

3 Summary of Watershed Conditions

This watershed management plan combines an assessment of three non-contiguous watersheds: Belle Haven, Dogue Creek and the Fairfax County portion of the Four Mile Run watershed, into one document. These watersheds are located in southeastern and eastern Fairfax County as shown on Figure 3-1. The Dogue Creek watershed was divided into five Watershed Management Areas (WMAs). Due to their smaller size, the Belle Haven and Four Mile Run watersheds were not divided into WMAs and thus the entire watershed for each was treated as a single WMA. Watershed Management Area and subwatershed boundaries for these three watersheds are shown on Figures 3-3, 3-6 and 3-9. A summary of each watershed is discussed separately in the sections that follow. Detailed information regarding watershed conditions can be found in the Draft Belle Haven, Dogue Creek and Four Mile Run Watershed Workbook, dated January 2009, located in Appendix A.

Methods and background common to all three watersheds are discussed below.

Land Use and Imperviousness

Existing land use mapping was provided by Fairfax County, and was derived from property mapping and aerial photography. Future land use was also provided by the County and is based on zoning, land use plans and forecasts of expected development and redevelopment.

The acres of impervious surface in each watershed were calculated by WMA from Geographic Information System (GIS) planimetric layers provided by the County. Impervious surfaces include roads, parking lots, buildings, sidewalks and driveways.

Stream Monitoring

In 1999, Fairfax County established the Stream Protection Strategy (SPS) monitoring program, to assess the biological health of the County's streams. A baseline study was completed in 2001. One hundred fourteen sampling sites were established within the County; three were located in Dogue Creek, one in Belle Haven and one in Four Mile Run. The County maintains a continuous monitoring program which assesses the biological, chemical and physical health of the streams. This datum was used by several Watershed Impact Indicators.

In addition to monitoring conducted by County staff, the Northern Virginia Soil and Water Conservation District (NVSWCD) maintains a volunteer monitoring program throughout Fairfax County.

Stream Habitat and Geomorphology

To supplement the biological and habitat data collected by County staff, beginning in the fall of 2002, field crews conducted a detailed Stream Physical Assessment (SPA) on approximately 801 miles of streams throughout Fairfax County, including the Belle Haven, Dogue Creek and Four Mile Run watersheds. As part of the SPA, field crews conducted a physical habitat assessment, a geomorphologic assessment and collected infrastructure information for all streams with a drainage area greater than 50 acres.

303(d) List and TMDLs

The Commonwealth of Virginia is required to monitor Waters of the State and submit a report to EPA and the public every two years. The Virginia Department of Environmental Quality (DEQ) prepares and submits the 305(b)/303(d) Water Quality Assessment Integrated Report, which

combines general water quality information required under Section 305(b) of the Clean Water Act with a report on impaired waters that do not meet the water quality standards required in Section 303(d).

The list of impaired waters in the Integrated Report (often referred to as the 303(d) List) specifically describes the locations of the listed water body and the cause and source of pollutants causing the impairment. Once a water body is listed as impaired, a plan is developed to restore the water. This plan takes into account the total amount of pollution a water body can assimilate, or a Total Maximum Daily Load (TMDL). The restoration plan is often referred to as a TMDL and is accompanied by a target year for restoration (referred to as a schedule). Impaired waters for which a TMDL is required are listed under Category 5 in the Impaired Waters Report. For more information on Virginia's monitoring program, visit DEQ's page at www.deq.state.va.us/wqa/homepage.html. For more information on the TMDL program in Virginia, visit DEQ's page at www.deq.virginia.gov/tmdl/homepage.html. Watershed specific information on 303(d) and TMDLs are included in the sections that follow.

HSI/NSA Field Investigations

Field reconnaissance was conducted to update and supplement existing Fairfax County geographic data so current field conditions were accurately represented. This information was used to update watershed GIS data for subsequent analysis. The reconnaissance effort included the identification of current stormwater management facilities, potential restoration opportunities and identification of pollution sources at a representative sample of commercial, industrial, and residential areas using the Center for Watershed Protection's Hotspot Site Investigation (HSI) and Neighborhood Source Assessment (NSA).

Hotspot Site Investigation. The Hotspot Site Investigation was conducted to evaluate the pollution-producing behaviors at commercial hotspots (e.g., gas stations, restaurants, industrial areas, etc.) The goal was to quickly identify areas where stormwater pollution is generated and identify ways to mitigate it. A subsample of potential hotspots within each watershed was assessed. At each site, field crews evaluated various site practices, including vehicle operations, outdoor material storage, waste management, condition of the building, parking and landscaped areas and stormwater infrastructure.

Neighborhood Source Assessment. The Neighborhood Source Assessment is used to evaluate the pollution-producing behaviors in residential areas. A subsample of neighborhoods within each watershed was assessed. Field crews used a windshield survey method to get a sense of general neighborhood characteristics, such as the location of downspouts, turf management, curb and gutter condition and the amount of forest canopy. Where needed, the neighborhood was split into multiple areas when one portion of the neighborhood had significantly different characteristics.



Figure 3-1: Watershed Location Map

3.1 Belle Haven Watershed

The Belle Haven watershed is approximately 2.7 square miles and is part of the Potomac River Basin. As shown in Figure 3-3, the main waterway within the watershed is Hunting Creek (known locally as Quander Brook), which flows for nearly two miles in a northeastern direction from its headwaters near the junction of the Richmond Highway and Beacon Hill Road to its confluence with Cameron Run just upstream of the mouth of Cameron Run where it flows into the Potomac River near the Woodrow Wilson Bridge. The two other principal waterways in the watershed are direct tributaries to the Potomac River, one flowing northeast parallel to and east of Hunting Creek and draining to tidewater, and the other, known as Belle Haven, consisting of three branches flowing southeast to the Potomac River. There are 166 acres of wetlands, the majority of which are freshwater emergent or forested/shrub wetlands.

3.1.1 Land Use and Imperviousness

Approximately 69 percent of the watershed is developed with the majority, 41 percent, in various residential land uses. Current and future land uses are shown on Figure 3-4, Belle Haven Land Use Map. Commercial areas are primarily located along North Kings Highway and Richmond Highway in the northwestern portion of the watershed. Existing imperviousness is 32 percent and is expected to increase by approximately 1.5 percent from future development. Several environmental problems have been accelerated by development, including increased stream erosion and stream sedimentation due to concentrated points of stormwater runoff.

County records indicate that there are 20 stormwater management facilities within the Belle Haven WMA. These facilities provide control for five percent of the WMA. There are no existing or proposed regional ponds for the Belle Haven watershed.

