

Chapter 2: Watershed Management Area Characterization

2.0 WATERSHED MANAGEMENT AREA CHARACTERIZATION

2.1 Introduction

The Environmental Protection Agency (EPA) considers, a **watershed** as “the area in which all water, sediments, and dissolved materials flow or drain from the land into a common river, lake, ocean, or other body of water (EPA, <http://www.epa.gov/owow/watershed/what.html>)”. Watersheds are also known as drainage basins and can be defined by the topography of the land. The Chesapeake Bay watershed which spans more than 64,000 square miles and falls within Virginia, West Virginia, Maryland, Delaware, New York, Pennsylvania, and the entire District of Columbia and is one of the largest watersheds in the country. Each State has a unique approach to managing their smaller watersheds within the Chesapeake Bay. The Pohick Creek watershed is located in the Chesapeake Bay watershed and is one of 30 major watersheds within Fairfax County.

Consisting of more than 36 square miles, the Pohick Creek watershed is one of the larger watersheds in the County. Based on the terrain, the watershed is naturally divided into ten (10) smaller **watershed management areas** (WMAs). WMAs typically consist of a small area approximately 4 square miles which drains to a specific stream or tributary. Table 12 below identifies the 10 WMAs within Pohick Creek. Refer to **Map 2.1-1** for the locations of each WMA within Pohick Creek. For Fairfax County planning and management purposes, WMA are further subdivided into smaller **subwatersheds**, typically 100-300 acres. Refer to **Map 2.1-2** for the locations of each of the subwatersheds within Pohick Creek. These areas can be used to identify specific projects or opportunities to enhance the overall stream conditions, as well as serving as the basic units for watershed modeling and other evaluations.

Table 12: Pohick Creek Watershed Management Areas

WMA:	Sq. Miles	Acres
1 Pohick - Rabbit Branch	3.95	2524.90
2 Pohick - Sideburn Branch	3.61	2307.90
3 Pohick - Upper South Run	3.19	2040.74
4 Pohick - Middle South Run	2.95	1889.12
5 Pohick - Lower South Run	3.04	1947.69
6 Pohick - Middle Run	3.97	2540.17
7 Pohick - Upper	4.85	3104.70
8 Pohick - Middle	4.71	3014.60
9 Pohick - Lower	3.67	2346.46
10 Pohick - Potomac	2.39	1532.42
Total	36.33	23,248.71

2.1.1 Tributaries /Streams

Pohick Creek watershed contains more than 180 miles of stream within the 10 watershed management areas. Included in the 10 watershed management areas are 13 named tributaries. A tributary is considered a stream or a river that flows into a mainstem or a larger river. In

addition to the 13 named tributaries, there are numerous unnamed tributaries; however the 13 named tributaries collect the majority of the water for the watershed.

In the northern portions of the watershed two main tributaries converge into Pohick Creek stream, the mainstem for the watershed. The Rabbit Branch tributary begins in the highly developed areas of George Mason University and Fairfax City while Sideburn Branch tributary begins in the highly developed area southwest of George Mason University. These two tributaries are considered Pohick Creek’s main contributors. The Middle Run tributary drains Huntsman Lake and moderately-developed residential areas. The South Run tributary drains Burke Lake and Lake Mercer, as well as the low-density southwestern portion of the watershed. Both Middle Run and South Run contribute substantially to the mainstem’s (Pohick Creek) volume. Hydraulic and hydrological modeling results of the streams can be found in Section 2.4

2.1.2 Perennial Streams and Resource Protection Area

While Pohick Creek has more than 180 miles of streams, only 66% or 121 miles are considered perennial streams. A perennial stream can be defined as a stream which has continuous flow in its channel year round. The remaining streams are either intermittent streams which flow during normal rainfall and can continue to flow for a few weeks or months or ephemeral streams which typically only flow for only a few hours during and after a rain event. Many of the streams in the Pohick Creek watershed are protected under the Chesapeake Bay Preservation Act. Under the Act, Resource Protection Area (RPAs) were established to help protect perennial streams from degradation and to reduce pollutants reaching the Chesapeake Bay. Table 13 below illustrates the break out of stream miles per watershed management area of perennial streams and RPAs. Since the County adoption of the Chesapeake Bay Preservation Ordinance in 1993, throughout the years, additional RPA areas have been identified and added to the County inventory and are reflected in the table below.

Table 13: WMA Perennial & RPA streams*

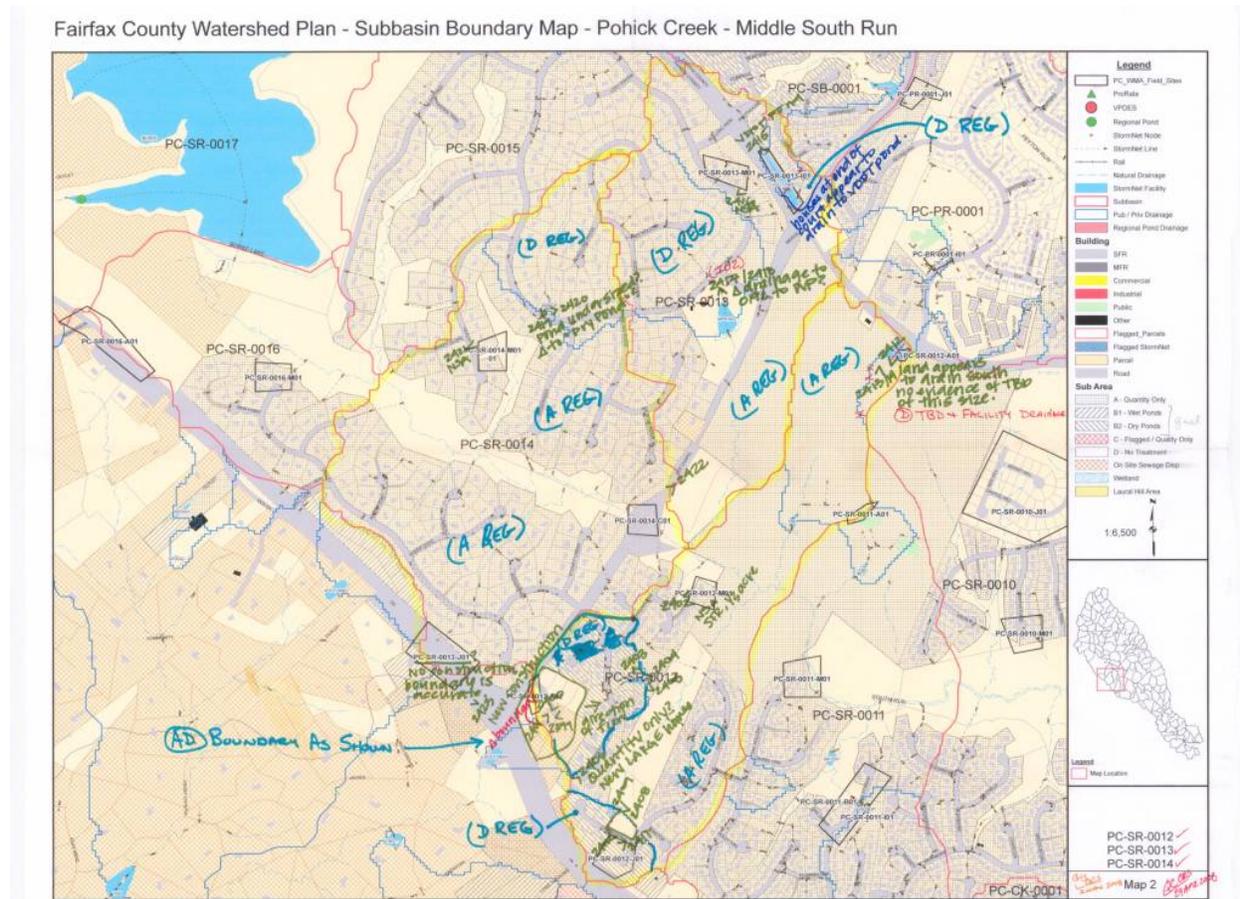
WMA	Total Stream Miles	Perennial Stream Miles	Stream miles within 1993 RPA	Added Stream miles within 2003 RPA	Added Stream miles within 2005 RPA
Rabbit Branch	15.50	11.68	7.78	5.37	0.04
Sideburn Branch	15.40	9.43	4.51	6.64	0.04
Upper South Run	12.90	5.01	1.81	4.31	0.00
Middle South Run	16.06	8.64	5.12	4.92	0.07
Lower South Run	23.81	15.15	13.77	3.88	0.07
Middle Run	20.23	11.33	8.66	4.99	0.32
Upper	21.48	14.23	10.12	6.75	0.23
Middle	29.84	22.61	19.24	5.21	0.56
Lower	16.28	12.47	10.60	1.41	0.25
Potomac	11.30	10.60	6.05	1.36	0.00
Total	182.80	121.15	87.65	44.84	1.58

*Stream miles: FFX Co. GIS data layers

2.2 Current Conditions

Field reconnaissance was conducted to update/supplement existing Fairfax County geographic data so current field conditions would be accurately represented. Once this data was acquired, spatial analysis was performed to characterize county watersheds as they currently exist using the county’s geographic information system (GIS). The reconnaissance effort included the identification of pollution sources, current stormwater management and potential restoration opportunities across the various watersheds.

Field maps, photos and data forms were used to capture current watershed conditions. Below provides an example of one of the field maps used to identify unique issues within the WMA.



Generally, Pohick Creek watershed is characterized by residential land uses, the most prevalent of which appears as single family detached housing units. Commercial and limited industrial uses are also found in the watershed, primarily centered on the service industries that support residential development, such as shopping centers, transit facilities, and schools. Although the watershed was primarily developed during the period between the early 1960’s and the mid 1980’s, limited development in the watershed has continued into the present day. Several areas within the watershed demonstrate significant, redevelopment efforts. These areas include

