Chapter 1
NATURAL ENVIRONMENT

Fluvanna's Natural Resources

Fluvanna conserves its natural resources and manages growth by directing development into specified growth areas called community planning areas, and by specifying how development can have a positive impact on the county. Well-managed forests and farms are still a primary land use, and a key component of the county's historic and rural character and economic viability.

The James, Rivanna, and Hardware rivers are critical to the history and ecology of the county. They are healthy, viable rivers with a diversity of aquatic life. Vegetative buffers along floodplains, sensitive development within the watersheds, and other development and preservation techniques protect these natural resources. Groundwater is protected and serves as the primary water source for the rural areas of the county.

Well-planned, compact development that efficiently utilizes green infrastructure to create interconnected, walkable, and fiscally sustainable communities that employ the latest in environmental controls is desirable. Fluvanna County's government strives for energy efficiency and the use of renewable technologies.

Conservation easements and lower land-use assessment taxes continue to be valuable tools for land preservation and conservation. Ag/forestal districts are also abundant in rural areas, and permanent open spaces including greenways, parks, and buffer areas are preserved as part of the development process. The growth areas and surrounding rural areas are connected through this open-space network.

EXISTING CONDITIONS

Geology

Fluvanna County lies entirely within the Piedmont region, between the Blue Ridge to the west and Coastal Plain (Tidewater) to the east. Some of the bedrock of Fluvanna was formed locally, while some was transported here by natural events over time. As it broke down, this diverse bedrock left the numerous soil types found in the county.

Approximately 8,500 acres of soil in Fluvanna are underlain by subsoils with clays that become plastic to very plastic when wet, and are indicators of "shrink/swell" soils (USDA Soil Survey, ca. 1950). These soils should be evaluated by professionals to determine site-specific conditions if

the construction of buildings or roads is contemplated. These soil types can also restrict the installation of traditional septic fields, which historically has limited development.