3.1.2 Stream Monitoring

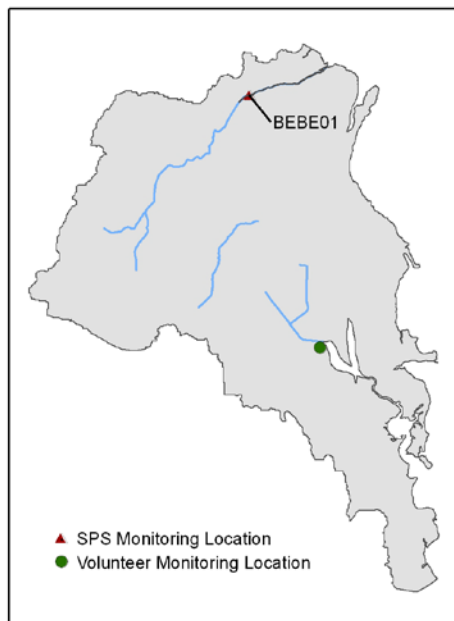


Figure 3-2: SPS baseline and volunteer sampling sites – Belle Haven watershed

There was one site sampled during the SPS Baseline Study. The site, BEBE01, is located on Hunting Creek, as shown on Figure 3-2, and the results are listed in Table 3-1. The composite condition rating for this site was very poor. This site received some of the lowest scores of the entire coastal plain system in Fairfax County. The high level of impervious area and the limited stormwater controls implemented when this watershed was initially developed are likely contributing to poor habitat quality. The most significant problem noted in the SPS Study was the limiting of habitat quality by sediment deposition.

Available County water quality data indicated that water quality fell within acceptable levels for all collected parameters including temperature, dissolved oxygen, specific conductance and pH.

There are no known active monitoring sites in the Belle Haven watershed under the Northern Virginia Soil and Water Conservation District program. There was one site for which no data was available.

Table 3-1: Stream Protection Strategy baseline data summary – Belle Haven

Stream Name (Site Code)	Composite Site Condition Rating	Environmental Variables		
		Index of Biotic Integrity	Habitat Score	Fish Taxa Richness
Belle Haven (BEBE01)	Very Poor	Very Poor	Very Poor	Very Low

Source: SPS Baseline Study Report, 2001.

3.1.3 Stream Habitat and Geomorphology

There were two miles of stream assessed in the Belle Haven watershed with all habitat rated as fair to very poor. Physical evaluations of the stream channels resulted in classifying all channels as Channel Evolution Model, Stage III, indicating unstable channels with severe bank erosion. Based on the habitat score, the Belle Haven watershed is the poorest quality watershed in the County.

There were 38 inventory points collected for the infrastructure inventory. The majority of these points were areas of buffer encroachment or locations of storm drain pipes where stormwater enters the stream. The most severe of these points were three buffer points, one obstruction and one erosion point all rated as having a severe impact on the stream system.

In 2008, the US Army Corps of Engineers completed a Flood Damage Reduction Analysis study to examine various alternatives to reduce flooding in the New Alexandria and Belle View subdivisions in the central portion of the Belle Haven watershed. The Corps performed a preliminary investigation and five percent level concept plans but stopped short of conducting a risk and uncertainty analysis required to receive federal funding. As a result of this study, the Corps determined that a floodwall/levee combination with an interior pumping station would be both feasible and cost-effective, with annualized economic benefits outweighing annualized project costs. These costs were estimated to be \$12.7 million (escalated to FY 2010 dollars) and would provide a levee/floodwall around the New Alexandria and Belle View communities with a top of protection to elevation 12 feet. The study is available on the Fairfax County Government's website at:

www.fairfaxcounty.gov/dpwes/publications/stormwater/bellehavenfinalreport.pdf. For more information, please call the Fairfax County Stormwater Planning Division at 703-324-5500, TTY 711.

3.1.4 Water Quality

Fairfax County Sampling Available County data in the Belle Haven watershed, ranging from August 1999 to March 2006 indicated no sites for which water quality fell outside of acceptable limits. There are no County Health Department sampling sites in the Belle Haven watershed.

303(d) List and TMDLs There were no stream segments in the Belle Haven watershed listed by DEQ as impaired and no TMDLs are scheduled for development or implementation. General information about the TMDL program is presented at the beginning of Section 3.

HSI/NSA Field Investigations In 2009, field crews conducted seven Hotspot Site Investigations and assessed nine neighborhoods to determine potential runoff pollution sources and identify potential treatment practices. Two of sites investigated were determined to be possible hotspots. Of the assessed neighborhoods, overall there was good potential for onsite retrofits of drainage system and only one neighborhood had potential for sediment pollution. Detailed

results of the hotspot and neighborhood assessments are discussed in Draft Watershed Workbook found in Appendix A.

Modeling Results The pollutant load model (STEPL) showed that three subwatersheds on the northern end of the WMA had the highest modeled pollutant loads, based primarily on medium and high-density residential development. The best quality subwatershed is on the southeast side of the WMA, containing open space.

The ranking procedure described in Section 2.3 was used to determine the relative condition of the subwatersheds in the Belle Haven watershed. The average existing conditions composite score ranking was 4.37 out of 10, where the worst condition subwatershed scored 3.10 and the best scored 6.03. All the Belle Haven subwatersheds were ranked in the lower half when all three watersheds were considered as a group.

