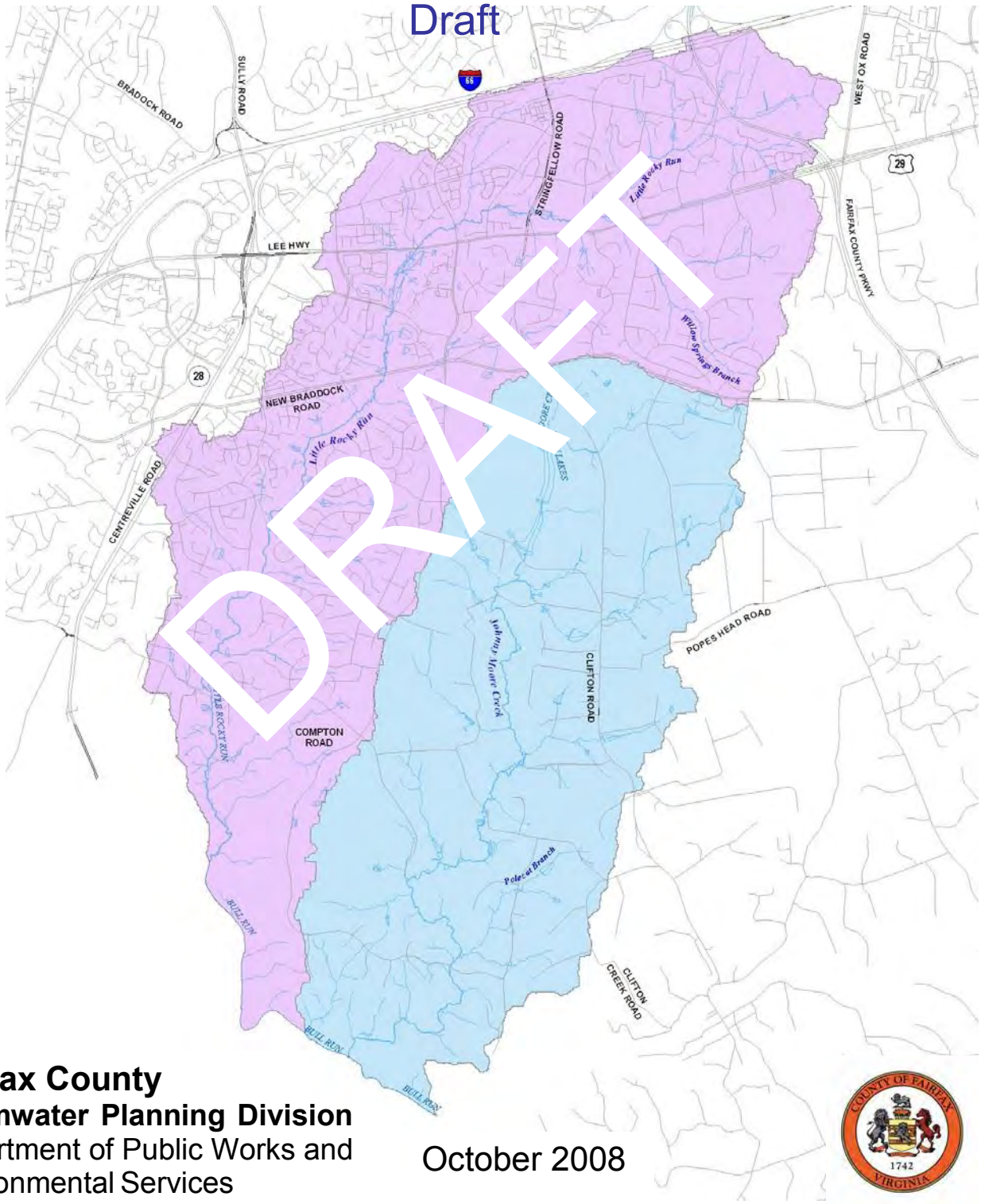
Appendix A – Draft Watershed Workbook

The Draft Watershed Workbook provides background on existing studies on the Little Rocky Run and Johnny Moore Creek watersheds. The draft document was published in October 2008 for the Issues Scoping Forum held October 1, 2008. It was not intended to be updated past this point in the characterization process. Please note that the modeling and mapping information provided in this workbook has since been updated.

Little Rocky Run
Johnny Moore Creek

Watershed Workbook

Draft



Fairfax County
Stormwater Planning Division
Department of Public Works and Environmental Services

October 2008

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Preface

The Little Rocky Run – Johnny Moore Creek Watershed Management Plan is a strategic plan that will protect and improve the water quality within the watershed over the next 25 years. The planning process is in its early stages and will include the participation and recommendations of a watershed advisory group.

Chapter 1 of the plan provides a summary of the data currently available for the watersheds, the policy documents that impact the watershed planning process and proposed projects and improvements that have been identified in the watersheds during previous County studies.

Chapter 2 of the plan provides details about the subwatershed characterization. The information is organized per Watershed Management Area (WMA) and these sections provide more detail about the current watershed conditions. The preliminary modeling that has been performed by the County at this point in the planning process is also summarized. The subwatersheds are ranked based on various indicators and the preliminary results are available to begin the identification of problem areas in the watershed.

When complete, the Little Rocky Run – Johnny Moore Creek Watershed Management Plan will provide strategies for protecting the watersheds and mitigating adverse stream impacts that have occurred, such as stream bank erosion and poor water quality.

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Chapter 1: Compilation of Overall Watershed Condition Data

1.1 Introduction

The Little Rocky Run and Johnny Moore Creek watersheds drain into Bull Run and eventually to the Chesapeake Bay, and are located in the southwestern part of Fairfax County, Virginia, as shown on Figure 1-1. They are bounded to the east by the Popes Head Creek watershed and to the west and north by the Cub Run watershed.

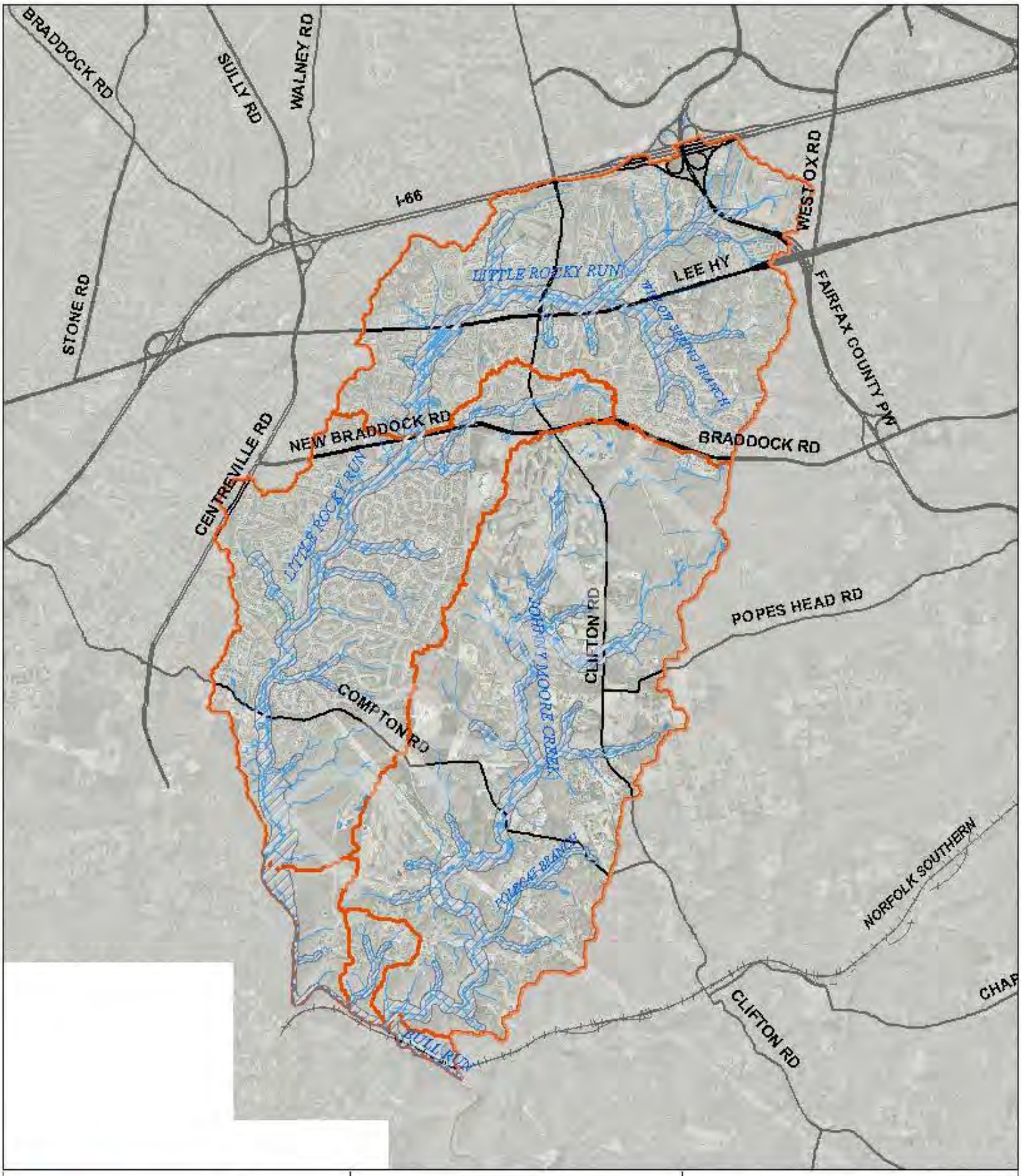
Figure 1-1: Location of the Little Rocky Run and Johnny Moore Creek Watersheds

The Little Rocky Run watershed encompasses 4,605 acres (7.2 square miles) and the Johnny Moore Creek watershed encompasses 3,374 acres (5.3 square miles). Both watersheds are located in the piedmont physiographic province, a region characterized by gently rolling hills, deeply weathered bedrock, and very little solid rock at the surface.

The headwaters of Little Rocky Run are located near the intersection of West Ox Road and Lee Highway. The creek flows in a southwesterly direction to its confluence with Bull Run. The headwaters of Johnny Moore Creek are located along Braddock Road near its intersection with Clifton Road. The creek flows in a southerly direction to its confluence with Bull Run. Major roads in the watersheds include: Interstate 66, Lee Highway (Route 29), Braddock Road, and Clifton Road.

The Little Rocky Run and Johnny Moore Creek watersheds are part of the Chesapeake Bay Preservation Area (CBPA) and both main stream corridors are located in the County's designated Resource Protection Area (RPA). The RPA is designated around all water bodies with perennial flows to protect the quality of water flowing to the Chesapeake Bay. The RPA totals approximately 683 acres (1.1 square miles) in the Little Rocky Run watershed and totals approximately 463 acres (0.7 square miles) in the Johnny Moore Creek watershed. The remainder of the watershed area is part of the County's designated Resource Management Area (RMA), which is designed to protect water quality by preserving or enhancing the functional value of the RPA. Map 1-1 shows the RPA areas in both watersheds.

The Little Rocky Run and Johnny Moore Creek watersheds have been subdivided into watershed management areas. The watershed management areas will be used to evaluate portions of the watershed with similar land use and development characteristics. Map 1-2 shows the watershed management areas that will be used for Little Rocky Run and Johnny Moore Creek.



