6.8 Parks and Recreation

Parks and Recreation amenities in the County are provided and managed by numerous entities. The County Department of Parks and Recreation maintains twenty-four facilities countywide that offer sports, recreation and cultural activities for all ages. Curtis Park, Aquia Landing, Willowmere Park, Patawomeck Park, Duff McDuff Green Park, Chichester Park, Embrey Mill Park, Stafford Civil War Park and Smith Lake Park are the largest facilities, providing the greatest variety of recreational opportunities. Smaller, more specialized facilities are located throughout the County. The County charges a user fee for the use of some facilities, and at some sites, charges more for non-Stafford residents. An 18-hole golf course, The Gauntlet, operated by New Direction Golf, Inc., is located at Curtis Park. Private organizations provide recreation facilities to their members. In addition to County facilities, the Fredericksburg and Spotsylvania National Military Park is located at Chatham Manor on River Road. Figure 6.9 shows the location of parks and recreation resources in the County.

- In November 2009, County voters approved a bond referendum to secure funding in the form of General Obligation Bonds for the purpose of various park and recreation improvements, design and construction of new park facilities, and acquisition of land suitable for new park locations. The specific facilities in the referendum included:Development of three (3) new park facilities (Chichester Park, Musselman Park, and Duff McDuff Green Park)
- Development of three (3) new trail systems (Belmont to Ferry Farm Trail, Dominion Virginia Power Easement Trail, and Cannon Ridge Trail)
- Renovations at several parks
- Land acquisition for future parks

Bond referendums have been approved in the past for parks. In November, 1993, and again in November, 2002, County voters approved a bond referendum for new park facilities While not all proposed projects were completed, funding from previous bond referendums was utilized for the following facilities:

- Belmont-Ferry Farm Trail – multiple phases
- Chichester Park
- Curtis Park pool renovation
- Duff McDuff Green Park
- Embrey Mill Park – including the indoor recreation center and aquatics facility
- Smith Lake Park – design only
- Willowmere Park
- Woodlands Pool

Development of these parks has greatly enhanced the array of facilities available within the County.

Table 6.23: Facilities Managed by the Department of Parks and Recreation

Abel Lake Reservoir
1 Boat Ramp

Aquia Landing Park
1 Restroom Facility
3 Pavilions
2 Horse shoes
1 Beach Area

Autumn Ridge Park
1 Open Grass Area
1 Diamond Field
1 Pavilion
1 Playground

Belmont Ferry Farm Trail
2.5 Miles of Multi Use Trail

Carl Lewis Field and Community Building
1 Open Grass Area
1 Meeting Room
1 Kitchen
1 Restroom

Chichester Park
5 Diamond Fields
2 Restrooms
1 Pavilion
1 Playground
1 Mile Hiking Trail

Courthouse Community Center
1 Gymnasium
2 Restrooms
3 Meeting Rooms

Curtis Memorial Park
1 Boat Ramp
1 Fishing Pier
5.5 Mile Hiking Trails
1 Skate Park
1 Playground
3 Tennis Courts
2 Outdoor Volleyball Courts
1 Amphitheater
1 Open Grass Area
8 Pavilions
3 Restrooms
1 18 Hole Disc Golf Course
Mark Lenzi Pool at Curtis Memorial Park
18 Hole Golf Course- managed by New Direction

Duff McDuff Green Memorial Park
2 Rectangle Fields
3 Diamond Fields
1 Restroom Facility
2.2 Mile Hiking Trail
3 Pavilions
3 Dog Parks
1 Playground
2 Corn Hole Games
1 Foot Pool Table
1 RC Race Track
1 RC Crawler Course
1 Scenic River Overlook

Embrey Mill Park
6 Multi Use Synthetic Turf Fields
5 Grass Rectangle Fields
3 Restrooms
1 Playground
Jeff Rouse Swim and Sport Center- managed by ESM

Government Island
1 Mile Hiking/Walking Trail
1 Historic Stone Quarry

Historic Port of Falmouth
1 Natural Area

Lake Mooney Park
1 Boat Ramp
2.09 Walking/Hiking Trail
1 Bathroom

Little Falls Boat Ramp
1 Boat Ramp

Patawomeck Park
2 Rectangle Fields
2 Diamond Fields
2 Playgrounds
1 Restroom
1 Pavilion
.75 Mile Hiking/Walking Trail

John L. Pratt Memorial Park
1.1 Mile Walking/Biking Trail
1 Playground
4 Tennis/Pickleball Courts
1 Bankshot® Basketball Court
2 Pavilions
1 Restroom Facility
1 Diamond Field
1 18 Hole Disc Golf Course
1 Celebration Stage

River Road Park
1 Open Grass Area

Rowser Complex
1 Kitchen
1 Meeting Room
1 Diamond Field
1 Gymnasium
1 Bocce Ball

Smith Lake Park
1 Playground
2 Multi Use Synthetic Turf Fields
3 Diamond Fields
1 Restroom
1.29 Mile Walking Trail
2 Pavilions

Stafford Civil War Park
1 Pavilion
1 Restroom Facility
1.45 Mile Hiking Trails
3 Bunkers with cannon displays
1 Replica Winter Hunt
1 Historic Stone Quarry

Stafford Gymnastics Center
1 Gymnasium

St. Clair Brooks Memorial Park
1 Playground
2 Basketball Courts
2 Diamond Fields
1 Pavilion
2 Restroom Facilities
1 Skate Park
1 Open Grass Area
1 Outdoor Volleyball Court

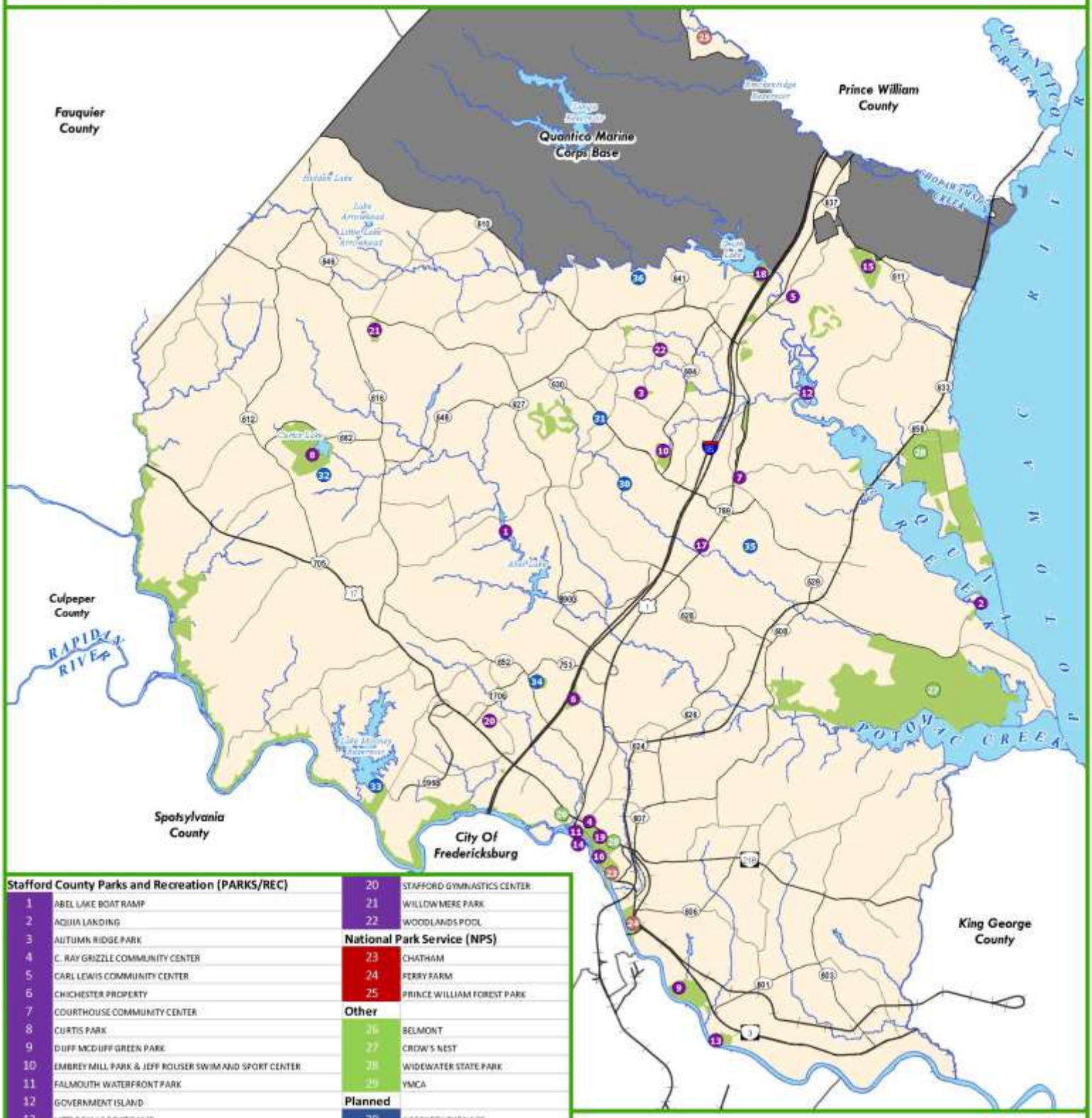
Willowmere Park
4 Rectangle Fields
4 Diamond Fields
1 Restroom
1 Pavilion
.75 Mile Walking Trail
1 Open Play Area
1 Playground

Woodlands Pool
1 Outdoor Pool
1 Restroom

Source: Stafford County Department of Parks and Recreation

Produced: 9/30/2021

FIGURE 6.9
Parks & Recreational Facilities
Stafford County Comprehensive Plan
Stafford County, Virginia
September 8, 2021