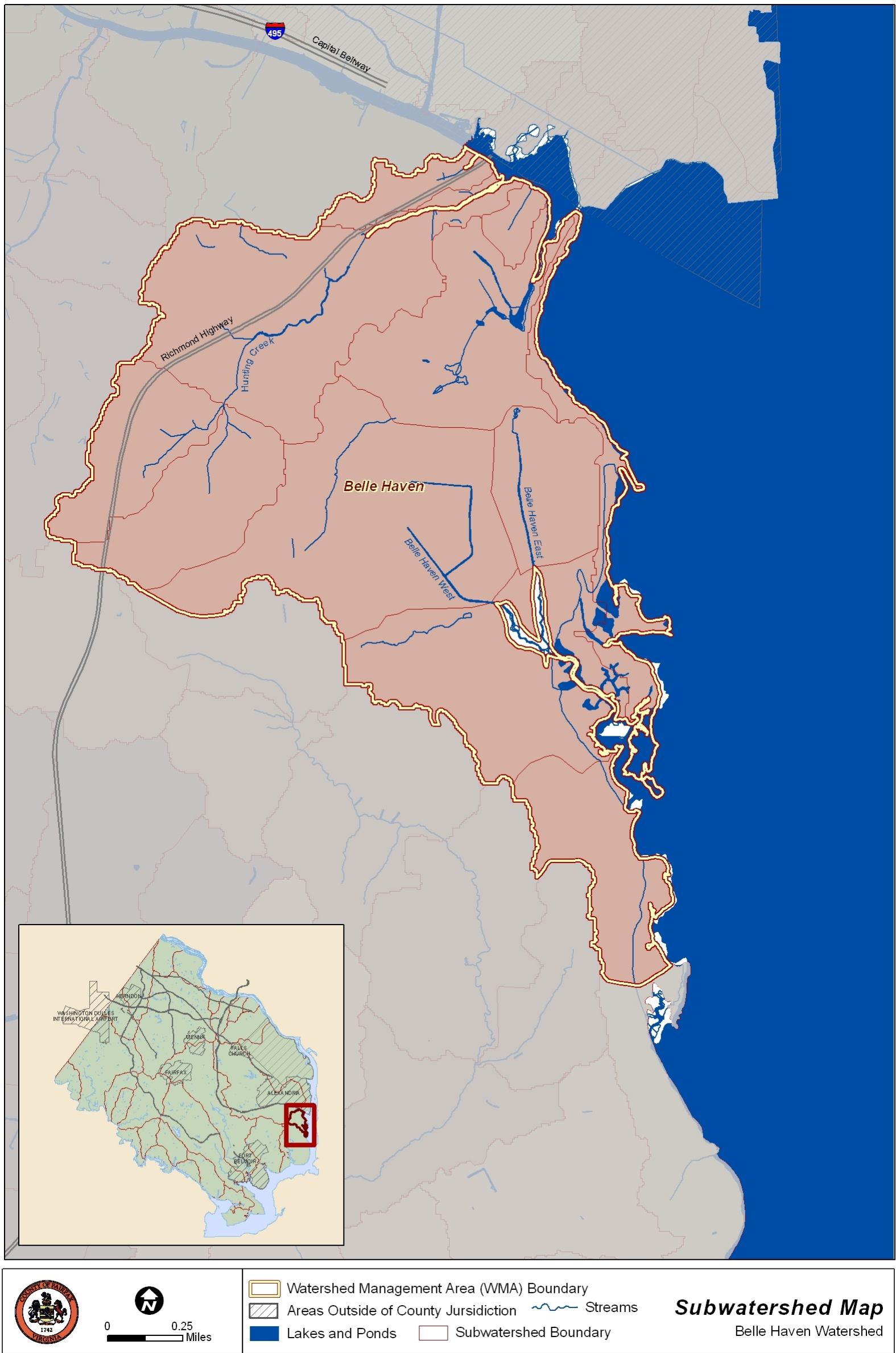


Figure 3-3: Belle Haven Watershed Map

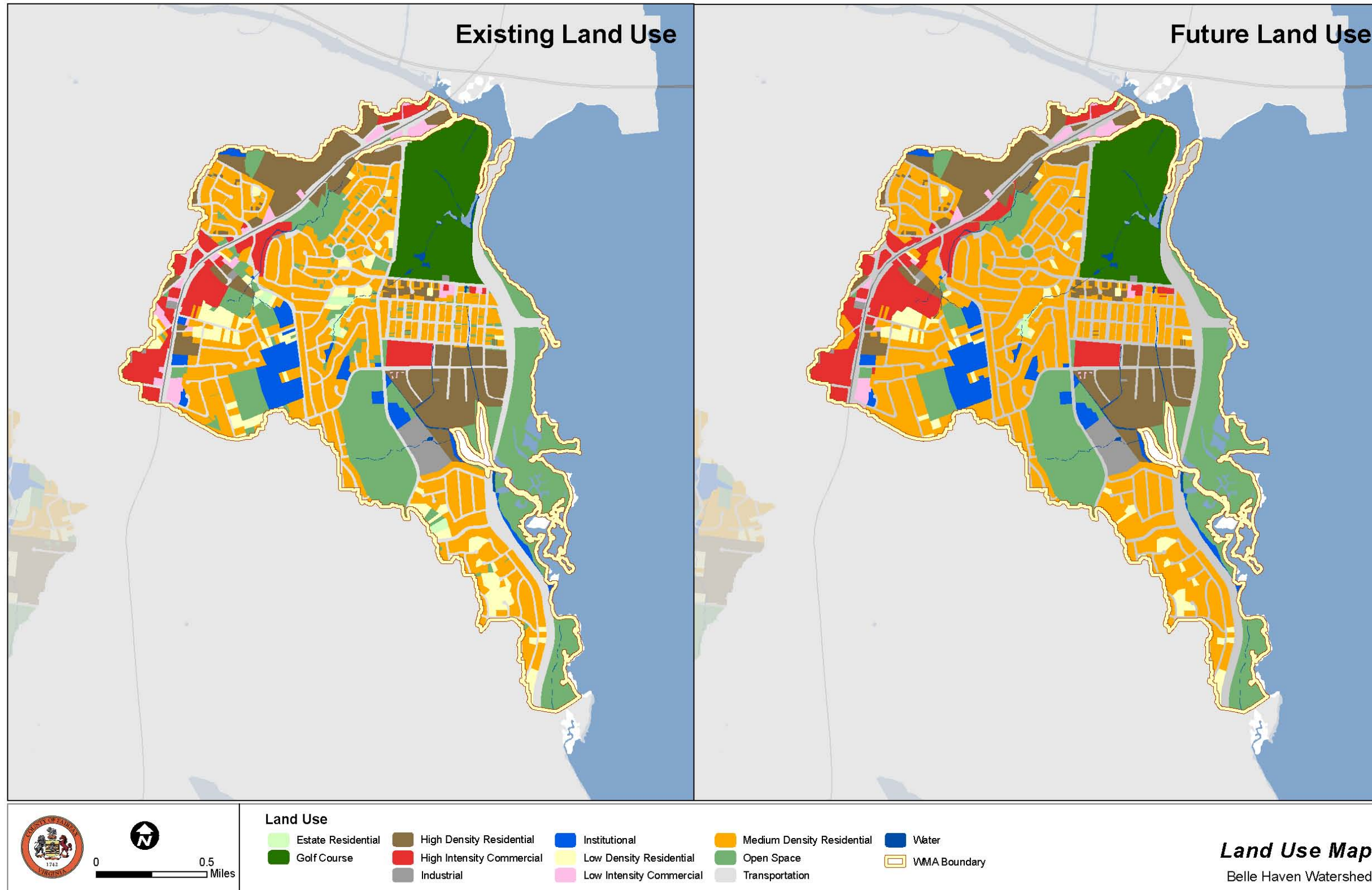


Figure 3-4: Belle Haven Land Use Map

3.2 Dogue Creek Watershed

The Dogue Creek watershed is approximately 19.5 square miles with 6.3 square miles (32 percent) of the watershed located in areas outside of the County jurisdiction in the Fort Belvoir Military Reservation (30 percent) and other US government installations (2 percent), as seen in Figure 3-6. The Dogue Creek watershed is part of the Potomac River Basin and contains about 32 miles of stream divided among five Watershed Management Areas (WMAs): Barnyard Run, Mainstem, North Fork, Piney Run and Potomac, shown in Table 3-2, below. The Potomac WMA is predominantly within the boundaries of Fort Belvoir Military Reservation and is not included in this plan.

Table 3-2: WMAs in the Dogue Creek watershed

WMA	WMA Area (ac)	WMA Area (sq mi)	Stream Length (mi)
Barnyard Run	1,529	2.4	5.3
Mainstem	3,776	5.9	10.2
North Fork	2,806	4.4	9.8
Piney Run	1,736	2.7	6.6
Potomac	2,629	4.1	4.3
Total Watershed	12,476	19.5	31.9

The mainstem of Dogue Creek flows for six miles in a southerly direction from its headwaters near the intersection of Franconia Road and South Van Dorn Street to the Dogue Creek Estuary and Potomac River near Fort Belvoir. The principal tributaries to Dogue Creek are Barnyard Run, which drains to the southwest into Dogue Creek within Huntley Meadows Park; Piney Run, which drains southeast into Dogue Creek near Kingman Road within Fort Belvoir; and North Fork, which drains southeast and east into Dogue Creek at Mount Vernon Memorial Highway. There is also direct drainage to the tidal portions of Dogue Creek and the Potomac River in areas of the watershed downstream of the confluence.

3.2.1 Land Use and Imperviousness

Approximately 70 percent of the watershed is developed, primarily in the headwaters of Dogue Creek, Barnyard Run and Piney Run, as well as most of the North Fork subwatershed. Current and future land use for the watershed is shown on Figure 3-7. Most of the development took place after the Flood Plain Ordinance of 1959, which preserved stream valleys and floodplains as open space and limited flooding of habitable buildings. Development west of Telegraph Road is more recent, having primarily been developed since 1980 with high-density residential housing.