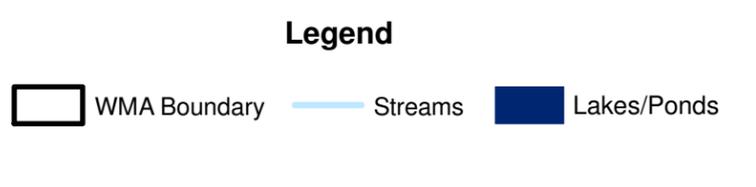
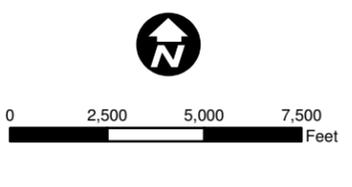
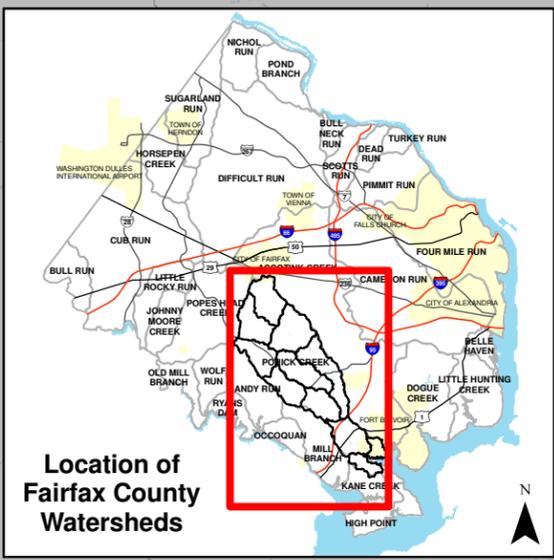
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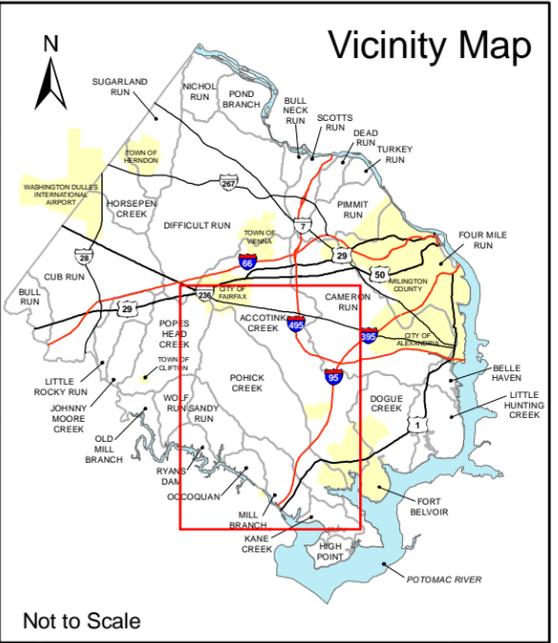
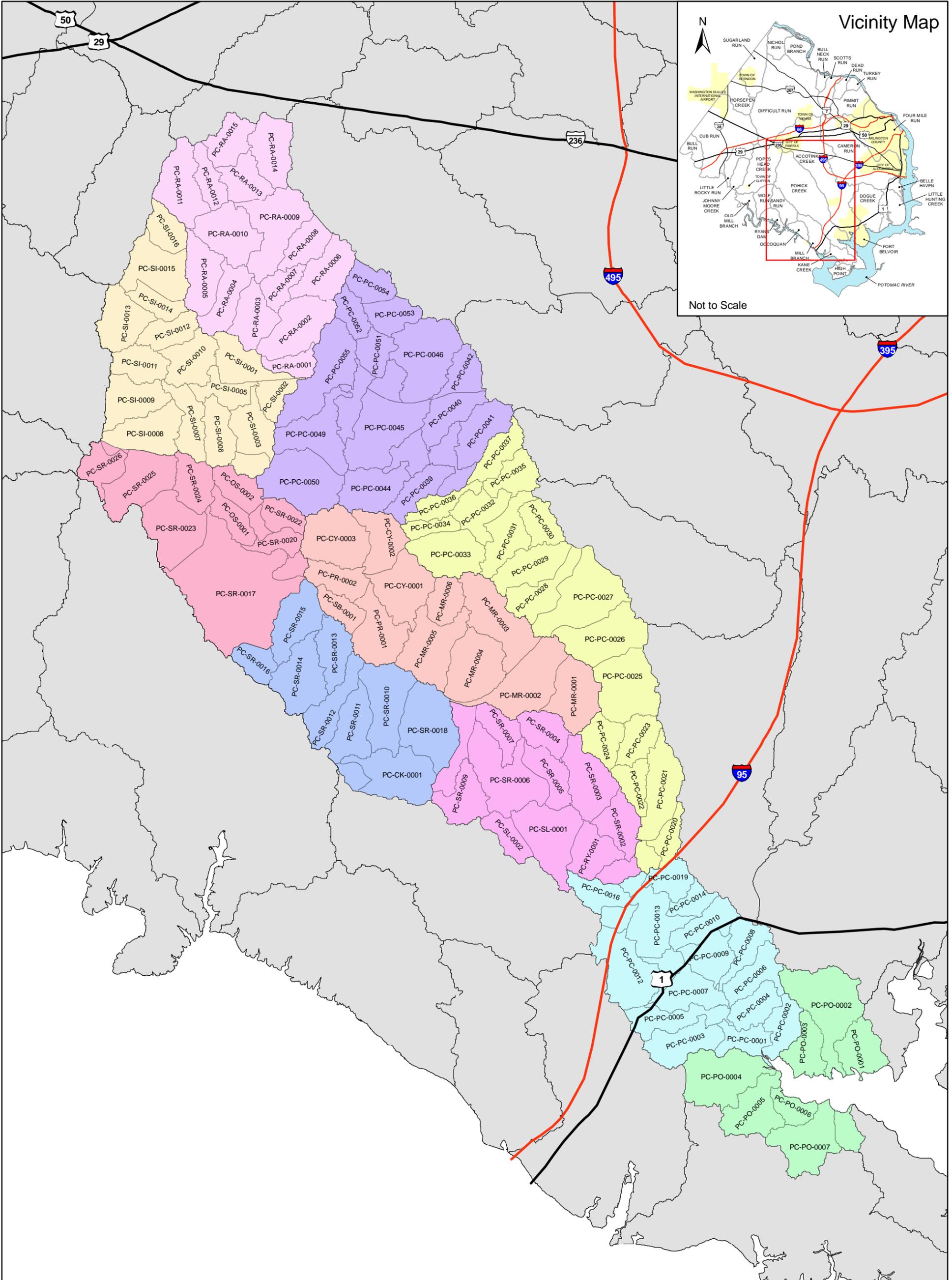
portions of George Mason University in the northern headwaters, to portions of Fort Belvoir and other federally managed lands in close proximity, to a large redevelopment project at Laurel Hill in the watershed's southern region.

The Pohick Creek watershed contains six flood control lakes, built by the United States Department of Agriculture, Natural Resources Conservation Service under the authority of Public Law 83-566 (PL-566) as part of the Pohick Creek Watershed Protection and Flood Prevention Project, around which substantial residential property development has taken place. The western portion of the watershed contains Burke Lake Park, an 888 acre park built around a 218 acre recreational lake, Burke Lake. Additional infrastructure serving the Pohick Creek watershed includes a number of major transportation arteries in Fairfax County, including the Fairfax County Parkway, which bisects the watershed, and Interstate 95, running across the southern, downstream portion of the watershed.

A description of the findings in each WMA is listed in the following sections including field reconnaissance findings, existing and future land use, stream conditions, and stormwater infrastructure. Each WMA was examined at the subwatershed level in order to capture as much data as possible.



**Map 2.1-1
Pohick Watershed**



0 0.5 1 Miles

Legend

US Highway	Non-Pohick WMAs	Pohick Creek Middle	Middle South Run
State Highway	Rabbit Branch	Pohick Creek Upper	Lower South Run
Interstate	Sideburn Branch	Middle Run	Potomac
	Pohick Creek- Lower	Upper South Run	

Map 2.1-2
Pohick Creek Subwatersheds

2.2.1 Rabbit Branch

Field Reconnaissance

The Rabbit Branch WMA is located in the northern portion of the Pohick Creek watershed and contains a total of 15 subwatersheds. The Rabbit Branch WMA includes several major arterial roadways, including Braddock Road, which bisects the WMA in the northern portion and Guinea Road, which forms a portion of the WMA's southern and eastern border. The upper reaches of the Rabbit Branch WMA, north of Braddock Road, include a portion of the City of Fairfax and a portion of the George Mason University campus. While both the City and the University operate independent of Fairfax County, each manages property in the upstream reaches of the Rabbit Branch WMA, and as such, impacts the watershed. George Mason University's campus includes multiple institutional structures with associated impervious areas (sidewalks, parking lots, etc). The City of Fairfax's portion of the WMA is characterized by intensely developed residential and associated service industry development.

The Fairfax County portion of the Rabbit Branch WMA is comprised primarily of single family detached residential properties. The majority of the observed single family detached dwellings were constructed on estimated ¼ acre lots configured in multiple subdivisions, including some larger subdivisions such as Kings Park West, the Twinbrook area, and the Reserve at Martin's Point. The residential development, while primarily featuring ¼ acre lots sizes, proves fairly dense as many of the subdivision design layouts include street patterns terminating in cul-de-sacs (i.e. not as many through streets). The age of development in this WMA ranges from an estimated 40 years old up to new construction (within the past two to three years), including some evidence of recent infill development. Land cover consists primarily of impervious surface associated with residential development (i.e. rooftops, streets and driveways, sidewalks, etc.) and associated landscaping, including managed turf. Curb and gutter on streets was observed as almost universally present in the Rabbit Branch WMA.

The Rabbit Branch WMA includes Lake Royal, a PL-566 flood control structure completed in 1977, as well as several stream valley parks, including Pohick Stream Valley Park and Crooked Creek Park. Observed stormwater management facilities in the Rabbit Branch WMA consist primarily of dry detention basins, typically designed for stormwater volume control and not for water quality treatment. Among the non-residential land uses observed, Rabbit Branch contains some commercial developments, primarily associated with industries/activities supporting residential development, including the Twinbrook shopping center. The most significant institutional facilities observed in this WMA is a southern portion of the George Mason University campus; Robinson Secondary School to the west along Sideburn Road, and Laurel Ridge Elementary School.

Impervious Areas and Treatment Types

Increased impervious surfaces can result in channel erosion and downstream degradation. Water discharging from an impervious surface does not have time to slow down or infiltrate into the ground. This increases the quantity and velocity of stormwater runoff. This increased discharge into receiving waters begins to degrade the banks of the streams and instream habitat. It has been shown that levels of 10-20% impervious surface can significantly reduce the overall health

of a stream (Annual Report, 2005). As one method of preventing stream degradation, stormwater management detention facilities are used throughout Fairfax County. By utilizing land use data and the contributing areas which drain to these stormwater management detention facilities, the County can identify areas of impervious surfaces and trace the flow path of the resulting discharges and quantify the treatment provided by the specific type of stormwater management detention facility. Below are the four primary stormwater management facility types and treatment provided.

- *Quantity* -Detention storage facilities that only provide quantity control
- *Quality*: -Detention storage facilities that only provide quality control
- *Quantity & Quality*:-Detention storage facilities that provide quantity + quality control
- *None*: -Areas that do not drain to detention facilities (uncontrolled runoff/no treatment), however some of these areas also are undeveloped open space and parks and therefore were not designed to capture and treat rainfall runoff.

Utilizing the Technical Memorandum 3 guidance document, Table 14 below identifies the current and future impervious surface areas based on the existing and future land use conditions for Rabbit Branch as well as the associated treatment types. See **Map 2.2.1-1** for existing and future land use for Rabbit Branch. As expected Rabbit Branch WMA is fully developed and contains a large percentage of impervious areas. In addition, much of stormwater management treatment consists of quantity only which is consistent with older development.

Table 14: Rabbit Branch Impervious Areas and Treatment Types

WMA Name	Percent Impervious				Current Treatment Types			
	Current Condition		Ultimate Condition		Quantity	Quality	Quantity/ Quality	None
	(acres)	%	(acres)	%	(acres)	(acres)	(acres)	(acres)
Rabbit Branch	701.93	27.80	707.03	28.00	107.53	14.12	90.43	2312.82

Stormwater Infrastructure

During the watershed’s development, a series of flood control lakes were constructed in the watershed between 1970 and 1985 under the federal Watershed Protection and Flood Prevention Act (PL 566) of 1954. These lakes (Lake Royal, Lake Barton, Woodglen Lake, Lake Braddock, Lake Mercer, and Huntsman Lake) all provide significant flood control capacity in residentially developed areas.