Stafford County Parks and Recreation (PARKS/REC)	
1	ABEL LAKE BOAT RAMP
2	AQUIA LANDING
3	AUTUMN RIDGE PARK
4	C. RAY GRIZZLE COMMUNITY CENTER
5	CARL LEWIS COMMUNITY CENTER
6	CHICHESTER PROPERTY
7	COURTHOUSE COMMUNITY CENTER
8	CURTIS PARK
9	DUFF MCDUFF GREEN PARK
10	EMBREY MILL PARK & JEFF ROUSER SWIM AND SPORT CENTER
11	FALMOUTH WATERFRONT PARK
12	GOVERNMENT ISLAND
13	LITTLE FALLS BOAT RAMP
14	OLD MILL PARK
15	PATAWOMECK PARK
16	PRATT PARK
17	ROWSER COMPLEX
18	SMITH LAKE PARK
19	ST. CLAIR BROOKS MEMORIAL PARK
20	STAFFORD GYMNASTICS CENTER
21	WILLOW MERE PARK
22	WOODLANDS POOL
National Park Service (NPS)	
23	CHATHAM
24	FERRY FARM
25	PRINCE WILLIAM FOREST PARK
Other	
26	BELMONT
27	CROW'S NEST
28	WIDEWATER STATE PARK
29	YMCA
Planned	
30	ACCOKEEK FURNACE
31	AUGUSTINE NORTH
32	CURTIS PARK EXPANSION
33	LAKE MOONEY BOAT RAMP
34	MUSSELMAN/JONES PARK
35	STAFFORD RECREATION SOCCER LEAGUE
36	VULCAN QUARRY SITE

0 6,250 12,500 25,000 Feet

Data layers are compiled from various sources and are not to be construed or used as a "legal description." Data layers are believed to be accurate, but accuracy is not guaranteed.

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School Maintained Recreation Facilities

The County School Board maintains the playfields and other facilities at the County schools. Although these facilities were developed primarily for the use of students, some of the fields, gymnasiums, and other facilities are available for public use. The County Parks and Recreation Department coordinates recreational programs in several sports which take place on School Board property.

Table 6.24 School Board Owned Recreational Facilities

School	Recreational Facilities
Elementary Schools (PK-Grade 5)	
Anthony Burns	1 Playground
Conway	1 Playground, 1 Basketball Court
Falmouth	2 baseball fields, 2 playgrounds, 1 soccer field, 2 basketball courts
Ferry Farm	1 playground, 1 little league field, 1 soccer field
Garrisonville	1-¼ mile fitness trail, 2 playgrounds, 2 soccer fields, 1 little league field, 1 gymnasium
Grafton Village	1 playground, 1 soccer field
Hampton Oaks	1 Playground, 1 soccer field
Hartwood	1 playground, 2 softball fields, 1 football field, 2 basketball courts
Kate Waller Barrett	1 playground
Margaret Brent	1 playground
Anne E. Moncure	1 playground, 1 little league field
Park Ridge	1 playground, 1 soccer field, 1 baseball field
Rockhill	1 playground
Rocky Run	1 soccer/softball field
Stafford	1 baseball field, 1 practice field, 2 soccer fields
Widewater	1 little league field, 2 soccer fields, 1 practice field
Winding Creek Elementary	1 playground, 1 softball/soccer field
Middle Schools (Grades 6-8)	
Dixon-Smith	1 gymnasium, 1 football field, 1 softball field, 1 soccer field, 4 tennis courts, ¼ mile track, auxiliary gym
Edward E. Drew	¼ mile track, 1 softball field, 1 football field, 4 tennis courts, 1 gymnasium, 1 indoor basketball court, 1 soccer field
T. Benton Gayle	¼ mile track, 2 baseball/softball fields, 1 football field, 2 soccer fields, 1 gymnasium
H. H. Poole	1 softball field, 1 baseball field, 1 football field, 2 soccer fields, 1 open field, ¼ mile track, 1 gymnasium
Rodney Thompson	1 gymnasium, 1 auxiliary gym, 1 football field, 4 multi-purpose fields, ¼ mile track
Stafford	1 baseball field, 1 dual purpose field, 1 practice field, 1 playground, ¼ mile track, 1 indoor basketball court, 1 gymnasium
A. G. Wright	1 softball fields, 1 football fields
High Schools (Grades 9-12)	
Brooke Point	2 baseball fields, 1 softball field, 1 gymnasium, 1 football field, 2 soccer fields, 2 practice fields, ¼ mile track
Colonial Forge	1 gymnasium, 6 lighted multi-purpose fields, 1 lighted baseball field, 1lighted softball field, 3 softball/baseball fields, 5 soccer/field hockey fields, 6 tennis courts, 1 auxiliary gym
Mountain View	1 gymnasium, 1 lighted multi-purpose field, 1 lighted softball field, 1 baseball field, 5 soccer/field hockey fields, 6 tennis courts, 1 auxiliary gym
North Stafford	2-mile hiking trail, 1 baseball field, 1 softball field, 1 lighted multi-purpose field, 6 tennis courts, 2 practice fields, 1 gymnasium, ¼ mile track
Stafford	2-mile fitness trail, ¼ mile track, 1 lighted baseball field, 1 softball field, 1 lighted dual-purpose field, 6 tennis courts, 1 gymnasium

Source: Stafford County Parks and Recreation Department

6.8.1 National Parks

Chatham Manor
Chatham Manor is the Fredericksburg and Spotsylvania National Military Park headquarters located at 120 Chatham Lane overlooking Fredericksburg. Chatham Manor is a former hospital for Union soldiers during the Civil War.

6.8.2 State Parks

Widewater State Park
Widewater State Park is at located 101 Widewater Road State Park Road, and lies on a peninsula of land where Aquia Creek and the Potomac River meet. The park provides access to both bodies of water, including a visitor center, picnic shelters, playgrounds, canoe and kayak launch areas, and a hiking trail

6.8.3 Other Area Parks

Belmont
Gari Melchers Home and Studio, also known as Belmont is located at 224 Washington Street, and overlooks the Rappahannock River and the City of Fredericksburg. Belmont is the historic home and art studio of famous American artist Gari Melchers. The 27-acre estate provides tours of the home, art studio and galleries, as well as other historic buildings and gardens, and several miles of walking trails.

George Washington's Ferry Farm
Ferry Farm is located at 268 Kings Highway, and is the boyhood home of George Washington overlooking the Rappahannock River. The farm offers guided tours of the Washington house replica, as well as a visitor center, displays of colonial and Civil War artifacts, an archaeology lab, gardens, and hiking trails.

6.8.4 Other Recreational Facilities and Organizations

In addition to the recreation facilities that are owned and operated by Stafford County or the Stafford County School Board, there are other recreational resources that are available to residents. These include local creeks and rivers, hunting acreage on the Marine Corps Base Quantico, various golf courses and marinas, recreation centers, and community swimming pools. Private organizations such as the American Legion, Girl Scouts of America and YMCA maintain private facilities. In addition, youth sports are organized by private organizations such as the Stafford Baseball League, Stafford Area Soccer Association, Stafford Lacrosse Association, and the Stafford Youth Football Coaches Association.

6.8.5 Future Park Facilities

Stafford County has realized the importance of developing new parks as its population grows and the needs of its residents change. There are properties that the County has acquired or is pursuing in order to actively transform them into viable public parks, including

- Musselman/Jones Property (40 acres)
- Duff Green Park (126 acres)
- Patawomeck Park (160 acres)
- Mountain View Park (2 parcels – total 26 acres)
-

In addition, there are properties owned by other entities that are proposed for park development or preservation of natural resources. These include:

- Crow's Nest Natural Area Preserve
- City of Fredericksburg owned riparian land along the Rappahannock River

Stafford County is a fast growing community. There is a need for more parks in order to meet the population demands and conform with the guidelines set in this Plan. Acquiring new park land is difficult but important to meet the changing recreational and athletic needs of county residents. The cost of property in Stafford County is increasing rapidly. Buying large (i.e. 100-200+ acres) parcels may no longer be financially feasible. It is recommended that smaller parcels be purchased (between 20-50 acres). These small parcels should be designed as neighborhood parks that pedestrians can readily access without having to drive to the facility. parcels should be located in the northern and southern ends of the County, but it is essential that they be close to Interstate 95 so residents can access them easily.

A Park Utilization Study – Phase I, was completed in 2014. The focus of this study was on future athletic field needs. An additional study was completed in 2017, Park Utilization Study – Phase II, to identify other recreational amenity needs beyond athletic fields.

6.8.6 Potomac Heritage National Scenic Trail

In December 2006, the National Park Service designated three trails in Stafford as part of the Potomac Heritage National Scenic Trail, a 425-mile corridor between the Chesapeake Bay and the Allegheny Highlands. The National Park Service administers, designates and coordinates the trail and local jurisdictions manage their sections of the trail. The selected trails are expected to help boost tourism in the County, since they will be included in National Park Service literature and maps and promoted through the Service's website. The Stafford trails are:

- Government Island Trail – 1.5 miles in length on Government Island highlighting historic quarries, building foundation, roadbed and canal; stone quarried here was used to construct some of the nation's most prominent buildings, including the White House and US Capitol Building. The Trail was completed in 2010.
- Belmont-Ferry Farm Trail – When it is finished, the Trail will connect Belmont to Chatham and Ferry Farm as well as the Historic Port of Falmouth and the Moncure Conway House which is designated in the National Underground Railroad Network to

Freedom. This project is planned to be developed in phases. Currently five of six phases have been built from Belmont through Pratt Park to the Chatham Bridge.

- Aquia Creek Water Trail – This trail, which is yet to be developed, will celebrate the unique Civil War history of the creek as well as the transportation history of Aquia Landing.