There are two significant commercial areas: Kingstowne Towne Center and the Festival at Manchester Lakes Shopping Center in the northwestern portion of the watershed. There are also commercial areas along Route 1 in the southeastern portion of the watershed. The watershed is essentially built out. Only 3.5 percent of the land use is forecast to change.

There are 888 acres of wetlands in the Dogue Creek watershed, according to National Wetland Inventory (NWI) data. Of this, approximately 690 acres are freshwater forested or shrub wetlands, primarily located in Huntley Meadows Park in the Mainstem and Barnyard Run WMAs. The large areas of undeveloped land on Fort Belvoir Military Reservation and Huntley Meadows Park help to protect the overall quality of the mainstem of Dogue Creek. This is in contrast to neighboring watersheds with much higher levels of impervious cover.

The Fairfax County Park Authority, which owns and manages Huntley Meadows Park, is currently restoring the central wetlands of the park to its previous, more water-filled condition. Goals of the project are to preserve the biodiversity of this non-tidal marsh, the only marsh of its type in Fairfax County. The project design will take into account site-specific factors and will be maintainable by park staff and useable by visitors to the park. Currently the area is in the beginning stages of survey, with flagging and stakes marking existing wetland boundaries and areas that will be disturbed by construction. No projects have been proposed within the Park boundaries because of the ongoing restoration.

Overall, the Dogue Creek watershed is 19 percent impervious as shown in Table 3-3. Imperviousness among the WMAs in the watershed ranges from 11 percent in the Potomac WMA to 27 percent impervious in the North Fork WMA. Imperviousness across the watershed is expected to increase by approximately 1.5 percent due to future development.

Table 3-3: Dogue Creek watershed imperviousness

WMA	Total Area (ac)	Impervious Area (ac)	Percent Impervious
Barnyard Run	1,529	194	12.7
Mainstem	3,776	784	20.8
North Fork	2,806	769	27.4
Piney Run	1,736	396	22.8
Potomac	2,629	282	10.7
Total Watershed	12,476	2,425	19.4

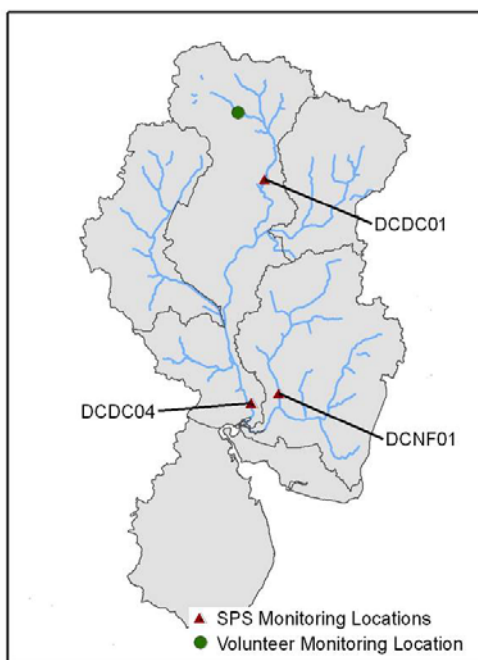


Figure 3-5: SPS baseline and volunteer sampling sites - Dogue Creek watershed

County records indicate that there are 123 stormwater management facilities within the Dogue Creek watershed. These facilities provide control for 12 percent of the area. There are two existing regional ponds in the watershed, one in the North Fork WMA and one in the Mainstem WMA. More information on these ponds can be found in Section 4.3.

3.2.2 Stream Monitoring

The results of the data collected from the three SPS baseline study sampling sites within the Dogue Creek watershed are shown in Table 3-4 (listed generally upstream to downstream). SPS monitoring locations are shown on Figure 3-5. Composite condition ratings for sites in the watershed ranged from poor (in the North Fork WMA at site DCNF01) to good at the two Dogue Mainstem WMA sites. Habitat was fair at all three sites, but sampling of biological health varied from good at the upstream Dogue Mainstem site, DCDC01 (where fish taxa richness was also high) to very poor at the North Fork site. Goldfish, an exotic species, were noted throughout the Dogue Creek stream system, with naturalized populations present in

both the mainstem of Dogue Creek and in the North Fork tributary. The most significant problem noted in the SPS Study was the limiting of habitat quality by sediment deposition.

The large areas of undeveloped land on Fort Belvoir Military Reservation and Huntley Meadows Park help to protect the overall quality of the mainstem of Dogue Creek. This is in contrast to neighboring watersheds with much higher levels of impervious cover. However, future development and redevelopment of Fort Belvoir as part of the Base Realignment and Closure (BRAC) may impact the overall quality of Dogue Creek, especially if forested areas are removed as part of the process.

There is one NVSWCD monitoring site in the Dogue Creek watershed, as shown in Figure 3-5. This site is located on a tributary to the mainstem of Dogue Creek near its headwaters and received a rating of unacceptable. A separate volunteer monitoring program conducted within Huntley Meadows Park indicates good habitat with only a few problem areas.

Table 3-4: Stream Protection Strategy baseline data summary – Dogue Creek

Stream Name (Site Code)	Composite Site Condition Rating	Environmental Variables		
		Index of Biotic Integrity	Habitat Score	Fish Taxa Richness
Dogue Creek 1 (DCDC01)	Good	Good	Fair	High
North Fork 1 (DCNF01)	Poor	Very Poor	Fair	Low
Dogue Creek 2 (DCDC04)	Good	Fair	Fair	Moderate

Source: SPS Baseline Study Report, 2001. Sites are generally ordered from upstream to downstream.

3.2.3 Stream Habitat and Geomorphology

In 2002, habitat was assessed on approximately 17 of the 32 miles of stream within the Dogue Creek watershed. Of the assessed reaches, three miles (nine percent) of stream were rated as good, nine miles (28 percent) as fair and five miles (16 percent) as poor for habitat conditions. There were no reaches rated as excellent. In comparison with the rest of the County, the Dogue Creek watershed is in the lower range of quality.

The Channel Evolution Model resulted in classifying approximately 50 percent of the channels in the Dogue Creek watershed as Stage III, indicating unstable stream channels experiencing severe bank erosion. Most of the remainder of the watershed was categorized as Stage IV, indicating the stream channels are beginning to recover after disturbance.

3.2.4 Water Quality

Fairfax County Sampling Available County data within the Dogue Creek watershed, ranging from July 1999 to September 2006, including SPS Baseline and continued DPWES monitoring, indicated one site on Dogue Creek Mainstem and one site along the North Fork each had a pH reading below the acceptable range of 6.0.

For health department data collected between 2000 and 2002 at the single sampling site in the Dogue Creek watershed, there was only one occurrence where pH was outside of criteria limits out of a total of 53 samples. All temperature readings were within required limits. Criteria exceedance for dissolved oxygen was higher, with 13 percent (seven samples) below the allowable dissolved oxygen limit. Fecal coliform samples exceeded the maximum allowable limit of 200 bacteria per 100 ml of water for 89 percent of the samples collected between 2000 and 2002, with the maximum reading in September of 2001 at 3100 colonies per 100 mL of water.

