2.3 Johnny Moore Creek Watershed (Johnny Moore Creek and Johnny Moore Creek – Bull Run WMAs)

2.3.1 WMA Characteristics

The Johnny Moore Creek and Johnny Moore Creek – Bull Run WMAs are combined in this summary. The Johnny Moore Creek –Bull Run WMA drains directly into Bull Run and is adjacent to and surrounded on three sides by the Johnny Moore Creek watershed. It is relatively undeveloped and much smaller than the Johnny Moore Creek WMA. The Johnny Moore Creek WMA has an area of approximately 3,213 acres (5.0 mi^2) and the Johnny Moore Creek –Bull Run WMA has an area of approximately 161 acres (0.25 mi^2). The Johnny Moore Creek watershed is located in southern Fairfax County and is bounded to the north by Braddock Road and to the south by Bull Run. Union Mill Road is its approximate western boundary and its eastern boundary extends from the intersection of Colchester Road and Braddock Road to the southern end of Balmoral Forest Road.

The Johnny Moore Creek WMA includes 19.0 miles of perennial streams and the Johnny Moore Creek – Bull Run WMA includes 0.7 miles of perennial streams. The streams flow generally in a southwest direction through predominantly open space and low density residential areas. Johnny Moore Creek flows into Bull Run upstream of the Norfolk Southern Railway Crossing of Bull Run.

In the *Occoquan Environmental Baseline Report (February 1978)* 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 report also noted severe sedimentation on Polecat Branch upstream of the power line. In the erosion areas noted by the *Occoquan Environmental Baseline Report* in 1978 at Twin Lakes Drive, Compton Road and the power line, the banks remain moderately unstable with scattered vegetation; however these areas were not flagged for severe erosion in 2005. The *Stream Physical Assessment (August 2005)* data reflects erosion areas downstream of Polecat Branch and near the confluence with Bull Run. The severe sedimentation on Polecat Branch upstream of the power line noted in the 1978 *Occoquan Environmental Baseline Report* is consistent with the 2005 *Stream Physical Assessment* that also noted severe sedimentation on Polecat Branch upstream of Balmoral Forest Road and also on three other tributaries to Johnny Moore Creek.

2.3.2 Existing and Future Land Use

The existing land use in the Johnny Moore Creek and Johnny Moore Creek – Bull Run WMAs consists primarily of open space and estate residential. This is because both of the WMAs are located in the Residential-Conservation (R-C) District where development is limited to one dwelling unit per 5 acres. This area was rezoned by the Fairfax County Board of Supervisors in 1982 to protect the Occoquan Reservoir. The Johnny Moore Creek WMA is currently 40 percent estate residential development and 36 percent open space. The Johnny Moore Creek – Bull Run WMA is currently 63 percent open space and 26 percent low density residential development. Most of the Twin Lakes Golf Course and the Westfields Golf Course at Balmoral are located in the Johnny Moore Creek WMA. A summary of the land use in the WMAs can be found in Table 2-3.

Comparing existing land use to future land use, 614 acres or 19% of the WMA shifts from open space to estate residential in Johnny Moore Creek. In the Johnny Moore Creek – Bull Run WMA, 4 acres or 2% of the WMA shifts from open space to estate residential. Map 2-2 shows the existing and future conditions land use in the Johnny Moore Creek watershed.

