located near the intersection of Chain Bridge Road and Tysons Boulevard and near the intersection of Chain Bridge Road and Colshire Drive. Other future transportation improvements include widening roadways, improving interchanges, and installing new trails. The improvements are described in more detail below.

The roadway and interchange improvements planned for the Scotts Run Watersheds include:

- Widening the Capital Beltway (I-495) to at least ten lanes, including an HOV facility providing peak period service from both directions to the Tysons Corner area.
- Widening the Dulles Toll Road to eight lanes, including an HOV facility providing peak period service from the west to the Tysons Corner area.
- Widening Leesburg Pike (Route 7) to six lanes from Towlston Road to the Dulles Toll Road.
- Widening Leesburg Pike (Route 7) to eight lanes between the Dulles Toll Road and the Capital Beltway and providing other access improvements in conjunction with the Leesburg Pike design plans.
- Widening Leesburg Pike (Route 7) to six lanes between the Capital Beltway (I-495) and I-66.
- Widening Chain Bridge Road (Route 123) to six lanes from Old Courthouse Road to Route 7.
- Widening Chain Bridge Road (Route 123) to eight lanes between Route 7 and the Capital Beltway.
- Widening Chain Bridge Road/Dolley Madison Boulevard to six lanes from the Capital Beltway to the Dulles Toll Road.
- Widening Gallows Road to six lanes from Old Gallows Road to at least Idylwood Road.
- Widening Spring Hill Road to four lanes between Route 7 and International Drive.
- Widening International Drive to six lanes between Route 7 and Route 123.
- Widening Magarity Road to four lanes between Lisle/Route 7 and Great Falls Street.
- Improving Swinks Mill Road between Lewinsville Road and Old Dominion Drive.
- Improving Old Courthouse Road to a standard two-lane section west of Gosnell Road.
- Improving Route 7 interchanges at Westpark Drive/Gosnell Road, Route 7/Gallows Road/International Drive, Route 7/Route 123 interchange, and Route 7/Dulles Toll Road interchange
- Improving Capital Beltway (I-495) interchanges at Dulles Toll Road, Route 123, Route 7, Georgetown Pike, and the George Washington Memorial Parkway.
- Improving Route 123 interchanges at the Dulles Toll Road and International Drive.

The planned trails for the Scotts Run Watershed include:

- The Potomac Heritage National Scenic Trail with a six-foot- to eight-foot-wide natural surface or stone dust trail along the end of the George Washington Memorial Parkway, I-495, and Georgetown Pike.
- A stream valley trail with a six-foot- to eight-foot-wide natural surface or stone dust trail along the Potomac River and Scotts Run.
- A major eight-foot-wide asphalt or concrete trail along a small portion of Georgetown Pike, Chain Bridge Road, Old Dominion Drive, Swinks Mill Road, International Drive, Magarity Road, Route 7, Anderson Road, and Lewinsville Road.
- A new bike lane along Old Dominion Drive, Jones Branch Drive, and Westpark Drive.
- A minor four- to eight-foot-wide asphalt or concrete trail through Westgate Park.

5.1.3 Existing Stormwater Management

The highly commercialized area of Westgate, located east of Interstate 495, is drained through an extensive network of storm drainpipe systems, which have their outfall on the

west side of Interstate 495 creating the headwaters of Scotts Run. Numerous large storm drain systems convey runoff from the highly developed areas of Upper Scotts Run to the main stem of the stream. Runoff in Lower Scotts Run is conveyed by means of minor storm drain systems, which collect runoff from local street networks. These storm drain systems outfall to ditches and minor tributaries that eventually discharge into Scotts Run. The outfalls in this watershed vary in size, ranging from an 18-inch diameter pipe to a ten- by 25-foot box culvert. Most segments of the outfall channels have been altered with concrete lining or with riprap bed and bank protection. The stream is experiencing "minor to moderate" erosion due to discharges from the pipes. The locations of all pipe impacts are shown on Maps 5.1 and 5.2.

Erosional impacts were also assessed for all roads, footbridges, and driveways that crossed the stream reaches evaluated in the SPA. Maps 5.1 and 5.2 show the location of the crossings and their erosional impacts on the streams. Thirty-three of the 34 crossings evaluated in the SPA had a "minor to moderate" impact and the other crossing had a "severe to extreme" impact on the stream as described below:

- Unnamed crossing: A private culvert crossing of unknown size between the Dulles Toll Road and Old Springhouse Road has a "severe to extreme" impact on an unnamed tributary to Scotts Run due to debris and sediment at the upstream and downstream sides of the structure.

The county's list of master plan drainage projects shows that there are ten identified projects in this watershed. Table 5.2 summarizes the type of master plan drainage project, project name/location, cost, and also shows the current project status. Cost information was not available for the project with N/A in the cost column.

Table 5.2 Scotts Run Watershed Master Plan Drainage Projects

Type of Work	Project Name/Location	Old Project Number	Cost	Status
Flood protection	Timberly Lane	E00015	$85,243	Keep as CIP project.
Stream restoration and stabilization	Potomac River Road	SC201	$320,124	Keep as CIP project.
Stream stabilization	Bridle Path Lane	SC213	$450,947	Incorporated into SC9219.
Stream restoration and stabilization	Sconset Lane/Saigon	SC215	$359,791	Incorporated into SC9206.
Stream restoration and stabilization	Colshire Drive	SC232	$414,637	Keep as CIP project.
Stream bank stabilization	The Colonies (near Provincial Drive)	SC234	$349,000	Keep as CIP project.
Floodwall	919 Swinks Mill Road	SC612	$212,731	Incorporated into SC9672.
Floodwall	935 Swinks Mill Road	SC613	$184,920	Incorporated into SC9672.
Flood protection	Box Elder Court	SC614	$85,086	Incorporated into SC9475.
Lower channel invert	Swinks Mill Road (near Georgetown Court)	N/A	$216,839	Incorporated into SC9204.

The county's Maintenance and Stormwater Management Division (MSMD) tracks storm drainage problems as reported by county residents. According to the MSMD data, 22 drainage complaints regarding flooding and erosion were registered with the county. The locations of these complaints are shown on Maps 5.1 and 5.2. Projects were not added for all MSMD complaints; only for the serious complaints where a project was warranted.

According to the county's MSMD BMP inspection database, there are 39 private and 13 public stormwater management facilities located in the watershed. The majority of private facilities are located in the southern part of the watershed in Upper Scotts Run. Public facilities are located throughout the watershed. The drainage area served by stormwater management facilities in this watershed is 743 acres out of the total area of 3,860 acres, or 19% of the watershed. The types of facilities listed in the MSMD database are described in Table 5.3. The facilities in the table are shown on Maps 5.1 and 5.2 along with some additional stormwater management facilities that are in the county's Stormnet GIS database. The Stormnet database does not have as much detailed information as the MSMD database, so the type of facility could not be determined for these additional sites.

Table 5.3 Scotts Run Watershed Stormwater Management Facilities

Type of Facility	Number of Facilities	
	Privately owned	Publicly owned
Bioretention	2	-
Dry pond	9	13
Manufactured BMP	-	-
Parking lot	-	-
Roof top detention	8	-
Sand filter	5	-
Infiltration Trench	1	-
Underground	9	-
Wet pond	5	-
Total	**39**	**13**

Note: The source of data for this table was the MSMD database.

5.1.4 Stream Geomorphology

The majority of the soil types in the watershed exhibit characteristics of hydrologic soil group B. The hydrologic soil group classifications of A, B, C, and D describe the soil's runoff potential and are based on the characteristics of soil texture, permeability, and infiltration rate. Hydrologic soil group B soils are classified as having moderate infiltration rates and tend to soak up more water and have less runoff than many of the other soil groups.

The geomorphology of the stream segments of Upper Scotts Run and its tributaries can be summarized as shown below. More information about the Channel Evolution Model (CEM) used to classify the watersheds is in Section 2.5.10 of Chapter 2.

- The dominant substrate in the majority of stream segments is gravel; however, some of the reaches have a combination of cobbles and gravel.

- The majority of reaches are of CEM type 3, referring to nearly vertical stream bank slopes, active widening and accelerated bend migration.

The geomorphology of the stream segments of Lower Scotts Run and its tributaries can be summarized as follows:

- The dominant substrate along 1.5 miles of the downstream reaches to the Potomac River is cobble; however, the rest of Lower Scotts Run consists of a combination of sand and gravel.
- The majority of reaches are of CEM type 3, referring to nearly vertical stream bank slopes, active widening and accelerated bend migration.

Maps 5.3 and 5.4 show the stream segment CEM type in the watershed. Fallen trees and debris obstructing the flow were observed at several locations along Scotts Run. The impact of this debris on the stream is minor, except for one location where it is moderate. No dumpsites were identified during the SPA. Properties with on-site sewage systems are also shown on the maps, but this information is based on the best available data only and may not be completely accurate.

5.1.5 Stream Habitat and Water Quality

The Virginia Department of Environmental Quality (DEQ) does not have any monitoring stations located on Scotts Run. There is one volunteer water quality monitoring site located on Scotts Run which is coordinated by the Northern Virginia Soil and Water Conservation District. The data collected from this site generally support the findings of the Fairfax County Stream Protection Strategy Baseline Study and indicates significant biological impairment at the site.

The Virginia DEQ's 2004 305(b)/303(d) Water Quality Assessment Integrated Report lists Scotts Run as a Water of Concern for benthics, while citizen monitoring stations revealed a medium probability of adverse conditions for biota. The Fairfax County Health Department monitored stream water quality at one sampling site in the Scotts Run Watershed, Site 07-01, located at Georgetown Pike. In 2002, water samples were collected from this site and evaluated for fecal coliform, dissolved oxygen, nitrate nitrogen, pH, phosphorous, temperature, and heavy metals. These parameters indicate the amount of non-point source pollution contributed from manmade sources and help to evaluate the quality of the aquatic environment. For 2002, 47 percent of the samples had fecal coliform counts greater than 400/100 ml. The maximum fecal coliform count of all the samples was 2100/100ml. Approximately 363 acres of Scotts Run Watershed, or nine percent, are served by on-site sewage disposal systems. The areas served by on-site systems are located mostly in Lower Scotts Run in the River Oaks, Potomac Overlook, Swinks Mill, Saigon, Timberly, and McLean Knolls Neighborhoods.

The *Fairfax County Stream Protection Strategy (SPS) Baseline Study* from January 2001 evaluated the quality of streams throughout the county. Scotts Run received a "very poor" composite site condition rating. The ratings were based on environmental parameters such as an index of biotic integrity, stream physical assessment, habitat assessment, fish taxa richness, and percent imperviousness. In the *SPS Baseline Study*, Scotts Run was classified

as a Watershed Restoration Level II area with the goals of maintaining areas to prevent further degradation and implementing measures to improve water quality and comply with Chesapeake Bay initiatives, TMDL regulations, and other water quality initiatives and standards.