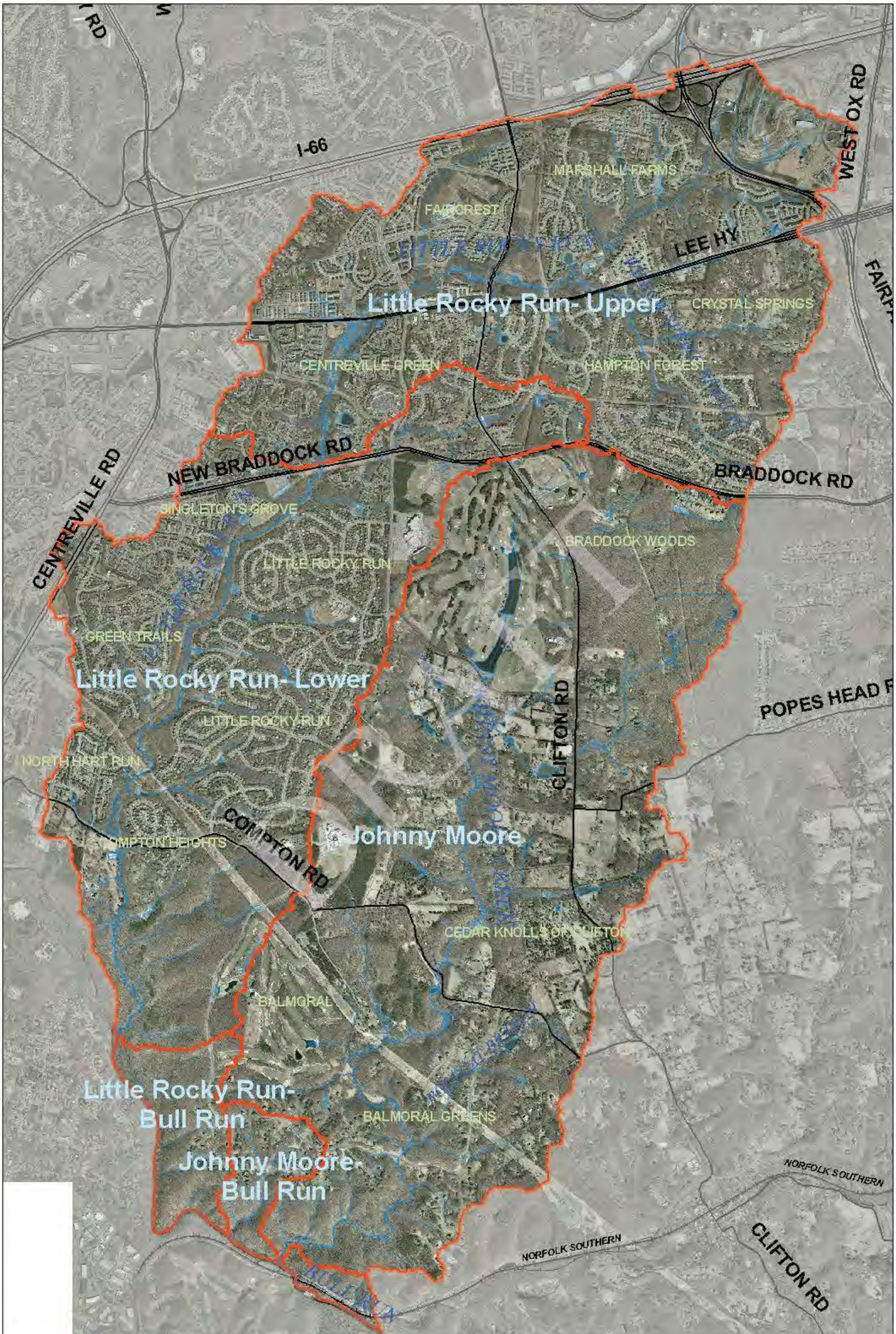
Scale

0 2,000 4,000 Feet

Streams
Resource Protection Areas (RPA)
Watershed Management Areas
Major Roads
Railroad

Map 1-1
Resource Protection Areas (RPA)

Little Rocky Run / Johnny Moore Creek Watersheds



Streams
Watershed Management Areas
Major Roads
Railroad

Map 1-2
Watershed Management Areas

Little Rocky Run / Johnny Moore Creek

1.2 Land Use

A large portion of the Johnny Moore Creek watershed consists primarily of large lot residential development. On July 26, 1982, the Fairfax County Board of Supervisors approved a rezoning of more than 41,000 acres in the Occoquan watershed, which includes the Johnny Moore Creek watershed and a portion of the Little Rocky Run watershed, in order to protect the Occoquan Reservoir, which supplies drinking water to the County. Land in the rezoned area is classified as a Residential-Conservation (R-C) District, designating a maximum density of one dwelling unit per 5 acres. The entire Johnny Moore Creek watershed is located in the R-C District. The portion of Little Rocky Run south of Compton Road and the area south of Braddock Road and east of Union Mill Road are in the R-C District.

The predominant existing land use in the Little Rocky Run watershed is open space, as shown in Table 1-1, with 31 percent of the watershed area designated as open space. The next major land use is medium-density residential at 23 percent. The future land use designations show that only 4 percent of the watershed is expected to change. The amount of open space in the watershed will decrease by 186 acres. The amount of residential acreage will increase by 199 acres and high-intensity commercial development will increase by ten acres.

The predominant existing land use in the Johnny Moore Creek watershed is estate residential (39 percent) closely followed by open space (37 percent). In the future, open space will decrease 50 percent from 1,243 acres to 620 acres. The amount of estate residential in the watershed will increase from 39 percent of the watershed in existing conditions to 57 percent in the future. Map 1-3 shows the existing and future land use designations for each watershed.

Table 1-1 Existing and Future Land Use in the Little Rocky Run and Johnny Moore Creek Watersheds

Land Use Description	Little Rocky Run				Johnny Moore Creek			
	Existing		Future		Existing		Future	
	Area (acres)	%	Area (acres)	%	Area (acres)	%	Area (acres)	%
Open space	1,433	31	1,247	27	1,243	37	620	19
Golf Course	41	1	41	1	535	16	535	16
Estate residential	207	4	191	4	1,305	39	1,928	57
Low-density residential	372	8	520	11	141	4	141	4
Medium-density residential	1,054	23	1,078	24	1	0	1	0
High-density residential	542	12	569	12	0	0	0	0
Low-intensity commercial	13	0	10	0	0	0	0	0
High-intensity commercial	38	1	48	1	0	0	0	0
Institutional	141	3	137	3	2	0	2	0
Industrial	51	1	51	1	10	0	10	0
Transportation	668	15	668	15	87	3	87	3
Water	45	1	45	1	50	1	50	1
TOTAL	4,605	100	4,605	100	3,374	100	3,374	100

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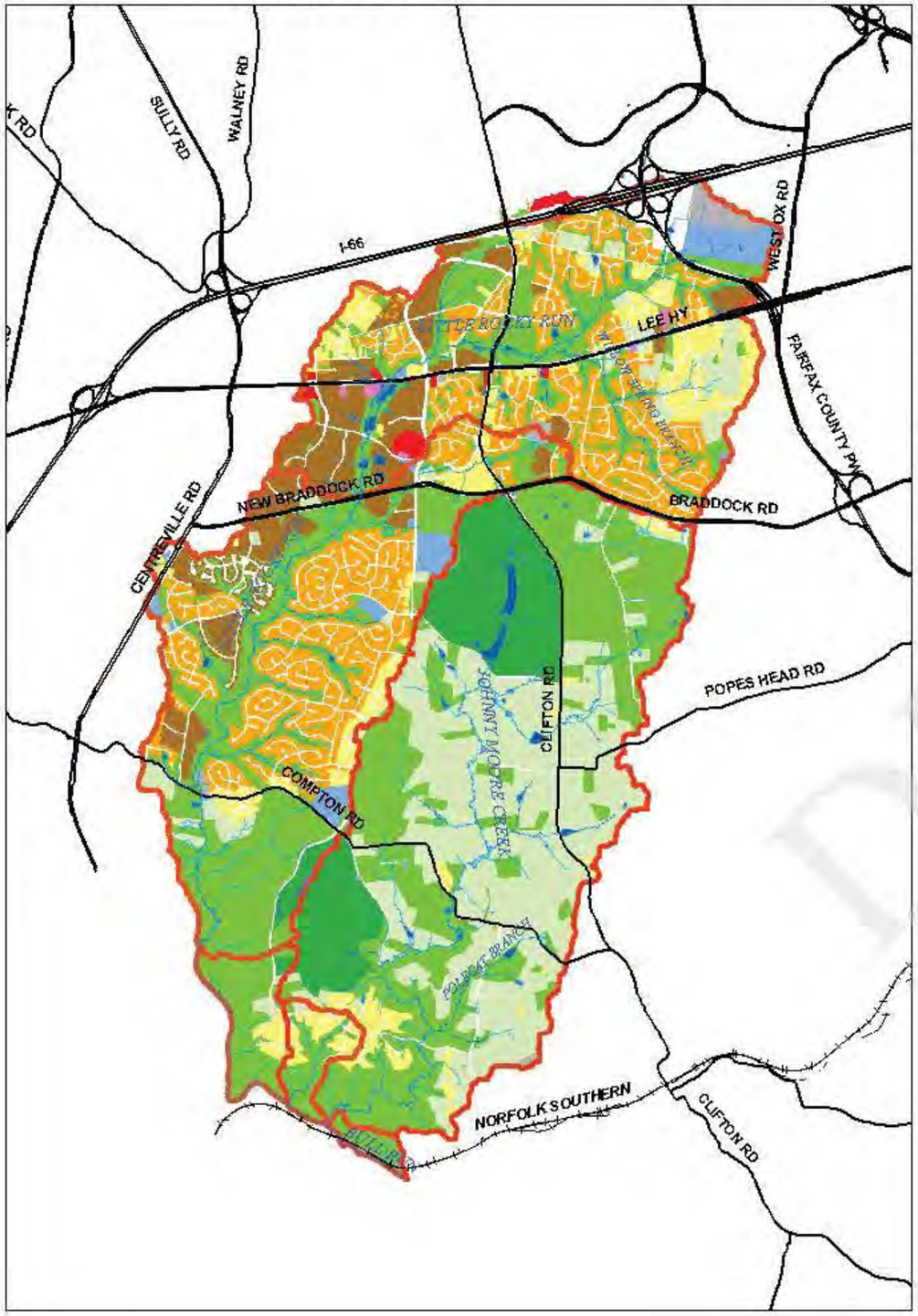
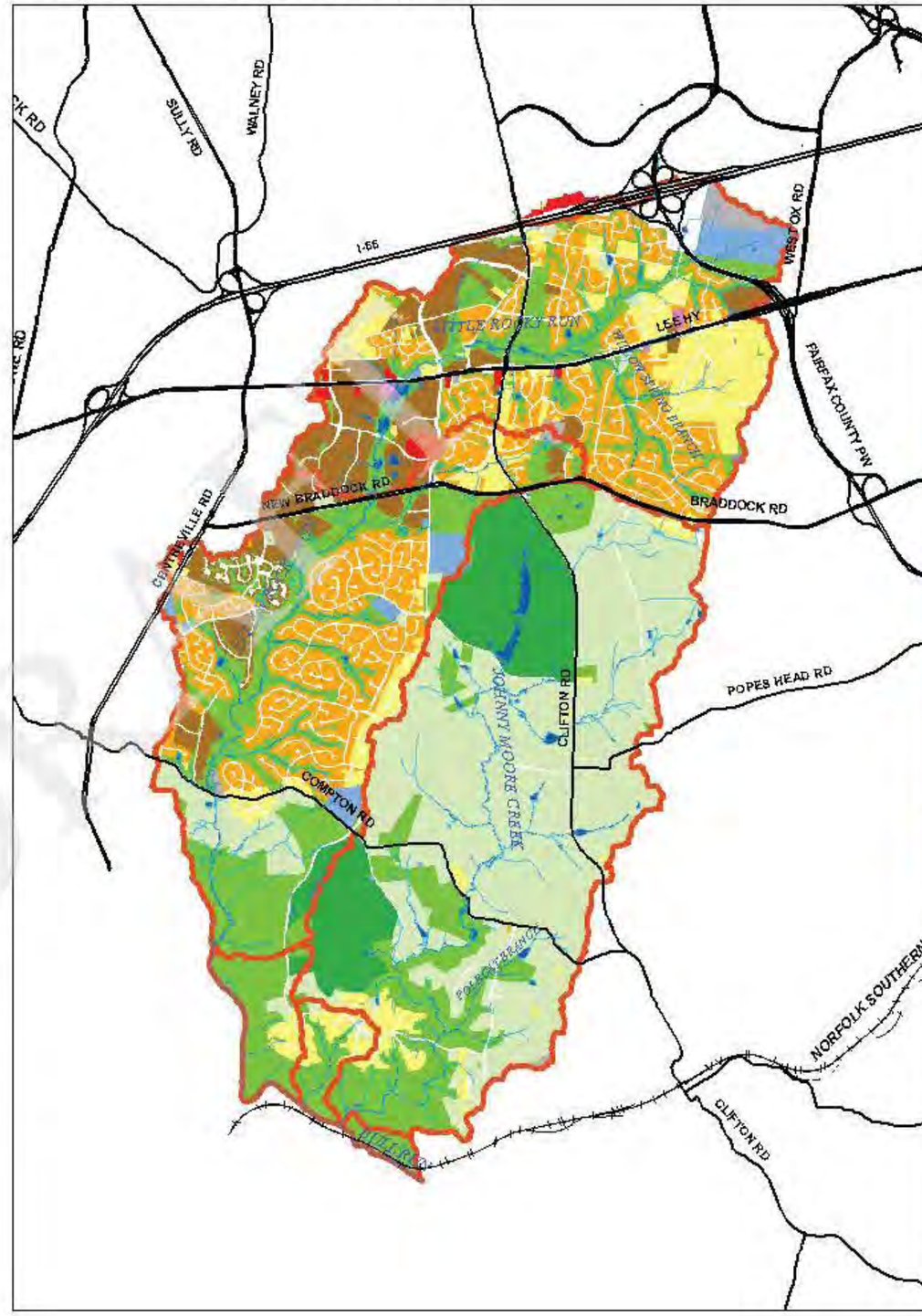
Map 1-3: Existing and Future Land Use