Table 2-3. Existing and Future Land Use in Johnny Moore Creek

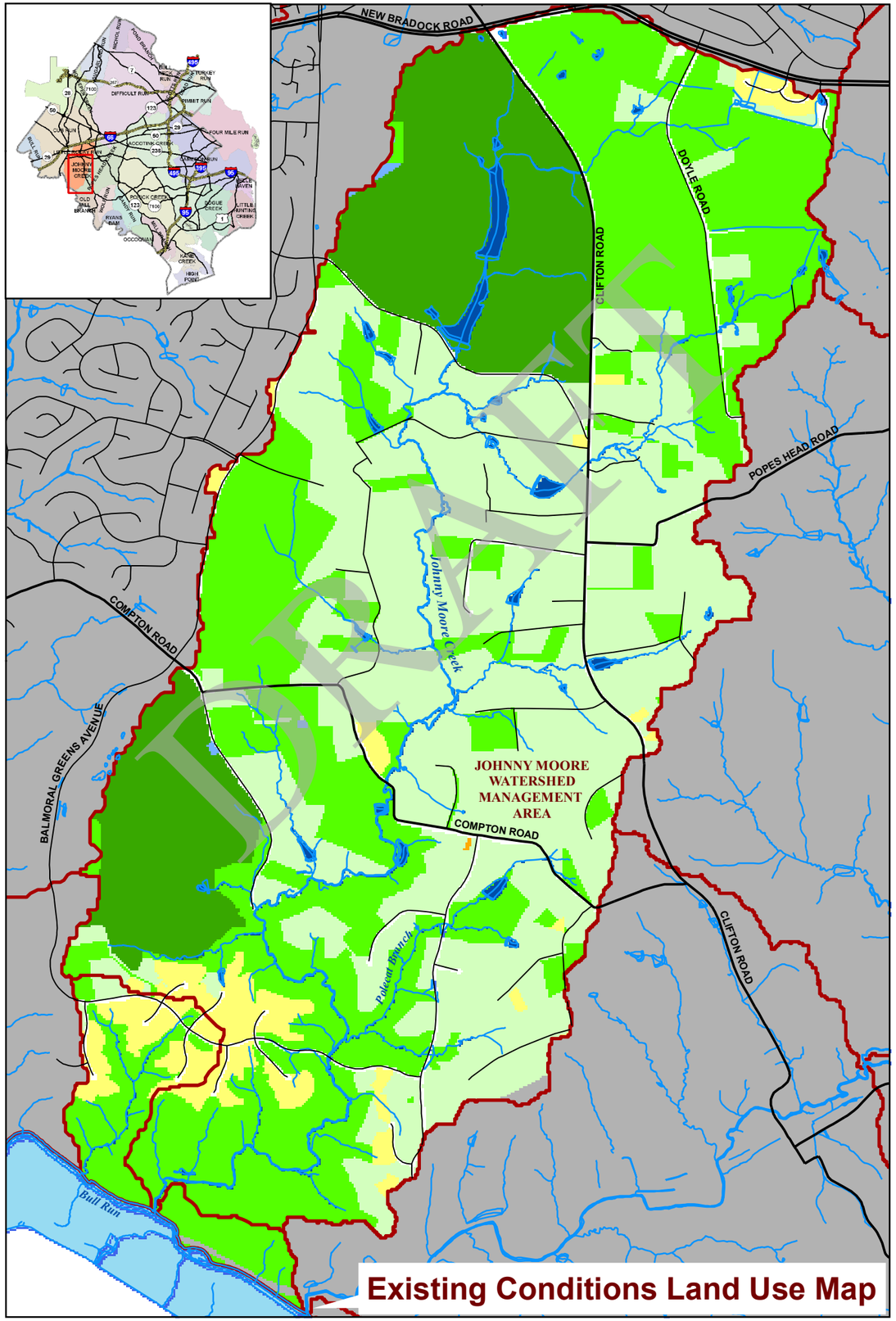
Johnny Moore Creek WMA

Land Use Type	Existing		Future		Change	
	Acres	%	Acres	%	Acres	%
Estate Residential (ESR)	1291	40%	1905	60%	614	19%
Low Density Residential (LDR)	100	3%	100	3%	0	0%
Medium Density Residential (MDR)	0	0%	0	0%	0	0%
High Density Residential (HDR)	0	0%	0	0%	0	0%
Low Intensity Commercial (LIC)	0	0%	0	0%	0	0%
High Intensity Commercial (HIC)	0	0%	0	0%	0	0%
Industrial (IND)	4	0%	4	0%	0	0%
Institutional (INT)	2	0%	2	0%	0	0%
Golf Course (GC)	534	17%	534	17%	0	0%
Open Space (OS)	1137	36%	523	16%	-614	-19%
Water (W)	49	2%	49	2%	0	0%
Transportation (T)	79	2%	79	2%	0	0%
Total	**3200**	**100%**	**3200**	**100%**		**0%**