Map 2.2.1-2 demonstrates the observed stormwater infrastructure conditions in the Rabbit Branch WMA. Stormwater infrastructure consists primarily of curb and gutter stormwater collection leading to a piped network of storm drains discharging to either dry detention basins or directly into Rabbit Branch and its associated stream valleys and tributaries on the way downstream to Lake Royal. The Rabbit Branch WMA contains approximately 25 dry detention facilities designed to manage stormwater quantity. In addition, the WMA contains two underground chambers, which store stormwater runoff in underground vaults and release the water at a slower pace (much like the peak flow attenuation employed in dry detention basins)

and one infiltration trench, which is a stormwater quality component designed to allow for the infiltration of stormwater into the ground rather than having the stormwater runoff directed to a control structure for treatment.

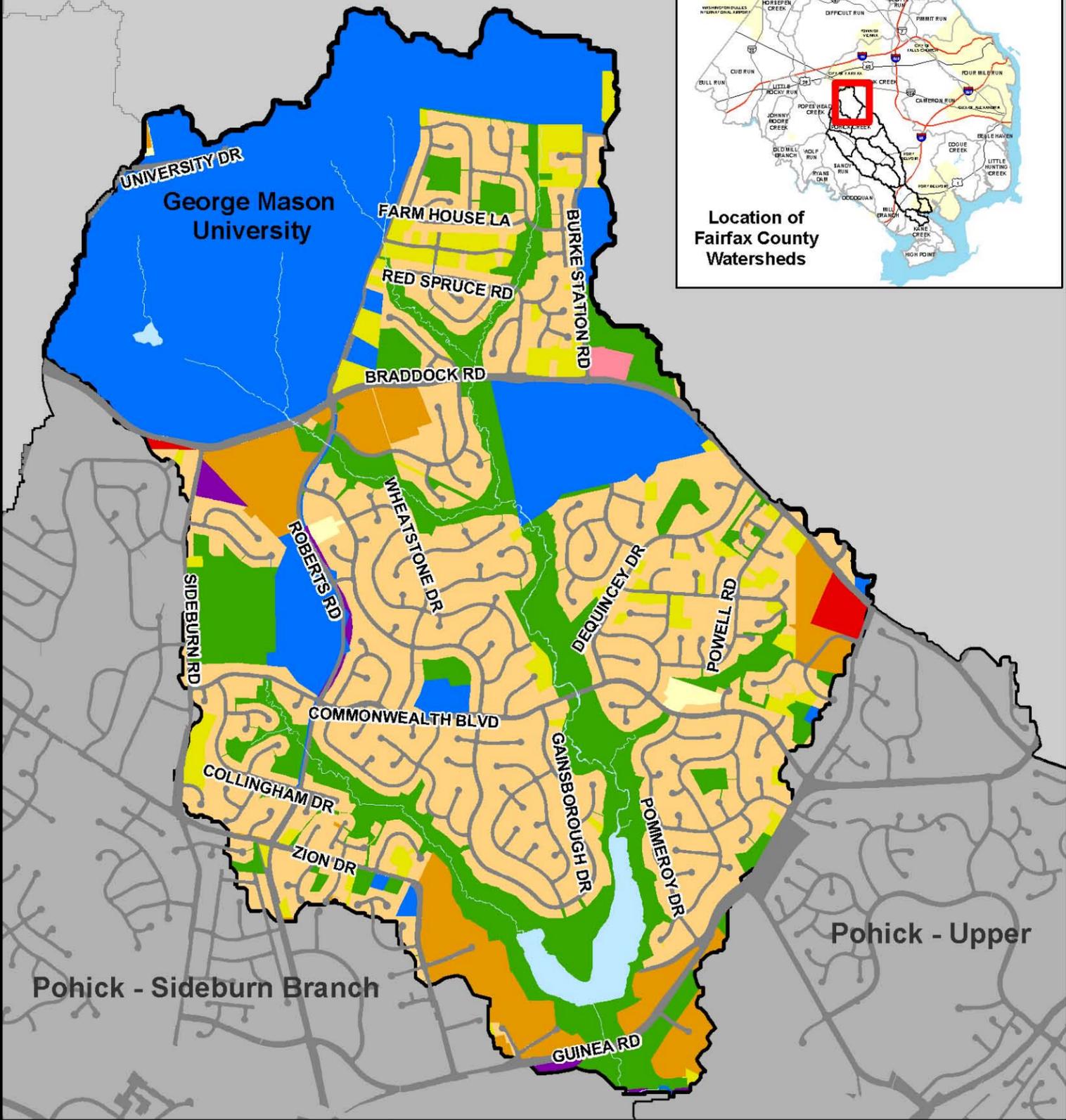
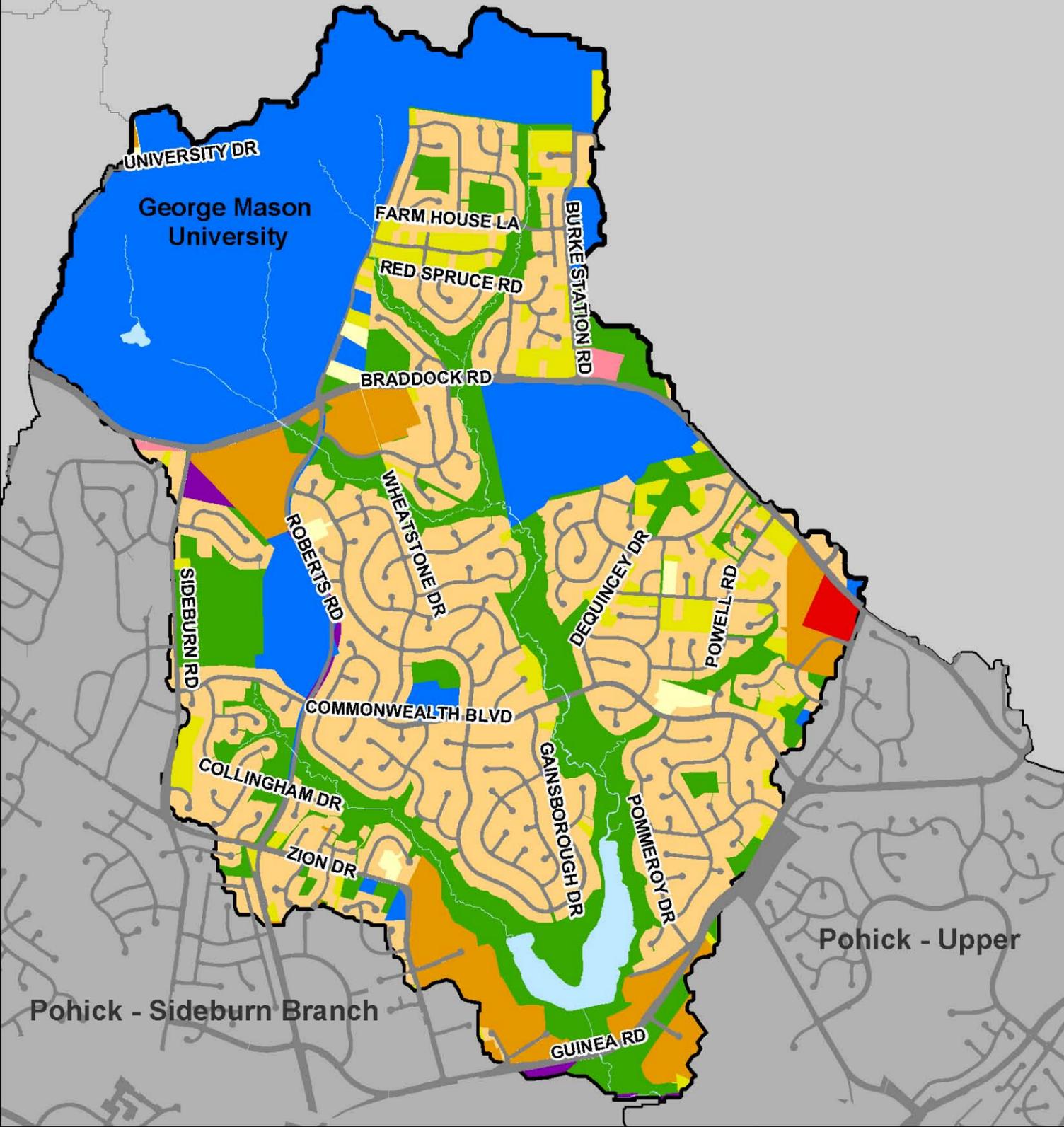
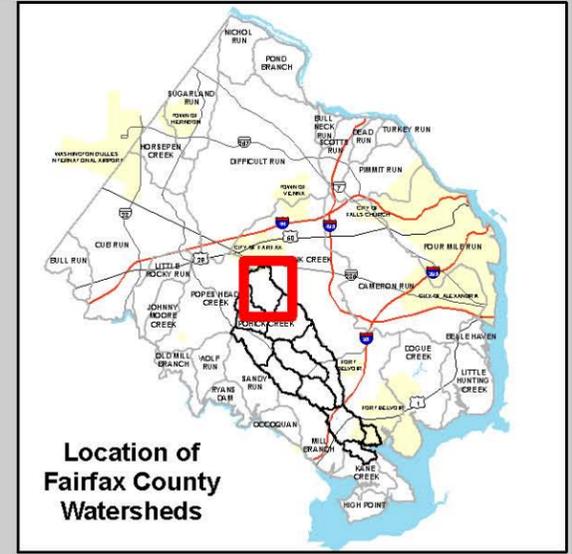
Stream Conditions

The Stream Conditions **Map 2.2.1-3** denotes the generally observed stream conditions as documented in the 2005 SPA and through additional, windshield level field reconnaissance performed for this study. The Stream Conditions Map demonstrates the general conditions of the main stem streams and tributaries in the WMA along with a series of features that typically impact stream condition, including stream channel erosion, channel widening, stream buffer condition, discharge pipe and ditch impacts, and utility and road crossing impacts.

In the Rabbit Branch WMA, the most prevalent stream condition features noted include disturbed stream buffers and stream channel erosion and/or widening. In addition, pipe discharge and ditch discharge into the WMA's streams have a demonstrated impact as well, as these pipes and ditches discharge stormwater runoff directly into the streams in many instances, contributing to the observed widening and erosive conditions. Utility and crossing impacts in the Rabbit Branch WMA are generally minor. Instances of demonstrated stream head cutting, or an abrupt vertical drop in the bed of a stream channel that demonstrates active erosion (NC DWQ, 2005), were limited, with two instances recorded in the south western portion of the WMA at points where streams made significant turns.