The stream reaches of Upper and Lower Scotts Run have high gradient slopes and are classified as the riffle/run prevalent stream type. A riffle/run is an area in a stream where the water flow is rapid and usually shallower than the reaches above and below.

The habitat assessment for Upper Scotts Run and its tributaries, as determined from the *Fairfax County Stream Physical Assessment (SPA)*, can be summarized as follows:

- In less than 50 percent of the stream reaches, four of the possible habitat types such as fallen trees, large woody debris, deep pools, large rocks, undercut banks, thick root mats, and dense macrophyte beds were common.
- The dominant substrate in stream reaches is a mixture of bedrock, gravel stones or stable woody debris.
- Sediment deposition is mainly fine sediment and silt with 40 to 50 percent of the stream bottom affected. However, 70 to 80 percent of the stream bottom is affected in two segments of tributaries to Scotts Run.
- Forty to 70 percent of the stream segments have alteration of the channel or banks. A major tributary located close to the Dulles Airport Access Road has high channel disturbance with signs of dredging and artificial embankments.
- For most of Upper Scotts Run, the water fills approximately 85 percent of the available channel cross section during normal flow periods. This amount of water filling the channel allows for adequate aquatic habitat.
- A majority of the channel banks are highly unstable with approximately 80 percent of the banks covered by thin vegetated cover with a few barren areas present.
- Flows were observed in the stream channel for the majority of Upper Scotts Run and no head cuts were observed. The stream segments along the Upper Scotts Run main stem are good candidates for stream restoration projects because each individual project would have adequate stream length, would not involve easement acquisition, and would have good access for construction.
- The majority of the stream buffer is inadequate and consists mainly of lawn grass with a width of 25 to 50 feet. Fifteen to 30 percent of the banks have erosional areas. The locations of deficient buffer areas along the stream corridor are shown on Map 5.3.

The habitat assessment for Lower Scotts Run and its tributaries can be summarized as follows:

- In most of the downstream reaches, six of the possible in-stream habitat types such as fallen trees, large woody debris, deep pools, large rocks, undercut banks, thick root mats, and dense macrophyte beds were common. However, in half of the upstream reaches of Lower Scotts Run, only four habitat types were common.
- Half of the major tributary reaches of Lower Scotts Run exhibited four common habitat types. Having less than four common habitat types signifies that the stream's habitat structures are becoming monotonous, thus decreasing the diversity of macroinvertebrates.

- The dominant substrate in the downstream reaches is cobblestones.
- Sediment deposition is mainly fine sediment and silt with ten percent of the stream bottom affected in the downstream segments and 30 to 40 percent of the stream bottom affected in the upstream segments of Lower Scotts Run.
- No alteration of the channel or banks was evident in the downstream segments. Approximately 70 percent of the streams exhibited channel disturbance in the upstream segments.
- For most of the upstream segments of Lower Scotts Run, the water fills approximately 80 percent of the available channel cross section during normal flow periods. This amount of water filling the channel allows for adequate aquatic habitat. However, the downstream channel segments were only 60 to 65 percent full.
- A majority of the channel banks in the upstream portion of Lower Scotts Run are unstable with approximately 70 percent of the banks covered by thin vegetated cover and scattered grasses, non-grass plants, and shrubs. About 90 percent of the banks in the downstream reaches are covered with a variety of vegetation.
- Flows were observed in the stream channel for the majority of Lower Scotts Run and no head cuts were observed.
- The majority of the stream buffer is inadequate and consists mainly of lawn grass with a width of 50 to 100 feet. The locations of deficient buffer areas along the stream corridor are shown on Map 5.4. On average, 40 to 50 percent of the banks have erosion areas.

5.1.6 Problem Locations Identified During Public Forums

Problem locations were provided by the public at the Community Watershed Forum held on April 16, 2005, the Draft Plan Workshop on November 1, 2005, and by the Middle Potomac Watersheds Steering Committee. The problem locations were investigated and the observations are included in the following table. Maps 5.1 and 5.2 show the locations of the problem areas.

Table 5.4 Problem Locations Identified During Public Forums

Map ID	Description
Upper Scotts Run	
SC1	Location: Tysons Corner Problem: Impervious cover Observation: Increased runoff from development has caused impacts to Scotts Run. This issue is addressed by the Tysons Corner Stormwater Strategy Project SC9845, which is described in Chapter 9.
SC1	Location: Tysons Corner Problem: In the Tysons Corner redevelopment area, the county should ask developers on land that contains Resource Protection Areas (RPAs) to dedicate conservation easements and require green roofs. Observation: The RPA in Tysons Corner totals approximately 16 acres. Project SC9845 recommends LID measures be required for any rezoned parcel in Tysons Corner. There are three parcels with RPAs that have substantial development potential as described in the Tysons Corner Urban Center Study. The other parcels with RPA are described as open space or as stable.

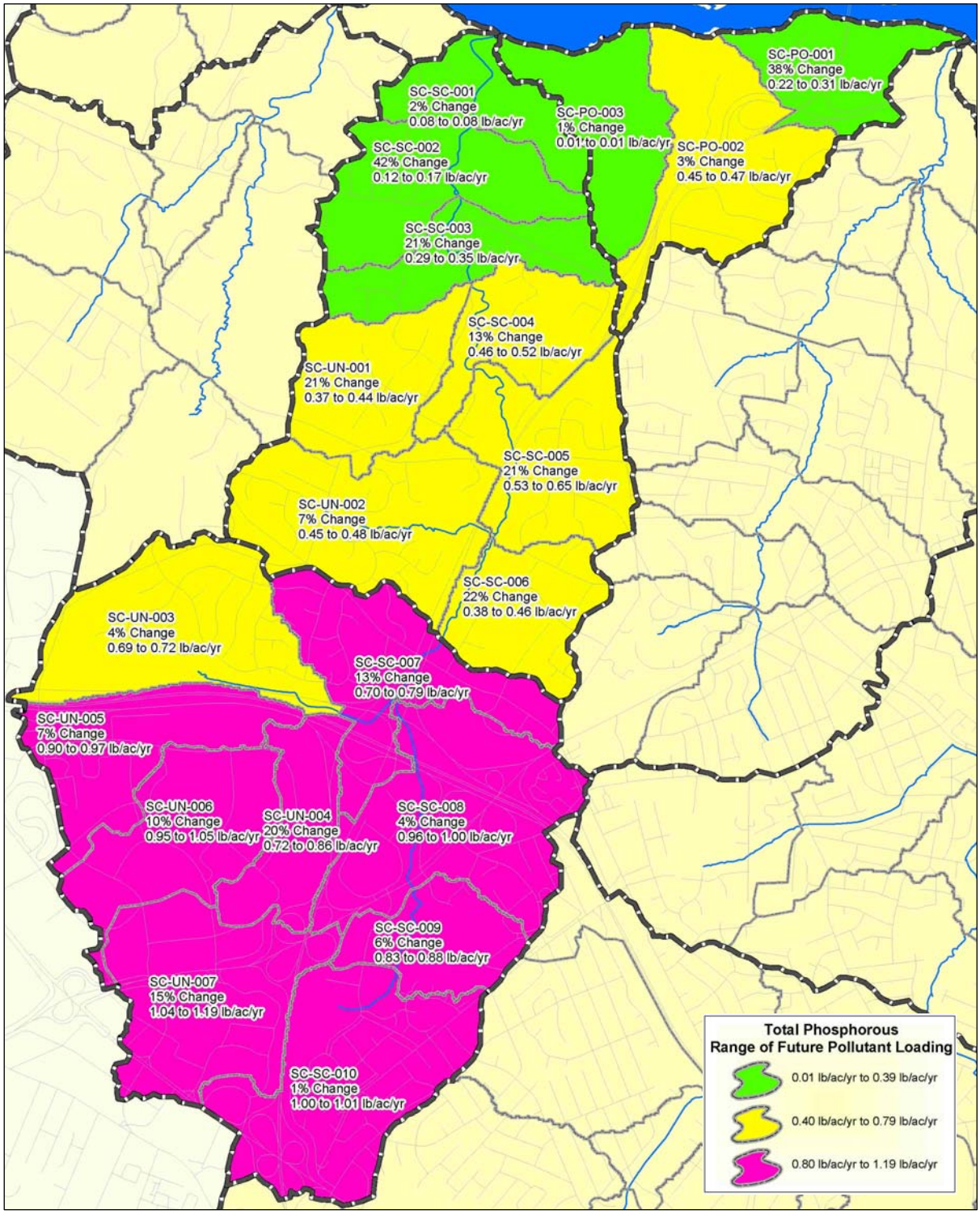
Map ID	Description
SC2	Location: Magarity Road at Dolly Madison Apartments Problem: Residents change oil in parking lot and contribute other sources of non-point source pollution. Observation: It is estimated that less than 15 percent of do-it-yourself oil changers properly dispose of their oil. The remaining majority dump the oil into sewers, on the ground, and into the trash. One quart of improperly disposed oil can ruin two million gallons of freshwater. This issue will be addressed by Public Education Project SC9976.
None – watershed wide	Location: Watershed-wide Observation: Provide incentives for homeowners to connect to the municipal sanitary sewer system by providing matching funds from the county. This issue will be addressed by Fecal Coliform Source Study SC9781.
None – watershed wide	Location: Watershed-wide Observation: Provide all homeowner's associations/neighborhoods/PTA's with stencil and spray paint for identifying storm drain inlets draining into Chesapeake Bay/Potomac River/other watershed designation. This will be addressed by Community Outreach Project SC9977.
SC12	Location: Along Dolley Madison Boulevard inside the Capital Beltway near the Mitre parking lot Problem: There is potential for building larger stormwater detention ponds serving to reduce flows. Observation: BMP Retrofit Project SC9156 is at this location, but the pond will not be made bigger. Vacant land in this area is in the RPA, so it should not be used for new BMPs.
Lower Scotts Run	
SC3	Location: Scotts Run at Scotts Run Road Problem: Frequent floods at this location have dumped large amounts of debris and sediment on the floodplains. Several in the group felt that this location is important to recognize, because it reflects the impacts of development at Tysons Corner in the headwaters of Scotts Run. Participants also noted that Woolpert's map indicates poor habitat quality at this location. Observation: The county's stream physical assessment shows the stream is actively widening. We observed large sediment deposits in the stream. This issue will be addressed by Stream Restoration Project SC9220.
SC4	Location: 864 Sconsett Lane and the Saigon Road area in Lower Scotts Run. Problem: Resident would like to do some stormwater remediation and will pay for it if he needs to, but he needs to get the okay from the county. There is severe erosion occurring at an unnamed tributary to Scotts Run at this location. Banks are eroding, trees are falling, and stream banks are being eroded from under the trees. The volume and speed of the water after a rain event is overwhelming. Homeowners would like to know how they could keep the erosion from increasing. The maintenance for the gas, electric, and sewer easements is also a problem in this location. When the utility companies clear the vegetation from the floodplain and leave debris in the channel, the problems are exacerbated. Observation: The increased runoff from existing development is causing the streams to degrade. The county's stream physical assessment shows that the stream is actively widening, has no buffer vegetation, and has severe erosion at one location along the stream. This issue will be addressed by Stream Restoration Project SC9206.
SC5	Location: Fair weather stream crossings of Scotts Run in Scotts Run Nature Preserve Problem: Recently, a sewer easement went in near the main parking lot and a lot of big rip rap was added to the stream. A big flood came along and moved some of the rip rap so that it was caught between two of the 'stepping stones.' Obviously the level of erosion associated with one rock may be somewhat minimal, but at one of the crossings, there are rip rap and 'stepping stones' across 30 percent of the stream. Observation: There was minimal riprap at the crossing at the time of the investigation. However, Stream Restoration Project SC9204 will address moving rip rap as necessary to minimize erosion.
SC6	Location: Scotts Run Road Problem: The floodplain appears to cross Scotts Run Road based on observations over the past 5 years. Observation: Neither Woolpert's floodplain or the county's floodplain for the 100 year storm event show it crossing Scotts Run Road. No further action is required.