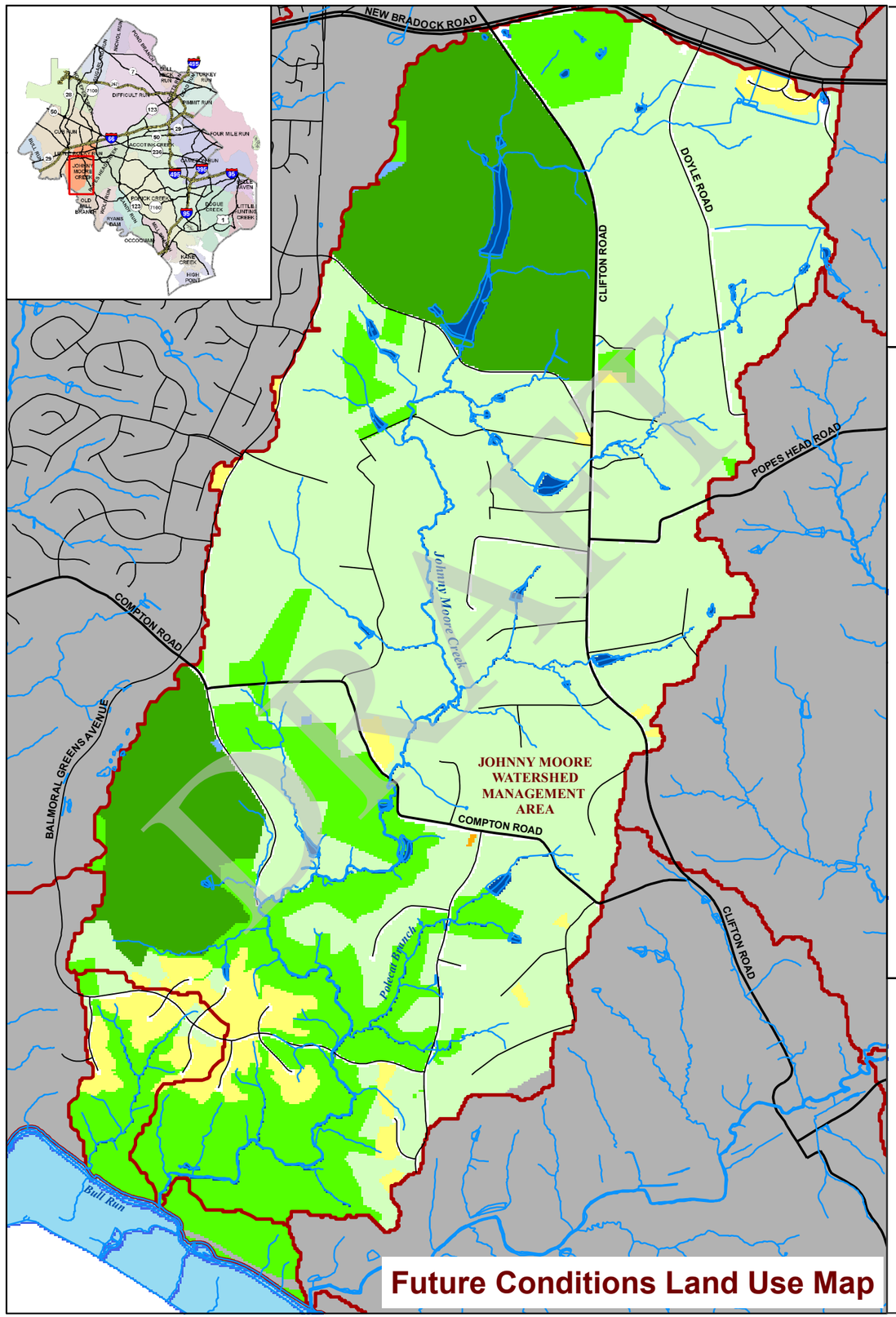
Johnny Moore Creek - Bull Run WMA

	Existing		Future		Change	
	Acres	%	Acres	%	Acres	%
Estate Residential (ESR)	4	3%	8	5%	4	2%
Low Density Residential (LDR)	40	26%	40	26%	0	0%
Medium Density Residential (MDR)	0	0%	0	0%	0	0%
High Density Residential (HDR)	0	0%	0	0%	0	0%
Low Intensity Commercial (LIC)	0	0%	0	0%	0	0%
High Intensity Commercial (HIC)	0	0%	0	0%	0	0%
Industrial (IND)	4	3%	4	3%	0	0%
Institutional (INT)	0	0%	0	0%	0	0%
Golf Course (GC)	0	0%	0	0%	0	0%
Open Space (OS)	99	63%	95	61%	-4	-2%
Water (W)	1	1%	1	1%	0	0%
Transportation (T)	7	5%	7	5%	0	0%
Total	**156**	**100%**	**156**	**100%**		**0%**

The total impervious area (includes all paved areas and building rooftops) for the Johnny Moore Creek WMA is 117 acres or 3.6 percent of the WMA and for the Johnny Moore Creek – Bull Run WMA the total impervious area is 8 acres or 4.9 percent of the WMA. In general, low amounts of impervious surface indicate good stream water quality.



Existing Conditions Land Use Map



Future Conditions Land Use Map

Map 2-2
Existing and Future Land Use Maps

Johnny Moore Creek and Johnny Moore Creek - Bull Run Watershed Management Areas

Legend

- Streams
- Major Roads

Watershed Management Areas

WMA

- Johnny Moore WMAs
- Other WMAS

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

N

Scale

0 1,000 2,000 Feet

2.3.3 Stormwater Infrastructure

Stormwater infrastructure in the WMAs consists of stormwater management facilities, storm sewer and other manmade stormwater conveyances. Stormwater management facilities provide control of stormwater runoff in two ways; by reducing the quantity of stormwater runoff and providing treatment to reduce pollution and thereby improve the quality of stormwater runoff. Stormwater management facilities are designed to improve water quality by reducing the erosive effects of stormwater runoff and by filtering or capturing pollutants in the facility. Earlier facilities (prior to 1980 in the Occoquan basins and prior to 1994 in the rest of the County) provide only water quantity reduction, while facilities constructed later may provide both water quantity and quality treatment or provide quality treatment alone.

There are 47 stormwater management facilities in the County records for the Johnny Moore Creek WMAs: 10 of these are dry ponds and 3 are wet ponds. From field reconnaissance and desktop assessment, it was determined that: 2 are not stormwater facilities, 1 appears to be a constructed wetland, 5 are golf course wet ponds, 14 are small farm ponds that were not designed for stormwater management, 3 are larger wet ponds or farm ponds on private property that were not designed for stormwater management and 9 are unknown because they were inaccessible to field staff. Map 2-3 shows the location of these facilities, locations of drainage complaints and the parcels covered by stormwater management.