303(d) List and TMDLs DEQ listed portions of the streams in the Dogue Creek watershed as impaired waters, as shown in Table 3-5. General information about the TMDL program is presented at the beginning of Section 3.

Table 3-5: Dogue Creek Watershed impaired water bodies

Impairment Code	Location	Impairment	Year Listed	TMDL Schedule
A14E-02-BAC	Segment includes all tidal waters of Dogue Creek, extending from approximately river mile 2.1 until the confluence with the Potomac River.	<i>Escherichia coli</i>	2006	2022

HSI/NSA Field Investigations In 2009, field crews conducted 32 Hotspot Site Investigations and assessed 10 neighborhoods in the Dogue Creek watershed to determine potential runoff pollution sources and identify potential treatment practices. As a result of this investigation, there were five confirmed hotspots and 21 potential hotspots identified. Neighborhoods generally lacked stormwater treatment and stenciled storm drains. Table 3-6 provides a summary of the sites investigated for each WMA. Detailed results of the hotspot and neighborhood assessments are discussed in the Draft Watershed Workbook in Appendix A.

Table 3-6: Dogue Creek HSI/NSA results

WMA	HSI	NSA	Confirmed Hotspots	Potential Hotspots	NSA Result
Barnyard Run*	n/a	n/a	n/a	n/a	
Mainstem	10	2	2	6	Lacked stormwater treatment and stenciled storm drains.
North Fork	19	7	2 (1 severe)	14	Lacked stormwater treatment and stenciled storm drains; rooftops drained to impervious surfaces.
Piney Run	3	1	1	1	Lacked stormwater treatment and stenciled storm drains.
Total	32	10	5	21	

* The Barnyard Run WMA is primarily forested. There were no potential hotspots or neighborhoods identified during desktop analysis that required field investigation.

Modeling Results The northern end of the Dogue Creek watershed, specifically the northern end of the Mainstem and Piney Run WMAs and the northern portion of the North Fork WMA, show the highest modeled pollutant loads for total nitrogen, total phosphorus and total suspended solids. The best quality areas based on pollutant load modeling (STEPL) are in the southern portion of the Barnyard Run WMA, associated with Huntley Meadows, and the central and southern portions of Piney Run.

Of the three watersheds evaluated in this Plan (Belle Haven, Dogue Creek and Four Mile Run), Dogue Creek showed to be in the best condition, showing the influence of Huntley Meadows Park and the undeveloped area in Fort Belvoir. The average existing conditions composite score ranking for the subwatershed was 5.51 out of 10, where the worst condition subwatershed scored 3.72 and the best scored 7.51.