6.8.7 Parks Analysis

Area guidelines are used to determine the number of acres of recreational and park lands that are needed by a locality. The 2013 Virginia Outdoors Plan provides an area guideline for recreation and park sites in Virginia of 10 acres per 1,000 people in the population. This figure represents a minimum acreage that should be provided whenever possible. However, Stafford's Parks and Recreation Commission has recommended a standard of 12 acres per 1,000 residents. Based upon this standard, Stafford should have approximately 1,570 acres of recreation and park space. Additionally, the population is growing rapidly and additional park space will be needed in the near future. It is estimated that 1,988 acres would be needed by the year 2036 based on population estimates and the 12 acres per 1,000 population standard.

6.8.8 Findings

- Stafford residents have access to a wide variety of recreation facilities, both publicly and privately owned and operated.
- Additional parkland is required to meet the needs of Stafford's growing population
- There are twenty County-owned recreational facilities within Stafford County.
- Stafford County Board of Education's recreation facilities are also available to be used for community recreational programs.
- Several potential future parks and recreation facilities have been identified
- Several private and nonprofit organizations also sponsor sports programs for youths in Stafford County.

6.9 Natural Resources

Stafford County is characterized by a rolling landscape cut by winding streams and creeks. Bordered to the east by the Potomac River and to the south by the Rappahannock River, surface water is a significant natural feature in the County. In addition, the County's forestlands provide habitat for many different wildlife species. This natural environment provides a desirable place to live, for wildlife and residents.

The County's continued population growth and intense development pressures are threatening the natural resources. Development has caused increases in impervious surfaces, loss of forestlands, open space and farmland and increased transportation pressures. These development factors lead to increases in runoff, channel erosion, and flooding in some low lying areas decreases in groundwater recharge, increases in carbon dioxide releases, displacement of wildlife and non-point source pollution.

The following section provides a basic understanding of what natural resources exist in the County and how they fit together to form the overall natural environment. This information can help guide efforts to maintain the air and water quality, preserve wildlife habitats and minimize the risk of natural hazards. A map on page 6-86 shows the County's natural resources and another on page 6-72 shows the watersheds.

6.9.1 Land Resources

Topography

The topography details the different elevations and describes the overall shape of the land. This information is relevant to understanding the flow of water across the land and determining appropriate land uses.

The topography of Stafford County generally consists of rolling hills with most steep slopes occurring at the County's rivers, streams and creeks. The elevation ranges from sea level to about 450 feet with higher elevations towards the western part of the County. The County's highest elevation is located at the northern tip of the County.

Geology

The geology of Stafford County describes earth's composition below the surface of the land. Knowledge of the geological makeup of the County is important to understanding how development will affect the land.

The geology of the County includes two physiographic provinces, the Piedmont province and the Coastal Plain province. These provinces are landform regions that have similar terrain and have been shaped by a common geological history. Figure 6.13 identifies the location of the geologic zones.

The Piedmont province is the western portion of the County, generally west of Interstate 95. This province has a generally rolling terrain that consists of bedrock that is made up of hard igneous and metamorphic rock. In the eastern portion of the County is the Coastal Plain, a terraced landscape consisting of unconsolidated sediments that are relatively soft compared to the igneous and metamorphic rock of the Piedmont Province. These two provinces are separated by the Fall Line, a low east-facing cliff that extends from New Jersey to the Carolinas.

Several mining operations are present in the County, including sand and gravel, generally in the southeastern part of the County and a type of granite material in the northwestern portion of the County. Figure 6.14A identifies the location and type of mineral resources in the County. Figure 6.14B is the legend associated with the map that describes the resources. The data is from the Virginia Department of Mines, Minerals, and Energy.

Soils

A familiarity with the soil composition is necessary to determine the suitability of various land uses such as farming, construction or septic systems. The compatibility with different land uses depends on several different soil characteristics including drainage and erodibility. Within Stafford County, there are 126 classifications of soil from the National Cooperative Soil Survey of the National Resource Conservation Service (NRCS), each with varying characteristics. The following soil information, gathered from the NRCS, gives a general review of the soil properties in the County as well as the compatible land uses with the County's soil.

The drainage of the soils depends on the percolation capacity of the soil, the topography of the land and the proximity to surface and groundwater discharge. It is important to look at soil drainage because it affects the transport of pollutants and the ability for plants to grow. If a soil drains rapidly, precipitation or irrigation water transports water-soluble pollutants through the soil, potentially affecting the quality of groundwater. Soils that are not drained well may become saturated making it difficult for plants to survive because the roots don't get enough oxygen. The NRCS data shows that though the majority of the County, 64%, is well drained, 12% of the land area of the County is classified as very poorly drained. The majority of this poorly drained area is located just west of the Interstate 95 as it travels through the northern portion of the County.

Produced: 9/15/2021

FIGURE 6.10

Natural Resources

Stafford County Comprehensive Plan

Stafford County, Virginia

September 8, 2021

Legend

- Streams
- RPA Buffer
- National Wetlands
- Forest

0 6,250 12,500 25,000 Feet

Data layers are compiled from various sources and are not to be construed or used as a "legal description." Data layers are believed to be accurate, but accuracy is not guaranteed.

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Table 6.25 Soil Drainage Capacity

Capacity	Acres	Percent
Somewhat Excessively Drained	3,689	2.0%
Well Drained	115,928	63.8%
Moderately Well Drained	21,304	11.7%
Somewhat Poorly Drained	3,981	2.2%
Poorly Drained	22,058	12.1%
Very Poorly Drained	1,340	0.7%
Not Rated	13,380	7.4%

Source: National Cooperative Soil Survey,
National Resource Conservation Service,
United States Department of Agriculture &
design based planning, inc.

Erosion is the transport of soil by wind or water. Susceptibility of a type of soil to erosion is based on the composition of the soil as well as the slope and the vegetative cover of the land. Soil erosion causes a loss of topsoil and creates ruts and gullies in the land. Erosion also causes problems with the transport of materials, polluting downstream waters, clogging creeks, streams and other bodies of water as well as clogging drainage ditches.

Over ¾ of the County is either highly erodible or potentially highly erodible. This figure shows that soil erosion is a significant issue in the County and should be considered as development occurs.

Table 6.26 Soil Erodibility

Erodibility	Acres	Percent
Not Highly Erodible Land	28,508	15.7%
Potentially Highly Erodible	73,049	40.2%
Highly Erodible Land	69,865	38.5%
Not Rated	10,259	5.6%

Source: National Cooperative Soil Survey,
National Resource Conservation Service,
United States Department of Agriculture
& design based planning, inc.

In addition to the soil characteristics, the following information from the NRCS provides what percentage of the County is suitable for dwellings, farming or septic systems. Land use suitability for dwellings, farming and septic systems are all determined by the NRCS based on several factors that affect these land uses. For example, suitability for septic systems is based on flooding, bedrock depth, slope, saturated hydraulic conductivity and other measures. The figures show that nearly all the land is limited in some way; this causes potential competition for suitable lands.

Only 11%of the County is classified as limited suitability for dwellings with basements. In addition, most of the County's soil is either somewhat limited or very limited for septic system suitability. Furthermore, east of the Fall Line most of the soil is very limited for septic system suitability. This area east of the Fall Line is also where there is little prime farmland.

Because the County has such a limited amount of land suitable for septic systems, an alternative type of septic system is being utilized to deal with land with this limitation. This alternative septic

system uses a two-step process rather than the traditional one-step process to treat wastewater effluent.

Table 6.27 Land Use Suitability

Suitability for Dwellings (with basement)	**Acres**	**Percent**
Not Limited	20,668	11.4%
Somewhat Limited	65,277	35.9%
Very limited	82,356	45.3%
Not Rated	13,380	7.4%
Farming Soils	**Acres**	**Percent**
Areas of Prime Farmland	34,788	19.1%
Farmland of Statewide Importance	50,141	27.6%
Prime Farmland if Drained	2,308	1.3%
Not Prime Farmland	94,444	52.0%
Suitability for Traditional Septic Systems	**Acres**	**Percent**
Somewhat Limited	53,347	29.4%
Very Limited	100,496	55.3%
Not Rated	27,838	15.3%

Source: National Cooperative Soil Survey,
National Resource Conservation Service,
United States Department of Agriculture &
design based planning, inc.

Another soil characteristic in the County is the acidity of the soils. The range for the median pH level is 4.3 to 6.8 showing that the soil is generally acidic. This is an important factor in development because the excavation of acidic soil can cause acidic levels in streams to rise, disturbing the stream ecosystem, as a result of runoff from the acidic soils entering the stream. Also, in highly acidic soils, vegetation is not able to grow, and utility lines corrode.

The most important precaution for acidic soils is the knowledge that they exist in an area. This can be accomplished by testing for acidic soils before development occurs. Testing the soil can help prevent environmental disasters such as that of the County's airport where highly acidic soil that was excavated from the site was spread as fill for the site, preventing vegetation growth and damaging the local stream. Although the soil that is below the earth's surface does not reach full acidity until it is excavated, a sulfur test can be conducted to predict the acidity of the covered soil. This knowledge can prevent the excavation and spread of acidic soils, benefiting both the environment and developers.

6.9.2 Water Resources

Watersheds

A watershed is an area of land where water drains downhill to a body of water. A watershed may include several sub-watersheds that drain into a larger watershed. In Stafford there are numerous sub-watersheds of both the Potomac River and Rappahannock River.

The Stafford County, Virginia Rappahannock Tributaries Watershed Planning Study found that "runoff from impervious cover and agricultural cover is the primary determinants of water quality in the tributaries (of the Rappahannock), and consequently, the primary parameters through which to address watershed management actions." As a rapidly developing County, the

Watershed Planning Study shows that the most pertinent watershed issue is the increasing amounts of impervious surfaces which has led to a significant increase in flooding in areas, even during minor rain events. Impervious surfaces include rooftops, parking lots, driveways, sidewalks, roads and other surfaces that prevent water infiltration and groundwater recharge. Also, instead of allowing precipitation to penetrate the ground, impervious surfaces cause runoff to travel rapidly across the land, collecting sediments, nutrients and toxics that are carried to streams and creeks of the watershed.