Map ID	Description
SC6	Location: End of Box Elder Court Problem: The massive spring complex, with associated wetlands, feeds a perennial stream that was not discovered during mapping projects. The streams have been redirected and filled. Three houses on north side of Box Elder Court and one house at Windy Hill Courts consistently experience wet basements and flooding due to the insufficient piping system. Observation: Woolpert investigated this site and it appears that a stream was replaced with a pipe system. Infrastructure Improvement Project SC9475 will address the flooding problems in this area.
SC7	Location: Along Dulany Drive, between Selwyn Drive and Balls Hill Road Problem: There is an unstudied minor floodplain that has not been mapped. There is a perennial stream there that has not been included in the buffering plan and also has potential wetlands. Observation: The county performed a field investigation to verify the RPA limit that ends to the east of Coan Street, downstream of Selwyn Drive. No further action is required.
SC8	Location: Dulany Drive Problem: This area was identified as a good location for connecting to the municipal sanitary sewer system. Observation: This will be addressed by Fecal Coliform Source Study SC9781.
SC9	Location: At the end of Westerly Lane Problem: Develop a wildlife corridor that connects Scotts Run Nature Preserve on the Potomac River, through Timberly Park, and along Scotts Run main stem to Lewinsville Road. There is an opportunity to capitalize on existing conservation easements. Observation: The county's Comprehensive Plan depicts this stream corridor as a public park from the Scotts Run Nature Preserve south to the Capital Beltway and private open space from Lewinsville Road north for approximately 3,000 feet towards Old Dominion Drive. There is a section of the stream not shown as a public park on the Comprehensive Plan map because it is located in the Capital Beltway right of way owned by the Virginia Department of Transportation (VDOT). Policy Action B3.7 will address this issue.
SC10	Location: Swinks Mill Road Problem: Flooding occurs at Swinks Mill Road near Georgetown Pike and it is likely due to impervious surface in the Upper Scotts Run Watershed. Observation: Many projects in the headwaters of Scotts Run will help address this problem by reducing the amount of runoff produced in Upper Scotts Run.
SC11	Location: Scotts Run adjacent the Capital Beltway Problem: Projects SC9206 and SC9220 should be high priority areas for stream restoration. With the proposed Capital Beltway expansion, there will be a loss of floodplain and increased need to restore the stream. Observation: Although stream restoration is important, stream restoration projects should be implemented after upstream projects have been completed which will help to reduce both the velocity and the amount of water coming downstream. Waiting to implement the stream restoration will ensure that the work is most effective and does not have to be redone after a short period of time.

5.1.7 Modeling Results

Hydrologic, hydraulic, and water quality models were developed for the Scotts Run Watershed to simulate the generation of runoff, how the runoff is transported downstream, and the amount of pollutants in the runoff and stream flow. The hydrologic and water quality models include the entire Scotts Run Watershed, which consists of the area draining to Scotts Run and a smaller area draining directly to the Potomac River. Twenty subbasins were created for the model in order to provide more detail for the modeling results. The subbasins with the future total phosphorus loading are shown in Figure 5.1.

Figure 5.1 Scotts Run Future Total Phosphorous Loading



5.1.7.1 Hydrology and Water Quality Modeling

In the hydrologic model, the current watershed imperviousness is 30 percent, which generates moderate to high peak runoff flows. Additional residential imperviousness caused by adding on to existing houses was added to the future land use conditions for the hydrologic model. The predicted increase in runoff volumes for future development conditions may be attributed to the change from estate residential land use to low density residential land use in the Lower Scotts Run Subwatershed and the change from low intensity commercial land use to high intensity commercial land use in the Upper Scotts Run Subwatershed. The projected future development of vacant parcels also contributes to the increase in runoff volumes. Table 5.5 shows the cumulative peak runoff flows and the comparison between the runoff volumes for the existing and future land use conditions for the two and ten-year rainfall events.

Table 5.5 Scotts Run Peak Cumulative Runoff Flows

	Two-Year Rainfall Event			Ten-Year Rainfall Event		
Subbasin	Existing Peak Flow (cfs)	Future Peak Flow (cfs)	% Peak Flow Increase	Existing Peak Flow (cfs)	Future Peak Flow (cfs)	% Peak Flow Increase
SC-PO-001	74	79	7%	153	162	6%
SC-PO-002	175	178	2%	328	333	2%
SC-PO-003	6	6	0%	79	78	-1%
SC-SC-001	1,590	1,640	3%	3,240	3,340	3%
SC-SC-002	1,600	1,660	4%	3,220	3,320	3%
SC-SC-003	1,590	1,660	4%	3,190	3,290	3%
SC-SC-004	1,600	1,660	4%	3,140	3,240	3%
SC-SC-005	1,600	1,660	4%	3,040	3,140	3%
SC-SC-006	1,680	1,730	3%	3,180	3,270	3%
SC-SC-007	1,700	1,750	3%	3,100	3,180	3%
SC-SC-008	1,640	1,690	3%	3,020	3,110	3%
SC-SC-009	950	962	1%	1,780	1,790	1%
SC-SC-010	386	389	1%	725	732	1%
SC-UN-001	83	84	1%	152	154	1%
SC-UN-002	167	169	1%	314	318	1%
SC-UN-003	226	235	4%	418	435	4%
SC-UN-004	654	690	6%	1,180	1,230	4%
SC-UN-005	375	393	5%	642	674	5%
SC-UN-006	195	195	0%	326	326	0%
SC-UN-007	448	452	1%	826	832	1%

In the water quality model, the moderate levels of pollutants for both existing and future land use conditions can be attributed to the high intensity commercial areas such as the Tysons Corner area in the Upper Scotts Run and low-density residential areas in the Lower Scotts Run watershed. Some of the subbasins have a slight decrease in the annual pollutant load for a few of the metals from the existing to future land use conditions. This decrease

can be attributed to the lower pollutant loading factors for the proposed future land use. Table 5.6 shows the comparison of the existing and future pollutant loading rates for the Scotts Run Watershed.

5.1.7.2 Hydraulic Modeling

The hydraulic model includes the portion of Scotts Run from the confluence of its main stem with its southwestern tributary to its confluence with the Potomac River. The hydraulic model results show that the peak discharge from the two-year rainfall event is contained within the main channel banks for the majority of the modeled length of Scotts Run. The model results showed overtopping for all storm events at a driveway box culvert near Swinks Mill Road. The model results also showed overtopping at a small bridge at Swinks Mill Road for the ten- and 100-year storm events. The peak discharge from the ten-year rainfall event is generally contained within the main channel banks with a few areas of minor overtopping where there are adjacent and connected floodplains. Scotts Run Watershed has been heavily developed over the years, resulting in higher imperviousness. Hence, the upcoming changes due to redevelopment in this watershed will not significantly affect the future overall imperviousness of the watershed but instead, presents an opportunity to improve existing stormwater controls. Due to this, the future conditions hydraulic modeling results are consistent with the existing conditions results.

The majority of the 100-year event is contained within the current main channel banks as the main channel has become more incised in response to increased runoff from greater imperviousness as a result of development in the watershed. However, the floodplains are utilized where they are connected to the stream channel. These results are consistent with the SPA findings which document that Scotts Run is widening to accommodate existing flows. This can be seen along the southwest tributary of Scotts Run and downstream of its junction with the main stem. Five properties had buildings located in the 100-year floodplain and these properties are described in the Flood Protection Project described in Section 5.2.6.

The velocities produced by the hydraulic model for the two-year rainfall event in the Scotts Run Watershed average approximately 7.9 ft/sec. The average velocity at the southwest tributary is 6.3 ft/sec while the upper portions of the main stem have an average velocity of 7.1 ft/sec. The average velocity throughout the main channel is causing erosion and changes in the stream channel geometry. The model indicates higher and much more erosive velocities of approximately 10.0 ft/sec immediately upstream and downstream of the I-495 bridge crossing.

According to the county's SPA from 2001, over 1,300 linear feet of erosion along the stream banks was observed in the bends and meanders in the headwaters of Scotts Run. The SPA characterized Scotts Run as CEM Type 3, which means it is actively widening. These observations and characterization are further supported by the results of the stream's hydraulic model. Please note that conditions in the stream may have worsened since the SPA was conducted due to new development in the watershed.