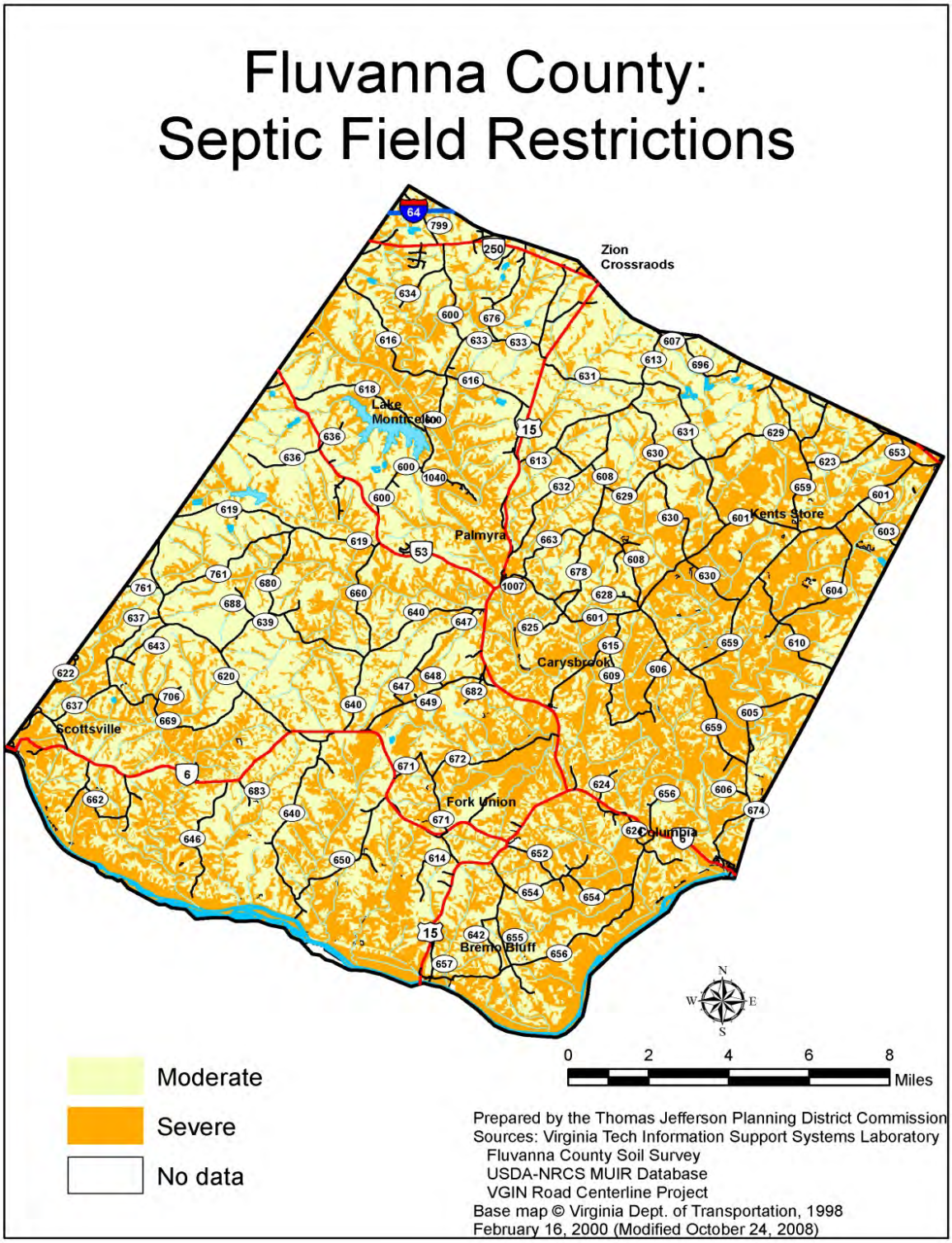

Figure NE-1, Septic Field Restrictions

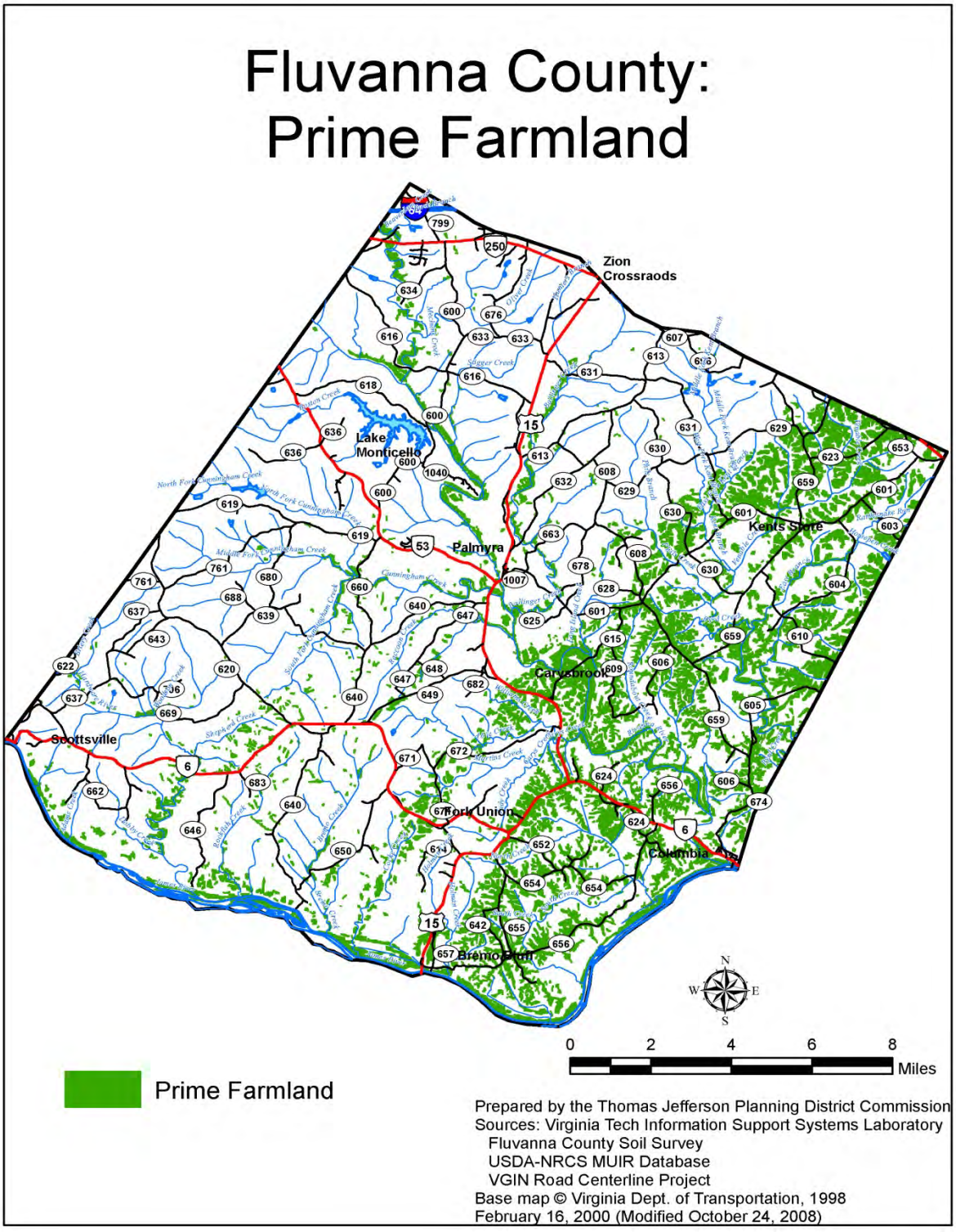

Figure NE-2, Prime Farmland

Present Conditions

Fluvanna contains 180,480 acres, or 282 square miles of land. The upland areas of the county are no higher than 548 feet above sea level and slope gently toward the James and Rivanna rivers, which are approximately 200–275 feet above sea level. There are no mountains in Fluvanna County; the terrain is rolling Piedmont.

Figure NE-3, Native Vegetation

The 2013 rainfall was 50.31 inches, and the average growing season is 166 days. The growing season usually begins around April 27 and extends to October 10. Average temperatures range from 36.9 ºF in January to 76.8ºF in July.

Forest Resources

The predominant land cover in the county is forest, with 131,182 acres. The income from timber sales provides the incentive for landowners to grow timber. From 1986 through 2001, Fluvanna's annual forest harvests averaged $823,763. Over the last two decades, forest management has become less profitable due to rising costs and land values, so only 94,980 acres of Fluvanna's forest are currently suitable for producing forest products on a large scale.

Cleaner air and water, and other ecoservices, are no-cost byproducts of responsible forest management. Aside from direct economic and aesthetic benefits, forests contribute services like stormwater management, wildlife habitat protection, reduced erosion, groundwater recharge, carbon sequestration, and insect pollination.