Produced: 9/15/2021

FIGURE 6.11
Watersheds
Stafford County Comprehensive Plan
Stafford County, Virginia
September 8, 2021

Data layers are compiled from various sources and are not to be construed or used as a "legal description." Data layers are believed to be accurate, but accuracy is not guaranteed.

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Table 6.28 Stafford Watershed System

	Major Water Shed	Minor Water Shed	Acres
	Chopawamsic		12,903
	Aquia	Beaverdam	11,066
	Aquia		34,846
	Potomac River	Potomac River	171
	Widewater		2,656
	Widewater	Tank	821
	Rappahannock	Alcotti Run	4,560
	Rappahannock	Deep Run	2,586
	Potomac Creek	Potomac Run	6,719
	Widewater	Potomac River	748
	Aquia	Whitsons Run	1,493
	Aquia	Austin Run	5,239
	Accokeek		14,539
	Potomac Creek	Long Branch	9,595
	Potomac River	Potomac River	1,911
	Rappahannock	Richland Run	3,979
	Potomac Creek		20,547
	Rappahannock	Rappahannock	15,922
	Rappahannock	Horsepen Run	4,920
	Rappahannock	Falls Run	4,209
	Rappahannock	Rocky Pen Run	3,444
	Accokeek	Potomac River	390
	Rappahannock	Claiborne Run	4,242
	Potomac Creek	Beaver Dam Run	2,036
	Potomac Creek	Black Swamp Creek	852
	Rappahannock	White Oak Run	5,238
	Rappahannock	Little Falls Run	3,662

Source: Stafford County and design based planning, inc.

The level of stream impact relates to the percent of impervious cover in the watershed. An area with between 0 to 10% of watershed impervious area relates to low stream impact, an area between 10 to 25% of watershed impervious area relates to moderate stream impact, and an area 25% and higher of watershed impervious area relates to high stream impact. (EPA Center for Watershed Protection, 2005), the protection of watersheds is essential to the preservation of water quality.

The sub-watersheds of the Potomac River, which consist of 70% of the land area in Stafford, are part of a much larger watershed that stretches across Maryland, Pennsylvania, Virginia and West Virginia covering about 14,679 square miles.

The sub-watersheds of the Rappahannock River are part of a larger watershed that crosses the southwestern edge of the County. The Rappahannock Watershed is much smaller than the Potomac River Watershed and is entirely in the State of Virginia traveling from the Blue Ridge Mountains to the Chesapeake Bay. The Watershed covers 2,715 square miles of land. According to the Chesapeake Bay Program, there is only one sub-watershed of the Rappahannock River in Stafford County, the Rappahannock River - Middle Watershed, which is part of the Lower Rappahannock Watershed. Sub-watersheds of the Rappahannock River – Middle Watershed include Horsepen Run, Alcotti Run, Falls Run, Richland Run, Claiborne Run, England Run, Rocky Pen Run, Little Falls Run, White Oak Run and Muddy Creek.

Both the Potomac and the Rappahannock River Watersheds are part of the Chesapeake Bay Watershed, an expansive watershed that travels through six states. The watershed drains into the Chesapeake Bay, the largest estuary in the Country supporting 3,600 species of fish, animals and plants. The Chesapeake Bay Watershed is made up of eight sub-watersheds, with two of these sub-watersheds, the Potomac River Watershed and the Rappahannock Watershed, within Stafford County.

As part of the Chesapeake Bay Watershed, the County's water impacts have repercussions to the water quality of the Chesapeake Bay. In 1988, the State of Virginia enacted the Chesapeake Bay Preservation Act to help improve the quality of the water in the Bay. Stafford County is included in the Chesapeake Bay Preservation Areas of the Act in which local governments are required to adopt programs "requiring the use of effective conservation planning and pollution prevention practices when using and developing environmentally sensitive lands." The main goal of the Chesapeake Bay Preservation Act is to reduce nonpoint source pollution.

Nonpoint source pollution is a major threat to waterways. The source of this type of pollution is mainly stormwater runoff from a multitude of common urban, suburban and rural sites. The problem is that the runoff from these areas contains toxics, pathogens, nutrients and sediments that contaminate the water. This type of pollution is especially difficult to deal with because it comes from so many different sources, requiring the need for sound land use planning throughout the watershed.

Impacts from non-point sources of pollution include phosphorus pollution from fertilizers used by farmers and residents, E. coli contamination from poor agricultural practice and low pH levels when soils with low acidity are exposed during development.

6.9.3 Floodplain

A floodplain is an area that is susceptible to full and partial water inundation. Floodplains provide natural flood and erosion control, protect the water quality, offer areas for groundwater recharge and serve as a fish and wildlife habitat. Increased development in a floodplain can result in more severe natural disasters.

Within Stafford County, 12% of the land (20,918 acres) is in a 100-year flood hazard area. According to the Federal Emergency Management Agency (FEMA), the 100-year flood is the flood elevation that has a 1% chance of a flood being equaled or exceeded each year. The County regulates development activities in the flood way, the flood fringe and the 100-year floodplain to minimize natural hazards and development impacts. In addition, Stafford County entered the

National Flood Insurance Program, a program of the FEMA. By actively protecting the floodplain, Stafford County can provide residents the ability to purchase flood insurance through the FEMA program that is administered by the United State Department of Housing and Urban Development. Residents within the 100-year floodplain are required to have flood insurance. This requirement applies to a just over 1,000 residential structures located within the County's 100-year floodplain. Effective May 1, 2011, Stafford County entered the Community Rating System (CRS) with a Class 8 rating, a rating achieved by only 14 other communities within the Commonwealth. This qualifies each eligible National Flood Insurance Policy (NFIP) policyholder for a 10% savings in their flood insurance premium.

6.9.4 Dam Break Inundation Zones

A dam is a man-made structure, across or outside of a watercourse, used to impound water or other material. The larger dams are regulated by Virginia Department of Conservation and Recreation (DCR). DCR regulates two groups of dams:(i) dams that are 25 feet or greater in height and impound more than 15 acre-feet of water, and (ii) dams that are six feet or greater in height and impound more than 50 acre-feet of water. A Dam Break Inundation Zone is the area downstream of a dam likely to be inundated or otherwise directly affected because of a dam failure. Any proposal for development to encroach into the Dam Break Inundation Zone shall meet the requirements set forth in Sections 10.1-606.2 and 10.1-606.3 of the Code of Virginia.

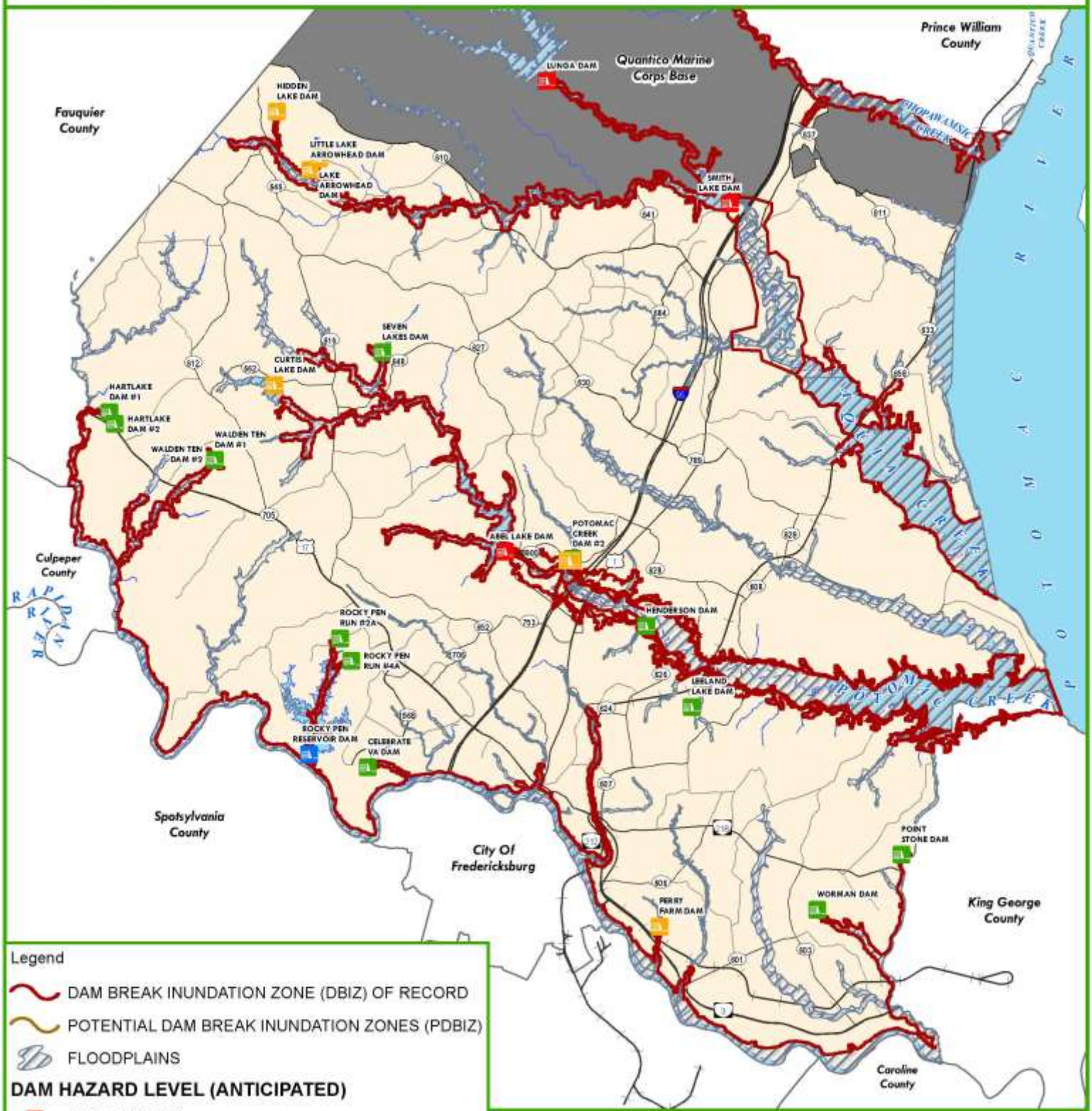
There are 22 listed dams in Stafford County, of which 20 are subject to Department of Virginia Conservation and Recreation (DCR) regulations. Two dams located on the Marine Corps Base Quantico are federally owned and not subject to DCR regulation. The list of dams is provided in Table 6.29 and the location of these dams and potential impact areas are identified in Figure 6.12.