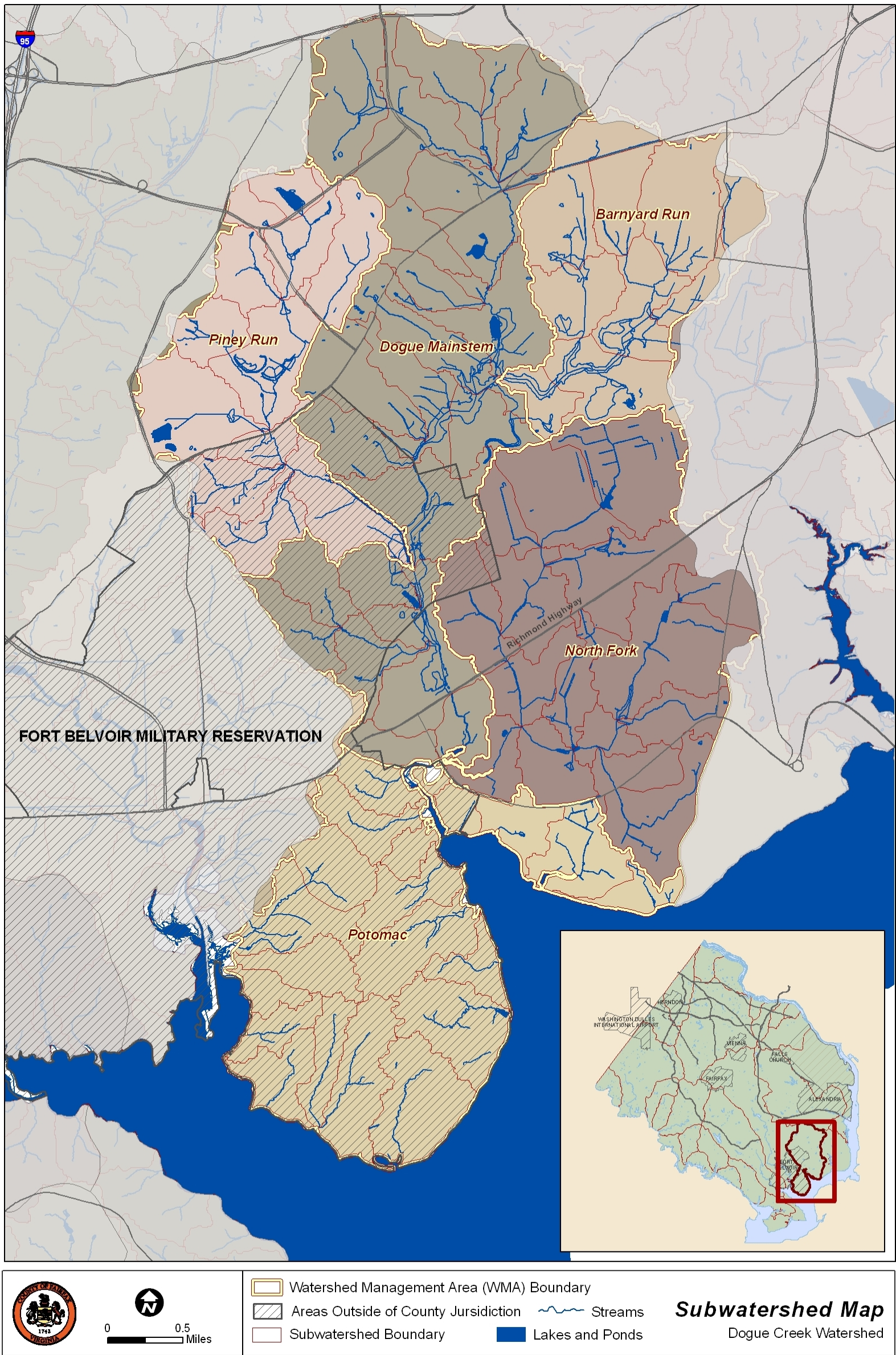


Figure 3-6: Dogue Creek Watershed Map

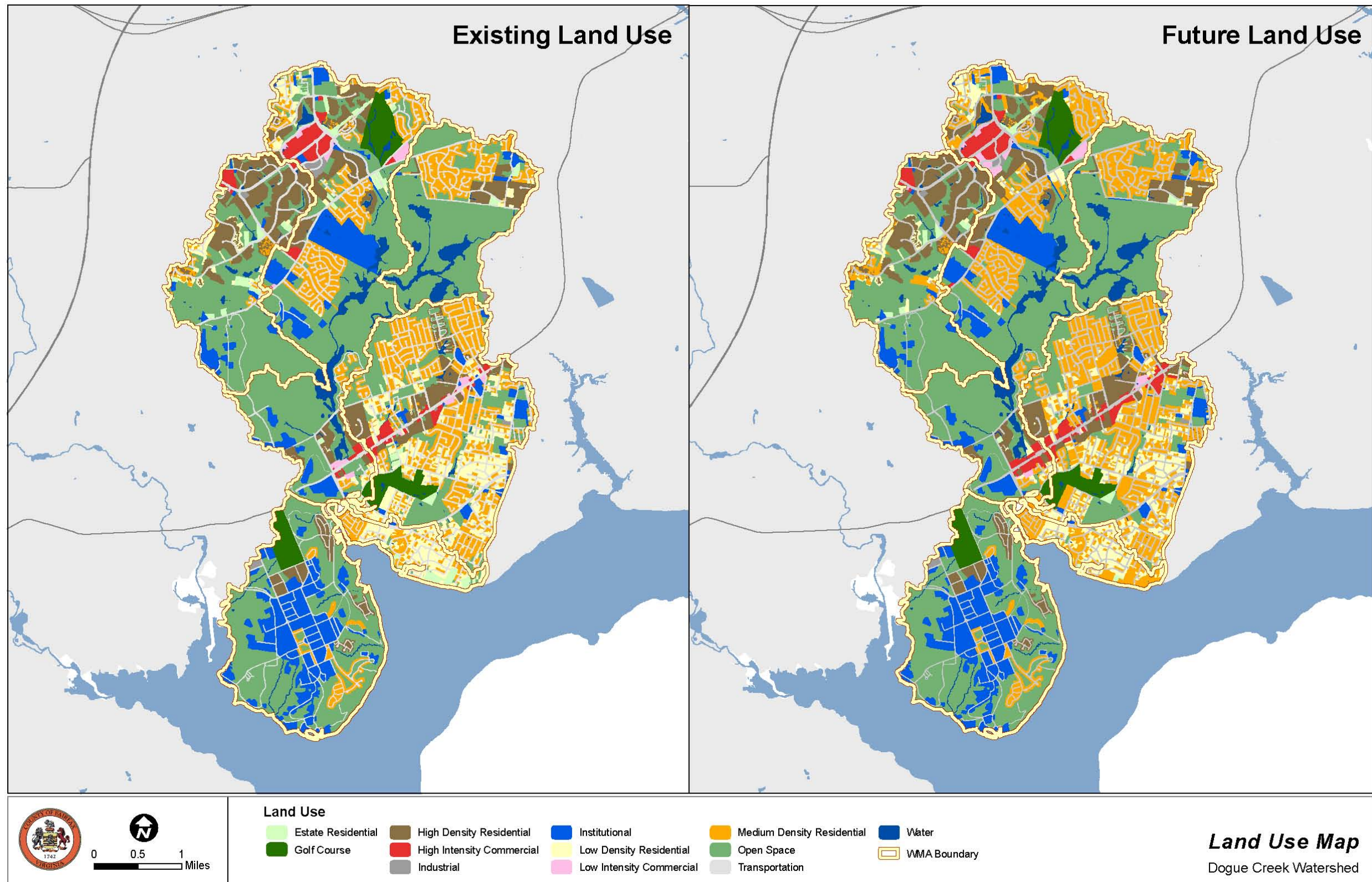


Figure 3-7: Dogue Creek Land Use Map

3.3 Four Mile Run Watershed

The Four Mile Run watershed is approximately 20 square miles with 17 square miles of the watershed located in areas outside of Fairfax County jurisdiction in the City of Falls Church, City of Alexandria and Arlington County, as shown on Figure 3-9. This plan will focus only on the portion of Four Mile Run located within Fairfax County (approximately 3.1 square miles), which includes the headwaters of Four Mile Run and Upper Long Branch which flows into Arlington County. Throughout this report, when the term Four Mile Run watershed is used, it refers to only the portion of Four Mile Run within the study area as described above.

The headwaters of Four Mile Run flow for 0.3 miles in a southeastern direction from its origin near I-66 and Westmoreland Street to the edge of the study area where it leaves Fairfax County jurisdiction. Long Branch flows for 1.5 miles in a southeastern and eastern direction from its headwaters near Leesburg Pike and Arlington Boulevard to the boundary with Arlington County. As with the Belle Haven watershed, the Fairfax County portion of the Four Mile Run watershed was not subdivided into WMAs so that the entire watershed is one WMA.

3.3.1 Land Use and Imperviousness

Approximately 95 percent of the watershed study area is developed, with only small portions of open space along the headwaters of Four Mile Run and the mainstem of Upper Long Branch. Current and future land use for the watershed is shown on Figure 3-10. The Four Mile Run watershed is 36 percent impervious and is expected to increase by approximately 1.5 percent from future development. Several environmental problems have been accelerated by the high level of development including increased stream erosion and stream sedimentation due to concentrated points of stormwater runoff.

Commercial areas in the Four Mile Run watershed are situated in two areas: Seven Corners and Bailey's Crossroads. Significant redevelopment of these areas can be expected as part of the County's revitalization plan. Redevelopment is not expected to change the land use, but it may provide opportunities for stormwater and watershed improvements as part of a coordinated plan.

County records indicate that there are 80 stormwater management facilities within the Fairfax County portion of the Four Mile Run watershed. These facilities provide control for 14 percent of the WMA. There are no existing or proposed regional ponds for this watershed.

3.3.2 Stream Monitoring

There was one site sampled during the SPS Baseline Study. The site, FMLO01, is located on Upper Long Branch, as shown on Figure 3-8, and the results are listed in Table 3-7. The composite condition rating for the sampling site was very poor. Habitat was very poor and fish taxa richness was very low with the sample dominated by tolerant species. The index of biotic integrity was poor. Stream modification was noted as a



Figure 3-8: SPS baseline and volunteer sampling sites - Four Mile Run watershed

significant problem in the Four Mile Run watershed. Many streams have been modified to allow large amounts of stormwater to be quickly conveyed. This results in many streams with banks stabilized by concrete, rip-rap and gabion. Due to the highly urbanized nature of this watershed, in some areas stream reaches are conveyed through a series of pipes and concrete channels.

There are no known volunteer sampling sites in the Fairfax County portion of the Four Mile Run watershed.

Table 3-7: Stream Protection Strategy baseline data summary – Four Mile Run

Stream Name (Site Code)	Composite Site Condition Rating	Environmental Variables		
		Index of Biotic Integrity	Habitat Score	Fish Taxa Richness
Four Mile Run (FMLO01)	Very Poor	Poor	Very Poor	Very Low

Source: SPS Baseline Study Report, 2001.

3.3.3 Stream Habitat and Geomorphology

Upper Long Branch extends for approximately 1.5 miles. Of the assessed length, 60 percent was considered to be recovering from disturbance while the remaining 40 percent was actively eroding. The dominant substrate was gravel along the entire assessed reach and habitat ranged from fair to poor. In comparison with the rest of Fairfax County, the Four Mile Run watershed falls in the lower range of quality with issues of poor bank stability and buffer zone width.

3.3.4 Water Quality

Fairfax County Sampling There is one Fairfax County Health Department sampling site in the Four Mile Run watershed. Of the 54 samples collected to test fecal coliform at this site between 2000 and 2002, fecal coliform levels exceeded the allowable criteria limit for 41 samples (76 percent).