Fluvanna's stream corridors are an important part of its overall environmental health. The Rivanna River bisects the county and is the Commonwealth's first designated scenic river. The James River is Fluvanna's southern border. Other significant rivers and streams are the Hardware River, Cunningham Creek, Byrd Creek, and Mechunk Creek.

The Rivanna River

The Rivanna drains a 766-square-mile watershed that is home to approximately 140,000 people. The basin's rivers and streams offer indispensable services in the form of water supply and waste treatment capability. About 72.2% of the basin is forested, and much of the aquatic system retains its exceptional natural assets, including some of the healthiest small Piedmont streams in the mid-Atlantic region.

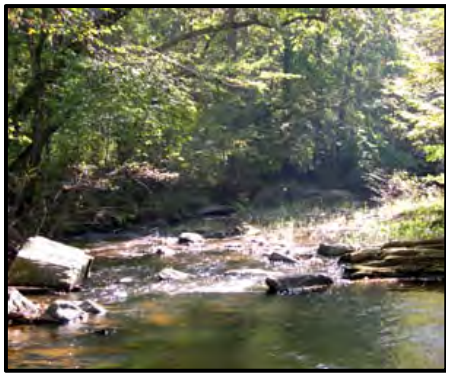

Figure NE-4, Rivanna River

These waterways provide habitat to wildlife, including river otters, bald eagles, and over eighty pecies of fish. For some organisms, such as the globally threatened James River spiny mussel, the Rivanna basin is one of few places in the world suitable for survival and reproduction. The streams of the Rivanna also provide recreational opportunities to hikers, canoeists, kayakers, and fishermen.