Table 5.6 Scotts Run Pollutant Loads

Pollutants		Upper Scotts Run Subbasins									Lower Scotts Run Subbasins								Potomac Tributary Subbasins		
		SC-SC-007	SC-SC-008	SC-SC-009	SC-SC-010	SC-UN-003	SC-UN-004	SC-UN-005	SC-UN-006	SC-UN-007	SC-SC-001	SC-SC-002	SC-SC-003	SC-SC-004	SC-SC-005	SC-SC-006	SC-UN-001	SC-UN-002	SC-PO-001	SC-PO-002	SC-PO-003
	Existing (lb/ac/yr)	46	74	45	68	30	53	68	57	84	2	3	8	12	15	11	11	16	7	13	1
	Future (lb/ac/yr)	55	83	58	71	31	76	73	80	107	3	5	10	15	23	15	12	17	9	13	1
BOD5	% Load Increase	20%	12%	29%	4%	3%	43%	7%	40%	27%	50%	67%	25%	25%	53%	36%	9%	6%	29%	0%	0%
	Existing (lb/ac/yr)	204	380	281	398	170	266	367	337	352	17	23	47	67	86	65	66	94	45	77	5
	Future (lb/ac/yr)	240	398	313	416	180	327	401	419	418	17	29	58	80	129	84	70	100	54	78	5
COD	% Load Increase	18%	5%	11%	5%	6%	23%	9%	24%	19%	0%	26%	23%	19%	50%	29%	6%	6%	20%	1%	0%
	Existing (lb/ac/yr)	151	256	229	229	107	213	239	256	330	10	13	25	38	51	39	30	51	26	46	3
	Future (lb/ac/yr)	162	262	253	230	111	258	248	296	374	10	16	31	45	74	49	32	54	31	46	3
TSS	% Load Increase	7%	2%	10%	0%	4%	21%	4%	16%	13%	0%	23%	24%	18%	45%	26%	7%	6%	19%	0%	0%
	Existing (lb/ac/yr)	202	332	260	311	136	264	317	287	345	22	26	41	53	68	53	45	76	54	68	5
	Future (lb/ac/yr)	224	353	283	321	142	314	330	336	388	22	29	46	60	98	66	46	78	56	69	5
TDS	% Load Increase	11%	6%	9%	3%	4%	19%	4%	17%	12%	0%	12%	12%	13%	44%	25%	2%	3%	4%	1%	0%
	Existing (lb/ac/yr)	0.50	0.73	0.61	0.72	0.49	0.57	0.71	0.76	0.75	0.06	0.09	0.24	0.35	0.37	0.28	0.35	0.35	0.15	0.33	0.02
	Future (lb/ac/yr)	0.59	0.75	0.64	0.73	0.51	0.74	0.76	0.87	0.89	0.06	0.12	0.28	0.39	0.46	0.34	0.37	0.37	0.21	0.34	0.02
DP	% Load Increase	18%	3%	5%	1%	4%	30%	7%	14%	19%	0%	33%	17%	11%	24%	21%	6%	6%	40%	3%	0%
	Existing (lb/ac/yr)	0.71	1.01	0.86	1.03	0.70	0.81	0.98	1.03	1.08	0.08	0.12	0.33	0.50	0.53	0.40	0.46	0.50	0.22	0.48	0.03
	Future (lb/ac/yr)	0.80	1.04	0.91	1.04	0.72	0.98	1.03	1.15	1.23	0.08	0.17	0.39	0.56	0.65	0.49	0.49	0.53	0.31	0.49	0.03
TP	% Load Increase	13%	3%	6%	1%	3%	21%	5%	12%	14%	0%	42%	18%	12%	23%	23%	7%	6%	41%	2%	0%
	Existing (lb/ac/yr)	3.6	5.3	5.0	5.5	4.0	4.3	5.3	6.1	5.3	0.4	0.7	1.8	2.6	2.9	2.2	2.5	2.7	1.2	2.5	0.1
	Future (lb/ac/yr)	4.2	5.3	5.0	5.5	4.2	5.2	5.6	6.4	5.9	0.4	0.9	2.1	2.9	3.6	2.6	2.7	2.9	1.6	2.6	0.1
TKN	% Load Increase	17%	0%	0%	0%	5%	21%	6%	5%	11%	0%	29%	17%	12%	24%	18%	8%	7%	33%	4%	0%
	Existing (lb/ac/yr)	6.40	9.63	7.83	9.19	5.51	7.66	9.26	9.52	10.55	0.58	0.89	2.36	3.60	3.94	3.01	3.29	3.65	1.59	3.42	0.18
	Future (lb/ac/yr)	7.33	10.10	8.49	9.33	5.73	9.86	9.76	11.11	12.46	0.59	1.22	2.77	4.00	4.85	3.56	3.50	3.86	2.18	3.50	0.18
TN	% Load Increase	15%	5%	8%	2%	4%	29%	5%	17%	18%	2%	37%	17%	11%	23%	18%	6%	6%	37%	2%	0%

		2.6	3.5	4.4	4.5	4.0	3.0	3.7	4.7	4.7	1.1	1.4	2.3	2.8	3.1	2.5	2.5	3.3	2.7	3.2	0.3
		2.6	3.2	4.6	4.6	4.1	3.0	3.7	4.7	4.5	1.1	1.6	2.5	2.9	3.7	2.8	2.6	3.3	2.9	3.3	0.3
		0%	-9%	5%	2%	2%	0%	0%	0%	-4%	0%	14%	9%	4%	19%	12%	4%	0%	7%	3%	0%
		55.4	119.6	107.6	113.0	25.8	97.0	120.8	115.2	90.3	2.5	3.1	5.0	7.7	10.7	9.0	5.7	8.9	6.4	10.9	0.6
		61.7	118.9	99.3	114.1	26.0	98.7	126.9	115.2	90.2	2.6	3.5	5.7	8.7	14.4	10.7	5.9	9.3	6.7	10.3	0.6
		11%	-1%	-8%	1%	1%	2%	5%	0%	0%	4%	13%	14%	13%	35%	19%	4%	4%	5%	-6%	0%
		11.9	17.7	9.3	14.8	5.4	13.2	15.7	11.0	21.2	1.2	1.4	1.9	2.4	2.8	2.3	1.8	3.4	3.0	3.1	0.3
		13.2	20.4	13.2	15.9	5.7	18.2	16.4	16.4	25.8	1.3	1.5	2.1	2.7	4.1	2.7	1.8	3.5	3.0	3.2	0.3
		11%	15%	42%	7%	6%	38%	4%	49%	22%	8%	7%	11%	13%	46%	17%	0%	3%	0%	3%	0%
		34.4	59.2	48.3	46.4	14.1	50.7	56.9	52.7	51.4	1.1	1.4	2.6	4.4	5.8	4.8	3.2	5.0	2.9	5.6	0.3
		38.9	61.2	45.7	46.0	14.3	58.6	58.8	55.6	55.7	1.2	1.7	3.1	5.0	8.1	5.8	3.3	5.3	3.3	5.3	0.3
	% Load Increase	13%	3%	-5%	-1%	1%	16%	3%	6%	8%	9%	21%	19%	14%	40%	21%	3%	6%	14%	-5%	0%

5.2 Management Plan Strategy

This section outlines proposed projects for the Scotts Run Watershed. The locations of the projects in this section are shown on Maps 5.5 and 5.6. The projects are organized by goal, objective and action as they were presented in Chapter 3.

Goal A: Reduce stormwater impacts to protect human health, safety and property.

Objective 1: Reduce stormwater volumes and velocities to minimize stream bank erosion.

Action A1.1: Retrofit existing stormwater management facilities and BMPs.

A number of the BMP retrofit options described in Section 3.2.1 may be suitable for implementation in the Dead Run Watershed. These options are:

1. Increasing detention storage
2. Modifying or replacing existing riser structures and/or outlet controls
3. Adding infiltration features
4. Modifying basins that are currently "short circuiting"
5. Redirecting runoff from additional drainage area
6. Adding water quality treatment
7. Planting buffer vegetation

Locations of existing stormwater management facilities and BMPs that may be suitable for retrofit projects are described below and grouped by public or private ownership. Retrofit option numbers from the list above are provided in the following project descriptions.

Public BMP Retrofits

Upper Scotts Run

- Publicly owned dry detention SWM facility located to the east of the Timberly South subdivision behind 1319 Timberly Lane. Possible retrofit options include 2 and 6. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9126)
- Publicly owned dry detention SWM facilities located at 7401 Windy Hill Court and 1355 Windy Hill Road. Possible retrofit options include 2, 6, and 7. For the downstream pond, modifying the riser structure will allow for extended detention storage. For the upstream pond, adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9127)
- Publicly owned dry detention SWM facility located in the VDOT Dulles Toll Road right of way in the northeast cloverleaf at the intersection of the Dulles Toll Road and Dolley Madison Boulevard. Possible retrofit options include 2, 6, and 7. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9147)
- Publicly owned dry detention SWM facility located in the VDOT Dulles Toll Road right of

way in the southwest cloverleaf at the intersection of the Dulles Toll Road and Dolley Madison Boulevard. Possible retrofit options include 1 and 6. Increasing the storage volume by expanding the surface area of the pond will allow for additional runoff to be stored. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9150)

- Publicly owned wet BMP located in the VDOT Interstate 495 right of way in the southeast cloverleaf at the intersection of I-495 and Route 7. Possible retrofit options include 2, 6, and 7. Adding an aquatic bench will remove approximately 15% of the phosphorus, improving water quality. (Retrofit BMP Project SC9165)

Lower Scotts Run

- Publicly owned dry detention BMP located at 7410 Georgetown Court. Possible retrofit options include 2, 3, and 7. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will improve water quality. (Retrofit BMP Project SC9105)
- Publicly owned dry detention BMP located at 914 Helga Place. Possible retrofit options include 2, 6, and 7. The riser structure is filled with trash and debris and should be cleaned out. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will improve water quality. (Retrofit BMP Project SC9108)
- Publicly owned dry detention SWM facility located at 1106 Mill Ridge. Possible retrofit options include 2, 6, and 7. This pond was designed to minimize the post-development peak flows and does not have water quality controls. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will improve water quality. (Retrofit BMP Project SC9114)
- Publicly owned dry detention SWM facility located at 1165 Old Stage Court. Possible retrofit options include 2 and 6. The pond is very small and the existing riser only has a small opening, which is causing flooding in both of the neighboring properties. One option to prevent flooding would be to retrofit the riser to allow for greater peak discharges, but this may affect the condition of the downstream channel. Adding a bioretention area near the pond as well as replacing the eroded ditch with a bioswale will help reduce the flows and improve water quality. (Retrofit BMP Project SC9117)
- Publicly owned dry detention SWM facility located at Timberly Park with access from 1160 Old Gate Court. Possible retrofit options include 2, 6, and 7. Modifying the riser structure will allow for extended detention storage. Improving water quality by adding a shallow wetland will directly benefit downstream restoration of an unnamed tributary to Lower Scotts Run. (Retrofit BMP Project SC9118)
- Publicly owned dry detention SWM facility located to the east of the Timberly South subdivision behind 7601 Timberly Court. Possible retrofit options include 2 and 6. This pond was designed to minimize the post development peak flows and does not have water quality controls. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9123)
- Publicly owned dry detention SWM facility located to the north of Hooking Road in the McLean Station subdivision. The facility is accessed from Coan Street and is located behind 7309 Dulany Drive. Possible retrofit options include 2 and 6. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9124)

Potomac Tributaries

- Publicly owned dry detention SWM facility located at 889 Linganore Drive. Possible retrofit options include 2, 6, and 7. This facility detains the runoff from surrounding areas before releasing it directly into the Scotts Run Nature Preserve and was not designed with water quality controls. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9107)