303(d) List and TMDLs DEQ listed portions of the streams in the Four Mile Run watershed as impaired waters, as shown in Table 3-8 General information about the TMDL program is presented at the beginning of Section 3.

Table 3-8: Four Mile Run impaired water bodies

Impairment Code	Location	Impairment	Year Listed	TMDL Schedule
A12R-01-BAC	Segment begins at the headwaters of Four Mile Run and continues downstream until river mile 1.46, approximately 0.27 river miles upstream from the Arlington Ridge Road bridge. Segment includes non-tidal waters of Four Mile Run.	<i>Escherichia coli</i>	1994	Completed, 2002
A12R-01-BAC	Segment includes the tidal waters of Four Mile Run; from river mile 1.46 downstream until the confluence with the Potomac River,	<i>Escherichia coli</i>	1996	2010

Impairment Code	Location	Impairment	Year Listed	TMDL Schedule
	at the state line.			

HSI/NSA Field Investigations In 2008, field crews conducted 19 Hotspot Site Investigations and assessed eight neighborhoods in the Four Mile Run watershed to determine potential runoff pollution sources and identify treatment practices. The Hotspot Site Investigation resulted in two confirmed hotspots, 13 potential hotspots and four sites that were determined not to be a hotspot. Neighborhoods generally lacked stormwater treatment and storm drains were either lacking or not stenciled. Detailed results of the hotspot and neighborhood assessments are discussed in the Draft Watershed Workbook in Appendix A.

Modeling Results The pollutant load model (STEPL) showed that pollutant loads for Four Mile Run were high for total suspended solids, total nitrogen and total phosphorus. The highest modeled loads correspond with heavily developed commercial areas while the lowest correspond with high-density residential areas.

The average existing conditions composite score ranking for Four Mile Run was 4.42 out of 10, where the worst condition subwatershed scored 3.55 and the best scored 5.86. Of the three watersheds in the Plan, Four Mile Run ranked slightly better than Belle Haven but poorer than Dogue Creek.