Existing Conditions Land Use Map



Future Conditions Land Use Map



Map 1-3
Existing and Future Land Use Maps

Little Rocky Run / Johnny Moore Creek Watersheds

Legend

- Streams
- Major Roads
- Railroad
- JMwatershed
- Watershed Management Areas

Land Use

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

Scale

4,000 2,000 0 4,000

Feet

1.3 Little Rocky Run and Johnny Moore Creek - Review of Previous Studies and Data

Fairfax County has collected data and prepared reports on its watersheds for over 20 years. These reports were prepared by various agencies within the County with different missions and goals; therefore, the documents focus on a multitude of issues. In this chapter, the data and reports are summarized and their context and purpose is described.

Table 1-2 provides a listing of the available reports grouped according to their main topic area and presented in chronological order.

Table 1-2 List of Reports Reviewed by Topic and Date

Report	Date	Prepared By
Topic: Data		
Occoquan Environmental Baseline Report	February 1978	Parsons, Brinckerhoff, Quade & Douglas
Fairfax County Stream Water Quality Reports	Annually 1997-2002	Fairfax County Health Department
Fairfax County Stream Protection Strategy Baseline Study	January 2001	Fairfax County Department of Public Works & Environmental Services, Stormwater Planning Division
Fairfax County Stream Physical Assessment	August 2005	CH2M Hill
Annual Report on Fairfax County's Streams	November 2005 October 2006	Fairfax County Department of Public Works & Environmental Services, Stormwater Planning Division
Virginia Department of Environmental Quality Data: • Virginia 2006 305(b)/303(d) Water Quality Assessment Integrated Report, October 2006 • Benthic TMDL Development for Bull Run, Virginia, June 2006 • Bacteria TMDLs for Popes Head Creek, Broad Run, Kettle Run, South Run, Little Bull Run, Bull Run and the Occoquan River, Virginia, October 2006		Various: VA Department of Environmental Quality The Louis Berger Group, Inc. George Mason University
Virginia Natural Heritage Resource Database	Continuously updated	VA Department of Conservation and Recreation
Topic: Policy		
Infill and Residential Development Study	July 2000	VA Department of Planning & Zoning VA Department of Public Works & Environmental Services VA Department of Transportation
Fulfilling the Promise: The Occoquan Watershed in the New Millennium	January 2003	New Millennium Occoquan Watershed Task Force
Fairfax County Park Authority, Natural Resource Management Plan, 2004-2008	October 2004	Fairfax County Park Authority Natural Resource Management Project Team
Topic: Proposed Projects and Improvements		

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Report	Date	Prepared By
Proposed Drainage Plan, The Occoquan Watersheds	April 1979	Parsons, Brinckerhoff, Quade & Douglas
Fairfax County Master Plan Drainage Projects	Continuously Updated	Fairfax County Department of Public Works and Environmental Services
Regional Stormwater Management Plan	January 1989	Camp Dresser & McKee
The Role of Regional Ponds in Fairfax County's Watershed Management	March 2003	Fairfax County Environmental Coordinating Committee, Regional Pond Subcommittee

The previous studies conducted by Fairfax County and others indicate that the Little Rocky Run and the Johnny Moore Creek watersheds are in fair to good condition. The studies recommended the use of innovative Best Management Practices (BMPs) and new Low Impact Development (LID) techniques, the preservation of trees and open space, and identified the need to update the Public Facilities Manual (PFM). The studies also identified opportunities to educate and involve the public, and to promote regional cooperation between agencies, citizens, and nongovernmental organizations.

1.3.1 DATA

Occoquan Environmental Baseline Report, 1978

The *Occoquan Environmental Baseline Report* was written by Parsons, Brinckerhoff, Quade & Douglas in February 1978, based on data collected in 1976. The report presented a comprehensive review of the environmental baseline conditions for the 11 watersheds in the southern area of the County that drain into Bull Run and the Occoquan Reservoir. The baseline water quality of the 11 watersheds in the study was rated "very good." Two sites were sampled on Little Rocky Run at Lee Highway and Compton Road and one site was sampled on Johnny Moore Creek at Compton Road. The yearly log average fecal coliforms in 1976 (Table E-4 in the report) were 35 fecal coliforms per 100 milliliters of water (35/100 ml) and 24/100 ml for the Little Rocky Run site and 33/100 ml for the Johnny Moore Creek site.

The report also assessed the aquatic environment by surveying the aquatic fauna at two sites in the Little Rocky Run watershed and at two sites in the Johnny Moore Creek watershed (Table 7 and Figure 13 in the report). The sites along Little Rocky Run were at Braddock Road and at Compton Road, and the sites along Johnny Moore Creek were at Twin Lakes Road and near the confluence with Polecat Branch. The stream fauna quality was ranked "good" to "very good" on Little Rocky Run at Compton Road and on Johnny Moore Creek near Polecat Branch, "good" on Little Rocky Run at Braddock Road, and "fair" to "good" on Johnny Moore Creek at Twin Lakes Road.

Severe erosion was noted at several locations on Little Rocky Run, Johnny Moore Creek, and their tributaries. Along Little Rocky Run, severe erosion was noted in four areas upstream of Lee Highway, two areas upstream of Compton Road, and one area downstream of Compton Road. Along Willow Spring Branch, severe erosion was noted in one area slightly upstream of Lee Highway. An unnamed tributary to Little Rocky Run located south of Interstate 66 and west of Stringfellow Road was also experiencing one

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area of severe erosion. Along Johnny Moore Creek, severe erosion was noted in one location downstream of Twin Lakes Drive, two locations downstream of Compton Road and the power line, and one location near the confluence with Polecat Branch.

The *Occoquan Environmental Baseline Report* noted severe sedimentation at three locations in the Little Rocky Run watershed and one location in the Johnny Moore Creek watershed. Two locations were noted along Little Rocky Run, one upstream of Lee Highway and one upstream of Compton Road. One location within the Little Rocky Run watershed was noted along Willow Spring Branch, upstream of Lee Highway. The one location within the Johnny Moore Creek watershed was noted on Polecat Branch, upstream of the power line.

The data in this report provide baseline information that can be compared to more recent data collected for the *Stream Physical Assessment* and the *Stream Protection Strategy* reports. Little Rocky Run and Johnny Moore Creek have more recent stream physical assessments that were performed in 2003 (*Fairfax County Stream Physical Assessment*, 2005). The more recent assessments and field observations conducted as part of this watershed planning study will be used to identify erosion and sedimentation areas for mitigation in the Watershed Management Plans.

Fairfax County Annual Stream Water Quality Reports, 1997 through 2002

The Fairfax County Health Department monitored stream water quality at 72 sampling sites throughout the County from 1986 to 1999. In 2000, 13 new sites were added, totaling 85 sampling sites. In 2001 and 2002, only 84 sites were sampled. The water quality sampling program was transferred to the Department of Public Works and Environmental Services in 2002 (see the *Annual Report on Fairfax County's Streams*). Reports from 1997 to 2002 were reviewed in preparation of this document.

Two water quality sampling sites were located in the Little Rocky Run watershed and one water quality sampling site was located in the Johnny Moore Creek watershed. The locations of the sampling sites are shown on Map 1-4. Site 27-01 is located on Johnny Moore Creek, and sites 28-01 and 28-02 are located on Little Rocky Run. The three sampling stations from the *Occoquan Environmental Baseline Report* are approximately in the same locations as those used in the *Stream Water Quality* reports. In 2002, 15 water samples were collected from site 27-01, 16 water samples were collected from site 28-01, and 18 water samples were collected from site 28-02. These samples were evaluated for fecal coliform, dissolved oxygen, nitrate, nitrogen, pH, total phosphorous, temperature, and heavy metals. These parameters indicate the amount of pollution contributed from manmade sources and help to evaluate the quality of the aquatic environment. Information regarding the parameters and data collected for the *Fairfax County Annual Stream Water Quality Reports* (1997-2002) can be found on the Fairfax County website at http://www.fairfaxcounty.gov/hd/streams/.