Current Landuse Pohick - Rabbit Branch

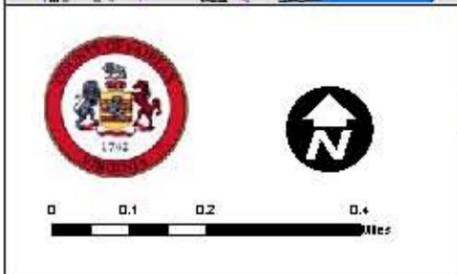
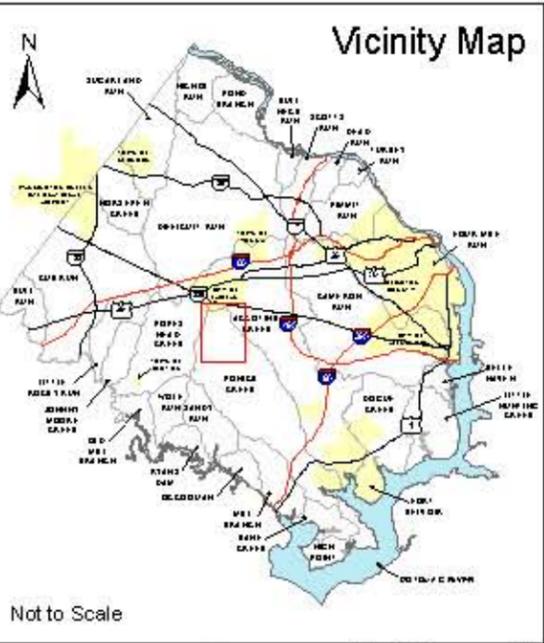
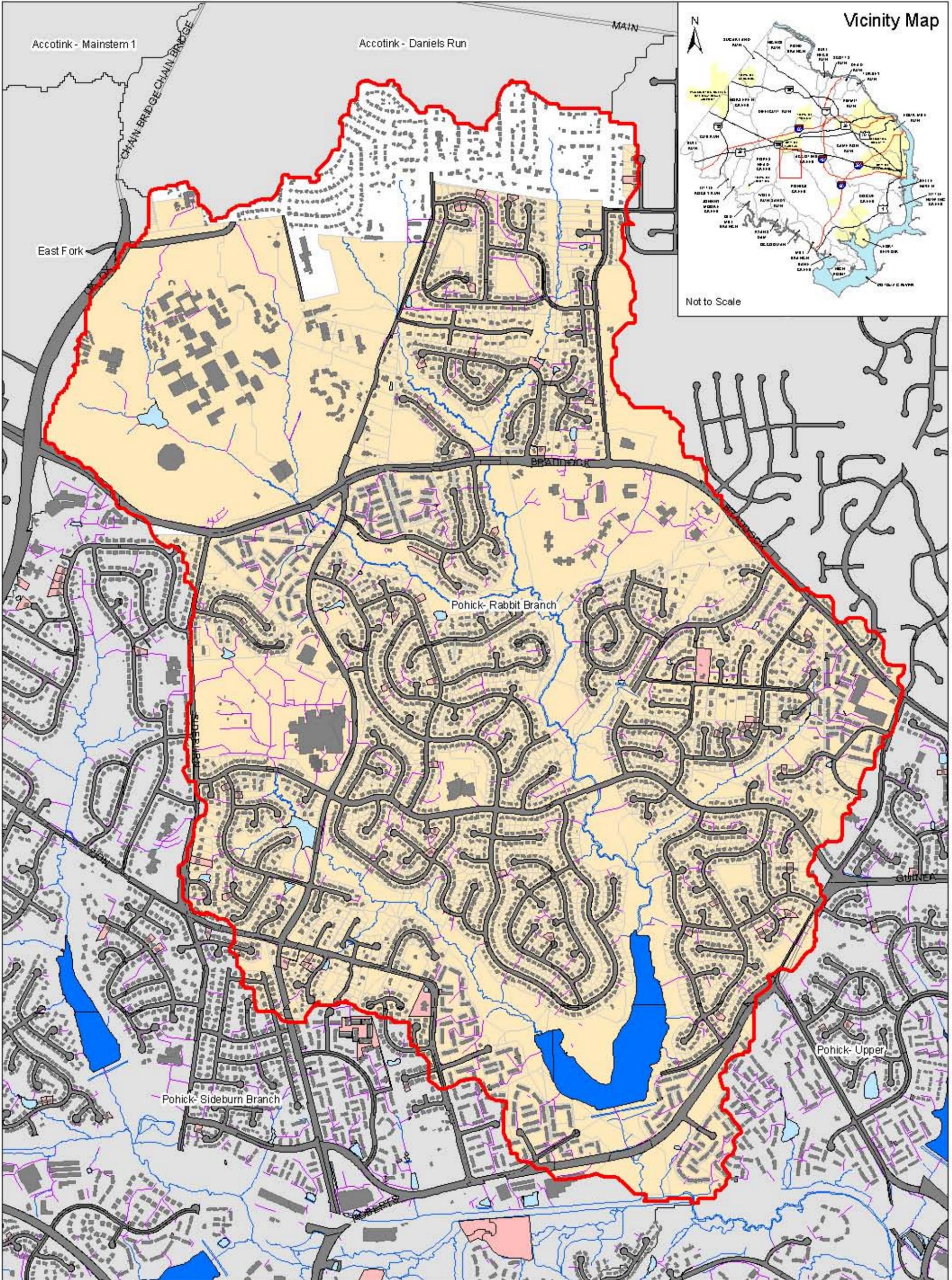
Future Landuse Pohick - Rabbit Branch



Legend

WMA Boundary	Estate Residential	Institutional
Open Space	Low Density Residential	Low Intensity Commercial
Forested	Medium Density Residential	High Intensity Commercial
Golf Course	High Density Residential	Industrial
	Transportation	Water

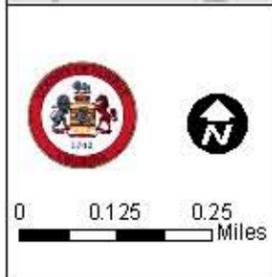
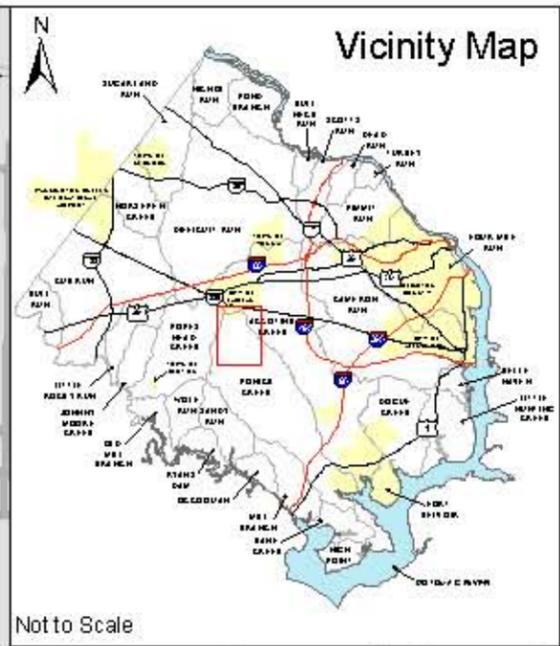
**Map 2.2.1-1
Pohick Creek- Rabbit Branch
Existing and Future Land Use**



Legend

Storm Drainage	Roads	Drainage Complaints	WMA - Other
Rivers and Streams	Subbasins	Storm Drainage Facilities	Pohick - Rabbit Branch
Buildings	Lake		

Map 2.2.1-2
 Pohick Creek
 Rabbit Branch
 Stormwater Infrastructure



Legend						
Poor/Very Poor Habitat	CEM - Type 2: Incision	Disturbed Buffer	Lake	Other WMA Boundaries	Pohick - Rabbit Branch	
Streams and Rivers	CEM - Type 3: Widening	Roads	Storm Drainage Facilities			
Erosion/Bank Instability						
Obstruction Impact	Dump Site Impact	Head Cut Height	Pipe Impact	Ditch Impact	Utility Impact	Crossing Impact
Minor to Moderate	Minor to Moderate	0.5' - 1'	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate
Moderate to Severe	Moderate to Severe	1' - 2'	Moderate to Severe	Moderate to Severe	Moderate to Severe	Moderate to Severe
Severe to Extreme	Severe to Extreme	>2'	Severe to Extreme	Severe to Extreme	Severe to Extreme	Severe to Extreme

Map 2.2.1-3

Pohick Creek Rabbit Branch Stream Conditions

2.2.2 Sideburn Branch

Field Reconnaissance

The Sideburn Branch WMA is located in the north western portion of the Pohick Creek watershed and contains a total of 16 subwatersheds. The Sideburn Branch WMA is bordered on the west by Ox Road (Route 123) and is bisected in the southern portion by Burke Centre Parkway, with the Fairfax County Parkway forming a portion of the WMA's southern boundary. The upper reaches of the Sideburn Branch WMA include a portion of the intersection Route 123 and Braddock Road, including the University Mall development. The Sideburn Branch WMA is comprised primarily of single family detached residential properties. While the majority of the observed single family detached dwellings were constructed on estimated ¼ to ½ acre lots, the residential development in this WMA is largely characterized by street patterns terminating in cul-de-sacs (i.e. not as many through streets). The Sideburn Branch WMA includes the Burke Centre subdivision, which also includes the Burke Centre Conservancy, which manages several stream valley parks in the area. The age of development in this WMA ranges from an estimated 30 plus years up to approximately 10 to 15 years. Very little evidence of recent infill was observed. Land cover consists primarily of impervious surface associated with residential development (i.e. rooftops, streets and driveways, sidewalks, etc.) and associated landscaping, including managed turf. Curb and gutter was almost universally observed in this area.

The Sideburn Branch WMA includes two PL-566 flood control structures built in the 1970's and early 1980's; Lake Barton, built in 1978 and Woodglen Lake, completed in 1981. In addition, the Sideburn Branch WMA includes several stream valley parks, including a portion of the Pohick Creek Stream Valley Park and the Woodglen Lake Park. Observed stormwater management facilities in the Sideburn Branch WMA consist primarily of dry detention basins. Among the non-residential land uses observed, Sideburn Branch contains several commercial developments, primarily associated with industries/activities supporting residential development, including the University Mall, just outside George Mason University, as well as the Burke Centre Shopping Center. The most significant institutional facilities observed in this WMA are a Virginia Railway Express (VRE) parking facility that was undergoing an expansion in spring 2008; Bonnie Brae Elementary School; and Terra Centre Elementary School.

Impervious Areas and Treatment Types

Increased impervious surfaces can result in channel erosion and downstream degradation. Water discharging from an impervious surface does not have time to slow down or infiltrate into the ground. This increases the quantity and velocity of stormwater runoff. This increased discharge into receiving waters begins to degrade the banks of the streams and instream habitat. It has been shown that levels of 10-20% impervious surface can significantly reduce the overall health of a stream (Annual Report, 2005). As one method of preventing stream degradation, stormwater management detention facilities are used throughout Fairfax County. By utilizing land use data and the contributing areas which drain to these stormwater management detention facilities, the County can identify areas of impervious surfaces and trace the flow path of the resulting discharges and quantify the treatment provided by the specific type of stormwater management detention facility. Below are the four primary stormwater management facility types and treatment provided.

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- *None*: -Areas that do not drain to detention facilities (uncontrolled runoff/no treatment), however some of these areas also are undeveloped open space and parks and therefore were not designed to capture and treat rainfall runoff.

Utilizing the Technical Memorandum 3 guidance document, Table 15 below identifies the current and future impervious surface areas based on the existing and future land use conditions for Sideburn Branch as well as the associated treatment types. See **Map 2.2.2-1** for existing and future land use for Sideburn Branch. As expected Sideburn Branch WMA is fully developed and contains a large percentage of impervious areas. In addition, much of stormwater management treatment consists of quantity only which is consistent with older development.