The James River

The 340 mile James River is Virginia's longest, flowing across the entire state to its mouth at the Chesapeake Bay. The James is Virginia's largest tributary to the Chesapeake Bay.

Figure NE-5, James River

The James River watershed encompasses approximately 10,000 square miles, or almost 25 percent of the state. Home to one-third of all Virginians in thirty-nine counties and nineteen cities and towns, it touches the lives of more Virginians than any other feature on the landscape (James River Association).

Open Space

Open space in Fluvanna can be categorized in three primary ways:

Figure NE-6, Open Space

1. Privately owned open space is associated with a farm or a home and is usually not open to public access.

2. Common open space is reserved for open space in a development and is intended solely for use by that development's residents.

3. Publicly owned open space is intended for use by the entire community.

All three types of open space contribute to quality of life in the community. Open spaces also help to preserve and protect natural features such as groundwater recharge areas, steep slopes, and wildlife habitats. The protection of open spaces will play an important role in the county's future.

Challenges

Water Quality and Quantity

Surface Water

Surface water is tested by the Virginia Department of Environmental Quality (DEQ). The DEQ has tried to increase its monitoring capacity by encouraging local monitoring programs. StreamWatch engages the community to develop useful data. The organization is guided and funded by a formal partnership of local governments, resource management agencies, and nongovernmental organizations. StreamWatch coordinates volunteer water quality monitoring on the Rivanna. The Rivanna Conservation Society, which is a volunteer organization, is also active in conservation efforts related to the Rivanna.

In 2011, StreamWatch summarized the biological health of the Rivanna River at thirty-five sites. Of the ten sites in Fluvanna, seven sites received a rating of fair, two were rated good and one was very good. Fluvanna's stream quality appears to generally outperform the watershed as a whole. (StreamWatch, *2011 Stream Conditions Map*).

The General Assembly of Virginia approved the creation of the Rivanna River Basin Commission, an independent local entity representing Fluvanna, Albemarle, and Green Counties and the city of Charlottesville. The commission discusses issues affecting the basin's water quality and quantity, and provides guidance for the stewardship of the Rivanna River Basin.

In good weather, water quality in Fluvanna's streams is generally fair-to-good. In high flows from storms, phosphorus, suspended solids, and fecal coliform reduce water quality. Nitrogen, phosphorus, and sediment threaten aquatic life and fecal coliform is a health hazard. The Hardware River, Byrd Creek, and portions of the Rivanna River and the Middle Fork of Cunningham Creek are listed as impaired by the Virginia Department of Environmental Quality.

Flooding, drainage problems, erosion and sedimentation, groundwater pollution, failed septic systems, and construction problems are all possible if soil characteristics are not considered when developing land. Fluvanna's topography includes slopes greater than 7 percent, which are susceptible to soil erosion. These areas of high erosion potential are interspersed throughout the county. Groundwater availability and vulnerability to contamination is determined by factors related to soils, saprolite (weathered rock), and bedrock geology.

Groundwater

Fluvanna citizens have major concerns about groundwater availability. Development should be required to show its projected impact on surrounding groundwater supplies, particularly within the context of the diminishing and limited supply of water available. Mitigating this impact, along with others such as stormwater and traffic on surrounding property owners, is of utmost importance in any discretionary zoning action.

Hydrogeological Testing

Hydrogeologic investigation and testing is an evaluation of groundwater quantity and quality and the potential effects that a proposed land development may have on water resources in Fluvanna County. The evaluation consists of on-site hydrogeologic investigation and testing, as well as compilation of existing and readily available information.