The average dissolved oxygen concentration for all three sites in the two watersheds was between 6 and 10 milligrams per liter (mg/l). This is above the minimum standard of 4.0 mg/l considered suitable for aquatic life. None of the samples from site 27-01 on Johnny Moore Creek or site 28-02 on Little Rocky Run had dissolved oxygen concentration less than 4.0 mg/l. However, 18 percent of samples collected from site 28-01 on Little Rocky Run showed a dissolved oxygen concentration of less than 4.0 mg/l. The 2002 report states that 54 percent of the samples measured below 4 mg/l were collected during the

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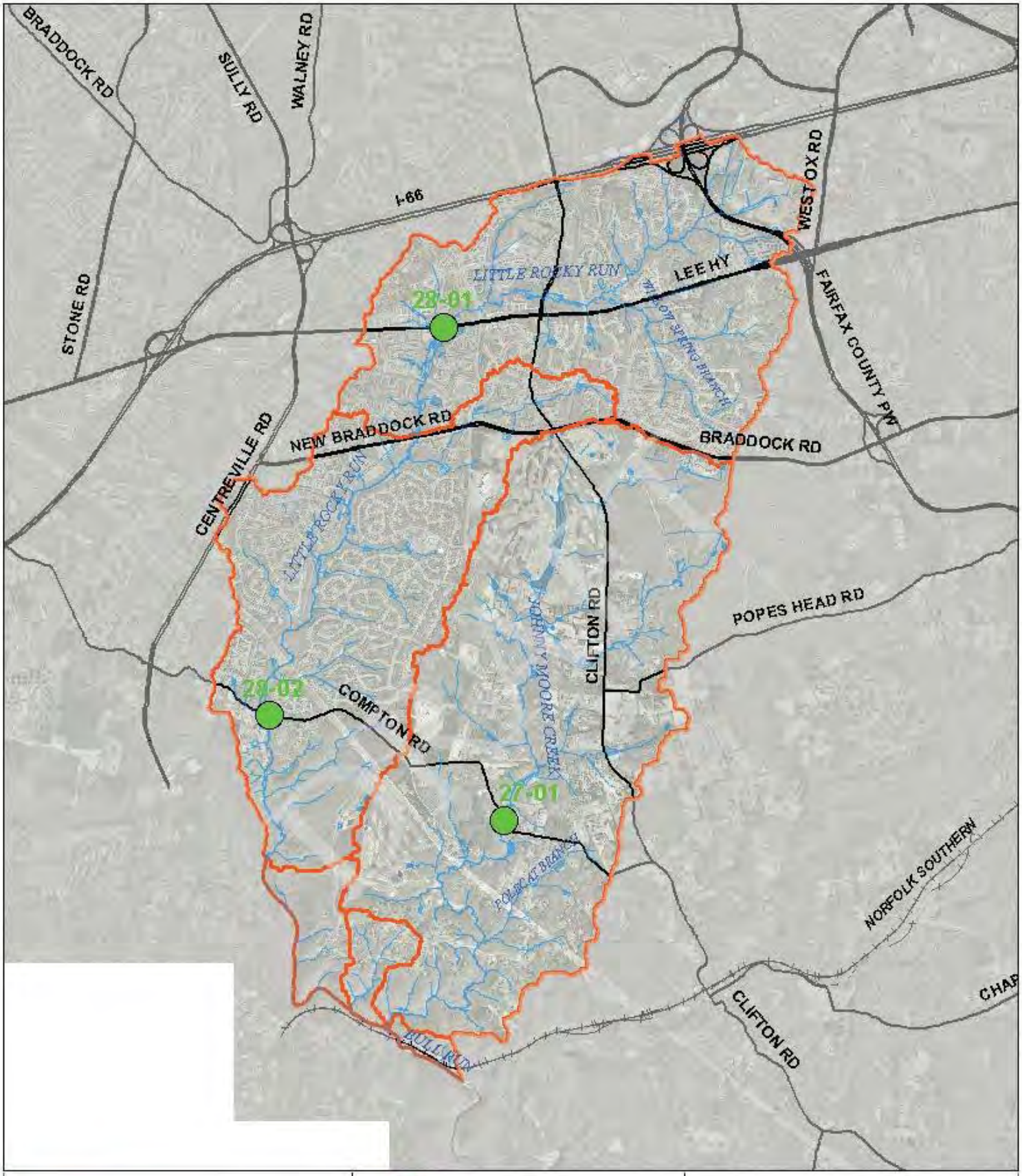

Monitoring Sites
Streams
Watershed Management Areas
Major Roads
Railroad

0 2,000 4,000 Feet

Map 1-4
Water Quality Monitoring Sites

Little Rocky Run / Johnny Moore Creek Watersheds

months of June and July, and that the summer water temperatures may be a contributing factor in the low dissolved oxygen levels. The three samples from site 28-01 that measured below 4 mg/l were taken in June and July.

For sites 27-01, 28-01, and 28-02, fecal coliform counts in 2002 were in the "good" range for 13 percent, 31 percent, and 17 percent of the samples, respectively. Countywide, 17 percent of the samples collected in 2002 were in the "good" range. In the 2002 report, a fecal coliform count less than 200/100 ml (geometric mean) was considered "good" water quality and a count of 250,000/100 ml was indicative of a direct sewage discharge. Figure 1-2 shows the values for the geometric mean of fecal coliforms from 1993 to 2002. The geometric mean is used to measure the central tendency of the data.

The data collected for the *Annual Stream Water Quality Reports* indicated a higher concentration of fecal coliforms at the three sampling sites than the fecal coliform data collected for the *Occoquan Environmental Baseline Report*. Data from 1976 and 2002 are compared in Table 1-3.

Figure 1-2: Yearly Geometric Mean of Fecal Coliforms for Little Rocky Run and Johnny Moore Creek

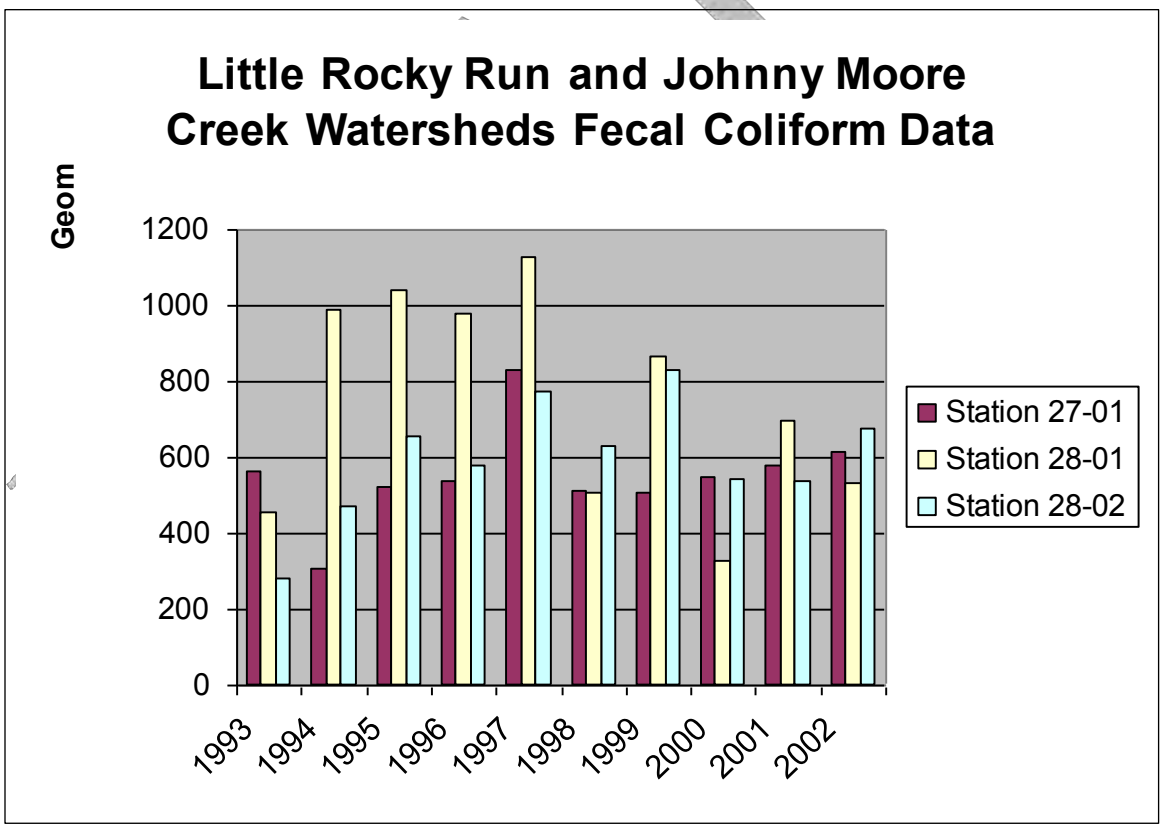

Table 1-3 Comparison of Fecal Coliform Levels – Occoquan Environmental Baseline Report and Stream Water Quality Reports

Sample Location	1976 Yearly Log Average Fecal Coliforms per 100 ml	2002 Geometric Mean Fecal Coliforms per 100 ml
Johnny Moore Creek at Compton Road (27-01)	33	615
Little Rocky Run at Lee Highway (28-01)	35	535
Little Rocky Run at Compton Road (28-02)	24	676

The stream water quality reports included analyses of sampling data that provide valuable information about the water quality in the Little Rocky Run and Johnny Moore Creek watersheds. These data will be used in conjunction with other County data to identify problem areas.

Fairfax County Stream Protection Strategy Baseline Study, 2001

The *Fairfax County Stream Protection Strategy (SPS) Baseline Study* evaluated the quality of streams throughout the County. The purpose of the SPS was to assess the continuing stream degradation within the ecosystem as evidenced by increasing stream channel erosion, loss of riparian buffers, decreased aquatic life, and poor water quality. The general objectives of the SPS program were to provide "recommendations for protection and restoration activities on a subwatershed basis, prioritization of areas for allocation of limited resources, establishment of a framework for long-term stream quality monitoring, and support for overall watershed management."

Little Rocky Run received "fair" composite site condition ratings in the upper and lower watershed, and a "good" rating in the central portion of the watershed. Johnny Moore Creek received "excellent" composite site condition ratings at both sites in the watershed. These ratings were based on the numeric scores of four components of stream/watershed conditions (environmental parameters): an index of biotic integrity; a general evaluation of watershed features, and a specific evaluation of 10 habitat quality parameters (habitat assessment); fish taxa richness (number of fish species); and percent imperviousness. Table 1-4 provides information regarding the macroinvertebrate and fish species and percent impervious surfaces at the five testing sites according to the *SPS Baseline Study Data Summary*. Faunal quality results at similar locations from the *Environmental Baseline Report* are also shown. Map 1-5 shows the location of the five SPS sampling sites.

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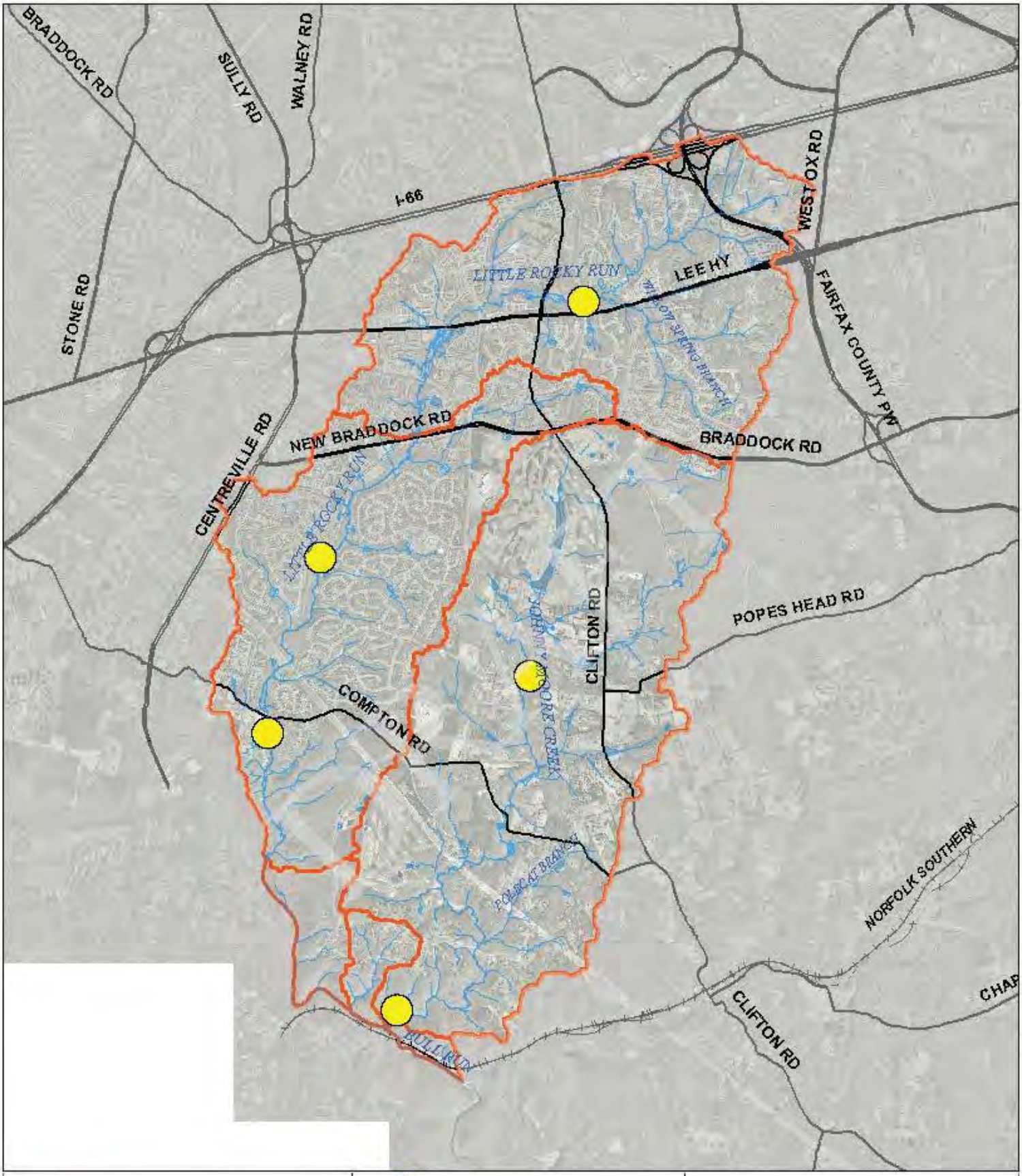