Table 15: Sideburn Branch Impervious Areas and Treatment Types

WMA Name	Percent Impervious				Current Treatment Types			
	Current Condition		Ultimate Condition		Quantity	Quality	Quantity/ Quality	None
	(acres)	%	(acres)	%	(acres)	(acres)	(acres)	(acres)
Sideburn Branch	756.91	32.61	757.49	32.63	331.37	11.37	78.70	1899.83

Stormwater Infrastructure

During the watershed’s development, a series of flood control lakes were constructed in the watershed between 1970 and 1985 under the federal Watershed Protection and Flood Prevention Act (PL 566) of 1954. These lakes (Lake Royal, Lake Barton, Woodglen Lake, Lake Braddock, Lake Mercer and Huntsman Lake) all provide significant flood control capacity in residentially developed areas.

Map 2.2.2-2 demonstrates the observed stormwater infrastructure conditions in the Sideburn Branch WMA. The upstream portions of the WMA contain stormwater infrastructure consisting primarily of curb and gutter stormwater collection leading to a piped network of storm drains discharging directly into the streams and tributaries leading to Woodglen Lake. Only five stormwater management facilities are evident upstream of Woodglen Lake, including three dry detention basins, one underground chamber, and one sand filter, which is a type of underground device that provides water quality treatment along with quantity control.

The observed stormwater infrastructure condition upstream of Lake Barton is similar to that of Woodglen Lake in that the upstream portions of the Lake Barton area contain stormwater infrastructure consisting primarily of curb and gutter stormwater collection leading to a piped network of storm drains discharging directly into the streams and tributaries leading the lake. Only two confirmed stormwater management facilities, both dry detention basins, exist in the upstream areas of Lake Barton.

Moving downstream to the east, the Sideburn Branch WMA contains approximately 15 dry detention facilities designed to manage stormwater quantity. In addition, the downstream portions of the WMA contain one infiltration trench, which is a stormwater quality component designed to allow for the infiltration of stormwater into the ground rather than having the stormwater runoff directed to a control structure for treatment; one rooftop detention device, which essentially stores rainwater on the roof of a structure and allows for a slower release; and one sand filter.

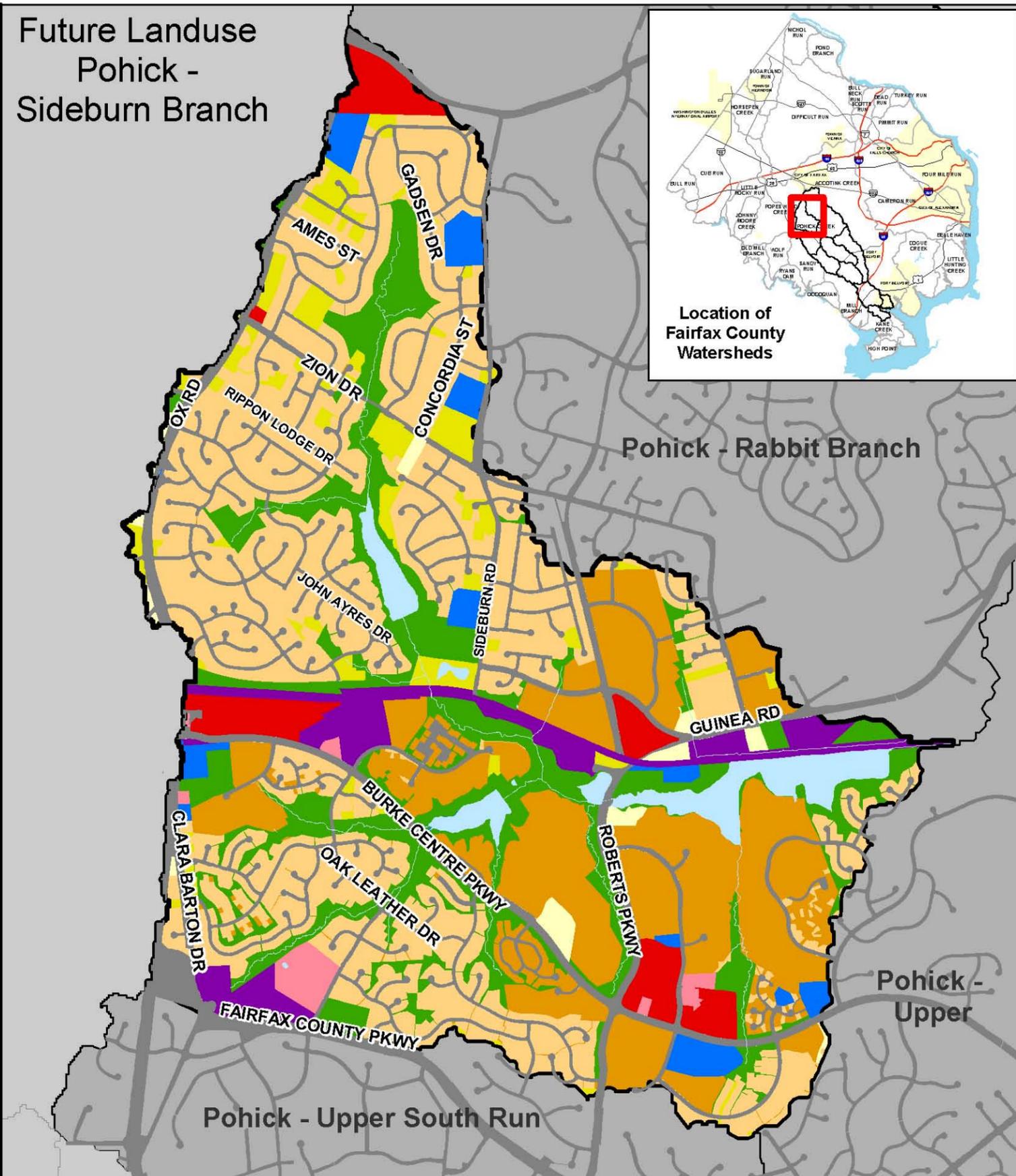
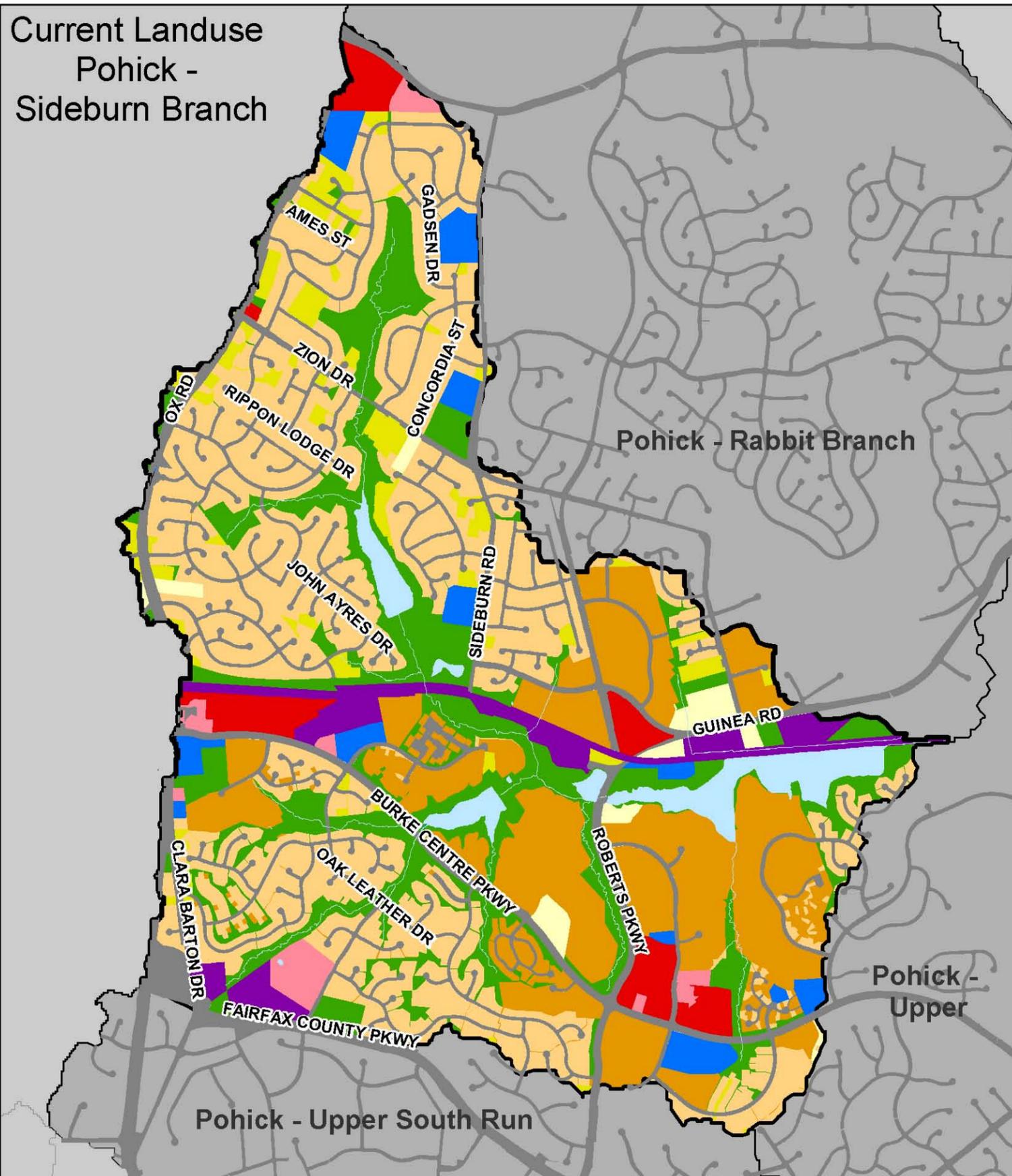
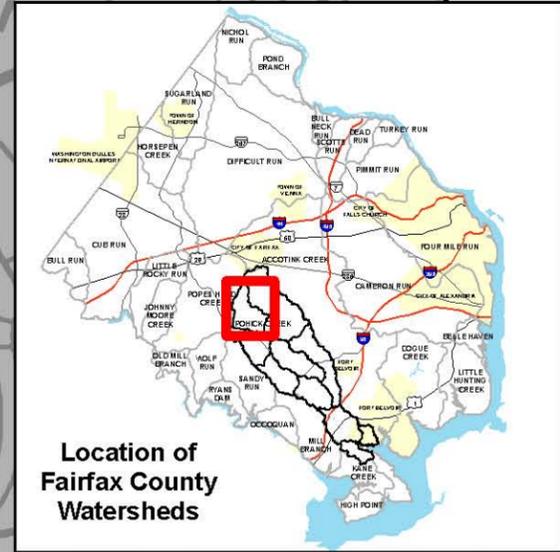
Stream Conditions

The Stream Conditions **Map 2.2.2-3** denotes the generally observed stream conditions as documented in the 2005 SPA and through additional, windshield level field reconnaissance performed for this study. The Stream Conditions Map demonstrates the general conditions of the main stem streams and tributaries in the WMA along with a series of features that typically impact stream condition, including stream channel erosion, channel widening, stream buffer condition, discharge pipe and ditch impacts, and utility and road crossing impacts.