Table 6.30 Regulated Dams in Stafford County

No.	DCR Dam No.	Name of Dam	Hazard Potential Classification
1	17901	Lunga Dam	High
2	17902	Potomac Creek Dam #1	High
3	17904	Breckinridge Dam	High
4	17906	Hidden Lake Dam	Significant
5	17907	Little Lake Arrowhead Dam	High
6	17908	Lake Arrowhead Dam	High
7	17910	Kennedy Dam	Significant
8	17911	Aquia Creek Dam	High
9	17912	Lake Curtis Dam	High
10	17913	Potomac Creek Dam #2	High
11	17914	Henderson Dam	Low
12	17915	Rocky Pen Run Regional Pond #4 Dam	Low
13	17916	Rocky Pen Run #2A Dam	High
14	17917	Celebrate VA Pond #12 Dam	Low
15	17918	Hartlake #1 Dam	Low
16	17919	Hartlake #2 Dam	Significant
17	17920	Walden Ten # 1 Dam	Low
18	17922	Seven Lakes Dam	High
19	17923	Bridle Lake Dam	High
20	17924	Pt. Stone Dam	Low
21	17925	Leeland Lake Dam	High
22	17926	Rocky Pen Run Reservoir Dam	High

Produced: 9/30/2021

FIGURE 6.12
Dam Break Inundation Zones
Stafford County Comprehensive Plan
Stafford County, Virginia
September 8, 2021



Legend

- DAM BREAK INUNDATION ZONE (DBIZ) OF RECORD
- POTENTIAL DAM BREAK INUNDATION ZONES (PDBIZ)
- FLOODPLAINS

DAM HAZARD LEVEL (ANTICIPATED)

- HIGH HAZARD
- SIGNIFICANT HAZARD
- LOW HAZARD
- UNDER CONSTRUCTION

0 6,250 12,500 25,000 Feet

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6.9.5 Wetlands

The County has 17,450 acres of wetlands, about 10% of the County's land area. Both tidal and non-tidal wetlands are located within the County. The County's tidal wetlands are affected by the ebb and flow of the tide of the Atlantic Ocean by way of the Chesapeake Bay. The non-tidal wetlands occur inland along streams, lakes and ponds.

According to the U.S. Army Corps of Engineers non-tidal wetlands are "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Tidal wetlands consist of areas found between contiguous to mean low water and mean high water in the portions of the County affected by the tide. Tidal wetlands may be vegetated or non-vegetated. Wetlands generally include swamps, marshes, bogs, wet meadows and similar areas." Wetlands provide important water quality controls by filtering pollutants, providing flood control and providing flood and sediment control. Wetlands also provide wildlife habitats.

6.9.6 Groundwater

Groundwater is an available natural resource serving the County. The groundwater is recharged through the percolation of water through soil or through aquifer recharge areas. The quality and quantity of groundwater in Stafford County relate specifically to the two physiographic provinces. In the Piedmont province the groundwater supply relies on fractures in the bedrock. This source of groundwater is generally protected from surface impacts of pollution and runoff. Yet, a major issue for this source of groundwater is deep pumping and drought.

In the Coastal Plain province, the groundwater supply relies on precipitation recharge and permeability of sands and gravels for storage. The groundwater of the Coastal Plain province is not as impacted by deep pumping and drought as in the Piedmont province, yet surface impacts such as pollution and runoff are a much greater threat in this area. The pollution of groundwater is especially harmful because, while surface water can somewhat be treated, once the groundwater is polluted it cannot be treated.

An important part of the County's groundwater sources is the Coastal Plain Aquifer Recharge Area, which is also known as the Fall Zone. In this area the layers that make up the Coastal Plain aquifers slope upward to intersect the surface and most of the groundwater recharge occurs. The Aquifer Recharge Area, which is generally located along Interstate 95, is particularly at risk of contamination from surface impacts such as pollution and runoff as well as a decrease in recharge from increases in impervious surfaces. Also located over the Aquifer Recharge Area is the designated County Urban Services Area (USA). This presents a major environmental concern because, while the purpose of the USA is to concentrate growth and minimize the impacts of development on the land and the community, the location over the Aquifer Recharge Area clusters growth and land cover over an area that should be preserved for the protection of groundwater.

The County's Groundwater Protection Plan provides recommendations of well protection prioritization such as protecting wells far removed from the water system while making wells in proximity to the water system less of a priority. The Plan also emphasizes the need to protect the groundwater recharge from pollution.

Potential mitigation tools the Plan mentions include identifying existing sources of potential pollution and ensuring that essential spill prevention and cleanup measures are in place as well as applying an overlay zoning district to ensure site plans for new development incorporate adequate pollution prevention measures. These measures have not yet been adopted by the County.

6.9.7 Forest and Wildlife Resources

Forestland

In addition to being an important natural resource, the forestland of Stafford County is an essential part of protecting the environmental quality of the whole community. The forestland provides a habitat, nesting ground and food source for the area's wildlife. Forestland also provides an area for water recharge, preventing runoff and soil erosion and filtering pollution, playing a prime role in the prosperity of Stafford's natural environment. An economic benefit from the forestland is the renewable resource it provides. The County forests harvest deciduous hardwoods, mixed soft woods and pine.

Most the County's forested lands are located on private lands. According to Stafford County's Wildlife Habitat Protection Plan using a 1985 report entitled "The Forest Resources of Stafford County", it is estimated that from 1985 to 2000 the County lost 20,200 acres of forestland. The Wildlife Habitat Protection Plan also states that in 2000 the County was estimated to have 100,000 acres of forestland, 21,876 of which is in Quantico Marine Corps Combat Development Command's boundaries. According to the "Urban Ecosystem Analysis for the George Washington Region (PD 16)" prepared by the George Washington Regional Commission (GWRC), Stafford County lost an additional 6.4 percent of the tree canopy area between 1996 and 2009. This equates to more than 8,000 additional acres of forestland being lost. With the County's continued development, the current amount of forestland is likely to be substantially lower than the 100,000 acres estimate of the 2000 Wildlife Habitat Protection Plan. The County should make every effort to preserve forested lands.

Wildlife Habitat

Within Stafford County, the Virginia Department of Game and Inland Fisheries identifies 493 known or likely animal species. The County is also home to a number of Federal and State listed endangered or threatened species.

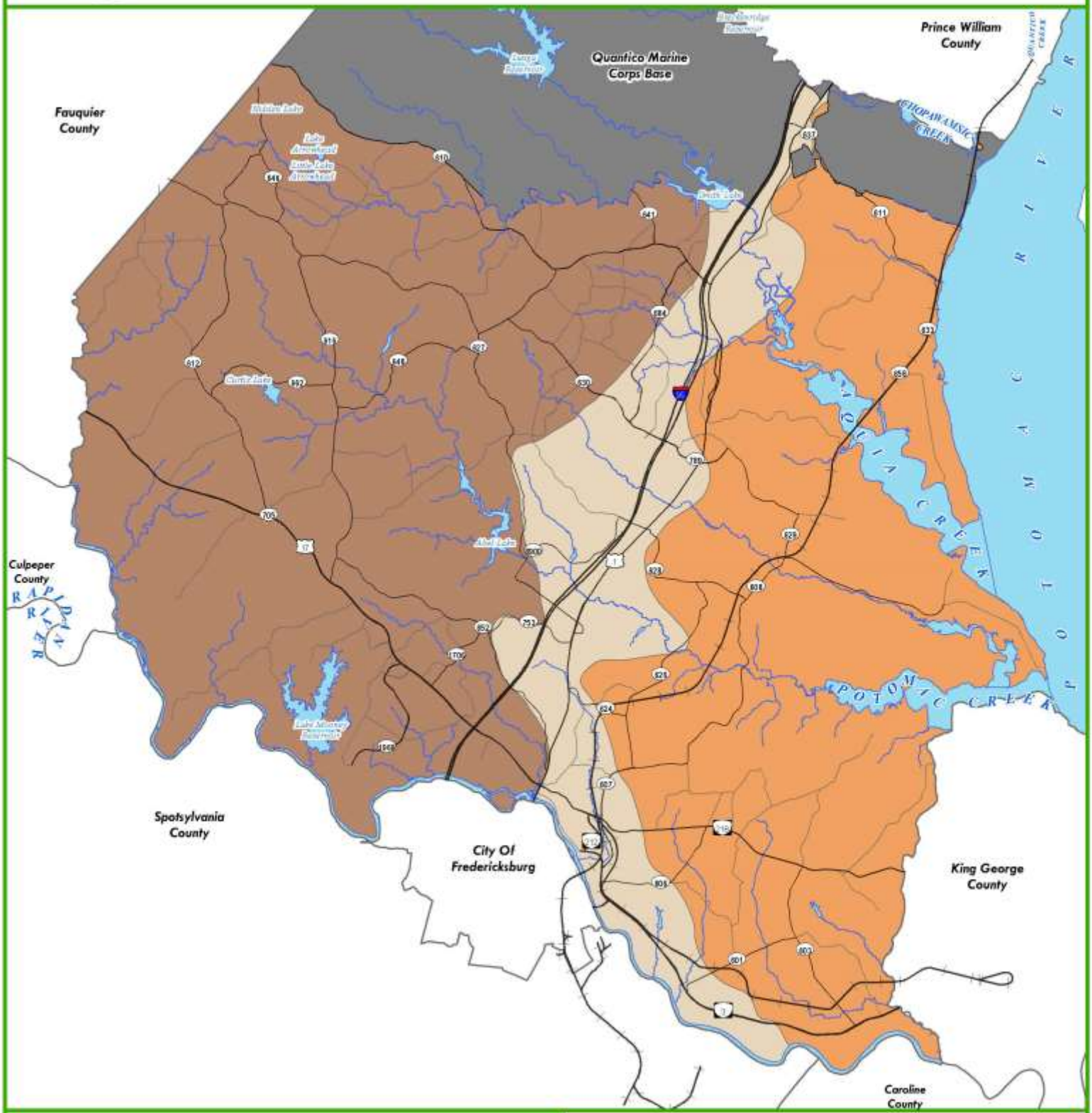
In order to maintain the wildlife habitat, the County needs to maintain the overall quality of natural resources. A successful wildlife habitat means protection of forestlands and water quality which means maintaining quality soils, floodplains, wetlands, etc. Overall protection of wildlife habitat means minimizing impacts of development.