Private BMP Retrofits

Upper Scotts Run

- Privately owned dry detention SWM basin located near 8121 Dunsinane Court. Possible retrofit options include 2, 6, and 7. (Retrofit BMP Project SC9135)
- Privately owned wet SWM facility located at 7980 Jones Branch Drive. This facility is owned by Westpark Associates, LP and was designed to store the runoff from the Tysons Corner area. Possible retrofit options include 2, 6, and 7. Modifying the riser structure will allow for extended detention storage. Adding an aquatic bench will also improve water quality. (Retrofit BMP Project SC9138)
- Privately owned wet SWM facility located at 7927 Jones Branch Drive. This facility is owned by West Group Properties, LLC. The Tysons Corner area has large amounts of impervious surfaces which increase runoff and contribute to poor water quality. Adding water quality controls such as an aquatic bench to this facility will help improve the runoff quality from Tysons Corner. Possible retrofit options include 2, 6, and 7. (Retrofit BMP Project SC9139)
- Privately owned wet SWM facility located at 1517 Westbranch Drive. This facility is owned by Avalon Properties, Inc. Possible retrofit options include 2, 6, and 7. This facility was designed to handle the post development peak flows from the surrounding Tysons Corner area and not for water quality control. Modifying the riser structure will allow for extended detention storage. Adding an aquatic bench will also improve water quality. (Retrofit BMP Project SC9140)
- Privately owned wet SWM facility located at 8003 Westpark Drive. This facility is owned by Avalon Properties, Inc. Possible retrofit options include 2, 6, and 7. During a county inspection, silt and debris was noticed in the control structure. The control structure should be cleaned out and the pond should be retrofitted for water quality treatment. (Retrofit BMP Project SC9141)
- Privately owned wet SWM pond located at the intersection of Jones Branch Drive and Park Run Drive. Possible retrofit options include 2, 6, and 7. Modifying the riser structure will allow for extended detention storage. Adding an aquatic bench will also improve water quality. (Retrofit BMP Project SC9143)
- Privately owned dry detention SWM facility located near the intersection of Tysons McLean Drive and Farm Credit Drive behind 1501 Farm Credit Drive. Possible retrofit options include 2 and 6. The bottom of the pond should be retrofitted with vegetation for greater filtering of runoff which will improve water quality. Also, the picnic tables located in the pond should be moved to the bank. (Retrofit BMP Project SC9146)
- Privately owned wet SWM pond located behind 1820 Dolley Madison Boulevard. Possible retrofit options include 1, 2, and 6. This facility collects runoff from I-495 and the Tysons Corner area and then releases it into an unnamed tributary to Upper Scotts Run. Retrofitting this facility for greater water quality treatment will benefit downstream water quality. Increasing the storage volume by increasing the depth will

allow for extended storage. Adding an aquatic bench will also improve water quality. The pond is within the RPA and this property is also subject to proffers which should be reviewed with DPZ before planning this project. (Retrofit BMP Project SC9149)

- Privately owned wet detention SWM facility located near 1820 Dolley Madison Boulevard. Possible retrofit options include 1, 6, and 7. This facility collects runoff from I-495 and the Tysons Corner area and then releases it into Upper Scotts Run. Increasing the storage volume by increasing the depth will allow for extended storage. Adding an aquatic bench will improve water quality for Upper Scotts Run. (Retrofit BMP Project SC9154)
- Privately owned dry detention SWM facility located at 1749 Old Meadow Road. Possible retrofit options include 2, 6, and 7. Modifying the riser structure will allow for extended storage. Adding a shallow wetland will also improve water quality. The pond is located within the RPA. (Retrofit BMP Project SC9155)
- Privately owned wet BMP facility located at 7525 Colshire Drive. Modifying the riser structure will allow for extended storage. Adding an aquatic bench will also improve water quality. Possible retrofit options include 2 and 6. (Retrofit BMP Project SC9156)

Lower Scotts Run

- Privately owned dry detention SWM facility located at 1009 Swinks Mill Road. Possible retrofit options include 2, 6, and 7. This location drains the runoff from Swinks Mill Road and the surrounding neighborhoods and then discharges it into Lower Scotts Run. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9111)
- Privately owned dry detention SWM facility located at 1033 Swinks Mill Road with access from Gelston Circle. Possible retrofit options include 2, 6, and 7. A weir wall could be installed to allow for a limited amount of detention storage to build up before overflowing into the existing culvert which leads to another dry detention facility located downstream at 1009 Swinks Mill Road. (Retrofit BMP Project SC9112)
- Privately owned dry detention SWM facility located at 1219 Swinks Mill Road. This facility is owned by Korean United Methodist Church. Possible retrofit options include 2, 6, and 7. This facility consists of a fenced-in basin with a riprap-lined bottom and a detention riser. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9122)
- Privately owned dry detention SWM basin located at the McLean Presbyterian Church property at 1020 Balls Hill Road. The basin captures the runoff from the parking lot. Possible retrofit options include 2, 6, and 7. Modifying the riser structure will allow for extended detention storage. Adding a shallow wetland will also improve water quality. (Retrofit BMP Project SC9174)

The size of the proposed drainage areas and the benefits from the proposed BMP retrofits that will be implemented first are included in Table 5.7.

Table 5.7 Benefits of Stormwater Management Facility and BMP Retrofits

Project Number	Subbasin ID	Location	Proposed Drainage Area (acres)	Total Phosphorus Removal (lbs/yr)	Channel Erosion Control Volume Provided (ac-ft)
SC9105	SC-SC-003	7410 Georgetown Court	42.7	2.8	0.4
SC9107	SC-PO-003	889 Linganore Drive	9.0	2.0	0.3
SC9108	SC-SC-004	914 Helga Place	20.8	1.4	0.2
SC9111	SC-SC-004	1009 Swinks Mill Road	5.8	1.3	0.5
SC9112	SC-SC-004	1033 Swinks Mill Road	7.6	1.7	0.4
SC9114	SC-UN-001	1106 Mill Ridge	17.0	3.7	0.4
SC9117	SC-UN-002	1165 Old Stage Court	5.0	0.5	0.2
SC9118	SC-UN-002	1160 Old Gate Court	2.7	0.6	0.1
SC9122	SC-UN-002	1219 Swinks Mill Road	4.5	2.0	0.2
SC9123	SC-UN-002	7601 Timberly Court	4.4	2.2	0.2
SC9124	SC-SC-006	Behind 7309 Dulany Drive	13.0	6.5	0.9
SC9126	SC-SC-007	1319 Timberly Lane	6.1	3.0	0.3
SC9127	SC-SC-007	7401 Windy Hill Court	29.1	4.4	1.2
SC9135	SC-UN-003	8121 Dunsinane Court	25.0	12.5	1.0
SC9138	SC-UN-004	7980 Jones Branch Drive	48.9	13.7	4.4
SC9139	SC-UN-006	7927 Jones Branch Drive	27.9	7.8	6.0
SC9140	SC-UN-006	1517 Westbranch Drive	26.6	7.4	2.4
SC9141	SC-UN-006	8003 Westpark Drive	71.5	17.8	15.5
SC9143	SC-UN-005	Intersection of Jones Branch Drive and Park Run Drive	43.7	8.8	2.9
SC9146	SC-SC-008	1501 Farm Credit Drive	65.1	18.1	2.3
SC9147	SC-SC-008	Northeast cloverleaf at the intersection of Dulles Toll Road and Dolley Madison Boulevard	3.7	1.9	0.3
SC9149	SC-SC-008	1820 Dolley Madison Boulevard	21.0	9.8	1.4
SC9150	SC-SC-008	Southwest cloverleaf at the intersection of Dulles Toll Road and Dolley Madison Boulevard	26.0	31.2	2.5
SC9154	SC-SC-008	1820 Dolley Madison Boulevard	26.2	12.8	1.9
SC9155	SC-SC-009	1749 Old Meadow Road	4.0	3.7	0.3
SC9156	SC-SC-009	7525 Colshire Drive	16.5	4.8	1.3

Project Number	Subbasin ID	Location	Proposed Drainage Area (acres)	Total Phosphorus Removal (lbs/yr)	Channel Erosion Control Volume Provided (ac-ft)
SC9165	SC-SC-010	Southeast cloverleaf at the intersection of I-495 and Route 7	4.5	0.9	0.3
SC9174	SC-SC-005	1020 Balls Hill Road	10.5	9.8	0.9

Action A1.2: Construct new BMPs including Low Impact Development (LID) practices.
The new BMP projects have been grouped into public or privately owned land and conventional BMPs or LID methods. The proposed new BMP locations are described below and are shown on Maps 5.5 and 5.6.

New Public BMPs

Upper Scotts Run

- A new one-year extended detention BMP could be constructed on Fairfax County Park Authority property located at 7717 Falstaff Road. The BMP should be installed near the yard inlet which collects runoff from Falstaff Road. The estimated buildable area at this location is 41,000 square feet. (New BMP Project SC9128)
- A new one-year extended detention BMP could be constructed in the McLean Hamlet Park; the entrance is next to 8005 Falstaff Road. A dry detention BMP should be installed at the outfall of the pipe in this location. The estimated buildable area at this location is 5,000 square feet. (New BMP Project SC9132)
- Four new one-year extended detention BMPs could be constructed within the VDOT right of way near the Dulles Toll Road. All of the sites have dense tree cover and should be designed to minimize tree loss. According to the topographic information, the sites located southwest and southeast of the intersection of I-495 and Dulles Toll Road are in naturally low areas and have estimated buildable areas of 20,000 square feet and 10,000 square feet, respectively. The site to the southwest is also in the RPA. The site to the northeast is in a floodplain and the RPA, and has an estimated buildable area of 25,000 square feet. The site to the northwest has an estimated buildable area of 40,000 square feet. (New BMP Project SC9137)
- A new one-year extended detention BMP could be constructed within the Freddie Mac campus at 8000 Jones Branch Drive. The site has dense cover and the estimated buildable area is 12,000 square feet. (New BMP Project SC9142)
- A new one-year extended detention BMP could be constructed in the VDOT Dulles Toll Road right of way in the southeast cloverleaf at the intersection of Dulles Toll Road and Dolley Madison Boulevard. The proposed location has open land where a BMP could be constructed. The estimated buildable area at this location is 8,000 square feet. (New BMP Project SC9153)
- A new one-year extended detention BMP could be constructed in the VDOT I-495 right of way in the southeast cloverleaf at the intersection of I-495 and Chain Bridge Road. This location may be suitable for a dry detention basin because there is a large amount of open space and a storm drainage network nearby. The estimated buildable area at this location is 8,000 square feet. (New BMP Project SC9157)
- A new one-year extended detention BMP could be constructed in the VDOT I-495 right of way in the southwest cloverleaf at the intersection of I-495 and Chain Bridge Road.