In the Sideburn Branch WMA, the most prevalent stream condition features noted include disturbed stream buffers and stream channel erosion and/or widening. Upstream of Woodglen Lake, significant channel erosion has been documented, along with subsequent channel widening. Buffer disturbances and channel widening conditions have also been documented upstream of Lake Barton. In addition, pipe discharge and ditch discharge into the WMA's streams have a demonstrated impact as well, as these pipes and ditches discharge stormwater runoff directly into the streams in many instances, contributing to the observed widening and erosive conditions. Utility and crossing impacts in the Sideburn Branch WMA are generally minor, with some notable exceptions for significant utility impacts in the downstream tributaries in the eastern portion of the WMA. Instances of demonstrated stream head cutting, or an abrupt vertical drop in the bed of a stream channel that demonstrates active erosion (NC DWQ, 2005), were limited, with one example recorded in the eastern portion of the WMA at a significant turn in the Sideburn Branch tributary. Finally, one potential dump site obstruction was noted at the downstream confluence of the Lake Barton discharge point and the main stem of Sideburn Branch

Current Landuse
Pohick -
Sideburn Branch

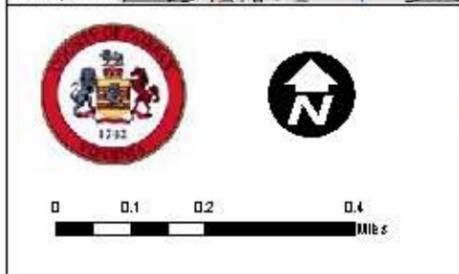
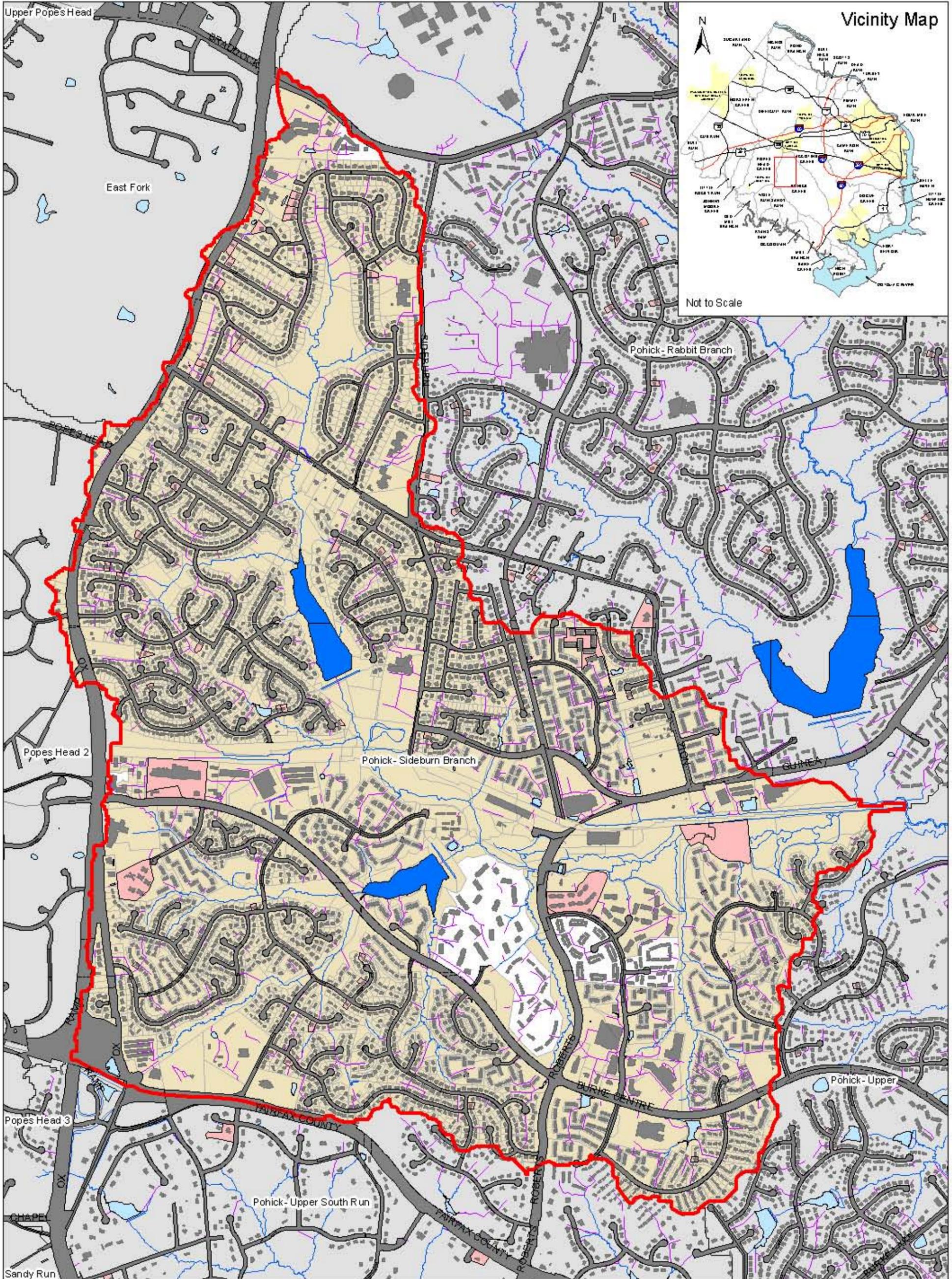
Future Landuse
Pohick -
Sideburn Branch



Legend

WMA Boundary	Estate Residential	Institutional
Open Space	Low Density Residential	Low Intensity Commercial
Forested	Medium Density Residential	High Intensity Commercial
Golf Course	High Density Residential	Industrial
	Transportation	Water

Map 2.2.2-1
Pohick Creek-Sideburn Branch
Existing and Future Land Use



Legend

Storm Drainage	Roads	Drainage Complaints	WMA - Other
Rivers and Streams	Subbasins	Lake	Pohick - Sideburn Branch
Buildings	Storm Drainage Facilities		

Map 2.2.2-2
 Pohick Creek
 Sideburn Branch
 Stormwater Infrastructure

2.2.3 Upper South Run

Field Reconnaissance

The Upper South Run WMA is located in the western portion of the Pohick Creek watershed and contains a total of 11 subwatersheds. The Upper South Run WMA is roughly bounded on the west and south by Ox Road (Route 123) and to the north by the Fairfax County Parkway, which also bisects the WMA in the northeastern portion. The Upper South Run WMA is comprised primarily of single family detached residential properties. The majority of the observed single family detached dwellings were constructed on estimated ¼ to one acre lots, with the denser developments typically appearing in the northern and northeastern portions of the WMA (north of the Fairfax County Parkway). The majority of the residential development in the WMA has been constructed on larger lots (i.e. estate residential). The age of development in this WMA ranges from an estimated 20 to 25 years old (1980's) up to approximately 10 to 15 years old (1990's) with little evidence of recent infill development. Land cover consists primarily of impervious surface associated with residential development (i.e. rooftops, streets and driveways, sidewalks, etc.) and associated landscaping, including managed turf for the larger residential lots. Curb and gutter for streets were intermittently present in the WMA.

The Upper South Run WMA includes Burke Lake, a 218 acre recreational lake that is managed by the Virginia Department of Game and Inland Fisheries (DGIF) and around which the 888 acre Burke Lake Park has been developed. Burke Lake was constructed in the early 1960's for recreational uses, primarily fishing. Burke Lake Park is managed cooperatively by DGIF and the Fairfax County Park Authority. The Upper South Run WMA also includes South Run Stream Valley Park, adjacent to the Fairfax County Parkway. Observed stormwater management facilities in the Upper South Run WMA consist primarily of dry detention basins, typically designed for stormwater volume control and not for water quality treatment. Upper South Run contains some non-residential land uses, including limited commercial development, primarily associated with industries/activities supporting residential development. The most significant institutional facilities observed in this WMA are Burke Lake Park and the Fairfax Baptist Temple and Academy at the intersection of Burke Lake Road and the Fairfax County Parkway.

Impervious Areas and Treatment Types

Increased impervious surfaces can result in channel erosion and downstream degradation. Water discharging from an impervious surface does not have time to slow down or infiltrate into the ground. This increases the quantity and velocity of stormwater runoff. This increased discharge into receiving waters begins to degrade the banks of the streams and instream habitat. It has been shown that levels of 10-20% impervious surface can significantly reduce the overall health of a stream (Annual Report, 2005). As one method of preventing stream degradation, stormwater management detention facilities are used throughout Fairfax County. By utilizing land use data and the contributing areas which drain to these stormwater management detention facilities, the County can identify areas of impervious surfaces and trace the flow path of the resulting discharges and quantify the treatment provided by the specific type of stormwater management detention facility. Below are the four primary stormwater management facility types and treatment provided.

- *Quantity* -Detention storage facilities that only provide quantity control
- *Quality*: -Detention storage facilities that only provide quality control
- *Quantity & Quality*:-Detention storage facilities that provide quantity + quality control
- *None*: -Areas that do not drain to detention facilities (uncontrolled runoff/no treatment, however some of these areas also are undeveloped open space and parks and therefore were not designed to capture and treat rainfall runoff.)

Utilizing the Technical Memorandum 3 guidance document, Table 16 below identifies the current and future impervious surface areas based on the existing and future land use conditions for Upper South Run as well as the associated treatment types. See **Map 2.2.3-1** for existing and future land use for Upper South Run. As expected Upper South Run WMA has a relatively lower percentage of impervious area than the majority of Pohick Creek. This is due to the development of Burke Lake and associated surround parklands.