Hydrogeologic investigations, testing and reports should be required and specifically defined for the two basic types of residential subdivisions:

- Residential subdivisions not served by a central water system (i.e. served by individual wells); and

- Residential subdivisions served by a newly proposed or expanded central water system not owned and/or operated by Fluvanna County, FUSD, or other public entity.

Stormwater

As of April 2014, the county has elected to "opt out" of administering new stormwater regulations. This does not mean that stormwater will not be regulated; for the near-future, the Department of Environmental Quality will administer stormwater management for the county. As the regulatory process becomes more established and county staff becomes more familiar with the new stormwater requirements, responsibility will shift to the county. Stormwater ordinances address quality and quantity of stormwater runoff and outline the use of low-impact development practices.

Riparian buffers, the forested areas along stream banks, are the best use of land near streams; however, many of the county's rivers and streams do not have adequate riparian buffers, or the buffers are threatened by development. Riparian buffers filter nutrients, sediments, and other pollutants before they can enter a waterway. The U.S. Department of Agriculture (USDA) recommends that over 80 percent of nutrients and sediments be captured by a hundred-foot-deep forest buffer. Additionally, riparian buffers offer a great habitat for plants and wildlife.

Flood Protection

Fluvanna County has added a flood protection ordinance to its zoning code. The purpose of these provisions is to prevent the loss of life and property, health and safety hazards, the disruption of commerce and governmental services expenditure of public funds for flood protection and relief, and the impairment of the tax base.

Figure NE-7, Wheat Field

The ordinance regulates uses, activities, and development that will increase flood heights, velocities, and frequencies; restricting certain uses, activities, and development within districts subject to flooding; requiring all those uses, activities, and developments in flood-prone districts to be protected and/or flood-proofed; and discouraging individuals from buying land and structures that are

unsuitable because of flood hazards. These provisions apply to all lands within Fluvanna County identified as being in the hundred-year floodplain by the Federal Insurance & Mitigation Administration.

Erosion and Sedimentation

The predominant soils in Fluvanna County are silt loams, many of which have high clay content. These soils support significant areas of marginal farmland, with some prime land in river bottoms, predominantly in the southern part of the county.

Fluvanna County has adopted an erosion and sediment control ordinance in compliance with state regulations. This ordinance promotes the health and welfare of the people of Fluvanna by establishing requirements and enforcement procedures for the control of erosion and sedimentation.

Air Quality and Energy

Fluvanna's air quality is a major asset to the county. The Environmental Protection Agency (EPA) establishes standards monitored by the Department of Environmental Quality, which determine whether a region is an "air quality attainment area" or not. Fluvanna County lies within a region that achieves this designation.

Air pollutants come primarily from the combustion of fossil fuels from stationary and mobile sources, not only locally but also from other areas. Motor vehicle emissions are the major local source. Preserving or planting appropriate trees species throughout vehicular corridors is a good way to mitigate the effects of automobile emissions.

The best way to support air quality and conserve resources is to reduce energy use, thus decreasing fossil fuel combustion and air pollutant emissions. Transportation accounts for most of the energy consumed in the county. The county can improve its energy efficiency and reduce emissions with a compact development pattern, and by developing a greenway, bikeway, and walkway system. Infill, cluster, and mixed-use development reduce residents' transportation energy needs, while alternatives to driving reduce energy use and improve community health.

Energy consumed by buildings accounts for another portion of the county's energy consumption. Improving the efficiency of buildings is essential to increased energy efficiency, and resulting energy savings often translate into financial savings.

Figure NE-8, Tenaska

Conservation

Efforts to conserve land are ongoing throughout the county. Some examples are Virginia's land-use taxation program, agricultural and forestal districts, conservation easements, and cluster development.

Land-Use Taxation

In Virginia, localities may elect to reduce the real estate tax burden on land used for agriculture, horticulture, sylviculture, viticulture, aquaculture, improved pasturage, and open space. The Commissioner of the Revenue determines if the land is suitable for such land-use valuation. When the locality accepts the application for the land-use valuation, the property tax reflects productivity rather than fair market value, resulting in lower real property taxes on the land. During years of general reassessments, the Commissioner of the Revenue reviews the recommendations of the State Land Evaluation Advisory Council (SLEAC) and then establishes rates for the productive value of the land when calculating the real property tax obligation of the landowner. Land-use values are determined for agriculture, horticulture, forestry, and open space.