This area has dense tree cover, and the estimated buildable area is 8,000 square feet. (New BMP Project SC9158)

- Construct a new one-year extended detention BMP in the VDOT I-495 right of way in the northwest cloverleaf at the intersection of I-495 and Route 7. Tree removal should be limited to the embankment area. The estimated buildable area at this location is 12,500 square feet. (New BMP Project SC9162)
- A new one-year extended detention BMP could be constructed in the VDOT Interstate 495 right of way in the northeast cloverleaf at the intersection of intersection of I-495 and Route 7. This location may be suitable for a dry detention basin because there is open space and a storm drain network in the vicinity. The estimated buildable area at this location is 8,000 square feet. (New BMP Project SC9164)
- Construct a new one year extended detention BMP at the vacant lot located west of 1500 Westbranch Drive. This area has dense tree cover, so the BMP should be designed to minimize tree loss. There is nearby access to the storm drainage network. The estimated buildable area at this location is 13,000 square feet. (New BMP Project SC9167)

Public LID Projects

Schools were targeted for LID projects because the properties are owned by the county, usually have large impervious areas, most have no existing stormwater controls, and the projects are ideally situated to help educate the students on watershed issues.

Upper Scotts Run

- New LID methods could be constructed at the Spring Hill Elementary School located at 8201 Lewinsville Road as demonstration projects. Four bioretention areas could be constructed in the landscaped areas near the school building and a bioswale could be constructed on the northeast side of the property, next to the parking lot. Also, a curb inlet in the parking lot could be replaced by tree box filter. (New LID Project SC9836)
- New LID methods could be constructed at the Westgate Elementary School located at 7500 Magarity Road. This school has large amounts of impervious surfaces and implementing LID methods would help decrease the peak runoff from the school. A bioswale could be constructed adjacent to the asphalt playground area and three curb drop inlets could be replaced by tree box filters. Two bioretention areas could be constructed in the landscaped areas near the school building. (New LID Project SC9859)

Private LID Projects

LID projects are recommended for the following privately owned commercial developments. The commercial LID sites were chosen because they have large impervious areas and do not have existing stormwater management controls.

Upper Scotts Run

- New LID methods could be constructed at the Tysons Westpark Transit Station located at 8300 Jones Branch Drive. Four bioretention areas could be constructed in the medians and landscaped areas. Three curb drop inlets could be replaced with tree box filters. (New LID Project SC9844)
- Construct a LID project at the Pimmit Hills Center located at 7510 Lisle Avenue. Bioretention areas could be constructed near the building and in the parking lot

medians. The parking lots do not have curbs so bioswales or infiltration trenches should be constructed adjacent to the parking lots to capture and treat the runoff. (New LID Project SC9860)

Lower Scotts Run

- Construct a LID project at the McLean Presbyterian Church at 1020 Balls Hill Road. The landscaped areas near the church could be converted into bioretention areas. Porous pavement or pavers could be used in the outlying parking areas. Bioswales could be constructed adjacent to the parking lot and curb cuts placed to allow runoff to drain to the bioswales. (New LID Project SC9813)
- Construct a LID project at the Church of the Latter Day Saints located at 1325 Scotts Run Road. The curb drop inlets could be replaced by tree box filters and bioretention areas could be constructed in the parking lot medians and in the landscaped areas near the building. Porous pavement or pavers could be used in the outlying parking areas. (New LID Project SC9825)

The pollutant removal benefit for the proposed BMP and LID projects that will be implemented first are shown in Table 5.8.

Table 5.8 Benefits of New BMPs and LID Projects

Project Number	Subbasin ID	Location	Proposed Drainage Area (acres)	Total Phosphorus Removal (lbs/yr)
SC9128	SC-SC-007	7717 Falstaff Road	46.7	23.3
SC9132	SC-UN-003	8005 Falstaff Road	5.6	2.8
SC9137	SC-SC-007, SC-UN-004	Intersection of I-95 and Dulles Toll Road	109.0	54.5
SC9142	SC-UN-005	8000 Jones Branch Drive	6.0	5.5
SC9153	SC-SC-008	Southeast cloverleaf at the intersection of Dulles Toll Road and Dolley Madison Boulevard	9.0	3.5
SC9157	SC-UN-007	Southeast cloverleaf at the intersection of I-495 and Chain Bridge Road	6.1	6.0
SC9158	SC-UN-007	Southwest cloverleaf at the intersection of I-495 and Chain Bridge Road	6.1	6.0
SC9162	SC-SC-010	Northwest cloverleaf at the intersection of I495 and Route 7	9.4	4.2
SC9164	SC-SC-010	Northeast cloverleaf at the intersection of I495 and Route 7	4.4	1.9
SC9167	SC-UN-006	West of 1500 Westbranch Drive	9.7	2.0
SC9813	SC-SC-005	1020 Balls Hill Road	N/A	N/A
SC9825	SC-SC-006	1325 Scotts Run Road	N/A	N/A
SC9836	SC-UN-003	8201 Lewinsville Road	4.9	4.8
SC9844	SC-UN-005	8300 Jones Branch Drive	3.1	3.0
SC9859	SC-SC-009, SC-SC-010	7500 Magarity Road	3.7	2.9
SC9860	SC-SC-010	7510 Lisle Avenue	N/A	N/A

Action A1.3: Construct LID practices in neighborhoods in the public rights-of-way and encourage LID practices on private property.

The neighborhoods selected for neighborhood stormwater improvements do not have existing stormwater management controls and the runoff from these neighborhoods contributes to downstream erosion problems. Targeting these neighborhoods for LID methods will help to mitigate the effects of the impervious surfaces and to improve the effectiveness of stream restoration projects downstream. The neighborhood stormwater improvement areas are described below and are shown on Maps 5.5 and 5.6.

Upper Scotts Run

- Conduct a storm drain study in the McLean Hamlet neighborhood located between the Dulles Toll Road and Lewinsville Road. Flooding in this neighborhood may be a result of inadequate capacity in the storm drain system. The study should be accompanied by LID measures that will reduce the peak flows. Currently this neighborhood has concrete sidewalks, curb and gutter, storm drain inlets, and many cul-de-sacs. Fifteen small bioretention areas could be added throughout the neighborhood in existing open space areas, in the area between the sidewalk and the curb and in cul-de-sacs. Also, sixteen tree box filters could replace existing curb drop inlets.(Neighborhood Stormwater Improvement Area SC9834)
- Tysons Corner Stormwater Strategy SC9845 is described in Chapter 9.
- New LID methods could be constructed in the Scotts Hills neighborhood located between Magarity Road and Lisle Avenue. There are concrete sidewalks, curb and gutter, and storm drain inlets. Four small bioretention areas could be constructed around storm drain inlets located in low area behind the houses, as well as in existing open space areas. Eight storm drain inlets could also be replaced with tree box filters to improve the water quality. (Neighborhood Stormwater Improvement Area SC9861)

The pollutant removal benefit for the proposed neighborhood stormwater improvement areas is shown in Table 5.9.

Table 5.9 Benefits of Neighborhood Stormwater Improvement Areas

Project Number	Subbasin ID	Location	Proposed Drainage Area (acres)	Total Phosphorus Removal (lbs/yr)
SC9834	SC-SC-007, SC-UN-003	McLean Hamlet neighborhood	14.5	13.5
SC9861	SC-SC-010	Scotts Hills neighborhood	6.0	5.6

Action A1.4: Reconnect the floodplains to stream channels to provide floodwater storage and treatment.

There are no floodplain restoration projects in this watershed.

Action A1.5: Remove detrimental channel obstructions.

Channel obstructions that block stream flow, like the ones listed below, should be removed. Obstructions in the watershed will vary over time. It may be necessary to clean up future obstructions that are not listed below or shown on any of the watershed maps. Some of the

obstructions shown on Maps 5.3 and 5.4 have been cleaned up since the SPA was conducted, so projects were not needed at those locations.

Lower Scotts Run

- Remove five obstructions identified in the SPA that consist primarily of tree debris. The locations are in the vicinity of Timberly Park, Coan Street, Woburn Court, Saigon Road, and Potomac River Road. (Dumpsite/Obstruction Removal SC9903)

Action A1.6: Stabilize eroding streambanks using bioengineering methods.
The projects identified for this action are also addressed by Action B5.1 and are described under that action.

Objective A2: Reduce stormwater flooding and the potential damage from stormwater flooding.

Action A2.1: Improve existing stormwater infrastructure to prevent flooding of roadways and property.
Improve the existing stormwater infrastructure at the following location:

Lower Scotts Run

- Improve the deficient storm drain system in the vicinity of Box Elder Court that has caused house and yard flooding in the past. There is a natural spring here which has been piped and the existing pipes are not sufficient to contain the flow. The outfall at Scotts Run Road frequently backs up and some of the pipes at Box Elder Court are clogged. A portion of this project is in the county's list of master plan drainage projects (SC614). (Infrastructure Improvement SC9475)

Action A2.2: Improve the existing stormwater infrastructure to prevent negative impacts to the stream.
Improve the existing stormwater infrastructure at the following location:

Upper Scotts Run

- Improve the existing fair weather crossing located near Old Springhouse Road. (Infrastructure Improvement SC9451)

Action A2.3: Protect structures located in the 100-year flood limit from flooding.
Table 5.10 lists the number of properties in the watershed that are located in the 100-year floodplain or are recommended for flood protection (Flood Protection Project SC9672).

Table 5.10 Recommended Flood Protection Locations

Street	# Properties
Dolley Madison Boulevard	1
Scotts Run Road	1
Swinks Mill Road	3

Objective A3: Reduce pollutants in stormwater runoff to protect human health.

Action A3.1: Identify the sources of fecal coliform bacteria in the watersheds and seek to reduce controllable sources.
Collaborate with DEQ and DCR to perform a study to identify the sources of fecal coliform bacteria in the Scotts Run Watershed using E. coli as the indicator bacteria and prepare an action plan that describes how the controllable sources, especially human sources, will be reduced (Fecal Coliform Source Study SC9781).

Scotts Run has been identified by the Virginia Department of Environmental Quality as an impaired stream due to high levels of bacteria. Fecal coliform sampling of Scotts Run in 2002 by the county showed an improvement in the bacteria levels from the previous year. However, Scotts Run did not meet the state's current instantaneous fecal coliform standard that no more than 10% of the samples collected in a month shall exceed 400 fecal coliform per 100 milliliter of water. The ultimate goal of the study action plan would be to remove Scotts Run from Virginia's list of impaired waters.

GOAL B: Protect and improve habitat and water quality to sustain native animals and plants.

Objective B1: Reduce pollutants in stormwater runoff to protect fish and other aquatic life.

Action B1.1: Retrofit existing stormwater management facilities and BMPs.
The projects identified for this action are also addressed by Action A1.1 and are described in that section.

Action B1.2: Construct new BMPs including LID methods.
The projects identified for this action also addressed by Action A1.2 and are described under that action.

Objective B2: Increase the use of LID for all development projects to reduce runoff and improve water quality.

This objective will be achieved through policy and land use recommendations which are located in Chapter 9 under Objective B2.

Objective B3: Restore and protect vegetated stream buffers to filter pollutants from runoff, to provide erosion control and to provide habitat for animals.