Table 16: Upper South Run Impervious Areas and Treatment Types

WMA Name	Percent Impervious				Current Treatment Types			
	Current Condition		Ultimate Condition		Quantity (acres)	Quality (acres)	Quantity/ Quality (acres)	None (acres)
	(acres)	%	(acres)	%				
Upper South Run	219.39	10.82	227.48	11.22	133.49	112.71	103.03	1678.13

Stormwater Infrastructure

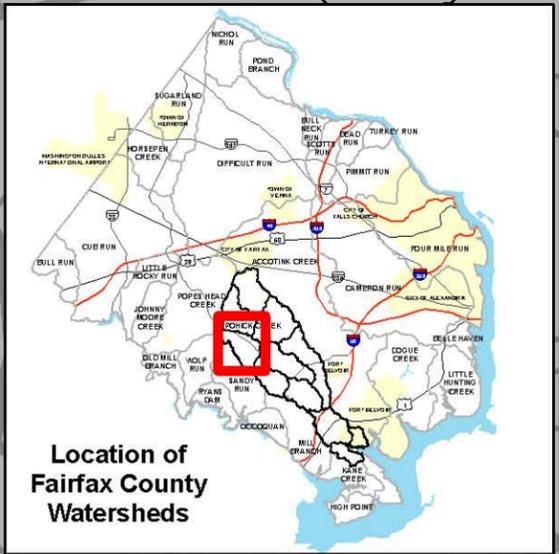
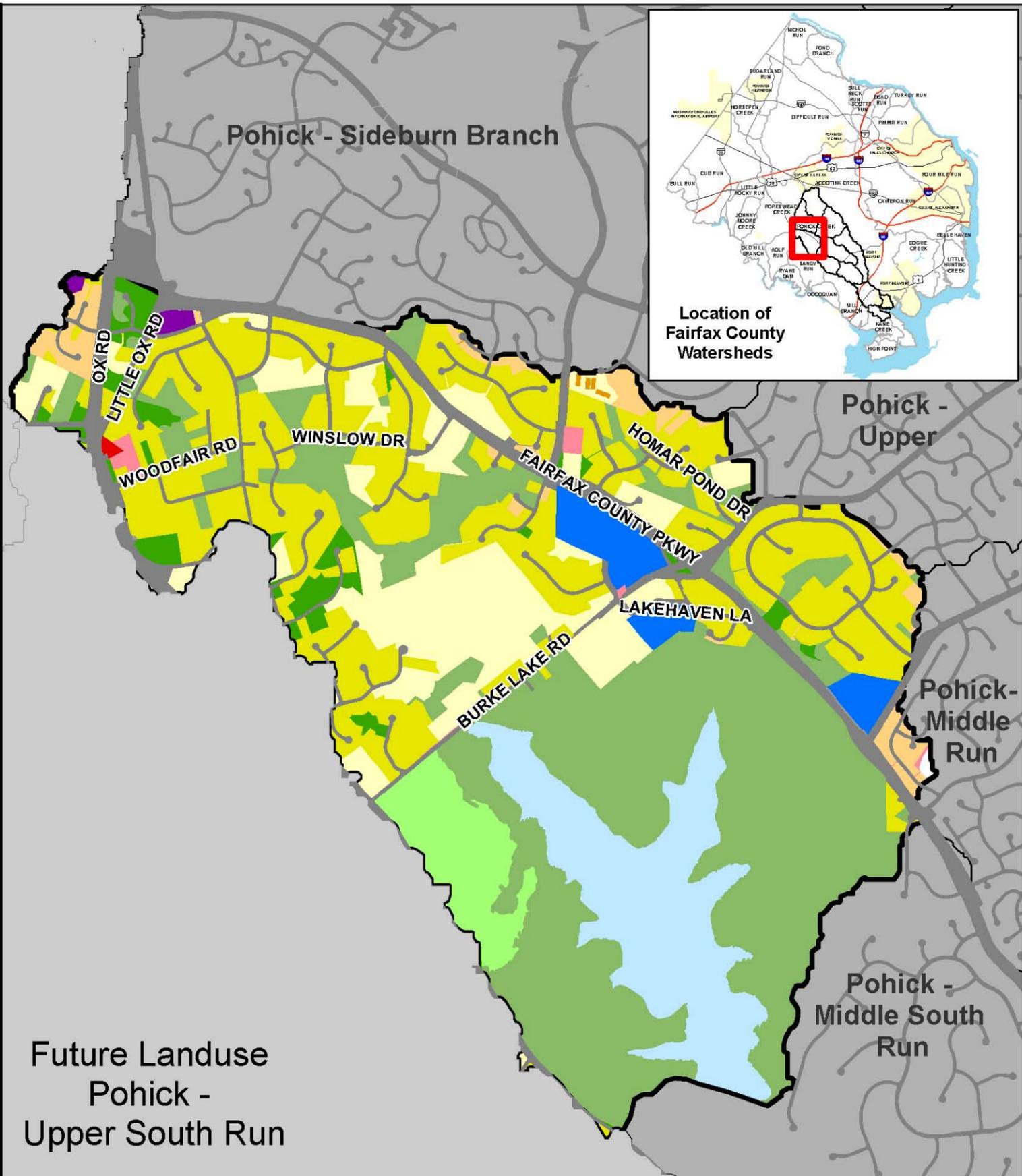
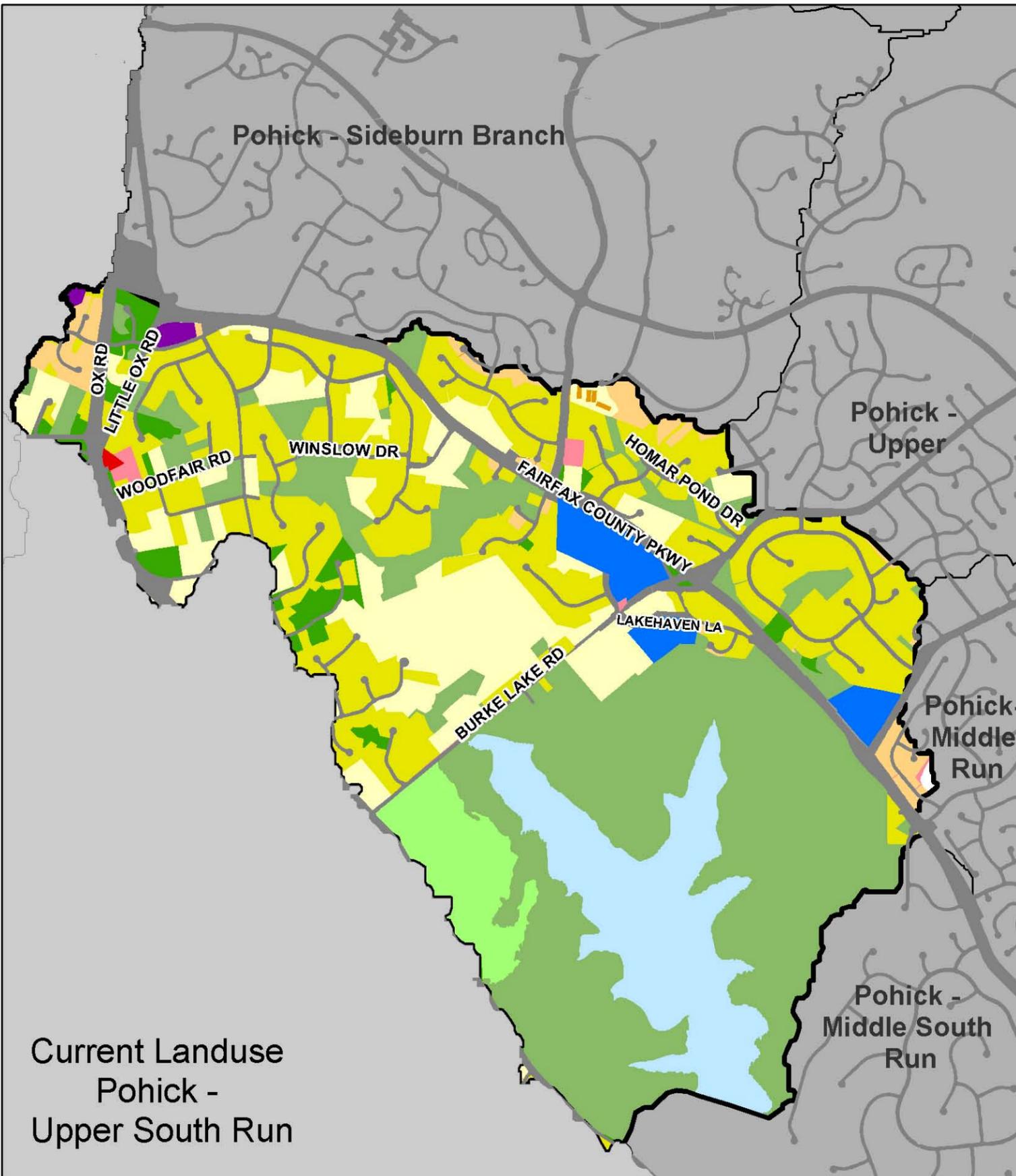
During the watershed’s development, a series of flood control lakes were constructed in the watershed between 1970 and 1985 under the federal Watershed Protection and Flood Prevention Act (PL 566) of 1954. These lakes (Lake Royal, Lake Barton, Woodglen Lake, Lake Braddock, Lake Mercer and Huntsman Lake) all provide significant flood control capacity in residentially developed areas. In addition to the PL 566 facilities, the Pohick Creek watershed also includes Burke Lake, a 218 acre recreational lake that serves as the centerpiece of Burke Lake Park.

Map 2.2.3-2 demonstrates the observed stormwater infrastructure conditions in the Upper South Run WMA. Stormwater infrastructure consists primarily of open channel and overland stormwater collection leading to a limited upstream pipe network of storm drains discharging to either dry detention basins or directly into Upper South Run and its associated stream valleys and tributaries on the way downstream to Burke Lake. Many of the tributaries leading to Burke Lake directly are unimproved. The Upper South Run WMA contains approximately 11 dry detention facilities designed to manage stormwater quantity. In addition, the WMA contains two wet retention basins, which often serve to treat both water quantity and quality, and two infiltration trenches, which is a stormwater quality component designed to allow for the infiltration of stormwater into the ground rather than having the stormwater runoff directed to a control structure for treatment. Roughly half of the stormwater management facilities observed in the Upper South Run WMA are located north of the Fairfax County Parkway in the more densely developed areas of the WMA

Stream Conditions

The Stream Conditions **Map 2.2.3-3** denotes the generally observed stream conditions as documented in the 2005 SPA and through additional, windshield level field reconnaissance performed for this study. The Stream Conditions Map demonstrates the general conditions of the main stem streams and tributaries in the WMA along with a series of features that typically impact stream condition, including stream channel erosion, channel widening, stream buffer condition, discharge pipe and ditch impacts, and utility and road crossing impacts.