The locality may take an individual property out of land-use assessment when a landowner changes the use. Examples include the owner harvesting timber with no provision to reforest, or a landowner causing pollution by not following accepted best management practices, or the property being developed. Landowners may elect at any time to remove the property from land use to take advantage of demand for development property. Although this taxation program does not offer long-term conservation, it removes some of the financial pressure for sale and development of land. The open-space class of lands, such as scenic rivers and Virginia byways, makes properties automatically eligible for the special land-use tax program (*Virginia Outdoors Plan*, 2007, Ch. 3).

Ag/Forestal Districts

Agricultural lands provide economic value and contribute to the unique character of the county. A challenge in preserving this valuable land use is the fact that land suitable for agricultural use is also suitable for development.

2013 Land Use District Totals for Fluvanna County

Magisterial District	Number of Parcels	Change Since 2006	Ag Acres	Change Since 2006	Forest Acres	Change Since 2006	Open Space Acres	Change Since 2006	Total Land Use
Palmyra	429	-40	5,513	-580	15,591	-1,171	0	**0**	**21,104**
Columbia	496	-3	5,161	-1,248	21,320	-1,620	21	**21**	**26,502**
Cunningham	403	5	5,930	-1,019	16,499	-2,884	54	**-348**	**22,483**
Fork Union	733	31	9,498	102	25,966	-730	9	**-31**	**35,473**
Lake Monticello	2	2	1,084	1,084	42	42	0	**0**	**42**
Total	2,063	-5	27,186	-1,661	79,418	6,273	84	**-379**	**105,604**

Source: Fluvanna County Office of the Commissioner of the Revenue

Figure NE-9, Fluvanna County Land Use District Totals

Agricultural and forestal districts were established to conserve, protect, and encourage the development of agricultural and forestal lands for food and other agricultural and forestal products. The districts conserve and protect agricultural and forestal lands as valued natural and ecological resources that provide open space for watershed protection, wildlife habitat, and aesthetic purposes. As of 2013, 331 parcels, totaling almost 18,695 acres, were within Fluvanna's 19 Agricultural/Forestal Districts. The majority of these districts are roughly located throughout the midsection of the county (see figure NE-13).