Action B3.1: Restore vegetated buffers along streams especially at public sites such as schools, park, and municipal facilities.
Restore vegetated buffers along streams especially at public sites such as schools, parks, and municipal facilities. The deficient buffer location described below was found during the 2002 SPA or was identified as a potential location for buffer restoration during the watershed

planning process. This reach length will be further evaluated to determine what portions require restoration work. The location of this project is shown on Map 5.5. Steps to protect existing vegetated buffers are included in Public Education Project SC9976 described later in this chapter.

Upper Scotts Run

- Evaluate the 1,800 feet of Upper Scotts Run from Dolley Madison Boulevard to the Dulles Toll Road to determine if buffer restoration work is required. (Buffer Restoration SC9352)

Action B3.2: Provide landowner education about the importance of stream buffers and how to manage and protect them (through coordination, brochures, and workshops).
This is a county-wide action and details of this action are presented in Chapter 3.

Action B3.3: Increase enforcement of stream buffer violations.
This is a county-wide action and details of this action are presented in Chapter 3.

Action B3.4: Remove invasive species from stream buffer areas and replant with native plants.
This is a county-wide action and details of this action are presented in Chapter 3.

Action B3.5: Protect stream buffer areas from development.
There are no land conservation projects in this watershed.

Objective B4: Protect and restore wetlands to provide habitat and improve water quality.

Action B4.1: Conduct a detailed inventory of existing wetlands in order to identify areas for protection or restoration.
A wetlands functions and values survey should be performed. This wetlands survey will provide a baseline condition and mapping of the wetlands in the watershed and help the county and watershed stakeholders make decisions regarding priority wetland conservation and preservation areas. (Wetland Assessment Project SC9980)

Objective B5: Restore natural stream channels, banks and bed to provide improved habitat.

Action B5.1: Utilize bioengineering to restore and stabilize stream banks, restore natural geometries and remove concrete from stream banks and beds.
Utilize bioengineering to restore and stabilize stream banks, restore natural stream geometries, and remove concrete from stream banks and beds. Scotts Run is actively widening along the majority of its length and the steam protection strategy composite site

condition rating was “very poor.” Restoring the stream and its tributaries will improve the condition of the aquatic habitat and should be carefully coordinated with the previously described objectives of reducing the quantity and improving the quality of runoff in order to prevent further erosion and channel widening. The locations of proposed stream restoration activities are described below and shown on Maps 5.5 and 5.6. It should be noted that the stream reaches identified in the following project descriptions and on the maps designate lengths that will be further evaluated. Restoration work will be done in required areas, not necessarily along the continuous lengths designated.

Upper Scotts Run

- Approximately 6,500 linear feet of two tributaries to Scotts Run that run parallel to the Dulles Toll Road will be evaluated to determine locations for stream restoration. The longer of the two tributaries is west of the main channel and the shorter is to the east. The channels in this area appear to have been straightened to accommodate the Dulles Toll Road. The streams are classified in the habitat assessment as having poor habitat quality. Proposed activities will include removing the riprap along the channel, reconfiguring the stream banks, connecting the stream with its floodplain and/or installing soft structural stream bank measures such as fascines or root wads. The new channel, with some restrictions, should be designed as close as possible in dimension, pattern, and profile to a reference stream in the watershed. Proposed activities will also include channel riparian vegetation planting, trash/debris removal, and installation of some in-stream habitat improvement structures, such as small log cross vanes. All natural materials should be used in the construction of the in-stream structures. Additional activities will include culvert replacement or adjustment where the pipe outlet elevation is not the same as the stream channel bottom. Stable inlet and outlet protection must be installed at all stream crossings. Cross vanes or “W” weirs may be constructed to help eliminate scour and redirect the stream flow through culverts or bridges. (Stream Restoration SC9230)

Lower Scotts Run

- Evaluate 5,500 linear feet of Scotts Run for stream restoration locations beginning at the northern end of Timberly Park and flowing northward, and a minor tributary joining the main channel from the west and paralleling Georgetown Pike. This stream is in a transitional phase of stream bank evolution from a stable stream to an eroding/widening stream. This type of stream channel incision usually is an indication of a change in stream slope. But this stream is limited in the amount of slope change and downcutting due to the large amounts of bedrock found along the stream channel bottom. In order to stop stream bank erosion, gabions and concrete walls have been constructed along the outside of some of the meanders of the stream. Approximately 40 to 70 percent of the channel has been disturbed and the banks are 40 to 60 percent eroded. Proposed activities include channel reconfiguration of the stream banks, connecting the stream with its floodplain, riparian vegetation planting and some installation of in-stream habitat improvement structures and trash/debris removal. Natural materials will be used in the construction of all in-stream structures. Proposed activities will also include repair of existing gabions and concrete walls or construction of new structural stream bank protection measures and some bioengineering of the stream banks. This project will also include replacement of the Swinks Mill Road bridge because it is undersized and extensive flooding has occurred at this location in the past. (Stream Restoration SC9204)

- Evaluate three tributaries located on the east side of Scotts Run near Saigon Road for a total of approximately 3,700 linear feet for stream restoration locations. These three tributaries to Scotts Run are all in a transitional phase of stream bank evolution and exhibit the eroding and vertical banks of an incising/widening stream. Proposed activities include channel reconfiguration, riparian vegetation planting and some installation of in-stream habitat improvement structures along with bioengineering of the stream banks. The channel reconfiguration of these tributaries should help to minimize the contributory erosional forces to the main stem. A portion of this project is in the county's list of master plan drainage projects (SC215). (Stream Restoration SC9206)
- Evaluate approximately 4,100 linear feet of two tributaries to Scotts Run located to the west of Scotts Run and running parallel to Swinks Mill Road for stream restoration locations. The upper portion of the longest unnamed tributary flows between several houses through a concrete channel. The homeowners should be encouraged to create a vegetated buffer zone along the length of the concrete ditch. The second of the two tributaries is in a transitional phase of stream bank evolution and exhibits the eroding and vertical banks of an incising/widening stream. Proposed activities include channel reconfiguration, reconnecting the stream with its flood plain, riparian vegetation planting and some installation of in-stream habitat improvement structures along with some bioengineering of the stream banks. All natural materials should be used in the construction of the in-stream structures. All of the culverts should be provided proper inlet and outlet protection against erosion. (Stream Restoration SC9210)
- Evaluate Bradley Branch for approximately 3,650 linear feet flowing west along the southern border of Timberly Park for stream restoration locations. The channel evolution model has indicated that this stream is evolving from a stable stream to a widening stream. Approximately 40 percent of the stream has been altered and 60 to 70 percent of the stream has eroded banks. Proposed activities will include channel reconfiguration, floodplain creation, bioengineering of stream banks, selective placement of in-stream habitat structures, and removal of debris and unstable trees. A portion of this project is in the county's list of master plan drainage projects (SC213). (Stream Restoration SC9219)
- Evaluate approximately 7,800 of Scotts Run and one minor tributary for stream restoration locations. The tributary flows north along the Capital Beltway beginning at the Dulles Toll Road and ends in the vicinity of Old Dominion Drive. The stream banks in the upstream portion of the restoration area are undercut and eroded with many trees along the bank falling into the stream. Woody debris accumulation in the stream has inhibited any defined riffle and pool development. Irregular point bars of sand and gravel are seen along this stream length and bank full flow (1.5 to 2 year storm) is predicted to be at the top of the streams banks. Proposed activities will include removal of woody debris and trash, stream channel and bank reconfiguration, selective placement of in-stream habitat structures and riparian vegetation planting. The downstream portion of the evaluation reach begins near the intersection of the Capital Beltway and Old Dominion Drive. The stream flows along the embankment fill for the Capital Beltway for the majority of the evaluation reach. The channel has been lined with riprap to protect the roadway fill embankment. Much of the riprap can be found in the stream and along some of its banks. Proposed activities will include removal of the riprap channel lining and replacing it with a stream channel equal to an identified reference reach stream in the same watershed. The new channel will be equal in dimension, pattern and profile to the reference stream and will include the placement of in-stream structures to promote good riffle and pool habitat. Outlet protection

should be placed at the downstream end of the I-495 box culvert and woody debris and trash should be removed. (Stream Restoration SC9220)

- An assessment and evaluation of headwater streams will be performed. Headwater streams with less than 50 acres of drainage area that were not included in the SPA will be evaluated in this project. (Stream Assessment Project SC9982)

Goal C: Provide for long term stewardship of the Middle Potomac Watersheds by building awareness of the importance of watershed protection and providing opportunities for enjoyment of streams.

Watershed stewardship actions will build awareness of the importance of watershed protection and may also provide citizens with an opportunity to improve their watershed. Several watershed-wide projects will help with this goal. The projects under the following objectives will be developed and overseen by county staff, but will depend on the participation of citizens to be successful.

Objective C1: Improve education and outreach.

Public Education Project SC9976 will include the following actions:

- Provide materials to homeowners with septic tank systems to educate them about the proper operation and maintenance of their system.
- Coordinate with community groups to provide technical assistance and suitable educational materials for planting and maintaining healthy buffers.
- Write and distribute a watershed planning fact sheet and lesson plan for teachers that incorporate Standard of Learning 6.7, which deals with watershed protection. Provide specific information about the *Middle Potomac Watersheds Management Plan*.
- Consolidate existing educational materials that describe the value of the watersheds and make them accessible through one county contact.
- Create a watershed planning slide show with watershed basics that can be shown to civic groups, watershed associations, businesses, realtors and other interested groups.
- Provide homeowner brochures about proper yard compost practices and damage done to streams by improper disposal of yard wastes.
- If a stormwater utility is established and it entails billings to individual properties, include educational messages about reducing stormwater runoff (and incentives for doing so) in any mailings.
- Integrate the watershed management plan with existing state and local government planning efforts such as Capital Improvement Project planning, the County Comprehensive Plan, Area Plans, the Virginia Department of Transportation Six Year Plans, road standards and mitigation projects.

Objective C2: Improve watershed access and stewardship.

Community Outreach Project SC9977 will include the following actions:

- Establish an on-going relationship with civics and science teachers at middle schools and high schools who need to provide their students with opportunities for service credits or hands-on projects.
- Encourage voluntary donation of trail and conservation easements.
- Promote annual or semiannual cleanup projects for streams.
- Form or designate a volunteer community organization to aid in the stewardship of the

Middle Potomac Watersheds and to coordinate watershed plan implementation activities with county staff.

- Post signage at stream crossings and watershed divides identifying the waterway to increase public awareness of watershed boundaries.
- Encourage private BMP owners to post signage at their facilities with contact information for reporting problems at the facility.

Enforcement Enhancement Project SC9979 will include the following actions:

- Evaluate the current enforcement of the Chesapeake Bay Preservation Ordinance to determine the best way to prevent the destruction of buffer vegetation.
- Improve enforcement of anti-dumping regulations.

Objective C3: Promote the implementation and maintenance of Low Impact Development (LID) practices.