6.9.8 Findings

- Stafford County consists of a rolling landscape with slopes along the County's waterways
- The County is made of two geological provinces, the hard bedrock of the Piedmont province and the soft sediments of the Coastal Plain, which are separated by the Fall Line that crosses the County generally along Interstate 95
- Stafford County is a Chesapeake Bay Preservation Area, meaning that the County must adopt programs that protect the quality of water through land use regulations
- 12% of the County's land area is in a 100-year flood hazard area
- 10% of the County's land area is a tidal or non-tidal wetland
- The County has a substantial amount of groundwater resources east of Interstate 95, but this area is very susceptible to contamination. West of Interstate 95 the groundwater sources are less abundant, but are not as susceptible to contamination
- The Coastal Plain Aquifer Recharge Area, located along Interstate 95, is where most of the County's groundwater recharge occurs and where the groundwater is most susceptible to pollution
- The County's Growth Area is located over the Coastal Plain Aquifer Recharge Area
- From 1996 to 2009 the County lost 6.4 percent of the existing forestlands
- The County has up to 493 wildlife species that depend on the natural resources

Produced: 9/15/2021

FIGURE 6.13
Geology
Stafford County Comprehensive Plan
Stafford County, Virginia
September 8, 2021



Legend

- PIEDMONT
- AQUIFER RECHARGE AREA PATUXENT FORMATION
- COASTAL PLAIN

0 6,250 12,500 25,000 Feet

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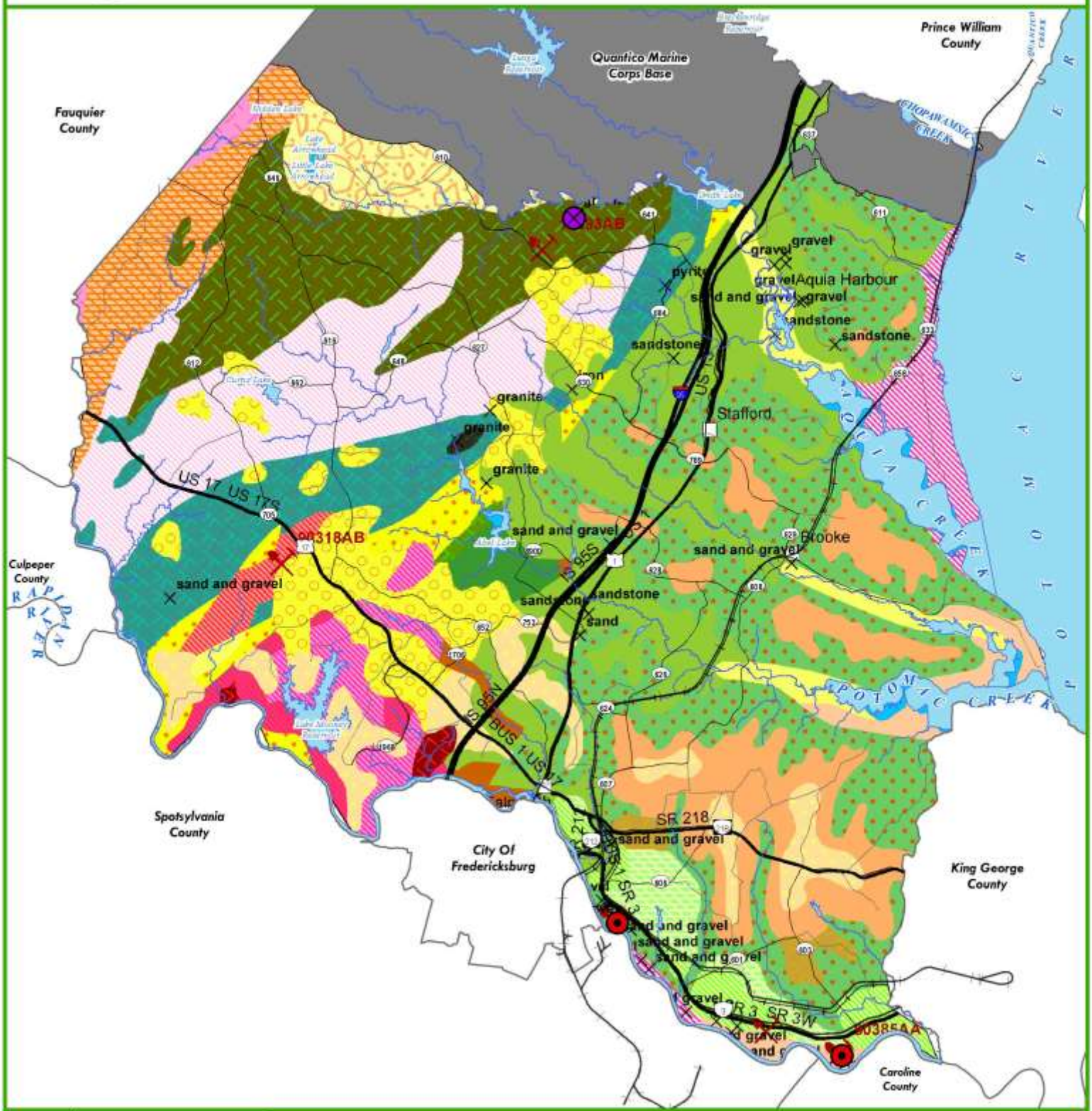
Produced: 9/15/2021

FIGURE 6.14A
Mineral Resources
Stafford County Comprehensive Plan
Stafford County, Virginia
September 8, 2021



Legend

QUARRIES :

- CRUSHED STONE
- SAND AND GRAVEL

0 6,250 12,500 25,000 Feet

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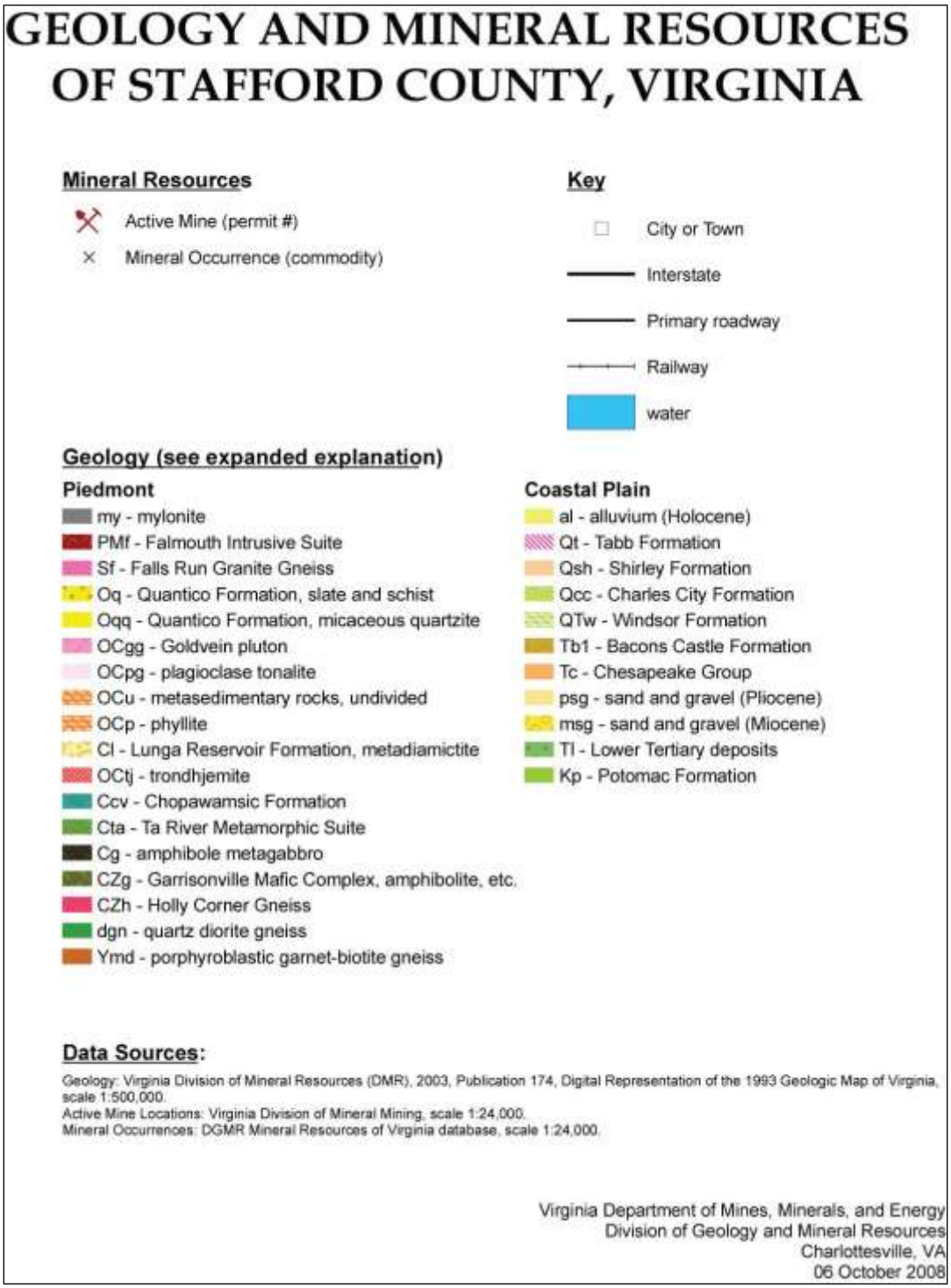
Figure 6.14B Mineral Resources Legend



6.10 Transportation

The movement of people and goods around a community is determined by the effectiveness of its transportation network. To assess the existing transportation network in Stafford County and identify areas of deficiency, the following elements were examined: roads; bus service; rail service; air service; and bicycle and pedestrian circulation. Figure 6.15 on the following page shows the existing transportation network and street classifications. Figure 6.16 shows other transportation facilities in the County.