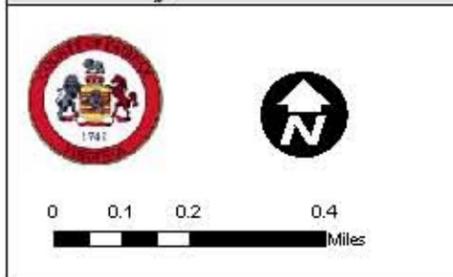
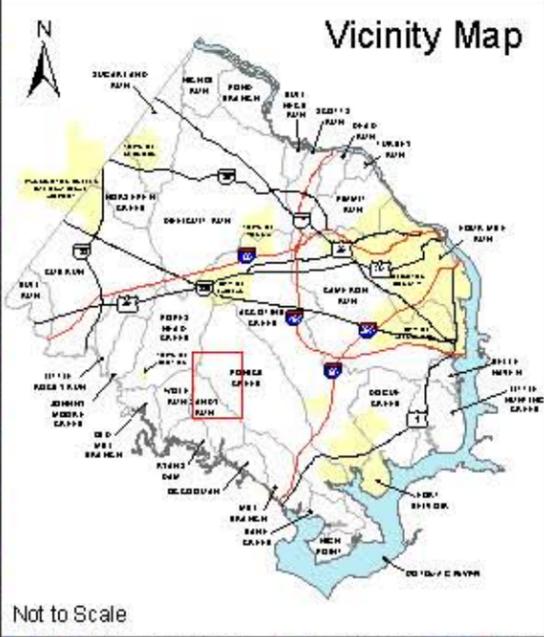
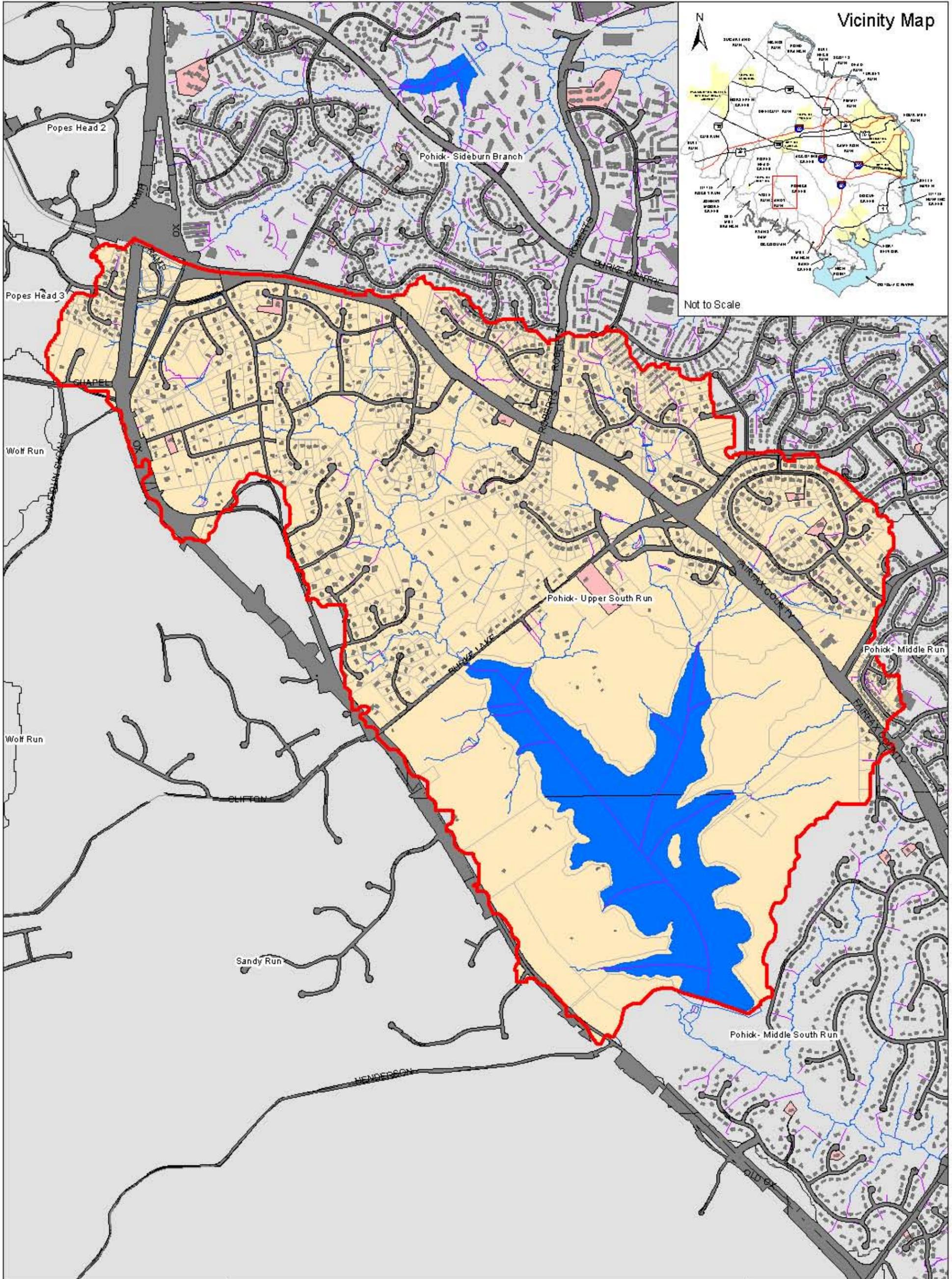
In the Upper South Run WMA, the most prevalent stream condition features noted include disturbed stream buffers upstream of Burke Lake, and stream channel incision and widening in the streams and tributaries closer to Burke Lake. As this WMA contains less curb, gutter, and pipe stormwater infrastructure than others in the Pohick Creek watershed, pipe discharge and ditch discharge into the WMA's streams does not show the impact in this WMA that it does in others in the watershed. However, the Upper South Run WMA does display several significant crossing impacts, particularly the road crossings for the Fairfax County Parkway north of Roberts Road and south of the Burke Lake Road intersection. Additional crossing impacts are seen on Burke Lake Road itself just south of the intersection with the Fairfax County Parkway. Instances of demonstrated stream head cutting, or an abrupt vertical drop in the bed of a stream channel that demonstrates active erosion (NC DWQ, 2005), were limited to two tributaries entering Burke Lake, recorded in the south eastern portion of the WMA.



Legend

WMA Boundary	Estate Residential	Institutional
Open Space	Low Density Residential	Low Intensity Commercial
Forested	Medium Density Residential	High Intensity Commercial
Golf Course	High Density Residential	Industrial
	Transportation	Water

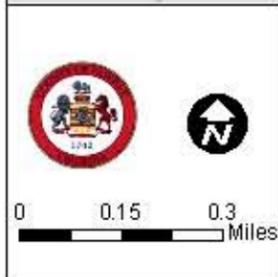
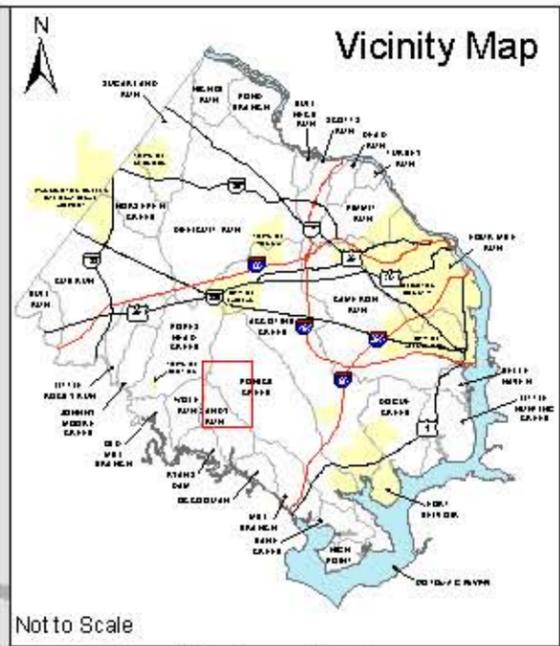
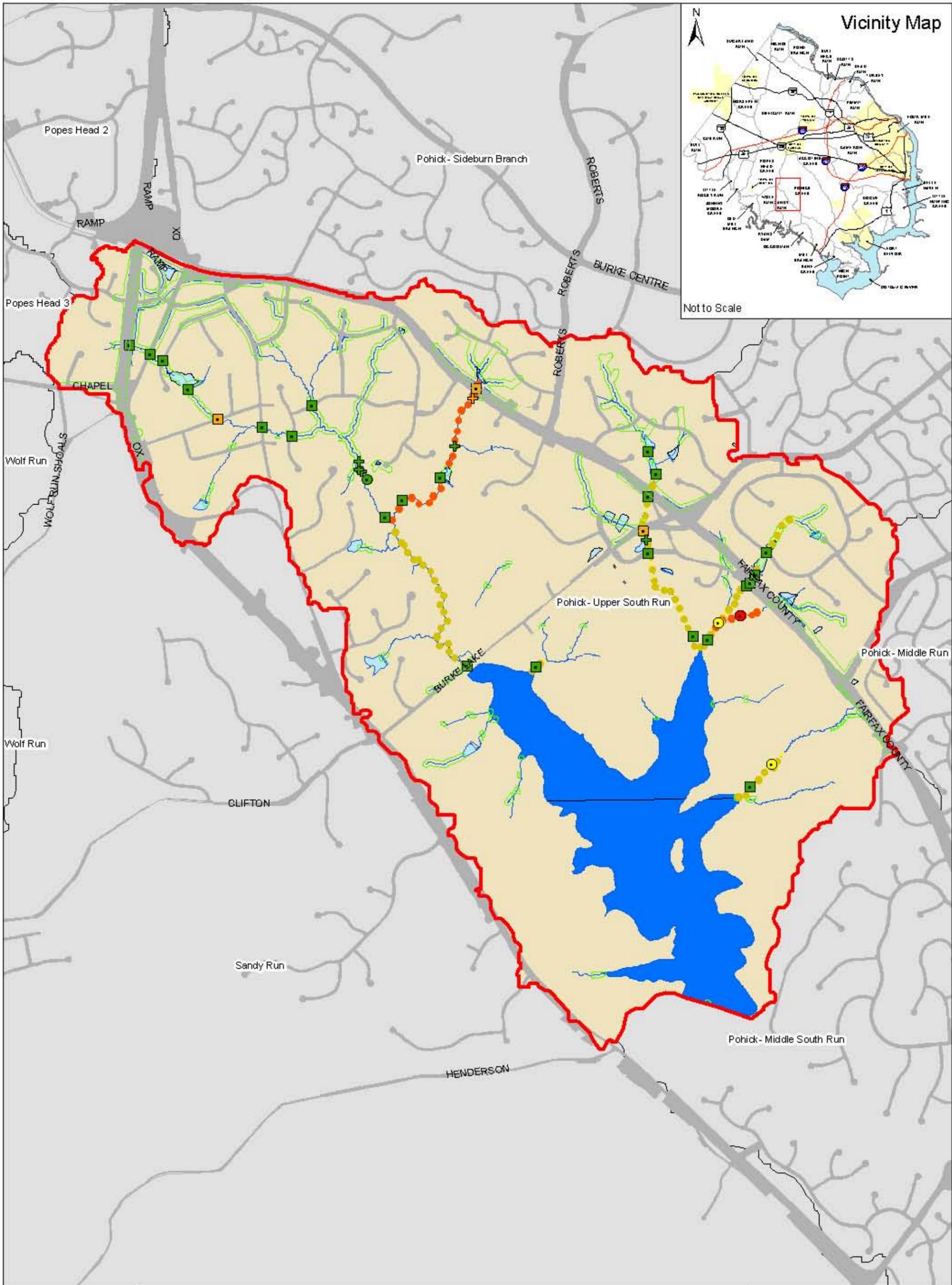
Map 2.2.3-1
Pohick Creek- Upper South Run
Existing and Future Land Use



Legend

Storm Drainage	Roads	Drainage Complaints	WMA - Other
Rivers and Streams	Subbasins	Storm Drainage Facilities	Pohick - Upper South Run
	Buildings	Lake	

Map 2.2.3-2
Pohick Creek
Upper South Run
Stormwater Infrastructure



Legend

Poor/Very Poor Habitat	CEM - Type 2: Incision	Disturbed Buffer	Lake	Other WMA Boundaries
Streams and Rivers	CEM - Type 3: Widening	Roads	Storm Drainage Facilities	Pohick - Upper South Run
Erosion/Bank Instability				

Obstruction Impact	Dump Site Impact	Head Out Height	Pipe Impact	Ditch Impact	Utility Impact	Crossing Impact
Minor to Moderate	Minor to Moderate	0.5' - 1'	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate
Moderate to Severe	Moderate to Severe	1' - 2'	Moderate to Severe	Moderate to Severe	Moderate to Severe	Moderate to Severe
Severe to Extreme	Severe to Extreme	> 2'	Severe to Extreme	Severe to Extreme	Severe to Extreme	Severe to Extreme

Map 2.2.3-3
Pohick Creek
Upper South Run
Stream Conditions