Map 1-5
Stream Protection Strategy
Sampling Sites

Little Rocky Run / Johnny Moore
Creek Watersheds

Table 1-4 Macroinvertebrate Assessment and Fish Species

Stream Name and Location	Composite Site Condition Rating	Macro-invertebrate Assessment	Number of Fish Species	1978 Faunal Quality	2001 Percent Impervious Surfaces
Little Rocky Run upstream of Stringfellow Road	Fair	Poor	High	No data available	14.6
Little Rocky Run downstream of New Braddock Road (and Springstone Drive)	Good	Fair	High	Good	17.7
Little Rocky Run downstream of Compton Road	Fair	Poor	Moderate	Good to Very Good	19.1
Johnny Moore Creek downstream of Johnny Moore Lane	Excellent	Good	High	Fair to Good	2.6
Johnny Moore Creek upstream of the confluence with Bull Run	Excellent	Poor	High	Good to Very Good	2.4

The Little Rocky Run watershed differs from the Johnny Moore Creek watershed in terms of level of development. The Johnny Moore Creek watershed has a greater percentage of forested land and fields/pastures than the Little Rocky Run watershed. Little Rocky Run has a greater percentage of low intensity residential, high intensity residential, and commercial/ industrial development than Johnny Moore Creek. This is evident in the difference in percent imperviousness in the two watersheds. Johnny Moore Creek has a substantially lower percent imperviousness than Little Rocky Run.

Polluted stormwater runoff affects the number and diversity of macroinvertebrate and fish species. Twenty-one individual species of fish were found in each of the two watersheds, accounting for the high fish taxa richness. The generally poor rating for the benthic macro-invertebrate community for both watersheds was due to aquatic worms and/or midges (organisms generally considered tolerant of degraded conditions) dominating the community. The volunteer monitoring conducted by the Northern Virginia Soil and Water Conservation District indicated a generally healthy benthic community at four sites within the Johnny Moore Creek main stem. For the macroinvertebrate assessment, the number

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of unique species and the balance between pollution-tolerant and intolerant species were measured. The SPS rankings ranged between excellent, good, fair, poor, and very poor. A fair rating indicates a marked decrease in intolerant species and a shift to an unbalanced community; a poor rating indicates decreased diversity with intolerant species being rare or absent. For the number of unique fish species collected, the SPS ratings were high, moderate, low, or very low.

Sediment deposition and bank stability ratings negatively impacted overall habitat rankings. Specifically, active channel widening was identified on some reaches of Little Rocky Run, indicating bank instability. Little Rocky Run was considered a semi-degraded aquatic system with the potential for improvement. Sediment deposition and bank stability ratings also lowered overall habitat scores across the region; however, in-stream and riparian zone conditions were generally "good" throughout both watersheds (some exceptions being portions of Little Rocky Run with evidence of instability, often in the form of active channel widening). The Little Rocky Run and Johnny Moore Creek watersheds still contain some of the higher quality stream systems found within the Piedmont Upland Region in Fairfax County.

In the *SPS Baseline Study*, the central portion of Little Rocky Run watershed and all of Johnny Moore Creek watershed were classified as Watershed Protection Areas, with the goal of preserving biological integrity by taking active measures to identify and protect, as much as possible, the conditions responsible for the current high-quality rating of these streams. The upper portion of Little Rocky Run watershed was classified as a Watershed Restoration Area Level I, with the goal of reestablishing healthy biological communities by taking active measures to identify and remedy causes of stream degradation. The lower portion of Little Rocky Run watershed was classified as a Watershed Restoration Area Level II, with the goal of maintaining areas to prevent further degradation and implementing measures to improve water quality to comply with Chesapeake Bay initiatives, Total Maximum Daily Load (TMDL) regulations, and other water quality measures. It was also designated as an Assessment Priority Area, indicating a need to select sites and implement monitoring within that area. This reflects the uncertainty over the dramatic change in condition between monitoring sites along the system's main stem. These designations were based on the composite biological ranking and estimated imperviousness (future development potential based on current zoning information). The Countywide representation in each of the management categories was as follows:

- Watershed Protection: 31.5 percent of the County
- Watershed Restoration Level I: 7.2 percent of the County
- Watershed Restoration Level II: 61.3 percent of the County

The entire Johnny Moore Creek watershed and a portion of the Little Rocky Run watershed are under the zoning ordinance of the Water Supply Protection Overlay District (WSPOD) to protect the quality of water draining directly into the Occoquan reservoir. The Centreville area within the Little Rocky Run watershed is exempt from the ordinance, a fact that explains the abrupt differences in land use and imperviousness between the two watersheds.

Based on the SPS goals of protecting and restoring stream quality within Fairfax County, a diverse management approach will be necessary. It will require active and ongoing stream

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monitoring, targeted restoration projects, public outreach and education, enhanced stormwater controls, and improved communication with the development community.

The recommendations generated by the baseline study were as follows:

- Promote use of innovative BMPs and reduction of imperviousness for infill and redevelopment.
- Conduct public education in stream stewardship.
- Promote programs like Adopt-A-Stream to increase public involvement.

Additional recommendations are discussed in the Executive Summary and Chapter 5 of the *SPS report* which can be found on the Fairfax County website at: http://www. fairfaxcounty. gov/dpwes/environmental/sps_main.htm.

The SPS report provides data on a number of factors affecting the quality of Little Rocky Run and Johnny Moore Creek. The watershed characterization level from the SPS will guide the types of improvements recommended for the watershed management areas.

Fairfax County Stream Physical Assessment, 2005

The County initiated a stream physical assessment for all of its watersheds in August 2002, resulting in the final *Stream Physical Assessment Report* dated August 2005. The report included a habitat assessment, infrastructure inventory, stream characterization, and stream geomorphologic assessment. The assessment data are described for each of the subwatersheds in the following sections.

Habitat Assessment

As part of the assessment, the following characteristics were evaluated to determine the stream habitat quality for each stream reach:

- In-stream cover (fish)
- Epifaunal substrate (benthic)
- Embeddedness
- Channel/bank alteration
- Frequency of riffles
- Channel flow status (drought & normal flow)
- Bank vegetative protection
- Bank stability
- Vegetated buffer zone width

The scores assessed for the various physical parameters representing the stream habitat conditions were combined for each stream segment to obtain a total habitat score. The majority of the stream habitat was assessed as “fair” for both watersheds. The score of 102 for Little Rocky Run watershed is considered in the lower middle range of quality as compared with the rest of the County, and the score of 104 for Johnny Moore Creek watershed is considered in the middle range of quality as compared with the rest of the County. Tables 1-5 and 1-6 describe the percentage of length for each habitat quality rating for the streams according to the total score.

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Table 1-5 Summary of Stream Habitat Quality for Little Rocky Run Watershed

Stream	Percent of Stream Length				
	Very Poor	Poor	Fair	Good	Excellent
Little Rocky Run	0%	11%	60%	21%	8%
Tributary to Bull Run	0%	0%	100%	0%	0%
Tributary to Little Rocky Run	0%	76%	24%	0%	0%
Willow Springs Branch	0%	0%	100%	0%	0%
Total Watershed	**0%**	**19%**	**62%**	**14%**	**5%**

Table 1-6 Summary of Stream Habitat Quality for Johnny Moore Creek Watershed

Stream	Percent of Stream Length				
	Very Poor	Poor	Fair	Good	Excellent
Johnny Moore Creek	0%	0%	53%	47%	0%
Polecat Branch	0%	35%	65%	0%	0%
Tributary to Bull Run	0%	0%	0%	100%	0%
Tributary to Johnny Moore Creek	2%	28%	66%	4%	0%
Tributary to Polecat Branch	0%	0%	100%	0%	0%
Total Watershed	**1%**	**15%**	**60%**	**24%**	**0%**

Vegetative Buffer Zone Width

Vegetative buffers filter pollutants entering a stream from runoff and minimize erosion along the stream. Approximately 37 percent of stream buffers in the Little Rocky Run watershed have a severe impact score, while 21 percent have a moderate to severe impact score, and 42 percent have a minor to moderate impact score. Approximately 5 percent of stream buffers in the Johnny Moore Creek watershed have a severe impact score, while 36 percent have a moderate to severe impact score, and 59 percent have a minor to moderate impact score.

Bank Stability

Stable stream banks have minimal erosion and gently sloping banks while unstable banks have steep slopes with evident erosion and bank failure. In the Little Rocky Run watershed, 46 percent of the banks were classified as moderately unstable and 54 percent were classified as moderately stable. In the Johnny Moore Creek watershed, 89 percent of the banks were classified as moderately unstable and 11 percent were classified as moderately stable.

Embeddedness

The assessment documented the degree of streambed embeddedness. Embeddedness, the degree to which cobbles and gravel on the streambed are covered with or sunken into sediment, is a measure used to quantify the impact of sedimentation on stream habitat. As the streambed becomes more embedded, the habitat of bottom dwelling organisms is

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increasingly impaired. In the Little Rocky Run watershed, embeddedness rankings were: 4 percent poor, 61 percent marginal, 32 percent suboptimal and 3 percent optimal. In the Johnny Moore Creek watershed, embeddedness rankings were: 8 percent poor, 65 percent marginal, and 27 percent suboptimal.

Infrastructure Inventory

The assessment identified and characterized the following significant characteristics and features within the watersheds:

- Deficient buffer vegetation
- Dumpsites
- Erosion locations
- Head cuts
- Obstructions
- Pipe and ditch outfalls
- Public utility lines
- Roads and other crossings

An impact score was assigned to those inventory items causing a negative impact to the stream. Based on the impact score, the degrees of impact were classified into four groups: minor, moderate, severe, and extreme. Table 1-7 describes the classifications for each of the stream inventory items. These impacts are further categorized by watershed management area in Chapter 2.