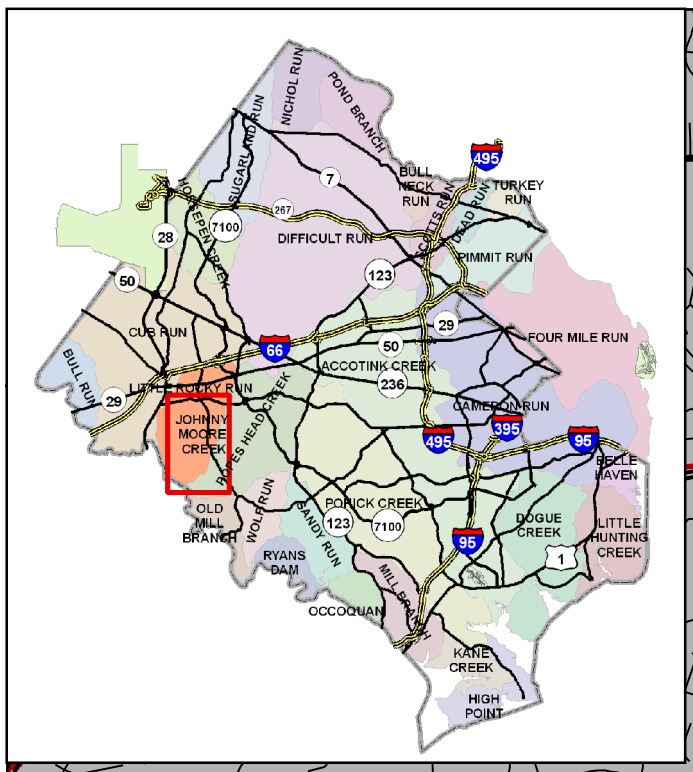
The primary land use in the WMAs is estate residential, where the lots are typically developed independently and may not have traditional stormwater management facilities. The stormwater treatment data for the WMAs is summarized in Table 2-4. Future estate residential development in the WMAs should be designed with adequate stormwater control in order to prevent water quality impacts downstream.

Table 2-4. Stormwater Treatment Types in the Johnny Moore Creek WMAs

WMA Name	Current Percent Impervious	Current Treatment Types			
		Quantity (acres)	Quality (acres)	Quantity/Quality (acres)	None (acres)
Johnny Moore	3.6	2	188	114	2909
Johnny Moore – Bull Run	4.9	0	42	5	113
Total		2	230	119	3022

There were 9 complaints related to stormwater in the County's complaints database in the WMAs. The classification of these complaints is summarized below:

- 8 Citizen Responsibility
- 1 Unclassified, but described as a cave-in by a pond


NICHOL RUN
POND BRANCH
SUGARLAND RUN
HOPE SPRING BRANCH
BULL NECK RUN
TURKEY RUN
CUB RUN
DIFFICULT RUN
PIMMIT RUN
FOUR MILE RUN
ACCOTINK CREEK
LITTLE ROCKY RUN
BULL RUN
JOHNNY MOORE CREEK
POPES HEAD CREEK
CAMERON RUN
BELLE HAVEN
OLD MILL BRANCH
WOLF RUN
POHICK CREEK
SANDY RUN
DOGUE CREEK
LITTLE HUNTING CREEK
RYANS DAM
MILL BRANCH
OCCOQUAN
KANE CREEK
HIGH POINT
495
7
267
7100
28
50
123
29
66
236
395
95
1

NEW BRADOCK ROAD
DOYLE ROAD
CLIFTON ROAD
JOHNNY MOORE WATERSHED MANAGEMENT AREA
POPES HEAD ROAD
Johnny Moore Creek
COMPTON ROAD
BALMORAL GREENS AVENUE
Polecat Bylanch
Bull Run
JOHNNY MOORE - BULL RUN WATERSHED MANAGEMENT AREA
DRAFT
N
0 1,000 2,000 Feet
Legend
303d Listed Streams
MAJOR_ROADS
Arterial Streets
WMA
Johnny Moore WMAs
Other WMAS
Drainage Complaints
Parcels
Type of SWM Facility
Other BMP
Dry Pond
Wet Pond
Farm Pond
Unknown
Storm Drainage Infrastructure
Streams
Parcel SWM Treatment Type
Parcel Controlled by Quantity BMP
Parcel Controlled by Wet Pond (Quality & Quantity
Parcel Controlled by Dry Pond (Quality & Quantity
Parcel Controlled by Quality BMP
Map 2-3
Johnny Moore and Johnny Moore - Bull Run WMAs
Stormwater Infrastructure

2.3.4 Stream Condition

The County conducted a *Stream Physical Assessment* (SPA) in August 2005 that assessed the habitat, stream geomorphology and impacts to the streams from crossings, ditches, pipes, headcuts, dump sites, utilities and obstructions. Map 2-4 shows a summary of the SPA data.