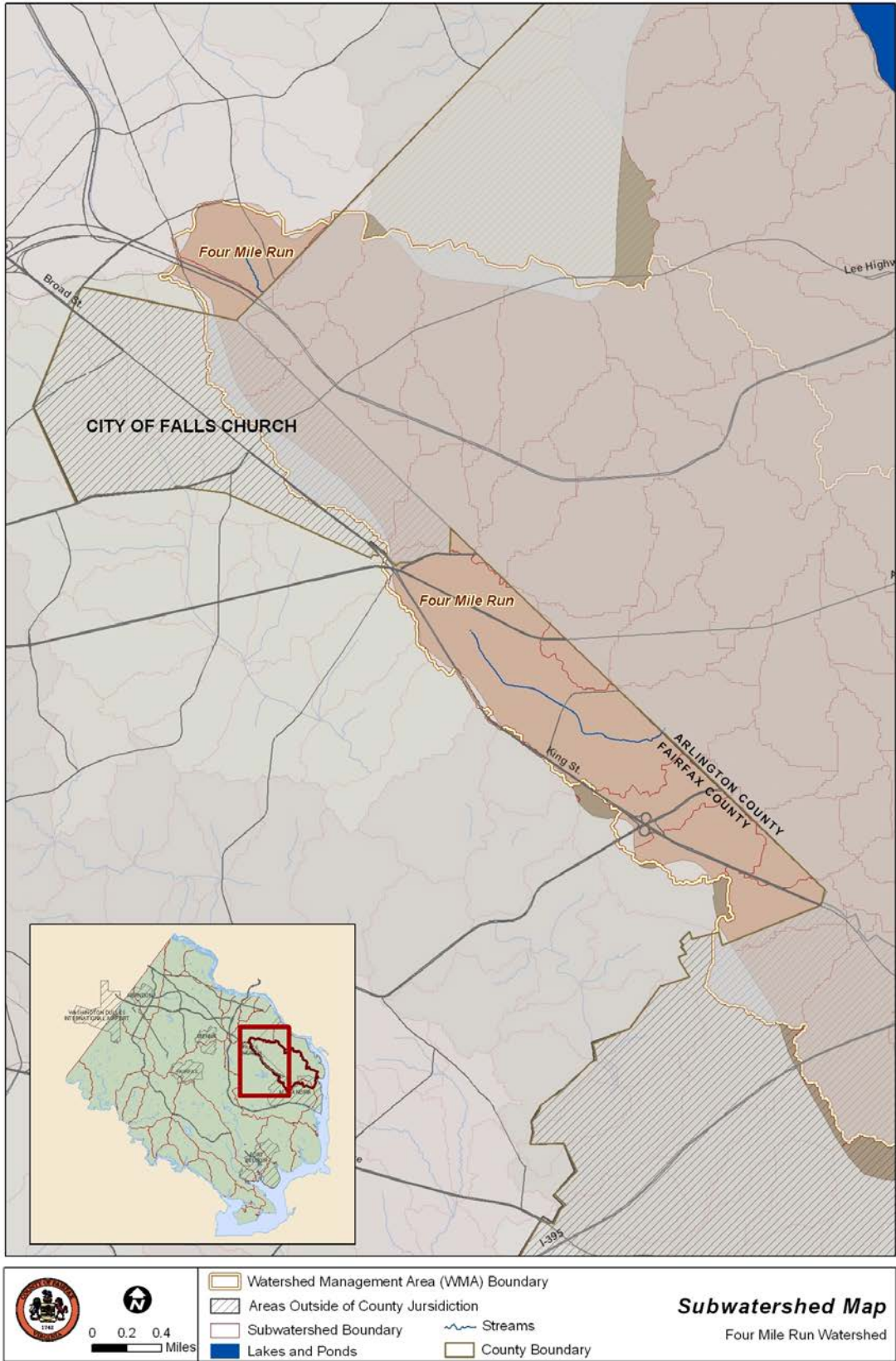


Figure 3-9: Four Mile Run Watershed Map

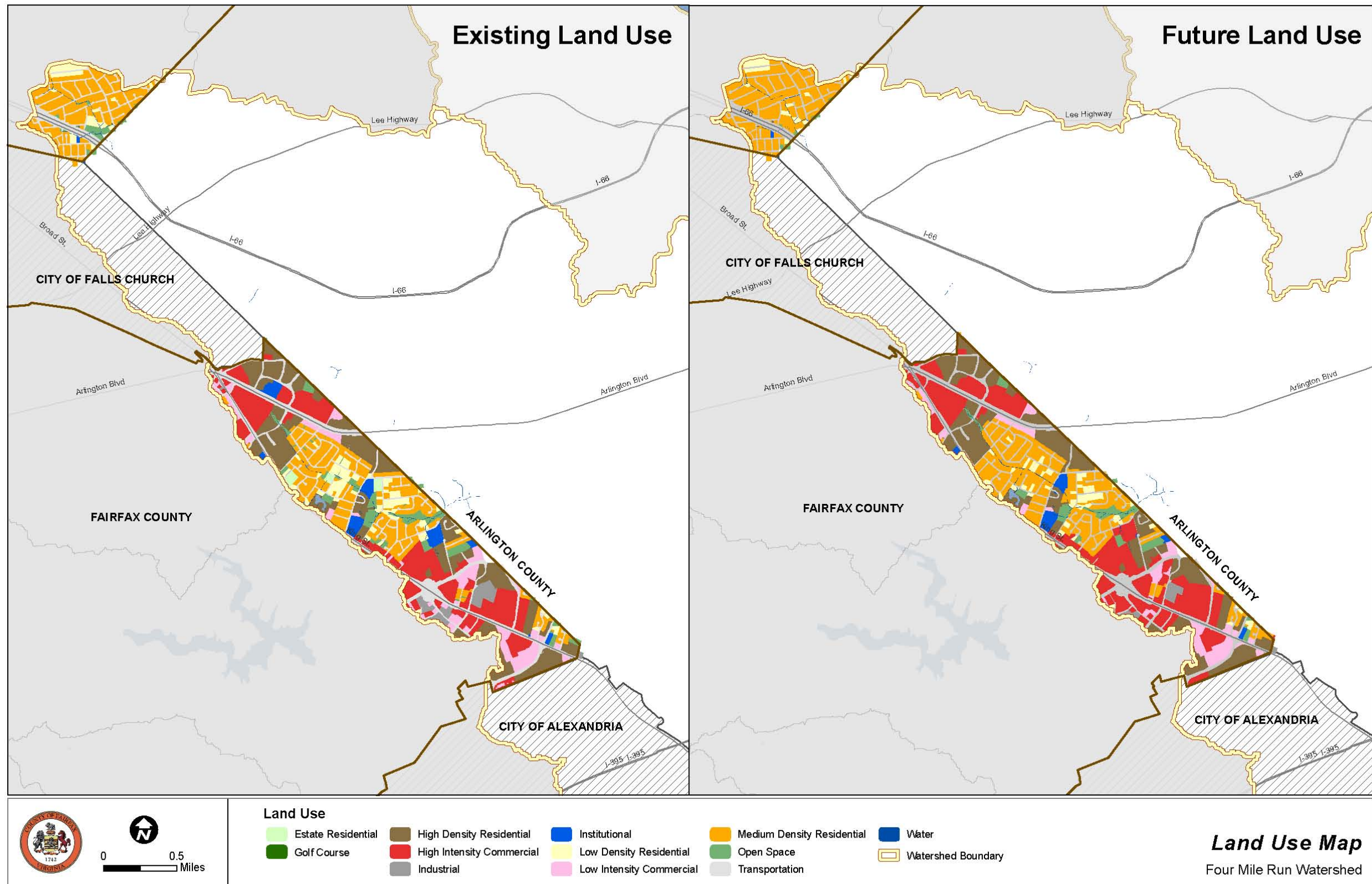


Figure 3-10: Four Mile Run Land Use Map

THIS PAGE INTENTIONALLY LEFT BLANK

3.4 Subwatershed Ranking

The subwatershed ranking procedure described in Section 2.3 was performed on all three watersheds as if they were a single entity. A short description of the subwatershed scores for each of the watersheds is provided in the separate watershed discussions above. Figure 3-11 shows the results of the ranking through color gradation between green (best) to red (worst). Of the three watersheds, Belle Haven's subwatersheds scored the lowest, with an average score of 4.37 out of 10.0. The Four Mile Run subwatersheds ranked slightly better than those in Belle Haven, with an average score of 4.42. Dogue Creek had the highest quality subwatersheds and overall best average score of 5.51. The results of the subwatershed ranking were an integral part of identifying the highest priority projects for restoring the watershed and stream systems.

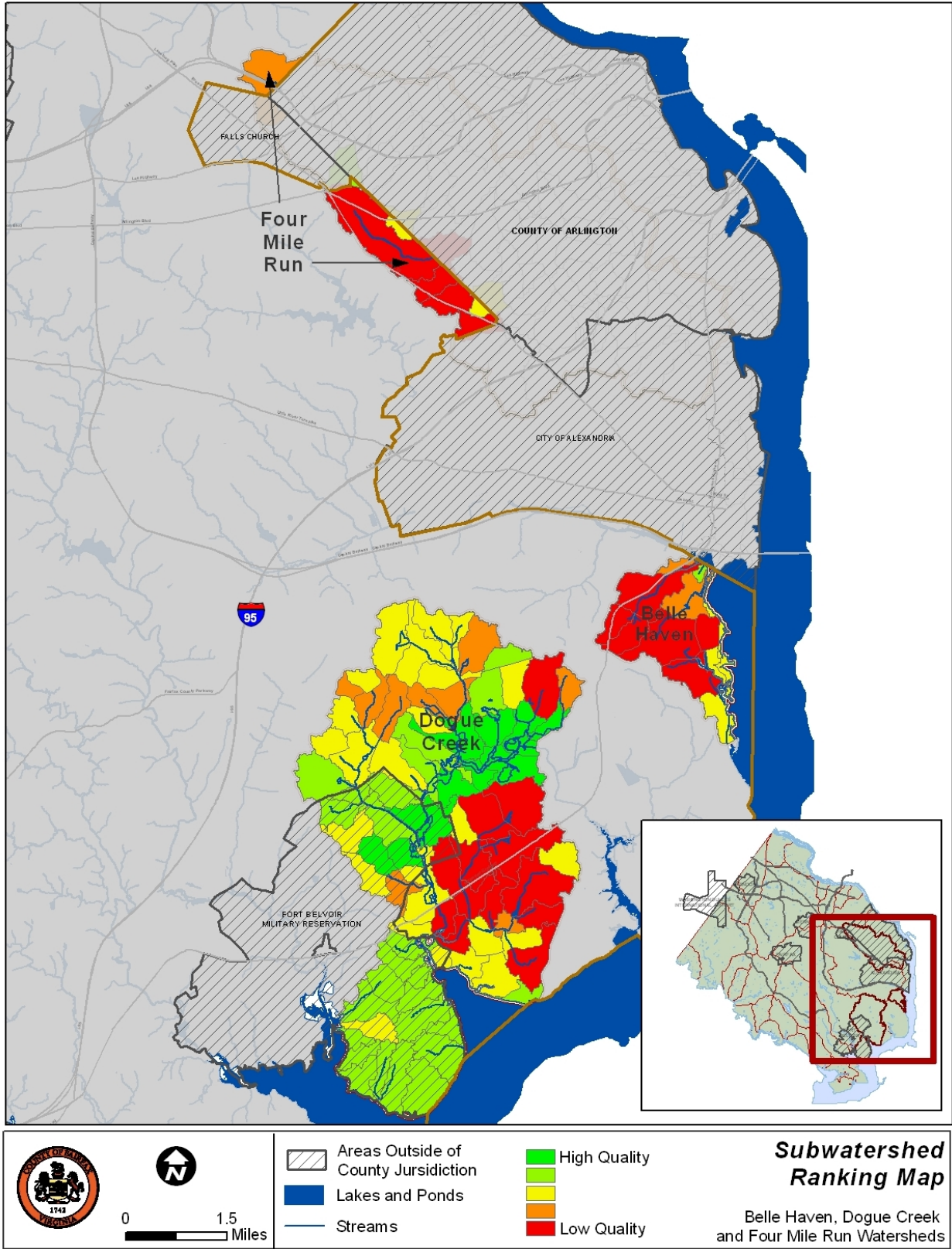


Figure 3-11: Subwatershed Ranking Map