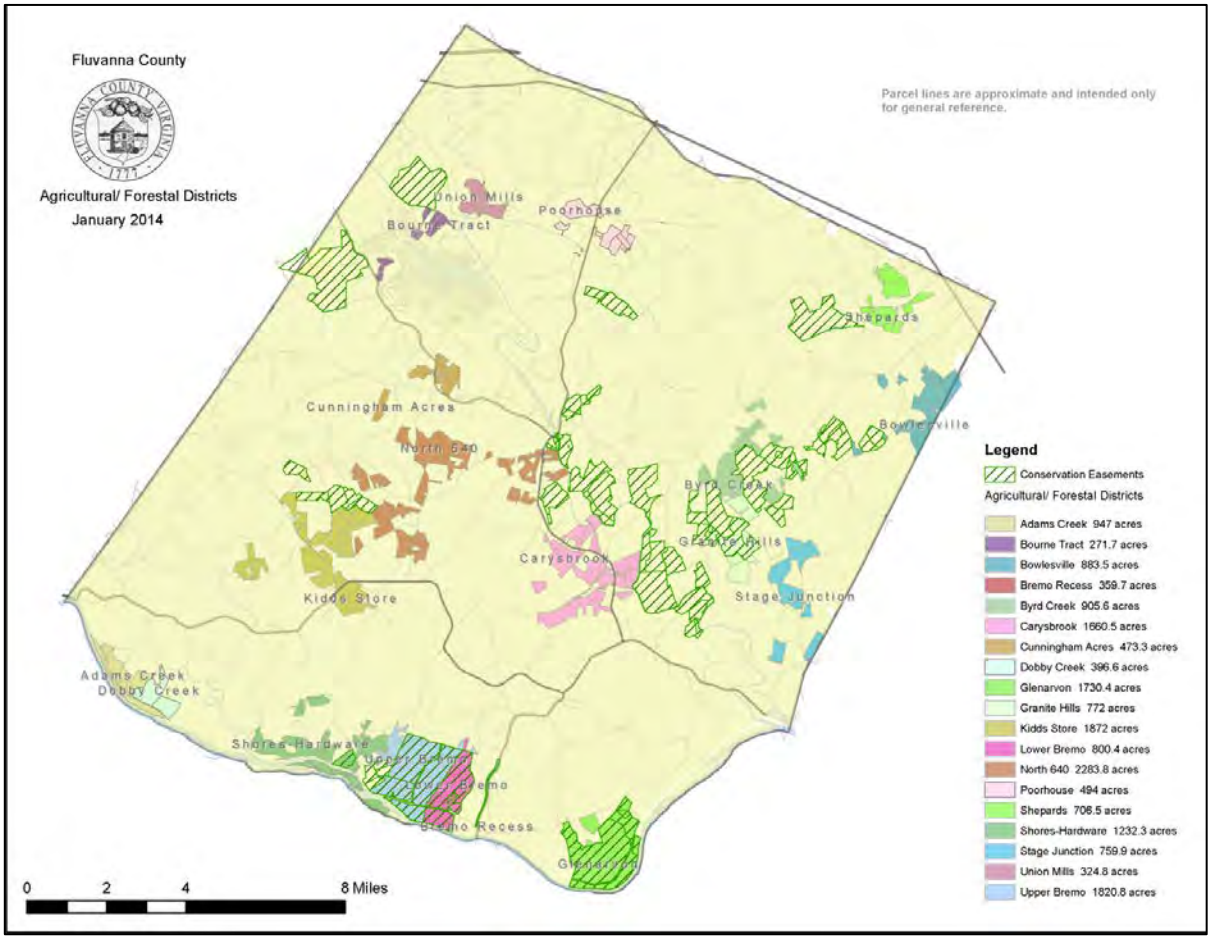

Figure NE-10, Ag/Forestal Districts and Conservation Easements

Conservation Easements

The Board of Supervisors created an easement program whereby the jurisdiction may hold and protect easements and, in 2007, Fluvanna County accepted the first easement under its conservation easement program. There are currently 34 conservation and historic easements in the county, totaling 13,266 acres (figure NE-13). Most of the easements are owned by the Virginia Outdoors Foundation.

Cluster Development

The county adopted cluster development zoning in 2004 to help conserve open space. Cluster developments in the residential (R-1) zoning district require 50 percent open space, while in the agricultural (A-1) zoning district they require 75 percent open space. Environmentally, this development scenario will help to reduce the impacts of erosion, sedimentation, and quantity of stormwater runoff.

Low-Impact Development (LID)

LID is an approach to site development and stormwater management designed to mitigate development impacts to land, water, and air. The approach emphasizes site design and planning techniques that conserve natural systems and hydrologic functions on a site. The practice has been integrated into municipal development codes and stormwater management ordinances throughout the country. LID begins with the site planning process, and is more sustainable than traditional development practices.

LID:

- Preserves open space and minimizes land disturbance;
- Protects natural systems (drainage ways, vegetation, soils, sensitive areas);
- Reexamines the use and sizing of traditional site infrastructure (lots, streets, curbs, gutters, sidewalks);
- Customizes site design to each site;
- Incorporates natural site elements (wetlands, stream corridors, mature forests) as design elements; and
- Decentralizes and manages stormwater at its source.

Economic Development

The county's natural resources deserve consideration as economic development tools – forestry and agriculture are essential parts of the local economy, and Fluvanna's trails, rivers, and wildlife attract people from other communities for recreation. At the same time, preserving the county's natural resources depends on the continuing health of the local economy. The more economic activity our natural resources can support, the safer those resources will remain. Future discussions about economic development should include natural resources, and economic development efforts should include protecting, enhancing, and promoting these resources.