6.10.1 Road Network

Interstates

Interstate 95 passes through Stafford County. I-95 is a major north-south corridor along the east coast which stretches from New England to Florida. More regionally, I-95 provides access to Washington, DC and the state capital of Richmond. I-95 can be accessed at four interchanges in the County located at Garrisonville Road, Courthouse Road, Centreport Parkway and Warrenton Road. The portion of the roadway north of Garrisonville Road within the County has high occupancy toll lanes for directional peak hour traffic.

US Routes

U.S. Route1 is a major north-south arterial which runs parallel to I-95 through the center of the County. Warrenton Road is a major east-west arterial that runs along the southwest boundary of the County north of U.S. Route 1. Warrenton Road joins U.S. Route 1 as it exits the County into Fredericksburg.

Major State Routes

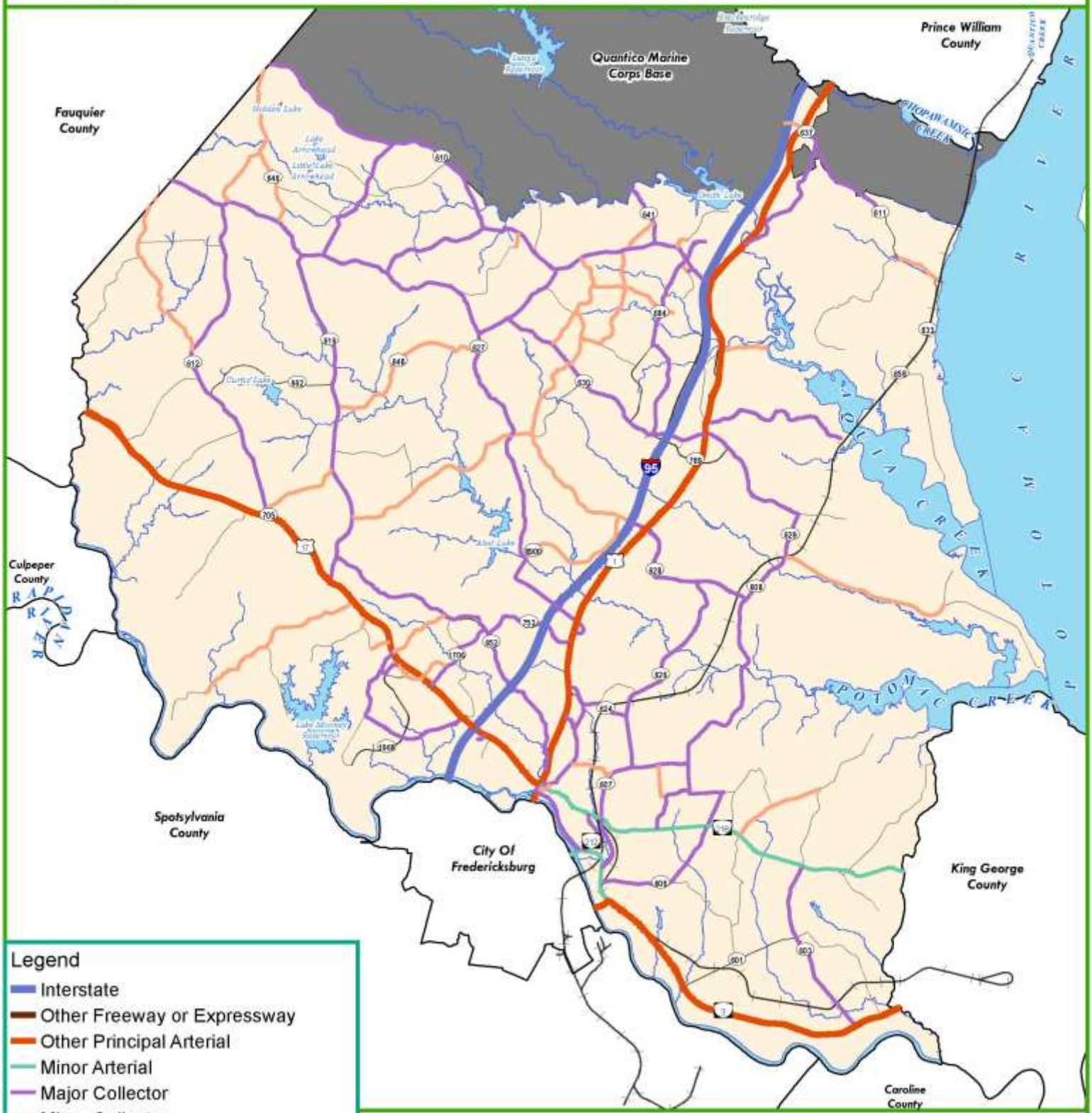
There are several state routes in Stafford County that provide connections to other counties, as well as function as arterials within the County. Kings Highway travels along the southern boundary of the County from just outside of the Falmouth area to King George County. The Butler Road / White Oak Road corridor is another east- west connection between Falmouth and King George County. Garrisonville Road is an east-west corridor along the northern boundary of the County that provides access between the interstate and Fauquier County.

Remaining Road Network

The remaining road network is made up of roads serving as collectors, and local roads in subdivisions. Collector roads often connect several local roads to arterials and help to form the major road network. These roads are primarily narrow roads and as traffic volumes increase, they often experience safety and traffic capacity problems.

Produced: 9/20/2021

FIGURE 6.15
Street Network and Classification
Stafford County Comprehensive Plan
Stafford County, Virginia
September 8, 2021



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6.10.2 Roadway Jurisdiction

The Virginia Department of Transportation (VDOT) has the primary responsibility for maintaining all public roads in Stafford County. The County works with VDOT to identify necessary road improvements.

6.10.3 Traffic Volume

Based on 2019 road counts from VDOT, I-95 carries approximately 151,000 vehicles daily through Stafford County. U.S. Route 1 carries between 18,000 and 40,000 vehicles on an average day. Depending on the section, Warrenton Road carries between 21,000 and 73,000 vehicles daily. Near the I-95 interchange, Garrisonville Road moves as many as 78,000 vehicles each day. Courthouse Road carries as many as 16,000 vehicles per day near the I-95 interchange. Near Shelton Shop Road, Courthouse Road carries 11,000 vehicles per day. Centreport Parkway from U.S. Route 1 to I-95 carries 15,000 daily vehicles.

6.10.4 Traffic Safety

Traffic accident records are kept by the Stafford County Sheriff's Office. Each accident is recorded using a Global Positioning System (GPS) to identify its location. When these points are plotted on a map, areas where there are high frequencies of accidents can be recognized.

Roadway Management and Improvement

Stafford County actively coordinates with VDOT to promote access management for development. The County also works with the Fredericksburg Area Metropolitan Planning Organization (FAMPO), our local Metropolitan Planning Organization, and the state to identify funding opportunities for transportation improvements. Stafford County seeks to work with new developers to reduce impacts to the roadway network and through proffers and impact fees to help off-set the cost of new development.