Table 1-7 Description of Impacts

Impact	Description
Deficient Buffer Vegetation (within 100 feet of stream bank)	
Extreme	Impervious/commercial area in close proximity to a stream. The stream banks may be modified or engineered. The stream character (bank/bed stability, sediment deposition, and/or light penetration) is obviously degraded by adjacent use.
Severe	Some impervious areas and/or turf located up to the bank and water. Very little vegetation aside from the turf exists within the 25-foot zone. Home sites may be located very close to the stream. The stream character is probably degraded by adjacent use.
Moderate	Encroachment mostly from residential uses and yards. There is some vegetation within the 25-foot zone, but very little aside from turf exists within the remainder of the 100-foot zone. The stream character may be changed slightly by adjacent use.
Minor	Vegetated buffer primarily consists of native meadow (not grazed).
Dumpsites	
Severe to Extreme	Active and/or threatening sites. The materials may be considered toxic or threatening to the environment (concrete, petroleum, empty 55-

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Impact	Description
	gallon drums, etc.) or the site is large (greater than 2,500 square feet) and appears active.
Moderate	Dumpsite less than 2,500 square feet with non-toxic material. It does not appear to be used often, but clean-up would definitely be a benefit.
Minor	Dumpsite appears small (less than 1,000 square feet) and the material stable (will not likely be transported downstream by high water). This site is not a high priority.
Erosion Locations	
Extreme	Impending threat to structures or infrastructure
Severe	Large area of erosion that is damaging property and causing obvious in-stream degradation. The eroding bank is generally five feet or greater in height.
Moderate	A moderate area of erosion that may be damaging property and causing in-stream degradation. The eroding bank is generally two feet or greater in height.
Minor	A minor area of erosion that is a low threat to property and causes no noticeable in-stream degradation.
Head Cuts	
Severe to Extreme	Greater than two-foot head cut height
Moderate	One- to two-foot head cut height
Minor	One-half to less than one-foot head cut height
Obstructions	
Severe to Extreme	The blockage is causing a significant erosion problem and/or the potential for flooding that can cause damage to infrastructure. The stream is usually almost totally blocked (more than 75% blocked).
Moderate to Severe	The blockage is causing moderate erosion and could cause flooding. The stream is partially blocked, but obstructions should probably be removed or the problem could worsen.
Minor to Moderate	The blockage is causing some erosion problems and has the potential to worsen. It should be looked at and/or monitored.
Pipes and Ditch Outfalls	
Severe to Extreme	Stormwater runoff from a ditch or pipe is causing a significant erosion problem to the stream bank or stream. Discharge that may not be stormwater is coming from the stormwater pipe.
Moderate	Stormwater runoff from a ditch or pipe is causing a moderate erosion problem and should be fixed; it may get worse if left unattended. Discharge is coming from the pipe. It is probably stormwater, but it will be uncertain without further investigation.
Minor	Stormwater runoff from a ditch or pipe is causing a minor erosion problem and some discharge is occurring.

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Public Utility Lines	
Extreme	A utility line is leaking.
Severe	An exposed utility line is causing a significant erosion problem and/or obstruction (blockage). The potential for the sanitary line to burst or leak appears high.
Moderate	A partially exposed utility line is causing a moderate erosion problem. The line is partially visible (mostly buried in a stream bed with little if any erosion).
Minor	A utility line is exposed but stabilized with concrete lining and stable anchoring into the bank.
Road and other Crossings	
Extreme	The condition of debris, sediment, or erosion poses an immediate threat to the structural stability of the road crossing or other structure. Major repairs will be needed if the problem is not addressed.
Severe	The condition probably poses a threat to a road crossing or other structure. The problem should be addressed to avoid larger problems in the future
Moderate	The condition does not appear to pose a threat to a road crossing or other structure but should be addressed to enhance stream integrity and the future stability of the structures.
Minor	The condition is noticeable but may not warrant repair.

Source: *Fairfax County Stream Physical Assessment Protocols*, December 2002

Stream Geomorphologic Assessment

The geomorphologic assessment of the stream channels in the Little Rocky Run and Johnny Moore Creek watersheds was based on the conceptual incised channel evolution model (CEM) developed by Schumm, et al. (1984). Based on visual observation of the channel cross section and other morphological observations of the channel segment, the CEM type was assigned for the channel segment. The CEM types are summarized in Table 1-8. The CEM type for the stream segments is shown on maps in Chapter 2.

Table 1-8 Summary of CEM Types

CEM Type	Description
1	Stable stream banks and developed channel
2	Deep incised channel
3	Unstable stream banks and actively widening channel
4	Stream bank stabilizing and channel developing
5	Stable stream banks and widened channel

The data obtained from the stream physical assessment will be used as a starting point to determine problem areas in the watersheds. The assessment data will be field verified and projects to mitigate the problem areas will be recommended as part of the *Watershed Management Plan*.

Annual Report on Fairfax County's Streams, 2005 and 2006

In 2004, the County's biological sampling strategy was reevaluated and long-term goals were established. The Fairfax County Stormwater Planning Division developed the *2005*

Annual Report on Fairfax County's Streams. It was determined that annual Countywide conditions and trends were best determined from a probability-based sampling procedure, rather than the targeted sampling approach employed in the *Stream Protection Strategy Baseline Study*. The biological monitoring program focused on bacteria levels, biotic integrity, and stream quality. Three biological monitoring sites were located within the Little Rocky Run watershed. Additionally, there were three coliform bacteria monitoring sites located within Little Rocky Run and Johnny Moore watersheds. There were also six sites monitored by Audubon Naturalist Society (ANS) and Northern Virginia Soil and Water Conservation District (NVSWCD) volunteer groups within the two watersheds. The index scores and condition ratings for the 2004 sampling locations based on benthic macroinvertebrate and fish data are shown in Table 1-9.

Table 1-9 Table 1-9: Benthic and Fish Indices from 2004 Sampling

Sampling Site ID	Stream Order	Benthic Index Score	Rating	Fish Index Score	Rating
Little Rocky Run (LR0401)	3	27.36	Poor	25	Fair
Little Rocky Run (LR0402)	1	30.80	Poor	No fish sampling	
Little Rocky Run (LR0403)	1	15.56	Very Poor	No fish sampling	

In 2006, Fairfax County Stormwater Planning Division published the *2006 Annual Report on Fairfax County's Streams*. The 2005 and 2006 reports can be found on the Fairfax County website at: http://www.fairfaxcounty.gov/dpwes/stormwater/streams/streamreports.htm. The biological monitoring program focused on bacteria levels (fecal-related), benthic macroinvertebrates, fish communities, and water chemistry. There was one randomly selected biological and bacteriological monitoring site located within the Little Rocky Run watershed. Additionally, there was one ANS volunteer monitoring site located on Little Rocky Run. Page 38 of the 2006 annual report contains a detailed map showing monitoring results from 1999 through 2005.

Data from this report provided further documentation of water quality and habitat issues in the watershed and will provide additional focus in development of the Watershed Management Plan.

Virginia Department of Environmental Quality Water Quality Data

None of the stream segments in either the Little Rocky Run watershed or the Johnny Moore Creek watershed are listed as Category 5 impaired water bodies in the 2006 305(b)/303(d) Water Quality Assessment (WQA) Integrated Report prepared by the Virginia Department of Environmental Quality (DEQ). United States Environmental Protection Agency (EPA) Category 5 impaired water bodies are defined as "impaired or threatened and a TMDL is needed." Two segments from the watersheds are listed in the *2006 Integrated List of All Assessed Waters in Virginia*. A 4.98-mile segment of Little Rocky Run (VAN-A23R_LIP01A06) is designated as a Virginia Category 2B, which is a subcategory to EPA Category 2. EPA Category 2 waters meet some of their designated uses, but there are insufficient data to determine if remaining designated uses are met. Virginia Category 2B waters are of concern to the state, but no water quality standards exist for an identified pollutant, or the water exceeds a state screening value. The waters

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are considered fully supporting their uses with observed effects. Map 1-6 shows the location of the 303(d) impaired waters.

A 3.78-mile segment of Johnny Moore Creek (VAN-A23R_JOH01A02) is listed as a Virginia Category 3C, which is a subcategory to EPA Category 3. EPA Category 3 waters are defined as those that have insufficient data to determine whether any designated uses are met. Virginia Category 3C waters may have data collected by a citizen monitoring group or other organization which indicate water quality problems, but the methodology or data quality has not been approved for a determination of attainment of designated uses. These waters are considered to have insufficient data with observed effects. These waters will be prioritized for follow-up monitoring.

There have been changes in the criteria for identifying impaired waters since the 2002 assessment. One significant change was the assessment of fish tissue data. In order to protect human health, waters were listed as impaired when two or more of the human health surface water criteria were exceeded in samples collected at the same station. In addition, Virginia Department of Health (VDH) approved a trigger value for mercury.

Once a water body has been listed as impaired, DEQ must develop a TMDL report identifying the sources causing the water quality problem and the reductions needed to resolve it, and submit the report to the EPA for approval. Upon approval, DEQ must develop a TMDL Implementation Plan to restore water quality. Once the TMDL report is approved by EPA, the loading reductions are incorporated into Fairfax County's Virginia Stormwater Management Program (VSMP) permit to discharge stormwater into waters of the state. As a result, the loading reductions become mandatory for the County.

A report titled *Benthic TMDL Development for Bull Run, Virginia* was prepared by the Louis Berger Group, Inc. in June 2006 and submitted to DEQ. EPA Region III approved the TMDL for aquatic life use impairments on Bull Run (VAN-A23R-01) on September 26, 2006. Bull Run was first listed on Virginia's Section 303(d) list in 1994, and again in 1998 and 2002. It was listed more specifically as an impaired water, due in part to benthic impairment, on the 2004 WQA 305(b)/ 303(d) Integrated Report. It was also listed in the 2004 WQA Integrated Report due to exceedances of the water quality standards for fecal coliform bacteria and PCB concentrations in fish tissue samples. DEQ conducted bioassessments at the DEQ monitoring station located at the intersection of Bull Run and Route 28, which indicated a moderately impaired benthic macroinvertebrate community, resulting in the 303(d) listing.

The June 2006 report documented efforts to determine and identify the stressors (causal pollutants) and sources within the watershed. Several candidate stressors were reviewed in the report, including: dissolved oxygen, temperature, pH, metals, organic chemicals, nutrients, toxic compounds, and sediments. These were evaluated based on available monitoring data, field observations, and consideration of potential sources in the watershed. Sedimentation, caused by higher runoff flows, was identified as a primary stressor impacting benthic macroinvertebrates in this segment of Bull Run. Potential sources of sediment loading in the watershed included urban stormwater runoff, stream bank erosion, and sediment loss from habitat degradation associated with urbanization. The report suggested that reducing sediment loadings through stormwater control and restoring instream and riparian habitat to alleviate the impacts of urbanization on the river were key to improving the benthic community.