LID Promotion Project SC9978 will include the following actions:

- Inspire landowners to use LID measures by demonstrating LID benefits via recognition programs for businesses and neighborhoods that implement LID measures voluntarily.
- Demonstrate that LID measures can increase property values.
- Provide marketing ideas to showcase properties using extensive LID methods and publicize environmental and social benefits.
- Provide a training and certification program for landscaping companies to learn LID installation and maintenance methods.
- Contact supply companies that could carry LID materials (such as biofilter soils and plants or pervious pavers) and encourage them to stock those items so that construction companies, landscaping companies and homeowners will have easy access to them.
- Stock educational brochures about LID practices for homeowners at hardware stores, home improvement stores, and nurseries.

5.3 Benefits of Plan Actions

Thirty-three BMP retrofit projects, six LID projects, two Neighborhood Stormwater Improvement Areas, and eleven new BMP projects have been proposed for the Scotts Run Watershed to help improve the quality of the stream. The channel erosion control volume to be provided by twenty-eight of the BMP retrofit projects will serve approximately 83 percent of the required channel erosion control volume for the 628 acres controlled by the BMP retrofit locations. The channel erosion control volume to be provided by ten of the new BMP projects will serve all of the required channel erosion control volume for the 212 acres of drainage area. For the forty-three retrofit BMP, LID, Neighborhood Stormwater Improvement Areas, and new BMP projects with benefit calculations, the total additional phosphorus removal is estimated to be 328 lbs/year upon successful implementation of these projects.

Approximately 31,250 linear feet of Scotts Run will be restored as part of the proposed stream restoration projects. These projects will help minimize the velocity of the stream, provide nutrient reduction, and reduce the erosion of the stream banks. Approximately 1,800 linear feet of stream buffers will be restored by implementing the buffer restoration project. The project will increase the amount of habitat and provide nutrient reduction for Scotts

Run. The storm drain study project will help to evaluate the storm drain system deficiencies and construct recommended drainage system improvements for the McLean Hamlet neighborhood.

5.4 Implementation of Plan Actions

The recommended plan actions described in this chapter will be implemented over the 25-year life of the watershed plan. The initial implementation schedule was developed using prioritization criteria provided by the county which were used to calculate a numerical score. The prioritization scores are on a scale of 0 to 5 with the highest scores having the highest priority in each watershed. Projects which received higher scores were generally located in the subbasins with the poorest existing conditions, in the headwaters of the watershed, on public land, or would provide the greatest benefits.

Once the prioritization score was calculated, other factors were considered when assigning the implementation timeframes. These factors included promoting projects that have high visibility and low costs but that may not have received a high priority score such as buffer restoration projects and obstruction removal projects. Sequencing and geographic location were also considered so that the Group A or B projects, when successfully implemented, will help to minimize the effects of stormwater in a specific subbasin which will make it possible to implement other projects in later timeframes.

The implementation periods have been divided into five year timeframes with the following designations:

Group A	0 to 5 years
Group B	5 to 10 years
Group C	10 to 15 years
Group D	15 to 20 years
Group E	20 to 25 years

The public education, community outreach, LID promotion, and the enforcement enhancement capital projects were not ranked because they are to be implemented for the length of the 25-year plan period. Hence, these projects are designated under Group A*.

Priority projects will be implemented within the first fifteen years of the plan in each watershed. Detailed costs and benefits were computed for these projects. The priority projects each have a Fact Sheet, presented in Appendix A, which summarizes key information about the projects. This is only preliminary information and is expected to change as projects enter the design phase of implementation. The priority project total cost for Scotts Run is $7,520,000. The priority projects are summarized in Table 5.11 below along with the land owners, prioritization scores and implementation groups for the projects.

Coordination with the land owners will be essential to the successful implementation of the plan actions. Cost-sharing opportunities may be explored for projects where both the land owner and the county will benefit. Projects identified on VDOT property will be coordinated directly with VDOT to determine final schedule and cost sharing.

Table 5.11 Summary of Scotts Run Priority Projects

Project Number	Type	Land Owner	Estimated Cost	Score	Year Group
SC9157	New BMP Project	VDOT[1]	$110,000	4.30	**
SC9158	New BMP Project	VDOT[1]	$110,000	4.30	**
SC9147	Retrofit BMP Project	VDOT[1]	$40,000	4.20	**
SC9128	New BMP Project	Fairfax County Park Authority (FCPA)	$430,000	4.15	A
SC9137	New BMP Project	VDOT[1]	$940,000	4.15	**
SC9126	Retrofit BMP Project	Timberly South HOA[1]	$70,000	4.05	A
SC9132	New BMP Project	FCPA	$80,000	4.05	A
SC9117	Retrofit BMP Project	Private Residential[1]	$40,000	4.00	A
SC9142	New BMP Project	Commercial Development[1]	$130,000	4.00	A
SC9167	New BMP Project	Commercial Development[1]	$130,000	4.00	A
SC9845	Tysons Corner Stormwater Strategy	VDOT and Commercial Development[1]	$200,000[2]	4.00	A
SC9114	Retrofit BMP Project	Private Residential and Reserve HOA[1]	$80,000	3.95	A
SC9141	Retrofit BMP Project	Residential Development[1]	$100,000	3.90	A
SC9352	Buffer Restoration	VDOT, Residential Development and Commercial Development[1]	$90,000	3.15	A
SC9124	Retrofit BMP Project	McLean Station HOA[1]	$130,000	3.95	B
SC9138	Retrofit BMP Project	Commercial Development[1]	$590,000	3.95	B
SC9861	Neighborhood Stormwater Improvement Area	VDOT and Private Residential[1]	$280,000	3.95	**
SC9154	Retrofit BMP Project	Commercial Development[1]	$120,000	3.90	B
SC9118	Retrofit BMP Project	FCPA	$30,000	3.85	B
SC9139	Retrofit BMP Project	Commercial Development[1]	$180,000	3.85	B
SC9153	New BMP Project	VDOT[1]	$110,000	3.85	**
SC9162	New BMP Project	VDOT[1]	$130,000	3.85	**
SC9164	New BMP Project	VDOT[1]	$110,000	3.85	**
SC9165	Retrofit BMP Project	VDOT[1]	$60,000	3.85	**
SC9834	Neighborhood Stormwater Improvement Area	VDOT and Private Residential[1]	$870,000	3.85	**
SC9836	New LID Project	Fairfax Count Public Schools (FCPS)	$260,000	3.85	B
SC9844	New LID Project	Fairfax County Board of Supervisors	$160,000	3.85	B
SC9859	New LID Project	FCPS	$160,000	3.85	B
SC9150	Retrofit BMP Project	VDOT[1]	$280,000	3.75	**
SC9135	Retrofit BMP Project	Spring Hill Road HOA[1]	$140,000	3.60	B
SC9143	Retrofit BMP Project	Residential Development[1]	$210,000	3.60	B
SC9140	Retrofit BMP Project	Commercial Development[1]	$130,000	3.35	B
SC9155	Retrofit BMP Project	Commercial Development[1]	$60,000	3.75	C

Project Number	Type	Land Owner	Estimated Cost	Score	Year Group
SC9156	Retrofit BMP Project	Commercial Development[1]	$120,000	3.75	C
SC9127	Retrofit BMP Project	Windy Hill HOA and Maplewood HOA[1]	$170,000	3.65	C
SC9174	Retrofit BMP Project	Private Organization[1]	$80,000	3.45	C
SC9123	Retrofit BMP Project	Timberly South HOA[1]	$50,000	3.40	C
SC9149	Retrofit BMP Project	Residential Development[1]	$110,000	3.35	C
SC9146	Retrofit BMP Project	Commercial Development[1]	$120,000	3.25	C
SC9108	Retrofit BMP Project	Private Residential and Beaufort Park HOA[1]	$60,000	3.15	C
SC9122	Retrofit BMP Project	Private Organization[1]	$40,000	3.10	C
SC9111	Retrofit BMP Project	Private Residential[1]	$90,000	3.00	C
SC9112	Retrofit BMP Project	Urquhart Subdivision Association[1]	$40,000	3.00	C
SC9105	Retrofit BMP Project	Private Residential[1]	$60,000	2.90	C
SC9107	Retrofit BMP Project	Private Residential[1]	$70,000	2.90	C

[1]These projects will require coordination with land owners prior to implementation to determine cost sharing and project schedule.

[2]Cost shown is an estimated cost for a study, not for implementation of the projects from the study.

** These projects will be coordinated directly with VDOT.

The non-priority projects, including the watershed stewardship actions in Year Group A*, are shown in Table 5.12 below along with the land owners, prioritization scores, and implementation groups for the projects. While the projects in Groups A and A* will be implemented right away, the remainder of the projects in the table should be thought of as future opportunities. Conditions in the Middle Potomac Watersheds may be very different in fifteen years time, so the projects in Groups C, D, and E will be re-evaluated at that time.

Table 5.12 Summary of Scotts Run Non-Priority Projects

Project Number	Type	Land Owner	Score	Year Group
SC9976	Public Education Project	Watershed-wide Project	N/A	A*
SC9977	Community Outreach Project	Watershed-wide Project	N/A	A*
SC9978	LID Promotion Project	Watershed-wide Project	N/A	A*
SC9979	Enforcement Enhancement Project	Watershed-wide Project	N/A	A*
SC9982	Stream Assessment Project	Watershed-wide Project	N/A	A*
SC9903	Dumpsite/Obstruction Removal	FCPA, Private Residential, and Timberly South HOA[1]	2.05	A
SC9825	New LID Project	Private Organization[1]	3.10	D
SC9860	New LID Project	FCPS	3.10	D
SC9813	New LID Project	Private Organization[1]	3.00	D
SC9220	Stream Restoration	VDOT and Private Residential[1]	2.85	D

Project Number	Type	Land Owner	Score	Year Group
SC9219	Stream Restoration	VDOT, FCPA, Private Residential, McLean Hunt HOA, and Timberly South HOA[1]	2.75	D
SC9230	Stream Restoration	VDOT, FCPA, and Private Organization[1]	2.75	D
SC9980	Wetland Assessment Project	Watershed-wide Project	2.75	D
SC9475	Infrastructure Improvement	VDOT and Private Residential[1]	2.65	**
SC9451	Infrastructure Improvement	VDOT and Residential Development[1]	2.55	**
SC9204	Stream Restoration	VDOT, FCPA, Private Residential, Reserve HOA, and Scotts Run HOA[1]	2.75	E
SC9206	Stream Restoration	VDOT and Private Residential[1]	2.75	E
SC9210	Stream Restoration	VDOT and Private Residential[1]	2.65	E
SC9672	Flood Protection Project	Private Residential[1]	2.40	E
SC9781	Fecal Coliform Source Study	Watershed-wide Project	1.50	E

[1]These projects will require coordination with land owners prior to implementation to determine cost sharing and project schedule.

*All public education and outreach projects will be implemented for the entire 25-year period.

**These projects will be coordinated directly with VDOT.