6.10.5 Bus Service

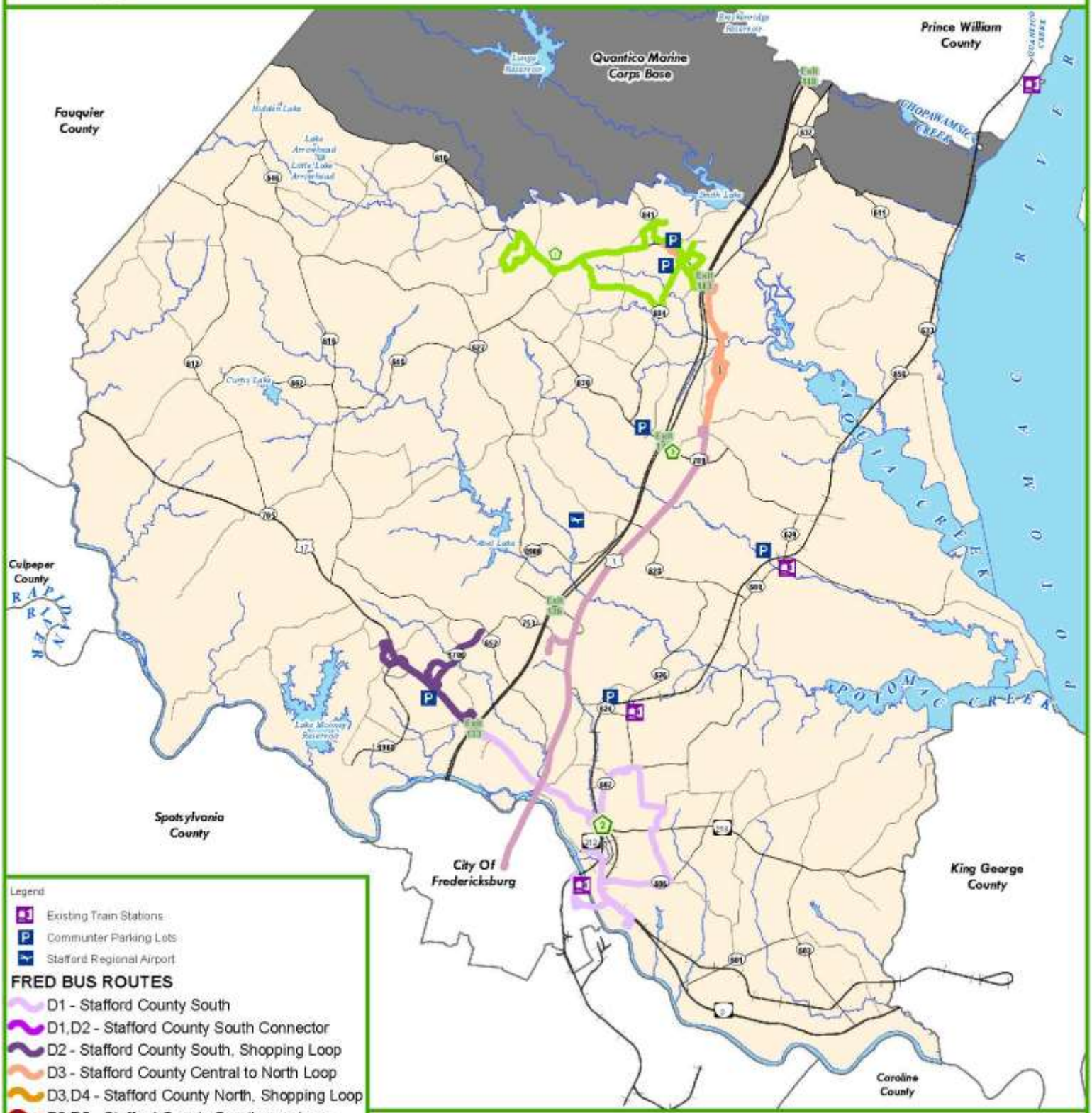
The FREDericksburg Regional Transit (FRED) provides bus service to Stafford, Fredericksburg, and the surrounding area. Connections to Washington, D.C. are by private commuter bus.

6.10.6 Rail Service

The Virginia Railway Express (VRE) operates two rail lines that carry commuters to Washington, D.C. The Manassas Line extends from Prince William County to Washington, and the Fredericksburg Line extends from Spotsylvania County to Washington, serving Stafford County. The Fredericksburg Line has two station in Stafford County, with locations at Leeland Road and Brooke Road. Commuters can also access the VRE at Fredericksburg and Quantico, just outside of the County. Park & Ride facilities are located at all stations.

Produced: 9/15/2021

FIGURE 6.16
Transportation
Stafford County Comprehensive Plan
Stafford County, Virginia
September 8, 2021



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6.10.7 Commuter Lots

There are six commuter lots located within Stafford County. Two of them are operated by the Virginia Railway Express (VRE) in conjunction with the rail stations. The other four are maintained by VDOT and are in close proximity to Interstate 95. From these lots, people can take a train, bus, or car pool.

The commuter lot located on Courthouse Road was relocated and expanded as part of the new I-95 interchange project which was completed in 2020. The new lot expanded parking capacity to 850 spaces and includes dedicated carpool, vanpool, and bus pick-up and drop-off areas. Total capacity for all six commuter lots is 6,060 spaces.

However, in 2017 it was noted two of the six available commuter lots had exceeded capacity, with commuters observed parking in unmarked spaces. Those lots included the Mine Road commuter lot, maintained by VDOT, and the commuter lot located at the VRE station located on Leeland Road.

6.10.8 Air Service

Stafford County has its own regional airport and is within a reasonable drive from two major airports.

Stafford Regional Airport is centrally located in the County. An independent authority operates the airport with representatives from Stafford, Prince William, and the City of Fredericksburg. The facility is 550 acres with a 5,000-foot airstrip with an ongoing operation to extend to 6,000 feet. The runway can accommodate private and business class jets with wingspans of up to 80 feet. There is no passenger service at this airport. The airport was built to accommodate up to 75,000 operations per year. The new extension would not change the classification of aircraft at the facility but, will allow aircraft to make longer flights and carry more cargo.

There are also two privately owned airports located within Stafford County. Dogwood Airpark located east of US-1 near Cranes Corner Road, and Chimney View Airport located on Brent Point Road.

6.10.9 Bicycle and Pedestrian Facilities

According to the 1996 Bicycle/Pedestrian Facilities Plan, Stafford County is lacking adequate facilities for bicycle and pedestrian transportation and recreation. Many of the roadways in the County are considered unsafe for bicycle and pedestrian use due to width and line of sight. Some trails are available in County parks. The County is working toward establishing a countywide network of trails for bicycle and pedestrian use. The County is also working with the FAMPO to create a regional network and has participated with FAMPO in the Regional Bicycle and Pedestrian Facilities Plan.

6.10.10 Findings

- There are four interchanges on I-95 in Stafford County.
- Increasing population negatively affects the existing roads network.
- Safety is an issue on many of the narrow, winding roads.
- The County works closely with many partners to provide funding for facility improvements.
- Bus service for Stafford County is provided by FREDericksburg Regional Transit (FRED).
- Rail service is available in the County and Quantico for commuters traveling to Northern Virginia and Washington D.C. on VRE.
- Two of the six available commuter lots in Stafford County are at or have exceeded their capacity.
- The County is served by a regional airport.

Produced: 9/22/2021

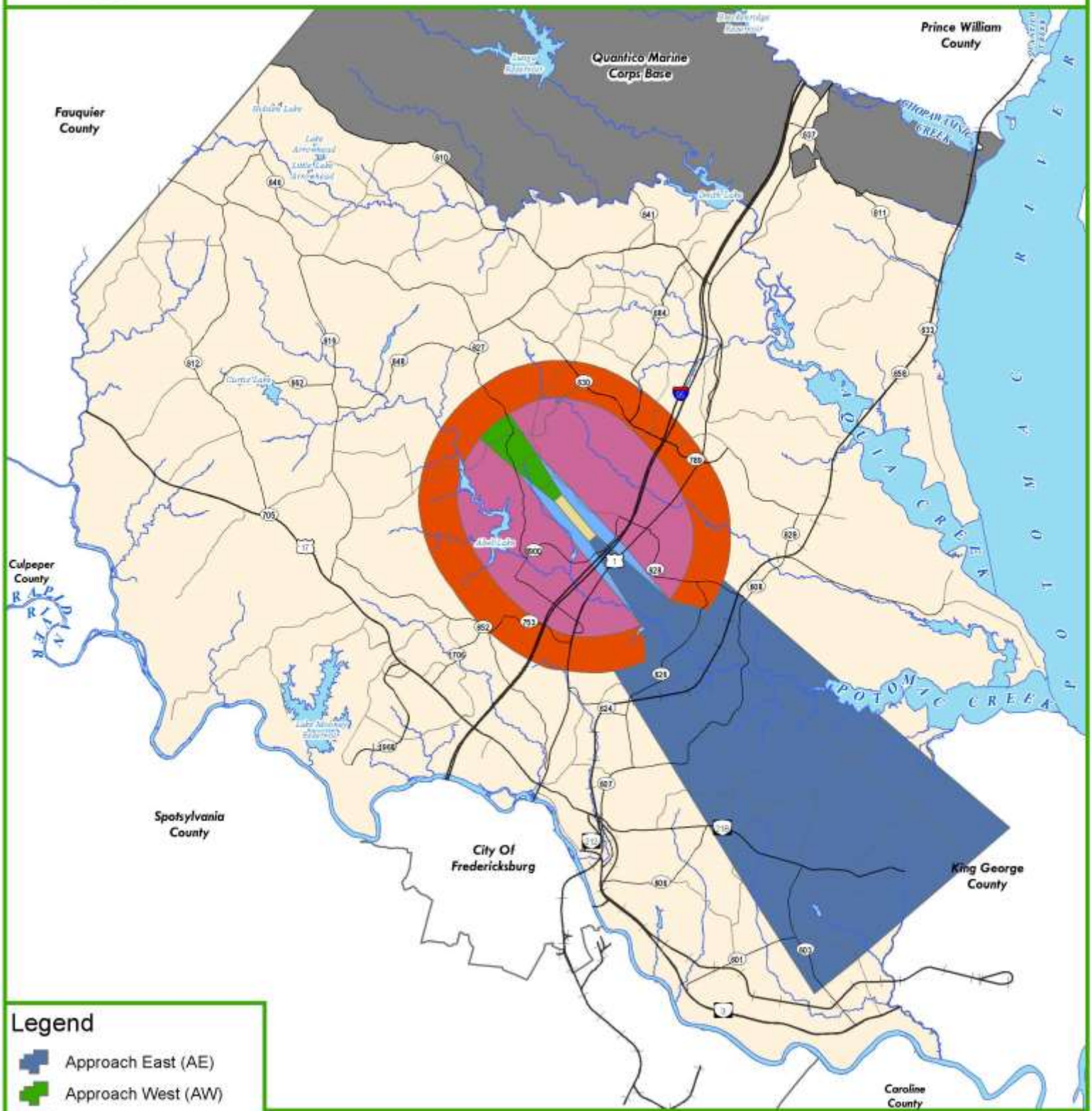
FIGURE 6.17

Airport Overlay Zoning District

Stafford County Comprehensive Plan

Stafford County, Virginia

September 8, 2021



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