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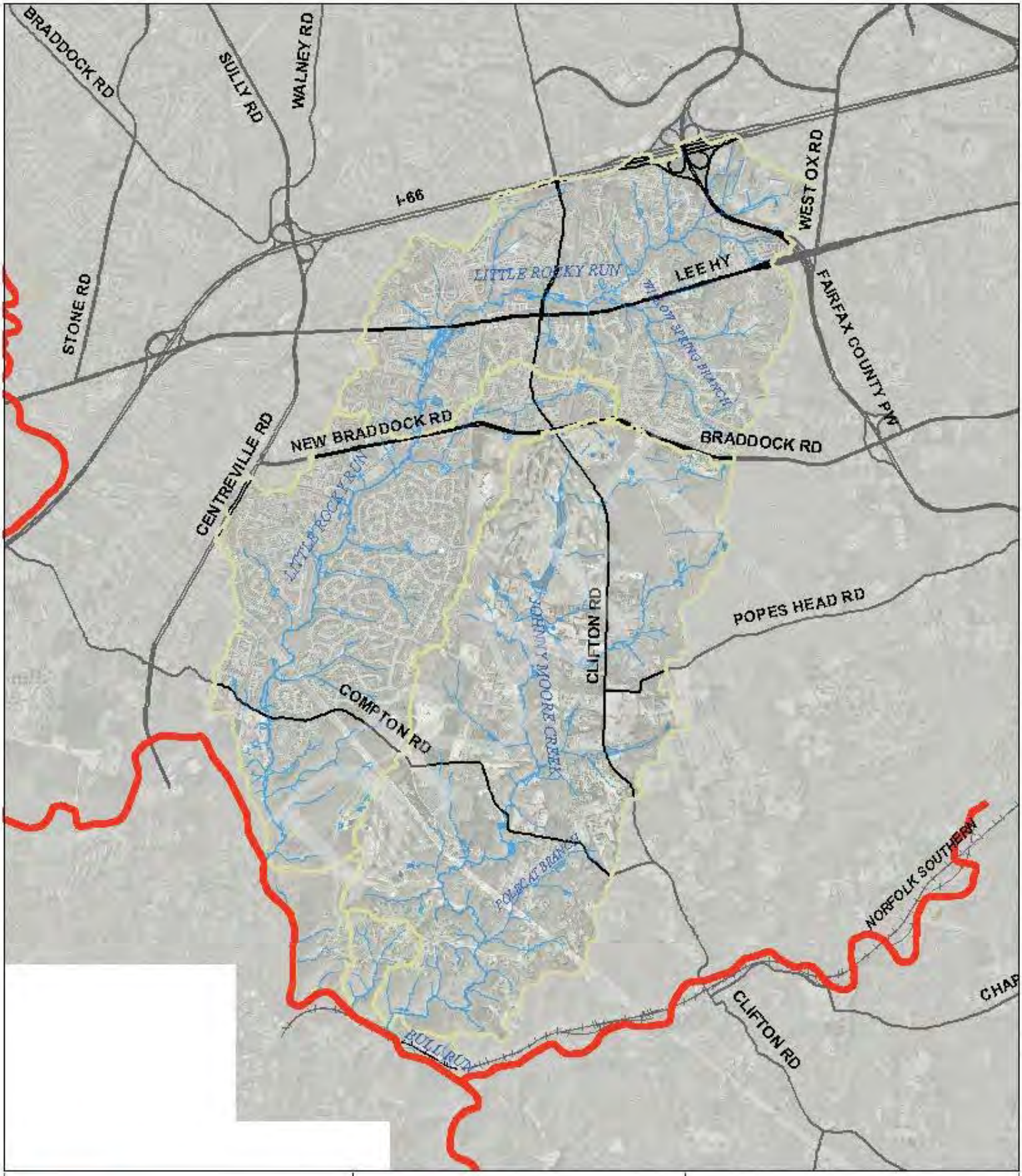

0 2,000 4,000 Feet

Virginia 303(d) Impaired Waters
Streams
Watershed Management Areas
Major Roads
Railroad

Map 1-6
Virginia 303(d) Impaired Waters

Little Rocky Run / Johnny Moore Creek Watersheds

The report indicated that the overall sediment load in the Fairfax County municipal separate storm sewer system (MS4) area contributing to Bull Run should be decreased by 77.1 percent. The Fairfax County MS4 area includes the Virginia Department of Transportation (VDOT) and Fairfax County Public Schools as permit holders. The *Watershed Management Plan* will focus on reducing sediment loading in the watershed by addressing stormwater control, stream bank erosion, and riparian buffers.

A report titled *Bacteria TMDLs for Popes Head Creek, Broad Run, Kettle Run, South Run, Little Bull Run, Bull Run and the Occoquan River, Virginia* was prepared by George Mason University and the Louis Berger Group, Inc. in August 2006. EPA Region III approved this TMDL on November 12, 2006. Segments of the streams covered by the TMDL were listed as impaired on Virginia's 1998 303(d) TMDL Priority List and Report because of violations of the state's water quality standard for fecal coliform bacteria. These segments were also included on Virginia's 2002 303(d) Report on Impaired Waters and the 2004 305(b)/303(d) WQA Integrated Report. The impaired segment of Bull Run (VAN-A23R-01) begins at the confluence with Cub Run and continues to the confluence with Popes Head Creek. Four out of 34 samples (11.8 percent) collected between January 1, 1998 and December 31, 2002 were recorded as exceeding the instantaneous fecal coliform bacteria criterion of 400/100 ml.

At the time of the TMDL listings, the Virginia bacteria standard was expressed in fecal coliform bacteria. However, the standard has recently changed and is now expressed in *E. coli*. Virginia's current bacteria water quality standard currently states that *E. coli* bacteria shall not exceed a geometric mean of 126 *E. coli* counts per 100 ml of water for two or more samples within a calendar month, or an *E. coli* concentration of 235 counts per 100 ml of water at any time. The TMDL was expressed in *E. coli* by converting modeled daily fecal coliform concentrations to daily *E. coli* concentrations using an in-stream translator.

The report indicated that the overall *E. coli* load in the Fairfax County MS4 area (including VDOT and the Fairfax County Public School permit holders) contributing to Bull Run should be decreased by 89 percent. The report suggested possible methods for reducing *E. Coli* such as: septic tank education, septic system repair/replacement program, sanitary sewer inspection and management, more restrictive ordinances on pet waste, improved garbage collection and control, and improved street cleaning. The *Watershed Management Plan* will consider recommendations for reducing *E. coli* in the Little Rocky Run and Johnny Moore Creek watersheds.

Virginia Natural Heritage Resource

The Virginia Natural Heritage Resources Database describes the status and rank of rare plant and animal species for subwatersheds in Virginia. Little Rocky Run and Johnny Moore Creek are both located within the Lower Bull Run subwatershed, which is within the Middle Potomac – Anacostia -Occoquan watershed. Two resources were listed in the database for the Lower Bull Run subwatershed. The Manassas stonefly was given a state ranking of SH (possibly extirpated). The trailing stitchwort vascular plant was given a state ranking of S1 (critically imperiled). Neither of these resources was given a federal or state status for endangerment.

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1.3.2 POLICY

Infill and Residential Development Study, 2000

The *Fairfax County Infill and Residential Development Study, Draft Staff Recommendations Report* was released by the County in July 2000. Any residential development occurring proximate to or within already established neighborhoods is referred to as infill development. The primary focus of this study was the identification of recommendations to better address issues associated with the impacts of new residential development on its immediate surroundings. The issues that have been cited most frequently as problems associated with infill development with respect to the immediate environs were divided into four main categories on which staff presented recommendations: Site Design and Neighborhood Compatibility (SC), Traffic and Transportation (TR), Tree Preservation (TP), and Stormwater Management and E&S Control (SW). Problems associated with infill development may negatively impact upper parts of the Little Rocky Run watershed where the most development has taken place.

The following recommendations from the report which address water quality and stormwater management may be evaluated as part of the *Little Rocky Run and Johnny Moore Creek Watershed Management Plan*.

- TP 1: Reduce grading to increase tree preservation;
- TP 3: Request conservation easements where appropriate;
- SW 1: Improve the awareness, planning, and financial resolution capability of the County for land disturbing projects upstream of sensitive sites;
- SW9: Require additional conditions associated with stormwater detention/water quality waivers to address potential problems associated with land disturbance;
- SW10: Require reports from applicants that identify baseline data for properties downstream, corrective measures planned for implementation in the event that impacts occur, and a commitment to implement those measures;
- SW11: Enhance the use of Best Management Practices (BMP) through additional guidance on BMP selection and enhanced design standards in the PFM; and,
- SW13: Modify requirements and procedures as they relate to the consideration of stormwater management during the zoning process.

Fulfilling the Promise: The Occoquan Watershed in the New Millennium , 2003

The New Millennium Occoquan Watershed Task Force prepared a report titled *Fulfilling the Promise: The Occoquan Watershed in the New Millennium* in January 2003. The Board of Supervisors established the Task Force to provide an assessment of issues facing the Fairfax County portion of the Occoquan watershed; to examine gaps in programs not being carried out by local, State and regional agencies; to define the role of volunteer organizations that have interests in the watershed; and to provide a vision for the future management of the watershed. The report presented recommendations on: the reservoir, streams and ecosystems, land use and open space, tree preservation, erosion and sediment control and stormwater management, onsite sewage disposal, citizen involvement, and regional coordination.

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The following recommendations from the report which address water quality and stormwater management may be evaluated as part of the *Little Rocky Run and Johnny Moore Creek Watershed Management Plan*.

Occoquan Reservoir Recommendations:

1. Promote existing programs and policies aimed at maintaining acceptable levels of water quality in the Reservoir;
2. Reduce nutrient and sediment contributions to the Reservoir above and beyond those being achieved through existing policies and ordinances; and,
3. Actively participate in State and Federal regulatory and/or policy initiatives that might result in requirements for additional nutrient and sediment reductions.

Streams and Ecosystems Recommendations:

1. Rigorously maintain the integrity of the Occoquan downzoning;
2. Continue regular long-term stream assessments by the Stream Protection Strategy staff;
3. Fully develop and implement the Stormwater Planning Division's watershed management planning process in the Occoquan watershed;
4. Study and adopt new stormwater management designs that have been demonstrated to protect or improve the health of stream ecosystems; and,
5. Encourage the use of those LID techniques that have been proven effective under local conditions, both where new development is planned and, to the extent feasible, for retrofitting of existing development.

Land Use and Open Space Recommendations:

1. Continue the County's commitment to the successful strategy for water quality protection of Occoquan Reservoir;
2. Establish a broad-based advisory committee, to include stakeholders, County staff, and one or more members of the County's Planning Commission, to review standards and guidelines associated with Special Permit, Special Exception, and public uses that may be approved in the R-C District in the Occoquan watershed and to report its findings and recommendations to the Board of Supervisors;
3. Establish a more proactive easements program that provides for outreach efforts to owners of land in the Occoquan watershed that contains environmentally sensitive resources;
4. Fully fund watershed management planning efforts as well as the implementation of adopted plan measures; and,
5. Complete the ongoing review of impediments to the application of low impact site design techniques and identify disincentives and policy/regulatory conflicts associated with the implementation of these techniques.

Tree Preservation Recommendations:

1. Continue to press for tree preservation and preservation enabling legislature;

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2. Establish tree canopy goals for the Occoquan watershed and determine appropriate implementation measures for attaining those goals; and,
3. Encourage the revegetation of lost riparian stream buffers with native woody vegetation by identifying potential reforestation areas, providing citizen education, and encouraging citizen reforestation efforts.

Citizen Involvement Recommendations:

1. Strengthen partnerships with public and citizen organizations to broaden participation in education and stewardship activities;
2. Encourage growth of the network of organizations and citizen groups concerned with and/or actively involved in watershed and water quality issues, and seek assistance on methods of reaching more citizens to seek participation in stewardship activities;
3. Sponsor programs, meetings, seminars and festivals on water quality and natural resource protection that attract people who may become active volunteers in existing or new programs and help to educate others on the value of good stewardship;
4. Support the expansion of existing outreach and education programs, such as those sponsored by the Northern Virginia Soil and Water Conservation District, the Audubon Naturalist Society, and the Fairfax County Park Authority;
5. Investigate proactive outreach to property owners who have property in or abutting Resource Protection Areas (RPAs) and/or other stream valley areas; and,
6. Develop a strategy for strengthening the role of citizens in code and ordinance enforcement.

Fairfax County Park Authority Natural Resource Management Plan, 2004-2008

The *Natural Resource Management Plan* was prepared by the Fairfax County Park Authority in January 2004, and describes the system-wide resource preservation vision of the Park Authority for 2004 through 2008. The plan recognized that the impacts from urbanization and development place tremendous stress on natural areas. Among those impacts are stormwater runoff, water and air pollution, invasive plants, wildlife conflicts, and encroachment by adjoining property owners. The plan contains strategies for seven elements: Natural Resource Management Planning, Vegetation, Wildlife, Water Resources, Air Quality, Human Impacts on Parklands, and Education.