11.7 miles of stream habitat in the Johnny Moore WMAs were assessed for the SPA. The results for this study are summarized below:

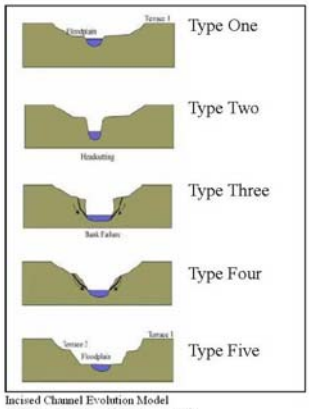
- Very Poor: 0.1 miles or 1%
- Poor: 1.8 miles or 15%
- Fair: 7 miles or 60%
- Good: 2.8 miles or 24%
- Excellent: 0 miles

Figure 2-2: Very poor stream habitat segment – Twin Lakes Golf Course

The stream habitat segment classified as very poor in the above list (shown in Figure 2-2) is located within the Twin Lakes Golf Course and is an altered channel with little to no vegetated buffer. Stream segments with sections classified as "poor" for stream habitat are located on various tributaries to Johnny Moore Creek, but none are on the Johnny Moore Creek main stem.

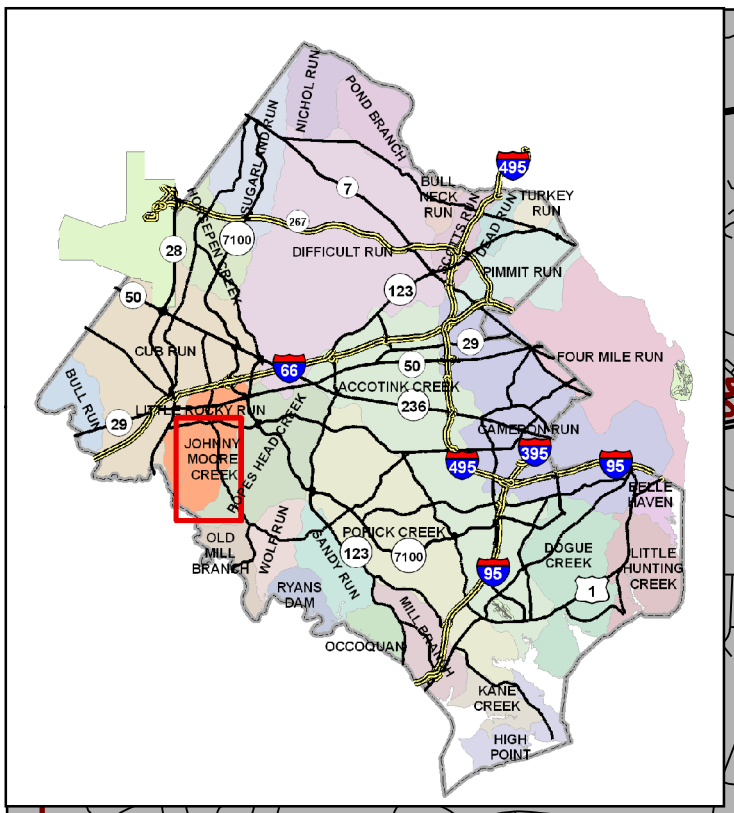
The geomorphological assessment of the stream channels in the WMAs were performed in 2003 and was based on the conceptual incised channel evolution model (CEM) developed by Schumm et al (1984). The CEM provides information about the evolution of a stream channel in response to disturbance. Based on visual 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 below.

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



Incised Channel Evolution Model
(Schumm, Harvey, and Watson, 1984)

The CEM Types 2 and 3 are shown on the stream condition map because these types are considered the most unstable. In the WMAs, all of the assessed reaches are CEM Type 3, except for the tributary that crosses Fox Shadow Lane, which is a CEM Type 4.



Legend

MAJOR_ROADS

WMA

- Other WMAs
- Johnny Moore WMAs

Utility Impact

- Minor to Moderate
- Moderate to Severe
- Severe to Extreme

Obstruction Impact

- Minor to Moderate
- Moderate to Severe
- Severe to Extreme

Ditch Impact

- Minor to Moderate
- Moderate to Severe
- Severe to Extreme

Head Cut Impact

- Minor to Moderate
- Moderate to Severe
- Severe to Extreme

Dump Impact

- Minor to Moderate
- Moderate to Severe
- Severe to Extreme

Pipe Impact

- Minor to Moderate
- Moderate to Severe
- Severe to Extreme

Crossing Impact

- Minor to Moderate
- Moderate to Severe
- Severe to Extreme

Channel Evolution Model Category

- 2
- 3

Habitat Assessment

- Very Poor
- Poor
- Fair
- Good
- Excellent
- Severe to Extreme Erosion
- Streams (No Assessment)

N

0 1,000 2,000 Feet

Map 2-4

Johnny Moore and Johnny Moore - Bull Run WMAs

Stream Condition

The SPA noted two areas of moderate to extreme erosion on Johnny Moore Creek. One near the confluence with Bull Run and one approximately 800 feet downstream of Balmoral Greens Avenue. Photos of the two areas are shown in Figures 2-3 and 2-4 below.

Figure 2-3: Erosion area near confluence with Bull Run

Figure 2-4: Erosion area downstream of Balmoral Greens Avenue

The other impacts found in the SPA are summarized in Table 2-5.

Table 2-5. SPA Impacts in the Johnny Moore Creek WMAs

Impact Type	Number	Comment
Utility	0	
Obstruction	9	All minor to moderate, includes 4 beaver dams
Ditch	0	
Headcut	1	2' Headcut on tributary in Twin Lakes Golf Course
Dump	1	Appliances, Trash on tributary along Union Mill Rd (minor to moderate)
Pipes	4	Minor to Moderate
Crossings	67	3 bridges, 4 box culverts, 32 circular culverts, 2 fords and 26 foot bridges 3 have moderate to severe impact (one ford, one box culvert and one circular pipe)

The following pictures show some of the impacts found in the WMAs during the 2005 SPA.

Figure 2-5: Headcut on tributary located on Twin Lakes Golf Course

Figure 2-6: Dump Site on tributary along Union Mill Road (no longer there – see below)

Figure 2-7: Pipe Impact near confluence with Bull Run

2.3.5 Field Reconnaissance

Field reconnaissance was conducted to update/supplement existing Fairfax County geographic data so current field conditions were 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.

During the field reconnaissance performed in June 2008, several areas of concern from 2005 were re-visited and were found to no longer exist. Most of the debris obstructions noted in 2005 had been removed or washed out. Prior to the 2008 field reconnaissance the area received unusually heavy rainfall. The rainfall likely contributed to the washing out of many beaver dams and natural stream obstructions that had previously existed. Evidence of this was observed throughout the watershed with large piles of branches and debris pushed to the side of channels. No evidence of dump sites observed in 2005

existed in 2008. A dump site identified in 2005 on a tributary along Union Mill Road where a hot tub was abandoned is no longer present.

Additionally, many new areas of concern were identified and inspected during the field reconnaissance. Bank erosion was one of the most common and significant impact types identified. Bank erosion was found to occur throughout the watershed and ranged from minor to severe in condition.

Severe erosion was observed on tributaries as well as the main stem of Johnny Moore Creek. The tributary located near the intersection of Clifton Road and Cedar Ridge Drive is experiencing severe erosion and headcuts. The following pictures show the erosion near the intersection.

Figure 2-8: Bank erosion in excess of 3ft on small tributary near Cedar Ridge Drive

Figure 2-9: Bank erosion in excess of 3ft on small tributary near Cedar Ridge Drive

Severe bank erosion was also observed along the main channel of Johnny Moore Creek near the Balmoral Greens neighborhood in the same location as noted in the 2005 SPA. The following pictures show an update of erosion occurring in this area.

Figure 2-10: Bank erosion in excess of 3ft on Johnny Moore Creek near Balmoral Greens Subdivision

Figure 2-11: Bank erosion in excess of 3ft on Johnny Moore Creek near Balmoral Greens Subdivision