The following recommendations from the report which address water quality and stormwater management may be evaluated as part of the *Little Rocky Run and Johnny Moore Creek Watershed Management Plan*.

Plan Element: <u>Natural Resource Planning</u>

Issue 1: Natural Resource Inventories and Planning

- Strategy 1.9: Promote partnerships and volunteer participations in resource management inventories, plans and management.

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- Strategy 1.12: Pursue opportunities through open space easements, proffered dedications, acquisitions and partnerships to preserve and protect additional open space – particularly land with significant natural, cultural or horticultural resources. Educate citizens about their opportunities to participate in these programs and to protect natural resources on their land.
- Strategy 1.13: Participate in County revitalization projects to identify areas appropriate for resource and open space preservation, as well as passive recreation.
- Plan Element: Wildlife

Issue 3: Resolving Conflicts with Wildlife

- Strategy 3.3: Provide information to increase citizen and staff awareness of the benefits and dangers of wildlife, the role of wildlife management and methods to peacefully coexist with wildlife.

Plan Element: Water Resources

Issue 2: Baseline Inventories for Water Resources

- Strategy 2.1: Continue to expand partnerships with DPWES, NVSWCD, ANS, DEQ, Fairfax County Public Schools and others to involve Park Authority volunteers in producing certified water quality monitoring data from park sites. Seek expanded coordination of data and information among participating organizations and volunteers.
- Strategy 2.2: Complete inventory and assessment of stormwater management facilities on parklands to determine their condition and effectiveness, as well as maintenance actions required and responsibility for ongoing maintenance.
- Strategy 2.3: For parks with water bodies, include water quality physical and biological assessments in natural resource baseline inventories as part of park master plans.
- Strategy 2.4: In cooperation with DWPES, begin an assessment of stormwater outfalls on or directly adjacent to parkland to identify locations of greatest concern for erosion and related damage. Explore options to mitigate damage at the sites of greatest concern.
- Strategy 2.5: Review the stream assessment data compiled by DPWES that are available for park stream valleys, identify problem areas on parklands, and develop a prioritized action plan for the most critical needs (including cost estimates for each project).

Issue 3: Protecting Water Resources

- Strategy 3.1: Participate in and closely monitor the Fairfax County Watershed Planning process being coordinated by DPWES.
- Strategy 3.2: As Fairfax County Watershed Plans are adopted by the Board of Supervisors, incorporate their requirements and recommendations in park master planning, design and construction in those watersheds and as may be applicable countywide.
- Strategy 3.5: Seek partnership opportunities and volunteer projects with the Potomac Conservancy, the Virginia Department of Forestry, the Northern Virginia Conservation Trust, DPWES, Department of Planning and Zoning, the

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Northern Virginia Regional Park Authority, the Fairfax County Tree Commission, and others to enhance riparian buffers and other aquatic habitats.

- Strategy 3.6: Pursue opportunities to utilize Best Management Practices (BMPs) and Low-Impact Development (LID) such as green buildings, rain gardens, and other innovative techniques to reduce water quality and other impacts of new or renovated Park Authority facilities.

1.3.3 PROPOSED PROJECTS AND IMPROVEMENTS

Proposed Drainage Plan, The Occoquan Watersheds, 1979

The *Proposed Drainage Plan, The Occoquan Watersheds* report was written by Parsons, Brinckerhoff, Quade & Douglas in April 1979. The report identified 12 projects for the Little Rocky Run watershed at an estimated cost of $905,000, and one project for the Johnny Moore Creek watershed at an estimated cost of $22,000. The various projects included 12 culvert/road improvement projects and one stream stabilization project. The purpose of these projects includes protecting houses, alleviating roadway flooding, and abating bank erosion. The status of the projects is shown in Table 1-10. The location of the projects is shown on Map 1-7.

Table 1-10 Little Rocky Run-Johnny Moore Creek Drainage Plan Project Status

Project Number	Description	Status
Willow Springs Segment – Little Rocky Run		
WS-1	Raise Road and Replace Culvert at Stringfellow Road	Inactive
WS-2	Lower Invert and Replace Culvert at Lee Highway	Inactive
WS-3	Lower Invert and Replace Culvert at Lee Highway	Completed
Centreville Segment – Little Rocky Run		
CV-1	Install Riprap Bank Protection in Vicinity of Stringfellow Road	Inactive
CV-2	Realign Channel and Install Culverts at Braddock Road	Completed
CV-3	Install Berm and Replace Culvert at Clifton Road	Completed
CV-4	Raise Road and Replace Culvert at Braddock Road	Completed
CV-5	Lower Invert and Replace Culvert at Lee Highway	Inactive
CV-6	Add Culvert to Existing Bridge at Lee Highway	Inactive
CV-7	Channelize Stream and Replace Culvert at Private Drive	Completed
CV-8	Lower Invert and Replace Culvert at Leland Road	Deleted
Little Rocky Segment – Little Rocky Run		

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Project Number	Description	Status
LR-1	Replace Culvert at Compton Road	Completed
Johnny Moore Creek Watershed		
JM-1	Lower Invert and Replace Culvert at Compton Road	Inactive

The inactive projects will be evaluated to determine if they are viable and needed, and will be included in the Watershed Management Plan as appropriate.

Fairfax County Master Plan Drainage Projects

Fairfax County currently has 34 master plan drainage projects designated for the Little Rocky Run and Johnny Moore Creek watersheds. This list includes the projects identified in the *Proposed Drainage Plan Report* and the *Regional Stormwater Management Plan*.

The 34 projects include the 13 projects from the *Proposed Drainage Plan*, 14 regional ponds from the *Regional Stormwater Management Plans*, and 7 other projects: two active dam repair projects, the completed Landfill Downshoot drainage system design, the deleted flood protection project at Battle Rock Drive, the inactive floodproofing project at 5410 Stringfellow, and two watershed studies (Little Rocky Run and Johnny Moore Creek).

Regional Stormwater Management Plan, 1989

In January 1989, the Fairfax County Board of Supervisors adopted a plan prepared by the engineering firm of Camp, Dresser and McKee. The plan, intended to be a pilot program, consists of a network of 134 detention facilities to directly control 35 square miles of drainage area. Many regional ponds described in the *Regional Stormwater Management Plan* already have been constructed. Several more facilities are in various stages of implementation. There are potential facilities that are in the final design phase either as County managed projects or by developers through rezoning. A summary of the regional pond facilities in the Little Rocky Run watershed is provided in Table 1-11 and the location of the facilities is shown on Map 1-7.

Table 1-11 Regional Pond Status

Regional Pond Identifier	Status	Taxmap Id
Clifton Manor R-11	Completed	66-1
Faircrest R-161	Completed	55-3
Pond R-02	Completed (not fully regional as constructed)	65-4
Pond R-05	Inactive	65-2
Pond R-06	Completed	55-4
Pond R-07	Completed (not fully regional as constructed)	55-3
Pond R-08	Completed	55-4
Pond R-09	Completed	55-2
Pond R-10	Inactive	55-4
Pond R-12	Inactive	55-2

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Regional Pond Identifier	Status	Taxmap Id
Pond R-13	Inactive	66-1
Pond R-16	Completed (not fully regional as constructed)	55-3
Pond R-17	Active, partially funded	55-3
Pond R-19	Completed	55-4

This *Stormwater Management Plan* has been reevaluated, and recommendations for changes have been made by the Regional Pond Subcommittee, which is an ad hoc subcommittee of the Fairfax County Environmental Coordinating Committee. One of the objectives of this *Watershed Management Plan* will be to evaluate ponds in all phases while incorporating watershed protection and restoration goals, allowing for innovative management techniques to be utilized throughout the watersheds.

The inactive regional pond sites in the Little Rocky Run watershed will be evaluated for incorporation of a variety of stormwater management techniques that will provide the water quality and stormwater detention that would have been provided by the regional ponds.

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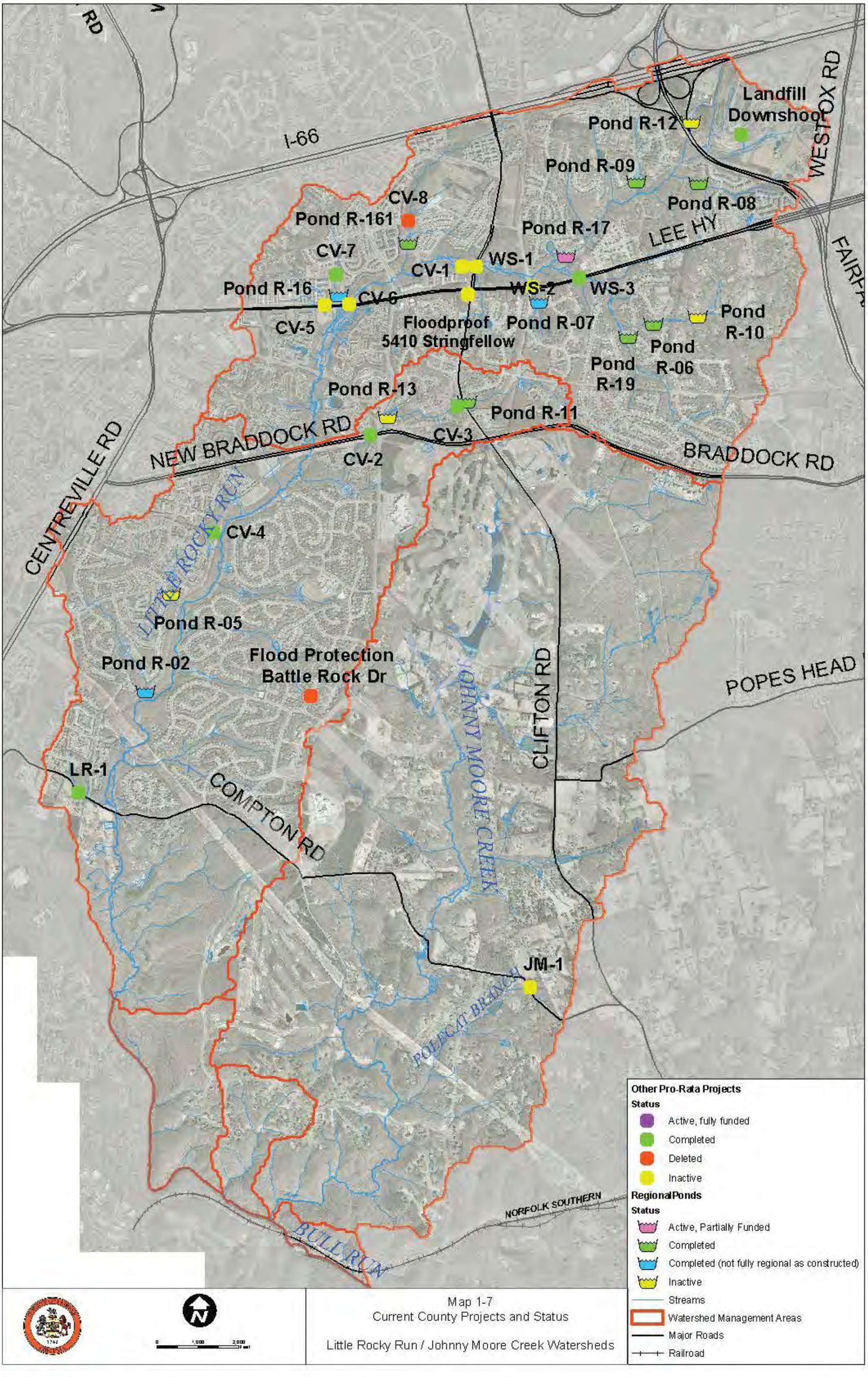

Map 1-7
Current County Projects and Status

Little Rocky Run / Johnny Moore Creek Watersheds